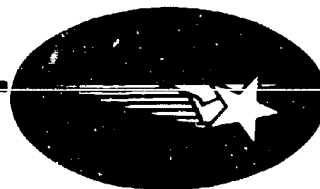


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THERMAL RADIATION PHENOMENA

VOL. 1

THE EQUILIBRIUM THERMODYNAMIC
PROPERTIES OF HIGH TEMPERATURE AIR

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May 1967

THERMAL RADIATION PHENOMENA

**The Equilibrium Thermodynamic
Properties of High Temperature Air**

by

Forrest R. Gilmore

Edited by

John L. Magee and Henry Aroeste

Open Publication was approved by the Department of Defense on 3 April 1967

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FOREWORD

"Thermal radiation" is electromagnetic radiation emitted by matter in a state of thermal excitation. The energy density of such radiation in an enclosure at constant temperature is given by the well known Planck formula. The importance of thermal radiation in physical problems increases as the temperature is raised; at moderate temperatures (say, thousands of degrees Kelvin) its role is primarily one of transmitting energy, whereas at high temperatures (say, millions of degrees Kelvin) the energy density of the radiation field itself becomes important as well. If thermal radiation must be considered explicitly in a problem, the radiative properties of the matter must be known. In the simplest order of approximation, it can be assumed that the matter is in thermodynamic equilibrium "locally" (a condition called local thermodynamic equilibrium, or LTE), and all of the necessary radiative properties can be defined, at least in principle. Of course whenever thermal radiation must be considered, the medium which contains it inevitably has pressure and density gradients and the treatment requires the use of hydrodynamics. Hydrodynamics with explicit consideration of thermal radiation is called "radiation hydrodynamics".

In the past twenty years or so, many radiation hydrodynamic problems involving air have been studied. In this work a great deal of effort has gone into calculations of the equilibrium properties of air. Both thermodynamic and radiative properties have been calculated. It has been generally believed that the basic theory is well enough understood that such calculations yield valid results, and the limited experimental checks which are possible seem to support this hypothesis. The advantage of having sets of tables which are entirely calculated is evident: the calculated quantities are self-consistent on the basis of some set of assumptions, and they can later be improved if calculational techniques are improved, or if better assumptions can be made.

The origin of this set of books was in the desire of a number of persons interested in the radiation hydrodynamics of air to have a good source of reliable information on basic air properties. A series of books dealing with both theoretical and practical aspects was envisaged. As the series materialized, it was thought appropriate to devote the first three volumes to the equilibrium properties of air. They are:

The Equilibrium Thermodynamic Properties of Air,
by F. R. Gilmore

The Radiative Properties of Heated Air,
by B. H. Armstrong and R. W. Nicholls

Tables of Radiative Properties of Air,
by Lockheed Staff

The first volume contains a set of tables along with a detailed discussion of the basic models and techniques used for their computation. Because of the size of the related radiative tables and text, two volumes were considered necessary. The first contains the text, and the second the tables. It is hoped that these volumes will be widely useful, but because of the emphasis on very high temperatures it is clear that they will be most attractive to those concerned with nuclear weapons phenomenology, reentry vehicles, etc.

Our understanding of kinetic phenomena, long known to be important and at present in a state of rapid growth, is not as easy to assess as are equilibrium properties. Severe limitations had to be placed on choice of material. One volume is offered at this time:

Excitation and Non Equilibrium Phenomena in Air,
by Landshoff, et al.

It provides material on the more important processes involved in the excitation of air, criteria for the validity of LTE and special radiative effects.

A discussion of radiation hydrodynamics was felt to be necessary and another volume was planned to deal with this topic:

Radiation Hydrodynamics of High Temperature Air,
by Landshoff, Hillendahl, et al.

It is not ready for publication at this time. It will review the basic theory of radiation hydrodynamics and discuss the application to fireballs in the atmosphere.

The choice of material for these last two volumes was made with an eye to the needs of the principal users of the other three volumes.

Most of the work on which these volumes are based was supported by the United States Government through various agencies of the Defense Department and the Atomic Energy Commission. The actual preparation of the volumes was largely supported by the Defense Atomic Support Agency.

We are indebted to many authors and organizations for assistance and we gratefully acknowledge their cooperation. We are particularly grateful to the RAND Corporation for permission to use works of F. R. Gilmore and H. L. Brode and to the IBM Corporation for permission to use some of the work of B. H. Armstrong. Most of the other authors are employed by the Lockheed Missiles and Space Company, in some cases as consultants.

Finally we would like to acknowledge the key role of Dr. R. E. Meyerott of LMSC in all of this effort, from the initial conception to its realization. We are particularly grateful to him for his constant advice and encouragement.

Criticism and constructive suggestions are invited from all readers of these books. We understand that much remains to be done in this field, and we hope that the efforts represented by this work will be a stimulus to its development.

The Editors

J. L. Magee

H. Aroeste

Preface

This volume is concerned with the thermodynamic properties of air as well as individual air constituents from 1000°K to 10^7°K for densities between 10 and 10^{-7} times sea level density. It consists of text and tables which were both prepared by Dr. Forrest R. Gilmore. He is also the author of a somewhat smaller work (Gilmore, 1955) on the same topic which has received wide circulation.

The text describes the techniques, models and approximations used in calculation of the tables. It is not intended to be a general treatment of the theory of such calculations which is too well known to need restatement. The reader is expected to have some familiarity with both thermodynamics and statistical mechanics. Discussion of the approximations is detailed enough so that the accuracy can be readily assessed and improvements can be readily considered.

The tables can be accepted as an accurate summary of the thermodynamic properties of air and its constituents. They have been compared with other calculations (which differ in various approximations) and, where possible, with experiment. Of all inputs for calculations of hydrodynamics and radiation hydrodynamics, the equilibrium thermodynamic properties are by far the most reliable. It is unlikely that there will be a significant improvement of our knowledge in this area in the near future, nor is it needed, except perhaps at the highest density considered.

Information provided in the tables is much more widely useful than for air problems alone. It should be noted that most of the tables are devoted to the individual air constituents.

The air of this volume is a mixture of about 78% N_2 , 21% O_2 , 1% Ar, with a trace of CO_2 . It is essentially the air (i.e., dry air) found in the

homosphere, or the atmosphere below 95 kilometers altitude. In the homosphere, mixing processes are rapid, and the composition remains essentially constant. The local thermodynamic equilibrium (LTE) approximation of radiation hydrodynamics is reasonable only in the homosphere. For convenience of the reader a discussion of properties of the atmosphere prepared by A. D. Anderson is included as Appendix A.

We would like to thank Dr. Forrest R. Gilmore for his splendid cooperation and the RAND Corporation for permission to include this work in our series on "Thermal Radiation." Thanks are also due Mr. A. D. Anderson for preparation of Appendix A.

J. L. Magee

H. Aroeste

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CHAPTER 1. THE EQUILIBRIUM THERMODYNAMIC PROPERTIES OF HIGH-TEMPERATURE AIR: DISCUSSION

1.1 Introduction

In order to calculate the behavior of nuclear fireballs and of hypersonic missiles and meteorites, one needs values for the thermodynamic properties of air over a wide range of temperatures and pressures or densities. At temperatures above about 2000°K there are great experimental difficulties in measuring these properties directly, while it is generally accepted that careful theoretical calculations can yield results of high accuracy. Consequently, in this chapter the methods and data available for the theoretical computation of such properties are outlined, and published results reviewed briefly. Some improvements over existing treatments are also indicated. Extensive tables based on these improved expressions are given in Chapter 2.

Throughout this chapter the assumption of local thermodynamic equilibrium (LTE) is made. In some situations of interest, such as fireballs or missile trails at very high altitudes, this assumption is not valid, and the results given in this chapter are not applicable. In such non-equilibrium situations the thermodynamic properties of air depend upon the energy deposition mechanisms and the subsequent atomic and molecular processes, as discussed in a companion volume of Thermal Radiation Phenomena, Excitation and Non-equilibrium Phenomena in Air.

1.2 Air as a mixture of ideal gases in chemical equilibrium

The thermodynamic properties of most gases at low and moderate densities can be approximated over a certain temperature range by a thermal equation of state of the form

$$pV = NRT \quad (1.2-1)$$

and a caloric equation of state of the form

$$E = NC_vT, \quad (1.2-2)$$

where p is the pressure, V the volume, N the number of moles, R the gas constant per mole, T the temperature, E the internal energy, and C_v the (constant) molal specific heat at constant volume. A gas which satisfies Eq. (1.2-1) and Eq. (1.2-2) is called a perfect gas. Many gases satisfy Eq. (1.2-1) over a fairly wide range of temperatures, but Eq. (1.2-2) only over a much narrower range. Consequently, the definition of a perfect gas is sometimes modified to include gases which obey Eq. (1.2-1) but not Eq. (1.2-2). However, to avoid ambiguity it seems preferable to follow thermochemical practice, and use the phrase ideal gas to denote a gas which is thermally perfect but has an internal energy varying arbitrarily with the temperature.

Ideal-gas thermodynamic properties for many pure elements and compounds have been calculated and tabulated by various workers. The most extensive and accurate set of such tables was recently issued by

a Joint Army-Navy-Air Force (JANAF) Thermochemical Panel in loose leaf form (JANAF Thermochemical Tables, 1960), with revisions issued periodically. These tables include values for most air molecules to 6000°K. Methods for making such calculations at still higher temperatures will be discussed in later sections of this chapter.

Air is a mixture of nitrogen and oxygen, with small amounts of argon, carbon dioxide, and rare gases, and a variable amount of water vapor. At low and moderate densities its thermodynamic properties may be obtained simply by adding the ideal-gas contributions from its components. This is straightforward at low temperatures, where the composition does not change. At high temperatures, however, dissociation and other chemical reactions cause the composition to vary with temperature and pressure. Because of this variation the product pV for the mixture is no longer proportional to T , even though each component is effectively ideal. Consequently, aerodynamicists often call air at high temperatures a "real gas," although thermochemists prefer to reserve this term for high densities where intermolecular forces cause deviations from ideal-gas behavior.

The first step in calculating the thermodynamic properties of high-temperature air is usually to calculate the equilibrium chemical composition. The basic condition for chemical equilibrium (Epstein, 1937) is that at a fixed temperature and pressure the amounts or concentrations of the various chemical species must be such as to minimize the Gibbs free energy of the mixture, subject to conservation of the chemical elements in the mixture. If the temperature is high enough to produce significant ionization, electrons and ions must be included among the species, and charge must also be conserved.

The Gibbs free energy of an ideal-gas mixture is given by

$$F_{\text{tot}} = \sum_i N_i (F_i^{\circ} + RT \ln p_i) , \quad (1.2-3)$$

where N_i is the number of moles of the i -th species, F_i° is the ideal-gas molal free energy of this species (at the temperature T and one atmosphere pressure), and p_i is its partial pressure (in atmospheres). White, Johnson, and Dantzig (1958) have developed numerical methods for minimizing Eq. (1.2-3) while keeping the temperature and the total pressure fixed and conserving mass. Their methods are convenient for calculating equilibrium compositions at specified temperatures and pressures. For fireball applications it is preferable to make computations at specified temperatures and volumes (or densities), because the air density within a fireball varies by two or three orders of magnitude at most, while the pressure variation can be several more orders of magnitude. A convenient procedure for such computations can be based on the thermodynamic principle of minimizing the Helmholtz free energy (or work function)

$$A_{\text{tot}} = F_{\text{tot}} - pV = \sum_i N_i [F_i^{\circ} - RT + RT \ln (N_i RT/V)] , \quad (1.2-4)$$

at a fixed temperature and volume (Epstein, 1937). Since Eq. (1.2-4) has nearly the same form as Eq. (1.2-3), the procedures of White, Johnson and Dantzig (1958) can be used with only minor modification.

For systems involving a limited number of reactions, or for more complex systems if a high-speed computer is not available, a computation

method based on "equilibrium constants" may be more convenient. To derive the necessary equations from the free-energy minimization principle, consider the effect of small changes δN_i in the amounts of the chemical species, while the temperature and (total) pressure are held fixed. By the use of Eq. (1.2-3) and the relation $p_i = p N_i / \sum_1 N_i$, the variation in free energy at constant p may be expressed as

$$\delta F_{\text{tot}} = \sum (F_i^{\circ} + RT \ln p_i) \delta N_i + \sum_1 N_i RT \delta (\ln N_i) - \sum_1 N_i RT \delta (\ln \sum_1 N_i). \quad (1.2-5)$$

Since $\delta \ln x = \delta x / x$, the last two terms on the right hand side of Eq. (1.2-5) cancel and the final result becomes

$$\delta F_{\text{tot}} = \sum_1 (F_i^{\circ} + RT \ln p_i) \delta N_i. \quad (1.2-6)$$

In equilibrium the free energy has a minimum, so $\delta F_{\text{tot}} = 0$ and from Eq. (1.2-6)

$$\sum_1 \delta N_i \ln p_i = - \sum_1 \delta N_i (F_i^{\circ} / RT) \quad (1.2-7)$$

for all sets of δN_i which satisfy the mass-balance constraints. One way of satisfying these constraints is to consider possible chemical reactions, such as



A composition variation due only to this reaction has $\delta N_{XY} = -\delta N_X = -\delta N_Y$ with all other δN_i vanishing. Eq. (1.2-7) then gives

$$\ln p_{XY} - \ln p_X - \ln p_Y = - \frac{F_{XY}^{\circ} - F_X^{\circ} - F_Y^{\circ}}{RT} \quad (1.2-9)$$

Taking the exponential of this equation, one obtains

$$\frac{p_{XY}}{p_X p_Y} = \exp \left[- \frac{F_{XY}^{\circ} - F_X^{\circ} - F_Y^{\circ}}{RT} \right]. \quad (1.2-10)$$

The right hand side of Eq. (1.2-10) is independent of the composition and pressure of the mixture (although it does vary with temperature); it is conventionally called the equilibrium constant, K_p , of reaction Eq. (1.2-8). With the help of the ideal-gas relation, $p_i = N_i RT/V = \bar{N}_i RT$, where $\bar{N}_i$ is the concentration (moles per unit volume) of the species i , Eq. (1.2-10) may be transformed to

$$\frac{\bar{N}_{XY}}{\bar{N}_X \bar{N}_Y} = RT \exp \left[- \frac{F_{XY}^{\circ} - F_X^{\circ} - F_Y^{\circ}}{RT} \right]. \quad (1.2-11)$$

(In Eq. (1.2-11) the F_i° are conventionally evaluated at 1 atmosphere pressure; hence, the units of RT must be atm-volume/mole.) The right hand side of Eq. (1.2-11) may be called the concentration equilibrium constant K_n , for reaction Eq. (1.2-8).

If there are I chemical species present in a reacting mixture and J mass-balance conditions to be satisfied (one for each element present, plus one for charge neutrality if ions are present), it turns out that $I - J$ independent equilibrium equations of the form Eq. (1.2-10) or Eq. (1.2-11)

can be found, and thus there are just enough equations to determine the partial pressures or concentrations uniquely. The set of equations used, however, is not unique, since, for example, the sum or difference of two reactions is also a permissible reaction; its equilibrium constant is just the product or quotient of the constants for the two reactions. Any convenient complete set of equations can be used to get the equilibrium composition.

Unless only two or three reactions are involved, a closed-form solution to the equilibrium equations is usually not obtainable, and numerical iteration schemes must be used. An important exception occurs however, when only atoms, atomic ions, and electrons are involved. The equilibrium ionization equations for each element X can be written

$$N_{X^+} = K_{X^+} N_X / N_e, \quad N_{X^{++}} = K_{X^{++}} N_X / N_e^2, \quad N_{X^{+++}} = K_{X^{+++}} N_X / N_e^3, \quad \dots, \quad (1.2-12)$$

where N_e is the electron concentration.* The sum of these concentrations, plus N_X , is the total concentration of the element X , $N_{\text{tot } X}$, which is usually specified. The summed equations can be readily solved for N_X :

$$N_X = \frac{N_{\text{tot. } X}}{1 + K_{X^+} / N_e + K_{X^{++}} / N_e^2 + \dots} \quad (1.2-13)$$

* If the negative ion X^- is stable, an additional equation for its concentration must be included in Eq. (1.2-12), and corresponding additional terms added to subsequent equations, but this does not complicate the analysis significantly.

If the elements X , Y , ... are present, the charge-balance relation is

$$N_e = N_{X+} + 2N_{X++} + 3N_{X+++} + \dots + N_{Y+} + 2N_{Y++} + 3N_{Y+++} + \dots \quad (1.2-14)$$

With the help of Eqs. (1.2-12), (1.2-13), and similar relations for Y , etc., Eq. (1.2-14) can be written

$$N_e = \frac{N_{\text{tot.}X}(K_{X+}N_e + 2K_{X++}N_e^2 + \dots)}{1 + K_{X+}N_e + K_{X++}N_e^2 + \dots} + \frac{N_{\text{tot.}Y}(K_{Y+}N_e + 2K_{Y++}N_e^2 + \dots)}{1 + K_{Y+}N_e + K_{Y++}N_e^2 + \dots} + \dots \quad (1.2-15)$$

In a specified-density problem the total concentration of each element is known, and Eq. (1.2-15) can in principle be solved for N_e , although analytic solutions are possible only when the number of different ions present is small. However, if the elemental composition (hence, the ratios $N_{\text{tot.}Y}/N_{\text{tot.}X}$, etc.) and the electron concentration N_e are taken as independent variables, Eq. (1.2-15) can be solved directly for $N_{\text{tot.}X}$, and then the other concentrations can be obtained from Eq. (1.2-12), etc., all without iteration.*

Although a solution of Eq. (1.2-15) at a specified density (i.e., specified values of $N_{\text{tot.}X}$, $N_{\text{tot.}Y}$, etc.) usually requires an iteration process, it is a particularly simple one, involving only the variable N_e . A numerical study by the writer shows that a scheme using the total atom concentration as the first approximation to N_e , and obtaining successively better values

* This fact has been discovered, apparently independently, by a number of different workers. The earliest publication known to the writer is that of Hilsenrath, Green, and Beckett (1959).

by substituting the previous value in the right hand side of Eq. (1.2-15), converges quite rapidly when the second approximate $N_{\bullet}$ is larger than about half the atom concentration. For smaller $N_{\bullet}$ values, rapid convergence can be obtained by using for each new approximation the geometric mean between the previous approximation and the value obtained from Eq. (1.2-15).

Once the equilibrium composition of a reacting gas mixture such as high-temperature air is obtained by the free-energy-minimization or equilibrium-constant methods described above, the basic thermodynamic properties may be obtained simply by adding the ideal-gas contributions from the various constituents. The ideal-gas entropies and free energies are conventionally tabulated for 1 atmosphere pressure, and must be corrected to the actual partial pressure of each species, as earlier indicated for the free energy (see Eq. (1.2-3)).

Calculations for "differential" thermodynamic functions, such as the specific heat, are less straightforward. A specific heat computed by averaging the specific heats of the component species, weighted according to their equilibrium concentrations at a given temperature and density, is a "frozen composition" specific heat, useful only in situations where the temperature is varied so rapidly that chemical reactions do not have time to take place. In the usual true-equilibrium situation, however, the variation of composition with temperature gives an additional contribution to the specific heat. Hochstim (1962) has presented rather lengthy equations for the specific heat and related quantities in terms of the equilibrium constants and their temperature derivatives, and shown how

they can be solved for air using a high-speed computer. In most cases, however, it is probably simpler to calculate the energy at two or three closely-spaced points and obtain the specific heat by numerical differentiation. Moreover, in many fireball calculations the energy and pressure of air are approximated by analytic functions of temperature and density. Differentiation of these functions gives approximate values for the specific heat, velocity of sound, etc., rather simply.

The equilibrium compositions obtained in the course of calculating thermodynamic properties are also useful in determining radiation properties (see Volume 2) and transport properties (viscosity, electrical conductivity, etc.) of air. For these purposes it is often more convenient to express species concentrations in terms of molecules (atoms, ions) per unit volume. Since thermochemical tables are usually based on the gram mole, the equations in this chapter are given in molal form, but they are equally valid if concentrations are expressed in molecules (or particles) per unit volume, while volumes, energies, etc., are taken per molecule instead of per mole and the gas constant per mole, R , is replaced by the gas constant per molecule, k (Boltzmann's constant).

1.3 Ideal-gas properties for monatomic gases

As will be shown below, the thermodynamic properties of monatomic gases depend in part on the quantum-mechanical properties of their constituent atoms. It is beyond the scope of this chapter to explain the quantum mechanics of atomic structure (for a good introduction, see

Herzberg, 1944). However, in the next few paragraphs, enough of the terminology will be explained to permit the reader to use existing energy-level tables to calculate thermodynamic properties.

An atom or atomic ion may exist in many different states with different energies, corresponding to different arrangements of the orbital electrons. According to quantum-mechanical principles for light atoms (Russell-Saunders coupling, Herzberg, 1944), the states are grouped in terms, where for each term the total orbital angular momentum (in atomic units) of the electrons must be an integer. The terms are designated, for historical reasons, by the letters $S, P, D, F, G, H, \dots$, corresponding to total orbital angular momenta, L , equal to $0, 1, 2, 3, 4, 5, \dots$, respectively. In addition, each electron possesses a spin (intrinsic angular momentum) of $1/2$, and these spins add algebraically to give a total spin S . The quantity $2S + 1$ is called the multiplicity of the term; it is conventionally written as a superscript. Thus a term with $L = 2$ and $S = 3/2$ is denoted by ${}^4D$. A given atom or ion may have many terms of the same type, with the same L and S values, but differing in the arrangement of the individual electrons, and thus in the energy.

A term having $S \leq L$ is composed of $2S + 1$ levels, having total angular momenta $J = L + S, L + S - 1, L + S - 2, \dots, L - S$, respectively, all with energies fairly close to each other. (If $L \leq S$, the quantities L and S should be interchanged in the preceding statement). Thus, a ${}^4D$ state is composed of four levels designated by subscripting their J values: ${}^4D_{7/2}, {}^4D_{5/2}, {}^4D_{3/2}, {}^4D_{1/2}$. By placing the atom in a magnetic field, each of these levels can be split further, into $2J + 1$ individual

sublevels. Quantum theory shows that there are just this many distinct "quantum states" in such an electronic level; in the absence of a magnetic or electric field their energies are the same, so that they can be treated as a single level with a "degeneracy" or statistical weight of $2J + 1$. Often, the splitting of an L, S state into levels with different J values can also be ignored, and it can be treated as a single level with a statistical weight of $(2L + 1)(2S + 1)$. Thus, a ${}^4D$ state has a statistical weight of 20; its four levels (${}^4D_{7/2}$, ${}^4D_{5/2}$, ${}^4D_{3/2}$, ${}^4D_{1/2}$) have statistical weights of 8, 6, 4, and 2, respectively.

Except for one-electron atoms and ions, accurate calculations of energy levels are difficult, while very accurate measurements by spectrography are usually relatively simple. Since spectroscopists measure wavelengths, which by Planck's law are inversely proportional to the energy level differences, they conventionally present energy levels in units of cm^{-1} . To convert to true energy units, these must be multiplied by hc , where h is Planck's constant and c is the velocity of light.

Moore (1949) has collected together the best experimental energy-level values for the light elements and ions; her tables are complete enough for many practical purposes. If necessary, Moore's values can be tested for completeness by comparison with the tables of predicted terms given in the front of the same volume, and missing values estimated by using various semiempirical methods (isoelectronic extrapolation, quantum defects, screening constants (Herzberg, 1944; Edlen, 1964)). For the highly ionized species, for which experimental data are incomplete, Edlen (1964) gives a number of useful extrapolation formulas and tables.

Fig. 1.1 depicts, as an example, the energy levels of the nitrogen atom. Since, there are many terms with the same L and S values, the terms are also marked with the quantum numbers of the individual electrons. Thus, $2s2p^4$ indicates one electron with principal quantum number $n = 2$ and orbital angular momentum $l = 0$, and four electrons with $n = 2$ and $l = 1$. Although not marked, all of the states shown have two inner, tightly bound electrons, $1s^2$; states without these electrons lie so high in energy that they can be completely ignored for present purposes.

According to statistical mechanics (Mayer and Mayer, 1940), in an ideal gas in equilibrium, the fraction of an atomic or ionic species which is in a particular electronic state or level j is

$$N_j/N = (g_j/Q) \exp (-hcE'_j/kT) , \quad (1.3-1)$$

where g_j is the statistical weight of the level, E'_j is its energy (in cm^{-1}), and Q is a proportionality constant called the partition function. The fraction N_j/N is also called the "fractional population" or "occupation number." When Eq. (1.3-1) is summed over all j values, the left-hand side reduces to unity and the equation can be solved for the partition function:

$$Q = \sum_j g_j \exp (-c_2 E'_j/T) , \quad (1.3-2)$$

where c_2 is known as the second radiation constant,

$$c_2 = hc/k = 1.43879 \text{ cm}^\circ\text{K} \quad (1.3-3)$$

The values quoted in this chapter for the pertinent physical constants are those recently recommended by the National Academy of Sciences - National Research Council (1964); they differ slightly from those used in previous work.

The electronic-energy contribution of the atoms in state j to the internal energy of the gas is $N_j G hcE'_j$, where G is the number of atoms per mole (Avogadro's number). Since $G = R/k$, this contribution can also be written $N_j Rc_2 E'_j$. The ideal-gas internal energy per mole can then be obtained by using Eq. (1.3-1) to evaluate N_j , summing the contributions over j , and adding $(3/2)RT$ for the contribution from the translational motion of the atoms. The result may be written in dimensionless form:

$$\frac{E^o - E_0^o}{RT} = \frac{3}{2} + \frac{1}{QT} \sum_j c_2 E'_j \exp(-c_2 E'_j / T), \quad (1.3-4)$$

where the superscript o indicates the ideal-gas state, the subscript 0 indicates 0°K , and

$$R = 8.3143 \times 10^7 \text{ erg}/^\circ\text{K-mole} = 1.98717 \text{ cal}/^\circ\text{K-mole}. \quad (1.3-5)$$

E_0° in Eq. (1.3-4) represents the internal energy of the ideal gas at 0°K ; its numerical value is somewhat arbitrary, since in thermodynamics only energy differences can be measured. However, in reacting gases, consistent choices must be made, so that the differences in E_0° values between the reactants and the products gives the correct reaction energy (at absolute zero). For example, if E_0° is taken to be zero for atomic N, the corresponding quantity for N^+ must equal the ionization energy of N, while that for N_2 must be the negative of the dissociation energy. In thermochemistry it is conventional to choose $E_0^{\circ} = 0$ for the elements in the phases that are stable at room temperature and pressure. For air (including carbon dioxide) these are gaseous N_2 , O_2 , and Ar and crystalline graphite. The use of graphite as a reference material has the disadvantage that it makes the internal energy of gaseous CO_2 negative, and this causes the calculated energies for air near room temperature to deviate appreciably from direct proportionality to the temperature. To prevent this behavior, E_0° for gaseous CO_2 (as well as gaseous N_2 , O_2 , and Ar) has been set equal to zero in the present work.

The corresponding values of E_0° for the atomic species of present interest are given in the first table of the second chapter, together with the dissociation and ionization energies from which they were derived, and the corresponding references. An effort was made to obtain the best values presently available, since results of thermodynamic calculations are usually more sensitive to inaccuracies in these values than to any other inaccuracies.

The ideal-gas entropy (at one atmosphere pressure) can be obtained, except for a constant term, from the thermodynamic relation $S = \int dH/T$ (p constant), where $H = E + RT$ and E is given by Eq. (1.3-4). The result can be written

$$S^{\circ}/R = (E^{\circ} - E_0^{\circ})/RT + \ln Q + \frac{5}{2} \ln T + C, \quad (1.3-6)$$

where statistical mechanics (Mayer and Mayer, 1940) shows that the integration constant is

$$C = 1 + \ln(k/p^{\circ}) + \frac{3}{2} \ln(2\pi M k/\mathcal{C}h^2) = \frac{3}{2} \ln M - 2.66496, \quad (1.3-7)$$

with $p^{\circ} = 1$ atmosphere and M the atomic weight. Other ideal-gas thermodynamic properties can be obtained from Eq. (1.3-4) and Eq. (1.3-6) using well-known thermodynamic identities. For example, the dimensionless Gibbs free energy is given by

$$-\frac{F^{\circ} - E_0^{\circ}}{RT} = \frac{S^{\circ}}{R} - \frac{E^{\circ} - E_0^{\circ}}{RT} - 1 = \ln Q + \frac{5}{2} \ln T + \frac{3}{2} \ln M - 3.66496. \quad (1.3-8)$$

Substitution of this expression in Eq. (1.2-11) gives an equation for the equilibrium constant in terms of the partition functions of the reactants:

$$\frac{N_{AB}}{N_A N_B} = Q \left(\frac{Q_{AB}^2 M_{AB}}{2\pi k T M_A M_B} \right)^{3/2} \frac{Q_{AB}}{Q_A Q_B} \exp \left[- \frac{E_0^{\circ}(AB) - E_0^{\circ}(A) - E_0^{\circ}(B)}{RT} \right]. \quad (1.3-9)$$

When A represents a positive ion, B an electron (with $Q_B = 2$), and AB a neutral atom, Eq. (1.3-9) yields the familiar Saha equation for equilibrium ionization.

In calculating ideal-gas functions by the above equations, however, there is a basic difficulty not mentioned in elementary texts. An isolated atom or positive ion (in an unlimited volume) actually has an infinite number of stable electronic states with energies E_j less than its ionization energy, and thus the sums in Eq. (1.3-2) and Eq. (1.3-4) diverge. However, at temperatures up to several thousand degrees the series are semi-convergent in the sense that essentially the same answer is obtained by taking the first ten or the first ten thousand terms. The omission of the infinite "tail" of the series, which contains terms corresponding to electrons in highly-excited levels, is justified because in actual situations no atom can occupy an unlimited volume, since it is limited at least to the volume of the system, and generally, in systems containing many atoms, to a much smaller volume, comparable to the mean volume per atom (see Section 1.7).

At somewhat higher temperatures the difficulty is less trivial, because there may be no point at which the terms in the sum become small, and thus the answer may depend significantly upon where the series is broken off. This is illustrated in Fig. 1.2, which shows the percentage increase in internal energy and free energy as the cutoff point is raised from an electron quantum number of $n = 4$ to $n = 8$. Various workers have suggested simple cutoffs which depend upon the atom density, the electron density, or the temperature. However, none of these simple

one-parameter relations can be completely correct, because the high electronic levels are affected both by close-in neutral particles and, to a greater extent, by close-in charged particles, while the temperature influences how often these particles come close-in. The true cutoff is thus a function of the composition, density, and temperature, so that if the sums in Eqs. (1.3-2) and (1.3-4) are sensitive to the cutoff the "ideal-gas" functions also depend upon the composition and density as well as temperature, which greatly complicates thermodynamic calculations. Moreover, the higher bound levels below the cutoff may be perturbed sufficiently to further affect the thermodynamic properties.

As shown by Fig. 1.2, at successively higher stages of ionization an atom's properties remain independent of the cutoff to successively higher temperatures. In air below standard (sea level) density, as the temperature is raised to the point where the cutoff for any particular ion becomes important the concentration of that ion becomes so small (due to further ionization) that the choice of cutoff has little effect on the thermodynamic properties of the equilibrium mixture. Unfortunately, this simplification does not hold for the highest air densities of present interest (up to 10 times the standard density, as produced by a strong shock wave at low altitudes). Even at such densities, however, electronic states with $n \leq 4$ should be little affected by neighboring atoms, since the electronic orbits of such states lie well within the mean interatomic or interionic distance. Thus, thermodynamic functions calculated by summing up to $n = 4$ represent lower limits to the true values. In addition, they usually represent useful approximations to the actual

values, since at high densities the correct cutoff is not much greater than 4 (see Section 1.7), while at low densities the equilibrium properties are relatively insensitive to the cutoff, as already pointed out.

If better, variable-cutoff thermodynamic properties are required they may be obtained by adding the contributions from states between $n = 5$ and the cutoff n_c . For light atoms and ions, the most important of such states are those having only one electron with $n > 4$, such states with one electron outside a "core" are quite hydrogen-like, with a statistical weight equal to $2n^2$ times that of the core (with the outer electron removed), and an energy just $Ry (Z + 1)^2/n^2$ less than the energy of the core, where Ry is the Rydberg ($109,737 \text{ cm}^{-1} = 13.605 \text{ eV}$), and Z is the charge of the atom or ion. The partition-function summation, Eq. (1.3-2), over these states can then be factored into a sum over the states of the outer electron and a sum over the states of the core. The final result is

$$Q(X) = Q_{n \leq 4}(X) + Q_{n \leq 4}(X^+) \exp \left(-\frac{I(X)}{kT} \right) \sum_{n=5}^{n_c} 2n^2 \exp \left(\frac{Ry (Z+1)^2}{n^2 kT} \right) \quad (1.3-10)$$

where $Q_{n \leq 4}(X^+)$ is the partition function for the next higher ion and $I(X)$ is the $X \rightarrow X^+$ ionization energy. Since the cutoff n_c depends upon temperature, density, and somewhat on composition (see Section 1.7), it is more convenient to calculate the correction term on the right hand side of Eq. (1.3-10) during the course of an equilibrium ionization calculation than to tabulate the "true" ideal-gas thermodynamic properties of each species as functions of two or three variables.

Accordingly, ideal gas functions for the atoms and ions of C, N, O, and Ar have been calculated for temperatures of present interest using a fixed cutoff just above $n = 4$. Extensive numerical results are presented in Chapter 2. Tables showing the energy-level data used, and the fractional population of each electronic state versus temperature are also included. The thermodynamic results have been compared with results of several previous workers (JANAF Thermochemical Tables, 1960; Gilmore, 1955; Woolley, 1957; Kilsch, Gilmer, and Gilles, 1957; Green, Poland, and Margrave, 1960; Yungman et al., 1961; Martinez, 1961; Gurvich et al., 1962; McBride et al., 1963; Hilsenrath, Messina, and Evans, 1964). Up to 10,000°K, almost all the results agree to within 0.03 per cent. Moreover, the small differences are due primarily to use of different values for the gas constant R ; if this is corrected for, the deviations are generally reduced to less than 0.01 per cent. An exception is the table for N by Hilsenrath, Messina, and Evans (1964), which gives values deviating from other work by up to 2 per cent (their values for the other air atoms and ions show no such deviation).

Only a few tables extending above 10,000°K have been published previously, and these show increasing variations in the results for the neutral atoms, depending upon the electronic cutoff used by the different investigators. (Variations for the ions appear only at considerably higher temperatures, as shown by Fig. 1.2.) The earlier work by the writer (Gilmore, 1955) up to 24,000°K used a cutoff around $n = 5$ but omitted some states. Up to 12,000°K those results agree very well with the present results, but differ by up to 6 per cent for the neutral atoms at 24,000°K. The values of Woolley (1957) to 4,000,000°K and the extensive Russian tables (Yungman et al., 1961; Gurvich et al., 1962) to 20,000°K also show deviations above 10,000°K. Woolley (1957) used a somewhat different type of cutoff that excludes many

states included in the present work (planning to include them in subsequent equilibrium calculations). Hence, his values for the enthalpy, entropy, and negative free energy are generally lower than the present values; for the neutral atoms the difference is a few per cent or less at $20,000^{\circ}\text{K}$. On the other hand, the Russian values are generally higher because they used cutoffs at $n = 11 - 13$, based on restricting the electrons to the mean volume per atom at densities corresponding to a pressure of one atmosphere. At $20,000^{\circ}\text{K}$ their enthalpy values for the neutral atoms are almost a factor of two higher than the present values, although their entropies and free energies are only a few per cent higher. Whether such differences are significant in equilibrium thermodynamic calculations depends upon the density under consideration and also upon whether separate allowance for the highly excited states is made in the equilibrium computation, as already discussed (see also Section 1.7).

1.4 Ideal-gas properties for diatomic gases

The relations Eqs. (1.3-4) and (1.3-6) for the energy and entropy of a monatomic gas apply equally well to a molecular gas, provided that the summations are extended over all the molecular energy levels, which can differ not only in electronic energy but also in rotational and vibrational energy. Because of these additional degrees of freedom, the individual levels of a molecule are so numerous that it is rather impractical to tabulate all of them. Fortunately, however, for each degree of electronic excitation the rotational and vibrational levels are usually quite regular and can be represented by simple formulas, only the coefficients of which

need to be tabulated. Moreover, using these formulas, the terms of the series in Eqs. (1.3-2), (1.3-4) and (1.3-6) can often be summed algebraically with reasonable accuracy, at least in some temperature ranges.

The energy levels of molecules can be grouped into electronic states, each of which is characterized (in part) by the total spin S of the electrons. Just as for atoms, the multiplicity $2S + 1$, is written as a superscript on the left of the state symbol. Unlike the atoms, however, diatomic molecules have an internuclear axis, and the second important quantum number is not the total orbital angular momentum, L , of the electrons, but the component, Λ , of this momentum in the axial direction. In analogy with the Roman-letter designations of atomic terms, diatomic states are designated by the Greek letters Σ , Π , Δ , Φ , ..., corresponding to $\Lambda = 0, 1, 2, 3, \dots$. Because in diatomic molecules terms of a given L are separated into states of different Λ , the statistical weights of these states are generally less than those of the corresponding atomic terms; specifically, the weights are $2S + 1$ for Σ states and $2(2S + 1)$ for Π , Δ , Φ , ..., states. States with $S > 0$ and $\Lambda > 0$ split into $2S + 1$ substates, designated by writing the vector sum of Λ and the axial component of S as a subscript. However, this splitting can often be ignored, since it is usually small and often associated only with higher excited states. Other subscripts and superscripts are sometimes added to the state symbol to indicate the electronic symmetry, but this does not affect the present considerations.

Since a diatomic molecule may have more than one state with the same S and Λ values, and also since there may be a considerable period between the experimental discovery of a state and the determination of its type, the states are also labelled somewhat arbitrarily by Roman letters, with X designating the ground state, and $A, B, C, \dots$ the successively higher (or earlier discovered) states of the same multiplicity as the ground state, while $a, b, c, \dots$ designate states of a different multiplicity. (Exceptions are the N_2 and C_2 molecules, where the capital and lower case letters are reversed, due to early misidentification of the ground state.)

The electronic energy of a diatomic molecule depends not only upon the electronic state but also upon the interatomic (or, more accurately, internuclear) distances. Curves showing this variation for N_2 and N_2^+ are presented in Fig. 1.3. At large internuclear distances the energy must be that of two individual atoms. At distances approaching zero the energy must approach infinity because of the strong Coulomb (electrostatic) repulsion between the two nuclei. At intermediate distances the curve must have a minimum if the molecular state is to be stable. The two nuclei will tend to approach this minimum-energy distance, but may vibrate about this point. Since the vibrational motion of the nuclei is much slower than the orbital motions of the lighter electrons, the electrons will keep adjusted to the instantaneous position of the nuclei. Thus, the electronic energy will follow the same curve regardless of the amplitude of vibration, and such a curve forms an effective potential for molecular vibration.

The lower portion of an attractive potential curve (see Fig. 1.3) can often be approximated by a parabola. Quantum theory (Herzberg, 1950) shows that the vibrational energy in a parabolic potential equals $w(v + 1/2)$, where w is a constant which depends inversely upon the width of the parabola, v is the vibrational quantum number, which can take on the values 0, 1, 2, ..., and the zero of energy is measured from the bottom of the parabola. Actual potential curves, however, diverge more and more from a parabola at higher energies; therefore the vibrational energy levels, instead of being evenly spaced as in the above formula, fall closer and closer together as the dissociation limit is approached. It is conventional to fit these levels by the formula

$$G(v) = w_e(v + 1/2) - w_e x_e(v + 1/2)^2 + w_e y_e(v + 1/2)^2 + \dots, \quad (1.4-1)$$

where w_e , $w_e x_e$, $w_e y_e$, etc., are constants determined spectroscopically, and the subscripted e indicates that this is an expansion about the equilibrium point (potential curve minimum). The short numbered lines on the potential curves of Fig. 1.3 indicate the observed vibrational energy levels of these molecules.

Besides vibrating, a molecule can also rotate. The simplest approximation is that of a "rigid rotator," whose quantum-mechanical energy levels (Herzberg, 1950) are given by $BJ(J+1)$, where B is a constant inversely proportional to the square of the internuclear distance, and the rotational quantum number J equals 0, 1, 2, ... Since actual molecules are not rigid, but stretch as they rotate so that the effective value of B

decreases with increasing J , a negative correction term proportional to $J^2(J+1)^2$ is conventionally added to the energy expression. Moreover, if the molecule is also vibrating, this affects the mean internuclear distance and gives a B value which depends somewhat on the vibrational quantum number.

By adding the contributions of electronic, vibrational, and rotational energy one obtains the following general formula for the molecular energy levels (term values):

$$\begin{aligned} \tilde{G}(v, J) = & \tilde{G}_e^* + \omega_e(v+1/2) - \omega_e x_e(v+1/2)^2 + \omega_e y_e(v+1/2)^3 \\ & + \dots + B_v J(J+1) - D_v J^2(J+1)^2 + H_v J^3(J+1)^3 + \dots, \end{aligned} \quad (1.4-2)$$

where

$$B_v = B_e - \alpha_e(v+1/2) + \gamma_e(v+1/2)^2 + \dots,$$

$$D_v = D_e + \beta_e(v+1/2) + \dots,$$

$$H_v = H_e + \delta_e(v+1/2) + \dots,$$

and $\tilde{G}_e^*$ is the electronic energy at the equilibrium distance, taking the zero of energy to be the lowest level ($v = 0, J = 0$) of the ground state. (The asterisk is added to distinguish this quantity from the conventional $\tilde{G}_e$, the energy above the potential minimum of the ground state.) In Eq. (1.4-2) some generally-negligible terms due to the interaction of the electronic and

rotational angular momenta have been omitted.

The statistical weight of each level is just the electronic statistical weight already discussed, multiplied by $2J + 1$ for most molecules. However, if the molecule is homonuclear (like N_2 , N_2^+ , etc.) the $2J + 1$ is replaced by a rapidly-oscillating function of J , which for present purposes can be approximated by its mean value, $(2J + 1)/2$.

Since each electronic state has only a finite number of bound rotational-vibrational levels,* the summations required for thermodynamic calculations can be carried out without any further convergence difficulties. However, at temperatures of a few thousand degrees, many hundreds of terms make significant contributions to the sums, so that hand computations become lengthy. For this reason, Mayer and Mayer (1940) have worked out approximate algebraic formulas for these sums, based on replacing the summation over rotational levels by an integration, and neglecting or approximating the higher correction terms in the energy-level formulas. However, some of these approximations become poor at very high temperatures. Moreover, with modern high-speed computers it is virtually as easy to perform the summation directly.

At temperatures above $5000^\circ K$ or $6000^\circ K$, vibration-rotation energy levels of the lower electronic states near their dissociation limits can make significant contributions to the thermodynamic properties. Unfortunately, spectroscopic measurements on such levels have not been made for most electronic states of interest. For the few states for which they are available, it is found that a large number of terms must be included in Eq. (1.4-2) in order to fit the data. This indicates that the usual measurements on only the lower levels of an electronic state cannot be safely

* Neglecting a few highly-excited states which dissociate to positive plus negative atomic ions.

extrapolated to get the very high levels. However, these levels are determined by the high portions of the corresponding potential curve. It is often possible to determine this curve with some confidence, by use of Rydberg-Klein and valence-bond calculations (Vanderslice, Mason, and Lippincott, 1959; Gilmore, 1965). The energy levels corresponding to this curve can then be calculated quantum-mechanically.

For present purposes, however, it is possible to bypass this last step, and calculate the contributions of the high levels to the thermodynamic properties directly from the potential curve. At temperatures where these levels contribute significantly, their spacing is small compared to kT , so that the formulas of classical statistical mechanics can be used. These formulas show that the partition function for structureless particles of mass m with total energies between E_1 and E_2 , in a volume dV where the potential is U , is given by (Mayer and Mayer, 1940):

$$\frac{2\pi(2m)^{3/2}dV}{h^3} \int_{E_1}^{E_2} (E-U)^{1/2} \exp(-E/kT) dE \quad (1.4-3)$$

$$= \frac{2\pi(2mkT)^{3/2}dV}{h^3} e^{-U/kT} \left[\frac{\sqrt{\pi}}{2} \operatorname{erf} x^{1/2} - x^{1/2} e^{-x} \right]_{(E_1-U)/kT}^{(E_2-U)/kT},$$

where erf is the error function. The partition function contribution from diatomic energy levels between E_1 and the dissociation energy D can be obtained by multiplying the above expression by the electronic statistical weight g_e , letting m be the reduced mass, $M_1 M_2 / (M_1 + M_2) Q$,

where M_1 and M_2 are the atomic weights of the two atoms, replacing dV by $4\pi r^2 dr$ where r is the internuclear distance, and integrating over r . The result is

$$Q(E_1 \text{ to } D) = \frac{8\pi^2 (2mkT)^{3/2} g}{h^3} \left[\int_{r_0}^{\infty} f_D(r) r^2 dr - \int_{r_1}^{r_2} f_1(r) r^2 dr \right] , \quad (1.4-4)$$

where

$$f_D(r) = \frac{\sqrt{\pi}}{2} \operatorname{erf} \left(\frac{D - U(r)}{kT} \right)^{1/2} e^{-U(r)/kT} - \left(\frac{D - U(r)}{kT} \right)^{1/2} e^{-D/kT} ,$$

$f_1(r)$ is the same function except that D is replaced by E_1 , r_0 is the point on the inner branch of the potential curve where $U(r) = D$, and r_1 and r_2 are the two points where $U(r) = E_1$. A similar but slightly longer expression can be derived for the summation appearing in Eq. (1.3-4).

The above approach omits the quasistable rotational levels above the dissociation energy (Herzberg, 1950), which some investigators include. However, such levels are more conveniently treated as two separate atoms subject to an interatomic attraction (see Section 1.6). Moreover, there is little point in including bound levels near or above the dissociation energy unless the unbound or "repulsive" states or levels of similar energy and internuclear distance are also included, since the two types make comparable contributions to the equilibrium thermodynamic properties. Inclusion of the latter type, however, requires a departure from the ideal-gas approximation.

To check the accuracy of the above relations, partition function and energy calculations for several of the states of N_2 , NO , and O_2 were made using the direct summation method up to $1/3$, $1/2$, and $2/3$ of the dissociation energy, respectively, and the classical integrals beyond these energies. The results using the three different crossover points were virtually identical up to several thousand degrees, and agreed within 0.5 per cent for the entire range from 1000 to 40,000°K.

The total partition function and energy of diatomic molecules may be obtained by adding such contributions from all the electronic states. Of course, just as for atoms, isolated molecules have an infinite number of high-excited electronic states, while at finite densities these are "cut off" in some complicated fashion by electron-ion interactions. However, for most molecules such states lie considerably above the dissociation energy, so the molecules tend to dissociate before the choice of electronic cutoff makes much difference. In fact, unless the repulsive as well as attractive states near the dissociation energy are treated carefully, there is little point in including states above the dissociation energy (unless their fractional populations are desired for other purposes, such as radiation calculations).

In the present work, thermodynamic calculations were made for the diatomic molecules N_2 , N_2^+ , NO , NO^+ , O_2^- , O_2 , O_2^+ , and CO , which make a significant contribution either to the thermodynamic properties or to the charged-particle concentration of equilibrium air. These calculations included all the known and predicted bound states up to the

lowest dissociation limit, and in some cases one or two states above this limit. The method used was to sum over the energy level up to half the dissociation energy of each state, where the levels were calculated using the spectroscopic data given in Table 86 of the supplementary volume. (The higher rotational constants D_v and H_v , for which data are sparse, were calculated from the vibrational constants using formulas given in Herzberg (1950).) Levels above half the dissociation energy were included by means of the classical integral, Eq. (1.4-3), using the potential curves of Figs. 1-3 to 1-5, and of Krupenie and Weissman (1965) for CO.

The results are presented in Chapter 2. Up to 6000°K they generally agree very well with those of previous workers (Gillmore, 1955; Beckett and Haar (1957); JANAF Thermochemical Panel (1960); Yungman et al., 1961; Gurvich et al., 1962; Bristow and McChesney, 1965) except for small differences due to use of more recent values for the gas constant R and the second-radiation constant $c_2 = hc/k$. Above 6000°K, however, the present values for most molecules begin to diverge from the older values, usually in the positive direction due to inclusion of more electronic states in the present calculation than in any previous calculation, except that of Bristow and McChesney (1965). At still higher temperatures, around 15,000 or 20,000°K, the present values cross over and fall below the few previous values available, because previous investigators effectively included some levels above the dissociation limit of each state.

1.5 Ideal-gas properties for polyatomic gases

The only polyatomic molecules which contribute as much as 0.01 per cent to the equilibrium thermodynamic properties of dry air are CO_2 and NO_2 . In addition, the negative ion NO_2^- can affect the electron concentration and hence the radio-wave absorption of high density air at a few thousand degrees, so it is desirable to include it in the equilibrium calculation.

The ideal-gas properties of polyatomic molecules can be computed by summing over their rotational, vibrational, and electronic energy levels in the same way as already described for diatomic molecules. Of course, the additional rotational and vibrational degree of freedom of the larger molecules produce a more complex set of energy levels. However, since the concentrations of polyatomic molecules generally become small above 5000 or 6000°K, the calculations can be restricted to lower temperatures, where excited electronic states and high rotational and vibrational levels can usually be neglected. This permits relatively simple approximations to the ideal-gas thermodynamic properties (Mayer and Mayer, 1940).

Results of such calculations are available in the JANAF Tables (1960) for the polyatomic molecules of present interest except NO_2^- . Thermodynamic values for the latter are tabulated in a recent report by Clifton (1966).

Since the existing ideal-gas tables for polyatomic molecules are fairly adequate for high-temperature air calculations, no further equations or tables will be presented here.

1.6 Effects of interparticle forces on the thermodynamic properties of air

In the ideal-gas approximation the interactions between the molecules, atoms, ions, and electrons in high-temperature air are neglected, except when two or more particles are bound together and can be treated as a single particle. This approximation is reasonable at low air densities, but at sufficiently high densities the mean distance between free particles becomes so small that such interactions can no longer be neglected. For neutral molecules and atoms, interaction forces are very small except at distances less than about twice the intermolecular distance in the liquid or solid phase. The highest air density associated with nuclear fireballs or missile flow-fields is that produced by a strong shock wave at sea level, which is roughly 0.01 g/cm^3 (about 10 times the ambient density). Since this density is about 1 per cent of that of liquid air, one may expect that neglect of intermolecular forces will produce errors of the order of one per cent in the thermodynamic properties.

At temperatures so high that the air is largely ionized, considerably greater errors can be made by neglecting the interactions between the ions and electrons. This large effect is due to the long range of the Coulomb forces between charged particles, which decrease with distance like $1/r^2$, in contrast to the forces between neutral molecules, which decrease like $1/r^7$ for large values of r . As an example, consider

air at 0.01 g/cm^3 and $70,000^\circ\text{K}$, where the major equilibrium species are N^+ , O^+ , and free electrons. The ideal-gas pressure under these conditions is about 10,000 atm, while the total Coulomb force between neighboring electrons and positive ions (at their mean distance on opposite sides of a unit surface) is about 1000 atm. Accordingly, one may expect errors of the order of ten per cent in the ideal-gas approximation under these conditions. This makes it quite desirable to include corrections for charged-particle interactions in the thermodynamic calculations for air, as well as somewhat desirable to include neutral-particle interactions.

The standard method for the thermodynamic treatment of moderately dense gases is to write a virial expansion, where the first term is the ideal-gas contribution and subsequent terms give the contributions from two-particle, three-particle, etc., interactions. The virial equation for the pressure of a gas mixture may be written (Mayer and Mayer, 1940; Hirschfelder, Curtis, and Bird, 1954)

$$p = \sum_i \bar{N}_i RT + \sum_i \sum_j \bar{N}_i \bar{N}_j B_{ij}(T) RT + \sum_i \sum_j \sum_k \bar{N}_i \bar{N}_j \bar{N}_k C_{ijk}(T) RT + \dots, \quad (1.6-1)$$

where $B_{ij}(T)$, $C_{ijk}(T)$, ... are called the second, third, etc., virial coefficients. These coefficients can be evaluated in terms of the inter-particle forces. If we treat the air particles as spherical so that they have a two-particle interaction energy U_{ij} which depends only on their distance r , the second virial coefficient is given by (Mayer and

Mayer, 1940; Hirschfelder, Curtis, and Bird, 1954)

$$B_{ij}(T) = 2\pi Q \int_0^{\infty} [1 - \exp(-U_{ij}(r)/kT)] r^2 dr \quad , \quad (1.6-2)$$

where Q is Avogadro's number. The expressions for the higher virial coefficients are much more complicated, but fortunately the corresponding terms in the virial expansion can generally be neglected for air densities of present interest.

A virial expansion can also be written for the internal energy, similar to Eq. (2.6-1) for the pressure, except that temperature derivatives of the virial coefficients, $T dB_{ij}/dT$, etc., appear instead of the coefficients themselves. Tabulations of virial coefficients for various molecules (Hirschfelder, Curtis, and Bird, 1954; Woolley, 1962) show that, at the high temperatures of present interest, such derivatives are typically an order of magnitude smaller than the coefficients themselves. This is to be expected, since the longer-range intermolecular interactions (except for Coulomb interactions) are fairly small compared to thermal energies at such temperatures, so that molecules behave roughly like rigid spheres, with virial coefficients approximately independent of temperature. Accordingly, for air densities and temperatures of present interest, it is reasonable to neglect virial corrections to the internal energy (except for charged-particle interactions; see Section 1.7).

The Helmholtz free energy is given by

$$A = A_{\text{ideal}} + VRT \sum_{\text{mixture}} \sum_j \bar{N}_i \bar{N}_j B_{ij}(T) + \dots \quad , \quad (1.6-3)$$

where V is the volume of the system. The virial corrections to the entropy and the Gibbs free energy may be obtained readily from Eqs. (1.6-1) and (1.6-3) with the help of the thermodynamic identities $S = (E-A)/T$ and $F = A + pV$.

In Section 1.2 the ideal-gas expression for the chemical-equilibrium constant, in terms of partial pressures, was derived by minimizing the Gibbs free energy. For nonideal gas mixtures, however, a similar derivation is not convenient because the total pressure is no longer the sum of the individual partial pressures. The equilibrium constant may be obtained instead, by minimizing the Helmholtz free energy at constant temperature and volume. Equation (1.6-3), after substitution for the ideal free energy from Eq. (1.2-4), can be written

$$A/VRT = \sum_i \bar{N}_i \left[F_i^0/RT - 1 + \ln(\bar{N}_i RT) \right] + \sum_i \sum_j \bar{N}_i \bar{N}_j B_{ij}(T) . \quad (1.6-4)$$

The minimization condition that the differential vanish yields, after some cancellation,

$$0 = \sum_i \left[F_i^0/RT + \ln(\bar{N}_i RT) + 2 \sum_j \bar{N}_j B_{ij} \right] \delta \bar{N}_i . \quad (1.6-5)$$

For variations due to a single chemical reaction, $XY \rightleftharpoons X + Y$, one has $\delta \bar{N}_{XY} = -\delta \bar{N}_X = -\delta \bar{N}_Y$, while all other $\delta \bar{N}_i$ vanish, so that Eq. (1.6-5) yields

$$\frac{\bar{N}_{XY}}{\bar{N}_X \bar{N}_Y} = RT \exp \left[-\frac{F_{XY}^0 - F_X^0 - F_Y^0}{RT} - 2 \sum_j \bar{N}_j (B_{XY,j} - B_{Xj} - B_{Yj}) \right] . \quad (1.6-6)$$

The ideal-gas part of this equation agrees with Eq. (1.2-11).

In order to apply the relations derived above to thermodynamic calculations, numerical values for the second virial coefficients, $B_{ij}(T)$, are needed. For most common molecules that are stable at room temperature, values of the virial coefficients for like molecules ($i = j$) and a few for unlike molecules ($i \neq j$) have been measured over the easily-accessible temperature range, and extrapolated to higher temperatures by fitting an intermolecular potential according to Eq. (1.6-2) (Hirschfelder, Curtis, and Bird, 1954). Woolley (1962) has calculated and tabulated such values for air molecules up to $15,000^{\circ}\text{K}$. However, at high temperatures such extrapolations often give too high values. Better virial coefficients for N_2 and the rare gases have been calculated by Amdur and Mason (1958), using potentials derived from molecular beam scattering. In the calculation range of 1000 to $15,000^{\circ}\text{K}$ their values for N_2 range from 0 to 19 per cent lower than those of Woolley, while their values for Ar are 10 to 23 per cent lower.

In high temperature air calculations, virial coefficients are also needed for species such as atomic N and O, for which no measurements are available. Woolley (1962) has also made estimates of these coefficients by deducing the interatomic potentials from the corresponding intermolecular potentials. For interactions not involving chemical bonding, such as N - N_2 or O - Ar, his results are not unreasonable. However, better values for the N - N_2 virial coefficient may be obtained by using the potential calculated by Meador (1960) using valence-bond theory. The results range from 25 to 40 per cent lower than Woolley's results, over the temperature range from 8000 to $15,000^{\circ}\text{K}$. It may be added that Meador's

potential, and the derived virial coefficient, are probably about 4 per cent too low, judging by a comparison of his $N_2 - N_2$ potential with the experimental results of Amdur, Mason, and Jordan (1957).

Nonbonding potentials, at temperatures of several thousand degrees or more where the small van der Waals attraction is negligible, can usually be fit by an exponential repulsion:

$$U(r) = a e^{-cr} , \quad (1.6-7)$$

where a and c are constants which depend upon the two molecules or atoms. The integral in Eq. (1.6-2) can then be approximated by (Amdur and Mason, 1958)

$$B(T) = \frac{2\pi a_0}{3c^3} \left[\log \frac{1.781a}{kT} \right]^3 , \quad kT \ll a . \quad (1.6-8)$$

The recommended values for the constants, obtained by increasing Meador's (1960) values by 4 per cent, are

$$\begin{aligned} N_2 - N_2: \quad a &= 833 \text{ eV}, \quad c = 2.78 \times 10^8 \text{ cm}^{-1} , \\ N - N_2: \quad a &= 363 \text{ eV}, \quad c = 2.85 \times 10^8 \text{ cm}^{-1} . \end{aligned} \quad (1.6-9)$$

Much less is known about the high-temperature interactions of other air molecules and atoms, although some theoretical calculations involving O_2 , NO , and O are available (Meador, 1960). However, these molecules and atoms, and even many of the minor air species like CO and C , are approximately the same "size" as N_2 or N , and should have roughly the same high-temperature

virial coefficients. For air above 8000°K, it is reasonable, then, to use Eqs. (1.6-8) and (1.6-9a) for all neutral molecule-molecule interactions, and Eqs. (1.6-8) and (1.6-9b) for all neutral atom-molecule interactions.

Virial coefficients for interactions between neutral and charged particles, on the other hand, are generally much smaller (Woolley, 1960) because the polarization attraction counteracts the core repulsion. For present purposes it seems adequate to set them equal to zero. Coulomb interactions between charged particles will be considered later, in Section 1.7.

Interactions involving chemical bonding, such as the important N - N , N - O , and O - O interactions, cannot be adequately treated by considering only a single interaction potential. Instead, as shown in Figs. 1-3, 1-4, and 1-5, the two atoms may approach each other on any of several potential curves, depending on the relative orientation of their electrons. The correct virial coefficient to use is a weighted average of the values computed using the various curves, where the proper weights are the statistical weights of the molecular states (see Section 1.4), and contributions of those states or levels already included in the molecular partition function should be omitted here.

The present calculations of the partition function and thermodynamic properties of diatomic molecules, described in Section 1.4, include for all the lower electronic states every rotational-vibrational level below the corresponding dissociation energy. For attractive potentials, to be consistent, the virial integral of Eq. (1.6-2) must then

be replaced by one which omits contributions from bound states. The result, after taking the weighted average over the different electronic states n , is

$$B(T) = \frac{2\pi q}{\sum_n g_n} \sum_n g_n \int_0^\infty r^2 dr \left[1 - \left(e^{-U_n/kT} \right)_{U_n > 0} - \frac{2}{kT/\pi kT} \int_{U_n < 0}^\infty (E - U_n)^{1/2} e^{-E/kT} dE \right] \quad (1.6-10)$$

where for simplicity the subscripts ij designating the interacting atoms, and the variation of U_n with r , are not explicitly indicated. The last integral in Eq. (1.6-10) can also be expressed in terms of the error function, as in Eq. (1.4-3).

Sample calculations for nitrogen and oxygen atoms at high temperatures were carried out using Eq. (1.6-10). They gave second virial coefficients almost an order of magnitude smaller than those involving molecules, because negative contributions from nonbound levels in the attractive potentials largely cancelled the positive contributions from the repulsive cores. Accordingly, for present purposes the atom-atom virial corrections can be neglected.

It might be mentioned that when high-temperature diatomic partition functions are calculated by integrating over all portions of the potential curves and all energies, as done by Beckett and Haar (1957) and Bristow and McChesney (1965), instead of cutting them off at the dissociation energy as done in Section 1.4, the corresponding atom-atom virial correction is already included implicitly in the molecular thermodynamics. The only remaining contributions to the coefficient are those from any electronic

states not included in the diatomic integration. In principle, the diatomic partition functions could include all electronic states, thus making the atom-atom virial coefficients vanish identically, but in practice the purely-repulsive states are usually omitted from the molecular treatment. The corresponding second virial coefficients, obtained by summing Eq. (1.6-10) only over the repulsive states, are somewhat larger than those obtained by using the complete sum, but still only about half as large as the coefficients estimated by Woolley (1960) by scaling down the molecule-molecule potentials.

1.7 Effects of Coulomb forces on the thermodynamic properties of ionized air

The Coulomb forces between the ions and electrons present in high-temperature air are sufficiently different from the intermolecular forces already considered as to require a separate treatment. When $U_{ij}(r) = \text{constant}/r$, the integral in Eq. (1.6-2) is found to diverge at $r = 0$ when the constant is negative (i.e., for charged particles of opposite sign), while for large r it behaves like $\pm \int r dr$ and diverges for both positive and negative Coulomb potentials. The divergence at $r = 0$ is due to inclusion of bound states; it may be removed by including only the states with energies above that of the separated particles, by use of Eq. (1.6-10). The divergence at $r = \infty$, however, is more fundamental. A uniform gas of charged particles which is not electrically neutral (i.e., has more positive than negative charges, or vice versa) can be shown to have a Coulomb energy per unit mass which depends upon the size and shape of the gas volume considered, and becomes infinite as

the volume goes to infinity (at fixed gas density). It is not surprising, then, that the virial coefficients for a Coulomb potential diverge. In an ionized gas with no net charge, the infinite positive and negative virial terms from the repulsive and attractive Coulomb forces, respectively, must somehow cancel to first order, leaving only a finite remainder.

If the charged-particle density is not too high, this problem can be treated by the Debye-Hückel theory, which determines the mean distribution of electrons and ions around any given electron or ion, using a linearized self-consistent-field approximation. Since the derivation and results are available in several texts (Fowler, 1936; Fowler and Guggenheim, 1956; Cambel, Duclos, and Anderson, 1963) they will not be reproduced here. Qualitatively, the effect of Coulomb interactions is to decrease the effective ionization potential of each species, and thus increase the degree of ionization. The interactions also decrease the pressure and energy of the ionized gas mixture directly, in contrast to the indirect increase due to the increased ionization, so that the net thermodynamic corrections are positive at some temperatures and densities and negative at others.

For present purposes, however, the conventional Debye-Hückel treatment needs to be supplemented by two additional considerations. The first concerns the dielectric constant. The original analysis of Debye and Hückel was applied to ions in solution, and since the force between adjacent ions is affected by the polarizability of the intervening liquid, the dielectric constant of the latter enters into the basic equations. A similar effect may be expected in an ionized gas whenever molecules, atoms, or polarizable ions are situated between neighboring ions, but in

gases the continuum fluid approximation and the use of the static dielectric constant will be less accurate. Fortunately, at gas densities and temperatures of present interest, the dielectric constant will not deviate more than a couple per cent from that of empty space, so that it can be approximated by the latter value, with an error less than the other errors inherent in the Debye-Hückel approach.

The second consideration involves the electronic-state "cutoff" introduced in Section 1.3. Conventional Debye-Hückel theory does not consider electronically-excited states. It does, however, give for the mean potential about each ion of charge Z :

$$U(r) = (Ze/r) \exp (-r/d) \quad , \quad (1.7-1)$$

where d is the Debye length, given by

$$d^2 = kT / \left(4\pi e^2 \sum_i \bar{N}_i Z_i^2 \right) \quad , \quad (1.7-2)$$

and the summation is taken over all charged particles, including electrons. Some workers have assumed that the higher excited states of each atom or ion are precisely the bound states of an electron in the Debye-Hückel potential, Eq. (1.7-1). This potential has only a finite number of bound states, so that the partition function converges. However, these states include a number having classical electron orbits with radii approaching the Debye length. Since the Debye-Hückel treatment is valid only when the Debye length is longer than the mean distance between ions (Cambel, Duclos, and Anderson, 1963), such states have a bound electron which is generally closer to other ions than to the ion to which it is presumed to be

bound. This is not reasonable. Moreover, from the viewpoint of classical statistical mechanics, in which an electron is characterized by a position and a momentum or energy, it is clear that such a procedure will give a partition function which counts portions of phase space more than once.

A better procedure is suggested by the classical approach: The entire volume of the gas can be divided into approximately spherical volume elements surrounding each ion, and the bound states within each element calculated. The volume elements may be taken of equal size, but when ions of different charges are present it is preferable to make the size of each element proportional to the charge of the ion it contains. Since the radii of the volume elements are smaller than the Debye-Hückel length d , it is reasonable to omit the exponential factor in Eq. (1.7-1), leaving just the ordinary Coulomb field. The lower bound states of electrons in this field will be just the Rydberg states already described in Section 1.3, while the higher ones will deviate due to the finite volume. However, for gas densities of present interest the latter states are high enough to be approximated classically. Classically, the bound electron is unaffected by the finite volume until its energy is sufficient to permit it to reach the boundary, at which point it ceases to be bound. This principle gives a cutoff quantum number for substitution in Eq. (1.3-10):

$$n_c^2 = Ry (Z + 1) r_{Z+1} / e^2, \quad (1.7-3)$$

where r_{Z+1} is the radius of the volume element about an ion of charge $Z + 1$ ($Z + 1$ appears instead of Z because a highly-excited atom or ion of charge Z is treated like an ion of charge $Z + 1$ plus an outer electron.)

1.3 Equilibrium calculations and results for air

Based on the theoretical relations presented in the preceding sections, a FORTRAN code has been written and equilibrium calculations carried out for air between 10,000 and 10,000,000°K, including the Debye-Hückel, variable electronic cutoff, and second virial corrections. The iteration process selected, based on the assumption that the molecular concentrations are smaller than the atomic ones, failed to converge for temperatures below 10,000°K at high densities. No attempt was made to modify it, due to lack of time and the adequacy of the earlier results of Hilsenrath and Klein (1963, 1965) in this lower temperature region.

The basic composition of normal air, used as input, was about the same as that used previously (Gilmore, 1955, 1959; Hilsenrath and Klein, 1963, 1965), except that the CO₂ concentration was decreased slightly in accordance with recent measurements (Kelley and La Chapelle, 1966), and the small amount of neon was lumped in with the argon. This gives the initial composition shown below:

<u>Molecule</u>	<u>Mole per cent</u>
N ₂	78.084
O ₂	20.946
Ar	0.938
CO ₂	0.032

The density range covered was from 10^{-9} to 10 times standard density, where the standard density is $1.2923 \times 10^{-3} \text{ g/cm}^3$, corresponding to the ideal gas mixture at 273.15°K and 1 atm pressure. At the lowest density considered the assumption of thermodynamic equilibrium might seem unrealistic in most practical situations. However, for energy densities corresponding to temperatures above about $10,000^\circ\text{K}$ many free electrons are usually present, and characteristic times for these electrons to equilibrate with each other and with the ion excitation and ionization are only a few milliseconds. Of course, equilibration of ion velocities will take a longer time (though often still short compared to radiative or hydrodynamic cooling times of large masses of air), but the ion kinetic energies make only a relatively small contribution to the total energy and pressure at the higher temperatures. Radiation will also depopulate nonmetastable states below their equilibrium concentrations, but even in equilibrium their populations are small, since at low densities ions tend to ionize further rather than become excited.

The calculated equilibrium compositions are presented graphically in Figs. 2.1 to 2.8. The concentrations of most species agree within a percent with the values of Hilsenrath and Klein (1963, 1965) up to $15,000^\circ\text{K}$, after correcting for the 3 percent smaller initial CO_2 concentration used in the present work. There are, however, differences of several percent in the molecular concentrations, due to use of improved diatomic thermodynamic properties and virial coefficients. Moreover, the O^- concentration is up to a factor of 2 lower, and the O_2^- concentration a couple orders of magnitude higher due to use of revised electron affinities. However, at all temperatures and densities considered the negative ion densities are more than an order of magnitude below the electron densities.

The calculated equilibrium thermodynamic properties are presented in Tables 102 to 111. These values agree within 1 percent with those of Hilsenrath and Klein up to 15,000°K. They also agree within 2 percent with the earlier values of the writer (Gilmcre, 1954, 1959) up to 24,000°K, and of Hilsenrath, Green, and Beckett (1957) up to 5,000,000°K, except for differences of several percent at the higher densities due to omission of virial and Debye-Hückel corrections from the earlier work.

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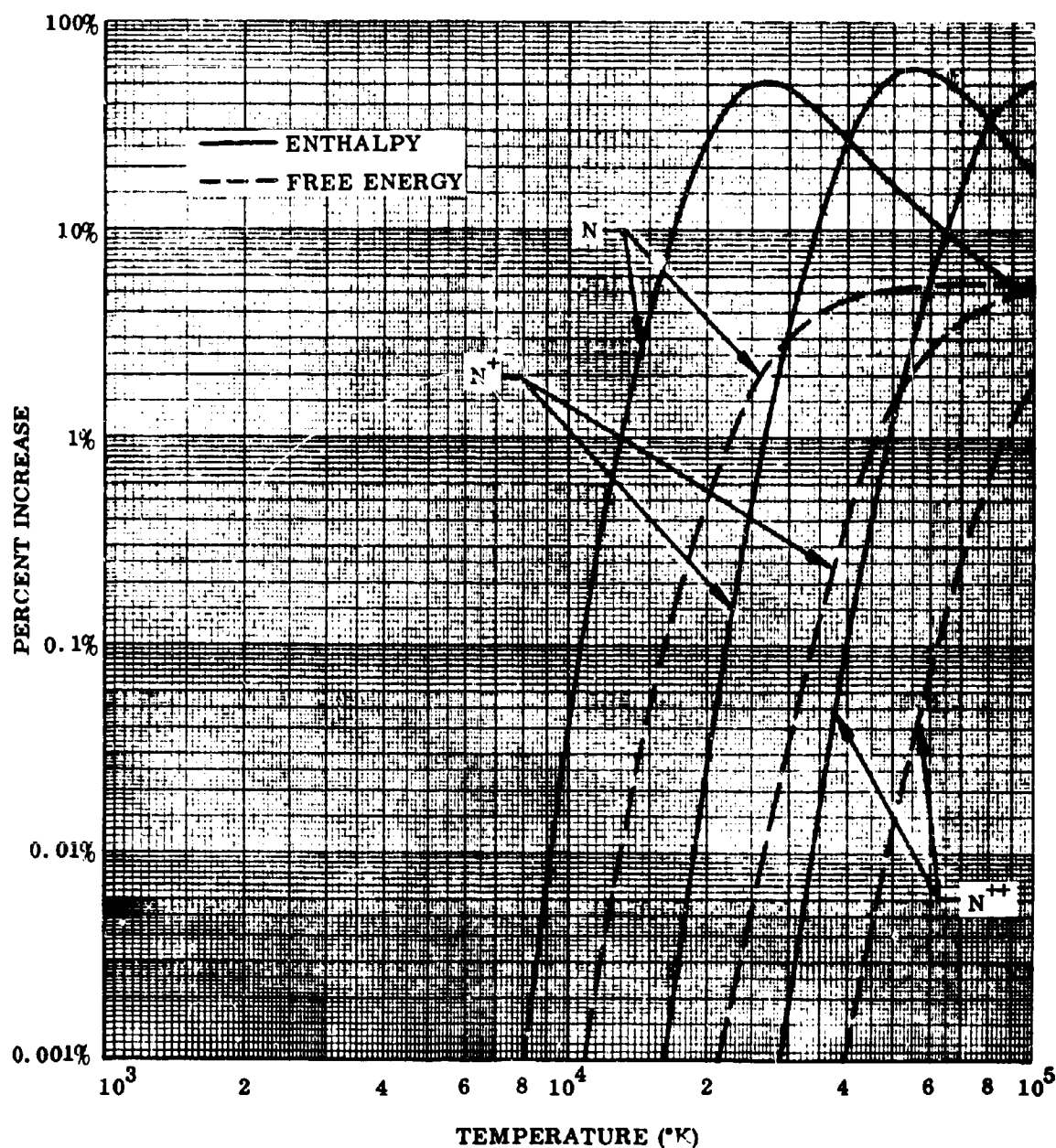
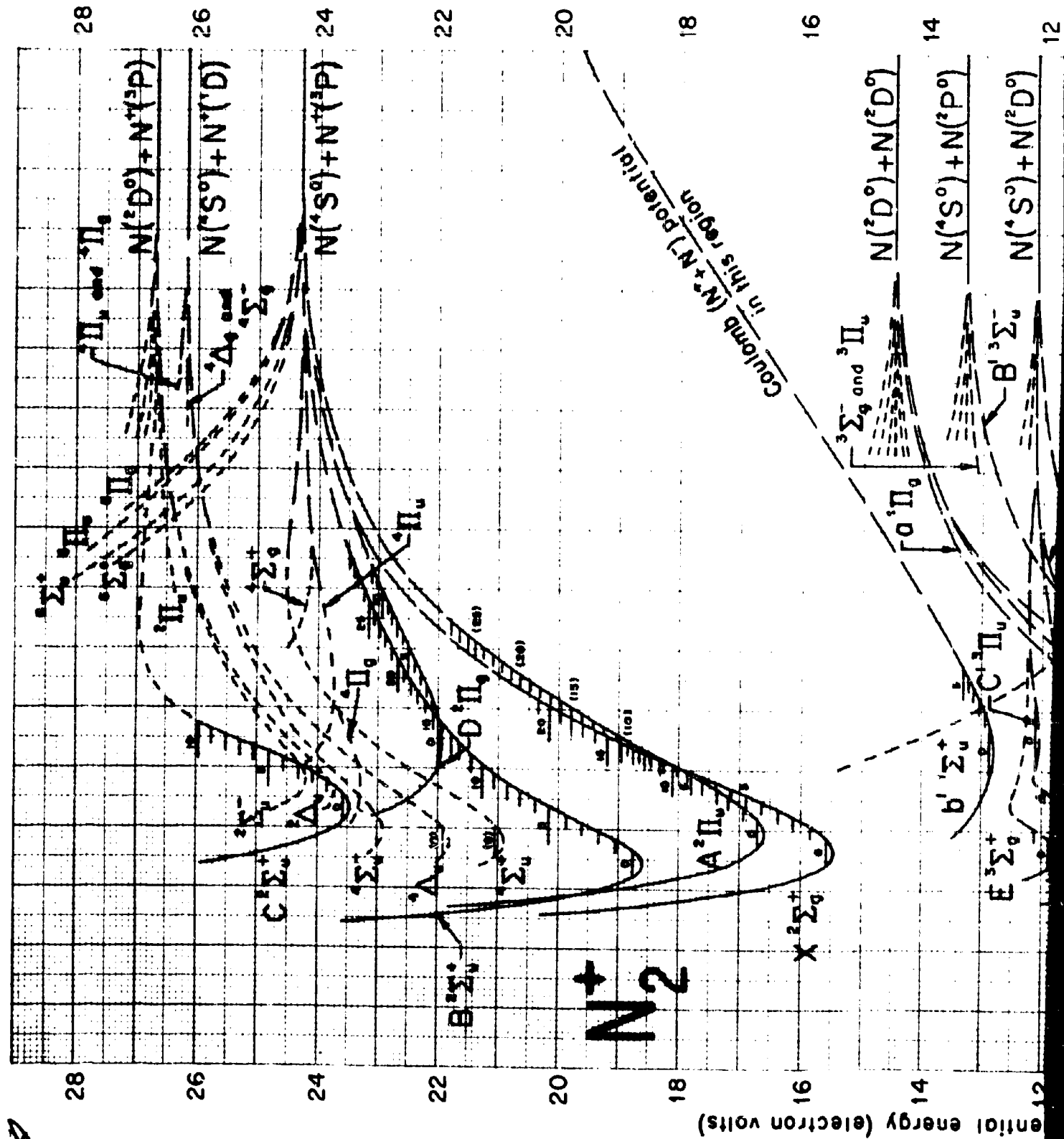


FIG. 1-2 PERCENT INCREASE IN THERMODYNAMIC FUNCTIONS FOR NITROGEN ATOMS AND IONS DUE TO SUMMING OVER ELECTRONIC LEVELS WITH $n \leq 8$ INSTEAD OF $n \leq 4$.



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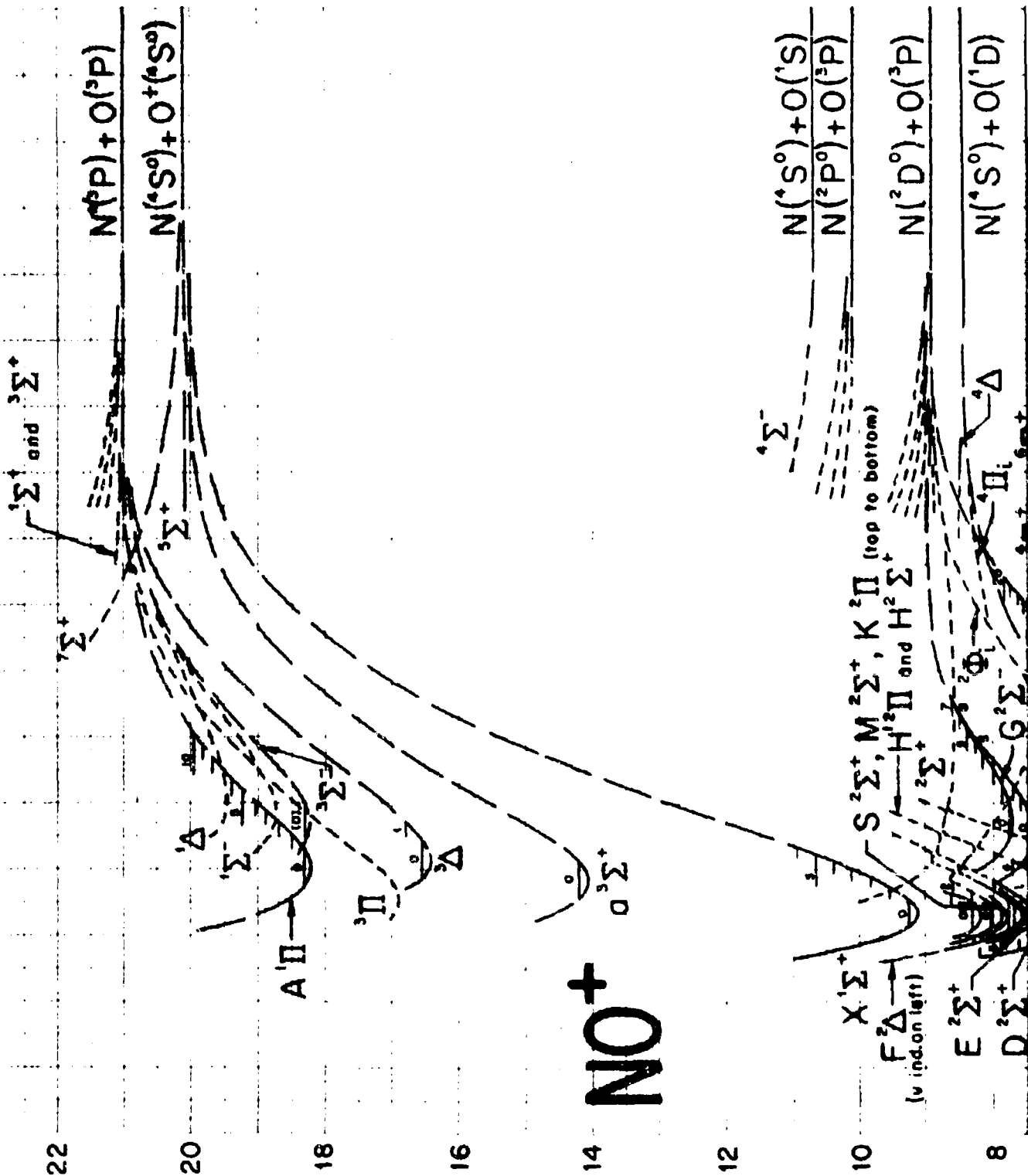
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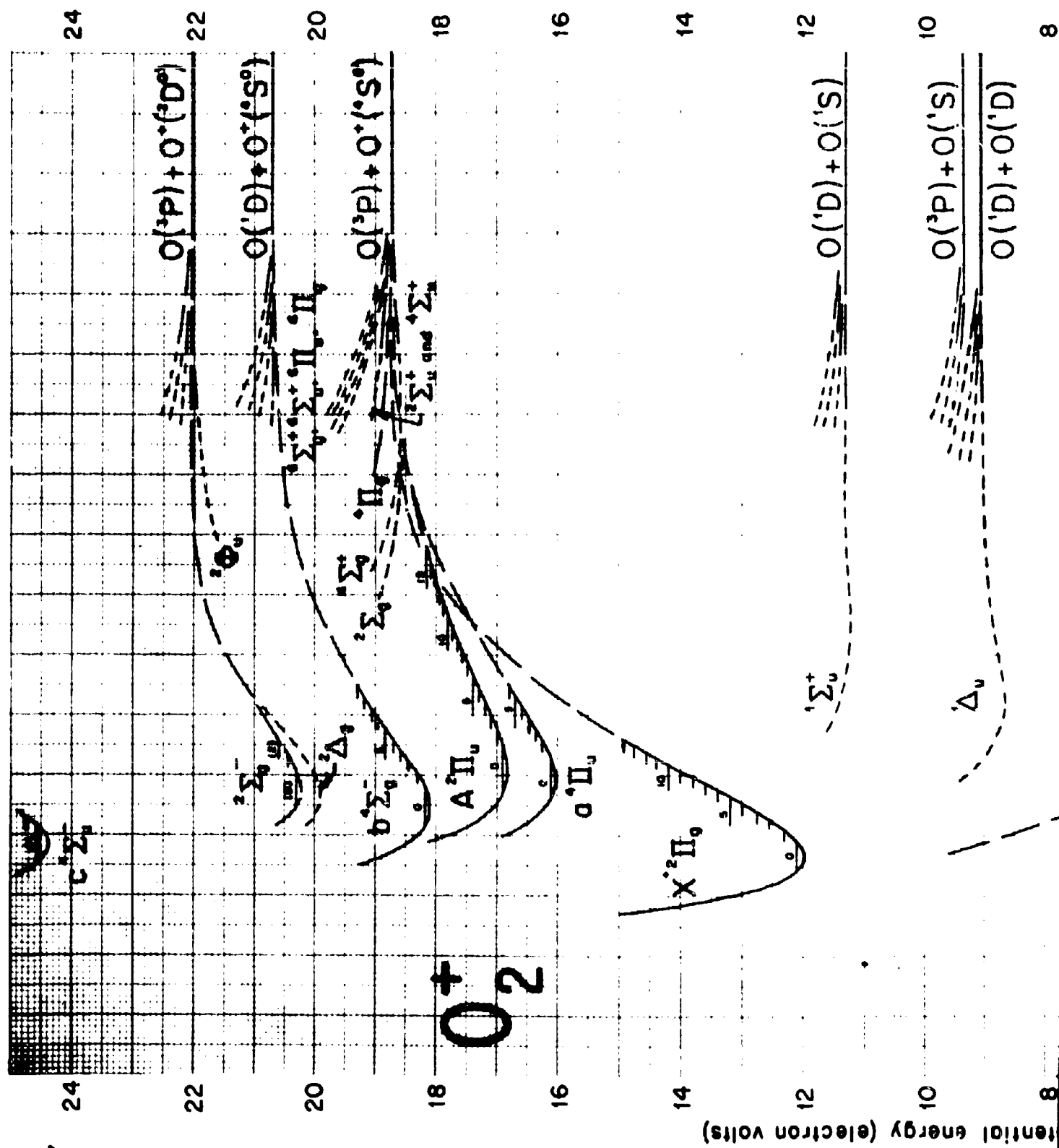
8

8

NO⁺

Potential energy (electron volts)





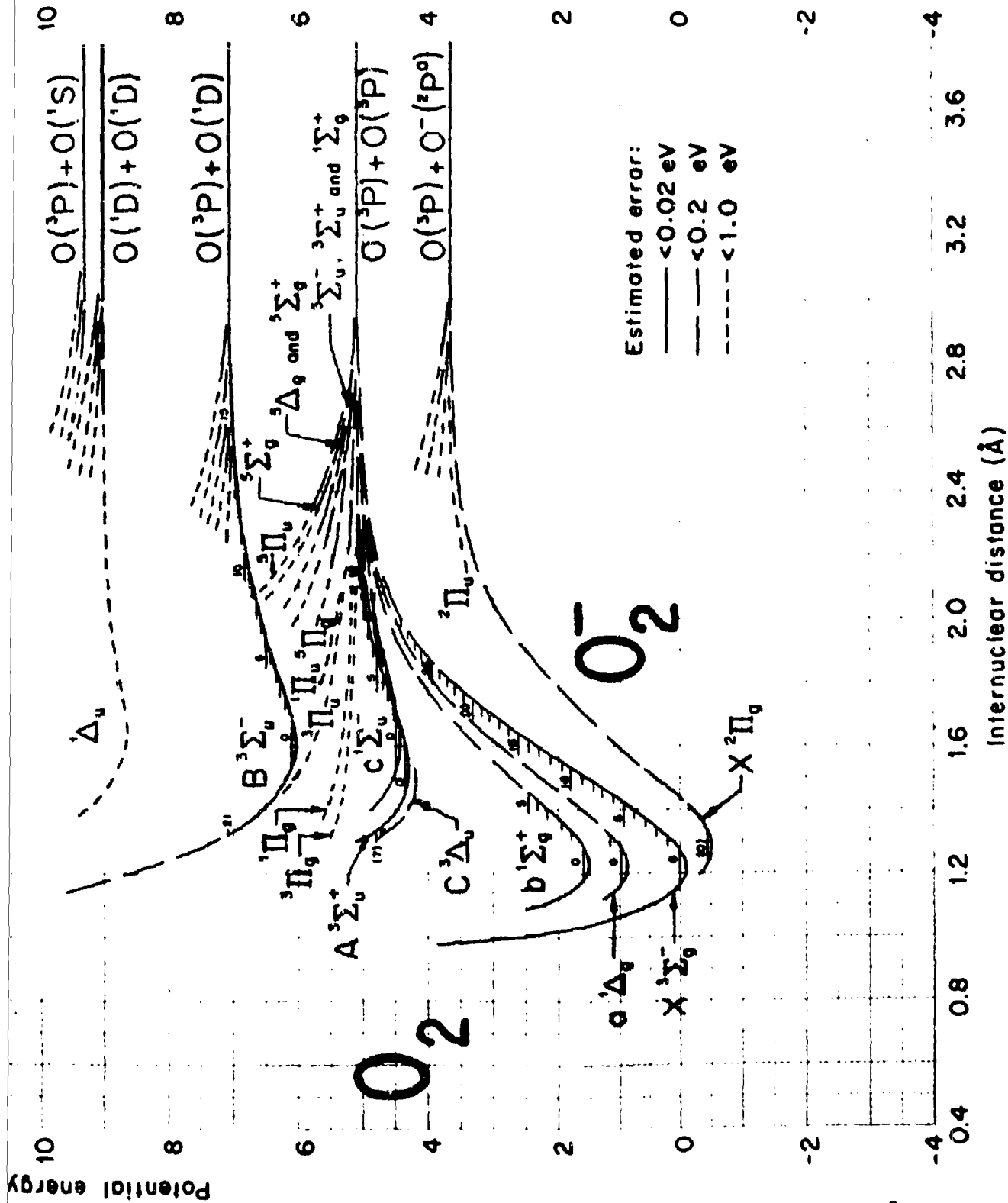


FIG. 1-5 POTENTIAL-ENERGY CURVES FOR O_2^- , O_2 and O_2^+ .

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Chapter 2. THE EQUILIBRIUM THERMODYNAMIC PROPERTIES OF HIGH-TEMPERATURE AIR: TABLES AND GRAPHS

This Chapter contains the following material:

1. Energy Zero for Air Species: Table 1.
2. Ideal-Gas Properties for Monatomic Air Species: Tables 2-45.
3. Energy Levels and Fractional Electronic Populations for Monatomic Air Species: Tables 46-85.
4. Spectroscopic Constants for Diatomic Air Species: Table 86.
5. Ideal-Gas Properties for Diatomic Air Species: Tables 87-94.
6. Fractional Electronic Populations for Diatomic Air Species: Tables 95-101.
7. Dimensionless Pressure, Pressure and Log of Pressure of Equilibrium Air, 10^4 to 10^7 °K, 10^{-9} to 10 Fold Sea Level Air Density: Tables 102-104.
8. Dimensionless Internal Energy, Internal Energy and Internal Energy Density of Equilibrium Air, Same Temperature and Density Range As Above: Tables 105-107.
9. Enthalpy of Equilibrium Air, Same Temperature and Density Range As Above: Table 108.
10. Effective Gamma of Equilibrium Air, Same Temperature and Density Range As Above: Table 109.
11. Dimensionless Entropy of Equilibrium Air, Same Temperature and Density Range as Above: Table 110.
12. Equilibrium Composition of Air, 10^4 to 10^7 °K, 10^{-6} fold to Normal Sea Level Air Density: Figs. 2-1 to 2-8.

Table 1. Energy of Air Particles at 0°K

Species	$E_0^0(\text{cm}^{-1})$	Species	$E_0^0(\text{cm}^{-1})$	Species	$E_0^0(\text{cm}^{-1})$
CO ₂	0	N	39,359	Ar	0
NO ₂	3,065	N ⁺	156,573	Ar ⁺	127,110
NO ₂ ⁻	-29,100	N ⁺⁺	395,324	Ar ⁺⁺	349,958
N ₂	0	N ³⁺	777,950	Ar ³⁺	679,924
N ₂ ⁺	125,667	N ⁴⁺	1,402,801	Ar ⁴⁺	1,162,300
NO	7,506	N ⁵⁺	2,192,317	Ar ⁵⁺	1,767,400
NO ⁺	82,253	N ⁶⁺	6,645,117	Ar ⁶⁺	2,504,000
O ₂ ⁻	-3,470	N ⁷⁺	12,025,206	Ar ⁷⁺	3,504,000
O ₂	0	O ⁻	8,705	Ar ⁸⁺	4,661,800
O ₂ ⁺	97,295	O	20,630	Ar ⁹⁺	8,069,100
CO	23,351	O ⁺	130,467	Ar ¹⁰⁺	11,930,000
C	92,315	O ⁺⁺	413,711	Ar ¹¹⁺	16,277,000
C ⁺	183,129	O ³⁺	856,518	Ar ¹²⁺	21,263,600
C ⁺⁺	379,788	O ⁴⁺	1,480,915	Ar ¹³⁺	26,797,400
C ³⁺	766,002	O ⁵⁺	2,399,617	Ar ¹⁴⁺	32,892,900
C ⁴⁺	128,179	O ⁶⁺	3,513,617	Ar ¹⁵⁺	39,787,100
C ⁵⁺	4,448,629	O ⁷⁺	9,476,617	Ar ¹⁶⁺	47,196,400
C ⁶⁺	8,400,690	O ⁸⁺	16,505,010	Ar ¹⁷⁺	80,386,400
				Ar ¹⁸⁺	116,086,300

TABLE 2. IDEAL GAS FUNCTIONS FOR O- (ATOMIC WEIGHT 15.9999, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $N \leq 4$. SEE TABLE 46 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2 - E_0}{RT}$	$\ln \frac{h^2 - E_0}{RT} - \frac{E_0 - E_0}{RT}$	$\frac{5}{2} R$	$\ln \frac{h^2 - E_0}{RT} - \frac{E_0 - E_0}{RT}$	$\frac{5}{2} R$	$E - E_0$	$\frac{h^2 - E_0}{RT} - \frac{E_0 - E_0}{RT}$	$-(E - E_0)$	TEMP. (°K)
1000	5.3272	2.60216	19.4361	22.0393	5.17092	38.4228	3.1838E 03	5.1709E 03	3.8623E 04	1000
1200	5.4311	2.58958	19.9094	22.0980	5.14592	39.5633	44.7092	6.1795E 03	4.7474E 04	1200
1400	5.4922	2.57858	20.3078	22.0875	5.13405	40.3520	45.4810	4.3944E 03	5.4497E 04	1400
1600	5.5478	2.57150	20.6517	22.2232	5.11000	41.0384	46.1424	4.8944E 03	6.1740E 04	1600
1800	5.5926	2.56487	20.9542	23.5191	5.09682	41.6395	46.7363	5.5974E 03	7.4951E 04	1800
2000	5.6292	2.55934	21.2242	23.7835	5.08583	42.1759	47.2617	6.1973E 03	8.4352E 04	2000
2200	5.6599	2.55466	21.4679	24.0225	5.07654	42.6602	47.7367	6.7968E 03	9.3852E 04	2200
2400	5.6859	2.55066	21.6900	24.2406	5.06858	43.1015	48.1761	7.3957E 03	1.0344E 05	2400
2600	5.7082	2.54720	21.8940	24.4412	5.06170	43.5070	48.5657	7.9938E 03	1.1312E 05	2600
2800	5.7275	2.54417	22.0826	24.6268	5.05569	43.8819	48.9375	8.5919E 03	1.2287E 05	2800
3000	5.7445	2.54151	22.2561	24.7995	5.05040	44.2305	49.2899	9.1897E 03	1.3264E 05	3000
3200	5.7595	2.53915	22.4220	24.9612	5.04570	44.5563	49.6270	9.7873E 03	1.4250E 05	3200
3400	5.7728	2.53704	22.5759	25.1129	5.04151	44.8620	49.9534	1.0363E 04	1.5253E 05	3400
3600	5.7847	2.53514	22.7209	25.2540	5.03775	45.1501	50.1878	1.0967E 04	1.6254E 05	3600
3800	5.7954	2.53343	22.8578	25.3913	5.03434	45.4224	50.4567	1.1579E 04	1.7261E 05	3800
4000	5.8051	2.53188	22.9878	25.5197	5.03126	45.6805	50.7118	1.2174E 04	1.8272E 05	4000
4200	5.8140	2.53046	23.1113	25.6417	5.02845	45.9259	50.9544	1.2773E 04	1.9289E 05	4200
4400	5.8220	2.52917	23.2290	25.7581	5.02587	46.1598	51.1857	1.3370E 04	2.0310E 05	4400
4600	5.8294	2.52798	23.3414	25.8693	5.02350	46.3832	51.4067	1.3967E 04	2.1336E 05	4600
4800	5.8362	2.52688	23.4489	25.9758	5.02132	46.5969	51.6182	1.4564E 04	2.2367E 05	4800
5000	5.8425	2.52586	23.5521	26.0779	5.01931	46.8018	51.8212	1.5161E 04	2.3401E 05	5000
5200	5.8483	2.52492	23.6511	26.1760	5.01744	46.9987	52.0161	1.5757E 04	2.4439E 05	5200
5400	5.8538	2.52405	23.7464	26.2704	5.01570	47.1860	52.2037	1.6354E 04	2.5482E 05	5400
5600	5.8588	2.52323	23.8382	26.3614	5.01408	47.3704	52.3845	1.6951E 04	2.6527E 05	5600
5800	5.8635	2.52247	23.9267	26.4492	5.01251	47.5463	52.5589	1.7547E 04	2.7577E 05	5800
6000	5.8679	2.52175	24.0122	26.5340	5.01114	47.7162	52.7274	1.8144E 04	2.8630E 05	6000
6200	5.8720	2.52108	24.0949	26.6160	5.00981	47.8805	52.8903	1.8740E 04	2.9686E 05	6200
6400	5.8759	2.52045	24.1749	26.6954	5.00856	48.0395	53.0481	1.9337E 04	3.0745E 05	6400
6600	5.8795	2.51986	24.2525	26.7723	5.00738	48.1936	53.2018	1.9933E 04	3.1809E 05	6600
6800	5.8830	2.51930	24.3277	26.8470	5.00627	48.3431	53.3494	2.0530E 04	3.2873E 05	6800
7000	5.8862	2.51877	24.4007	26.9195	5.00522	48.4882	53.4934	2.1124E 04	3.3942E 05	7000
7200	5.8893	2.51827	24.4716	26.9899	5.00422	48.6292	53.6334	2.1723E 04	3.5013E 05	7200
7400	5.8922	2.51779	24.5404	27.0584	5.00327	48.7663	53.7694	2.2319E 04	3.6087E 05	7400
7600	5.8950	2.51734	24.6078	27.1251	5.00238	48.8997	53.9021	2.2914E 04	3.7164E 05	7600
7800	5.8976	2.51692	24.6732	27.1901	5.00153	49.0296	54.0312	2.3512E 04	3.8243E 05	7800
8000	5.9001	2.51651	24.7369	27.2534	5.00072	49.1563	54.1570	2.4105E 04	3.9323E 05	8000
8200	5.9024	2.51612	24.7990	27.3151	4.99994	49.2797	54.2797	2.4704E 04	4.0409E 05	8200
8400	5.9047	2.51575	24.8596	27.3754	4.99920	49.4002	54.3994	2.5301E 04	4.1505E 05	8400
8600	5.9069	2.51539	24.9188	27.4342	4.99850	49.5178	54.5163	2.5897E 04	4.2605E 05	8600
8800	5.9089	2.51505	24.9767	27.4917	4.99783	49.6327	54.6308	2.6494E 04	4.3717E 05	8800
9000	5.9109	2.51473	25.0332	27.5479	4.99718	49.7450	54.7422	2.7090E 04	4.4835E 05	9000
9200	5.9128	2.51442	25.0884	27.6029	4.99657	49.8549	54.8514	2.7686E 04	4.5962E 05	9200
9400	5.9146	2.51412	25.1425	27.6566	4.99597	49.9623	54.9583	2.8283E 04	4.7095E 05	9400
9600	5.9164	2.51384	25.1954	27.7093	4.99541	50.0675	55.0639	2.8879E 04	4.8235E 05	9600
9800	5.9180	2.51356	25.2473	27.7608	4.99486	50.1705	55.1654	2.9475E 04	4.9387E 05	9800

TABLE 2 (CONT.). IDEAL GAS FUNCTIONS FOR O-

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2}{8\pi^2}$	$\frac{h^2}{8\pi^2}$	$\frac{h^2}{8\pi^2}$	$\frac{h^2}{8\pi^2}$	$\frac{h^2}{8\pi^2}$	$\frac{h^2}{8\pi^2}$	$\frac{h^2}{8\pi^2}$	$\frac{h^2}{8\pi^2}$	TEMP. (°K)
10000	5.9194	2.5133	25.5965	27.8113	4.99434	55.2637	3.0072E 04	4.9943E 04	5.271E 05	10000
10500	5.9234	2.51268	25.5207	27.9333	4.99311	55.1550	3.1562E 04	5.2620E 04	5.3001E 05	10500
11000	5.9268	2.51212	25.5375	28.0497	4.99200	55.7473	3.3453E 04	5.4912E 04	5.5022E 05	11000
11500	5.9299	2.51150	25.5492	28.1608	4.99097	56.4532	3.4944E 04	5.7394E 04	5.8619E 05	11500
12000	5.9328	2.51113	25.5561	28.2672	4.99004	57.1816	3.6034E 04	5.9300E 04	6.1611E 05	12000
12500	5.9355	2.51070	25.5596	28.3693	4.98917	57.9353	3.7329E 04	6.2362E 04	6.4232E 05	12500
13000	5.9379	2.51029	25.5570	28.4673	4.98837	58.7083	3.8914E 04	6.4694E 04	6.7059E 05	13000
13500	5.9402	2.50992	25.5518	28.5617	4.98763	59.5002	4.0793E 04	6.7333E 04	6.9906E 05	13500
14000	5.9423	2.50957	25.5430	28.6526	4.98694	60.3125	4.2907E 04	7.0317E 04	7.2731E 05	14000
14500	5.9442	2.50925	25.5311	28.7403	4.98629	61.1455	4.5267E 04	7.3601E 04	7.5582E 05	14500
4.4978E 04	7.4789E 04	7.8442E 05	15500	5.9478	2.50864	26.3904	28.9071	4.90313	52.4580	57.4432
BAD BLOCK SKIPPED										
16500	5.9509	2.50819	25.5253	29.0634	4.98610	52.7497	5.2442E 04	8.2230E 04	8.7070E 05	16500
17000	5.9523	2.50791	25.5201	29.1380	4.98563	53.5021	5.4540E 04	8.4722E 04	8.9961E 05	17000
17500	5.9537	2.50769	25.5168	29.2105	4.98519	54.2629	5.6830E 04	8.7204E 04	9.2840E 05	17500
18000	5.9550	2.50748	25.5135	29.2809	4.98477	55.0333	5.9321E 04	8.9690E 04	9.5764E 05	18000
18500	5.9562	2.50728	25.5102	29.3494	4.98438	55.8122	6.1911E 04	9.2174E 04	9.8679E 05	18500
19000	5.9573	2.50709	25.5070	29.4161	4.98400	56.6000	6.4602E 04	9.4650E 04	1.0160E 06	19000
19500	5.9584	2.50691	25.5041	29.4811	4.98365	57.3977	6.7392E 04	9.7142E 04	1.0452E 06	19500
20000	5.9594	2.50674	25.5016	29.5443	4.98331	58.2022	7.0282E 04	9.9624E 04	1.0744E 06	20000
20500	5.9604	2.50658	25.5000	29.6058	4.98300	59.0130	7.3272E 04	1.0192E 05	1.1036E 06	20500
21000	5.9614	2.50643	25.4985	29.6658	4.98271	59.8302	7.6362E 04	1.0440E 05	1.1331E 06	21000
21500	5.9623	2.50629	25.4971	29.7243	4.98245	60.6537	7.9452E 04	1.0688E 05	1.1626E 06	21500
22000	5.9631	2.50616	25.4958	29.7813	4.98221	61.4833	8.2542E 04	1.0936E 05	1.1921E 06	22000
22500	5.9639	2.50603	25.4945	29.8378	4.98198	62.3188	8.5632E 04	1.1184E 05	1.2216E 06	22500
23000	5.9647	2.50591	25.4932	29.8938	4.98176	63.1603	8.8722E 04	1.1432E 05	1.2511E 06	23000
23500	5.9654	2.50579	25.4920	29.9493	4.98155	64.0077	9.1812E 04	1.1680E 05	1.2806E 06	23500
24000	5.9661	2.50568	25.4908	30.0043	4.98135	64.8602	9.4902E 04	1.1928E 05	1.3101E 06	24000
24500	5.9668	2.50557	25.4896	30.0588	4.98115	65.7177	9.7992E 04	1.2176E 05	1.3396E 06	24500
25000	5.9675	2.50546	25.4884	30.1128	4.98096	66.5802	1.0088E 04	1.2424E 05	1.3691E 06	25000
25500	5.9682	2.50535	25.4872	30.1663	4.98077	67.4477	1.0384E 04	1.2672E 05	1.3986E 06	25500
26000	5.9689	2.50524	25.4860	30.2193	4.98058	68.3202	1.0680E 04	1.2920E 05	1.4281E 06	26000
26500	5.9696	2.50513	25.4848	30.2718	4.98039	69.1977	1.0976E 04	1.3168E 05	1.4576E 06	26500
27000	5.9703	2.50502	25.4836	30.3238	4.98021	70.0802	1.1272E 04	1.3416E 05	1.4871E 06	27000
27500	5.9710	2.50491	25.4824	30.3753	4.98003	70.9677	1.1568E 04	1.3664E 05	1.5166E 06	27500
28000	5.9717	2.50480	25.4812	30.4263	4.97985	71.8602	1.1864E 04	1.3912E 05	1.5461E 06	28000
28500	5.9724	2.50469	25.4800	30.4768	4.97967	72.7577	1.2160E 04	1.4160E 05	1.5756E 06	28500
29000	5.9731	2.50458	25.4788	30.5268	4.97949	73.6602	1.2456E 04	1.4408E 05	1.6051E 06	29000
29500	5.9738	2.50447	25.4776	30.5763	4.97931	74.5677	1.2752E 04	1.4656E 05	1.6346E 06	29500
30000	5.9745	2.50436	25.4764	30.6253	4.97913	75.4802	1.3048E 04	1.4904E 05	1.6641E 06	30000
30500	5.9752	2.50425	25.4752	30.6738	4.97895	76.3977	1.3340E 04	1.5152E 05	1.6936E 06	30500
31000	5.9759	2.50414	25.4740	30.7218	4.97877	77.3202	1.3632E 04	1.5400E 05	1.7231E 06	31000
31500	5.9766	2.50403	25.4728	30.7693	4.97859	78.2477	1.3924E 04	1.5648E 05	1.7526E 06	31500
32000	5.9773	2.50392	25.4716	30.8163	4.97841	79.1802	1.4216E 04	1.5896E 05	1.7821E 06	32000
32500	5.9780	2.50381	25.4704	30.8628	4.97823	80.1177	1.4508E 04	1.6144E 05	1.8116E 06	32500
33000	5.9787	2.50370	25.4692	30.9088	4.97805	81.0602	1.4800E 04	1.6392E 05	1.8411E 06	33000
33500	5.9794	2.50359	25.4680	30.9543	4.97787	82.0077	1.5092E 04	1.6640E 05	1.8706E 06	33500
34000	5.9801	2.50348	25.4668	31.0003	4.97769	82.9602	1.5384E 04	1.6888E 05	1.9001E 06	34000
34500	5.9808	2.50337	25.4656	31.0458	4.97751	83.9177	1.5676E 04	1.7136E 05	1.9296E 06	34500
35000	5.9815	2.50326	25.4644	31.0908	4.97733	84.8802	1.5968E 04	1.7384E 05	1.9591E 06	35000
35500	5.9822	2.50315	25.4632	31.1353	4.97715	85.8477	1.6260E 04	1.7632E 05	1.9886E 06	35500
36000	5.9829	2.50304	25.4620	31.1793	4.97697	86.8202	1.6552E 04	1.7880E 05	2.0181E 06	36000
36500	5.9836	2.50293	25.4608	31.2228	4.97679	87.7977	1.6844E 04	1.8128E 05	2.0476E 06	36500
37000	5.9843	2.50282	25.4596	31.2658	4.97661	88.7802	1.7136E 04	1.8376E 05	2.0771E 06	37000
37500	5.9850	2.50271	25.4584	31.3083	4.97643	89.7677	1.7428E 04	1.8624E 05	2.1066E 06	37500
38000	5.9857	2.50260	25.4572	31.3503	4.97625	90.7602	1.7720E 04	1.8872E 05	2.1361E 06	38000
38500	5.9864	2.50249	25.4560	31.3918	4.97607	91.7577	1.8012E 04	1.9120E 05	2.1656E 06	38500
39000	5.9871	2.50238	25.4548	31.4328	4.97589	92.7602	1.8304E 04	1.9368E 05	2.1951E 06	39000
39500	5.9878	2.50227	25.4536	31.4733	4.97571	93.7677	1.8596E 04	1.9616E 05	2.2246E 06	39500
40000	5.9796	2.50339	20.7739	31.2773	4.97466	97.1704	1.1950E 05	1.9099E 05	2.2071E 06	40000
42000	5.9806	2.50323	28.8960	31.3992	4.97434	97.4211	1.2544E 05	2.0092E 05	2.2417E 06	42000
44000	5.9814	2.50309	29.0124	31.5195	4.97405	97.6525	1.3142E 05	2.1084E 05	2.2536E 06	44000
46000	5.9823	2.50295	29.1237	31.6267	4.97378	97.8756	1.3737E 05	2.2079E 05	2.2622E 06	46000
48000	5.9830	2.50280	29.2302	31.7331	4.97354	98.0953	1.4335E 05	2.3073E 05	2.27081E 06	48000
50000	5.9837	2.50272	29.3324	31.8351	4.97332	98.2853	1.4931E 05	2.4047E 05	2.29144E 06	50000

TABLE 3. IDEAL GAS FUNCTIONS FOR C (ATOMIC WEIGHT 12.0112, R = 1.98717 CAL/MOLE)

BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $n \leq 4$. SEE TABLE 47 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL FUNCT.	$\frac{h^2 - E_0}{RT}$	$-\frac{h^2 - E_0}{RT}$	$5T$	$10^3 - \frac{E_0}{T}$ CAL/MOLE	$-10^3 - \frac{E_0}{T}$ CAL/MOLE	δ	$E^0 - E_0^0$	$-H^0 - E_0^0$ CAL/MOLE	$-(E^0 - E_0^0)$	TEMP. (°K)
1000	8.6287	2.84209	19.4880	22.0301	5.05156	38.7260	43.7775	3.0644E 03	5.0516E 03	3.8728E 04	1000
1200	8.6875	2.53519	19.9509	22.4861	5.03783	39.4657	44.6835	3.6608E 03	6.0454E 03	4.7579E 04	1200
1400	8.7314	2.30334	20.3413	22.8716	5.02812	40.4215	45.4497	4.2575E 03	7.0399E 03	5.6590E 04	1400
1600	8.7648	2.12698	20.6789	23.2059	5.02152	41.0925	46.1140	4.8550E 03	8.0344E 03	6.5740E 04	1600
1800	8.7915	2.02685	20.9764	23.5013	5.01730	41.6837	46.7010	5.4542E 03	9.0311E 03	7.5031E 04	1800
2000	8.8140	2.02269	21.2424	23.7663	5.01539	42.2122	47.2776	6.0545E 03	1.0031E 04	8.4424E 04	2000
2200	8.8341	2.02406	21.4830	24.0070	5.01520	42.6902	47.7059	6.6428E 03	1.1035E 04	9.3910E 04	2200
2400	8.8530	2.02531	21.7026	24.2279	5.01620	43.1267	48.1449	7.2745E 03	1.2044E 04	1.0390E 05	2400
2600	8.8717	2.02758	21.9048	24.4324	5.02271	43.5285	48.5912	7.8924E 03	1.3059E 04	1.1317E 05	2600
2800	8.8909	2.03077	22.0923	24.6230	5.02904	43.9010	48.9300	8.5173E 03	1.4081E 04	1.2292E 05	2800
3000	8.9109	2.03478	22.2670	24.8016	5.03703	44.2482	49.2852	9.1496E 03	1.5111E 04	1.3274E 05	3000
3200	8.9325	2.03948	22.4307	24.9702	5.04637	44.5736	49.6199	9.7995E 03	1.6148E 04	1.4264E 05	3200
3400	8.9551	2.04474	22.5848	25.1294	5.05683	44.8798	49.9364	1.0437E 04	1.7193E 04	1.5259E 05	3400
3600	8.9784	2.05045	22.7305	25.2809	5.06816	45.1692	50.2373	1.1092E 04	1.8245E 04	1.6261E 05	3600
3800	8.9954	2.05648	22.8685	25.4250	5.08015	45.4435	50.5237	1.1753E 04	1.9305E 04	1.7289E 05	3800
4000	9.0136	2.06274	22.9998	25.5625	5.09260	45.7044	50.7970	1.2422E 04	2.0370E 04	1.8328E 05	4000
4200	9.0321	2.06915	23.1259	25.6941	5.10532	45.9532	51.0595	1.3096E 04	2.1442E 04	1.9360E 05	4200
4400	9.0509	2.07561	23.2467	25.8203	5.11817	46.1910	51.3091	1.3774E 04	2.2520E 04	2.0324E 05	4400
4600	9.1248	2.08200	23.3593	25.9414	5.13102	46.4188	51.5498	1.4462E 04	2.3603E 04	2.1353E 05	4600
4800	9.1577	2.08850	23.4693	26.0578	5.14377	46.6374	51.7812	1.5152E 04	2.4699E 04	2.2366E 05	4800
5000	9.1920	2.09483	23.5751	26.1699	5.15635	46.8477	52.0040	1.5844E 04	2.5782E 04	2.3424E 05	5000
5200	9.2274	2.10103	23.6770	26.2780	5.16868	47.0501	52.2188	1.6544E 04	2.6877E 04	2.4464E 05	5200
5400	9.2637	2.10710	23.7753	26.3824	5.18073	47.2454	52.4262	1.7245E 04	2.7976E 04	2.5513E 05	5400
5600	9.3009	2.11300	23.8702	26.4832	5.19246	47.4341	52.6285	1.7950E 04	2.9078E 04	2.6563E 05	5600
5800	9.3387	2.11873	23.9620	26.5807	5.20384	47.6165	52.8263	1.8657E 04	3.0182E 04	2.7618E 05	5800
6000	9.3773	2.12428	24.0509	26.6752	5.21487	47.7931	53.0079	1.9364E 04	3.1289E 04	2.8676E 05	6000
6200	9.4164	2.12965	24.1370	26.7667	5.22554	47.9642	53.1800	2.0078E 04	3.2398E 04	2.9730E 05	6200
6400	9.4560	2.13484	24.2206	26.8554	5.23586	48.1303	53.3442	2.0792E 04	3.3509E 04	3.0803E 05	6400
6600	9.4961	2.13985	24.3017	26.9416	5.24582	48.2916	53.5374	2.1507E 04	3.4622E 04	3.1872E 05	6600
6800	9.5365	2.14470	24.3806	27.0253	5.25545	48.4483	53.7038	2.2224E 04	3.5737E 04	3.2945E 05	6800
7000	9.5772	2.14936	24.4574	27.1067	5.26475	48.6008	53.8455	2.2943E 04	3.6853E 04	3.4021E 05	7000
7200	9.6182	2.15391	24.5320	27.1860	5.27375	48.7492	54.0230	2.3663E 04	3.7971E 04	3.5099E 05	7200
7400	9.6595	2.15829	24.6048	27.2631	5.28244	48.8939	54.1743	2.4383E 04	3.9090E 04	3.6181E 05	7400
7600	9.7009	2.16255	24.6758	27.3383	5.29082	49.0348	54.3258	2.5102E 04	4.0211E 04	3.7266E 05	7600
7800	9.7424	2.16668	24.7450	27.4117	5.29891	49.1724	54.4715	2.5833E 04	4.1333E 04	3.8354E 05	7800
8000	9.7841	2.17071	24.8126	27.4833	5.30715	49.3066	54.6138	2.6568E 04	4.2457E 04	3.9445E 05	8000
8200	9.8260	2.17465	24.8785	27.5532	5.31497	49.4378	54.7528	2.7308E 04	4.3589E 04	4.0539E 05	8200
8400	9.8679	2.17852	24.9430	27.6216	5.32265	49.5660	54.8884	2.8018E 04	4.4710E 04	4.1635E 05	8400
8600	9.9098	2.18232	25.0061	27.6884	5.33021	49.6913	55.0215	2.8750E 04	4.5840E 04	4.2735E 05	8600
8800	9.9519	2.18600	25.0678	27.7539	5.33768	49.8139	55.1516	2.9485E 04	4.6972E 04	4.3834E 05	8800
9000	9.9940	2.18961	25.1282	27.8180	5.34509	49.9340	55.2790	3.0221E 04	4.8104E 04	4.4941E 05	9000
9200	10.0362	2.19355	25.1874	27.8809	5.35245	50.0515	55.4040	3.0961E 04	4.9243E 04	4.6047E 05	9200
9400	10.0785	2.19726	25.2454	27.9428	5.35990	50.1667	55.5264	3.1704E 04	5.0393E 04	4.7157E 05	9400
9600	10.1208	2.20101	25.3022	28.0032	5.36734	50.2796	55.6470	3.2450E 04	5.1527E 04	4.8268E 05	9600
9800	10.1632	2.20481	25.3579	28.0627	5.37490	50.3904	55.7653	3.3200E 04	5.2674E 04	4.9383E 05	9800

TABLE 3 (CONT.-1). IDEAL GAS FUNCTIONS FOR C

TEMP. (°F)	PARTIAL PRESS.	$\frac{h^* - h}{RT}$	$\ln \frac{h^*}{h}$	$\ln \frac{h^* - h}{RT}$	$-\ln \frac{h^* - h}{RT}$	$\frac{h^* - h}{RT}$	$\ln \frac{h^* - h}{RT}$	$\ln \frac{h^* - h}{RT}$	$\ln \frac{h^* - h}{RT}$	$\ln \frac{h^* - h}{RT}$	TEMP. (°F)
10000	10.2058	2.70647	25.4126	5.34258	50.4990	59.0816	3.39545	0.4	5.38345	0.4	10000
10500	10.3127	2.71873	25.5450	5.40254	50.7621	59.1647	3.39522	0.4	5.38272	0.4	10500
11000	10.4207	2.72940	25.6717	5.45817	51.0140	59.2381	3.39498	0.4	5.38198	0.4	11000
11500	10.5294	2.73960	25.7933	5.50821	51.2536	59.3036	3.39472	0.4	5.38122	0.4	11500
12000	10.6422	2.74951	25.9103	5.55406	51.4800	59.3627	3.39445	0.4	5.38045	0.4	12000
12500	10.7597	2.75911	26.0230	5.59647	51.7121	59.4168	3.39417	0.4	5.38000	0.4	12500
13000	10.8748	2.76844	26.1320	5.63586	51.9284	59.4672	3.39389	0.4	5.37957	0.4	13000
13500	10.9872	2.77754	26.2376	5.67277	52.1304	59.5151	3.39361	0.4	5.37915	0.4	13500
14000	11.1247	2.82794	26.3400	5.70680	52.3419	59.5616	3.39333	0.4	5.37872	0.4	14000
14500	11.2581	2.85209	26.4396	5.74758	52.5000	59.6075	3.39305	0.4	5.37830	0.4	14500
15000	11.3964	2.87682	26.5368	5.78499	52.7330	59.6537	3.39277	0.4	5.37787	0.4	15000
15500	11.5443	2.90233	26.6317	5.81914	52.9215	59.7004	3.39249	0.4	5.37745	0.4	15500
16000	11.7028	2.94034	26.7245	5.84948	53.1060	59.7469	3.39221	0.4	5.37702	0.4	16000
16500	11.8687	2.97512	26.8155	5.87604	53.2840	59.7939	3.39193	0.4	5.37659	0.4	16500
17000	12.0448	3.01230	26.9049	5.90023	53.4444	59.8407	3.39165	0.4	5.37617	0.4	17000
17500	12.2320	3.05236	26.9927	5.92255	53.5991	59.8864	3.39137	0.4	5.37574	0.4	17500
18000	12.4312	3.09457	27.0793	5.94342	53.7411	59.9309	3.39109	0.4	5.37531	0.4	18000
18500	12.6429	3.13894	27.1647	5.96299	53.8808	59.9744	3.39081	0.4	5.37488	0.4	18500
19000	12.8680	3.18526	27.2490	5.98144	54.0183	60.0170	3.39053	0.4	5.37445	0.4	19000
19500	13.1072	3.23331	27.3324	5.99813	54.1540	60.0589	3.39025	0.4	5.37402	0.4	19500
20000	13.3612	3.28285	27.4149	6.01356	54.2779	61.0014	3.38997	0.4	5.37359	0.4	20000
20500	13.6299	3.33406	27.4967	6.02786	54.3999	61.9449	3.38969	0.4	5.37316	0.4	20500
21000	13.9031	3.38694	27.5779	6.04105	54.5199	62.8884	3.38941	0.4	5.37273	0.4	21000
21500	14.1807	3.44151	27.6584	6.05314	54.6379	63.8319	3.38913	0.4	5.37230	0.4	21500
22000	14.4635	3.49676	27.7384	6.06413	54.7539	64.7754	3.38885	0.4	5.37187	0.4	22000
22500	14.7513	3.55369	27.8179	6.07402	54.8679	65.7189	3.38857	0.4	5.37144	0.4	22500
23000	15.0441	3.61132	27.8969	6.08281	54.9799	66.6624	3.38829	0.4	5.37101	0.4	23000
23500	15.3419	3.66964	27.9754	6.09150	55.0899	67.6059	3.38801	0.4	5.37058	0.4	23500
24000	15.6447	3.72864	28.0534	6.09919	55.1979	68.5494	3.38773	0.4	5.37015	0.4	24000
24500	15.9525	3.78832	28.1309	6.10578	55.3039	69.4929	3.38745	0.4	5.36972	0.4	24500
25000	16.2653	3.84869	28.2079	6.11227	55.4079	70.4364	3.38717	0.4	5.36929	0.4	25000
25500	16.5831	3.90976	28.2844	6.11866	55.5099	71.3799	3.38689	0.4	5.36886	0.4	25500
26000	16.9059	3.97152	28.3604	6.12495	55.6099	72.3234	3.38661	0.4	5.36843	0.4	26000
26500	17.2337	4.03399	28.4359	6.13114	55.7079	73.2669	3.38633	0.4	5.36800	0.4	26500
27000	17.5665	4.09716	28.5109	6.13723	55.8039	74.2104	3.38605	0.4	5.36757	0.4	27000
27500	17.9043	4.16103	28.5854	6.14322	55.8979	75.1539	3.38577	0.4	5.36714	0.4	27500
28000	18.2471	4.22560	28.6594	6.14911	55.9899	76.0974	3.38549	0.4	5.36671	0.4	28000
28500	18.5949	4.29087	28.7329	6.15490	56.0799	77.0409	3.38521	0.4	5.36628	0.4	28500
29000	18.9477	4.35684	28.8059	6.16059	56.1679	77.9844	3.38493	0.4	5.36585	0.4	29000
29500	19.3055	4.42351	28.8784	6.16618	56.2539	78.9279	3.38465	0.4	5.36542	0.4	29500
30000	19.6683	4.49078	28.9504	6.17167	56.3379	79.8714	3.38437	0.4	5.36499	0.4	30000
30500	20.0361	4.55865	29.0219	6.17706	56.4199	80.8149	3.38409	0.4	5.36456	0.4	30500
31000	20.4089	4.62712	29.0929	6.18235	56.5009	81.7584	3.38381	0.4	5.36413	0.4	31000
31500	20.7867	4.69619	29.1634	6.18754	56.5799	82.7019	3.38353	0.4	5.36370	0.4	31500
32000	21.1695	4.76586	29.2334	6.19263	56.6579	83.6454	3.38325	0.4	5.36327	0.4	32000
32500	21.5573	4.83613	29.3029	6.19762	56.7349	84.5889	3.38297	0.4	5.36284	0.4	32500
33000	21.9501	4.90700	29.3719	6.20251	56.8109	85.5324	3.38269	0.4	5.36241	0.4	33000
33500	22.3479	4.97847	29.4404	6.20730	56.8859	86.4759	3.38241	0.4	5.36198	0.4	33500
34000	22.7507	5.05054	29.5084	6.21209	56.9599	87.4194	3.38213	0.4	5.36155	0.4	34000
34500	23.1585	5.12321	29.5759	6.21678	57.0329	88.3629	3.38185	0.4	5.36112	0.4	34500
35000	23.5713	5.19648	29.6429	6.22137	57.1049	89.3064	3.38157	0.4	5.36069	0.4	35000
35500	23.9891	5.27035	29.7094	6.22586	57.1759	90.2499	3.38129	0.4	5.36026	0.4	35500
36000	24.4119	5.34482	29.7754	6.23025	57.2459	91.1934	3.38101	0.4	5.35983	0.4	36000
36500	24.8407	5.42089	29.8409	6.23454	57.3149	92.1369	3.38073	0.4	5.35940	0.4	36500
37000	25.2755	5.49756	29.9059	6.23873	57.3829	93.0804	3.38045	0.4	5.35897	0.4	37000
37500	25.7163	5.57483	29.9704	6.24282	57.4499	94.0239	3.38017	0.4	5.35854	0.4	37500
38000	26.1631	5.65270	30.0344	6.24681	57.5159	94.9674	3.37989	0.4	5.35811	0.4	38000
38500	26.6159	5.73117	30.0979	6.25070	57.5809	95.9109	3.37961	0.4	5.35768	0.4	38500
39000	27.0747	5.81024	30.1609	6.25449	57.6449	96.8544	3.37933	0.4	5.35725	0.4	39000
39500	27.5395	5.89091	30.2234	6.25818	57.7079	97.7979	3.37905	0.4	5.35682	0.4	39500
40000	28.0103	5.97318	30.2854	6.26177	57.7699	98.7414	3.37877	0.4	5.35639	0.4	40000
40500	28.4871	6.05605	30.3469	6.26526	57.8309	99.6849	3.37849	0.4	5.35596	0.4	40500
41000	28.9699	6.13952	30.4079	6.26865	57.8909	100.6284	3.37821	0.4	5.35553	0.4	41000
41500	29.4587	6.22359	30.4684	6.27194	57.9499	101.5719	3.37793	0.4	5.35510	0.4	41500
42000	29.9535	6.30826	30.5284	6.27513	58.0079	102.5154	3.37765	0.4	5.35467	0.4	42000
42500	30.4543	6.39353	30.5879	6.27822	58.0649	103.4589	3.37737	0.4	5.35424	0.4	42500
43000	30.9611	6.47940	30.6469	6.28121	58.1209	104.4024	3.37709	0.4	5.35381	0.4	43000
43500	31.4739	6.56587	30.7054	6.28410	58.1759	105.3459	3.37681	0.4	5.35338	0.4	43500
44000	31.9927	6.65294	30.7634	6.28689	58.2299	106.2894	3.37653	0.4	5.35295	0.4	44000
44500	32.5175	6.74061	30.8209	6.28958	58.2829	107.2329	3.37625	0.4	5.35252	0.4	44500
45000	33.0483	6.82888	30.8779	6.29217	58.3349	108.1764	3.37597	0.4	5.35209	0.4	45000
45500	33.5851	6.91775	30.9344	6.29466	58.3859	109.1199	3.37569	0.4	5.35166	0.4	45500
46000	34.1279	7.00722	30.9904	6.29705	58.4359	110.0634	3.37541	0.4	5.35123	0.4	46000
46500	34.6767	7.09729	31.0459	6.29934	58.4849	111.0069	3.37513	0.4	5.35080	0.4	46500
47000	35.2315	7.18796	31.1009	6.30153	58.5329	111.9504	3.37485	0.4	5.35037	0.4	47000
47500	35.7923	7.27923	31.1554	6.30362	58.5799	112.8939	3.37457	0.4	5.35000	0.4	47500
48000	36.3591	7.37110	31.2094	6.30561	58.6259	113.8374	3.37429	0.4	5.34957	0.4	48000
48500	36.9319	7.46357	31.2629	6.30750	58.6709	114.7809	3.37401	0.4	5.34914	0.4	48500
49000	37.5107	7.55664	31.3159	6.30929	58.7149	115.7244	3.37373	0.4	5.34871	0.4	49000
49500	38.0955	7.65031	31.3684	6.31098	58.7579	116.6679	3.37345	0.4	5.34828	0.4	49500
50000	38.6863	7.74458	31.4204	6.31257	58.8009	117.6114	3.37317	0.4	5.34785	0.4	50000

TABLE 4. IDEAL GAS FUNCTIONS FOR N (ATOMIC WEIGHT 14.0067, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 4B FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I} - \frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I} - \frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I} - \frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I} - \frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I} - \frac{h^2}{8\pi^2 I}$	TEMP. (°K)		
1000	4.0000	2.50000	18.9500	21.4500	4.96791	37.6548	42.6248	2.9007E 03	4.9679E 03	3.7657E 04	1000
1200	4.0000	2.50000	19.4000	21.9000	4.96791	38.1048	43.0748	2.9007E 03	4.9679E 03	3.7657E 04	1200
1400	4.0000	2.50000	19.7412	22.2412	4.96791	38.5548	43.5248	2.9007E 03	4.9679E 03	3.7657E 04	1400
1600	4.0000	2.50000	20.1250	22.6250	4.96791	38.9991	43.9691	2.9007E 03	4.9679E 03	3.7657E 04	1600
1800	4.0000	2.50001	20.4195	22.9195	4.96793	40.5749	45.5448	2.9007E 03	4.9679E 03	3.7657E 04	1800
2000	4.0000	2.50003	20.6829	23.1829	4.96794	41.1003	46.0693	2.9007E 03	4.9679E 03	3.7657E 04	2000
2200	4.0000	2.50011	20.9212	23.4212	4.96813	41.3736	46.3420	2.9007E 03	4.9681E 03	3.7657E 04	2200
2400	4.0001	2.50028	21.1387	23.6387	4.96848	42.0081	47.0746	2.9007E 03	4.9684E 03	3.7657E 04	2400
2600	4.0002	2.50046	21.3309	23.8309	4.96918	42.4039	47.4726	2.9007E 03	4.9691E 03	3.7657E 04	2600
2800	4.0005	2.50127	21.5242	24.0255	4.97044	42.7722	47.8426	2.9007E 03	4.9704E 03	3.7657E 04	2800
3000	4.0018	2.50230	21.6968	24.1991	4.97248	43.1151	48.1876	2.9007E 03	4.9724E 03	3.7657E 04	3000
3200	4.0030	2.50355	21.8504	24.3622	4.97556	43.4362	48.5076	2.9007E 03	4.9755E 03	3.7657E 04	3200
3400	4.0047	2.50509	22.0102	24.5162	4.97991	43.7379	48.8178	2.9007E 03	4.9799E 03	3.7657E 04	3400
3600	4.0067	2.51201	22.1935	24.6625	4.98579	44.0227	49.0805	2.9007E 03	4.9857E 03	3.7657E 04	3600
3800	4.0070	2.51281	22.2189	24.6821	4.98933	44.2925	49.2859	2.9007E 03	4.9893E 03	3.7657E 04	3800
4000	4.0101	2.51799	22.4183	24.9359	5.00284	44.5468	49.5317	2.9007E 03	5.0011E 03	3.7657E 04	4000
4200	4.0141	2.52337	22.6413	25.1644	5.01436	44.7932	49.8076	2.9007E 03	5.0143E 03	3.7657E 04	4200
4400	4.0191	2.52822	22.8548	25.3890	5.02796	45.0268	50.0547	2.9007E 03	5.0279E 03	3.7657E 04	4400
4600	4.0252	2.53314	23.0714	25.6096	5.04371	45.2506	50.2943	2.9007E 03	5.0437E 03	3.7657E 04	4600
4800	4.0325	2.53814	23.2779	25.8268	5.06160	45.4637	50.5272	2.9007E 03	5.0616E 03	3.7657E 04	4800
5000	4.0410	2.54321	23.4836	26.0410	5.08159	45.6727	50.7563	2.9007E 03	5.0815E 03	3.7657E 04	5000
5200	4.0518	2.54835	23.6893	26.2536	5.10362	45.8726	50.9768	2.9007E 03	5.1036E 03	3.7657E 04	5200
5400	4.0643	2.55355	23.8950	26.4638	5.12750	46.0655	51.1930	2.9007E 03	5.1275E 03	3.7657E 04	5400
5600	4.0782	2.55882	24.1007	26.6689	5.15336	46.2524	51.4050	2.9007E 03	5.1533E 03	3.7657E 04	5600
5800	4.0935	2.56416	24.3064	26.8733	5.18060	46.4337	51.6145	2.9007E 03	5.1806E 03	3.7657E 04	5800
6000	4.1094	2.56956	24.5121	27.0771	5.20976	46.6090	51.8196	2.9007E 03	5.2097E 03	3.7657E 04	6000
6200	4.1258	2.57502	24.7178	27.2794	5.24007	46.7811	52.0212	2.9007E 03	5.2400E 03	3.7657E 04	6200
6400	4.1428	2.58054	24.9235	27.4804	5.27154	46.9490	52.2195	2.9007E 03	5.2715E 03	3.7657E 04	6400
6600	4.1603	2.58612	25.1292	27.6796	5.30402	47.1107	52.4147	2.9007E 03	5.3040E 03	3.7657E 04	6600
6800	4.1783	2.59176	25.3349	27.8774	5.33731	47.2695	52.6069	2.9007E 03	5.3373E 03	3.7657E 04	6800
7000	4.2001	2.60322	25.5406	28.0735	5.37125	47.4240	52.7960	2.9007E 03	5.3712E 03	3.7657E 04	7000
7200	4.2233	2.61492	25.7463	28.2682	5.40546	47.5765	52.9822	2.9007E 03	5.4054E 03	3.7657E 04	7200
7400	4.2509	2.62686	25.9520	28.4617	5.44042	47.7251	53.1656	2.9007E 03	5.4404E 03	3.7657E 04	7400
7600	4.2800	2.63904	26.1577	28.6543	5.47634	47.8707	53.3469	2.9007E 03	5.4763E 03	3.7657E 04	7600
7800	4.3175	2.65292	26.3634	28.8467	5.51028	48.0134	53.5255	2.9007E 03	5.5102E 03	3.7657E 04	7800
8000	4.3604	2.66904	26.5691	29.0374	5.54511	48.1533	53.6994	2.9007E 03	5.5451E 03	3.7657E 04	8000
8200	4.3897	2.68080	26.7651	29.2271	5.58122	48.2907	53.8704	2.9007E 03	5.5812E 03	3.7657E 04	8200
8400	4.4142	2.68512	26.9591	29.4153	5.61836	48.4255	54.0395	2.9007E 03	5.6183E 03	3.7657E 04	8400
8600	4.4400	2.69425	27.1518	29.6027	5.65613	48.5586	54.2068	2.9007E 03	5.6561E 03	3.7657E 04	8600
8800	4.4650	2.70591	27.3434	29.7893	5.69513	48.6892	54.3699	2.9007E 03	5.6951E 03	3.7657E 04	8800
9000	4.4922	2.71937	27.5348	29.9748	5.73540	48.8163	54.5301	2.9007E 03	5.7354E 03	3.7657E 04	9000
9200	4.5204	2.73400	27.7252	30.1592	5.77722	48.9422	54.6881	2.9007E 03	5.7772E 03	3.7657E 04	9200
9400	4.5500	2.74978	27.9189	30.3425	5.82044	49.0661	54.8433	2.9007E 03	5.8204E 03	3.7657E 04	9400
9600	4.5811	2.76763	28.1133	30.5247	5.86578	49.1881	54.9959	2.9007E 03	5.8657E 03	3.7657E 04	9600
9800	4.6135	2.78763	28.3133	30.7059	5.91325	49.3081	55.1457	2.9007E 03	5.9132E 03	3.7657E 04	9800
10000	4.6472	2.80983	28.5133	30.8861	5.96296	49.4261	55.2929	2.9007E 03	5.9629E 03	3.7657E 04	10000

TABLE 4 (CONT.). IDEAL GAS FUNCTIONS FOR H

TEMP. (°F)	PARTIT. FUNCT.	$\frac{h^0 - h}{RT}$	$\ln \frac{h^0}{h}$	$\ln \frac{h^0}{h} - \frac{h^0 - h}{RT}$	$\ln \frac{h^0}{h} - \frac{h^0 - h}{RT}$	$\ln \frac{h^0}{h} - \frac{h^0 - h}{RT}$	$\ln \frac{h^0}{h} - \frac{h^0 - h}{RT}$	$\ln \frac{h^0}{h} - \frac{h^0 - h}{RT}$	TEMP. (°F)
10000	4.7237	2.95220	24.8728	27.8250	5.86650	49.4201	55.2809	3.87938	10000
10500	4.8332	2.96676	25.0177	28.0044	5.95519	49.7153	55.6495	4.14542	10500
11000	4.9476	3.01867	25.1574	28.1761	5.99061	49.9919	55.9995	4.41266	11000
11500	5.0663	3.04404	25.2922	28.3403	6.05403	50.2568	56.3368	4.68038	11500
12000	5.1889	3.07506	25.4225	28.4976	6.11066	50.5150	56.6594	4.94828	12000
12500	5.3149	3.10004	25.5466	28.6466	6.16029	50.7692	56.9725	5.21642	12500
13000	5.4439	3.12332	25.6704	28.7939	6.20650	51.0117	57.2785	5.48492	13000
13500	5.5758	3.14530	25.7889	28.9342	6.25024	51.2468	57.5778	5.75312	13500
14000	5.7104	3.16640	25.9037	29.0701	6.29216	51.4769	57.8708	6.02092	14000
14500	5.8476	3.18704	26.0151	29.2022	6.33318	51.6994	58.1576	6.28832	14500
15000	5.9875	3.20764	26.1235	29.3312	6.37315	51.9118	58.4396	6.55532	15000
15500	6.1301	3.22847	26.2291	29.4577	6.41198	52.1215	58.7166	6.82192	15500
16000	6.2758	3.24967	26.3319	29.5824	6.45023	52.3298	58.9891	7.08812	16000
16500	6.4246	3.27344	26.4323	29.7057	6.48696	52.5353	59.2578	7.35392	16500
17000	6.5770	3.29798	26.5304	29.8282	6.52346	52.7382	59.5227	7.61932	17000
17500	6.7334	3.32415	26.6263	29.9505	6.55963	52.9389	59.7845	7.88432	17500
18000	6.8943	3.35244	26.7204	30.0728	6.59550	53.1378	60.0431	8.14892	18000
18500	7.0601	3.38290	26.8126	30.1954	6.72254	53.3341	60.2997	8.41312	18500
19000	7.2315	3.41593	26.9033	30.3192	6.78001	53.5283	60.5545	8.67692	19000
19500	7.4089	3.45130	26.9925	30.4430	6.83846	53.7205	60.8076	8.94032	19500
20000	7.5932	3.48939	27.0803	30.5667	6.89700	53.9113	61.0591	9.20332	20000
20500	7.7846	3.53042	27.1670	30.6913	6.95663	54.1008	61.3091	9.46592	20500
21000	7.9820	3.57462	27.2527	30.8164	7.01738	54.2891	61.5578	9.72812	21000
21500	8.1863	3.62207	27.3374	30.9420	7.07925	54.4763	61.8053	9.98992	21500
22000	8.3976	3.67287	27.4212	31.0681	7.14224	54.6625	62.0518	10.25132	22000
22500	8.6159	3.72702	27.5041	31.1947	7.20635	54.8478	62.2973	10.51232	22500
23000	8.8412	3.78453	27.5861	31.3218	7.27158	55.0322	62.5418	10.77292	23000
23500	9.0735	3.84540	27.6673	31.4494	7.33793	55.2158	62.7853	11.03312	23500
24000	9.3128	3.90963	27.7477	31.5775	7.40540	55.3985	63.0278	11.29292	24000
24500	9.5591	3.97724	27.8273	31.7061	7.47398	55.5803	63.2693	11.55232	24500
25000	9.8124	4.04824	27.9061	31.8352	7.54367	55.7613	63.5098	11.81132	25000
25500	10.0727	4.12263	27.9841	31.9648	7.61446	55.9415	63.7493	12.07032	25500
26000	10.3399	4.20042	28.0613	32.0949	7.68635	56.1209	63.9878	12.32932	26000
26500	10.6142	4.28161	28.1377	32.2255	7.75934	56.2995	64.2253	12.58832	26500
27000	10.8955	4.36620	28.2133	32.3566	7.83343	56.4773	64.4618	12.84732	27000
27500	11.1828	4.45429	28.2881	32.4882	7.90862	56.6543	64.6973	13.10632	27500
28000	11.4771	4.54588	28.3621	32.6203	7.98491	56.8305	64.9318	13.36532	28000
28500	11.7784	4.64097	28.4353	32.7529	8.06230	57.0059	65.1653	13.62432	28500
29000	12.0867	4.73966	28.5078	32.8860	8.14079	57.1805	65.3978	13.88332	29000
29500	12.4020	4.84195	28.5795	33.0196	8.22038	57.3537	65.6293	14.14232	29500
30000	12.7243	4.94784	28.6505	33.1537	8.30107	57.5259	65.8608	14.40132	30000
30500	13.0536	5.05733	28.7208	33.2883	8.38286	57.6973	66.0913	14.66032	30500
31000	13.3899	5.17042	28.7904	33.4234	8.46575	57.8679	66.3208	14.91932	31000
31500	13.7332	5.28711	28.8593	33.5590	8.54974	58.0377	66.5493	15.17832	31500
32000	14.0835	5.40740	28.9275	33.6951	8.63483	58.2067	66.7768	15.43732	32000
32500	14.4408	5.53129	28.9950	33.8317	8.72102	58.3749	66.9993	15.69632	32500
33000	14.8051	5.65878	29.0618	33.9688	8.80831	58.5423	67.2168	15.95532	33000
33500	15.1764	5.78987	29.1279	34.1064	8.89670	58.7089	67.4333	16.21432	33500
34000	15.5547	5.92456	29.1933	34.2445	8.98619	58.8747	67.6488	16.47332	34000
34500	15.9399	6.06285	29.2581	34.3831	9.07678	59.0397	67.8633	16.73232	34500
35000	16.3322	6.20474	29.3223	34.5222	9.16847	59.1997	68.0768	16.99132	35000
35500	16.7315	6.35023	29.3859	34.6618	9.26126	59.3589	68.2893	17.25032	35500
36000	17.1378	6.50032	29.4490	34.8019	9.35515	59.5173	68.5008	17.50932	36000
36500	17.5511	6.65491	29.5115	34.9425	9.45014	59.6749	68.7113	17.76832	36500
37000	17.9714	6.81400	29.5735	35.0836	9.54623	59.8317	68.9208	18.02732	37000
37500	18.3987	6.97759	29.6350	35.2252	9.64342	59.9877	69.1293	18.28632	37500
38000	18.8330	7.14578	29.6960	35.3673	9.74171	60.1429	69.3368	18.54532	38000
38500	19.2743	7.31857	29.7565	35.5100	9.84110	60.2967	69.5433	18.80432	38500
39000	19.7226	7.49596	29.8165	35.6532	9.94159	60.4497	69.7488	19.06332	39000
39500	20.1779	7.67795	29.8760	35.7969	10.04318	60.6019	69.9533	19.32232	39500
40000	20.6402	7.86454	29.9351	35.9411	10.14587	60.7533	70.1568	19.58132	40000
40500	21.1095	8.05573	29.9937	36.0858	10.24966	60.9049	70.3593	19.84032	40500
41000	21.5858	8.25152	30.0518	36.2310	10.35455	61.0557	70.5608	20.09932	41000
41500	22.0691	8.45191	30.1094	36.3767	10.46054	61.2057	70.7613	20.35832	41500
42000	22.5594	8.65690	30.1665	36.5229	10.56763	61.3549	70.9608	20.61732	42000
42500	23.0567	8.86649	30.2231	36.6696	10.67582	61.5033	71.1593	20.87632	42500
43000	23.5610	9.08068	30.2788	36.8168	10.78511	61.6509	71.3568	21.13532	43000
43500	24.0723	9.29947	30.3340	36.9645	10.89550	61.7977	71.5533	21.39432	43500
44000	24.5906	9.52286	30.3897	37.1127	11.00709	61.9437	71.7488	21.65332	44000
44500	25.1159	9.75085	30.4449	37.2614	11.11988	62.0889	71.9433	21.91232	44500
45000	25.6482	9.98344	30.4996	37.4106	11.23387	62.2333	72.1368	22.17132	45000
45500	26.1875	10.22063	30.5538	37.5603	11.34906	62.3779	72.3293	22.43032	45500
46000	26.7338	10.46242	30.6075	37.7105	11.46545	62.5217	72.5208	22.68932	46000
46500	27.2871	10.70981	30.6607	37.8612	11.58304	62.6647	72.7113	22.94832	46500
47000	27.8474	10.96280	30.7134	38.0125	11.70183	62.8069	72.9008	23.20732	47000
47500	28.4147	11.22139	30.7656	38.1643	11.82182	62.9483	73.0893	23.46632	47500
48000	28.9890	11.48558	30.8173	38.3166	11.94301	63.0889	73.2768	23.72532	48000
48500	29.5703	11.75537	30.8685	38.4694	12.06540	63.2287	73.4633	23.98432	48500
49000	30.1586	12.03076	30.9192	38.6227	12.18909	63.3677	73.6488	24.24332	49000
49500	30.7539	12.31185	30.9695	38.7765	12.31408	63.5059	73.8333	24.50232	49500
50000	31.3562	12.59854	31.0193	38.9308	12.44037	63.6433	74.0168	24.76132	50000

TABLE 5. IDEAL GAS FUNCTIONS FOR O (ATOMIC WEIGHT 15.9994, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 49 FOR LIST OF STATES USED.

TEMP. (°K)	PARITY. FUNCT.	$\frac{W^2 - E^2}{RT}$	$\frac{E^2 - E^2}{RT}$	$\frac{E^2 - E^2}{RT}$	$\frac{E^2 - E^2}{RT}$	$\frac{E^2 - E^2}{RT}$	$\frac{E^2 - E^2}{RT}$	$\frac{E^2 - E^2}{RT}$	$\frac{E^2 - E^2}{RT}$	TEMP. (°K)
1000	0.1105	2.59613	19.8544	22.4525	5.15893	19.4560	44.6169	3.1718E 03	5.1589E 03	1000
1200	0.2435	2.58227	20.3285	22.9107	5.13140	40.3960	45.5274	3.7731E 03	5.1314E 03	1200
1400	0.3416	2.57186	20.7257	23.2976	5.11071	41.1894	46.2961	4.3730E 03	5.1107E 03	1400
1600	0.4174	2.56377	21.0486	23.6323	5.09463	41.8667	46.9614	4.9720E 03	5.0946E 03	1600
1800	0.4774	2.55732	21.3702	23.9275	5.08182	42.4660	47.5479	5.5704E 03	5.0818E 03	1800
2000	0.5244	2.55209	21.6393	24.1914	5.07142	43.0009	48.0723	6.1684E 03	5.0714E 03	2000
2200	0.5673	2.54780	21.8823	24.4302	5.06306	43.4938	48.5468	6.7664E 03	5.0630E 03	2200
2400	0.6016	2.54431	22.1039	24.6482	5.05656	43.9451	49.0000	7.3645E 03	5.0565E 03	2400
2600	0.6312	2.54150	22.3074	24.8489	5.05139	44.3285	49.3709	7.9626E 03	5.0513E 03	2600
2800	0.6571	2.53932	22.4957	25.0350	5.04695	44.7026	49.7487	8.5607E 03	5.0469E 03	2800
3000	0.6801	2.53773	22.6708	25.2086	5.04390	45.0597	50.0956	9.1588E 03	5.0439E 03	3000
3200	0.7009	2.53671	22.8346	25.3713	5.04186	45.3761	50.4169	9.7569E 03	5.0418E 03	3200
3400	0.7202	2.53622	22.9885	25.5246	5.04036	45.6816	50.7215	1.0354E 04	5.0403E 03	3400
3600	0.7382	2.53626	23.1333	25.6696	5.03946	45.9767	51.0097	1.0939E 04	5.0394E 03	3600
3800	0.7555	2.53678	23.2704	25.8072	5.03910	46.2622	51.2832	1.1524E 04	5.0391E 03	3800
4000	0.7722	2.53778	23.4006	25.9384	5.03920	46.5380	51.5438	1.2109E 04	5.0392E 03	4000
4200	0.7887	2.53920	23.5244	26.0636	5.04001	46.8048	51.7928	1.2694E 04	5.0400E 03	4200
4400	0.8051	2.54103	23.6426	26.1836	5.04144	47.0630	52.0312	1.3279E 04	5.0414E 03	4400
4600	0.8216	2.54321	23.7556	26.2988	5.04337	47.3131	52.2589	1.3864E 04	5.0433E 03	4600
4800	0.8383	2.54572	23.8639	26.4096	5.04587	47.5557	52.4853	1.4449E 04	5.0458E 03	4800
5000	0.8553	2.54852	23.9679	26.5164	5.04894	47.7903	52.7105	1.5034E 04	5.0489E 03	5000
5200	0.8727	2.55154	24.0679	26.6195	5.05259	48.0169	52.9346	1.5619E 04	5.0525E 03	5200
5400	0.8905	2.55484	24.1642	26.7191	5.05683	48.2356	53.1575	1.6204E 04	5.0568E 03	5400
5600	0.9088	2.55829	24.2572	26.8154	5.06167	48.4463	53.3795	1.6789E 04	5.0616E 03	5600
5800	0.9276	2.56189	24.3471	26.9089	5.06711	48.6491	53.5999	1.7374E 04	5.0671E 03	5800
6000	0.9469	2.56561	24.4340	27.0000	5.07315	48.8439	53.8187	1.7959E 04	5.0731E 03	6000
6200	0.9667	2.56943	24.5182	27.0876	5.07979	49.0308	54.0359	1.8544E 04	5.0797E 03	6200
6400	0.9871	2.57331	24.5998	27.1731	5.08703	49.2097	54.2515	1.9129E 04	5.0870E 03	6400
6600	0.9879	2.57724	24.6790	27.2563	5.09487	49.3816	54.4657	1.9714E 04	5.0948E 03	6600
6800	0.9292	2.58120	24.7560	27.3372	5.10331	49.5465	54.6785	2.0300E 04	5.1033E 03	6800
7000	0.9510	2.58516	24.8309	27.4161	5.11234	49.7054	54.8899	2.0885E 04	5.1123E 03	7000
7200	0.9733	2.58911	24.9036	27.4929	5.12196	49.8593	55.0999	2.1470E 04	5.1219E 03	7200
7400	0.9959	2.59304	24.9748	27.5678	5.13216	49.9991	55.3085	2.2055E 04	5.1321E 03	7400
7600	0.1196	2.59694	25.0440	27.6409	5.14294	50.1250	55.5157	2.2640E 04	5.1429E 03	7600
7800	0.1425	2.60079	25.1115	27.7123	5.15430	50.2481	55.7215	2.3225E 04	5.1543E 03	7800
8000	0.1662	2.60458	25.1774	27.7820	5.16624	50.3594	55.9259	2.3810E 04	5.1662E 03	8000
8200	0.1904	2.60831	25.2418	27.8501	5.17875	50.4591	56.1289	2.4395E 04	5.1787E 03	8200
8400	0.2148	2.61198	25.3044	27.9164	5.19183	50.5481	56.3305	2.4980E 04	5.1918E 03	8400
8600	0.2395	2.61557	25.3662	27.9817	5.20548	50.6264	56.5307	2.5565E 04	5.2054E 03	8600
8800	0.2645	2.61909	25.4263	28.0454	5.21970	50.6951	56.7295	2.6150E 04	5.2197E 03	8800
9000	0.2896	2.62252	25.4852	28.1077	5.23449	50.7543	56.9267	2.6735E 04	5.2344E 03	9000
9200	0.3150	2.62588	25.5429	28.1688	5.24984	50.8041	57.1223	2.7320E 04	5.2498E 03	9200
9400	0.3406	2.62916	25.5994	28.2286	5.26574	50.8445	57.3167	2.7905E 04	5.2657E 03	9400
9600	0.3664	2.63236	25.6547	28.2871	5.28219	50.8756	57.5098	2.8490E 04	5.2821E 03	9600
9800	0.3923	2.63547	25.7091	28.3446	5.29919	50.9074	57.7015	2.9075E 04	5.2991E 03	9800

TABLE 5 (CONT.). IDEAL GAS FUNCTIONS FOR O

TEMP. (°C)	PARTIT. FUNCT.	$\frac{h^2}{m^2}$	$\ln \frac{h^2}{m^2} - \frac{h^2}{m^2}$	$\ln \frac{h^2}{m^2} - \frac{h^2}{m^2}$	$\ln \frac{h^2}{m^2} - \frac{h^2}{m^2}$	$\ln \frac{h^2}{m^2} - \frac{h^2}{m^2}$	$\ln \frac{h^2}{m^2} - \frac{h^2}{m^2}$	$\ln \frac{h^2}{m^2} - \frac{h^2}{m^2}$	$\ln \frac{h^2}{m^2} - \frac{h^2}{m^2}$	TEMP. (°C)
10000	9.4183	2.43052	24.7624	24.3117	31.1941	54.4373	3.2540E 04	9.2432E 04	5.1194E 05	10000
10000	9.4039	2.43482	25.0913	24.7624	31.4903	54.7080	3.4500E 04	9.5204E 04	5.4023E 05	10000
11000	9.5499	2.45273	26.0145	25.0673	31.6952	55.9646	3.6127E 04	9.7904E 04	5.6606E 05	11000
11000	9.6164	2.45935	26.1826	25.2848	31.9298	57.2144	3.7920E 04	6.0773E 04	5.9719E 05	11000
12000	9.6832	2.46500	26.2459	25.2979	32.1550	57.4524	3.9723E 04	6.3509E 04	6.2306E 05	12000
12500	9.7562	2.47221	26.3549	25.31013	32.3715	57.6016	4.1537E 04	6.6177E 04	6.5644E 05	12500
13000	9.8175	2.47679	26.4590	25.32311	32.5800	57.7031	4.3367E 04	6.8200E 04	6.8394E 05	13000
13500	9.8652	2.48056	26.5610	25.33670	32.7812	58.1170	4.5219E 04	7.0045E 04	7.1259E 05	13500
14000	9.9035	2.48291	26.6580	25.35126	32.9755	58.3267	4.7097E 04	7.1818E 04	7.4144E 05	14000
14500	10.0225	2.48993	26.7535	25.36720	33.1635	58.5300	4.9011E 04	7.3624E 04	7.7037E 05	14500
15000	10.0925	2.49607	26.8452	25.38406	33.3458	58.7300	5.0967E 04	7.5474E 04	8.0019E 05	15000
15500	10.1650	2.50141	26.9342	25.40194	33.5227	58.9277	5.2974E 04	7.7378E 04	8.2940E 05	15500
16000	10.2368	2.50694	27.0207	25.42170	33.6946	59.1223	5.5040E 04	7.9328E 04	8.5911E 05	16000
16500	10.3120	2.51268	27.1050	25.44257	33.8621	59.3156	5.7156E 04	8.1332E 04	8.8904E 05	16500
17000	10.3897	2.51862	27.1871	25.46463	34.0253	59.5083	5.9328E 04	8.3412E 04	9.1942E 05	17000
17500	10.4706	2.52486	27.2673	25.48794	34.1847	59.7012	6.1563E 04	8.5559E 04	9.4923E 05	17500
18000	10.5551	2.53142	27.3455	25.51257	34.3406	59.8950	6.3874E 04	8.7792E 04	9.7912E 05	18000
18500	10.6430	2.53830	27.4227	25.53761	34.4936	60.0900	6.6258E 04	9.0124E 04	1.0081E 06	18500
19000	10.7374	2.54549	27.4981	25.56403	34.6433	60.2860	6.8719E 04	9.2549E 04	1.0362E 06	19000
19500	10.8365	2.55291	27.5722	25.59172	34.7906	60.4844	7.1259E 04	9.5023E 04	1.0642E 06	19500
20000	10.9410	2.56063	27.6452	25.62074	34.9355	60.6850	7.3844E 04	9.7550E 04	1.0923E 06	20000
20000	11.0500	2.56869	27.7176	25.65111	35.0772	61.0463	7.6484E 04	1.0019E 05	1.1203E 06	20000
20000	12.0002	3.23647	28.7006	4.53160	56.0303	62.5707	1.0444E 05	1.3439E 05	1.3444E 06	24000
20000	12.9359	3.46476	28.6605	6.08244	56.5716	63.4571	1.2736E 05	1.5902E 05	1.4709E 06	26000
20000	14.0211	3.71400	28.7363	7.30045	57.0999	64.4003	1.5101E 05	2.0642E 05	1.8500E 06	28000
30000	15.3781	3.96032	28.9992	7.08074	57.6262	65.5009	1.7601E 05	2.3442E 05	2.1720E 06	30000
30000	17.0160	4.20907	29.1629	8.35300	58.1501	66.5041	2.0374E 05	2.6733E 05	2.4802E 06	32000
30000	19.0124	4.41666	29.3263	9.13567	58.6696	67.4462	2.3004E 05	3.0011E 05	2.7940E 06	34000
30000	21.3250	4.59776	29.4820	9.52730	59.1817	68.3174	2.5735E 05	3.2808E 05	3.1395E 06	36000
30000	23.9853	4.76410	29.6346	9.92730	59.6858	69.1111	2.8273E 05	3.5624E 05	3.4408E 06	38000
40000	26.9921	4.89635	30.2010	9.65434	60.1734	69.8277	3.0649E 05	3.8417E 05	3.7404E 06	40000
40000	30.3494	5.00342	30.5202	9.82340	60.6407	70.4721	3.2985E 05	4.1250E 05	4.0402E 06	42000
40000	34.0931	5.09340	30.7517	9.98275	61.1006	71.0916	3.5095E 05	4.3740E 05	4.3408E 06	44000
40000	38.0972	5.04270	30.9750	10.03000	61.5525	71.6733	3.6974E 05	4.6096E 05	4.6408E 06	46000
40000	42.1730	5.06527	31.1902	10.06552	61.9000	72.0455	3.8774E 05	4.8315E 05	4.9408E 06	48000
50000	47.1735	5.07639	31.3972	10.08365	62.3913	72.4750	4.0442E 05	5.0410E 05	5.1194E 06	50000

TABLE 4. REDUCED GAS FUNCTIONS FOR AN IDEAL GASEOUS SUBSTANCE 39.9400, $R = 1.98717$ CAL/MOLE

BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS 1-50. SEE TABLE 50 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL PRESS.	$\frac{U^0 - U}{RT}$	$\ln \frac{U^0 - U}{RT}$	$\ln \frac{U^0 - U}{RT} - \ln \frac{U^0 - U}{RT}$	$\ln \frac{U^0 - U}{RT} - \ln \frac{U^0 - U}{RT}$	$\ln \frac{U^0 - U}{RT} - \ln \frac{U^0 - U}{RT}$	$\ln \frac{U^0 - U}{RT} - \ln \frac{U^0 - U}{RT}$	TEMP. (°K)
1000	1.0000	19.1350	21.6350	6.90791	30.0240	42.9939	2.90070	1000
1200	1.0000	2.50000	22.0916	6.90791	34.9316	42.9939	3.37696	1200
1400	1.0000	2.50000	22.4770	6.90791	38.9376	44.6055	3.73000	1400
1600	1.0000	2.50000	22.8104	6.90791	42.3609	45.3289	4.00000	1600
1800	1.0000	2.50000	23.1053	6.90791	45.4441	45.9140	4.20000	1800
2000	1.0000	2.50000	23.3607	6.90791	48.1495	46.4374	4.35000	2000
2200	1.0000	2.50000	23.5859	6.90791	50.5049	46.9049	4.46000	2200
2400	1.0000	2.50000	23.7855	6.90791	52.5353	47.3233	4.54000	2400
2600	1.0000	2.50000	23.9644	6.90791	54.2729	47.7044	4.60000	2600
2800	1.0000	2.50000	24.1259	6.90791	55.7599	48.0549	4.64000	2800
3000	1.0000	2.50000	24.2733	6.90791	57.0333	48.3833	4.67000	3000
3200	1.0000	2.50000	24.4083	6.90791	58.1433	48.6833	4.69000	3200
3400	1.0000	2.50000	24.5333	6.90791	59.1033	48.9533	4.70000	3400
3600	1.0000	2.50000	24.6483	6.90791	59.9333	49.1933	4.71000	3600
3800	1.0000	2.50000	24.7533	6.90791	60.6533	49.4033	4.72000	3800
4000	1.0000	2.50000	24.8483	6.90791	61.2733	49.5833	4.73000	4000
4200	1.0000	2.50000	24.9333	6.90791	61.8033	49.7333	4.74000	4200
4400	1.0000	2.50000	25.0083	6.90791	62.2433	49.8533	4.75000	4400
4600	1.0000	2.50000	25.0733	6.90791	62.5933	49.9533	4.76000	4600
4800	1.0000	2.50000	25.1283	6.90791	62.8533	49.9933	4.77000	4800
5000	1.0000	2.50000	25.1733	6.90791	63.0233	50.0000	4.78000	5000
5200	1.0000	2.50000	25.2083	6.90791	63.1033	50.0000	4.79000	5200
5400	1.0000	2.50000	25.2333	6.90791	63.1533	50.0000	4.80000	5400
5600	1.0000	2.50000	25.2533	6.90791	63.1833	50.0000	4.81000	5600
5800	1.0000	2.50000	25.2683	6.90791	63.2033	50.0000	4.82000	5800
6000	1.0000	2.50000	25.2783	6.90791	63.2133	50.0000	4.83000	6000
6200	1.0000	2.50000	25.2833	6.90791	63.2183	50.0000	4.84000	6200
6400	1.0000	2.50000	25.2883	6.90791	63.2233	50.0000	4.85000	6400
6600	1.0000	2.50000	25.2933	6.90791	63.2283	50.0000	4.86000	6600
6800	1.0000	2.50000	25.2983	6.90791	63.2333	50.0000	4.87000	6800
7000	1.0000	2.50000	25.3033	6.90791	63.2383	50.0000	4.88000	7000
7200	1.0000	2.50000	25.3083	6.90791	63.2433	50.0000	4.89000	7200
7400	1.0000	2.50000	25.3133	6.90791	63.2483	50.0000	4.90000	7400
7600	1.0000	2.50000	25.3183	6.90791	63.2533	50.0000	4.91000	7600
7800	1.0000	2.50000	25.3233	6.90791	63.2583	50.0000	4.92000	7800
8000	1.0000	2.50000	25.3283	6.90791	63.2633	50.0000	4.93000	8000
8200	1.0000	2.50000	25.3333	6.90791	63.2683	50.0000	4.94000	8200
8400	1.0000	2.50000	25.3383	6.90791	63.2733	50.0000	4.95000	8400
8600	1.0000	2.50000	25.3433	6.90791	63.2783	50.0000	4.96000	8600
8800	1.0000	2.50000	25.3483	6.90791	63.2833	50.0000	4.97000	8800
9000	1.0000	2.50000	25.3533	6.90791	63.2883	50.0000	4.98000	9000
9200	1.0000	2.50000	25.3583	6.90791	63.2933	50.0000	4.99000	9200
9400	1.0000	2.50000	25.3633	6.90791	63.2983	50.0000	5.00000	9400
9600	1.0000	2.50000	25.3683	6.90791	63.3033	50.0000	5.01000	9600
9800	1.0000	2.50000	25.3733	6.90791	63.3083	50.0000	5.02000	9800
10000	1.0000	2.50000	25.3783	6.90791	63.3133	50.0000	5.03000	10000

TABLE 6 (CONT.). IDEAL GAS FUNCTIONS FOR AIR

TEMP. (°F.)	PARTIAL PRESS.	$\frac{P}{T}$	$-\frac{P}{T^2}$	$\frac{P^2}{T^3}$	$\frac{P^3}{T^4}$	$\frac{P^4}{T^5}$	$\frac{P^5}{T^6}$	$\frac{P^6}{T^7}$	$\frac{P^7}{T^8}$	$\frac{P^8}{T^9}$	$\frac{P^9}{T^{10}}$	$\frac{P^{10}}{T^{11}}$	$\frac{P^{11}}{T^{12}}$	$\frac{P^{12}}{T^{13}}$	$\frac{P^{13}}{T^{14}}$	$\frac{P^{14}}{T^{15}}$	$\frac{P^{15}}{T^{16}}$	$\frac{P^{16}}{T^{17}}$	$\frac{P^{17}}{T^{18}}$	$\frac{P^{18}}{T^{19}}$	$\frac{P^{19}}{T^{20}}$	$\frac{P^{20}}{T^{21}}$	$\frac{P^{21}}{T^{22}}$	$\frac{P^{22}}{T^{23}}$	$\frac{P^{23}}{T^{24}}$	$\frac{P^{24}}{T^{25}}$	$\frac{P^{25}}{T^{26}}$	$\frac{P^{26}}{T^{27}}$	$\frac{P^{27}}{T^{28}}$	$\frac{P^{28}}{T^{29}}$	$\frac{P^{29}}{T^{30}}$	$\frac{P^{30}}{T^{31}}$	$\frac{P^{31}}{T^{32}}$	$\frac{P^{32}}{T^{33}}$	$\frac{P^{33}}{T^{34}}$	$\frac{P^{34}}{T^{35}}$	$\frac{P^{35}}{T^{36}}$	$\frac{P^{36}}{T^{37}}$	$\frac{P^{37}}{T^{38}}$	$\frac{P^{38}}{T^{39}}$	$\frac{P^{39}}{T^{40}}$	$\frac{P^{40}}{T^{41}}$	$\frac{P^{41}}{T^{42}}$	$\frac{P^{42}}{T^{43}}$	$\frac{P^{43}}{T^{44}}$	$\frac{P^{44}}{T^{45}}$	$\frac{P^{45}}{T^{46}}$	$\frac{P^{46}}{T^{47}}$	$\frac{P^{47}}{T^{48}}$	$\frac{P^{48}}{T^{49}}$	$\frac{P^{49}}{T^{50}}$	$\frac{P^{50}}{T^{51}}$	$\frac{P^{51}}{T^{52}}$	$\frac{P^{52}}{T^{53}}$	$\frac{P^{53}}{T^{54}}$	$\frac{P^{54}}{T^{55}}$	$\frac{P^{55}}{T^{56}}$	$\frac{P^{56}}{T^{57}}$	$\frac{P^{57}}{T^{58}}$	$\frac{P^{58}}{T^{59}}$	$\frac{P^{59}}{T^{60}}$	$\frac{P^{60}}{T^{61}}$	$\frac{P^{61}}{T^{62}}$	$\frac{P^{62}}{T^{63}}$	$\frac{P^{63}}{T^{64}}$	$\frac{P^{64}}{T^{65}}$	$\frac{P^{65}}{T^{66}}$	$\frac{P^{66}}{T^{67}}$	$\frac{P^{67}}{T^{68}}$	$\frac{P^{68}}{T^{69}}$	$\frac{P^{69}}{T^{70}}$	$\frac{P^{70}}{T^{71}}$	$\frac{P^{71}}{T^{72}}$	$\frac{P^{72}}{T^{73}}$	$\frac{P^{73}}{T^{74}}$	$\frac{P^{74}}{T^{75}}$	$\frac{P^{75}}{T^{76}}$	$\frac{P^{76}}{T^{77}}$	$\frac{P^{77}}{T^{78}}$	$\frac{P^{78}}{T^{79}}$	$\frac{P^{79}}{T^{80}}$	$\frac{P^{80}}{T^{81}}$	$\frac{P^{81}}{T^{82}}$	$\frac{P^{82}}{T^{83}}$	$\frac{P^{83}}{T^{84}}$	$\frac{P^{84}}{T^{85}}$	$\frac{P^{85}}{T^{86}}$	$\frac{P^{86}}{T^{87}}$	$\frac{P^{87}}{T^{88}}$	$\frac{P^{88}}{T^{89}}$	$\frac{P^{89}}{T^{90}}$	$\frac{P^{90}}{T^{91}}$	$\frac{P^{91}}{T^{92}}$	$\frac{P^{92}}{T^{93}}$	$\frac{P^{93}}{T^{94}}$	$\frac{P^{94}}{T^{95}}$	$\frac{P^{95}}{T^{96}}$	$\frac{P^{96}}{T^{97}}$	$\frac{P^{97}}{T^{98}}$	$\frac{P^{98}}{T^{99}}$	$\frac{P^{99}}{T^{100}}$	$\frac{P^{100}}{T^{101}}$	$\frac{P^{101}}{T^{102}}$	$\frac{P^{102}}{T^{103}}$	$\frac{P^{103}}{T^{104}}$	$\frac{P^{104}}{T^{105}}$	$\frac{P^{105}}{T^{106}}$	$\frac{P^{106}}{T^{107}}$	$\frac{P^{107}}{T^{108}}$	$\frac{P^{108}}{T^{109}}$	$\frac{P^{109}}{T^{110}}$	$\frac{P^{110}}{T^{111}}$	$\frac{P^{111}}{T^{112}}$	$\frac{P^{112}}{T^{113}}$	$\frac{P^{113}}{T^{114}}$	$\frac{P^{114}}{T^{115}}$	$\frac{P^{115}}{T^{116}}$	$\frac{P^{116}}{T^{117}}$	$\frac{P^{117}}{T^{118}}$	$\frac{P^{118}}{T^{119}}$	$\frac{P^{119}}{T^{120}}$	$\frac{P^{120}}{T^{121}}$	$\frac{P^{121}}{T^{122}}$	$\frac{P^{122}}{T^{123}}$	$\frac{P^{123}}{T^{124}}$	$\frac{P^{124}}{T^{125}}$	$\frac{P^{125}}{T^{126}}$	$\frac{P^{126}}{T^{127}}$	$\frac{P^{127}}{T^{128}}$	$\frac{P^{128}}{T^{129}}$	$\frac{P^{129}}{T^{130}}$	$\frac{P^{130}}{T^{131}}$	$\frac{P^{131}}{T^{132}}$	$\frac{P^{132}}{T^{133}}$	$\frac{P^{133}}{T^{134}}$	$\frac{P^{134}}{T^{135}}$	$\frac{P^{135}}{T^{136}}$	$\frac{P^{136}}{T^{137}}$	$\frac{P^{137}}{T^{138}}$	$\frac{P^{138}}{T^{139}}$	$\frac{P^{139}}{T^{140}}$	$\frac{P^{140}}{T^{141}}$	$\frac{P^{141}}{T^{142}}$	$\frac{P^{142}}{T^{143}}$	$\frac{P^{143}}{T^{144}}$	$\frac{P^{144}}{T^{145}}$	$\frac{P^{145}}{T^{146}}$	$\frac{P^{146}}{T^{147}}$	$\frac{P^{147}}{T^{148}}$	$\frac{P^{148}}{T^{149}}$	$\frac{P^{149}}{T^{150}}$	$\frac{P^{150}}{T^{151}}$	$\frac{P^{151}}{T^{152}}$	$\frac{P^{152}}{T^{153}}$	$\frac{P^{153}}{T^{154}}$	$\frac{P^{154}}{T^{155}}$	$\frac{P^{155}}{T^{156}}$	$\frac{P^{156}}{T^{157}}$	$\frac{P^{157}}{T^{158}}$	$\frac{P^{158}}{T^{159}}$	$\frac{P^{159}}{T^{160}}$	$\frac{P^{160}}{T^{161}}$	$\frac{P^{161}}{T^{162}}$	$\frac{P^{162}}{T^{163}}$	$\frac{P^{163}}{T^{164}}$	$\frac{P^{164}}{T^{165}}$	$\frac{P^{165}}{T^{166}}$	$\frac{P^{166}}{T^{167}}$	$\frac{P^{167}}{T^{168}}$	$\frac{P^{168}}{T^{169}}$	$\frac{P^{169}}{T^{170}}$	$\frac{P^{170}}{T^{171}}$	$\frac{P^{171}}{T^{172}}$	$\frac{P^{172}}{T^{173}}$	$\frac{P^{173}}{T^{174}}$	$\frac{P^{174}}{T^{175}}$	$\frac{P^{175}}{T^{176}}$	$\frac{P^{176}}{T^{177}}$	$\frac{P^{177}}{T^{178}}$	$\frac{P^{178}}{T^{179}}$	$\frac{P^{179}}{T^{180}}$	$\frac{P^{180}}{T^{181}}$	$\frac{P^{181}}{T^{182}}$	$\frac{P^{182}}{T^{183}}$	$\frac{P^{183}}{T^{184}}$	$\frac{P^{184}}{T^{185}}$	$\frac{P^{185}}{T^{186}}$	$\frac{P^{186}}{T^{1$

TABLE 7. IDEAL GAS FUNCTIONS FOR C+ (ATOMIC WEIGHT 12.0104, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS n S.A. 800 TABLE 51 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL FUNCT.	$\frac{W-E}{RT}$	$-\frac{E-E_0}{RT}$	$\frac{h\nu}{RT}$	$-\ln \frac{Q}{Q_0}$	$-\ln \frac{Q}{Q_0} - \frac{E-E_0}{RT}$	$\frac{E-E_0}{RT}$	$\frac{E-E_0}{RT} - \frac{h\nu}{RT}$	$\frac{E-E_0}{RT} - \frac{h\nu}{RT} - \frac{W-E}{RT}$	TEMP. (°K)
1000	5.4481	2.59048	19.0644	21.6239	5.06410	37.0642	42.9793	3.00000	3.00000	1000
1200	5.7805	2.54083	19.5362	22.0800	5.06494	38.0764	43.8764	3.00000	3.00000	1200
1400	5.7454	2.54288	19.8227	22.4456	5.06512	38.5977	44.6428	3.00000	3.00000	1400
1600	5.7763	2.53762	20.2619	22.7995	5.06546	40.2637	45.3044	3.00000	3.00000	1600
1800	5.8065	2.53352	20.5405	23.0905	5.06582	40.8572	45.8917	3.00000	3.00000	1800
2000	5.8200	2.53022	20.8273	23.3575	5.06796	41.3073	46.4152	3.00000	3.00000	2000
2200	5.8360	2.52751	21.0843	23.5958	5.06958	41.6642	46.8808	3.00000	3.00000	2200
2400	5.8494	2.52525	21.2781	23.8134	5.07089	42.0309	47.3211	3.00000	3.00000	2400
2600	5.8608	2.52333	21.4902	24.0135	5.07186	42.3045	47.7480	3.00000	3.00000	2600
2800	5.8704	2.52146	21.6771	24.1980	5.07240	42.5740	48.1607	3.00000	3.00000	2800
3000	5.8791	2.52025	21.8510	24.3713	5.07266	42.8315	48.5590	3.00000	3.00000	3000
3200	5.8865	2.51900	22.0137	24.5327	5.07267	43.0768	48.9435	3.00000	3.00000	3200
3400	5.8931	2.51799	22.1643	24.6842	5.07247	43.3017	49.3147	3.00000	3.00000	3400
3600	5.8990	2.51691	22.3102	24.8271	5.07201	43.5141	49.6736	3.00000	3.00000	3600
3800	5.9042	2.51603	22.4463	24.9623	5.07176	43.7145	50.0203	3.00000	3.00000	3800
4000	5.9090	2.51523	22.5753	25.0906	5.07181	43.9039	50.3551	3.00000	3.00000	4000
4200	5.9133	2.51452	22.6980	25.2125	5.07177	44.0817	50.6799	3.00000	3.00000	4200
4400	5.9172	2.51389	22.8150	25.3289	5.07159	44.2489	50.9945	3.00000	3.00000	4400
4600	5.9207	2.51329	22.9267	25.4400	5.07128	44.4059	51.3000	3.00000	3.00000	4600
4800	5.9240	2.51277	23.0337	25.5464	5.07083	44.5532	51.5965	3.00000	3.00000	4800
5000	5.9271	2.51231	23.1362	25.6485	5.07027	44.6915	51.8849	3.00000	3.00000	5000
5200	5.9299	2.51190	23.2348	25.7467	5.06956	44.8211	52.1659	3.00000	3.00000	5200
5400	5.9325	2.51155	23.3296	25.8411	5.06870	44.9421	52.4395	3.00000	3.00000	5400
5600	5.9350	2.51125	23.4209	25.9321	5.06768	45.0545	52.7059	3.00000	3.00000	5600
5800	5.9373	2.51103	23.5096	26.0200	5.06652	45.1583	52.9649	3.00000	3.00000	5800
6000	5.9395	2.51087	23.5961	26.1050	5.06521	45.2535	53.2169	3.00000	3.00000	6000
6200	5.9416	2.51078	23.6795	26.1872	5.06376	45.3401	53.4622	3.00000	3.00000	6200
6400	5.9436	2.51077	23.7597	26.2670	5.06218	45.4183	53.6999	3.00000	3.00000	6400
6600	5.9454	2.51085	23.8364	26.3443	5.06048	45.4890	53.9300	3.00000	3.00000	6600
6800	5.9475	2.51103	23.9094	26.4194	5.05863	45.5519	54.1527	3.00000	3.00000	6800
7000	5.9495	2.51130	23.9812	26.4929	5.05663	45.6066	54.3684	3.00000	3.00000	7000
7200	5.9516	2.51149	24.0519	26.5634	5.05448	45.6534	54.5769	3.00000	3.00000	7200
7400	5.9533	2.51119	24.1208	26.6310	5.05213	45.6927	54.7784	3.00000	3.00000	7400
7600	5.9553	2.51281	24.1878	26.6966	5.04957	45.7245	54.9730	3.00000	3.00000	7600
7800	5.9573	2.51356	24.2531	26.7606	5.04681	45.7483	55.1607	3.00000	3.00000	7800
8000	5.9595	2.51445	24.3167	26.8212	5.04386	45.7645	55.3422	3.00000	3.00000	8000
8200	5.9617	2.51548	24.3788	26.8794	5.04073	45.7727	55.5179	3.00000	3.00000	8200
8400	5.9640	2.51666	24.4394	26.9351	5.03743	45.7727	55.6877	3.00000	3.00000	8400
8600	5.9664	2.51799	24.4987	26.9887	5.03397	45.7645	55.8516	3.00000	3.00000	8600
8800	5.9690	2.51948	24.5566	27.0401	5.03036	45.7483	56.0094	3.00000	3.00000	8800
9000	5.9717	2.52113	24.6132	27.0893	5.02660	45.7245	56.1619	3.00000	3.00000	9000
9200	5.9746	2.52294	24.6686	27.1364	5.02270	45.6927	56.3094	3.00000	3.00000	9200
9400	5.9777	2.52492	24.7229	27.1818	5.01867	45.6534	56.4519	3.00000	3.00000	9400
9600	5.9809	2.52707	24.7761	27.2252	5.01451	45.6066	56.5894	3.00000	3.00000	9600
9800	5.9844	2.52936	24.8282	27.2670	5.01021	45.5519	56.7219	3.00000	3.00000	9800

TABLE 7 (CONT.). IDEAL GAS FUNCTIONS FOR C₂

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2 - \epsilon}{RT}$	$\ln \frac{h^2 - \epsilon}{RT}$	$\ln \frac{h^2 - \epsilon}{RT} - \ln \frac{h^2 - \epsilon}{RT}$	$\ln \frac{h^2 - \epsilon}{RT}$	$\ln \frac{h^2 - \epsilon}{RT}$	$\ln \frac{h^2 - \epsilon}{RT}$	$\ln \frac{h^2 - \epsilon}{RT}$	$\ln \frac{h^2 - \epsilon}{RT}$	TEMP. (°K)
1000	5.9681	2.53107	9.09124	46.4986	94.4986	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	10000
1050	5.9984	2.53883	9.09570	46.5000	94.5000	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	10500
11000	6.0103	2.54483	9.09998	46.5012	94.5012	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	11000
11500	6.0240	2.55386	9.10781	50.1454	55.2245	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	11500
12000	6.0394	2.56586	9.10979	50.3422	55.4610	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	12000
12500	6.0572	2.57678	9.12048	50.5708	55.6912	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	12500
13000	6.0769	2.58695	9.13487	50.7720	55.9199	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	13000
13500	6.0984	2.60110	9.14882	50.9464	56.1354	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	13500
14000	6.1225	2.61436	9.16317	51.1551	56.3502	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	14000
14500	6.1486	2.62826	9.17778	51.3379	56.5606	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	14500
15000	6.1769	2.64271	9.19250	51.5154	56.7649	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	15000
15500	6.2074	2.65764	9.20737	51.6881	56.9632	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	15500
16000	6.2401	2.67298	9.22236	51.8564	57.1579	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	16000
16500	6.2749	2.68867	9.23747	52.0202	57.3430	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	16500
17000	6.3118	2.70464	9.25278	52.1801	57.5197	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	17000
17500	6.3508	2.72094	9.26826	52.3364	57.6831	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	17500
18000	6.3919	2.73761	9.28392	52.4892	57.8344	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	18000
18500	6.4351	2.75465	9.29976	52.6386	57.9734	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	18500
19000	6.4802	2.77208	9.31586	52.7850	58.1000	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	19000
19500	6.5272	2.78991	9.33222	52.9284	58.2165	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	19500
20000	6.5762	2.80816	9.34895	53.0690	58.3242	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	20000
20500	6.6264	2.82684	9.36602	53.2062	58.4242	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	20500
21000	6.6784	2.84596	9.38342	53.3402	58.5168	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	21000
21500	6.7324	2.86552	9.40116	53.4708	58.6022	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	21500
22000	6.7884	2.88552	9.41926	53.6000	58.6802	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	22000
22500	6.8454	2.90596	9.43772	53.7284	58.7512	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	22500
23000	6.9034	2.92684	9.45662	53.8562	58.8162	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	23000
23500	6.9624	2.94816	9.47596	53.9836	58.8762	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	23500
24000	7.0224	2.96992	9.49576	54.1108	58.9312	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	24000
24500	7.0834	2.99212	9.51596	54.2376	58.9812	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	24500
25000	7.1454	3.01472	9.53656	54.3640	59.0262	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	25000
25500	7.2084	3.03772	9.55756	54.4900	59.0662	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	25500
26000	7.2724	3.06112	9.57896	54.6156	59.1012	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	26000
26500	7.3374	3.08492	9.59976	54.7408	59.1312	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	26500
27000	7.4034	3.10912	9.62096	54.8656	59.1562	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	27000
27500	7.4704	3.13372	9.64256	54.9900	59.1762	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	27500
28000	7.5384	3.15872	9.66456	55.1140	59.1912	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	28000
28500	7.6074	3.18412	9.68696	55.2376	59.2012	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	28500
29000	7.6784	3.20992	9.70976	55.3608	59.2062	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	29000
29500	7.7504	3.23612	9.73296	55.4836	59.2062	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	29500
30000	7.8234	3.26272	9.75656	55.6060	59.2012	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	30000
30500	7.8974	3.28972	9.78056	55.7280	59.1912	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	30500
31000	7.9724	3.31712	9.80496	55.8496	59.1762	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	31000
31500	8.0484	3.34492	9.82976	55.9708	59.1562	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	31500
32000	8.1254	3.37312	9.85496	56.0916	59.1312	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	32000
32500	8.2034	3.40172	9.88056	56.2120	59.1012	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	32500
33000	8.2824	3.43072	9.90656	56.3320	59.0662	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	33000
33500	8.3624	3.46012	9.93296	56.4516	59.0262	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	33500
34000	8.4434	3.49002	9.95976	56.5708	58.9812	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	34000
34500	8.5254	3.52042	9.98696	56.6896	58.9312	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	34500
35000	8.6084	3.55132	10.01456	56.8080	58.8762	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	35000
35500	8.6924	3.58272	10.04256	56.9260	58.8162	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	35500
36000	8.7774	3.61462	10.07096	57.0436	58.7512	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	36000
36500	8.8634	3.64702	10.10000	57.1608	58.6802	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	36500
37000	8.9504	3.68002	10.12976	57.2776	58.6022	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	37000
37500	9.0384	3.71362	10.15926	57.3940	58.5168	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	37500
38000	9.1274	3.74782	10.18956	57.5096	58.4242	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	38000
38500	9.2174	3.78262	10.22056	57.6248	58.3242	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	38500
39000	9.3084	3.81802	10.25226	57.7396	58.2168	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	39000
39500	9.4004	3.85402	10.28466	57.8540	58.1000	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	39500
40000	9.4934	3.89062	10.31776	57.9680	57.9734	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	40000
40500	9.5874	3.92782	10.35156	58.0816	57.8344	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	40500
41000	9.6824	3.96562	10.38606	58.1948	57.6831	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	41000
41500	9.7784	4.00402	10.42126	58.3076	57.5197	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	41500
42000	9.8754	4.04302	10.45716	58.4200	57.3430	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	42000
42500	9.9734	4.08262	10.49376	58.5320	57.1579	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	42500
43000	10.0724	4.12282	10.53106	58.6436	56.9632	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	43000
43500	10.1724	4.16362	10.56906	58.7548	56.7649	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	43500
44000	10.2734	4.20502	10.60776	58.8656	56.5606	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	44000
44500	10.3754	4.24702	10.64716	58.9760	56.3502	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	44500
45000	10.4784	4.28962	10.68726	59.0860	56.1354	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	45000
45500	10.5824	4.33282	10.72806	59.1956	55.9199	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	45500
46000	10.6874	4.37662	10.76956	59.3048	55.6912	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	46000
46500	10.7934	4.42102	10.81176	59.4136	55.4610	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	46500
47000	10.9004	4.46602	10.85466	59.5220	55.2245	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	47000
47500	11.0084	4.51162	10.89826	59.6300	54.9812	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	47500
48000	11.1174	4.55782	10.94256	59.7376	54.7262	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	48000
48500	11.2274	4.60462	10.98766	59.8448	54.4602	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	48500
49000	11.3384	4.65202	11.03346	59.9516	54.1832	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	49000
49500	11.4504	4.70002	11.08006	60.0580	53.8962	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	49500
50000	11.5634	4.74862	11.12746	60.1640	53.6002	1.0441E 04	5.0312E 04	5.0312E 04	5.0312E 04	50000

TABLE 8. TOTAL GAS FUNCTIONS FOR H₂ IONIC WAVELENGTH 14,000.2, R = 1.9717 CAL/PWOLE) BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS IN S_A. SEE TABLE 52 FOR LIST OF STATES USED.

GENO. (1%)	PARTIT. FUNCT.	$\frac{W-E}{RT}$	$-\frac{E^0-E}{RT}$	ΔH	$H^0-E^0/RT - 10^6 \frac{E-E}{CAL/MOLE \%}$	S^0	E^0-E^0	$H^0-E^0 - CAL/MOLE$	$(-F^0-E^0)$	TEMP. (1%)
1000	7.9993	2.62287	19.6395	22.2504	9.21209	39.0190	44.2311	3.22496	9.21209	1200
1200	8.1041	2.60310	20.1115	22.7150	9.17280	39.6456	45.1384	3.82206	6.20746	1400
1400	8.2246	2.59881	20.5120	23.1008	9.14439	40.7607	45.9051	4.20216	7.20216	1600
1600	8.3166	2.57800	20.8549	23.4349	9.12291	41.4462	46.5691	4.50172	8.19642	1800
1800	8.3891	2.56955	21.1601	23.7204	9.10613	42.0406	47.1547	4.81614	9.10102	2000
2000	8.4478	2.56281	21.4305	23.9913	9.09273	42.5959	47.6786	5.11116	1.01892	2200
2200	8.4963	2.55737	21.6745	24.2318	9.08192	43.0707	48.1324	5.40802	0.91892	2400
2400	8.5371	2.55298	21.8968	24.4448	9.07319	43.5125	48.5965	5.70452	0.81972	2600
2600	8.5721	2.54948	22.1010	24.6385	9.06626	43.9183	49.0865	6.00042	0.71722	2800
2800	8.6028	2.54678	22.2892	24.8192	9.06088	44.2935	49.5944	6.29692	0.61162	3000
3000	8.6299	2.54481	22.4655	25.0103	9.05697	44.6426	49.9995	6.59342	0.51162	3200
3200	8.6546	2.54333	22.6296	25.1732	9.05441	44.9688	50.3233	6.89042	0.41162	3400
3400	8.6772	2.54248	22.7838	25.3167	9.05312	45.2752	50.5781	7.18742	0.31162	3600
3600	8.6985	2.54283	23.0027	25.4720	9.05303	45.5640	50.8171	7.48442	0.21162	3800
3800	8.7188	2.54334	23.0667	25.6100	9.05404	45.8373	50.9913	7.78142	0.11162	4000
4000	8.7384	2.54437	23.1171	25.7415	9.05608	46.0966	51.1526	8.07842	0.01162	4200
4200	8.7576	2.54587	23.1613	25.8672	9.05906	46.3433	51.3024	8.37542	0.01162	4400
4400	8.7767	2.54780	23.1998	25.9876	9.06290	46.5787	51.4416	8.67242	0.01162	4600
4600	8.7958	2.55011	23.2351	26.1032	9.06749	46.8039	51.5714	8.96942	0.01162	4800
4800	8.8151	2.55276	23.2617	26.2144	9.07276	47.0197	51.6928	9.26642	0.01162	5000
5000	8.8346	2.55571	23.2800	26.3217	9.07861	47.2269	51.8095	9.56342	0.01162	5200
5200	8.8545	2.55911	23.2863	26.4252	9.08497	47.4262	51.9112	9.86042	0.01162	5400
5400	8.8747	2.56232	23.2859	26.5252	9.09176	47.6182	52.0089	1.01742	0.01162	5600
5600	8.8954	2.56591	23.2781	26.6221	9.09900	47.8035	52.1034	1.31442	0.01162	5800
5800	8.9166	2.56965	23.2617	26.7159	9.10632	47.9828	52.1949	1.61142	0.01162	6000
6000	8.9383	2.57351	23.2394	26.8069	9.11398	48.1558	52.2835	1.90842	0.01162	6200
6200	8.9604	2.57745	23.2116	26.8953	9.12196	48.3236	52.3694	2.20542	0.01162	6400
6400	8.9830	2.58145	23.1798	26.9812	9.13077	48.4864	52.4611	2.50242	0.01162	6600
6600	9.0061	2.58549	23.1473	27.0648	9.13780	48.6443	52.5500	2.80342	0.01162	6800
6800	9.0297	2.58956	23.1162	27.1461	9.14586	48.7978	52.6437	3.10942	0.01162	7000
7000	9.0537	2.59363	23.0816	27.2253	9.15390	48.9471	52.7424	3.42042	0.01162	7200
7200	9.0781	2.59770	23.0448	27.3024	9.16200	49.0924	52.8455	3.72642	0.01162	7400
7400	9.1030	2.60174	23.0077	27.3777	9.17006	49.2346	52.9524	4.03542	0.01162	7600
7600	9.1282	2.60575	22.9694	27.4512	9.17808	49.3720	53.0630	4.34842	0.01162	7800
7800	9.1538	2.60972	22.9302	27.5229	9.18594	49.5066	53.1769	4.66542	0.01162	8000
8000	9.1797	2.61364	22.8903	27.5929	9.19374	49.6380	53.2944	4.98642	0.01162	8200
8200	9.2059	2.61751	22.8493	27.6614	9.20142	49.7663	53.4167	5.31142	0.01162	8400
8400	9.2324	2.62132	22.8077	27.7283	9.20900	49.8917	53.5430	5.64042	0.01162	8600
8600	9.2592	2.62507	22.7657	27.7938	9.21645	50.0144	53.6730	5.97342	0.01162	8800
8800	9.2862	2.62876	22.7231	27.8579	9.22377	50.1344	53.8069	6.31042	0.01162	9000
9000	9.3136	2.63238	22.6802	27.9206	9.23097	50.2519	53.9438	6.65142	0.01162	9200
9200	9.3411	2.63593	22.6361	27.9820	9.23803	50.3669	54.0849	6.99642	0.01162	9400
9400	9.3688	2.63941	22.5923	28.0423	9.24495	50.4794	54.2294	7.34542	0.01162	9600
9600	9.3967	2.64283	22.5484	28.1013	9.25174	50.5901	54.3774	7.69842	0.01162	9800
9800	9.4247	2.64617	22.5039	28.1591	9.25839	50.6985	54.5289	8.05542	0.01162	10000

TABLE 8 (CONT.). IDEAL GAS FUNCTIONS FOR N₂

TEMP. (°K)	PARTIAL FUNCT.	$\frac{h^2 - c}{RT}$	$\frac{h^2 - c}{RT}$	$\frac{h^2 - c}{RT}$	$\frac{h^2 - c}{RT}$	$\frac{h^2 - c}{RT}$	$\frac{h^2 - c}{RT}$	$\frac{h^2 - c}{RT}$	$\frac{h^2 - c}{RT}$	TEMP. (°K)		
10000	9.4529	2.64945	25.5465	28.2159	5.26490	50.8040	56.0497	3.27778	04	5.08058	05	10000
10500	9.5239	2.63734	25.4899	28.3533	5.28062	51.0621	56.3627	3.45818	04	5.54478	04	10500
11000	9.5956	2.62487	25.4337	28.4864	5.29854	51.3093	56.6735	3.63828	04	6.02818	04	11000
11500	9.6677	2.61201	25.3783	28.6193	5.31873	51.5438	56.9835	3.82096	04	6.51242	04	11500
12000	9.7401	2.60000	25.3232	28.7510	5.34022	51.7760	57.2935	4.00338	04	7.00198	04	12000
12500	9.8128	2.58828	25.2687	28.8870	5.36309	51.9876	57.6037	4.18628	04	7.49208	04	12500
13000	9.8855	2.57674	25.2147	29.0266	5.38699	52.1971	57.9142	4.36962	04	7.98228	04	13000
13500	9.9583	2.56530	25.1610	29.1648	5.41177	52.3992	58.2247	4.55342	04	8.47248	04	13500
14000	10.0311	2.55397	25.1076	29.3010	5.43731	52.5993	58.5352	4.73762	04	8.96268	04	14000
14500	10.1039	2.54274	25.0545	29.4366	5.46364	52.7960	58.8457	4.92312	04	9.45288	04	14500
15000	10.1765	2.53161	25.0016	29.5718	5.49077	52.9899	59.1562	5.10982	04	9.94308	04	15000
15500	10.2490	2.52058	24.9490	29.7066	5.51869	53.1814	59.4667	5.29732	04	10.43328	04	15500
16000	10.3214	2.50965	24.8965	29.8410	5.54739	53.3708	59.7772	5.48582	04	10.92348	04	16000
16500	10.3936	2.49882	24.8442	29.9749	5.57687	53.5583	60.0877	5.67532	04	11.41368	04	16500
17000	10.4657	2.48809	24.7920	30.1084	5.60713	53.7438	60.3982	5.86582	04	11.90388	04	17000
17500	10.5376	2.47746	24.7398	30.2414	5.63817	53.9273	60.7087	6.05732	04	12.39408	04	17500
18000	10.6093	2.46693	24.6876	30.3749	5.66989	54.1088	61.0192	6.24882	04	12.88428	04	18000
18500	10.6812	2.45640	24.6354	30.5079	5.70231	54.2883	61.3297	6.44032	04	13.37448	04	18500
19000	10.7528	2.44597	24.5832	30.6404	5.73543	54.4658	61.6402	6.63182	04	13.86468	04	19000
19500	10.8244	2.43564	24.5310	30.7729	5.76915	54.6413	61.9507	6.82332	04	14.35488	04	19500
20000	10.8959	2.42541	24.4788	30.9054	5.80347	54.8148	62.2612	7.01482	04	14.84508	04	20000
20500	11.0222	2.41528	24.4266	31.0379	5.83839	54.9863	62.5717	7.20632	04	15.33528	04	20500
21000	11.1485	2.40525	24.3744	31.1704	5.87391	55.1558	62.8822	7.39782	04	15.82548	04	21000
21500	11.2748	2.39532	24.3222	31.3029	5.91003	55.3233	63.1927	7.58932	04	16.31568	04	21500
22000	11.4011	2.38549	24.2700	31.4354	5.94675	55.4888	63.5032	7.78082	04	16.80588	04	22000
22500	11.5274	2.37576	24.2178	31.5679	5.98407	55.6523	63.8137	7.97232	04	17.29608	04	22500
23000	11.6537	2.36613	24.1656	31.7004	6.02199	55.8138	64.1242	8.16382	04	17.78628	04	23000
23500	11.7800	2.35660	24.1134	31.8329	6.06051	55.9733	64.4347	8.35532	04	18.27648	04	23500
24000	11.9063	2.34717	24.0612	31.9654	6.10003	56.1308	64.7452	8.54682	04	18.76668	04	24000
24500	12.0326	2.33784	24.0090	32.0979	6.14055	56.2863	65.0557	8.73832	04	19.25688	04	24500
25000	12.1589	2.32861	23.9568	32.2304	6.18207	56.4398	65.3662	8.92982	04	19.74708	04	25000
25500	12.2852	2.31948	23.9046	32.3629	6.22459	56.5913	65.6767	9.12132	04	20.23728	04	25500
26000	12.4115	2.31045	23.8524	32.4954	6.26811	56.7408	65.9872	9.31282	04	20.72748	04	26000
26500	12.5378	2.30152	23.8002	32.6279	6.31263	56.8883	66.2977	9.50432	04	21.21768	04	26500
27000	12.6641	2.29269	23.7480	32.7604	6.35815	57.0338	66.6082	9.69582	04	21.70788	04	27000
27500	12.7904	2.28396	23.6958	32.8929	6.40467	57.1763	66.9187	9.88732	04	22.19808	04	27500
28000	12.9167	2.27533	23.6436	33.0254	6.45219	57.3168	67.2292	10.07882	04	22.68828	04	28000
28500	13.0430	2.26680	23.5914	33.1579	6.50071	57.4543	67.5397	10.27032	04	23.17848	04	28500
29000	13.1693	2.25837	23.5392	33.2904	6.55023	57.5888	67.8502	10.46182	04	23.66868	04	29000
29500	13.2956	2.24994	23.4870	33.4229	6.60075	57.7203	68.1607	10.65332	04	24.15888	04	29500
30000	13.4219	2.24161	23.4348	33.5554	6.65227	57.8498	68.4712	10.84482	04	24.64908	04	30000
30500	13.5482	2.23338	23.3826	33.6879	6.70479	57.9763	68.7817	11.03632	04	25.13928	04	30500
31000	13.6745	2.22525	23.3304	33.8204	6.75831	58.1008	69.0922	11.22782	04	25.62948	04	31000
31500	13.8008	2.21722	23.2782	33.9529	6.81283	58.2233	69.4027	11.41932	04	26.11968	04	31500
32000	13.9271	2.20929	23.2260	34.0854	6.86835	58.3438	69.7132	11.61082	04	26.60988	04	32000
32500	14.0534	2.20146	23.1738	34.2179	6.92487	58.4613	70.0237	11.80232	04	27.09998	04	32500
33000	14.1797	2.19373	23.1216	34.3504	6.98239	58.5768	70.3342	12.00000	04	27.59008	04	33000
33500	14.3060	2.18610	23.0694	34.4829	7.04091	58.6893	70.6447	12.19250	04	28.08018	04	33500
34000	14.4323	2.17857	23.0172	34.6154	7.10043	58.8008	70.9552	12.38500	04	28.57028	04	34000
34500	14.5586	2.17114	22.9650	34.7479	7.16095	58.9103	71.2657	12.57750	04	29.06038	04	34500
35000	14.6849	2.16381	22.9128	34.8804	7.22247	59.0178	71.5762	12.77000	04	29.55048	04	35000
35500	14.8112	2.15658	22.8606	35.0129	7.28500	59.1233	71.8867	12.96250	04	30.04058	04	35500
36000	14.9375	2.14945	22.8084	35.1454	7.34853	59.2268	72.1972	13.15500	04	30.53068	04	36000
36500	15.0638	2.14242	22.7562	35.2779	7.41306	59.3283	72.5077	13.34750	04	31.02078	04	36500
37000	15.1901	2.13549	22.7040	35.4104	7.47859	59.4278	72.8182	13.54000	04	31.51088	04	37000
37500	15.3164	2.12866	22.6518	35.5429	7.54512	59.5253	73.1287	13.73250	04	32.00098	04	37500
38000	15.4427	2.12193	22.5996	35.6754	7.61265	59.6208	73.4392	13.92500	04	32.49108	04	38000
38500	15.5690	2.11530	22.5474	35.8079	7.68118	59.7143	73.7497	14.11750	04	32.98118	04	38500
39000	15.6953	2.10877	22.4952	35.9404	7.75071	59.8058	74.0602	14.31000	04	33.47128	04	39000
39500	15.8216	2.10234	22.4430	36.0729	7.82124	59.8953	74.3707	14.50250	04	33.96138	04	39500
40000	15.9479	2.09601	22.3908	36.2054	7.89277	59.9828	74.6812	14.69500	04	34.45148	04	40000
40500	16.0742	2.08978	22.3386	36.3379	7.96530	60.0683	74.9917	14.88750	04	34.94158	04	40500
41000	16.2005	2.08365	22.2864	36.4704	8.03883	60.1518	75.3022	15.08000	04	35.43168	04	41000
41500	16.3268	2.07762	22.2342	36.6029	8.11336	60.2333	75.6127	15.27250	04	35.92178	04	41500
42000	16.4531	2.07169	22.1820	36.7354	8.18889	60.3138	75.9232	15.46500	04	36.41188	04	42000
42500	16.5794	2.06586	22.1298	36.8679	8.26542	60.3923	76.2337	15.65750	04	36.90198	04	42500
43000	16.7057	2.06013	22.0776	36.9999	8.34295	60.4688	76.5442	15.85000	04	37.39208	04	43000
43500	16.8320	2.05450	22.0254	37.1324	8.42148	60.5433	76.8547	16.04250	04	37.88218	04	43500
44000	16.9583	2.04897	21.9732	37.2649	8.50101	60.6158	77.1652	16.23500	04	38.37228	04	44000
44500	17.0846	2.04354	21.9210	37.3974	8.58154	60.6863	77.4757	16.42750	04	38.86238	04	44500
45000	17.2109	2.03821	21.8688	37.5299	8.66307	60.7548	77.7862	16.62000	04	39.35248	04	45000
45500	17.3372	2.03298	21.8166	37.6624	8.74560	60.8213	78.0967	16.81250	04	39.84258	04	45500
46000	17.4635	2.02785	21.7644	37.7949	8.82913	60.8858	78.4072	17.00500	04	40.33268	04	46000
46500	17.5898	2.02282	21.7122	37.9274	8.91366	60.9483	78.7177	17.19750	04	40.82278	04	46500
47000	17.7161	2.01789	21.6600	38.0599	9.00000	61.0088	79.0282	17.39000	04	41.31288	04	47000
47500	17.8424	2.01306	21.6078	38.1924	9.08733	61.0673	79.3387	17.58250	04	41.80298	04	47500
48000	17.9687	2.00833	21.5556	38.3249	9.17566	61.1238	79.6492	17.77500	04	42.29308	04	48000
48500	18.0950	2.00370	21.5034	38.4574	9.26500	61.1783	79.9597	17.96750	04	42.78318	04	48500
49000	18.2213	2.00000	21.4512	38.5899	9.35533	61.2308	80.2702	18.16000	04	43.27328	04	49000
49500	18.3476	1.99647	21.3990	38.7224	9.44666	61.2813	80.5807	18.35250	04	43.76338	04	49500
50000	18.4739	1.99304	21.3468	38.8549	9.53900	61.3298	80.8912	18.54500	04	44.25348	04	50000

TABLE 9. IDEAL GAS FUNCTIONS FOR D₂ (ATOMIC WEIGHT 19.992, R = 1.90717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 33 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL FUNCT.	$\frac{h^2 - \bar{E}}{RT}$	$\frac{h^2 - \bar{E}}{RT}$	$\frac{h^2 - \bar{E}}{RT}$	$\frac{h^2 - \bar{E}}{RT}$	$\frac{h^2 - \bar{E}}{RT}$	$\frac{h^2 - \bar{E}}{RT}$	$\frac{h^2 - \bar{E}}{RT}$	$\frac{h^2 - \bar{E}}{RT}$	TEMP. (°K)
1000	4.0000	2.50000	19.1499	21.0049	4.90791	30.0932	43.0211	2.90076	03	4.90791
1200	4.0000	2.50000	19.0653	22.1053	4.90791	30.0932	43.0211	3.57092	03	4.90791
1400	4.0000	2.50000	19.0007	22.4407	4.90791	30.0932	43.0211	4.17306	03	4.90791
1600	4.0000	2.50000	18.9445	22.8245	4.90791	30.0932	43.0211	4.70928	03	4.90791
1800	4.0000	2.50000	18.8950	23.2450	4.90791	30.0932	43.0211	5.18438	03	4.90791
2000	4.0000	2.50000	18.8510	23.7010	4.90791	30.0932	43.0211	5.60500	03	4.90791
2200	4.0000	2.50000	18.8116	24.1916	4.90791	30.0932	43.0211	5.97750	03	4.90791
2400	4.0000	2.50000	18.7760	24.7160	4.90791	30.0932	43.0211	6.30000	03	4.90791
2600	4.0000	2.50000	18.7435	25.2735	4.90791	30.0932	43.0211	6.58000	03	4.90791
2800	4.0000	2.50000	18.7135	25.8635	4.90791	30.0932	43.0211	6.82000	03	4.90791
3000	4.0000	2.50000	18.6855	26.4855	4.90791	30.0932	43.0211	7.03000	03	4.90791
3200	4.0000	2.50000	18.6590	27.1490	4.90791	30.0932	43.0211	7.21000	03	4.90791
3400	4.0000	2.50000	18.6335	27.8535	4.90791	30.0932	43.0211	7.37000	03	4.90791
3600	4.0000	2.50000	18.6095	28.5985	4.90791	30.0932	43.0211	7.51000	03	4.90791
3800	4.0000	2.50000	18.5865	29.3835	4.90791	30.0932	43.0211	7.63000	03	4.90791
4000	4.0000	2.50000	18.5640	30.2080	4.90791	30.0932	43.0211	7.74000	03	4.90791
4200	4.0000	2.50000	18.5425	31.0725	4.90791	30.0932	43.0211	7.84000	03	4.90791
4400	4.0000	2.50000	18.5215	31.9775	4.90791	30.0932	43.0211	7.93000	03	4.90791
4600	4.0000	2.50000	18.5010	32.9230	4.90791	30.0932	43.0211	8.01000	03	4.90791
4800	4.0000	2.50000	18.4810	33.9090	4.90791	30.0932	43.0211	8.08000	03	4.90791
5000	4.0000	2.50000	18.4615	34.9355	4.90791	30.0932	43.0211	8.15000	03	4.90791
5200	4.0000	2.50000	18.4425	36.0025	4.90791	30.0932	43.0211	8.21000	03	4.90791
5400	4.0000	2.50000	18.4240	37.1100	4.90791	30.0932	43.0211	8.27000	03	4.90791
5600	4.0000	2.50000	18.4060	38.2580	4.90791	30.0932	43.0211	8.33000	03	4.90791
5800	4.0000	2.50000	18.3885	39.4475	4.90791	30.0932	43.0211	8.39000	03	4.90791
6000	4.0000	2.50000	18.3715	40.6790	4.90791	30.0932	43.0211	8.45000	03	4.90791
6200	4.0000	2.50000	18.3550	41.9530	4.90791	30.0932	43.0211	8.51000	03	4.90791
6400	4.0000	2.50000	18.3390	43.2695	4.90791	30.0932	43.0211	8.57000	03	4.90791
6600	4.0000	2.50000	18.3235	44.6290	4.90791	30.0932	43.0211	8.63000	03	4.90791
6800	4.0000	2.50000	18.3085	46.0320	4.90791	30.0932	43.0211	8.69000	03	4.90791
7000	4.0000	2.50000	18.2940	47.4790	4.90791	30.0932	43.0211	8.75000	03	4.90791
7200	4.0000	2.50000	18.2795	48.9710	4.90791	30.0932	43.0211	8.81000	03	4.90791
7400	4.0000	2.50000	18.2655	50.5090	4.90791	30.0932	43.0211	8.87000	03	4.90791
7600	4.0000	2.50000	18.2515	52.0940	4.90791	30.0932	43.0211	8.93000	03	4.90791
7800	4.0000	2.50000	18.2375	53.7270	4.90791	30.0932	43.0211	8.99000	03	4.90791
8000	4.0000	2.50000	18.2240	55.4090	4.90791	30.0932	43.0211	9.05000	03	4.90791
8200	4.0000	2.50000	18.2105	57.1420	4.90791	30.0932	43.0211	9.11000	03	4.90791
8400	4.0000	2.50000	18.1975	58.9270	4.90791	30.0932	43.0211	9.17000	03	4.90791
8600	4.0000	2.50000	18.1845	60.7640	4.90791	30.0932	43.0211	9.23000	03	4.90791
8800	4.0000	2.50000	18.1715	62.6540	4.90791	30.0932	43.0211	9.29000	03	4.90791
9000	4.0000	2.50000	18.1585	64.5980	4.90791	30.0932	43.0211	9.35000	03	4.90791
9200	4.0000	2.50000	18.1455	66.5970	4.90791	30.0932	43.0211	9.41000	03	4.90791
9400	4.0000	2.50000	18.1325	68.6520	4.90791	30.0932	43.0211	9.47000	03	4.90791
9600	4.0000	2.50000	18.1195	70.7640	4.90791	30.0932	43.0211	9.53000	03	4.90791
9800	4.0000	2.50000	18.1065	72.9340	4.90791	30.0932	43.0211	9.59000	03	4.90791
10000	4.0000	2.50000	18.0935	75.1640	4.90791	30.0932	43.0211	9.65000	03	4.90791

TABLE 9 (CONT.). IDEAL GAS HEAT CAPACITIES PER MO.

TEMP. (°K.)	PARTIT. FUNKT.	$\frac{U^0 - U^0}{T}$	$\frac{U^0 - U^0}{T}$	$\frac{U^0 - U^0}{T}$	$\frac{U^0 - U^0}{T}$	$\frac{U^0 - U^0}{T}$	$\frac{U^0 - U^0}{T}$	$\frac{U^0 - U^0}{T}$	$\frac{U^0 - U^0}{T}$	$\frac{U^0 - U^0}{T}$	TEMP. (°K.)
10000	4.2207	2.71606	24.9616	5.39904	99.0000	3.61196	5.39904	3.61196	5.39904	10000	
10500	4.2769	2.74522	25.0949	5.44116	99.0077	3.61176	5.44116	3.61176	5.44116	10500	
11000	4.3296	2.77960	25.2235	5.48031	99.0122	3.61156	5.48031	3.61156	5.48031	11000	
11500	4.3809	2.81073	25.3471	5.51695	99.0171	3.61136	5.51695	3.61136	5.51695	11500	
12000	4.4402	2.84127	25.4660	5.55097	99.0222	3.61116	5.55097	3.61116	5.55097	12000	
12500	4.5133	2.87095	25.5806	5.58266	99.0275	3.61096	5.58266	3.61096	5.58266	12500	
13000	4.5921	2.90094	25.6917	5.61211	99.0331	3.61076	5.61211	3.61076	5.61211	13000	
13500	4.6761	2.93129	25.8000	5.64031	99.0389	3.61056	5.64031	3.61056	5.64031	13500	
14000	4.7657	2.96207	25.9056	5.66736	99.0449	3.61036	5.66736	3.61036	5.66736	14000	
14500	4.8613	3.00337	26.0086	5.69326	99.0511	3.61016	5.69326	3.61016	5.69326	14500	
15000	4.9633	3.04529	26.1090	5.71801	99.0575	3.60996	5.71801	3.60996	5.71801	15000	
15500	5.0721	3.08783	26.2068	5.74161	99.0641	3.60976	5.74161	3.60976	5.74161	15500	
16000	5.1881	3.13109	26.3020	5.76406	99.0709	3.60956	5.76406	3.60956	5.76406	16000	
16500	5.3116	3.17517	26.3946	5.78536	99.0779	3.60936	5.78536	3.60936	5.78536	16500	
17000	5.4431	3.22009	26.4846	5.80551	99.0851	3.60916	5.80551	3.60916	5.80551	17000	
17500	5.5831	3.26587	26.5720	5.82451	99.0925	3.60896	5.82451	3.60896	5.82451	17500	
18000	5.7321	3.31253	26.6568	5.84236	99.1001	3.60876	5.84236	3.60876	5.84236	18000	
18500	5.8906	3.36007	26.7390	5.85906	99.1079	3.60856	5.85906	3.60856	5.85906	18500	
19000	6.0591	3.40849	26.8186	5.87461	99.1159	3.60836	5.87461	3.60836	5.87461	19000	
19500	6.2381	3.45781	26.8956	5.88901	99.1241	3.60816	5.88901	3.60816	5.88901	19500	
20000	6.4281	3.50803	26.9690	5.90226	99.1325	3.60796	5.90226	3.60796	5.90226	20000	
20500	6.6296	3.55915	27.0398	5.91446	99.1411	3.60776	5.91446	3.60776	5.91446	20500	
21000	6.8431	3.61117	27.1080	5.92561	99.1499	3.60756	5.92561	3.60756	5.92561	21000	
21500	7.0691	3.66409	27.1736	5.93571	99.1589	3.60736	5.93571	3.60736	5.93571	21500	
22000	7.3081	3.71791	27.2368	5.94476	99.1681	3.60716	5.94476	3.60716	5.94476	22000	
22500	7.5606	3.77263	27.2976	5.95276	99.1775	3.60696	5.95276	3.60696	5.95276	22500	
23000	7.8271	3.82825	27.3560	5.95971	99.1871	3.60676	5.95971	3.60676	5.95971	23000	
23500	8.1081	3.88477	27.4120	5.96561	99.1969	3.60656	5.96561	3.60656	5.96561	23500	
24000	8.4041	3.94219	27.4656	5.97046	99.2069	3.60636	5.97046	3.60636	5.97046	24000	
24500	8.7161	3.99951	27.5168	5.97426	99.2171	3.60616	5.97426	3.60616	5.97426	24500	
25000	9.0441	4.05783	27.5656	5.97701	99.2275	3.60596	5.97701	3.60596	5.97701	25000	
25500	9.3881	4.11715	27.6120	5.97971	99.2381	3.60576	5.97971	3.60576	5.97971	25500	
26000	9.7491	4.17747	27.6560	5.98236	99.2489	3.60556	5.98236	3.60556	5.98236	26000	
26500	10.1271	4.23879	27.6976	5.98496	99.2599	3.60536	5.98496	3.60536	5.98496	26500	
27000	10.5231	4.29991	27.7368	5.98751	99.2711	3.60516	5.98751	3.60516	5.98751	27000	
27500	10.9371	4.36103	27.7736	5.98996	99.2825	3.60496	5.98996	3.60496	5.98996	27500	
28000	11.3691	4.42215	27.8080	5.99236	99.2941	3.60476	5.99236	3.60476	5.99236	28000	
28500	11.8191	4.48327	27.8400	5.99471	99.3059	3.60456	5.99471	3.60456	5.99471	28500	
29000	12.2871	4.54439	27.8696	5.99696	99.3179	3.60436	5.99696	3.60436	5.99696	29000	
29500	12.7731	4.60551	27.8968	5.99916	99.3301	3.60416	5.99916	3.60416	5.99916	29500	
30000	13.2771	4.66663	27.9216	6.00131	99.3425	3.60396	6.00131	3.60396	6.00131	30000	

TABLE 10. IDEAL GAS FUNCTIONS FOR AR* (ATOMIC WEIGHT 39.9470, R = 1.00717 CAL/MOLE)

BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N. 4. SEE TABLE 5A FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL FUNCT.	$\frac{U^0 - U}{RT}$	$\frac{H^0 - H}{RT}$	$\ln \frac{Q}{N}$	$\ln \frac{Q}{N} - \ln \frac{Q}{N} - \ln \frac{Q}{N}$	$\frac{U^0 - U}{RT}$	$\frac{H^0 - H}{RT}$	$\frac{U^0 - U}{RT}$	TEMP. (°K)
1000	4.2548	2.62339	20.5038	21.2072	5.21312	40.9034	44.1344	3.22086	1000
1200	4.3592	2.64149	21.0639	23.7053	5.24307	41.8074	47.1064	3.25143	1200
1400	4.4591	2.65152	21.4719	26.1234	5.26900	42.6442	49.5372	3.27648	1400
1600	4.5518	2.65611	21.8263	28.4824	5.29182	43.4175	51.9117	3.29806	1600
1800	4.6367	2.65717	22.1392	30.7964	5.30824	44.1344	54.1344	3.31648	1800
2000	4.7139	2.65681	22.4191	33.0752	5.31794	44.5955	56.2835	3.33195	2000
2200	4.7846	2.65547	22.6622	35.3257	5.32289	45.0194	58.3835	3.34486	2200
2400	4.8476	2.65311	22.9029	37.5530	5.32426	45.4048	60.4344	3.35561	2400
2600	4.9055	2.64987	23.1169	39.7612	5.32304	45.7482	62.4372	3.36461	2600
2800	4.9582	2.64621	23.3109	41.9454	5.32034	46.0482	64.3917	3.37217	2800
3000	5.0064	2.64206	23.4950	44.1111	5.31634	46.3048	66.3064	3.37851	3000
3200	5.0505	2.63752	23.6697	46.2626	5.31112	46.5175	68.1817	3.38386	3200
3400	5.0911	2.63267	23.8357	48.4000	5.30577	46.6864	70.0175	3.38831	3400
3600	5.1284	2.62753	23.9929	50.5246	5.30034	46.8117	71.8134	3.39195	3600
3800	5.1629	2.62213	24.1414	52.6369	5.29482	46.8948	73.5697	3.39486	3800
4000	5.1949	2.61648	24.2812	54.7367	5.28924	46.9364	75.2864	3.39717	4000
4200	5.2246	2.61064	24.4126	56.8234	5.28361	46.9364	76.9634	3.39895	4200
4400	5.2522	2.60464	24.5357	58.8969	5.27794	46.8948	78.6000	3.39995	4400
4600	5.2779	2.59845	24.6514	60.9575	5.27224	46.8117	80.2064	3.39995	4600
4800	5.3020	2.59201	24.7594	62.9964	5.26654	46.6864	81.7817	3.39895	4800
5000	5.3246	2.58537	24.8597	64.9964	5.26084	46.5175	83.3264	3.39717	5000
5200	5.3457	2.57874	24.9537	66.9534	5.25512	46.3048	84.8417	3.39486	5200
5400	5.3654	2.57111	25.0416	68.8689	5.24937	46.0482	86.3264	3.39195	5400
5600	5.3839	2.56348	25.1234	70.7369	5.24361	45.7482	87.7817	3.38831	5600
5800	5.4017	2.55584	25.2000	72.5575	5.23784	45.4048	89.2064	3.38386	5800
6000	5.4187	2.54819	25.2719	74.3317	5.23204	45.0194	90.5917	3.37851	6000
6200	5.4345	2.54053	25.3389	76.0577	5.22624	44.5955	91.9364	3.37217	6200
6400	5.4495	2.53283	25.4016	77.7369	5.22037	44.1344	93.2417	3.36461	6400
6600	5.4637	2.52516	25.4594	79.3689	5.21451	43.6364	94.5064	3.35611	6600
6800	5.4772	2.51752	25.5126	80.9534	5.20864	43.1000	95.7317	3.34661	6800
7000	5.4901	2.50989	25.5614	82.4917	5.20274	42.5246	96.9164	3.33611	7000
7200	5.5023	2.50223	25.6064	83.9864	5.19684	41.9094	98.0617	3.32461	7200
7400	5.5139	2.49453	25.6482	85.4369	5.19094	41.2500	99.1664	3.31211	7400
7600	5.5251	2.48683	25.6864	86.8417	5.18504	40.5482	100.2317	3.29861	7600
7800	5.5357	2.47912	25.7200	88.2000	5.17914	40.0000	101.2564	3.28411	7800
8000	5.5459	2.47149	25.7497	89.5134	5.17324	39.4048	102.2417	3.26861	8000
8200	5.5556	2.46384	25.7754	90.7817	5.16734	38.7617	103.1864	3.25211	8200
8400	5.5650	2.45614	25.7982	92.0064	5.16144	38.0764	104.0917	3.23461	8400
8600	5.5739	2.44845	25.8184	93.1869	5.15554	37.3482	104.9564	3.21611	8600
8800	5.5825	2.44075	25.8364	94.3217	5.14964	36.5764	105.7817	3.19661	8800
9000	5.5908	2.43304	25.8514	95.4117	5.14374	35.7617	106.5664	3.17611	9000
9200	5.5987	2.42534	25.8634	96.4564	5.13784	34.9064	107.3117	3.15461	9200
9400	5.6063	2.41764	25.8726	97.4564	5.13194	34.0000	108.0164	3.13211	9400
9600	5.6137	2.40994	25.8794	98.4117	5.12604	33.0500	108.6817	3.10861	9600
9800	5.6208	2.40224	25.8842	99.3264	5.12014	32.0664	109.3064	3.08411	9800
10000	5.6276	2.39453	25.8875	100.2000	5.11424	31.0364	109.8917	3.05861	10000

TABLE 10 (CONT.). THERMAL GAS FUNCTIONS FOR AIR

THERM. (°F.)	PRST PSIA	$\frac{U^*}{T}$	$-\frac{U^*}{T^2}$	$\ln \frac{U^*}{T}$	$-\ln \frac{U^*}{T}$	$\ln \frac{U^*}{T}$	$\ln \frac{U^*}{T}$	$\ln \frac{U^*}{T}$	$\ln \frac{U^*}{T}$	THERM. (°F.)
10000	5.6276	2.59999	26.6199	29.1795	5.06433	52.0902	57.0045	3.49922	5.06433	10000
10500	5.6437	2.59713	26.7647	29.3019	5.06148	52.1442	57.2277	3.24908	5.06148	10500
11000	5.6594	2.59400	26.9036	29.4195	5.05702	52.2025	57.4995	3.00000	5.05702	11000
11500	5.6719	2.59083	27.0372	29.5330	5.05209	52.2640	57.8010	2.75000	5.05209	11500
12000	5.6845	2.58761	27.1658	29.6437	5.04677	52.3293	58.1350	2.50000	5.04677	12000
12500	5.6961	2.58433	27.2899	29.7519	5.04105	52.3985	58.5017	2.25000	5.04105	12500
13000	5.7069	2.58100	27.4099	29.8573	5.03493	52.4717	58.8913	2.00000	5.03493	13000
13500	5.7170	2.57761	27.5260	29.9601	5.02841	52.5489	59.3040	1.75000	5.02841	13500
14000	5.7264	2.57416	27.6387	30.0603	5.02149	52.6301	59.7399	1.50000	5.02149	14000
14500	5.7352	2.57065	27.7483	30.1581	5.01417	52.7153	60.1990	1.25000	5.01417	14500
15000	5.7436	2.56709	27.8540	30.2535	5.00645	52.8045	60.6813	1.00000	5.00645	15000
15500	5.7514	2.56349	27.9569	30.3467	5.00000	52.8977	61.1866	0.75000	5.00000	15500
16000	5.7589	2.55984	28.0571	30.4379	4.99281	52.9949	61.7150	0.50000	4.99281	16000
16500	5.7660	2.55615	28.1545	30.5271	4.98500	53.0961	62.2665	0.25000	4.98500	16500
17000	5.7729	2.55241	28.2493	30.6143	4.97657	53.2013	62.8400	0.00000	4.97657	17000
17500	5.7795	2.54863	28.3416	30.6997	4.96753	53.3105	63.4355		4.96753	17500
18000	5.7859	2.54481	28.4313	30.7833	4.95789	53.4237	64.0530		4.95789	18000
18500	5.7922	2.54096	28.5185	30.8651	4.94765	53.5409	64.6925		4.94765	18500
19000	5.7983	2.53708	28.6033	30.9453	4.93681	53.6621	65.3540		4.93681	19000
19500	5.8043	2.53316	28.6857	31.0241	4.92537	53.7873	66.0375		4.92537	19500
20000	5.8100	2.52921	28.7657	31.1015	4.91343	53.9165	66.7430		4.91343	20000
20500	5.8156	2.52523	28.8433	31.1775	4.90099	54.0497	67.4705		4.90099	20500
21000	5.8210	2.52122	28.9185	31.2521	4.88805	54.1879	68.2200		4.88805	21000
21500	5.8263	2.51719	28.9913	31.3253	4.87461	54.3301	68.9915		4.87461	21500
22000	5.8315	2.51313	29.0627	31.3971	4.86067	54.4763	69.7850		4.86067	22000
22500	5.8366	2.50904	29.1317	31.4675	4.84623	54.6265	70.6005		4.84623	22500
23000	5.8416	2.50492	29.1983	31.5365	4.83129	54.7807	71.4380		4.83129	23000
23500	5.8465	2.50077	29.2627	31.6041	4.81585	54.9389	72.2975		4.81585	23500
24000	5.8513	2.49659	29.3247	31.6703	4.80000	55.1011	73.1790		4.80000	24000
24500	5.8560	2.49238	29.3843	31.7351	4.78365	55.2673	74.0825		4.78365	24500
25000	5.8606	2.48813	29.4415	31.7985	4.76681	55.4375	75.0080		4.76681	25000
25500	5.8651	2.48385	29.4963	31.8605	4.74947	55.6117	75.9555		4.74947	25500
26000	5.8695	2.47953	29.5487	31.9211	4.73163	55.7909	76.9250		4.73163	26000
26500	5.8738	2.47517	29.5987	31.9803	4.71329	55.9751	77.9165		4.71329	26500
27000	5.8780	2.47077	29.6463	32.0381	4.69445	56.1643	78.9290		4.69445	27000
27500	5.8821	2.46633	29.6915	32.0945	4.67511	56.3585	79.9625		4.67511	27500
28000	5.8861	2.46187	29.7343	32.1495	4.65527	56.5577	81.0170		4.65527	28000
28500	5.8900	2.45738	29.7747	32.2031	4.63493	56.7619	82.0925		4.63493	28500
29000	5.8938	2.45285	29.8117	32.2553	4.61409	56.9711	83.1890		4.61409	29000
29500	5.8975	2.44828	29.8463	32.3061	4.59275	57.1853	84.3065		4.59275	29500
30000	5.9011	2.44367	29.8785	32.3555	4.57091	57.4045	85.4450		4.57091	30000
30500	5.9046	2.43902	29.9083	32.4035	4.54857	57.6287	86.6045		4.54857	30500
31000	5.9080	2.43433	29.9357	32.4501	4.52573	57.8579	87.7850		4.52573	31000
31500	5.9113	2.42960	29.9607	32.4953	4.50239	58.0921	88.9865		4.50239	31500
32000	5.9145	2.42483	29.9833	32.5391	4.47855	58.3313	90.2090		4.47855	32000
32500	5.9176	2.41999	29.9997	32.5815	4.45421	58.5755	91.4525		4.45421	32500
33000	5.9206	2.41511	30.0137	32.6225	4.42937	58.8247	92.7170		4.42937	33000
33500	5.9235	2.41019	30.0257	32.6621	4.40403	59.0789	93.9925		4.40403	33500
34000	5.9263	2.40523	30.0357	32.7003	4.37819	59.3381	95.2890		4.37819	34000
34500	5.9290	2.40023	30.0437	32.7371	4.35185	59.6023	96.6065		4.35185	34500
35000	5.9316	2.39519	30.0497	32.7725	4.32501	59.8715	97.9450		4.32501	35000
35500	5.9341	2.39011	30.0537	32.8065	4.29767	60.1457	99.3045		4.29767	35500
36000	5.9365	2.38499	30.0557	32.8391	4.26983	60.4249	100.6850		4.26983	36000
36500	5.9388	2.37983	30.0557	32.8703	4.24149	60.7091	102.0865		4.24149	36500
37000	5.9410	2.37463	30.0537	32.9001	4.21265	61.0003	103.5090		4.21265	37000
37500	5.9431	2.36939	30.0497	32.9285	4.18331	61.2975	104.9525		4.18331	37500
38000	5.9451	2.36411	30.0437	32.9555	4.15347	61.6007	106.4170		4.15347	38000
38500	5.9470	2.35879	30.0357	32.9811	4.12313	61.9109	107.9025		4.12313	38500
39000	5.9488	2.35343	30.0257	33.0053	4.09229	62.2281	109.4090		4.09229	39000
39500	5.9505	2.34803	30.0137	33.0281	4.06095	62.5523	110.9365		4.06095	39500
40000	5.9521	2.34259	30.0000	33.0495	4.02911	62.8835	112.4850		4.02911	40000
40500	5.9536	2.33711	30.0000	33.0695	4.00000	63.2207	114.0545		4.00000	40500
41000	5.9550	2.33159	30.0000	33.0881	3.96985	63.5649	115.6450		3.96985	41000
41500	5.9563	2.32603	30.0000	33.1053	3.93869	63.9161	117.2565		3.93869	41500
42000	5.9575	2.32043	30.0000	33.1211	3.90653	64.2743	118.8890		3.90653	42000
42500	5.9586	2.31479	30.0000	33.1355	3.87337	64.6395	120.5425		3.87337	42500
43000	5.9596	2.30911	30.0000	33.1485	3.83921	65.0117	122.2170		3.83921	43000
43500	5.9605	2.30339	30.0000	33.1601	3.80405	65.3909	123.9125		3.80405	43500
44000	5.9613	2.29763	30.0000	33.1703	3.76789	65.7771	125.6290		3.76789	44000
44500	5.9620	2.29183	30.0000	33.1791	3.73073	66.1703	127.3665		3.73073	44500
45000	5.9626	2.28599	30.0000	33.1865	3.69257	66.5705	129.1250		3.69257	45000
45500	5.9631	2.28011	30.0000	33.1925	3.65341	66.9777	130.9045		3.65341	45500
46000	5.9635	2.27419	30.0000	33.1971	3.61325	67.3919	132.7050		3.61325	46000
46500	5.9638	2.26823	30.0000	33.2003	3.57209	67.8131	134.5265		3.57209	46500
47000	5.9640	2.26223	30.0000	33.2021	3.52993	68.2413	136.3690		3.52993	47000
47500	5.9641	2.25619	30.0000	33.2025	3.48677	68.6765	138.2325		3.48677	47500
48000	5.9641	2.25011	30.0000	33.2015	3.44261	69.1187	140.1170		3.44261	48000
48500	5.9640	2.24399	30.0000	33.1991	3.39745	69.5679	142.0225		3.39745	48500
49000	5.9638	2.23783	30.0000	33.1953	3.35129	70.0241	143.9490		3.35129	49000
49500	5.9635	2.23163	30.0000	33.1901	3.30413	70.4873	145.8965		3.30413	49500
50000	5.9631	2.22539	30.0000	33.1835	3.25597	70.9575	147.8650		3.25597	50000

TABLE 11. IDEAL GAS FUNCTIONS FOR C ++ (ATOMIC WEIGHT 12.0101, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 55 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2}{8\pi^2 I}$	$\frac{h^2}{8\pi^2 I} - \frac{F_0}{N_A}$	$\ln$	$10^3 \cdot \frac{h^2}{8\pi^2 I} - 10^3 \cdot \frac{F_0}{N_A}$	$\frac{F_0}{N_A}$	e^{-F_0/N_A}	$\frac{N^2}{CAL/MOLE}$	$-(F_0 - \frac{N^2}{CAL/MOLE})$	TEMP. (°K)
3000	1.0000	2.50000	20.8706	22.5706	4.94791	39.9014	44.8494	0.94232	05	1.1970E 05
3200	1.0000	2.50000	20.8706	22.5706	4.94791	40.2221	45.1900	0.93642	03	1.2077E 05
3400	1.0000	2.50000	20.8706	22.5706	4.94791	40.5432	45.5292	0.93052	04	1.2184E 05
3600	1.0000	2.50000	20.8706	22.5706	4.94791	40.8642	45.8684	0.92462	04	1.2291E 05
3800	1.0000	2.50000	20.8706	22.5706	4.94791	41.1852	46.2076	0.91872	04	1.2398E 05
4000	1.0000	2.50000	20.8706	22.5706	4.94791	41.5062	46.5468	0.91282	04	1.2505E 05
4200	1.0000	2.50000	20.8706	22.5706	4.94791	41.8272	46.8860	0.90692	04	1.2612E 05
4400	1.0000	2.50000	20.8706	22.5706	4.94791	42.1482	47.2252	0.90102	04	1.2719E 05
4600	1.0000	2.50000	20.8706	22.5706	4.94791	42.4692	47.5644	0.89512	04	1.2826E 05
4800	1.0000	2.50000	20.8706	22.5706	4.94791	42.7902	47.9036	0.88922	04	1.2933E 05
5000	1.0000	2.50000	20.8706	22.5706	4.94791	43.1112	48.2428	0.88332	04	1.3040E 05
5200	1.0000	2.50000	20.8706	22.5706	4.94791	43.4322	48.5820	0.87742	04	1.3147E 05
5400	1.0000	2.50000	20.8706	22.5706	4.94791	43.7532	48.9212	0.87152	04	1.3254E 05
5600	1.0000	2.50000	20.8706	22.5706	4.94791	44.0742	49.2604	0.86562	04	1.3361E 05
5800	1.0000	2.50000	20.8706	22.5706	4.94791	44.3952	49.5996	0.85972	04	1.3468E 05
6000	1.0000	2.50000	20.8706	22.5706	4.94791	44.7162	49.9388	0.85382	04	1.3575E 05
6200	1.0000	2.50000	20.8706	22.5706	4.94791	45.0372	50.2780	0.84792	04	1.3682E 05
6400	1.0000	2.50000	20.8706	22.5706	4.94791	45.3582	50.6172	0.84202	04	1.3789E 05
6600	1.0000	2.50000	20.8706	22.5706	4.94791	45.6792	50.9564	0.83612	04	1.3896E 05
6800	1.0000	2.50000	20.8706	22.5706	4.94791	45.9999	51.2956	0.83022	04	1.4003E 05
7000	1.0000	2.50000	20.8706	22.5706	4.94791	46.3209	51.6348	0.82432	04	1.4110E 05
7200	1.0000	2.50000	20.8706	22.5706	4.94791	46.6419	51.9740	0.81842	04	1.4217E 05
7400	1.0000	2.50000	20.8706	22.5706	4.94791	46.9629	52.3132	0.81252	04	1.4324E 05
7600	1.0000	2.50000	20.8706	22.5706	4.94791	47.2839	52.6524	0.80662	04	1.4431E 05
7800	1.0000	2.50000	20.8706	22.5706	4.94791	47.6049	52.9916	0.80072	04	1.4538E 05
8000	1.0000	2.50000	20.8706	22.5706	4.94791	47.9259	53.3308	0.79482	04	1.4645E 05
8200	1.0000	2.50000	20.8706	22.5706	4.94791	48.2469	53.6700	0.78892	04	1.4752E 05
8400	1.0000	2.50000	20.8706	22.5706	4.94791	48.5679	54.0092	0.78302	04	1.4859E 05
8600	1.0000	2.50000	20.8706	22.5706	4.94791	48.8889	54.3484	0.77712	04	1.4966E 05
8800	1.0000	2.50000	20.8706	22.5706	4.94791	49.2099	54.6876	0.77122	04	1.5073E 05
9000	1.0000	2.50000	20.8706	22.5706	4.94791	49.5309	55.0268	0.76532	04	1.5180E 05
9200	1.0000	2.50000	20.8706	22.5706	4.94791	49.8519	55.3660	0.75942	04	1.5287E 05
9400	1.0000	2.50000	20.8706	22.5706	4.94791	50.1729	55.7052	0.75352	04	1.5394E 05
9600	1.0000	2.50000	20.8706	22.5706	4.94791	50.4939	56.0444	0.74762	04	1.5501E 05
9800	1.0000	2.50000	20.8706	22.5706	4.94791	50.8149	56.3836	0.74172	04	1.5608E 05
10000	1.0000	2.50000	20.8706	22.5706	4.94791	51.1359	56.7228	0.73582	04	1.5715E 05
10500	1.0000	2.50000	20.8706	22.5706	4.94791	51.8169	57.4036	0.72742	04	1.5927E 05
11000	1.0000	2.50000	20.8706	22.5706	4.94791	52.4979	58.0844	0.71902	04	1.6139E 05
11500	1.0000	2.50000	20.8706	22.5706	4.94791	53.1789	58.7652	0.71062	04	1.6351E 05
12000	1.0000	2.50000	20.8706	22.5706	4.94791	53.8599	59.4460	0.70222	04	1.6563E 05
12500	1.0000	2.50000	20.8706	22.5706	4.94791	54.5409	60.1268	0.69382	04	1.6775E 05
13000	1.0000	2.50000	20.8706	22.5706	4.94791	55.2219	60.8076	0.68542	04	1.6987E 05
13500	1.0000	2.50000	20.8706	22.5706	4.94791	55.9029	61.4884	0.67702	04	1.7199E 05
14000	1.0000	2.50000	20.8706	22.5706	4.94791	56.5839	62.1692	0.66862	04	1.7411E 05
14500	1.0000	2.50000	20.8706	22.5706	4.94791	57.2649	62.8500	0.66022	04	1.7623E 05

TABLE 11 (CONT.). IDEAL GAS FUNCTIONS FOR C

TEMP. (°K)	PARTIAL PRESS.	$\frac{V}{RT} - \frac{P}{RT^2}$	$\ln \frac{V}{RT} - \frac{P}{RT^2}$	$\ln \frac{V}{RT} - \frac{P}{RT^2}$	$\ln \frac{V}{RT} - \frac{P}{RT^2}$	$\ln \frac{V}{RT} - \frac{P}{RT^2}$	$\ln \frac{V}{RT} - \frac{P}{RT^2}$	TEMP. (°K)
15000	1.0992	2.78171	24.1600	26.9423	5.52771	46.0112	53.5309	15000
15500	1.0696	2.81767	24.2524	27.0793	5.59957	46.1936	53.7932	15500
16000	1.0411	2.85817	24.3425	27.1977	5.67349	46.3726	54.0462	16000
16500	1.0136	2.89332	24.4309	27.3243	5.74991	46.5483	54.2978	16500
17000	1.1072	2.93265	24.5179	27.4499	5.82846	46.7211	54.5475	17000
17500	1.1217	2.97107	24.6034	27.5745	5.90900	46.8911	54.7951	17500
18000	1.1374	3.01014	24.6877	27.6976	5.99164	47.0589	55.0401	18000
18500	1.1540	3.04983	24.7707	27.8197	6.07692	47.2234	55.2824	18500
19000	1.1716	3.08952	24.8525	27.9406	6.16484	47.3849	55.5215	19000
19500	1.1902	3.12942	24.9332	28.0606	6.25544	47.5434	55.7571	19500
20000	1.2090	3.16959	25.0128	28.1794	6.34889	47.6989	55.9892	20000
20500	1.2272	3.20994	25.0913	28.2972	6.44520	47.8514	56.2189	20500
21000	1.2458	3.25048	25.1688	28.4140	6.54437	47.9999	56.4452	21000
21500	1.2648	3.29122	25.2453	28.5298	6.64641	48.1444	56.6684	21500
22000	1.2842	3.33216	25.3208	28.6446	6.75132	48.2849	56.8884	22000
22500	1.3040	3.37330	25.3953	28.7584	6.85910	48.4214	57.1052	22500
23000	1.3242	3.41464	25.4688	28.8712	6.96975	48.5539	57.3189	23000
23500	1.3448	3.45618	25.5413	28.9830	7.08327	48.6824	57.5294	23500
24000	1.3658	3.49792	25.6128	29.0938	7.19965	48.8069	57.7369	24000
24500	1.3872	3.53986	25.6833	29.2036	7.31889	48.9274	57.9414	24500
25000	1.4090	3.58199	25.7528	29.3124	7.44100	49.0439	58.1429	25000
25500	1.4312	3.62432	25.8213	29.4202	7.56599	49.1564	58.3414	25500
26000	1.4538	3.66684	25.8888	29.5270	7.69386	49.2649	58.5369	26000
26500	1.4768	3.70956	25.9553	29.6328	7.82461	49.3694	58.7294	26500
27000	1.4992	3.75248	26.0208	29.7376	7.95824	49.4699	58.9189	27000
27500	1.5220	3.79560	26.0853	29.8414	8.09475	49.5664	59.1054	27500
28000	1.5452	3.83892	26.1488	29.9442	8.23414	49.6589	59.2889	28000
28500	1.5688	3.88244	26.2113	30.0460	8.37641	49.7474	59.4694	28500
29000	1.5928	3.92616	26.2728	30.1468	8.52156	49.8319	59.6469	29000
29500	1.6172	3.96998	26.3333	30.2466	8.66959	49.9124	59.8214	29500
30000	1.6420	4.01390	26.3928	30.3454	8.82050	50.0000	60.0000	30000
30500	1.6672	4.05792	26.4513	30.4432	8.97429	50.0835	60.1735	30500
31000	1.6928	4.10204	26.5088	30.5400	9.13096	50.1630	60.3430	31000
31500	1.7188	4.14626	26.5653	30.6358	9.29051	50.2385	60.5085	31500
32000	1.7452	4.19058	26.6208	30.7306	9.45294	50.3100	60.6700	32000
32500	1.7720	4.23490	26.6753	30.8244	9.61825	50.3775	60.8275	32500
33000	1.7992	4.27922	26.7288	30.9172	9.78644	50.4400	60.9800	33000
33500	1.8268	4.32364	26.7813	31.0090	9.95751	50.4975	61.1275	33500
34000	1.8548	4.36816	26.8328	31.1008	10.13146	50.5500	61.2700	34000
34500	1.8832	4.41278	26.8833	31.1916	10.30829	50.5975	61.4075	34500
35000	1.9120	4.45740	26.9328	31.2814	10.48800	50.6400	61.5400	35000
35500	1.9412	4.50202	26.9813	31.3702	10.67059	50.6775	61.6675	35500
36000	1.9708	4.54664	27.0288	31.4580	10.85606	50.7100	61.7900	36000
36500	1.9992	4.59126	27.0753	31.5458	11.04441	50.7375	61.9075	36500
37000	2.0280	4.63588	27.1208	31.6326	11.23564	50.7600	62.0200	37000
37500	2.0572	4.68050	27.1653	31.7184	11.42975	50.7875	62.1275	37500
38000	2.0868	4.72512	27.2088	31.8032	11.62674	50.8100	62.2300	38000
38500	2.1168	4.76974	27.2513	31.8870	11.82661	50.8275	62.3275	38500
39000	2.1472	4.81436	27.2928	31.9698	12.02936	50.8400	62.4200	39000
39500	2.1780	4.85898	27.3333	32.0516	12.23500	50.8475	62.5075	39500
40000	2.2092	4.90360	27.3728	32.1324	12.44353	50.8500	62.5900	40000
40500	2.2408	4.94822	27.4113	32.2122	12.65496	50.8475	62.6675	40500
41000	2.2728	4.99284	27.4488	32.2910	12.86929	50.8400	62.7400	41000
41500	2.3052	5.03746	27.4853	32.3688	13.08654	50.8275	62.8075	41500
42000	2.3380	5.08208	27.5208	32.4456	13.30671	50.8100	62.8700	42000
42500	2.3712	5.12670	27.5553	32.5214	13.52980	50.7875	62.9275	42500
43000	2.4048	5.17132	27.5888	32.5962	13.75581	50.7600	62.9800	43000
43500	2.4388	5.21594	27.6213	32.6700	13.98474	50.7275	63.0275	43500
44000	2.4732	5.26056	27.6528	32.7428	14.21660	50.6900	63.0700	44000
44500	2.5080	5.30518	27.6833	32.8146	14.45139	50.6475	63.1075	44500
45000	2.5432	5.34980	27.7128	32.8854	14.68914	50.5975	63.1400	45000
45500	2.5788	5.39442	27.7413	32.9552	14.92985	50.5400	63.1675	45500
46000	2.6148	5.43904	27.7688	33.0240	15.17352	50.4775	63.1900	46000
46500	2.6512	5.48366	27.7953	33.0918	15.42015	50.4100	63.2075	46500
47000	2.6880	5.52828	27.8208	33.1586	15.66974	50.3375	63.2200	47000
47500	2.7252	5.57290	27.8453	33.2244	15.92229	50.2600	63.2275	47500
48000	2.7628	5.61752	27.8688	33.2892	16.17780	50.1775	63.2300	48000
48500	2.8008	5.66214	27.8913	33.3530	16.43627	50.0900	63.2275	48500
49000	2.8392	5.70676	27.9128	33.4158	16.69770	50.0000	63.2200	49000
49500	2.8780	5.75138	27.9333	33.4776	16.96209	49.9075	63.2075	49500
50000	2.9172	5.79590	27.9528	33.5384	17.22944	49.8100	63.1900	50000
50500	2.9568	5.84052	27.9713	33.5982	17.49975	49.7075	63.1675	50500
51000	2.9968	5.88514	27.9888	33.6570	17.77300	49.5975	63.1400	51000
51500	3.0372	5.92976	28.0053	33.7148	18.04919	49.4800	63.1075	51500
52000	3.0780	5.97438	28.0208	33.7716	18.32834	49.3575	63.0700	52000
52500	3.1192	6.01890	28.0353	33.8274	18.61045	49.2300	63.0275	52500
53000	3.1608	6.06352	28.0488	33.8822	18.89554	49.0975	62.9800	53000
53500	3.2028	6.10814	28.0613	33.9360	19.18361	48.9600	62.9275	53500
54000	3.2452	6.15276	28.0728	33.9888	19.47466	48.8175	62.8700	54000
54500	3.2880	6.19738	28.0833	34.0406	19.76869	48.6700	62.8075	54500
55000	3.3312	6.24190	28.0928	34.0914	20.06570	48.5175	62.7400	55000
55500	3.3748	6.28652	28.1013	34.1412	20.36569	48.3600	62.6675	55500
56000	3.4188	6.33114	28.1088	34.1890	20.66866	48.1975	62.5900	56000
56500	3.4632	6.37576	28.1153	34.2358	20.97461	48.0300	62.5075	56500
57000	3.5080	6.42038	28.1208	34.2816	21.28354	47.8575	62.4200	57000
57500	3.5532	6.46490	28.1253	34.3264	21.59545	47.6800	62.3275	57500
58000	3.5988	6.50952	28.1288	34.3702	21.91034	47.4975	62.2300	58000
58500	3.6448	6.55414	28.1313	34.4130	22.22821	47.3100	62.1275	58500
59000	3.6912	6.59876	28.1328	34.4548	22.54906	47.1175	62.0200	59000
59500	3.7380	6.64338	28.1333	34.4956	22.87289	46.9200	61.9075	59500
60000	3.7852	6.68790	28.1328	34.5354	23.19970	46.7175	61.7900	60000

TABLE 12. IDEAL GAS FUNCTIONS FOR H_2 (ATOMIC WEIGHT 1.00794, $R = 1.90717$ CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $n \leq 4$. SEE TABLE 54 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL PRESS.	$\frac{W}{RT}$	$\frac{U}{RT}$	$\frac{H}{RT}$	$\frac{S}{R}$	$\ln \frac{W}{RT} - \frac{U}{RT} - \frac{H}{RT}$	$\frac{S}{R} - \ln \frac{W}{RT} + \frac{U}{RT} + \frac{H}{RT}$	$\frac{U}{RT} - \frac{H}{RT}$	$\frac{H}{RT} - \frac{U}{RT}$	TEMP. (°K)
3000	5.6789	2.55422	22.0449	24.6811	5.07565	43.0108	44.0065	9.24546	0	3000
3200	5.6982	2.55092	22.2116	24.7424	5.08310	44.0132	44.9973	9.84228	0	3200
3400	5.7151	2.54800	22.3462	24.7912	5.08934	44.4443	45.9805	10.62212	0	3400
3600	5.7305	2.54540	22.4518	24.8372	5.09513	44.7744	46.9577	11.60992	0	3600
3800	5.7443	2.54307	22.5403	24.8812	5.09999	44.9979	47.9284	12.80000	0	3800
4000	5.7566	2.54096	22.6167	24.9237	5.10431	45.1217	48.8744	14.19244	0	4000
4200	5.7679	2.53905	22.6856	24.9647	5.10813	45.1533	49.7990	15.68744	0	4200
4400	5.7781	2.53731	22.7487	25.0040	5.11150	45.1836	50.7060	17.28484	0	4400
4600	5.7875	2.53572	22.8067	25.0419	5.11444	45.2127	51.5980	18.98324	0	4600
4800	5.7962	2.53426	22.8600	25.0776	5.11696	45.2406	52.4780	20.78164	0	4800
5000	5.8041	2.53291	22.9090	25.1112	5.11915	45.2674	53.3480	22.67904	0	5000
5200	5.8115	2.53167	22.9540	25.1427	5.12100	45.2931	54.2040	24.67544	0	5200
5400	5.8183	2.53052	22.9956	25.1721	5.12254	45.3177	55.0480	26.76984	0	5400
5600	5.8246	2.52945	23.0334	25.2000	5.12386	45.3412	55.8820	28.96224	0	5600
5800	5.8305	2.52846	23.0678	25.2264	5.12497	45.3636	56.7070	31.25264	0	5800
6000	5.8360	2.52754	23.0989	25.2514	5.12587	45.3850	57.5240	33.64004	0	6000
6200	5.8413	2.52669	23.1266	25.2750	5.12657	45.4054	58.3330	36.12444	0	6200
6400	5.8462	2.52590	23.1511	25.2973	5.12707	45.4248	59.1350	38.70584	0	6400
6600	5.8507	2.52515	23.1724	25.3184	5.12737	45.4432	59.9300	41.38424	0	6600
6800	5.8551	2.52444	23.1906	25.3382	5.12747	45.4606	60.7180	44.15864	0	6800
7000	5.8592	2.52378	23.2059	25.3567	5.12737	45.4770	61.5000	47.02904	0	7000
7200	5.8630	2.52315	23.2186	25.3739	5.12707	45.4924	62.2760	50.00000	0	7200
7400	5.8667	2.52254	23.2286	25.3897	5.12657	45.5068	63.0480	53.07144	0	7400
7600	5.8703	2.52193	23.2359	25.4040	5.12587	45.5202	63.8180	56.24284	0	7600
7800	5.8736	2.52132	23.2406	25.4169	5.12497	45.5326	64.5810	59.51424	0	7800
8000	5.8768	2.52071	23.2428	25.4284	5.12386	45.5440	65.3360	62.88464	0	8000
8200	5.8799	2.52010	23.2425	25.4386	5.12254	45.5544	66.0830	66.35004	0	8200
8400	5.8829	2.51949	23.2397	25.4475	5.12100	45.5638	66.8240	69.91044	0	8400
8600	5.8857	2.51888	23.2344	25.4550	5.11915	45.5722	67.5580	73.56584	0	8600
8800	5.8885	2.51827	23.2266	25.4612	5.11700	45.5796	68.2860	77.31624	0	8800
9000	5.8912	2.51766	23.2163	25.4661	5.11444	45.5860	69.0080	81.16164	0	9000
9200	5.8939	2.51705	23.2036	25.4697	5.11150	45.5914	69.7240	85.10304	0	9200
9400	5.8964	2.51644	23.1886	25.4721	5.10813	45.5958	70.4350	89.14044	0	9400
9600	5.8989	2.51583	23.1714	25.4734	5.10431	45.5992	71.1410	93.27484	0	9600
9800	5.9015	2.51522	23.1521	25.4736	5.10000	45.6016	71.8420	97.50624	0	9800
10000	5.9040	2.51461	23.1306	25.4727	5.09547	45.6030	72.5380	101.83464	0	10000
10200	5.9064	2.51399	23.1071	25.4707	5.09073	45.6034	73.2290	106.25904	0	10200
10400	5.9088	2.51338	23.0816	25.4676	5.08579	45.6028	73.9150	110.77944	0	10400
10600	5.9112	2.51276	23.0541	25.4634	5.08065	45.6012	74.5960	115.39584	0	10600
10800	5.9136	2.51215	23.0246	25.4581	5.07531	45.5986	75.2710	120.10824	0	10800
11000	5.9159	2.51154	22.9931	25.4517	5.06977	45.5950	75.9400	124.91664	0	11000
11200	5.9182	2.51093	22.9596	25.4442	5.06503	45.5904	76.6030	129.82104	0	11200
11400	5.9205	2.51032	22.9241	25.4357	5.06009	45.5858	77.2600	134.82144	0	11400
11600	5.9228	2.50971	22.8866	25.4261	5.05495	45.5812	77.9110	139.91784	0	11600
11800	5.9251	2.50910	22.8471	25.4154	5.04961	45.5766	78.5560	145.11024	0	11800
12000	5.9274	2.50849	22.8056	25.4037	5.04407	45.5719	79.1950	150.40064	0	12000
12200	5.9297	2.50788	22.7621	25.3910	5.03833	45.5673	79.8280	155.78804	0	12200
12400	5.9319	2.50727	22.7166	25.3773	5.03239	45.5627	80.4550	161.27244	0	12400
12600	5.9342	2.50666	22.6691	25.3626	5.02625	45.5581	81.0760	166.85384	0	12600
12800	5.9364	2.50605	22.6196	25.3469	5.01991	45.5535	81.6910	172.53224	0	12800
13000	5.9387	2.50544	22.5681	25.3302	5.01337	45.5489	82.2990	178.30764	0	13000
13200	5.9409	2.50483	22.5146	25.3125	5.00663	45.5443	82.9000	184.18004	0	13200
13400	5.9432	2.50422	22.4591	25.2938	5.00000	45.5397	83.4940	190.14944	0	13400
13600	5.9454	2.50361	22.4016	25.2741	4.99316	45.5351	84.0810	196.21584	0	13600
13800	5.9477	2.50299	22.3421	25.2534	4.98611	45.5305	84.6610	202.37924	0	13800
14000	5.9499	2.50238	22.2806	25.2317	4.97887	45.5259	85.2340	208.63964	0	14000
14200	5.9522	2.50177	22.2171	25.2090	4.97143	45.5213	85.8000	215.00004	0	14200
14400	5.9544	2.50116	22.1516	25.1853	4.96379	45.5167	86.3590	221.46044	0	14400
14600	5.9567	2.50055	22.0841	25.1606	4.95595	45.5121	86.9110	228.02084	0	14600
14800	5.9589	2.50000	22.0146	25.1359	4.94790	45.5075	87.4560	234.68124	0	14800
15000	5.9612	2.49939	21.9431	25.1102	4.93965	45.5029	88.0000	241.44164	0	15000

TABLE 12 (CONT.) 1. IDEAL GAS FUNCTIONS FOR H₂

TEMP. (°K)	PARTIAL PRESS.	$\frac{h^2}{8\pi^2}$	$-\frac{f^2}{T^2}$	$\frac{5R}{2}$	$\ln \frac{h^2}{8\pi^2} - \ln \frac{f^2}{T^2}$	$\ln \frac{h^2}{8\pi^2} - \ln \frac{f^2}{T^2}$	$\ln \frac{h^2}{8\pi^2} - \ln \frac{f^2}{T^2}$	$\ln \frac{h^2}{8\pi^2} - \ln \frac{f^2}{T^2}$	TEMP. (°K)
12000	9.9025	2.59731	26.1220	26.4001	5.00100	51.9182	56.9020	6.43200	15000
12500	9.0055	2.56431	26.3047	26.7709	5.00231	52.0771	57.1236	6.43200	15500
13000	8.0085	2.53131	26.4874	27.1421	5.00362	52.2360	57.3390	6.43200	16000
13500	6.9224	2.49831	26.6701	27.5133	5.00493	52.3949	57.5544	6.43200	16500
14000	6.0375	2.46531	26.8528	27.8845	5.00624	52.5538	57.7698	6.43200	17000
14500	5.1526	2.43231	27.0355	28.2557	5.00755	52.7127	57.9852	6.43200	17500
15000	4.2677	2.39931	27.2182	28.6269	5.00886	52.8716	58.2006	6.43200	18000
15500	3.3828	2.36631	27.4009	28.9981	5.01017	53.0305	58.4160	6.43200	18500
16000	2.4979	2.33331	27.5836	29.3693	5.01148	53.1894	58.6314	6.43200	19000
16500	1.6130	2.30031	27.7663	29.7405	5.01279	53.3483	58.8468	6.43200	19500
17000	0.7281	2.26731	27.9490	30.1117	5.01410	53.5072	59.0622	6.43200	20000
17500	0.0000	2.23431	28.1317	30.4829	5.01541	53.6661	59.2776	6.43200	20500
18000	0.0000	2.20131	28.3144	30.8541	5.01672	53.8250	59.4930	6.43200	21000
18500	0.0000	2.16831	28.4971	31.2253	5.01803	53.9839	59.7084	6.43200	21500
19000	0.0000	2.13531	28.6798	31.5965	5.01934	54.1428	59.9238	6.43200	22000
19500	0.0000	2.10231	28.8625	31.9677	5.02065	54.3017	60.1392	6.43200	22500
20000	0.0000	2.06931	29.0452	32.3389	5.02196	54.4606	60.3546	6.43200	23000
20500	0.0000	2.03631	29.2279	32.7101	5.02327	54.6195	60.5700	6.43200	23500
21000	0.0000	2.00331	29.4106	33.0813	5.02458	54.7784	60.7854	6.43200	24000
21500	0.0000	1.97031	29.5933	33.4525	5.02589	54.9373	61.0008	6.43200	24500
22000	0.0000	1.93731	29.7760	33.8237	5.02720	55.0962	61.2162	6.43200	25000
22500	0.0000	1.90431	29.9587	34.1949	5.02851	55.2551	61.4316	6.43200	25500
23000	0.0000	1.87131	30.1414	34.5661	5.02982	55.4140	61.6470	6.43200	26000
23500	0.0000	1.83831	30.3241	34.9373	5.03113	55.5729	61.8624	6.43200	26500
24000	0.0000	1.80531	30.5068	35.3085	5.03244	55.7318	62.0778	6.43200	27000
24500	0.0000	1.77231	30.6895	35.6797	5.03375	55.8907	62.2932	6.43200	27500
25000	0.0000	1.73931	30.8722	36.0509	5.03506	56.0496	62.5086	6.43200	28000
25500	0.0000	1.70631	31.0549	36.4221	5.03637	56.2085	62.7240	6.43200	28500
26000	0.0000	1.67331	31.2376	36.7933	5.03768	56.3674	62.9394	6.43200	29000
26500	0.0000	1.64031	31.4203	37.1645	5.03899	56.5263	63.1548	6.43200	29500
27000	0.0000	1.60731	31.6030	37.5357	5.04030	56.6852	63.3702	6.43200	30000
27500	0.0000	1.57431	31.7857	37.9069	5.04161	56.8441	63.5856	6.43200	30500
28000	0.0000	1.54131	31.9684	38.2781	5.04292	57.0030	63.8010	6.43200	31000
28500	0.0000	1.50831	32.1511	38.6493	5.04423	57.1619	64.0164	6.43200	31500
29000	0.0000	1.47531	32.3338	39.0205	5.04554	57.3208	64.2318	6.43200	32000
29500	0.0000	1.44231	32.5165	39.3917	5.04685	57.4797	64.4472	6.43200	32500
30000	0.0000	1.40931	32.6992	39.7629	5.04816	57.6386	64.6626	6.43200	33000
30500	0.0000	1.37631	32.8819	40.1341	5.04947	57.7975	64.8780	6.43200	33500
31000	0.0000	1.34331	33.0646	40.5053	5.05078	57.9564	65.0934	6.43200	34000
31500	0.0000	1.31031	33.2473	40.8765	5.05209	58.1153	65.3088	6.43200	34500
32000	0.0000	1.27731	33.4300	41.2477	5.05340	58.2742	65.5242	6.43200	35000
32500	0.0000	1.24431	33.6127	41.6189	5.05471	58.4331	65.7396	6.43200	35500
33000	0.0000	1.21131	33.7954	41.9901	5.05602	58.5920	65.9550	6.43200	36000
33500	0.0000	1.17831	33.9781	42.3613	5.05733	58.7509	66.1704	6.43200	36500
34000	0.0000	1.14531	34.1608	42.7325	5.05864	58.9098	66.3858	6.43200	37000
34500	0.0000	1.11231	34.3435	43.1037	5.05995	59.0687	66.6012	6.43200	37500
35000	0.0000	1.07931	34.5262	43.4749	5.06126	59.2276	66.8166	6.43200	38000
35500	0.0000	1.04631	34.7089	43.8461	5.06257	59.3865	67.0320	6.43200	38500
36000	0.0000	1.01331	34.8916	44.2173	5.06388	59.5454	67.2474	6.43200	39000
36500	0.0000	0.98031	35.0743	44.5885	5.06519	59.7043	67.4628	6.43200	39500
37000	0.0000	0.94731	35.2570	44.9597	5.06650	59.8632	67.6782	6.43200	40000
37500	0.0000	0.91431	35.4397	45.3309	5.06781	60.0221	67.8936	6.43200	40500
38000	0.0000	0.88131	35.6224	45.7021	5.06912	60.1810	68.1090	6.43200	41000
38500	0.0000	0.84831	35.8051	46.0733	5.07043	60.3399	68.3244	6.43200	41500
39000	0.0000	0.81531	35.9878	46.4445	5.07174	60.4988	68.5398	6.43200	42000
39500	0.0000	0.78231	36.1705	46.8157	5.07305	60.6577	68.7552	6.43200	42500
40000	0.0000	0.74931	36.3532	47.1869	5.07436	60.8166	68.9706	6.43200	43000
40500	0.0000	0.71631	36.5359	47.5581	5.07567	60.9755	69.1860	6.43200	43500
41000	0.0000	0.68331	36.7186	47.9293	5.07698	61.1344	69.4014	6.43200	44000
41500	0.0000	0.65031	36.9013	48.3005	5.07829	61.2933	69.6168	6.43200	44500
42000	0.0000	0.61731	37.0840	48.6717	5.07960	61.4522	69.8322	6.43200	45000
42500	0.0000	0.58431	37.2667	49.0429	5.08091	61.6111	70.0476	6.43200	45500
43000	0.0000	0.55131	37.4494	49.4141	5.08222	61.7700	70.2630	6.43200	46000
43500	0.0000	0.51831	37.6321	49.7853	5.08353	61.9289	70.4784	6.43200	46500
44000	0.0000	0.48531	37.8148	50.1565	5.08484	62.0878	70.6938	6.43200	47000
44500	0.0000	0.45231	37.9975	50.5277	5.08615	62.2467	70.9092	6.43200	47500
45000	0.0000	0.41931	38.1802	50.8989	5.08746	62.4056	71.1246	6.43200	48000
45500	0.0000	0.38631	38.3629	51.2701	5.08877	62.5645	71.3400	6.43200	48500
46000	0.0000	0.35331	38.5456	51.6413	5.09008	62.7234	71.5554	6.43200	49000
46500	0.0000	0.32031	38.7283	52.0125	5.09139	62.8823	71.7708	6.43200	49500
47000	0.0000	0.28731	38.9110	52.3837	5.09270	63.0412	71.9862	6.43200	50000
47500	0.0000	0.25431	39.0937	52.7549	5.09401	63.2001	72.2016	6.43200	50500
48000	0.0000	0.22131	39.2764	53.1261	5.09532	63.3590	72.4170	6.43200	51000
48500	0.0000	0.18831	39.4591	53.4973	5.09663	63.5179	72.6324	6.43200	51500
49000	0.0000	0.15531	39.6418	53.8685	5.09794	63.6768	72.8478	6.43200	52000
49500	0.0000	0.12231	39.8245	54.2397	5.09925	63.8357	73.0632	6.43200	52500
50000	0.0000	0.08931	40.0072	54.6109	5.10056	63.9946	73.2786	6.43200	53000
50500	0.0000	0.05631	40.1899	54.9821	5.10187	64.1535	73.4940	6.43200	53500
51000	0.0000	0.02331	40.3726	55.3533	5.10318	64.3124	73.7094	6.43200	54000
51500	0.0000	0.00000	40.5553	55.7245	5.10449	64.4713	73.9248	6.43200	54500
52000	0.0000	0.00000	40.7380	56.0957	5.10580	64.6302	74.1402	6.43200	55000
52500	0.0000	0.00000	40.9207	56.4669	5.10711	64.7891	74.3556	6.43200	55500
53000	0.0000	0.00000	41.1034	56.8381	5.10842	64.9480	74.5710	6.43200	56000
53500	0.0000	0.00000	41.2861	57.2093	5.10973	65.1069	74.7864	6.43200	56500
54000	0.0000	0.00000	41.4688	57.5805	5.11104	65.2658	75.0018	6.43200	57000
54500	0.0000	0.00000	41.6515	57.9517	5.11235	65.4247	75.2172	6.43200	57500
55000	0.0000	0.00000	41.8342	58.3229	5.11366	65.5836	75.4326	6.43200	58000
55500	0.0000	0.00000	42.0169	58.6941	5.11497	65.7425	75.6480	6.43200	58500
56000	0.0000	0.00000	42.1996	59.0653	5.11628	65.9014	75.8634	6.43200	59000
56500	0.0000	0.00000	42.3823	59.4365	5.11759	66.0603	76.0788	6.43200	59500
57000	0.0000	0.00000	42.5650	59.8077	5.11890	66.2192	76.2942	6.43200	60000
57500	0.0000	0.00000	42.7477	60.1789	5.12021	66.3781	76.5096	6.43200	60500
58000	0.0000	0.00000	42.9304	60.5501	5.12152	66.5370	76.7250	6.43200	61000
58500	0.0000	0.00000	43.1131	60.9213	5.12283	66.6959	76.9404	6.43200	61500
59000	0.0000	0.00000	43.2958	61.2925	5.12414	66.8548	77.1558	6.43200	62000
59500	0.0000	0.00000	43.4785	61.6637	5.12545	67.0137	77.3712	6.43200	62500
60000	0.0000	0.00000	43.6612	62.0349	5.12676	67.1726	77.5866	6.43200	63000
60500	0.0000	0.00000	43.8439	62.4061	5.12807	67.3315	77.8020	6.43200	63500
61000	0.0000	0.00000	44.0266	62.7773	5.12938	67.4904	78.0174	6.43200	64000
61500	0.0000	0.00000	44.2093	63.1485	5.13069	67.6493	78.2328	6.43200	64500
62000	0.0000	0.00000	44.3920	63.5197	5.1				

TABLE 13. IDEAL GAS FUNCTIONS FOR O_2 (ATOMIC WEIGHT 15.9993, $R = 1.98717$ CAL/MOLE) BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $n \leq 4$. SEE TABLE 57 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCTION	$\frac{h^2}{8\pi^2 I}$	$-\frac{h^2}{8\pi^2 I}$	$5R$	$h^2 - \frac{h^2}{8\pi^2 I} - \frac{h^2}{8\pi^2 I_0}$	$-\frac{h^2}{8\pi^2 I} - \frac{h^2}{8\pi^2 I_0} - \frac{h^2}{8\pi^2 I_1}$	$h^2 - \frac{h^2}{8\pi^2 I} - \frac{h^2}{8\pi^2 I_0} - \frac{h^2}{8\pi^2 I_1} - \frac{h^2}{8\pi^2 I_2}$	$h^2 - \frac{h^2}{8\pi^2 I} - \frac{h^2}{8\pi^2 I_0} - \frac{h^2}{8\pi^2 I_1} - \frac{h^2}{8\pi^2 I_2} - \frac{h^2}{8\pi^2 I_3}$	TEMP. (°K)			
3000	0.1268	2.99726	32.4009	23.2000	9.16110	44.9240	50.0000	9.5221E 03	1.5404E 04	1.5404E 04	1.3478E 05	3000
3200	0.2043	2.59164	22.7759	23.3676	9.15001	45.2596	50.4896	1.0121E 04	1.4400E 04	1.4400E 04	1.4400E 05	3200
3400	0.2500	2.50679	22.9729	23.5197	9.14039	45.5713	50.7119	1.0721E 04	1.7477E 04	1.7477E 04	1.5494E 05	3400
3600	0.2900	2.50245	23.0006	23.6033	9.13215	45.8651	50.9972	1.1322E 04	1.8478E 04	1.8478E 04	1.6411E 05	3600
3800	0.3272	2.57914	23.2062	23.7093	9.12315	46.1423	51.2675	1.1924E 04	1.9478E 04	1.9478E 04	1.7334E 05	3800
4000	0.3604	2.57420	23.3324	23.8206	9.11934	46.4051	51.5244	1.2529E 04	2.0477E 04	2.0477E 04	1.8262E 05	4000
4200	0.3910	2.57300	23.4700	23.9510	9.11554	46.6557	51.7643	1.3130E 04	2.1478E 04	2.1478E 04	1.9190E 05	4200
4400	0.4195	2.57189	23.5977	24.0896	9.11170	46.8926	52.0033	1.3744E 04	2.2478E 04	2.2478E 04	2.0118E 05	4400
4600	0.4462	2.57045	23.7120	24.2065	9.10791	47.1197	52.2276	1.4359E 04	2.3478E 04	2.3478E 04	2.1046E 05	4600
4800	0.4713	2.56944	23.8214	24.3000	9.10391	47.3370	52.4459	1.4970E 04	2.4478E 04	2.4478E 04	2.1974E 05	4800
5000	0.4953	2.56804	23.9263	24.4051	9.10071	47.5454	52.6581	1.5580E 04	2.5478E 04	2.5478E 04	2.2902E 05	5000
5200	0.5182	2.56661	24.0270	24.5056	9.10425	47.7456	52.8699	1.6190E 04	2.6478E 04	2.6478E 04	2.3830E 05	5200
5400	0.5403	2.56473	24.1239	24.6027	9.10449	47.9403	53.0420	1.6804E 04	2.7478E 04	2.7478E 04	2.4758E 05	5400
5600	0.5617	2.56217	24.2174	24.7065	9.10436	48.1237	53.2293	1.7423E 04	2.8478E 04	2.8478E 04	2.5686E 05	5600
5800	0.5826	2.56000	24.3075	24.8076	9.10402	48.3031	53.4099	1.8046E 04	2.9478E 04	2.9478E 04	2.6614E 05	5800
6000	0.6031	2.55791	24.3947	24.9056	9.10362	48.4763	53.5831	1.8670E 04	3.0478E 04	3.0478E 04	2.7542E 05	6000
6200	0.6233	2.55516	24.4790	25.0007	9.11131	48.6438	53.7551	1.9294E 04	3.1478E 04	3.1478E 04	2.8470E 05	6200
6400	0.6433	2.55246	24.5607	25.0934	9.11424	48.8061	53.9284	2.0013E 04	3.2478E 04	3.2478E 04	2.9398E 05	6400
6600	0.6631	2.54931	24.6399	25.1757	9.11757	48.9636	54.0811	2.0641E 04	3.3478E 04	3.3478E 04	3.0326E 05	6600
6800	0.6829	2.54577	24.7160	25.2540	9.12126	49.1164	54.2377	2.1270E 04	3.4478E 04	3.4478E 04	3.1254E 05	6800
7000	0.7026	2.54190	24.7915	25.3297	9.12527	49.2649	54.3902	2.1907E 04	3.5478E 04	3.5478E 04	3.2182E 05	7000
7200	0.7223	2.53734	24.8662	25.4036	9.12955	49.4094	54.5399	2.2544E 04	3.6478E 04	3.6478E 04	3.3110E 05	7200
7400	0.7420	2.53262	24.9390	25.4756	9.13400	49.5500	54.6860	2.3181E 04	3.7478E 04	3.7478E 04	3.4038E 05	7400
7600	0.7618	2.52801	25.0109	25.5469	9.13862	49.6869	54.8290	2.3818E 04	3.8478E 04	3.8478E 04	3.4966E 05	7600
7800	0.7817	2.52349	25.0711	25.6166	9.14375	49.8205	54.9642	2.4455E 04	3.9478E 04	3.9478E 04	3.5894E 05	7800
8000	0.8016	2.51904	25.1307	25.6847	9.14903	49.9500	55.0996	2.5092E 04	4.0478E 04	4.0478E 04	3.6822E 05	8000
8200	0.8217	2.51467	25.1897	25.7514	9.15445	50.0766	55.2320	2.5729E 04	4.1478E 04	4.1478E 04	3.7750E 05	8200
8400	0.8419	2.51034	25.2482	25.8166	9.15993	50.2022	55.3616	2.6366E 04	4.2478E 04	4.2478E 04	3.8678E 05	8400
8600	0.8623	2.50600	25.3054	25.8804	9.16547	50.3277	55.4885	2.6993E 04	4.3478E 04	4.3478E 04	3.9606E 05	8600
8800	0.8826	2.50182	25.3642	25.9440	9.17124	50.4435	55.6127	2.7620E 04	4.4478E 04	4.4478E 04	4.0534E 05	8800
9000	0.9034	2.49776	25.4227	26.0072	9.17726	50.5590	55.7345	2.8247E 04	4.5478E 04	4.5478E 04	4.1462E 05	9000
9200	0.9242	2.49370	25.4809	26.0698	9.18351	50.6726	55.8539	2.8874E 04	4.6478E 04	4.6478E 04	4.2390E 05	9200
9400	0.9451	2.48974	25.5386	26.1318	9.18998	50.7841	55.9709	2.9501E 04	4.7478E 04	4.7478E 04	4.3318E 05	9400
9600	0.9661	2.48580	25.5958	26.1934	9.19666	50.8933	56.0860	3.0128E 04	4.8478E 04	4.8478E 04	4.4246E 05	9600
9800	0.9873	2.48190	25.6524	26.2546	9.20353	51.0004	56.1985	3.0755E 04	4.9478E 04	4.9478E 04	4.5174E 05	9800
10000	0.0004	2.47804	25.7100	26.3164	9.21059	51.1055	56.3091	3.1382E 04	5.0478E 04	5.0478E 04	4.6102E 05	10000
10500	0.0424	2.47354	25.8457	26.4713	9.21758	51.1997	56.4171	3.2010E 04	5.1478E 04	5.1478E 04	4.7030E 05	10500
11000	0.1169	2.46839	25.9600	26.6004	9.22402	51.2828	56.5237	3.2638E 04	5.2478E 04	5.2478E 04	4.7958E 05	11000
11500	0.1721	2.46300	26.0652	26.7242	9.23000	51.3556	56.6289	3.3266E 04	5.3478E 04	5.3478E 04	4.8886E 05	11500
12000	0.2277	2.45747	26.1706	26.8431	9.23569	51.4279	56.7328	3.3894E 04	5.4478E 04	5.4478E 04	4.9814E 05	12000
12500	0.2839	2.45174	26.2650	26.9575	9.24104	51.4994	56.8353	3.4522E 04	5.5478E 04	5.5478E 04	5.0742E 05	12500
13000	0.3404	2.44580	26.3599	27.0677	9.24614	51.5700	56.9368	3.5150E 04	5.6478E 04	5.6478E 04	5.1670E 05	13000
13500	0.3973	2.43966	26.4553	27.1740	9.25100	51.6398	57.0373	3.5778E 04	5.7478E 04	5.7478E 04	5.2598E 05	13500
14000	0.4543	2.43340	26.5513	27.2766	9.25563	51.7086	57.1376	3.6406E 04	5.8478E 04	5.8478E 04	5.3526E 05	14000
14500	0.5116	2.42706	26.6476	27.3750	9.26003	51.7764	57.2374	3.7034E 04	5.9478E 04	5.9478E 04	5.4454E 05	14500

TABLE 13 (CONT.). IDEAL GAS FUNCTIONS FOR O++

TEMP. (°K)	PARTIC. FUNCT.	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	TEMP. (°K)
15000	9.5689	2.60003	26.7918	29.4718	5.32946	53.2397	58.5654	5.00777	04	7.98086	04	15000
15000	9.6264	2.60511	26.8098	29.5649	5.33978	53.4145	58.7383	5.19036	04	8.27946	04	15500
16000	9.6839	2.69003	26.9651	29.6951	5.34553	53.5841	58.9296	5.37342	04	8.55252	04	16000
16500	9.7414	2.69478	27.0479	29.7427	5.34998	53.7487	59.1037	5.55696	04	8.83578	04	16500
17000	9.7989	2.69939	27.1285	29.8278	5.35413	53.9087	59.2729	5.74086	04	9.11902	04	17000
17500	9.8563	2.70386	27.2068	29.9106	5.35801	54.0644	59.4374	5.92522	04	9.40286	04	17500
18000	9.9137	2.70826	27.2830	29.9912	5.36164	54.2158	59.5975	6.11016	04	9.68696	04	18000
18500	9.9710	2.71243	27.3573	30.0697	5.36504	54.3634	59.7534	6.29536	04	9.97166	04	18500
19000	10.0282	2.71655	27.4297	30.1462	5.36823	54.5073	59.9053	6.48106	04	1.02578	05	19000
19500	10.0853	2.72057	27.5003	30.2208	5.40423	54.6476	60.0538	6.66723	04	1.05422	05	19500
20000	10.1423	2.72451	27.5692	30.2937	5.41406	54.7846	60.1964	6.85386	04	1.08286	05	20000
20500	10.1990	2.72839	27.6366	30.3652	5.42405	54.9180	60.3320	7.04016	04	1.11177	05	20500
21000	10.2561	2.73220	27.7026	30.4356	5.43429	55.0489	60.4616	7.22616	04	1.14086	05	21000
21500	10.3137	2.73593	27.7673	30.5049	5.44469	55.1769	60.5852	7.41186	04	1.16996	05	21500
22000	10.3717	2.73961	27.8308	30.5732	5.45524	55.3020	60.7026	7.59786	04	1.19886	05	22000
22500	10.4297	2.74324	27.8932	30.6405	5.46594	55.4246	60.8139	7.78386	04	1.22786	05	22500
23000	10.4877	2.74683	27.9547	30.7068	5.47679	55.5446	60.9190	7.96986	04	1.25686	05	23000
23500	10.5457	2.75038	28.0152	30.7721	5.48779	55.6620	61.0180	8.15586	04	1.28586	05	23500
24000	10.6037	2.75389	28.0747	30.8364	5.49894	55.7769	61.1110	8.34186	04	1.31486	05	24000
24500	10.6617	2.75736	28.1332	30.8997	5.51024	55.8893	61.2000	8.52786	04	1.34386	05	24500
25000	10.7197	2.76079	28.1917	30.9620	5.52169	56.0000	61.2840	8.71386	04	1.37286	05	25000
25500	10.7777	2.76418	28.2492	31.0233	5.53329	56.1089	61.3630	8.90000	04	1.40186	05	25500
26000	10.8357	2.76753	28.3067	31.0836	5.54504	56.2160	61.4370	9.08600	04	1.43086	05	26000
26500	10.8937	2.77084	28.3632	31.1429	5.55694	56.3214	61.5060	9.27200	04	1.45986	05	26500
27000	10.9517	2.77411	28.4197	31.2012	5.56899	56.4252	61.5700	9.45800	04	1.48886	05	27000
27500	11.0097	2.77734	28.4762	31.2585	5.58119	56.5274	61.6290	9.64400	04	1.51786	05	27500
28000	11.0677	2.78053	28.5327	31.3148	5.59354	56.6289	61.6830	9.83000	04	1.54686	05	28000
28500	11.1257	2.78368	28.5892	31.3701	5.60604	56.7289	61.7330	10.01600	04	1.57586	05	28500
29000	11.1837	2.78679	28.6457	31.4254	5.61869	56.8274	61.7790	10.20200	04	1.60486	05	29000
29500	11.2417	2.78986	28.7022	31.4807	5.63149	56.9244	61.8210	10.38800	04	1.63386	05	29500
30000	11.2997	2.79289	28.7587	31.5360	5.64434	57.0200	61.8590	10.57400	04	1.66286	05	30000
30500	11.3577	2.79588	28.8152	31.5913	5.65734	57.1140	61.8930	10.76000	04	1.69186	05	30500
31000	11.4157	2.79883	28.8717	31.6466	5.67049	57.2060	61.9230	10.94600	04	1.72086	05	31000
31500	11.4737	2.80174	28.9282	31.7019	5.68369	57.2970	61.9490	11.13200	04	1.74986	05	31500
32000	11.5317	2.80461	28.9847	31.7572	5.69694	57.3870	61.9710	11.31800	04	1.77886	05	32000
32500	11.5897	2.80744	29.0412	31.8125	5.71034	57.4760	61.9890	11.50400	04	1.80786	05	32500
33000	11.6477	2.81024	29.0977	31.8678	5.72389	57.5640	62.0030	11.69000	04	1.83686	05	33000
33500	11.7057	2.81300	29.1542	31.9231	5.73759	57.6510	62.0140	11.87600	04	1.86586	05	33500
34000	11.7637	2.81573	29.2107	31.9784	5.75134	57.7370	62.0220	12.06200	04	1.89486	05	34000
34500	11.8217	2.81843	29.2672	32.0337	5.76514	57.8230	62.0280	12.24800	04	1.92386	05	34500
35000	11.8797	2.82110	29.3237	32.0890	5.77904	57.9080	62.0320	12.43400	04	1.95286	05	35000
35500	11.9377	2.82374	29.3802	32.1443	5.79304	57.9930	62.0340	12.62000	04	1.98186	05	35500
36000	11.9957	2.82635	29.4367	32.1996	5.80714	58.0780	62.0340	12.80600	04	2.01086	05	36000
36500	12.0537	2.82893	29.4932	32.2549	5.82134	58.1630	62.0320	12.99200	04	2.03986	05	36500
37000	12.1117	2.83148	29.5497	32.3102	5.83564	58.2480	62.0280	13.17800	04	2.06886	05	37000
37500	12.1697	2.83400	29.6062	32.3655	5.85004	58.3330	62.0220	13.36400	04	2.09786	05	37500
38000	12.2277	2.83649	29.6627	32.4208	5.86454	58.4180	62.0140	13.55000	04	2.12686	05	38000
38500	12.2857	2.83895	29.7192	32.4761	5.87914	58.5030	62.0040	13.73600	04	2.15586	05	38500
39000	12.3437	2.84138	29.7757	32.5314	5.89384	58.5880	61.9920	13.92200	04	2.18486	05	39000
39500	12.4017	2.84378	29.8322	32.5867	5.90864	58.6730	61.9780	14.10800	04	2.21386	05	39500
40000	12.4597	2.84615	29.8887	32.6420	5.92354	58.7580	61.9620	14.29400	04	2.24286	05	40000
40500	12.5177	2.84849	29.9452	32.6973	5.93854	58.8430	61.9440	14.48000	04	2.27186	05	40500
41000	12.5757	2.85080	29.9997	32.7526	5.95364	58.9280	61.9240	14.66600	04	2.30086	05	41000
41500	12.6337	2.85308	30.0542	32.8079	5.96884	59.0130	61.9020	14.85200	04	2.32986	05	41500
42000	12.6917	2.85533	30.1087	32.8632	5.98414	59.0980	61.8780	15.03800	04	2.35886	05	42000
42500	12.7497	2.85755	30.1632	32.9185	5.99954	59.1830	61.8520	15.22400	04	2.38786	05	42500
43000	12.8077	2.85974	30.2177	32.9738	6.01504	59.2680	61.8240	15.41000	04	2.41686	05	43000
43500	12.8657	2.86190	30.2722	33.0291	6.03064	59.3530	61.7940	15.59600	04	2.44586	05	43500
44000	12.9237	2.86403	30.3267	33.0844	6.04634	59.4380	61.7620	15.78200	04	2.47486	05	44000
44500	12.9817	2.86613	30.3812	33.1397	6.06214	59.5230	61.7280	15.96800	04	2.50386	05	44500
45000	13.0397	2.86820	30.4357	33.1950	6.07804	59.6080	61.6920	16.15400	04	2.53286	05	45000
45500	13.0977	2.87024	30.4902	33.2503	6.09404	59.6930	61.6540	16.34000	04	2.56186	05	45500
46000	13.1557	2.87225	30.5447	33.3056	6.11014	59.7780	61.6140	16.52600	04	2.59086	05	46000
46500	13.2137	2.87423	30.5992	33.3609	6.12634	59.8630	61.5720	16.71200	04	2.61986	05	46500
47000	13.2717	2.87618	30.6537	33.4162	6.14264	59.9480	61.5280	16.89800	04	2.64886	05	47000
47500	13.3297	2.87810	30.7082	33.4715	6.15904	60.0330	61.4820	17.08400	04	2.67786	05	47500
48000	13.3877	2.88000	30.7627	33.5268	6.17554	60.1180	61.4340	17.27000	04	2.70686	05	48000
48500	13.4457	2.88187	30.8172	33.5821	6.19214	60.2030	61.3840	17.45600	04	2.73586	05	48500
49000	13.5037	2.88371	30.8717	33.6374	6.20884	60.2880	61.3320	17.64200	04	2.76486	05	49000
49500	13.5617	2.88552	30.9262	33.6927	6.22564	60.3730	61.2780	17.82800	04	2.79386	05	49500
50000	13.6197	2.88730	30.9807	33.7480	6.24254	60.4580	61.2220	18.01400	04	2.82286	05	50000
50500	13.6777	2.88905	31.0352	33.8033	6.25954	60.5430	61.1640	18.20000	04	2.85186	05	50500
51000	13.7357	2.89078	31.0897	33.8586	6.27664	60.6280	61.1040	18.38600	04	2.88086	05	51000
51500	13.7937	2.89248	31.1442	33.9139	6.29384	60.7130	61.0420	18.57200	04	2.90986	05	51500
52000	13.8517	2.89415	31.1987	33.9692	6.31114	60.7980	60.9780	18.75800	04	2.93886	05	52000
52500	13.9097	2.89580	31.2532	34.0245	6.32854	60.8830	60.9120	18.94400	04	2.96786	05	52500
53000	13.9677	2.89742	31.3077	34.0798	6.34604	60.9680	60.8440	19.13000	04	2.99686	05	53000
53500	14.0257	2.89902	31.3622	34.1351	6.36364	61.0530	60.7740	19.31600	04	3.02586	05	53500
54000	14.0837	2.90059	31.4167	34.1904	6.38134	61.1380	60.7020	19.50200	04	3.05486	05	54000
54500	14.1417	2.90213	31.4712	34.2457	6.39914	61.2230	60.6280	19.68800	04	3.08386	05	54500
55000	14.1997	2.90364	31.5257	34.3010	6.41704	61.3080	60.5520	19.87400	04	3.11286	05	55000
55500	14.2577	2.90513	31.5802	34.3563	6.43504	61.3930	60.4740	20.0600				

TABLE 14 (CONT.). IDEAL GAS FUNCTIONS FOR $\text{Ar} \leftrightarrow$

[illegible]

TABLE 15. IDEAL GAS FUNCTIONS FOR C 3+ (ATOMIC WEIGHT 12.0095, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 59 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL FUNCT.	$\frac{W^0 - E^0}{RT}$	$-\frac{F^0 - E^0}{RT}$	$\frac{S^0}{R}$	$\ln^0 - \frac{E^0}{RT}$	$-\ln^0 - \frac{E^0}{RT}$	$\frac{F^0 - E^0}{RT}$	$-\ln^0 - \frac{F^0 - E^0}{RT}$	$\frac{W^0 - E^0}{RT}$	$-\ln^0 - \frac{W^0 - E^0}{RT}$	TEMP. (°K)
3000	2.0000	2.50000	20.7727	23.2727	4.96791	41.2787	46.2446	8.9422E 03	1.4904E 04	1.2304E 05	3000
3200	2.0000	2.49999	20.9340	23.4340	4.96791	41.5793	46.5172	9.5304E 03	1.5097E 04	1.3312E 05	3200
3400	2.0000	2.50000	21.0856	23.5856	4.96791	41.9005	46.8644	1.0135E 04	1.6091E 04	1.4244E 05	3400
3600	2.0000	2.50000	21.2285	23.7285	4.96791	42.1845	47.1524	1.0731E 04	1.7004E 04	1.5186E 05	3600
3800	2.0000	2.50000	21.3636	23.8636	4.96791	42.4531	47.4210	1.1327E 04	1.8070E 04	1.6132E 05	3800
4000	2.0000	2.50000	21.4919	23.9919	4.96791	42.7079	47.6750	1.1923E 04	1.9072E 04	1.7083E 05	4000
4200	2.0000	2.50000	21.6138	24.1138	4.96791	42.9503	47.9182	1.2519E 04	2.0095E 04	1.8039E 05	4200
4400	2.0000	2.50000	21.7301	24.2301	4.96791	43.1814	48.1493	1.3115E 04	2.1059E 04	1.9000E 05	4400
4600	2.0000	2.50000	21.8413	24.3413	4.96791	43.4022	48.3701	1.3711E 04	2.2052E 04	1.9964E 05	4600
4800	2.0000	2.50000	21.9477	24.4477	4.96791	43.6136	48.5816	1.4308E 04	2.3044E 04	2.0932E 05	4800
5000	2.0000	2.50000	22.0497	24.5497	4.96791	43.8164	48.7844	1.4904E 04	2.4040E 04	2.1908E 05	5000
5200	2.0000	2.50000	22.1478	24.6478	4.96792	44.0113	48.9792	1.5500E 04	2.5033E 04	2.2886E 05	5200
5400	2.0000	2.50000	22.2421	24.7421	4.96792	44.2088	49.1664	1.6096E 04	2.6027E 04	2.3867E 05	5400
5600	2.0000	2.50000	22.3330	24.8330	4.96792	44.3982	49.3474	1.6692E 04	2.7020E 04	2.4851E 05	5600
5800	2.0000	2.50001	22.4208	24.9208	4.96792	44.5895	49.5217	1.7288E 04	2.8014E 04	2.5841E 05	5800
6000	2.0000	2.50001	22.5055	25.0055	4.96793	44.7722	49.6901	1.7885E 04	2.9008E 04	2.6833E 05	6000
6200	2.0000	2.50002	22.5875	25.0875	4.96794	44.9561	49.8530	1.8481E 04	3.0002E 04	2.7827E 05	6200
6400	2.0000	2.50003	22.6669	25.1669	4.96794	45.1428	50.0108	1.9077E 04	3.1000E 04	2.8822E 05	6400
6600	2.0000	2.50003	22.7438	25.2438	4.96798	45.3297	50.1637	1.9673E 04	3.2000E 04	2.9834E 05	6600
6800	2.0000	2.50005	22.8184	25.3185	4.96801	45.5140	50.3120	2.0270E 04	3.3000E 04	3.0854E 05	6800
7000	2.0000	2.50007	22.8909	25.3910	4.96805	45.6980	50.4561	2.0866E 04	3.4000E 04	3.1884E 05	7000
7200	2.0000	2.50010	22.9613	25.4614	4.96811	45.8780	50.5961	2.1463E 04	3.5000E 04	3.2932E 05	7200
7400	2.0000	2.50013	23.0298	25.5300	4.96818	46.0541	50.7323	2.2059E 04	3.6000E 04	3.3989E 05	7400
7600	2.0000	2.50018	23.0965	25.5967	4.96827	46.2264	50.8649	2.2656E 04	3.7000E 04	3.5061E 05	7600
7800	2.0000	2.50024	23.1615	25.6617	4.96839	46.3956	50.9940	2.3254E 04	3.8000E 04	3.6146E 05	7800
8000	2.0001	2.50032	23.2248	25.7251	4.96854	46.5614	51.1200	2.3851E 04	3.9000E 04	3.7242E 05	8000
8200	2.0001	2.50041	23.2865	25.7869	4.96873	46.7261	51.2428	2.4449E 04	4.0000E 04	3.8348E 05	8200
8400	2.0001	2.50052	23.3468	25.8473	4.96895	46.8899	51.3628	2.5047E 04	4.1000E 04	3.9471E 05	8400
8600	2.0001	2.50064	23.4056	25.9063	4.96923	47.0523	51.4800	2.5646E 04	4.2000E 04	4.0612E 05	8600
8800	2.0002	2.50083	23.4631	25.9639	4.96955	47.2250	51.5946	2.6245E 04	4.3000E 04	4.1773E 05	8800
9000	2.0002	2.50102	23.5193	26.0203	4.96994	47.3977	51.7067	2.6845E 04	4.4000E 04	4.2946E 05	9000
9200	2.0002	2.50125	23.5743	26.0755	4.97040	47.5690	51.8163	2.7446E 04	4.5000E 04	4.4130E 05	9200
9400	2.0003	2.50152	23.6281	26.1296	4.97092	47.7397	51.9236	2.8047E 04	4.6000E 04	4.5324E 05	9400
9600	2.0004	2.50182	23.6807	26.1825	4.97151	47.9095	52.0290	2.8648E 04	4.7000E 04	4.6527E 05	9600
9800	2.0005	2.50218	23.7323	26.2345	4.97224	48.0784	52.1323	2.9250E 04	4.8000E 04	4.7740E 05	9800
10000	2.0006	2.50258	23.7829	26.2854	4.97303	48.2465	52.2335	2.9853E 04	4.9000E 04	4.8962E 05	10000
10500	2.0009	2.50382	23.9050	26.4088	4.97550	48.5032	52.4787	3.1378E 04	5.2243E 04	5.2908E 05	10500
11000	2.0013	2.50545	24.0215	26.5270	4.97874	48.7547	52.7135	3.2907E 04	5.5764E 04	5.7300E 05	11000
11500	2.0018	2.50752	24.1329	26.6404	4.98266	49.0011	52.9390	3.4436E 04	5.9390E 04	6.2100E 05	11500
12000	2.0026	2.51099	24.2397	26.7498	4.98796	49.2433	53.1562	3.6010E 04	6.3100E 04	6.7302E 05	12000
12500	2.0036	2.51519	24.3422	26.8554	4.99413	49.4820	53.3642	3.7597E 04	6.6927E 04	7.2904E 05	12500
13000	2.0047	2.51987	24.4409	26.9577	5.00144	49.7184	53.5695	3.9184E 04	7.0860E 04	7.8908E 05	13000
13500	2.0062	2.52515	24.5359	27.0571	5.00995	49.9529	53.7699	4.0800E 04	7.4900E 04	8.5322E 05	13500
14000	2.0079	2.53206	24.6277	27.1538	5.01960	50.1850	53.9640	4.2455E 04	7.9040E 04	9.2150E 05	14000
14500	2.0099	2.53999	24.7166	27.2480	5.03069	50.4157	54.1544	4.4131E 04	8.3290E 04	9.9400E 05	14500

TABLE 15 (CONT.). IDEAL GAS FUNCTIONS FOR C₃H₈

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2}{8\pi^2 I}$	$-\frac{F^0 - F}{RT}$	$\ln \frac{h^2}{8\pi^2 I}$	$-\ln \frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I}$	TEMP. (°K)			
19000	2.0123	2.53776	26.8024	27.3401	5.04296	49.2644	54.3294	4.58376	04	7.54446	04	7.39306	05	15000
15500	2.0150	2.54457	26.8057	27.4303	5.05647	49.2644	54.3294	4.58376	04	7.54446	04	7.39306	05	15500
14000	2.0181	2.55199	26.8066	27.5186	5.07122	49.2644	54.3294	4.58376	04	7.54446	04	7.39306	05	16000
12500	2.0215	2.56000	26.8052	27.6052	5.08715	49.2644	54.3294	4.58376	04	7.54446	04	7.39306	05	16500
11000	2.0254	2.56859	25.1218	27.6904	5.10422	49.2644	54.3294	4.58376	04	7.54446	04	7.39306	05	17000
17000	2.0297	2.57773	25.1264	27.7761	5.12231	50.0694	55.1317	5.48646	04	8.04416	04	8.76216	05	17500
16000	2.0344	2.58737	25.2691	27.8565	5.14153	50.2139	55.3555	5.67706	04	8.2176	04	9.03896	05	18000
15000	2.0396	2.59748	25.3602	27.9376	5.16162	50.3551	55.5167	5.87276	04	8.48906	04	9.31576	05	18500
14000	2.0452	2.60803	25.4096	28.0176	5.18258	50.4933	55.6754	6.07136	04	8.76406	04	9.59376	05	19000
13500	2.0512	2.61896	25.4775	28.0964	5.20431	50.6279	55.8322	6.27346	04	9.04136	04	9.87246	05	19500
20000	2.0577	2.63026	25.5639	28.1761	5.22673	50.7600	55.9867	6.47916	04	9.31536	04	1.01526	06	20000
22000	2.0680	2.64799	25.7068	28.2568	5.25040	50.8914	56.1360	6.68086	04	9.58946	04	1.12786	06	22000
24000	2.1251	2.72791	26.0320	28.7599	5.42082	51.1298	57.1506	8.24086	04	1.30106	05	1.26156	06	24000
26000	2.1625	2.77770	26.2523	29.0300	5.51976	52.1676	58.1674	9.18476	04	1.43516	05	1.35646	06	26000
28000	2.2175	2.82956	26.4599	29.2854	5.61495	53.1902	59.1750	1.01506	05	1.57226	05	1.47226	06	28000
30000	2.2714	2.87623	26.6564	29.5266	5.70363	54.1976	60.1743	1.11496	05	1.71116	05	1.58916	06	30000
32000	2.3246	2.91801	26.8429	29.7540	5.78665	55.1814	61.1600	1.21526	05	1.85116	05	1.70696	06	32000
34000	2.3909	2.96756	27.0205	29.9651	5.87229	56.1493	62.1316	1.31506	05	1.99156	05	1.82506	06	34000
36000	2.4591	3.01499	27.1900	30.1698	5.96153	57.1039	63.0885	1.41646	05	2.13106	05	1.94516	06	36000
38000	2.5216	3.06022	27.3518	30.3601	6.05476	58.0456	64.0330	1.51636	05	2.27106	05	2.06546	06	38000
40000	2.5899	3.10393	27.5068	30.5397	6.15293	58.9706	64.9675	1.61656	05	2.41006	05	2.18646	06	40000
42000	2.6595	3.14647	27.6553	30.7098	6.25573	59.8857	65.8914	1.71676	05	2.54936	05	2.30816	06	42000
44000	2.7302	3.18734	27.7978	30.8712	6.36393	60.7906	66.8056	1.81826	05	2.68776	05	2.43056	06	44000
46000	2.8016	3.22695	27.9348	31.0249	6.47694	61.6856	67.7106	1.91956	05	2.82446	05	2.55356	06	46000
48000	2.8739	3.26511	28.0667	31.1718	6.59404	62.5713	68.6065	2.02076	05	2.96106	05	2.67716	06	48000
50000	2.9466	3.30190	28.1937	31.3127	6.71593	63.4956	69.4936	2.12236	05	3.09906	05	2.80136	06	50000
60000	3.3176	3.48422	28.7681	31.9523	6.37758	67.1649	73.4945	2.60426	05	3.79656	05	3.43006	06	60000
70000	3.7081	3.26571	29.2667	32.5364	6.48951	68.1538	74.4634	3.15166	05	4.54276	05	4.07086	06	70000
80000	4.1353	3.37446	29.7076	33.0821	6.70561	69.0339	75.4195	3.77486	05	5.36456	05	4.72276	06	80000
90000	4.6177	3.50377	30.1124	33.6162	6.96257	69.8383	76.3633	4.47796	05	6.26636	05	5.58546	06	90000
100000	5.1609	3.65936	30.4886	34.1279	7.23200	70.5858	77.2956	5.24406	05	7.23206	05	6.05866	06	100000
150000	9.9685	4.07517	32.0644	36.1595	8.07803	71.7172	79.1812	7.16436	05	1.21576	06	1.31526	07	150000
200000	14.3791	4.08585	33.2445	37.3304	8.11926	72.6024	79.1817	1.27646	06	1.62396	06	1.62396	07	200000
300000	23.9979	3.80353	36.8505	38.6540	7.55823	76.8118	76.8118	1.07136	06	2.26736	06	2.07746	07	300000
400000	36.4641	3.55342	38.9085	39.6619	7.06123	71.3562	76.8117	2.02906	06	2.82456	06	2.63426	07	400000
500000	45.2214	3.37422	36.6811	40.6553	6.70513	72.8914	79.5965	2.35906	06	3.35206	06	3.64406	07	500000
600000	52.3965	3.26434	37.2842	40.5285	6.44704	73.0898	80.5369	2.87596	06	3.86826	06	4.44546	07	600000
800000	63.2599	3.07175	38.1918	41.2635	6.10408	75.4933	81.9974	3.29356	06	4.88336	06	6.07156	07	800000
1000000	70.9766	2.96334	38.8647	41.8281	5.88864	77.2306	83.1193	3.90156	06	5.88864	06	7.72316	07	1000000

TABLE 16. IDEAL GAS FUNCTIONS FOR N 3+ (ATOMIC WEIGHT 14.00506, R = 1.90717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 40 FOR LIST OF STATES USED.

[illegible]

TABLE 16 (CONT.). IDEAL GAS FUNCTIONS FOR N₂

TEMP. (°K)	PARTIT. FUNCT.	$\frac{H^0 - E^0}{RT}$	$\ln \frac{H^0 - E^0}{RT}$	$\ln \frac{H^0 - E^0}{RT} - \ln \frac{H^0 - E^0}{RT}$	$\ln \frac{H^0 - E^0}{RT} - \ln \frac{H^0 - E^0}{RT}$	$\ln \frac{H^0 - E^0}{RT} - \ln \frac{H^0 - E^0}{RT}$	$\ln \frac{H^0 - E^0}{RT} - \ln \frac{H^0 - E^0}{RT}$	TEMP. (°K)
15000	1.0152	2.59039	24.3478	24.9282	5.14754	48.3831	53.5304	15000
15000	1.0175	2.60761	24.5350	24.9404	5.18134	48.5524	53.7357	15000
15000	1.0213	2.62606	24.5161	24.9421	5.21842	48.7175	53.9399	15000
15000	1.0255	2.64489	24.5972	24.9435	5.25842	48.8787	54.1373	15000
15000	1.0304	2.66403	24.6765	24.9445	5.30111	49.0363	54.3301	15000
17500	1.0357	2.69118	24.7542	24.9453	5.34787	49.1906	54.5204	17500
18000	1.0417	2.71564	24.8303	24.9460	5.39841	49.3419	54.7104	18000
18500	1.0482	2.74130	24.9041	24.9464	5.45374	49.4905	54.9037	18500
19000	1.0554	2.76803	24.9765	24.9466	5.51395	49.6365	55.1000	19000
19500	1.0631	2.79569	25.0508	24.9465	5.57911	49.7801	55.3000	19500
20000	1.0715	2.82416	25.1219	24.9461	5.64924	49.9214	55.5035	20000
20000	1.1112	2.94332	25.1946	25.1946	5.64924	50.4473	56.1162	20000
20000	1.1610	3.06483	25.6580	25.6580	5.64924	50.9564	57.0769	20000
20000	1.2204	3.18193	25.9079	25.9079	5.64924	51.4524	57.8044	20000
20000	1.2888	3.29000	26.1478	26.1478	5.64924	51.9359	58.4977	20000
30000	1.3656	3.38648	26.3781	26.3781	5.64924	52.4177	59.1672	30000
30000	1.4500	3.47046	26.5946	26.5946	5.64924	52.8950	59.8238	30000
30000	1.5412	3.54214	26.8120	26.8120	5.64924	53.3682	60.4683	30000
30000	1.6387	3.60240	27.0163	27.0163	5.64924	53.8384	61.1003	30000
30000	1.7417	3.65245	27.2124	27.2124	5.64924	54.3056	61.7203	30000
40000	1.8496	3.69359	27.4008	27.4008	5.64924	54.7690	62.3290	40000
40000	1.9624	3.72797	27.5819	27.5819	5.64924	55.2284	62.9261	40000
40000	2.0790	3.75406	27.7559	27.7559	5.64924	55.6836	63.5115	40000
40000	2.1993	3.77560	27.9233	27.9233	5.64924	56.1347	64.0853	40000
40000	2.3228	3.79257	28.0843	28.0843	5.64924	56.5816	64.6475	40000
50000	2.4494	3.80575	28.2394	28.2394	5.64924	57.0244	65.1981	50000
50000	2.5810	3.81499	28.3844	28.3844	5.64924	57.4631	65.7364	50000
50000	2.7176	3.82126	28.5196	28.5196	5.64924	57.8976	66.2624	50000
50000	2.8592	3.82421	28.6459	28.6459	5.64924	58.3280	66.7764	50000
50000	2.9958	3.82432	28.7632	28.7632	5.64924	58.7544	67.2784	50000
60000	3.1282	3.82126	28.8716	28.8716	5.64924	59.1768	67.7684	60000
60000	3.2658	3.81499	28.9716	28.9716	5.64924	59.5951	68.2454	60000
60000	3.4084	3.80575	29.0632	29.0632	5.64924	60.0094	68.7094	60000
60000	3.5560	3.79257	29.1469	29.1469	5.64924	60.4197	69.1604	60000
70000	3.7086	3.77560	29.2233	29.2233	5.64924	60.8260	69.5984	70000
70000	3.8662	3.75406	29.2923	29.2923	5.64924	61.2284	70.0234	70000
70000	4.0288	3.72797	29.3539	29.3539	5.64924	61.6268	70.4364	70000
70000	4.1964	3.69359	29.4088	29.4088	5.64924	62.0212	70.8364	70000
80000	4.3690	3.65245	29.4578	29.4578	5.64924	62.4116	71.2234	80000
80000	4.5466	3.60240	29.5008	29.5008	5.64924	62.7980	71.5984	80000
80000	4.7292	3.54214	29.5378	29.5378	5.64924	63.1804	71.9604	80000
80000	4.9168	3.47046	29.5688	29.5688	5.64924	63.5588	72.3084	80000
90000	5.1094	3.38648	29.5946	29.5946	5.64924	63.9332	72.6424	90000
90000	5.3070	3.29000	29.6156	29.6156	5.64924	64.3036	72.9624	90000
90000	5.5096	3.18193	29.6316	29.6316	5.64924	64.6696	73.2684	90000
90000	5.7172	3.06483	29.6426	29.6426	5.64924	65.0316	73.5604	90000
100000	5.9298	2.94332	29.6486	29.6486	5.64924	65.3896	73.8384	100000
100000	6.1474	2.82416	29.6496	29.6496	5.64924	65.7436	74.1024	100000
100000	6.3700	2.70508	29.6456	29.6456	5.64924	66.0936	74.3524	100000
100000	6.5976	2.5810	29.6366	29.6366	5.64924	66.4396	74.5884	100000
100000	6.8302	2.4512	29.6226	29.6226	5.64924	66.7816	74.8104	100000
100000	7.0678	2.3176	29.6046	29.6046	5.64924	67.1196	75.0184	100000
100000	7.3104	2.1790	29.5816	29.5816	5.64924	67.4536	75.2124	100000
100000	7.5580	2.0354	29.5536	29.5536	5.64924	67.7836	75.3924	100000
100000	7.8106	1.8878	29.5206	29.5206	5.64924	68.1096	75.5584	100000
100000	8.0682	1.7362	29.4826	29.4826	5.64924	68.4326	75.7104	100000
100000	8.3308	1.5806	29.4396	29.4396	5.64924	68.7526	75.8484	100000
100000	8.5984	1.4220	29.3916	29.3916	5.64924	69.0696	75.9724	100000
100000	8.8710	1.2604	29.3386	29.3386	5.64924	69.3836	76.0824	100000
100000	9.1486	1.0948	29.2806	29.2806	5.64924	69.6946	76.1784	100000
100000	9.4312	0.9252	29.2176	29.2176	5.64924	70.0026	76.2604	100000
100000	9.7188	0.7516	29.1496	29.1496	5.64924	70.3076	76.3284	100000
100000	10.0114	0.5740	29.0756	29.0756	5.64924	70.6096	76.3824	100000
100000	10.3090	0.3924	29.0056	29.0056	5.64924	70.9086	76.4224	100000
100000	10.6116	0.2078	28.9306	28.9306	5.64924	71.2046	76.4484	100000
100000	10.9192	0.0202	28.8506	28.8506	5.64924	71.4976	76.4604	100000
100000	11.2318	-0.1704	28.7656	28.7656	5.64924	71.7876	76.4584	100000
100000	11.5494	-0.3640	28.6756	28.6756	5.64924	72.0746	76.4424	100000
100000	11.8720	-0.5524	28.5806	28.5806	5.64924	72.3586	76.4124	100000
100000	12.1996	-0.7358	28.4806	28.4806	5.64924	72.6396	76.3684	100000
100000	12.5322	-0.9142	28.3756	28.3756	5.64924	72.9176	76.3104	100000
100000	12.8698	-1.0876	28.2656	28.2656	5.64924	73.1926	76.2384	100000
100000	13.2124	-1.2560	28.1506	28.1506	5.64924	73.4646	76.1524	100000
100000	13.5600	-1.4194	28.0306	28.0306	5.64924	73.7336	76.0524	100000
100000	13.9126	-1.5778	27.9056	27.9056	5.64924	74.0006	75.9384	100000
100000	14.2702	-1.7312	27.7756	27.7756	5.64924	74.2646	75.8104	100000
100000	14.6328	-1.8796	27.6406	27.6406	5.64924	74.5256	75.6684	100000
100000	15.0004	-2.0230	27.5006	27.5006	5.64924	74.7836	75.5124	100000
100000	15.3730	-2.1614	27.3556	27.3556	5.64924	75.0386	75.3424	100000
100000	15.7506	-2.2948	27.2056	27.2056	5.64924	75.2916	75.1584	100000
100000	16.1332	-2.4232	27.0506	27.0506	5.64924	75.5416	74.9604	100000
100000	16.5208	-2.5466	26.8906	26.8906	5.64924	75.7886	74.7484	100000
100000	16.9134	-2.6650	26.7256	26.7256	5.64924	76.0326	74.5224	100000
100000	17.3110	-2.7784	26.5556	26.5556	5.64924	76.2736	74.2824	100000
100000	17.7136	-2.8868	26.3806	26.3806	5.64924	76.5116	74.0284	100000
100000	18.1212	-2.9902	26.2006	26.2006	5.64924	76.7466	73.7604	100000
100000	18.5338	-3.0886	26.0156	26.0156	5.64924	76.9786	73.4784	100000
100000	18.9514	-3.1820	25.8256	25.8256	5.64924	77.2076	73.1824	100000
100000	19.3740	-3.2704	25.6306	25.6306	5.64924	77.4336	72.8724	100000
100000	19.8016	-3.3538	25.4306	25.4306	5.64924	77.6566	72.5484	100000
100000	20.2342	-3.4322	25.2256	25.2256	5.64924	77.8766	72.2104	100000
100000	20.6718	-3.5056	25.0156	25.0156	5.64924	78.0936	71.8584	100000
100000	21.1144	-3.5740	24.8006	24.8006	5.64924	78.3076	71.4924	100000
100000	21.5620	-3.6374	24.5806	24.5806	5.64924	78.5186	71.1124	100000
100000	22.0146	-3.6958	24.3556	24.3556	5.64924	78.7266	70.7184	100000
100000	22.4722	-3.7492	24.1256	24.1256	5.64924	78.9316	70.3104	100000
100000	22.9348	-3.7976	23.8906	23.8906	5.64924	79.1336	69.8884	100000
100000	23.4024	-3.8410	23.6506	23.6506	5.64924	79.3326	69.4524	100000
100000	23.8750	-3.8794	23.4056	23.4056	5.64924	79.5286	68.9924	100000
100000	24.3526	-3.9128	23.1556	23.1556	5.64924	79.7216	68.5184	100000
100000	24.8352	-3.9412	22.9006	22.9006	5.64924	79.9116	68.0304	100000
100000	25.3228	-3.9646	22.6406	22.6406	5.64924	80.1006	67.5284	100000
100000	25.8154	-3.9830	22.3756	22.3756	5.64924	80.2876	67.0124	100000
100000	26.3130	-4.0064	22.1056	22.1056	5.64924	80.4726	66.4824	100000
100000	26.8156	-4.0248	21.8306	21.8306	5.64924	80.6556	65.9384	100000
100000	27.3232	-4.0382	21.5506	21.5506	5.64924	80.8366	65.3804	100000
100000	27.8358	-4.0466	21.2656	21.2656	5.64924	81.0156	64.8084	100000
100000	28.3534	-4.0500	20.9756	20.9756	5.64924	81.1926	64.2224	100000
100000	28.8760	-4.0484	20.6806	20.6806	5.64924	81.3676	63.6224	100000
100000	29.4036	-4.0418	20.3806	20.3806	5.64924	81.5406	63.0084	100000
100000	29.9362	-4.0302	20.0756	20.0756	5.64924			

TABLE 1/. IDEAL GAS FUNCTIONS FOR $\bar{U}^0$ (ATOMIC WEIGHT 15.9977, $R = 1.98717$ CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $n \leq 4$. SEE TABLE 61 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL FUNCT.	$\frac{W^0 - E^0}{RT}$	$-\frac{E^0 - E^0}{RT}$	ΔH	$(W^0 - E^0)_{CAL/MOLE}$	$-(E^0 - E^0)_{CAL/MOLE}$	$W^0 - E^0$	$E^0 - E^0$	$W^0 - E^0$	$-(E^0 - E^0)$	TEMP. (°K)
3000	5.3232	2.61572	22.1817	26.7974	5.19787	44.0707	49.2766	9.8321E 03	1.5594E 04	1.3224E 05	3000
3200	5.3619	2.60896	22.3503	26.9593	5.18443	44.4137	49.5902	1.0231E 04	1.5594E 04	1.4212E 05	3200
3400	5.3965	2.60294	22.5003	27.1112	5.17247	44.7277	49.9002	1.0080E 04	1.5594E 04	1.5207E 05	3400
3600	5.4275	2.59755	22.6549	27.2545	5.16176	45.0230	50.1848	1.1429E 04	1.5594E 04	1.6208E 05	3600
3800	5.4555	2.59269	22.7972	27.3899	5.15211	45.3018	50.4539	1.2027E 04	1.5578E 04	1.7215E 05	3800
4000	5.4808	2.58829	22.9301	27.5184	5.14337	45.5659	50.7093	1.2625E 04	2.0573E 04	1.8226E 05	4000
4200	5.5040	2.58429	23.0543	27.6406	5.13541	45.8166	50.9520	1.3223E 04	2.1567E 04	1.9243E 05	4200
4400	5.5251	2.58064	23.1764	27.7570	5.12815	46.0554	51.1835	1.3820E 04	2.2561E 04	2.0264E 05	4400
4600	5.5445	2.57728	23.2911	27.8683	5.12149	46.2832	51.4047	1.4418E 04	2.3559E 04	2.1266E 05	4600
4800	5.5624	2.57420	23.4007	27.9749	5.11536	46.5010	51.6184	1.5015E 04	2.4556E 04	2.2326E 05	4800
5000	5.5790	2.57135	23.5057	28.0770	5.10949	46.7097	51.8194	1.5613E 04	2.5548E 04	2.3395E 05	5000
5200	5.5943	2.56871	23.6065	28.1752	5.10445	46.9100	52.0145	1.6210E 04	2.6543E 04	2.4393E 05	5200
5400	5.6086	2.56626	23.7033	28.2697	5.09958	47.1026	52.2021	1.6807E 04	2.7538E 04	2.5435E 05	5400
5600	5.6219	2.56398	23.7967	28.3607	5.09504	47.2879	52.3830	1.7404E 04	2.8532E 04	2.6481E 05	5600
5800	5.6343	2.56185	23.8866	28.4485	5.09081	47.4667	52.5575	1.8001E 04	2.9527E 04	2.7531E 05	5800
6000	5.6459	2.55985	23.9734	28.5333	5.08685	47.6392	52.7260	1.8598E 04	3.0521E 04	2.8584E 05	6000
6200	5.6569	2.55798	24.0573	28.6151	5.08314	47.8059	52.8891	1.9195E 04	3.1515E 04	2.9640E 05	6200
6400	5.6671	2.55623	24.1385	28.6948	5.07965	47.9672	53.0469	1.9792E 04	3.2510E 04	3.0696E 05	6400
6600	5.6768	2.55458	24.2172	28.7717	5.07637	48.1235	53.1999	2.0389E 04	3.3504E 04	3.1762E 05	6600
6800	5.6859	2.55302	24.2934	28.8464	5.07328	48.2750	53.3483	2.0986E 04	3.4498E 04	3.2827E 05	6800
7000	5.6945	2.55155	24.3674	28.9196	5.07036	48.4220	53.4924	2.1582E 04	3.5493E 04	3.3895E 05	7000
7200	5.7027	2.55017	24.4392	28.9904	5.06760	48.5640	53.6324	2.2177E 04	3.6487E 04	3.4967E 05	7200
7400	5.7104	2.54886	24.5091	29.0586	5.06500	48.7034	53.7686	2.2774E 04	3.7481E 04	3.6041E 05	7400
7600	5.7178	2.54761	24.5771	29.1247	5.06253	48.8387	53.9012	2.3373E 04	3.8475E 04	3.7117E 05	7600
7800	5.7248	2.54644	24.6432	29.1897	5.06020	48.9701	54.0303	2.3970E 04	3.9470E 04	3.8197E 05	7800
8000	5.7314	2.54533	24.7077	29.2530	5.05798	49.0982	54.1562	2.4567E 04	4.0464E 04	3.9270E 05	8000
8200	5.7378	2.54427	24.7705	29.3148	5.05589	49.2231	54.2790	2.5164E 04	4.1458E 04	4.0343E 05	8200
8400	5.7438	2.54327	24.8318	29.3751	5.05391	49.3459	54.3990	2.5761E 04	4.2453E 04	4.1418E 05	8400
8600	5.7496	2.54233	24.8916	29.4340	5.05203	49.4638	54.5158	2.6358E 04	4.3447E 04	4.2493E 05	8600
8800	5.7552	2.54144	24.9501	29.4915	5.05026	49.5799	54.6302	2.6955E 04	4.4442E 04	4.3568E 05	8800
9000	5.7609	2.54060	25.0072	29.5478	5.04859	49.6934	54.7428	2.7553E 04	4.5437E 04	4.4643E 05	9000
9200	5.7656	2.53981	25.0630	29.6028	5.04701	49.8043	54.8514	2.8151E 04	4.6432E 04	4.5718E 05	9200
9400	5.7704	2.53906	25.1176	29.6567	5.04553	49.9129	54.9564	2.8749E 04	4.7426E 04	4.6818E 05	9400
9600	5.7751	2.53837	25.1711	29.7094	5.04415	50.0191	55.0632	2.9347E 04	4.8424E 04	4.8018E 05	9600
9800	5.7797	2.53772	25.2234	29.7611	5.04286	50.1231	55.1659	2.9944E 04	4.9420E 04	4.9121E 05	9800
10000	5.7841	2.53712	25.2747	29.8119	5.04167	50.2249	55.2666	3.0542E 04	5.0417E 04	5.0225E 05	10000
10200	5.7883	2.53652	25.3264	29.8612	5.03969	50.3249	55.3666	3.1140E 04	5.1410E 04	5.1294E 05	10200
10400	5.7924	2.53596	25.3764	29.9094	5.03782	50.4229	55.4649	3.1738E 04	5.2402E 04	5.2376E 05	10400
10600	5.7964	2.53543	25.4254	29.9567	5.03710	50.5191	55.5619	3.2336E 04	5.3395E 04	5.3458E 05	10600
10800	5.8003	2.53493	25.4734	29.9994	5.03577	50.6134	55.6579	3.2934E 04	5.4387E 04	5.4530E 05	10800
11000	5.8041	2.53446	25.5204	30.0411	5.03507	51.1434	56.1795	3.3532E 04	5.5379E 04	5.5602E 05	11000
11200	5.8078	2.53402	25.5664	30.0818	5.03507	51.1434	56.1795	3.4130E 04	5.6372E 04	5.6675E 05	11200
11400	5.8114	2.53360	25.6114	30.1215	5.03504	51.3490	56.3640	3.4728E 04	5.7365E 04	5.7748E 05	11400
11600	5.8149	2.53320	25.6554	30.1602	5.03504	51.3490	56.3640	3.5326E 04	5.8358E 04	5.8831E 05	11600
11800	5.8183	2.53282	25.6984	30.1979	5.03504	51.3490	56.3640	3.5924E 04	5.9351E 04	5.9904E 05	11800
12000	5.8216	2.53246	25.7404	30.2346	5.03504	51.3490	56.3640	3.6522E 04	6.0344E 04	6.0997E 05	12000
12200	5.8248	2.53212	25.7814	30.2703	5.03504	51.3490	56.3640	3.7120E 04	6.1337E 04	6.2090E 05	12200
12400	5.8279	2.53180	25.8214	30.3050	5.03504	51.3490	56.3640	3.7718E 04	6.2330E 04	6.3183E 05	12400
12600	5.8309	2.53150	25.8604	30.3387	5.03504	51.3490	56.3640	3.8316E 04	6.3323E 04	6.4276E 05	12600
12800	5.8338	2.53122	25.8984	30.3714	5.03504	51.3490	56.3640	3.8914E 04	6.4316E 04	6.5369E 05	12800
13000	5.8366	2.53096	25.9354	30.4031	5.03504	51.3490	56.3640	3.9512E 04	6.5309E 04	6.6462E 05	13000
13200	5.8393	2.53072	25.9714	30.4338	5.03504	51.3490	56.3640	4.0110E 04	6.6302E 04	6.7555E 05	13200
13400	5.8419	2.53050	26.0074	30.4635	5.03504	51.3490	56.3640	4.0708E 04	6.7295E 04	6.8648E 05	13400
13600	5.8444	2.53030	26.0424	30.4922	5.03504	51.3490	56.3640	4.1306E 04	6.8288E 04	6.9740E 05	13600
13800	5.8468	2.53012	26.0764	30.5199	5.03504	51.3490	56.3640	4.1904E 04	6.9281E 04	7.0832E 05	13800
14000	5.8491	2.53000	26.1094	30.5466	5.03504	51.3490	56.3640	4.2502E 04	7.0274E 04	7.1924E 05	14000
14200	5.8513	2.52990	26.1414	30.5723	5.03504	51.3490	56.3640	4.3100E 04	7.1267E 04	7.3016E 05	14200
14400	5.8534	2.52982	26.1724	30.5970	5.03504	51.3490	56.3640	4.3698E 04	7.2260E 04	7.4108E 05	14400
14600	5.8554	2.52976	26.2024	30.6217	5.03504	51.3490	56.3640	4.4296E 04	7.3253E 04	7.5200E 05	14600
14800	5.8573	2.52972	26.2314	30.6454	5.03504	51.3490	56.3640	4.4894E 04	7.4246E 04	7.6292E 05	14800
15000	5.8591	2.52970	26.2594	30.6681	5.03504	51.3490	56.3640	4.5492E 04	7.5239E 04	7.7384E 05	15000

TABLE 17 (CONT.). IDEAL GAS FUNCTIONS FOR O₂

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2}{8\pi^2 I}$	$\frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I}$	TEMP. (°K)
15000	5.8672	2.53935	26.3024	5.06411	52.2476	57.3137	4.58045	7.34728	7.84818	15000
15500	5.8750	2.54146	26.3359	5.06871	52.2332	57.4039	4.58045	7.34728	7.84818	15500
16000	5.8830	2.54359	26.3694	5.07331	52.2188	57.4941	4.58045	7.34728	7.84818	16000
16500	5.8914	2.54574	26.4029	5.07791	52.2044	57.5843	4.58045	7.34728	7.84818	16500
17000	5.9000	2.55109	26.4221	5.08444	52.1900	57.6745	4.58045	7.34728	7.84818	17000
17500	5.9091	2.55506	26.4391	5.09132	52.1756	57.7647	4.58045	7.34728	7.84818	17500
18000	5.9184	2.55943	26.4541	5.09860	52.1612	57.8549	4.58045	7.34728	7.84818	18000
18500	5.9281	2.56419	26.4681	5.10628	52.1468	57.9451	4.58045	7.34728	7.84818	18500
19000	5.9382	2.56933	26.4811	5.11436	52.1324	58.0353	4.58045	7.34728	7.84818	19000
19500	5.9487	2.57484	26.4931	5.12284	52.1180	58.1255	4.58045	7.34728	7.84818	19500
20000	5.9594	2.58070	26.5041	5.13172	52.1036	58.2157	4.58045	7.34728	7.84818	20000
20500	5.9704	2.58694	26.5141	5.14100	52.0892	58.3059	4.58045	7.34728	7.84818	20500
21000	5.9817	2.59357	26.5231	5.15068	52.0748	58.3961	4.58045	7.34728	7.84818	21000
21500	5.9934	2.60059	26.5311	5.16076	52.0604	58.4863	4.58045	7.34728	7.84818	21500
22000	6.0054	2.60801	26.5381	5.17124	52.0460	58.5765	4.58045	7.34728	7.84818	22000
22500	6.0177	2.61583	26.5441	5.18212	52.0316	58.6667	4.58045	7.34728	7.84818	22500
23000	6.0303	2.62405	26.5491	5.19340	52.0172	58.7569	4.58045	7.34728	7.84818	23000
23500	6.0431	2.63267	26.5531	5.20508	52.0028	58.8471	4.58045	7.34728	7.84818	23500
24000	6.0561	2.64169	26.5561	5.21716	51.9884	58.9373	4.58045	7.34728	7.84818	24000
24500	6.0693	2.65111	26.5581	5.22964	51.9740	59.0275	4.58045	7.34728	7.84818	24500
25000	6.0827	2.66093	26.5591	5.24252	51.9596	59.1177	4.58045	7.34728	7.84818	25000
25500	6.0963	2.67115	26.5591	5.25580	51.9452	59.2079	4.58045	7.34728	7.84818	25500
26000	6.1101	2.68177	26.5581	5.26948	51.9308	59.2981	4.58045	7.34728	7.84818	26000
26500	6.1241	2.69279	26.5561	5.28356	51.9164	59.3883	4.58045	7.34728	7.84818	26500
27000	6.1383	2.70421	26.5531	5.29804	51.9020	59.4785	4.58045	7.34728	7.84818	27000
27500	6.1527	2.71603	26.5491	5.31292	51.8876	59.5687	4.58045	7.34728	7.84818	27500
28000	6.1673	2.72825	26.5441	5.32820	51.8732	59.6589	4.58045	7.34728	7.84818	28000
28500	6.1821	2.74087	26.5381	5.34388	51.8588	59.7491	4.58045	7.34728	7.84818	28500
29000	6.1971	2.75389	26.5311	5.35996	51.8444	59.8393	4.58045	7.34728	7.84818	29000
29500	6.2123	2.76731	26.5231	5.37644	51.8299	59.9295	4.58045	7.34728	7.84818	29500
30000	6.2277	2.78113	26.5141	5.39332	51.8155	60.0197	4.58045	7.34728	7.84818	30000
30500	6.2433	2.79535	26.5041	5.41060	51.8011	60.1099	4.58045	7.34728	7.84818	30500
31000	6.2591	2.81007	26.4931	5.42828	51.7867	60.1999	4.58045	7.34728	7.84818	31000
31500	6.2751	2.82529	26.4811	5.44636	51.7723	60.2899	4.58045	7.34728	7.84818	31500
32000	6.2913	2.84091	26.4681	5.46484	51.7579	60.3799	4.58045	7.34728	7.84818	32000
32500	6.3077	2.85693	26.4541	5.48372	51.7435	60.4699	4.58045	7.34728	7.84818	32500
33000	6.3243	2.87335	26.4391	5.50300	51.7291	60.5599	4.58045	7.34728	7.84818	33000
33500	6.3411	2.89017	26.4231	5.52268	51.7147	60.6499	4.58045	7.34728	7.84818	33500
34000	6.3581	2.90749	26.4061	5.54276	51.6999	60.7399	4.58045	7.34728	7.84818	34000
34500	6.3753	2.92525	26.3881	5.56324	51.6855	60.8299	4.58045	7.34728	7.84818	34500
35000	6.3927	2.94347	26.3691	5.58412	51.6711	60.9199	4.58045	7.34728	7.84818	35000
35500	6.4103	2.96215	26.3491	5.60540	51.6567	61.0099	4.58045	7.34728	7.84818	35500
36000	6.4281	2.98129	26.3281	5.62708	51.6423	61.0999	4.58045	7.34728	7.84818	36000
36500	6.4461	2.99997	26.3061	5.64916	51.6279	61.1899	4.58045	7.34728	7.84818	36500
37000	6.4643	3.01919	26.2831	5.67164	51.6135	61.2799	4.58045	7.34728	7.84818	37000
37500	6.4827	3.03891	26.2591	5.69452	51.5991	61.3699	4.58045	7.34728	7.84818	37500
38000	6.5013	3.05913	26.2341	5.71780	51.5847	61.4599	4.58045	7.34728	7.84818	38000
38500	6.5201	3.07985	26.2081	5.74148	51.5703	61.5499	4.58045	7.34728	7.84818	38500
39000	6.5391	3.10107	26.1811	5.76556	51.5559	61.6399	4.58045	7.34728	7.84818	39000
39500	6.5583	3.12279	26.1531	5.78994	51.5415	61.7299	4.58045	7.34728	7.84818	39500
40000	6.5777	3.14501	26.1241	5.81462	51.5271	61.8199	4.58045	7.34728	7.84818	40000
40500	6.5973	3.16773	26.0941	5.83960	51.5127	61.9099	4.58045	7.34728	7.84818	40500
41000	6.6171	3.19095	26.0631	5.86488	51.4983	61.9999	4.58045	7.34728	7.84818	41000
41500	6.6371	3.21467	26.0311	5.89046	51.4839	62.0899	4.58045	7.34728	7.84818	41500
42000	6.6573	3.23889	26.0001	5.91624	51.4695	62.1799	4.58045	7.34728	7.84818	42000
42500	6.6777	3.26361	25.9681	5.94232	51.4551	62.2699	4.58045	7.34728	7.84818	42500
43000	6.6983	3.28883	25.9351	5.96860	51.4407	62.3599	4.58045	7.34728	7.84818	43000
43500	6.7191	3.31455	25.9011	5.99518	51.4263	62.4499	4.58045	7.34728	7.84818	43500
44000	6.7401	3.34077	25.8661	6.02196	51.4119	62.5399	4.58045	7.34728	7.84818	44000
44500	6.7613	3.36749	25.8301	6.04894	51.3975	62.6299	4.58045	7.34728	7.84818	44500
45000	6.7827	3.39471	25.7931	6.07612	51.3831	62.7199	4.58045	7.34728	7.84818	45000
45500	6.8043	3.42243	25.7551	6.10350	51.3687	62.8099	4.58045	7.34728	7.84818	45500
46000	6.8261	3.45065	25.7161	6.13118	51.3543	62.8999	4.58045	7.34728	7.84818	46000
46500	6.8481	3.47937	25.6761	6.15906	51.3399	62.9899	4.58045	7.34728	7.84818	46500
47000	6.8703	3.50859	25.6351	6.18714	51.3255	63.0799	4.58045	7.34728	7.84818	47000
47500	6.8927	3.53831	25.5931	6.21542	51.3111	63.1699	4.58045	7.34728	7.84818	47500
48000	6.9153	3.56853	25.5501	6.24390	51.2967	63.2599	4.58045	7.34728	7.84818	48000
48500	6.9381	3.59925	25.5061	6.27258	51.2823	63.3499	4.58045	7.34728	7.84818	48500
49000	6.9611	3.63047	25.4611	6.30146	51.2679	63.4399	4.58045	7.34728	7.84818	49000
49500	6.9843	3.66219	25.4151	6.33054	51.2535	63.5299	4.58045	7.34728	7.84818	49500
50000	7.0077	3.69441	25.3681	6.35982	51.2391	63.6199	4.58045	7.34728	7.84818	50000
50500	7.0313	3.72713	25.3201	6.38930	51.2247	63.7099	4.58045	7.34728	7.84818	50500
51000	7.0551	3.76035	25.2711	6.41898	51.2103	63.7999	4.58045	7.34728	7.84818	51000
51500	7.0791	3.79407	25.2211	6.44886	51.1959	63.8899	4.58045	7.34728	7.84818	51500
52000	7.1033	3.82829	25.1701	6.47894	51.1815	63.9799	4.58045	7.34728	7.84818	52000
52500	7.1277	3.86301	25.1181	6.50922	51.1671	64.0699	4.58045	7.34728	7.84818	52500
53000	7.1523	3.89823	25.0651	6.53970	51.1527	64.1599	4.58045	7.34728	7.84818	53000
53500	7.1771	3.93395	25.0111	6.57038	51.1383	64.2499	4.58045	7.34728	7.84818	53500
54000	7.2021	3.97017	24.9561	6.60126	51.1239	64.3399	4.58045	7.34728	7.84818	54000
54500	7.2273	4.00689	24.9001	6.63234	51.1095	64.4299	4.58045	7.34728	7.84818	54500
55000	7.2527	4.04411	24.8431	6.66362	51.0951	64.5199	4.58045	7.34728	7.84818	55000
55500	7.2783	4.08183	24.7851	6.69510	51.0807	64.6099	4.58045	7.34728	7.84818	55500
56000	7.3041	4.12005	24.7261	6.72678	51.0663	64.6999	4.58045	7.34728	7.84818	56000
56500	7.3301	4.15877	24.6661	6.75866	51.0519	64.7899	4.58045	7.34728	7.84818	56500
57000	7.3563	4.19799	24.6051	6.79074	51.0375	64.8799	4.58045	7.34728	7.84818	57000
57500	7.3827	4.23771	24.5431	6.82302	51.0231	64.9699	4.58045	7.34728	7.84818	57500
58000	7.4093	4.27793	24.4801	6.85550	51.0087	65.0599	4.58045	7.34728	7.84818	58000
58500	7.4361	4.31865	24.4161	6.88818	50.9943	65.1499	4.58045	7.34728	7.84818	58500
59000	7.4631	4.35987	24.3511	6.92096	50.9799	65.2399	4.58045	7.34728	7.84818	59000
59500	7.4903	4.40159	24.2851	6.95394	50.9655	65.3299	4.58045	7.34728	7.84818	59500
60000	7.5177	4.44381	24.2181	6.98712	50.9511	65.4199	4.58045	7.34728	7.8	

TABLE 18. IDEAL GAS FUNCTIONS FOR AR 3+ (ATOMIC WEIGHT 39.9440, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 62 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT- FUNCT.	$\frac{U^0-E^0}{RT}$	$-\frac{F^0-E^0}{RT}$	$\ln P^0$	$-\ln Q^0/RT$	$\ln P^0 - \ln Q^0/RT$	$\ln P^0 - \ln Q^0/RT$	$\ln P^0 - \ln Q^0/RT$	$\ln P^0 - \ln Q^0/RT$	TEMP. (°K)
3000	4.0004	2.50099	23.2406	25.7496	4.96908	46.2307	91.2009	0.9402E 03	1.4916E 04	3000
3200	4.0007	2.50175	23.4301	25.9318	4.97150	46.5394	91.5308	1.0402E 03	1.5372E 04	3200
3400	4.0013	2.50280	23.5818	26.0847	4.97346	46.8409	91.8446	1.0814E 04	1.5933E 04	3400
3600	4.0021	2.50405	23.7259	26.2294	4.97465	47.1453	92.1221	1.0763E 04	1.6772E 04	3600
3800	4.0033	2.50645	23.8604	26.3670	4.98114	47.4465	92.3956	1.1317E 04	1.8020E 04	3800
4000	4.0050	2.50945	23.9900	26.4984	4.98648	47.7471	92.6548	1.1908E 04	1.9648E 04	4000
4200	4.0071	2.51295	24.1115	26.6245	4.99344	48.0481	92.9072	1.2637E 04	2.0124E 04	4200
4400	4.0099	2.51721	24.2285	26.7457	5.00217	48.3494	93.1482	1.3286E 04	2.1104E 04	4400
4600	4.0134	2.52227	24.3405	26.8628	5.01217	48.6506	93.3806	1.3915E 04	2.2250E 04	4600
4800	4.0177	2.52817	24.4480	26.9761	5.02339	48.9522	93.6061	1.4576E 04	2.3319E 04	4800
5000	4.0229	2.53491	24.5513	27.0862	5.03728	49.2534	93.8248	1.5251E 04	2.4394E 04	5000
5200	4.0290	2.54249	24.6509	27.1934	5.05234	49.5544	94.0377	1.5939E 04	2.5472E 04	5200
5400	4.0361	2.55080	24.7470	27.2979	5.06864	49.8554	94.2454	1.6642E 04	2.6552E 04	5400
5600	4.0442	2.56012	24.8399	27.4000	5.08738	49.3410	94.4484	1.7361E 04	2.7642E 04	5600
5800	4.0535	2.57011	24.9299	27.5001	5.10723	49.5399	94.6471	1.8096E 04	2.8733E 04	5800
6000	4.0638	2.58084	25.0172	27.5981	5.12855	49.7334	94.8420	1.8848E 04	2.9828E 04	6000
6200	4.0754	2.59225	25.1021	27.6943	5.15122	49.9219	95.0332	1.9617E 04	3.0927E 04	6200
6400	4.0881	2.60429	25.1845	27.7888	5.17515	50.1059	95.2210	2.0404E 04	3.2029E 04	6400
6600	4.1020	2.61691	25.2649	27.8818	5.20022	50.2855	95.4057	2.1206E 04	3.3134E 04	6600
6800	4.1172	2.63004	25.3432	27.9732	5.22633	50.4611	95.5876	2.2024E 04	3.4244E 04	6800
7000	4.1335	2.64363	25.4196	28.0633	5.25334	50.6330	95.7643	2.2863E 04	3.5359E 04	7000
7200	4.1511	2.65762	25.4943	28.1519	5.28113	50.8013	95.9365	2.3717E 04	3.6478E 04	7200
7400	4.1699	2.67194	25.5673	28.2393	5.30959	50.9665	96.1061	2.4586E 04	3.7597E 04	7400
7600	4.1898	2.68654	25.6388	28.3253	5.33860	51.1280	96.2730	2.5471E 04	3.8721E 04	7600
7800	4.2110	2.70136	25.7087	28.4101	5.36804	51.2875	96.4355	2.6371E 04	3.9849E 04	7800
8000	4.2333	2.71633	25.7773	28.4936	5.39780	51.4442	96.5926	2.7285E 04	4.0979E 04	8000
8200	4.2568	2.73141	25.8446	28.5760	5.42776	51.5974	96.7452	2.8213E 04	4.2113E 04	8200
8400	4.2813	2.74655	25.9106	28.6571	5.45784	51.7486	96.8944	2.9154E 04	4.3254E 04	8400
8600	4.3070	2.76169	25.9754	28.7371	5.48794	51.8974	97.0403	3.0107E 04	4.4391E 04	8600
8800	4.3338	2.77680	26.0390	28.8158	5.51796	52.0439	97.1838	3.1071E 04	4.5535E 04	8800
9000	4.3615	2.79183	26.1016	28.8934	5.54782	52.1882	97.3240	3.2044E 04	4.6681E 04	9000
9200	4.3903	2.80674	26.1631	28.9699	5.57745	52.3307	97.4619	3.3031E 04	4.7831E 04	9200
9400	4.4201	2.82149	26.2237	29.0451	5.60677	52.4715	97.5975	3.4024E 04	4.8984E 04	9400
9600	4.4508	2.83606	26.2832	29.1193	5.63573	52.6107	97.7308	3.5024E 04	5.0140E 04	9600
9800	4.4824	2.85042	26.3418	29.1923	5.66426	52.7484	97.8618	3.6030E 04	5.1299E 04	9800
10000	4.5149	2.86454	26.3994	29.2641	5.69231	52.8843	97.9900	3.7041E 04	5.2464E 04	10000
10500	4.5997	2.89844	26.5402	29.4388	5.76087	53.1797	98.1998	3.8056E 04	5.3637E 04	10500
11000	4.6893	2.93082	26.6758	29.6066	5.82403	53.4691	98.3932	3.9076E 04	5.4810E 04	11000
11500	4.7832	2.96090	26.8067	29.7676	5.88360	53.7524	98.5715	4.0100E 04	5.5984E 04	11500
12000	4.8809	2.98877	26.9333	29.9221	5.93919	54.0291	98.7440	4.1129E 04	5.7159E 04	12000
12500	4.9819	3.01439	27.0559	30.0702	5.99009	54.2994	98.9114	4.2163E 04	5.8337E 04	12500
13000	5.0858	3.03777	27.1745	30.2123	6.03655	54.5625	99.0740	4.3204E 04	5.9519E 04	13000
13500	5.1921	3.05894	27.2896	30.3485	6.07845	54.8194	99.2326	4.4252E 04	6.0704E 04	13500
14000	5.3006	3.07803	27.4012	30.4792	6.11544	55.0707	99.3871	4.5307E 04	6.1894E 04	14000
14500	5.4109	3.09510	27.5095	30.6046	6.15047	55.3159	99.5384	4.6369E 04	6.3089E 04	14500

TABLE 10 (CONT.). IDEAL GAS FUNCTIONS FOR AIR 34

TEMP. (°F.)	PARTIC. FUNCT.	$\frac{h^* - h}{RT}$	$\frac{h^* - h}{RT} - \frac{h^* - h}{RT}$	$\ln \frac{h^* - h}{RT}$	$\ln \frac{h^* - h}{RT}$	$\frac{h^* - h}{RT}$	$\frac{h^* - h}{RT}$	$\frac{h^* - h}{RT}$	TEMP. (°F.)		
13000	5.5226	3.11027	27.6157	30.7250	6.10662	54.8750	61.0556	6.2902E 04	9.270ME 04	8.23.2E 05	15000
15000	5.6355	3.12367	27.7169	30.8466	6.20725	55.0781	62.2853	6.5411E 04	9.4212E 04	8.5371E 05	15500
16000	5.7493	3.13542	27.8163	30.9517	6.28061	55.2755	61.5061	6.7899E 04	9.5406E 04	8.8441E 05	16000
16500	5.8637	3.14566	27.9129	31.0586	6.35064	55.4676	61.7185	7.0352E 04	1.0314E 05	9.1527E 05	16500
17000	5.9784	3.15490	28.0070	31.1614	6.41891	55.6544	61.9230	7.2783E 04	1.0656E 05	9.4613E 05	17000
17500	6.0938	3.16204	28.0985	31.2606	6.48534	55.8354	62.1199	7.5187E 04	1.0994E 05	9.7714E 05	17500
18000	6.2091	3.16817	28.1877	31.3561	6.55028	56.0136	62.3098	7.7564E 04	1.1333E 05	1.0002E 06	18000
18500	6.3244	3.17383	28.2746	31.4486	6.61382	56.1882	62.4932	7.9914E 04	1.1668E 05	1.0304E 06	18500
19000	6.4394	3.17824	28.3593	31.5378	6.67610	56.3595	62.6702	8.2242E 04	1.2000E 05	1.0707E 06	19000
19500	6.5542	3.18181	28.4419	31.6237	6.73727	56.5287	62.8415	8.4543E 04	1.2332E 05	1.1021E 06	19500
20000	6.6686	3.18462	28.5225	31.7071	6.79737	56.6958	63.0072	8.6824E 04	1.2657E 05	1.1336E 06	20000
20500	6.7830	3.18707	28.6015	31.7893	6.85642	56.8608	63.1674	8.9092E 04	1.2976E 05	1.1647E 06	20500
21000	6.8974	3.18921	28.6788	31.8703	6.91453	57.0239	63.3214	9.1348E 04	1.3289E 05	1.1954E 06	21000
21500	7.0118	3.19104	28.7546	31.9499	6.97173	57.1849	63.4698	9.3593E 04	1.3596E 05	1.2257E 06	21500
22000	7.1262	3.19267	28.8290	32.0281	7.02803	57.3444	63.6126	9.5827E 04	1.3897E 05	1.2557E 06	22000
22500	7.2406	3.19410	28.9020	32.1049	7.08343	57.5025	63.7500	9.8051E 04	1.4193E 05	1.2854E 06	22500
23000	7.3550	3.19533	28.9737	32.1803	7.13793	57.6592	63.8821	1.0017E 05	1.4484E 05	1.3148E 06	23000
23500	7.4694	3.19636	29.0441	32.2543	7.19153	57.8146	64.0090	1.0221E 05	1.4770E 05	1.3439E 06	23500
24000	7.5838	3.19719	29.1133	32.3269	7.24423	57.9687	64.1311	1.0424E 05	1.5052E 05	1.3727E 06	24000
24500	7.6982	3.19782	29.1815	32.3981	7.29603	58.1215	64.2486	1.0626E 05	1.5330E 05	1.4012E 06	24500
25000	7.8126	3.19825	29.2487	32.4681	7.34693	58.2734	64.3615	1.0827E 05	1.5604E 05	1.4298E 06	25000
25500	7.9270	3.19848	29.3149	32.5369	7.39693	58.4248	64.4698	1.1027E 05	1.5875E 05	1.4581E 06	25500
26000	8.0414	3.19851	29.3801	32.6045	7.44603	58.5747	64.5736	1.1226E 05	1.6143E 05	1.4861E 06	26000
26500	8.1558	3.19834	29.4443	32.6709	7.49423	58.7231	64.6729	1.1424E 05	1.6408E 05	1.5138E 06	26500
27000	8.2702	3.19797	29.5075	32.7361	7.54153	58.8699	64.7677	1.1621E 05	1.6670E 05	1.5412E 06	27000
27500	8.3846	3.19740	29.5697	32.8001	7.58793	59.0152	64.8580	1.1817E 05	1.6929E 05	1.5683E 06	27500
28000	8.4990	3.19663	29.6309	32.8629	7.63343	59.1590	64.9438	1.2012E 05	1.7185E 05	1.5952E 06	28000
28500	8.6134	3.19566	29.6911	32.9245	7.67803	59.3013	65.0251	1.2206E 05	1.7438E 05	1.6219E 06	28500
29000	8.7278	3.19449	29.7503	32.9849	7.72173	59.4421	65.1019	1.2399E 05	1.7688E 05	1.6483E 06	29000
29500	8.8422	3.19312	29.8085	33.0441	7.76453	59.5815	65.1742	1.2591E 05	1.7935E 05	1.6745E 06	29500
30000	8.9566	3.19155	29.8657	33.1021	7.80643	59.7194	65.2420	1.2782E 05	1.8178E 05	1.7005E 06	30000
30500	9.0710	3.18978	29.9219	33.1589	7.84743	59.8558	65.3053	1.2972E 05	1.8418E 05	1.7263E 06	30500
31000	9.1854	3.18781	29.9771	33.2145	7.88753	59.9907	65.3641	1.3161E 05	1.8655E 05	1.7518E 06	31000
31500	9.2998	3.18564	29.9999	33.2689	7.92673	60.1241	65.4184	1.3347E 05	1.8889E 05	1.7770E 06	31500
32000	9.4142	3.18327	30.0211	33.3221	7.96503	60.2561	65.4682	1.3531E 05	1.9120E 05	1.8019E 06	32000
32500	9.5286	3.18070	30.0413	33.3741	8.00243	60.3869	65.5135	1.3714E 05	1.9348E 05	1.8266E 06	32500
33000	9.6430	3.17793	30.0605	33.4249	8.03893	60.5157	65.5550	1.3896E 05	1.9573E 05	1.8511E 06	33000
33500	9.7574	3.17496	30.0787	33.4745	8.07453	60.6425	65.5926	1.4077E 05	1.9796E 05	1.8754E 06	33500
34000	9.8718	3.17179	30.0959	33.5229	8.10923	60.7679	65.6261	1.4257E 05	2.0017E 05	1.8995E 06	34000
34500	9.9862	3.16842	30.1121	33.5699	8.14303	60.8919	65.6556	1.4436E 05	2.0236E 05	1.9234E 06	34500
35000	10.1006	3.16485	30.1273	33.6155	8.17593	61.0147	65.6801	1.4614E 05	2.0453E 05	1.9471E 06	35000
35500	10.2150	3.16108	30.1415	33.6599	8.20793	61.1365	65.7006	1.4791E 05	2.0668E 05	1.9706E 06	35500
36000	10.3294	3.15711	30.1547	33.7031	8.23903	61.2573	65.7171	1.4967E 05	2.0881E 05	1.9939E 06	36000
36500	10.4438	3.15294	30.1669	33.7451	8.26923	61.3771	65.7296	1.5142E 05	2.1092E 05	2.0170E 06	36500
37000	10.5582	3.14857	30.1781	33.7859	8.29853	61.4959	65.7381	1.5316E 05	2.1299E 05	2.0399E 06	37000
37500	10.6726	3.14400	30.1883	33.8255	8.32703	61.6137	65.7426	1.5489E 05	2.1504E 05	2.0626E 06	37500
38000	10.7870	3.13933	30.1975	33.8639	8.35473	61.7305	65.7431	1.5661E 05	2.1707E 05	2.0851E 06	38000
38500	10.9014	3.13446	30.2057	33.9011	8.38163	61.8463	65.7396	1.5832E 05	2.1908E 05	2.1074E 06	38500
39000	11.0158	3.12939	30.2129	33.9371	8.40773	61.9611	65.7321	1.6003E 05	2.2107E 05	2.1295E 06	39000
39500	11.1302	3.12412	30.2191	33.9719	8.43303	62.0749	65.7206	1.6173E 05	2.2304E 05	2.1514E 06	39500
40000	11.2446	3.11865	30.2243	34.0055	8.45753	62.1877	65.7051	1.6342E 05	2.2499E 05	2.1731E 06	40000
40500	11.3590	3.11298	30.2285	34.0379	8.48123	62.2995	65.6856	1.6510E 05	2.2692E 05	2.1946E 06	40500
41000	11.4734	3.10711	30.2317	34.0693	8.50413	62.4103	65.6621	1.6677E 05	2.2883E 05	2.2159E 06	41000
41500	11.5878	3.10104	30.2339	34.1007	8.52623	62.5191	65.6346	1.6843E 05	2.3072E 05	2.2370E 06	41500
42000	11.7022	3.09477	30.2351	34.1311	8.54753	62.6269	65.6031	1.7008E 05	2.3259E 05	2.2579E 06	42000
42500	11.8166	3.08830	30.2353	34.1605	8.56803	62.7337	65.5676	1.7172E 05	2.3444E 05	2.2786E 06	42500
43000	11.9310	3.08163	30.2345	34.1889	8.58773	62.8395	65.5281	1.7335E 05	2.3627E 05	2.2991E 06	43000
43500	12.0454	3.07476	30.2327	34.2163	8.60663	62.9443	65.4846	1.7497E 05	2.3808E 05	2.3194E 06	43500
44000	12.1598	3.06769	30.2299	34.2427	8.62473	63.0481	65.4371	1.7658E 05	2.3987E 05	2.3395E 06	44000
44500	12.2742	3.06042	30.2261	34.2681	8.64203	63.1509	65.3856	1.7818E 05	2.4164E 05	2.3594E 06	44500
45000	12.3886	3.05295	30.2213	34.2925	8.65853	63.2527	65.3301	1.7977E 05	2.4339E 05	2.3791E 06	45000
45500	12.5030	3.04528	30.2155	34.3159	8.67423	63.3535	65.2706	1.8135E 05	2.4512E 05	2.3986E 06	45500
46000	12.6174	3.03741	30.2087	34.3383	8.68913	63.4539	65.2081	1.8291E 05	2.4683E 05	2.4179E 06	46000
46500	12.7318	3.02934	30.2009	34.3597	8.70323	63.5533	65.1426	1.8446E 05	2.4852E 05	2.4370E 06	46500
47000	12.8462	3.02107	30.1921	34.3799	8.71653	63.6517	65.0741	1.8599E 05	2.5019E 05	2.4559E 06	47000
47500	12.9606	3.01260	30.1823	34.3991	8.72903	63.7491	65.0026	1.8751E 05	2.5184E 05	2.4746E 06	47500
48000	13.0750	3.00393	30.1725	34.4173	8.74073	63.8455	64.9281	1.8902E 05	2.5347E 05	2.4931E 06	48000
48500	13.1894	2.99506	30.1617	34.4345	8.75163	63.9409	64.8506	1.9052E 05	2.5508E 05	2.5114E 06	48500
49000	13.3038	2.98599	30.1509	34.4507	8.76173	64.0353	64.7691	1.9201E 05	2.5667E 05	2.5295E 06	49000
49500	13.4182	2.97672	30.1391	34.4659	8.77103	64.1287	64.6836	1.9349E 05	2.5824E 05	2.5474E 06	49500
50000	13.5326	2.96725	30.1263	34.4801	8.78053	64.2211	64.5941	1.9496E 05	2.5979E 05	2.5651E 06	50000
50500	13.6470	2.95758	30.1125	34.4933	8.78923	64.3125	64.5006	1.9642E 05	2.6132E 05	2.5826E 06	50500
51000	13.7614	2.94771	30.0977	34.5055	8.79713	64.4019	64.4031	1.9787E 05	2.6283E 05	2.5999E 06	51000
51500	13.8758	2.93764	30.0819	34.5167	8.80523	64.4903	64.3016	1.9931E 05	2.6432E 05	2.6170E 06	51500
52000	13.9902	2.92737	30.0651	34.5269	8.81353	64.5777	64.1961	2.0074E 05	2.6579E 05	2.6339E 06	52000
52500	14.1046	2.91690	30.0473	34.5361	8.82103	64.6641	64.0876	2.0216E 05	2.6724E 05	2.6506E 06	52500
53000	14.2190	2.90623	30.0285	34.5443	8.82873	64.7495	63.9761	2.0357E 05	2.6867E 05	2.6671E 06	53000
53500	14.3334	2.89536	30.0087	34.5515	8.83663	64.8339	63.8616	2.0497E 05	2.6999E 05	2.6834E 06	53500
54000	14.4478	2.88429	29.9879	34.5577	8.84373						

TABLE 19. IDEAL GAS FUNCTIONS FOR C 4+ (ATOMIC WEIGHT 12.0099, R = 1.987.7 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS n ≤ 6. SEE TABLE 43 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{U^0 - U^0}{RT}$	$\frac{U^0 - U^0}{RT}$	$\frac{U^0 - U^0}{RT}$	$\frac{U^0 - U^0}{RT}$	$\frac{U^0 - U^0}{RT}$	$\frac{U^0 - U^0}{RT}$	$\frac{U^0 - U^0}{RT}$	$\frac{U^0 - U^0}{RT}$	$\frac{U^0 - U^0}{RT}$	$\frac{U^0 - U^0}{RT}$	$\frac{U^0 - U^0}{RT}$	TEMP. (°K)
5000	1.0000	2.50000	21.3565	23.8565	4.96791	42.4399	47.4068	1.4904E 04	2.4040E 04	2.4040E 04	2.1219E 05	5000	
5200	1.0000	2.50000	21.4546	23.9546	4.96791	42.5318	47.6017	1.5000E 04	2.5000E 04	2.5000E 04	2.2170E 05	5200	
5400	1.0000	2.50000	21.5489	24.0489	4.96791	42.6212	47.7892	1.6094E 04	2.6094E 04	2.6094E 04	2.3123E 05	5400	
5600	1.0000	2.50000	21.6398	24.1398	4.96791	43.0019	47.9498	1.6672E 04	2.7820E 04	2.7820E 04	2.4081E 05	5600	
5800	1.0000	2.50000	21.7276	24.2276	4.96791	43.1762	48.1442	1.7280E 04	2.8814E 04	2.8814E 04	2.5042E 05	5800	
6000	1.0000	2.50000	21.8123	24.3123	4.96791	43.3447	48.3126	1.7884E 04	2.9607E 04	2.9607E 04	2.6007E 05	6000	
6200	1.0000	2.50000	21.8943	24.3943	4.96791	43.5076	48.4795	1.8481E 04	3.0091E 04	3.0091E 04	2.6973E 05	6200	
6400	1.0000	2.50000	21.9737	24.4737	4.96791	43.6653	48.6332	1.9077E 04	3.1179E 04	3.1179E 04	2.7944E 05	6400	
6600	1.0000	2.50000	22.0506	24.5506	4.96791	43.8182	48.7861	1.9673E 04	3.2708E 04	3.2708E 04	2.8920E 05	6600	
6800	1.0000	2.50000	22.1252	24.6252	4.96791	43.9665	48.9344	2.0269E 04	3.3782E 04	3.3782E 04	2.9897E 05	6800	
7000	1.0000	2.50000	22.1977	24.6977	4.96791	44.1105	49.0784	2.0865E 04	3.4775E 04	3.4775E 04	3.0877E 05	7000	
7200	1.0000	2.50000	22.2681	24.7581	4.96791	44.2504	49.2183	2.1461E 04	3.5768E 04	3.5768E 04	3.1860E 05	7200	
7400	1.0000	2.50000	22.3364	24.8184	4.96791	44.3865	49.3545	2.2058E 04	3.6761E 04	3.6761E 04	3.2846E 05	7400	
7600	1.0000	2.50000	22.4033	24.8793	4.96791	44.5190	49.4869	2.2654E 04	3.7754E 04	3.7754E 04	3.3834E 05	7600	
7800	1.0000	2.50000	22.4682	24.9382	4.96791	44.6481	49.6160	2.3250E 04	3.8750E 04	3.8750E 04	3.4825E 05	7800	
8000	1.0000	2.50000	22.5315	25.0315	4.96791	44.7738	49.7418	2.3844E 04	3.9743E 04	3.9743E 04	3.5819E 05	8000	
8200	1.0000	2.50000	22.5932	25.0932	4.96791	44.8965	49.8644	2.4442E 04	4.0737E 04	4.0737E 04	3.6815E 05	8200	
8400	1.0000	2.50000	22.6535	25.1535	4.96791	45.0162	49.9841	2.5038E 04	4.1730E 04	4.1730E 04	3.7814E 05	8400	
8600	1.0000	2.50000	22.7123	25.2123	4.96791	45.1331	50.1010	2.5634E 04	4.2724E 04	4.2724E 04	3.8814E 05	8600	
8800	1.0000	2.50000	22.7698	25.2698	4.96791	45.2473	50.2153	2.6231E 04	4.3718E 04	4.3718E 04	3.9818E 05	8800	
9000	1.0000	2.50000	22.8260	25.3260	4.96791	45.3590	50.3269	2.6827E 04	4.4711E 04	4.4711E 04	4.0823E 05	9000	
9200	1.0000	2.50000	22.8809	25.3809	4.96791	45.4682	50.4361	2.7423E 04	4.5702E 04	4.5702E 04	4.1831E 05	9200	
9400	1.0000	2.50000	22.9347	25.4347	4.96791	45.5750	50.5429	2.8019E 04	4.6690E 04	4.6690E 04	4.2841E 05	9400	
9600	1.0000	2.50000	22.9873	25.4873	4.96791	45.6796	50.6475	2.8615E 04	4.7672E 04	4.7672E 04	4.3852E 05	9600	
9800	1.0000	2.50000	23.0389	25.5389	4.96791	45.7820	50.7500	2.9211E 04	4.8664E 04	4.8664E 04	4.4864E 05	9800	
10000	1.0000	2.50000	23.0894	25.5894	4.96791	45.8826	50.8503	2.9807E 04	4.9679E 04	4.9679E 04	4.5882E 05	10000	
10500	1.0000	2.50000	23.2113	25.7113	4.96791	46.1248	51.0927	3.1298E 04	5.2163E 04	5.2163E 04	4.8431E 05	10500	
11000	1.0000	2.50000	23.3276	25.8276	4.96791	46.3599	51.3238	3.2788E 04	5.4647E 04	5.4647E 04	5.0971E 05	11000	
11500	1.0000	2.50000	23.4388	25.9388	4.96791	46.5787	51.5446	3.4279E 04	5.7131E 04	5.7131E 04	5.3503E 05	11500	
12000	1.0000	2.50000	23.5452	26.0452	4.96791	46.7882	51.7561	3.5769E 04	5.9615E 04	5.9615E 04	5.6144E 05	12000	
12500	1.0000	2.50000	23.6472	26.1472	4.96791	46.9910	51.9589	3.7259E 04	6.2099E 04	6.2099E 04	5.8799E 05	12500	
13000	1.0000	2.50000	23.7453	26.2453	4.96791	47.1858	52.1537	3.8750E 04	6.4583E 04	6.4583E 04	6.1342E 05	13000	
13500	1.0000	2.50000	23.8396	26.3396	4.96791	47.3733	52.3412	4.0240E 04	6.7067E 04	6.7067E 04	6.3954E 05	13500	
14000	1.0000	2.50000	23.9306	26.4306	4.96791	47.5540	52.5219	4.1730E 04	6.9551E 04	6.9551E 04	6.6570E 05	14000	
14500	1.0000	2.50000	24.0183	26.5183	4.96791	47.7283	52.6962	4.3221E 04	7.2035E 04	7.2035E 04	6.9206E 05	14500	
15000	1.0000	2.50000	24.1030	26.6030	4.96791	47.8967	52.8645	4.4711E 04	7.4519E 04	7.4519E 04	7.1849E 05	15000	
15500	1.0000	2.50000	24.1850	26.6850	4.96791	48.0596	53.0275	4.6202E 04	7.7003E 04	7.7003E 04	7.4492E 05	15500	
16000	1.0000	2.50000	24.2644	26.7644	4.96791	48.2173	53.1853	4.7692E 04	7.9487E 04	7.9487E 04	7.7144E 05	16000	
16500	1.0000	2.50000	24.3413	26.8413	4.96791	48.3702	53.3381	4.9182E 04	8.1971E 04	8.1971E 04	7.9811E 05	16500	
17000	1.0000	2.50000	24.4159	26.9159	4.96791	48.5185	53.4864	5.0673E 04	8.4455E 04	8.4455E 04	8.2481E 05	17000	
17500	1.0000	2.50000	24.4884	26.9884	4.96791	48.6625	53.6304	5.2163E 04	8.6938E 04	8.6938E 04	8.5159E 05	17500	
18000	1.0000	2.50000	24.5588	27.0588	4.96791	48.8025	53.7704	5.3653E 04	8.9422E 04	8.9422E 04	8.7844E 05	18000	
18500	1.0000	2.50000	24.6273	27.1273	4.96791	48.9386	53.9065	5.5144E 04	9.1906E 04	9.1906E 04	9.0534E 05	18500	
19000	1.0000	2.50000	24.6940	27.1940	4.96791	49.0711	54.0390	5.6634E 04	9.4390E 04	9.4390E 04	9.3233E 05	19000	
19500	1.0000	2.50000	24.7589	27.2589	4.96791	49.2001	54.1680	5.8123E 04	9.6874E 04	9.6874E 04	9.5940E 05	19500	

TABLE 19 (CONT.). IDEAL GAS FUNCTIONS FOR C₄

TEMP. (°K)	PARTIAL FUNCT.	$\frac{H^0 - E^0}{RT}$	$-\frac{S^0 - E^0}{RT}$	$\ln \frac{H^0 - E^0}{RT}$	$\ln \frac{H^0 - E^0}{RT}$	$\ln \frac{H^0 - E^0}{RT}$	$\ln \frac{H^0 - E^0}{RT}$	$\ln \frac{H^0 - E^0}{RT}$	$\ln \frac{H^0 - E^0}{RT}$	TEMP. (°K)
20000	1.0000	2.50000	27.3222	4.96791	49.3259	56.2938	5.96135	9.9358E	9.8652E	20000
22000	1.0000	2.50000	25.0605	4.96791	49.3259	56.2938	5.96135	9.9358E	9.8652E	22000
24000	1.0000	2.50000	22.7780	4.96791	49.3259	56.2938	5.96135	9.9358E	9.8652E	24000
26000	1.0000	2.50000	20.4782	4.96791	49.3259	56.2938	5.96135	9.9358E	9.8652E	26000
28000	1.0000	2.50000	18.1634	4.96791	49.3259	56.2938	5.96135	9.9358E	9.8652E	28000
30000	1.0000	2.50000	15.8359	4.96791	49.3259	56.2938	5.96135	9.9358E	9.8652E	30000
32000	1.0000	2.50000	13.4973	4.96791	49.3259	56.2938	5.96135	9.9358E	9.8652E	32000
34000	1.0000	2.50000	11.1488	4.96791	49.3259	56.2938	5.96135	9.9358E	9.8652E	34000
36000	1.0000	2.50000	8.7917	4.96791	49.3259	56.2938	5.96135	9.9358E	9.8652E	36000
38000	1.0000	2.50000	6.4269	4.96791	49.3259	56.2938	5.96135	9.9358E	9.8652E	38000
40000	1.0000	2.50000	4.0551	4.96791	49.3259	56.2938	5.96135	9.9358E	9.8652E	40000
42000	1.0000	2.50000	1.6771	4.96791	49.3259	56.2938	5.96135	9.9358E	9.8652E	42000
44000	1.0000	2.50000	-0.7034	4.96791	49.3259	56.2938	5.96135	9.9358E	9.8652E	44000
46000	1.0000	2.50000	-3.0945	4.96791	49.3259	56.2938	5.96135	9.9358E	9.8652E	46000
48000	1.0000	2.50000	-5.4819	4.96791	49.3259	56.2938	5.96135	9.9358E	9.8652E	48000
50000	1.0000	2.50000	-7.8658	4.96791	49.3259	56.2938	5.96135	9.9358E	9.8652E	50000
60000	1.0000	2.50000	-27.5688	4.96791	49.3259	56.2938	5.96135	9.9358E	9.8652E	60000
70000	1.0000	2.50000	-27.9541	4.96791	49.3259	56.2938	5.96135	9.9358E	9.8652E	70000
80000	1.0000	2.50000	-28.2880	4.96791	49.3259	56.2938	5.96135	9.9358E	9.8652E	80000
90000	1.0000	2.50000	-28.5824	4.96791	49.3259	56.2938	5.96135	9.9358E	9.8652E	90000
100000	1.0000	2.50000	-28.8458	4.96791	49.3259	56.2938	5.96135	9.9358E	9.8652E	100000
150000	1.0000	2.50000	-30.8995	4.96791	49.3259	56.2938	5.96135	9.9358E	9.8652E	150000
200000	1.0000	2.50000	-32.5187	4.96791	49.3259	56.2938	5.96135	9.9358E	9.8652E	200000
300000	1.0002	2.50257	-34.0951	4.97302	49.3302	56.2972	5.96648	9.94095	9.8705E	300000
400000	1.0050	2.50409	-35.3165	4.97648	49.3336	56.3006	5.96994	9.94444	9.8740E	400000
500000	1.0352	2.76861	-36.9041	4.98163	49.3388	56.3058	5.97509	9.95059	9.8801E	500000
600000	1.1321	3.27455	-38.4493	4.98787	49.3450	56.3120	5.98133	9.95683	9.8863E	600000
800000	1.7016	4.57624	-41.8137	4.99544	49.3526	56.3202	5.99048	9.96598	9.8954E	800000
1000000	2.9272	5.16922	-45.6763	4.99856	49.3557	56.3233	5.99360	9.96910	9.8985E	1000000
1500000	6.4832	4.90217	-37.7541	4.97643	49.3336	56.3006	5.96994	9.94444	9.8740E	1500000
2000000	15.8002	4.41968	-39.0952	4.95149	49.3188	56.2860	5.94599	9.92049	9.8495E	2000000
3000000	30.3378	3.82347	-40.7612	4.92647	49.2938	56.2610	5.92049	9.8954E	9.8240E	3000000
4000000	42.3389	3.50524	-41.8137	4.91370	49.2808	56.2480	5.90780	9.8824E	9.8110E	4000000
5000000	51.7954	3.30846	-42.5732	4.90170	49.2688	56.2360	5.89580	9.8704E	9.7990E	5000000
6000000	59.2790	3.17578	-43.1640	4.89017	49.2573	56.2249	5.88427	9.85887	9.7874E	6000000
8000000	70.2102	3.00854	-44.0534	4.87850	49.2460	56.2139	5.87260	9.84720	9.7757E	8000000
10000000	77.7344	2.90759	-44.7121	4.86765	49.2350	56.2030	5.86175	9.83555	9.7640E	10000000

TABLE 20. IDEAL GAS FUNCTIONS FOR N_2 (ATOMIC WEIGHT 14.0045, $R = 1.98717$ CAL/MOLE) BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $N=5$. SEE TABLE 64 FOR LIST OF STATES USED.

[illegible]

TABLE 20 (C.C.I.). IDEAL GAS FUNCTIONS FOR H₂

TEMP. (°K)	PARTIAL PRESSURE (atm)	$\frac{h^2}{RT}$	$\frac{h^2}{RT} - \frac{1}{2}$	$\ln \frac{h^2}{RT} - \frac{1}{2}$	$\ln \frac{h^2}{RT} - \frac{1}{2} - \frac{1}{2}$	$\ln \frac{h^2}{RT} - \frac{1}{2} - \frac{1}{2}$	$\ln \frac{h^2}{RT} - \frac{1}{2} - \frac{1}{2}$	$\ln \frac{h^2}{RT} - \frac{1}{2} - \frac{1}{2}$	TEMP. (°K)
2000	2.0181	2.55216	2.55216	5.07157	51.1795	56.2510	6.18086	0.10143	2000
2200	2.0308	2.57995	2.57995	5.12660	51.6533	56.7919	6.90676	0.11279	2200
2400	2.0477	2.61266	2.61266	5.19178	52.1141	57.3059	7.69116	0.12406	2400
2600	2.0692	2.64926	2.64926	5.26552	52.5325	57.7971	8.52116	0.13486	2600
2800	2.0952	2.68827	2.68827	5.34203	52.9255	58.2675	9.39346	0.14506	2800
3000	2.1255	2.72832	2.72832	5.42163	53.2948	58.7104	1.03036	0.15466	3000
3200	2.1598	2.76979	2.76979	5.50397	53.6432	59.1502	1.76036	0.16366	3200
3400	2.1978	2.81208	2.81208	5.58914	53.9850	59.5832	2.48546	0.17206	3400
3600	2.2391	2.85410	2.85410	5.67619	54.3200	59.9977	3.20446	0.17986	3600
3800	2.2833	2.89787	2.89787	5.76400	54.6484	60.3940	3.91746	0.18716	3800
4000	2.3300	2.94316	2.94316	5.85252	54.9705	60.7727	4.62446	0.19386	4000
4200	2.3789	2.98924	2.98924	5.94171	55.2864	61.1343	5.32546	0.20006	4200
4400	2.4295	3.03600	3.03600	6.03152	55.5961	61.4794	6.02046	0.20576	4400
4600	2.4817	3.08344	3.08344	6.12187	55.8997	61.8087	6.70946	0.21096	4600
4800	2.5351	3.13156	3.13156	6.21277	56.1972	62.1229	7.39246	0.21656	4800
5000	2.5894	3.18036	3.18036	6.30422	56.4887	62.4226	8.06946	0.22156	5000
5200	2.6448	3.22984	3.22984	6.39622	56.7742	62.7077	8.74046	0.22696	5200
5400	2.7009	3.28000	3.28000	6.48877	57.0537	62.9782	9.40546	0.23176	5400
5600	2.7578	3.33084	3.33084	6.58187	57.3272	63.2342	1.00446	0.23696	5600
5800	2.8154	3.38236	3.38236	6.67552	57.5947	63.4757	1.69746	0.24156	5800
6000	2.8737	3.43456	3.43456	6.76972	57.8562	63.7027	2.38446	0.24656	6000
6200	2.9327	3.48744	3.48744	6.86447	58.1117	63.9152	3.06546	0.25096	6200
6400	2.9923	3.54099	3.54099	6.95977	58.3612	64.1132	3.74046	0.25576	6400
6600	3.0525	3.59520	3.59520	7.05562	58.6047	64.2967	4.40946	0.26096	6600
6800	3.1132	3.64999	3.64999	7.15192	58.8422	64.4657	5.07246	0.26656	6800
7000	3.1744	3.70536	3.70536	7.24867	59.0737	64.6192	5.72946	0.27156	7000
7200	3.2361	3.76131	3.76131	7.34587	59.3002	64.7582	6.38046	0.27696	7200
7400	3.2983	3.81784	3.81784	7.44352	59.5217	64.8827	7.02546	0.28176	7400
7600	3.3610	3.87494	3.87494	7.54162	59.7382	64.9927	7.66446	0.28696	7600
7800	3.4242	3.93260	3.93260	7.63917	59.9497	65.0882	8.29746	0.29156	7800
8000	3.4879	3.99081	3.99081	7.73617	60.1562	65.1692	8.92446	0.29656	8000
8200	3.5521	4.04957	4.04957	7.83362	60.3577	65.2357	9.54546	0.30096	8200
8400	3.6168	4.10888	4.10888	7.93152	60.5542	65.2877	1.01446	0.30576	8400
8600	3.6819	4.16874	4.16874	8.02987	60.7457	65.3252	1.67746	0.31096	8600
8800	3.7474	4.22915	4.22915	8.12867	60.9312	65.3482	2.33446	0.31656	8800
9000	3.8133	4.29011	4.29011	8.22792	61.1117	65.3572	2.98546	0.32156	9000
9200	3.8796	4.35162	4.35162	8.32762	61.2862	65.3522	3.63046	0.32696	9200
9400	3.9463	4.41368	4.41368	8.42777	61.4547	65.3332	4.26946	0.33176	9400
9600	4.0134	4.47629	4.47629	8.52837	61.6172	65.3002	4.90246	0.33696	9600
9800	4.0809	4.53944	4.53944	8.62952	61.7737	65.2532	5.52946	0.34156	9800
10000	4.1488	4.60314	4.60314	8.73122	61.9242	65.1922	6.15046	0.34656	10000
10200	4.2171	4.66739	4.66739	8.83347	62.0687	65.1172	6.76546	0.35096	10200
10400	4.2858	4.73219	4.73219	8.93622	62.2072	65.0292	7.37446	0.35576	10400
10600	4.3549	4.79754	4.79754	9.03947	62.3407	64.9282	7.97746	0.36096	10600
10800	4.4244	4.86344	4.86344	9.14322	62.4692	64.8132	8.57446	0.36656	10800
11000	4.4943	4.92989	4.92989	9.24747	62.5927	64.6842	9.16546	0.37156	11000
11200	4.5646	5.00000	5.00000	9.35222	62.7112	64.5412	9.75046	0.37696	11200
11400	4.6352	5.07074	5.07074	9.45747	62.8247	64.3842	1.03446	0.38176	11400
11600	4.7061	5.14210	5.14210	9.56322	62.9332	64.2132	1.61746	0.38696	11600
11800	4.7773	5.21409	5.21409	9.66947	63.0367	64.0282	2.19446	0.39156	11800
12000	4.8488	5.28670	5.28670	9.77622	63.1352	63.8292	2.76546	0.39656	12000
12200	4.9206	5.35994	5.35994	9.88347	63.2287	63.6162	3.33046	0.40096	12200
12400	4.9927	5.43381	5.43381	9.99122	63.3172	63.3892	3.88946	0.40576	12400
12600	5.0651	5.50831	5.50831	10.09947	63.4017	63.1482	4.44246	0.41096	12600
12800	5.1378	5.58344	5.58344	10.20822	63.4812	62.8932	4.98946	0.41656	12800
13000	5.2108	5.65920	5.65920	10.31747	63.5557	62.6242	5.53046	0.42156	13000
13200	5.2841	5.73559	5.73559	10.42722	63.6252	62.3412	6.06546	0.42696	13200
13400	5.3577	5.81260	5.81260	10.53747	63.6907	62.0442	6.59446	0.43176	13400
13600	5.4316	5.89024	5.89024	10.64822	63.7522	61.7332	7.11746	0.43696	13600
13800	5.5058	5.96850	5.96850	10.75947	63.8097	61.4082	7.63446	0.44156	13800
14000	5.5803	6.04739	6.04739	10.87122	63.8632	61.0692	8.14546	0.44656	14000
14200	5.6551	6.12689	6.12689	10.98347	63.9127	60.7162	8.65046	0.45156	14200
14400	5.7302	6.20699	6.20699	11.09622	63.9582	60.3492	9.14946	0.45656	14400
14600	5.8056	6.28769	6.28769	11.20947	64.0007	59.9682	9.64246	0.46156	14600
14800	5.8813	6.36899	6.36899	11.32322	64.0392	59.5732	1.02946	0.46656	14800
15000	5.9573	6.45089	6.45089	11.43747	64.0737	59.1642	1.61246	0.47156	15000
15200	6.0336	6.53339	6.53339	11.55222	64.1042	58.7412	2.18946	0.47656	15200
15400	6.1102	6.61649	6.61649	11.66747	64.1307	58.3042	2.76046	0.48156	15400
15600	6.1871	6.69999	6.69999	11.78322	64.1532	57.8532	3.32546	0.48656	15600
15800	6.2643	6.78369	6.78369	11.89947	64.1717	57.3882	3.88446	0.49156	15800
16000	6.3418	6.86759	6.86759	12.01622	64.1862	56.9092	4.43746	0.49656	16000
16200	6.4195	6.95169	6.95169	12.13347	64.1967	56.4162	4.98446	0.50156	16200
16400	6.4974	7.03599	7.03599	12.25122	64.2032	55.9092	5.52546	0.50656	16400
16600	6.5755	7.12049	7.12049	12.36947	64.2057	55.3882	6.06046	0.51156	16600
16800	6.6538	7.20519	7.20519	12.48822	64.2042	54.8532	6.58946	0.51656	16800
17000	6.7323	7.29009	7.29009	12.60747	64.1987	54.3042	7.11246	0.52156	17000
17200	6.8110	7.37519	7.37519	12.72722	64.1892	53.7412	7.62946	0.52656	17200
17400	6.8899	7.46049	7.46049	12.84747	64.1757	53.1642	8.14046	0.53156	17400
17600	6.9690	7.54599	7.54599	12.96822	64.1582	52.5732	8.64546	0.53656	17600
17800	7.0483	7.63169	7.63169	13.08947	64.1367	51.9682	9.14446	0.54156	17800
18000	7.1278	7.71759	7.71759	13.21122	64.1112	51.3492	9.63746	0.54656	18000
18200	7.2075	7.80369	7.80369	13.33347	64.0827	50.7162	1.01446	0.55156	18200
18400	7.2874	7.89009	7.89009	13.45622	64.0502	50.0692	1.58946	0.55656	18400
18600	7.3675	7.97669	7.97669	13.57947	64.0137	49.4082	2.15846	0.56156	18600
18800	7.4478	8.06349	8.06349	13.70322	63.9732	48.7332	2.72146	0.56656	18800
19000	7.5283	8.15049	8.15049	13.82747	63.9287	48.0442	3.27846	0.57156	19000
19200	7.6089	8.23769	8.23769	13.95222	63.8802	47.3412	3.82946	0.57656	19200
19400	7.6896	8.32509	8.32509	14.07747	63.8277	46.6242	4.37446	0.58156	19400
19600	7.7704	8.41269	8.41269	14.20322	63.7712	45.8932	4.91346	0.58656	19600
19800	7.8513	8.50049	8.50049	14.32947	63.7107	45.1482	5.44646	0.59156	19800
20000	7.9323	8.58849	8.58849	14.45622	63.6462	44.3892	5.97346	0.59656	20000

TABLE 71. IDEAL GAS FUNCTIONS FOR 0 $\pm$ ATOMIC WEIGHT 15.9972, R = 1.98717 CAL/MOLE
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N $\pm$. SEE TABLE 65 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNC.	$\ln \frac{q}{N}$	$\ln \frac{q}{N} - \frac{E^0}{RT}$	$\frac{E^0}{RT}$	$\frac{E^0}{RT} - \frac{E^0}{RT}$	$\frac{E^0}{RT} - \frac{E^0}{RT}$	$\frac{E^0}{RT} - \frac{E^0}{RT}$	$\frac{E^0}{RT} - \frac{E^0}{RT}$	$\frac{E^0}{RT} - \frac{E^0}{RT}$	$\frac{E^0}{RT} - \frac{E^0}{RT}$	TEMP. (°K)
5000	1.0000	2.50000	21.7866	24.2666	4.96791	43.2937	48.2616	1.4904E 04	2.4840E 04	2.1647E 05	5000
5200	1.0000	2.50000	21.8667	24.3467	4.96791	43.4885	48.4564	1.5000E 04	2.4883E 04	2.2614E 05	5200
5400	1.0000	2.50000	21.9701	24.4791	4.96791	43.6760	48.6439	1.5096E 04	2.4927E 04	2.3595E 05	5400
5600	1.0000	2.50000	22.0700	24.5700	4.96791	43.8567	48.8246	1.5182E 04	2.4969E 04	2.4500E 05	5600
5800	1.0000	2.50000	22.1577	24.6577	4.96791	44.0310	49.0000	1.5260E 04	2.5010E 04	2.5330E 05	5800
6000	1.0000	2.50000	22.2425	24.7425	4.96791	44.1994	49.1673	1.5332E 04	2.5050E 04	2.6090E 05	6000
6200	1.0000	2.50000	22.3244	24.8244	4.96791	44.3623	49.3302	1.5400E 04	2.5089E 04	2.6790E 05	6200
6400	1.0000	2.50000	22.4038	24.9038	4.96791	44.5201	49.4880	1.5464E 04	2.5127E 04	2.7440E 05	6400
6600	1.0000	2.50000	22.4807	24.9807	4.96791	44.6729	49.6408	1.5525E 04	2.5164E 04	2.8050E 05	6600
6800	1.0000	2.50000	22.5554	25.0554	4.96791	44.8212	49.7892	1.5583E 04	2.5199E 04	2.8620E 05	6800
7000	1.0000	2.50000	22.6278	25.1278	4.96791	44.9652	49.9332	1.5638E 04	2.5233E 04	2.9160E 05	7000
7200	1.0000	2.50000	22.6983	25.1983	4.96791	45.1052	50.0731	1.5690E 04	2.5266E 04	2.9680E 05	7200
7400	1.0000	2.50000	22.7668	25.2668	4.96791	45.2413	50.2092	1.5739E 04	2.5298E 04	3.0190E 05	7400
7600	1.0000	2.50000	22.8334	25.3334	4.96791	45.3738	50.3418	1.5785E 04	2.5329E 04	3.0690E 05	7600
7800	1.0000	2.50000	22.8984	25.3984	4.96791	45.5028	50.4708	1.5829E 04	2.5359E 04	3.1180E 05	7800
8000	1.0000	2.50000	22.9617	25.4617	4.96801	45.6286	50.5966	1.5870E 04	2.5388E 04	3.1660E 05	8000
8200	1.0000	2.50000	23.0234	25.5235	4.96801	45.7513	50.7193	1.5909E 04	2.5416E 04	3.2130E 05	8200
8400	1.0000	2.50000	23.0836	25.5837	4.96810	45.8710	50.8391	1.5946E 04	2.5443E 04	3.2590E 05	8400
8600	1.0000	2.50000	23.1425	25.6426	4.96817	45.9879	50.9560	1.5981E 04	2.5469E 04	3.3040E 05	8600
8800	1.0000	2.50000	23.1999	25.7001	4.96825	46.1021	51.0704	1.6014E 04	2.5494E 04	3.3480E 05	8800
9000	1.0000	2.50000	23.2561	25.7564	4.96836	46.2133	51.1821	1.6046E 04	2.5518E 04	3.3910E 05	9000
9200	1.0000	2.50000	23.3111	25.8114	4.96850	46.3230	51.2915	1.6077E 04	2.5541E 04	3.4340E 05	9200
9400	1.0000	2.50000	23.3649	25.8652	4.96866	46.4298	51.3985	1.6107E 04	2.5563E 04	3.4760E 05	9400
9600	1.0000	2.50000	23.4175	25.9180	4.96887	46.5344	51.5033	1.6136E 04	2.5584E 04	3.5170E 05	9600
9800	1.0000	2.50000	23.4691	25.9697	4.96912	46.6369	51.6060	1.6164E 04	2.5605E 04	3.5580E 05	9800
10000	1.0000	2.50000	23.5196	26.0203	4.96942	46.7373	51.7067	1.6191E 04	2.5625E 04	3.5990E 05	10000
10500	1.0001	2.50127	23.6416	26.1429	4.97043	46.9798	51.9502	1.6242E 04	2.5676E 04	3.6500E 05	10500
11000	1.0002	2.50202	23.7580	26.2600	4.97193	47.2110	52.1830	1.6292E 04	2.5727E 04	3.7010E 05	11000
11500	1.0003	2.50309	23.8692	26.3723	4.97405	47.4321	52.4067	1.6341E 04	2.5778E 04	3.7520E 05	11500
12000	1.0005	2.50454	23.9758	26.4803	4.97694	47.6438	52.6208	1.6389E 04	2.5829E 04	3.8030E 05	12000
12500	1.0007	2.50648	24.0781	26.5845	4.98078	47.8471	52.8279	1.6436E 04	2.5879E 04	3.8540E 05	12500
13000	1.0010	2.50897	24.1764	26.6854	4.98573	48.0425	53.0283	1.6482E 04	2.5929E 04	3.9050E 05	13000
13500	1.0014	2.51210	24.2712	26.7833	4.99196	48.2308	53.2228	1.6527E 04	2.5979E 04	3.9560E 05	13500
14000	1.0019	2.51596	24.3626	26.8785	4.99963	48.4125	53.4131	1.6571E 04	2.6029E 04	4.0070E 05	14000
14500	1.0025	2.52063	24.4510	26.9716	5.00890	48.5881	53.5970	1.6614E 04	2.6079E 04	4.0580E 05	14500
15000	1.0033	2.52617	24.5365	27.0627	5.01992	48.7591	53.7780	1.6656E 04	2.6129E 04	4.1090E 05	15000
15500	1.0043	2.53285	24.6194	27.1521	5.03280	48.9229	53.9557	1.6697E 04	2.6179E 04	4.1600E 05	15500
16000	1.0054	2.54014	24.7000	27.2401	5.04767	49.0826	54.1306	1.6738E 04	2.6229E 04	4.2110E 05	16000
16500	1.0068	2.54866	24.7782	27.3269	5.06461	49.2391	54.3031	1.6778E 04	2.6279E 04	4.2620E 05	16500
17000	1.0084	2.55826	24.8545	27.4127	5.08369	49.3899	54.4736	1.6817E 04	2.6329E 04	4.3130E 05	17000
17500	1.0103	2.56897	24.9288	27.4977	5.10496	49.5376	54.6426	1.6856E 04	2.6379E 04	4.3640E 05	17500
18000	1.0124	2.58079	25.0013	27.5811	5.12845	49.6817	54.8102	1.6894E 04	2.6429E 04	4.4150E 05	18000
18500	1.0148	2.59373	25.0722	27.6633	5.15416	49.8226	54.9768	1.6932E 04	2.6479E 04	4.4660E 05	18500
19000	1.0176	2.60777	25.1416	27.7493	5.18207	49.9604	55.1425	1.6969E 04	2.6529E 04	4.5170E 05	19000
19500	1.0206	2.62291	25.2095	27.8324	5.21215	50.0954	55.3076	1.7006E 04	2.6579E 04	4.5680E 05	19500

TABLE 21 (CONT.). IDEAL GAS FUNCTIONS FOR D 4+

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2}{RT}$	$-\frac{h^2}{RT}$	$\ln h$	$\ln h - \frac{h^2}{RT}$	$\frac{h^2}{RT}$	$\frac{h^2}{RT} - \frac{h^2}{RT}$	$\frac{h^2}{RT}$	$\frac{h^2}{RT} - \frac{h^2}{RT}$	TEMP. (°K)
20000	1.0240	2.63910	25.2761	27.9152	5.26433	50.2278	55.4721	6.51436	1.04496	20000
22000	1.0412	2.71364	25.5310	28.2446	5.39244	50.7343	56.1268	7.49166	1.16436	22000
24000	1.0646	2.80096	25.7708	28.5718	5.50598	51.2108	56.7808	8.58926	1.33506	24000
26000	1.0946	2.89660	25.9987	28.8953	5.59603	51.6638	57.4198	9.79906	1.49646	26000
28000	1.1314	2.99589	26.2170	29.2129	5.69333	52.0975	58.0509	1.11036	1.64966	28000
30000	1.1747	3.09465	26.4271	29.5217	5.79459	52.5150	58.6646	1.24876	1.84496	30000
32000	1.2244	3.18958	26.6299	29.8194	5.89822	52.9179	59.2562	1.39236	2.02826	32000
34000	1.2801	3.27832	26.8259	30.1043	5.99157	53.3076	59.8221	1.53936	2.21506	34000
36000	1.3415	3.35947	27.0157	30.3751	6.07582	53.6846	60.3684	1.68796	2.40336	36000
38000	1.4081	3.43235	27.1993	30.6316	6.15066	54.0495	60.8961	1.83676	2.59186	38000
40000	1.4794	3.49688	27.3770	30.8739	6.21688	54.4026	61.3515	1.98476	2.77946	40000
42000	1.5555	3.55334	27.5490	31.1024	6.27408	54.7445	61.8085	2.13106	2.96576	42000
44000	1.6355	3.60237	27.7155	31.3177	6.32235	55.0752	62.2335	2.27536	3.14976	44000
46000	1.7193	3.64432	27.8764	31.5209	6.36186	55.3953	62.6372	2.41726	3.33126	46000
48000	1.8065	3.68019	28.0324	31.7126	6.39314	55.7051	63.0165	2.55636	3.51036	48000
50000	1.8968	3.71037	28.1833	31.8939	6.41649	56.0049	63.3784	2.69326	3.68606	50000
60000	2.3875	3.80114	28.8691	32.6703	6.55349	57.3678	64.9213	3.33906	4.53216	60000
70000	2.9254	3.82868	29.4577	33.2664	6.60222	58.5374	66.1496	3.93476	5.32586	70000
80000	3.4934	3.82554	29.9690	33.7945	6.60198	59.5533	67.1593	4.49196	6.08166	80000
90000	4.0801	3.80922	30.4187	34.2719	6.56955	60.4470	68.0165	5.02416	6.81266	90000
100000	4.6790	3.79041	30.8191	34.6095	6.53217	61.2426	68.7747	5.54506	7.53226	100000
150000	7.8764	3.62921	32.3535	36.1827	6.60927	64.2918	71.9011	6.43326	1.16166	150000
200000	11.9444	4.09168	33.4891	37.5850	8.13919	66.5484	74.6876	1.23046	1.42706	200000
300000	24.7781	4.53381	35.2325	39.6645	8.81072	70.0127	78.8235	2.04716	2.44326	300000
400000	42.9708	4.35054	36.5022	40.8128	8.64524	72.5560	81.1812	2.66326	3.45816	400000
500000	63.6204	4.15519	37.4525	41.6077	8.25705	74.4243	82.6814	3.13496	4.12896	500000
600000	84.5643	3.96432	38.1928	42.1876	7.87856	75.8954	83.7741	3.53406	4.72716	600000
800000	123.4091	3.66729	39.2961	42.8576	7.28732	78.0789	85.3434	4.24036	5.83006	800000
1000000	156.4224	3.46202	40.0850	43.3470	6.87960	79.6575	86.5351	4.89246	6.87966	1000000
1500000	218.7576	3.16290	41.4249	44.5878	6.28520	82.3181	88.6083	6.44706	9.42706	1500000
2000000	256.1329	3.00422	42.3110	45.3152	5.96988	84.0790	90.0488	7.96546	1.19406	2000000
3000000	303.3408	2.84043	43.4938	46.3343	5.64440	86.4294	92.0738	1.09726	1.69336	3000000
4000000	330.3706	2.75682	44.2984	47.0552	5.47825	88.0282	93.5045	1.39646	2.19136	4000000
5000000	347.8131	2.70614	44.9077	47.6136	5.37756	89.2390	94.6166	1.69526	2.68806	5000000
6000000	359.9843	2.67216	45.3979	48.0701	5.31003	90.2131	95.5232	1.99376	3.18606	6000000
8000000	375.8382	2.62947	46.1602	48.7897	5.22518	91.7280	96.9931	2.59046	4.18016	8000000
10000000	385.7048	2.60373	46.7440	49.3477	5.17405	92.6880	98.0421	3.18696	5.17416	10000000

TABLE 22. IDEAL GAS FUNCTIONS FOR AR 4+ (ATOMIC WEIGHT 39.9484, $R = 1.90717$ CAL/MOLE) BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $N \leq 6$. SEE TABLE 44 FOR LIST OF STATES USED.

TEMP. (°F)	TEMP. (°C)	PARTIT. FUNCT.	$\frac{H^2-E}{RT}$	S^H	$(H^2-E)T - (H^2-E)T_0 - \text{CAL/MOLE}$	S^E	$E^E - E^0$	$H^2 - E^0 - \text{CAL/MOLE}$	$(H^2-E)^0$	TEMP. (°F)			
6.2394	2.88058	24.9902	27.9700	5.72420	49.6997	59.3899	1.86836	04	2.84216	04	2.48306	05	5000
6.3324	2.87337	25.1030	27.9764	5.70985	49.8039	59.5938	1.93586	04	2.94916	04	2.59406	05	5200
6.4271	2.86699	25.2114	28.0764	5.69719	50.0992	59.7963	2.00346	04	3.07896	04	2.70546	05	5400
6.5204	2.86137	25.3155	28.1769	5.68602	50.3061	59.9922	2.07146	04	3.18426	04	2.81716	05	5600
6.5995	2.85642	25.4156	28.2723	5.67617	50.5065	56.1817	2.13946	04	3.29226	04	2.92936	05	5800
6.6691	2.85205	25.5126	28.3647	5.66750	50.6973	56.3453	2.20826	04	3.40096	04	3.04196	05	6000
6.7441	2.84821	25.6061	28.4543	5.65986	50.8835	56.5423	2.27716	04	3.50916	04	3.15496	05	6200
6.8207	2.84482	25.6964	28.5413	5.65313	51.0631	56.7162	2.34626	04	3.61806	04	3.26806	05	6400
6.8982	2.84184	25.7839	28.6258	5.64720	51.2369	56.8841	2.41546	04	3.72726	04	3.38146	05	6600
6.9636	2.83921	25.8687	28.7079	5.64198	51.4054	57.0474	2.48516	04	3.83646	04	3.49546	05	6800
7.0322	2.83689	25.9510	28.7879	5.63737	51.5689	57.2043	2.55516	04	3.94646	04	3.60986	05	7000
7.0990	2.83466	26.0309	28.8657	5.63330	51.7277	57.3610	2.62526	04	4.05806	04	3.72546	05	7200
7.1663	2.83203	26.1085	28.9416	5.62969	51.8820	57.5117	2.69596	04	4.16606	04	3.83986	05	7400
7.2280	2.83142	26.1841	29.0155	5.62649	52.0321	57.6584	2.76596	04	4.27616	04	3.95446	05	7600
7.2904	2.82998	26.2576	29.0876	5.62365	52.1782	57.8018	2.83696	04	4.38646	04	4.06996	05	7800
7.3514	2.82870	26.3292	29.1579	5.62110	52.3205	57.9416	2.90726	04	4.49696	04	4.18546	05	8000
7.4112	2.82755	26.3991	29.2266	5.61882	52.4593	58.0781	2.97806	04	4.60746	04	4.30176	05	8200
7.4699	2.82652	26.4672	29.2937	5.61676	52.5947	58.2117	3.04896	04	4.71916	04	4.41806	05	8400
7.5274	2.82558	26.5337	29.3593	5.61489	52.7268	58.3417	3.11996	04	4.82806	04	4.53486	05	8600
7.5839	2.82471	26.5986	29.4233	5.61318	52.8559	58.4640	3.19096	04	4.93946	04	4.65136	05	8800
7.6393	2.82392	26.6621	29.4860	5.61160	52.9820	58.5936	3.26206	04	5.05046	04	4.76846	05	9000
7.6939	2.82319	26.7242	29.5473	5.61014	53.1053	58.7155	3.33316	04	5.16136	04	4.88576	05	9200
7.7475	2.82250	26.7849	29.6074	5.60877	53.2260	58.8347	3.40436	04	5.27226	04	5.00376	05	9400
7.8002	2.82184	26.8443	29.6661	5.60747	53.3440	58.9515	3.47516	04	5.38326	04	5.12106	05	9600
7.8521	2.82122	26.9025	29.7231	5.60624	53.4598	59.0659	3.54676	04	5.49416	04	5.23906	05	9800
7.9031	2.82063	26.9594	29.7801	5.60505	53.5729	59.1779	3.61796	04	5.60516	04	5.35796	05	10000
8.0275	2.81921	27.0970	29.9162	5.60223	53.8463	59.4495	3.79586	04	5.82346	04	5.62396	05	10200
8.1473	2.81784	27.2282	30.0460	5.59950	54.1048	59.7043	3.97386	04	6.13996	04	5.93186	05	11000
8.2630	2.81647	27.3534	30.1698	5.59679	54.3557	59.9525	4.15116	04	6.45846	04	6.25096	05	11500
8.3748	2.81508	27.4732	30.2883	5.59402	54.5938	60.1878	4.32826	04	6.71206	04	6.50136	05	12000
8.4830	2.81364	27.5861	30.4017	5.59117	54.8221	60.4133	4.50506	04	6.98906	04	6.85286	05	12500
8.5877	2.81224	27.6984	30.5106	5.58821	55.0414	60.6296	4.68146	04	7.26476	04	7.15546	05	13000
8.6942	2.81081	27.8045	30.6151	5.58515	55.2522	60.8374	4.85796	04	7.54006	04	7.45906	05	13500
8.7877	2.80902	27.9067	30.7157	5.58200	55.4553	61.0373	5.03206	04	7.81406	04	7.76376	05	14000
8.8812	2.80739	28.0053	30.8127	5.57875	55.6511	61.2290	5.20706	04	8.08926	04	8.06946	05	14500
8.9760	2.80572	28.1004	30.9064	5.57544	55.8429	61.4156	5.38246	04	8.36326	04	8.37606	05	15000
9.0662	2.80403	28.1924	30.9964	5.57208	56.0229	61.5950	5.55446	04	8.64366	04	8.64366	05	15500
9.1539	2.80233	28.2814	31.0837	5.56869	56.1998	61.7685	5.73096	04	8.92096	04	8.92096	05	16000
9.2392	2.80062	28.3676	31.1682	5.56530	56.3711	61.9364	5.90396	04	9.18276	04	9.18276	05	16500
9.3223	2.79893	28.4512	31.2501	5.56193	56.5372	62.0991	6.07716	04	9.45536	04	9.45536	05	17000
9.4032	2.79726	28.5323	31.3295	5.55861	56.6984	62.2570	6.25006	04	9.72746	04	9.72746	05	17500
9.4820	2.79562	28.6111	31.4067	5.55537	56.8549	62.4103	6.42286	04	9.99976	04	9.99976	05	18000
9.5590	2.79404	28.6876	31.4817	5.55222	57.0071	62.5593	6.59536	04	1.02726	05	1.09446	06	18500
9.6340	2.79252	28.7631	31.5546	5.54919	57.1561	62.7043	6.76796	04	1.05496	05	1.12496	06	19000
9.7073	2.79106	28.8346	31.6257	5.54631	57.2992	62.8455	6.94036	04	1.08196	05	1.15736	06	19500

TABLE 22 (CONT.). IDEAL GAS FUNCTIONS FOR AR 4+

TEMP. (°K)	PARTIT. FUNC.	$\frac{h^2}{2\pi m k T}$	$-\frac{h^2}{2\pi m k T}$	$\ln \frac{h^2}{2\pi m k T}$	$\ln \frac{h^2}{2\pi m k T} - \frac{h^2}{2\pi m k T}$	$-\ln \frac{h^2}{2\pi m k T}$	$-\ln \frac{h^2}{2\pi m k T} - \frac{h^2}{2\pi m k T}$	$\ln \frac{h^2}{2\pi m k T}$	$\ln \frac{h^2}{2\pi m k T} - \frac{h^2}{2\pi m k T}$	$-\ln \frac{h^2}{2\pi m k T}$	TEMP. (°K)
2000	9.7789	2.78970	28.9053	31.6950	5.54359	57.4305	62.9832	7.1120E 04	1.1007E 05	1.1400E 06	20000
2200	10.0505	2.78524	29.1709	31.9562	5.53674	57.9675	63.5822	7.0847E 04	1.2176E 05	1.2753E 06	22000
2400	10.3018	2.78282	29.4132	32.1960	5.52993	58.4480	63.9748	8.5024E 04	1.3772E 05	1.4829E 06	24000
2600	10.5375	2.78284	29.6359	32.4187	5.52496	58.8914	64.4216	9.2113E 04	1.5378E 05	1.5312E 06	26000
2800	10.7616	2.78556	29.8422	32.6278	5.53537	59.3614	64.8368	9.9350E 04	1.5499E 05	1.6604E 06	28000
3000	10.9776	2.79116	30.0346	32.8257	5.54649	59.8037	65.2382	1.0677E 05	1.6439E 05	1.7995E 06	30000
3200	11.1887	2.79971	30.2150	33.0167	5.55849	60.2421	65.6056	1.1444E 05	1.7893E 05	1.9213E 06	32000
3400	11.3976	2.81128	30.3850	33.1965	5.56948	60.6301	65.9666	1.2230E 05	1.8994E 05	2.0529E 06	34000
3600	11.6069	2.82589	30.5461	33.3720	5.58150	61.0002	66.3157	1.3042E 05	2.0210E 05	2.1852E 06	36000
3800	11.8186	2.84354	30.6994	33.5429	5.59509	61.3607	66.6553	1.3921E 05	2.1472E 05	2.3182E 06	38000
4000	12.0349	2.86427	30.8457	33.7100	5.60918	61.7056	66.9874	1.4812E 05	2.2707E 05	2.4510E 06	40000
4200	12.2576	2.88808	30.9840	33.8741	5.62390	62.0354	67.3135	1.5750E 05	2.4104E 05	2.5841E 06	42000
4400	12.4805	2.91497	31.1210	34.0360	5.63922	62.3522	67.6351	1.6744E 05	2.5487E 05	2.7211E 06	44000
4600	12.7233	2.94486	31.2512	34.1962	5.65520	62.6574	67.9535	1.7790E 05	2.6920E 05	2.8567E 06	46000
4800	12.9816	2.97798	31.3773	34.3552	5.67175	62.9518	68.2695	1.8867E 05	2.8405E 05	2.9929E 06	48000
5000	13.2469	3.01405	31.4995	34.5136	5.68942	63.2398	68.5842	2.0011E 05	2.9947E 05	3.1297E 06	50000
6000	14.8223	3.23631	32.0677	35.3040	6.43109	63.7239	70.1550	2.6444E 05	3.8587E 05	3.8234E 06	60000
7000	16.9513	3.51031	32.5867	36.0970	6.97556	64.7552	71.7308	3.4919E 05	4.8829E 05	4.8829E 06	70000
8000	19.7594	3.80020	33.0744	36.8748	7.55163	65.7243	73.2760	4.4514E 05	6.0413E 05	5.2379E 06	80000
9000	23.3984	4.06969	33.5379	37.6076	8.08715	66.6454	74.7326	5.4900E 05	7.2704E 05	5.9981E 06	90000
10000	27.9426	4.29458	33.9788	38.2736	8.53405	67.5215	76.0955	6.5449E 05	8.5340E 05	6.7522E 06	100000
15000	64.7184	4.71032	35.8324	40.5427	9.36018	71.2049	80.5650	1.1040E 06	1.5040E 06	1.0881E 07	150000
20000	120.5037	4.56827	37.1732	41.7415	9.07790	73.8493	82.9472	1.4181E 06	1.8158E 06	1.4774E 07	200000
30000	255.7537	4.12508	38.9394	43.0645	8.19722	77.3791	85.5763	1.8430E 06	2.4592E 06	2.3214E 07	300000
40000	389.2408	3.79959	40.0786	43.8782	7.55042	79.6428	87.1932	2.2235E 06	3.0202E 06	3.1857E 07	400000
50000	507.0526	3.57526	40.9089	44.4761	7.10463	81.2788	88.3814	2.5587E 06	3.5523E 06	4.0430E 07	500000
60000	607.7148	3.41471	41.5378	44.9525	6.78560	82.5424	89.3280	2.8791E 06	4.0714E 06	4.9524E 07	600000
80000	765.9948	3.20262	42.4184	45.6910	6.34413	84.4315	90.7957	3.5014E 06	5.0913E 06	6.7544E 07	800000
100000	882.4050	3.06967	43.1878	46.2574	6.09993	85.8212	91.9212	4.1178E 06	5.9999E 06	8.5821E 07	1000000
150000	1068.6634	2.88622	44.3929	47.2792	5.73539	88.2161	93.9515	5.6223E 06	8.6031E 06	1.3232E 08	1500000
200000	1177.4513	2.79199	45.2091	48.0011	5.54814	89.8379	95.3861	7.1219E 06	1.1094E 07	1.7940E 08	2000000
300000	1298.3037	2.69617	46.3205	49.0186	5.35773	92.0484	97.4041	1.0112E 07	1.5073E 07	2.7614E 08	3000000
400000	1363.6903	2.64768	47.0888	49.7365	5.26138	93.5732	98.5346	1.3097E 07	2.1044E 07	3.7429E 08	4000000
500000	1404.6153	2.61841	47.6762	50.2946	5.20321	94.7405	99.9438	1.6080E 07	2.6016E 07	4.7370E 08	5000000
600000	1432.6309	2.59882	48.1518	50.7506	5.16428	95.6855	100.8498	1.9063E 07	3.0984E 07	5.7411E 08	6000000
800000	1466.4973	2.57425	48.8957	51.4700	5.11546	97.1639	102.2793	2.5024E 07	4.0924E 07	7.7731E 08	8000000
1000000	1490.4790	2.55946	49.4684	52.0279	5.08608	98.3019	103.3880	3.0969E 07	5.0861E 07	9.8302E 08	10000000

TABLE 23. IDEAL GAS FUNCTIONS FOR C₅ (ATOMIC WEIGHT 12.0084, R = 1.9871 CAL/MOLE) SEE TABLE 67 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNC.	$\frac{U^0-E^0}{RT}$	$-\frac{F^0-E^0}{RT}$	$\frac{S^0}{R}$	$\ln \frac{U^0-E^0}{RT} - \frac{F^0-E^0}{RT}$	$\ln \frac{U^0-E^0}{RT} - \frac{F^0-E^0}{RT} - \frac{S^0}{R}$	$\ln \frac{U^0-E^0}{RT} - \frac{F^0-E^0}{RT} - \frac{S^0}{R} - \frac{1}{2} \ln \frac{M}{2\pi}$	$\ln \frac{U^0-E^0}{RT} - \frac{F^0-E^0}{RT} - \frac{S^0}{R} - \frac{1}{2} \ln \frac{M}{2\pi} - \frac{1}{2} \ln \frac{h^3}{k^3 T^3}$	TEMP. (°K)
5000	2.00000	2.50000	22.0496	24.5496	4.96791	44.7811	48.7841	1.49046	5000
5200	2.00000	2.50000	22.1476	24.6476	4.96791	44.8110	48.8140	1.55006	5200
5400	2.00000	2.50000	22.2420	24.7420	4.96791	44.8365	48.8395	1.60966	5400
5600	2.00000	2.50000	22.3329	24.8329	4.96791	44.8572	48.8602	1.66926	5600
5800	2.00000	2.50000	22.4206	24.9206	4.96791	44.8735	48.8765	1.72886	5800
6000	2.00000	2.50000	22.5054	25.0054	4.96791	44.8858	48.8888	1.78846	6000
6200	2.00000	2.50000	22.5874	25.0874	4.96791	44.8942	48.8972	1.84806	6200
6400	2.00000	2.50000	22.6667	25.1667	4.96791	44.9005	48.9035	1.90766	6400
6600	2.00000	2.50000	22.7437	25.2437	4.96791	44.9048	48.9078	1.96726	6600
6800	2.00000	2.50000	22.8183	25.3183	4.96791	44.9072	48.9102	2.02686	6800
7000	2.00000	2.50000	22.8908	25.3908	4.96791	44.9078	48.9098	2.08646	7000
7200	2.00000	2.50000	22.9612	25.4612	4.96791	44.9065	48.9085	2.14606	7200
7400	2.00000	2.50000	23.0297	25.5297	4.96791	44.9035	48.9055	2.20566	7400
7600	2.00000	2.50000	23.0964	25.5964	4.96791	44.9005	48.9025	2.26526	7600
7800	2.00000	2.50000	23.1613	25.6613	4.96791	44.8972	48.8992	2.32486	7800
8000	2.00000	2.50000	23.2246	25.7246	4.96791	44.8935	48.8955	2.38446	8000
8200	2.00000	2.50000	23.2863	25.7863	4.96791	44.8892	48.8912	2.44406	8200
8400	2.00000	2.50000	23.3466	25.8466	4.96791	44.8842	48.8862	2.50366	8400
8600	2.00000	2.50000	23.4054	25.9054	4.96791	44.8785	48.8805	2.56326	8600
8800	2.00000	2.50000	23.4629	25.9629	4.96791	44.8722	48.8742	2.62286	8800
9000	2.00000	2.50000	23.5191	26.0191	4.96791	44.8653	48.8673	2.68246	9000
9200	2.00000	2.50000	23.5740	26.0740	4.96791	44.8578	48.8598	2.74206	9200
9400	2.00000	2.50000	23.6278	26.1278	4.96791	44.8500	48.8520	2.80166	9400
9600	2.00000	2.50000	23.6804	26.1804	4.96791	44.8418	48.8438	2.86126	9600
9800	2.00000	2.50000	23.7319	26.2319	4.96791	44.8332	48.8352	2.92086	9800
10000	2.00000	2.50000	23.7825	26.2825	4.96791	44.8242	48.8262	2.98046	10000
10500	2.00000	2.50000	23.9044	26.4044	4.96791	44.8021	48.8041	3.03906	10500
11000	2.00000	2.50000	24.0207	26.5207	4.96791	44.7778	48.7798	3.09766	11000
11500	2.00000	2.50000	24.1319	26.6319	4.96791	44.7512	48.7532	3.15626	11500
12000	2.00000	2.50000	24.2383	26.7383	4.96791	44.7222	48.7242	3.21486	12000
12500	2.00000	2.50000	24.3403	26.8403	4.96791	44.6908	48.6928	3.27346	12500
13000	2.00000	2.50000	24.4384	26.9384	4.96791	44.6572	48.6592	3.33206	13000
13500	2.00000	2.50000	24.5327	27.0327	4.96791	44.6215	48.6235	3.39066	13500
14000	2.00000	2.50000	24.6236	27.1236	4.96791	44.5838	48.5858	3.44926	14000
14500	2.00000	2.50000	24.7114	27.2114	4.96791	44.5442	48.5462	3.50786	14500
15000	2.00000	2.50000	24.7961	27.2961	4.96791	44.5028	48.5048	3.56646	15000
15500	2.00000	2.50000	24.8781	27.3781	4.96791	44.4597	48.4617	3.62506	15500
16000	2.00000	2.50000	24.9575	27.4575	4.96791	44.4148	48.4168	3.68366	16000
16500	2.00000	2.50000	25.0344	27.5344	4.96791	44.3682	48.3702	3.74226	16500
17000	2.00000	2.50000	25.1090	27.6090	4.96791	44.3198	48.3218	3.80086	17000
17500	2.00000	2.50000	25.1815	27.6815	4.96791	44.2697	48.2717	3.85946	17500
18000	2.00000	2.50000	25.2519	27.7519	4.96791	44.2178	48.2198	3.91806	18000
18500	2.00000	2.50000	25.3204	27.8204	4.96791	44.1642	48.1662	3.97666	18500
19000	2.00000	2.50000	25.3871	27.8871	4.96791	44.1088	48.1108	4.03526	19000
19500	2.00000	2.50000	25.4520	27.9520	4.96791	44.0517	48.0537	4.09386	19500

TABLE 23 (CONT.). IDEAL GAS FUNCTIONS FOR C 5+

TEMP. (°K)	PARTIAL PRESSURE	$\frac{h^2 - \epsilon}{RT}$	$-\frac{h^2 - \epsilon}{RT}$	$\frac{h^2 - \epsilon}{RT}$	$-\frac{h^2 - \epsilon}{RT}$	$\frac{h^2 - \epsilon}{RT}$	$-\frac{h^2 - \epsilon}{RT}$	$\frac{h^2 - \epsilon}{RT}$	$-\frac{h^2 - \epsilon}{RT}$	$\frac{h^2 - \epsilon}{RT}$	$-\frac{h^2 - \epsilon}{RT}$	TEMP. (°K)
20000	2.0000	2.50000	25.5153	28.0153	4.96791	50.7032	55.6711	5.96156	9.93506	1.0141E 04	1.1259E 04	20000
22000	2.0000	2.50000	25.7536	28.2536	4.96791	51.1767	56.1446	6.5576E 04	1.0929E 05	1.1259E 04	1.2306E 04	22000
24000	2.0000	2.50000	25.9711	28.4711	4.96791	51.6049	56.5768	7.1530E 04	1.1923E 05	1.2306E 04	1.3422E 04	24000
26000	2.0000	2.50000	26.1712	28.6712	4.96791	52.0046	56.9745	7.7499E 04	1.2917E 05	1.3422E 04	1.4466E 04	26000
28000	2.0000	2.50000	26.3565	28.8565	4.96791	52.3747	57.3426	8.3441E 04	1.3910E 05	1.4466E 04	1.5515E 04	28000
30000	2.0000	2.50000	26.5290	29.0290	4.96791	52.7175	57.6054	8.9423E 04	1.4904E 05	1.5515E 04	1.6572E 04	30000
32000	2.0000	2.50000	26.6903	29.1903	4.96791	53.0381	58.0060	9.5384E 04	1.5897E 05	1.6572E 04	1.7635E 04	32000
34000	2.0000	2.50000	26.8419	29.3419	4.96791	53.3393	58.3072	1.0133E 05	1.6891E 05	1.7635E 04	1.8704E 04	34000
36000	2.0000	2.50000	26.9848	29.4848	4.96791	53.6232	58.5911	1.0713E 05	1.7884E 05	1.8704E 04	1.9786E 04	36000
38000	2.0000	2.50000	27.1200	29.6200	4.96791	53.8916	58.8597	1.1327E 05	1.8870E 05	1.9786E 04	2.0879E 04	38000
40000	2.0000	2.50000	27.2482	29.7482	4.96791	54.1467	59.1146	1.1923E 05	1.9872E 05	2.0879E 04	2.1984E 04	40000
42000	2.0000	2.50000	27.3702	29.8702	4.96791	54.3890	59.3570	1.2519E 05	2.0885E 05	2.1984E 04	2.3093E 04	42000
44000	2.0000	2.50000	27.4865	29.9865	4.96791	54.6201	59.5881	1.3115E 05	2.1895E 05	2.3093E 04	2.4207E 04	44000
46000	2.0000	2.50000	27.5976	30.0976	4.96791	54.8410	59.8089	1.3711E 05	2.2892E 05	2.4207E 04	2.5324E 04	46000
48000	2.0000	2.50000	27.7040	30.2040	4.96791	55.0524	60.0203	1.4308E 05	2.3884E 05	2.5324E 04	2.6442E 04	48000
50000	2.0000	2.50000	27.8060	30.3060	4.96791	55.2532	60.2231	1.4904E 05	2.4869E 05	2.6442E 04	2.7620E 04	50000
60000	2.0000	2.50000	28.2619	30.7619	4.96791	56.1610	61.1289	1.7884E 05	2.9607E 05	3.3697E 04	4.0949E 04	60000
70000	2.0000	2.50000	28.6472	31.1472	4.96791	56.9268	61.8967	2.0865E 05	3.4775E 05	4.0949E 04	5.5235E 04	70000
80000	2.0000	2.50000	28.9811	31.4811	4.96791	57.5902	62.5581	2.3844E 05	3.9743E 05	4.8072E 04	7.0485E 04	80000
90000	2.0000	2.50000	29.2755	31.7755	4.96791	58.1753	63.1437	2.6827E 05	4.4711E 05	5.5235E 04	9.0000E 04	90000
100000	2.0000	2.50000	29.5389	32.0389	4.96791	58.6967	63.6666	2.9807E 05	4.9679E 05	6.2499E 04	1.00000E 05	100000
150000	2.0000	2.50000	30.5526	33.0526	4.96791	60.7130	65.4809	4.7711E 05	7.4510E 05	9.1070E 04	1.50000E 05	150000
200000	2.0000	2.50000	31.2718	33.7718	4.96791	62.1422	67.1101	5.9615E 05	9.9158E 05	1.2420E 05	2.00000E 05	200000
300000	2.0000	2.50005	32.2856	34.7855	4.96801	64.1565	69.1245	8.9423E 05	1.4904E 06	1.8247E 05	3.00000E 05	300000
400000	2.0003	2.50172	33.0048	35.5045	4.97132	65.5860	70.5573	1.1937E 06	1.9887E 06	2.6234E 05	4.00000E 05	400000
500000	2.0031	2.51442	33.5640	36.0785	4.99656	66.8971	71.6939	1.5047E 06	2.4983E 06	3.3349E 05	5.00000E 05	500000
600000	2.0149	2.55916	34.0258	36.5649	5.08547	67.6148	72.7003	1.8590E 06	3.0513E 06	4.0509E 05	6.00000E 05	600000
800000	2.1120	2.82370	34.7920	37.6157	5.61116	69.1375	74.7487	2.8992E 06	4.4809E 06	5.5310E 05	8.00000E 05	800000
1000000	2.3822	3.29156	35.4702	38.7618	6.54088	70.8852	77.0261	4.5537E 06	6.5409E 06	7.0485E 05	1.00000E 06	1000000
1500000	4.0007	4.16599	37.0024	41.1684	8.27E 1	73.5298	81.8083	9.4370E 06	1.2410E 07	1.1029E 06	1.50000E 06	1500000
2000000	6.6124	4.25275	38.2240	42.4768	8.45091	75.9575	84.4084	1.2927E 07	1.4902E 07	1.5191E 06	2.00000E 06	2000000
3000000	12.8820	3.91038	39.8889	43.8073	7.78447	79.2669	87.0524	2.3350E 07	2.3350E 07	2.3780E 06	3.00000E 06	3000000
4000000	18.2820	3.62155	40.9739	44.8016	7.20853	81.4219	88.4304	2.8834E 07	2.8834E 07	3.2540E 06	4.00000E 06	4000000
5000000	22.9775	3.42599	41.7403	45.4863	6.80800	82.7847	89.7227	3.4040E 07	3.4040E 07	4.1492E 06	5.00000E 06	5000000
6000000	26.8429	3.28297	42.3718	45.8546	6.52380	84.1994	90.7232	3.9149E 07	3.9149E 07	5.0520E 06	6.00000E 06	6000000
8000000	32.4979	3.09836	43.2801	46.3845	6.15298	86.0207	92.1737	4.9224E 07	4.9224E 07	6.5817E 06	8.00000E 06	8000000
10000000	36.8579	2.98092	43.9658	46.9467	5.92357	87.3672	93.2908	5.9234E 07	5.9234E 07	8.7367E 06	1.00000E 07	10000000

TABLE 24. IDEAL GAS FUNCTIONS FOR N₂ (ATOMIC WEIGHT 14.0039, R = 1.98717 CAL/MOLE)

BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 68 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2 E}{RT}$	$-\frac{E^2}{RT^2}$	$\ln$	$(h^2 E - \frac{E^2}{RT^2})$	$-\ln$	$-\ln$	$-\ln$	TEMP. (°K)		
5000	1.0000	2.50000	21.5876	24.0870	4.96791	42.8970	47.0649	1.4904E 04	2.4840E 04	2.1640E 05	10
5200	1.0000	2.50000	21.6851	24.1851	4.96791	43.0918	48.0598	1.5000E 04	2.4833E 04	2.2400E 05	5400
5400	1.0000	2.50000	21.7794	24.2794	4.96791	43.2793	48.2472	1.5096E 04	2.4827E 04	2.3171E 05	5600
5600	1.0000	2.50000	21.8704	24.3704	4.96791	43.4600	48.4279	1.5192E 04	2.4820E 04	2.3930E 05	5800
5800	1.0000	2.50000	21.9581	24.4581	4.96791	43.6343	48.6023	1.5288E 04	2.4814E 04	2.4690E 05	6000
6000	1.0000	2.50000	22.0428	24.5428	4.96791	43.8028	48.7787	1.5384E 04	2.4807E 04	2.5450E 05	6200
6200	1.0000	2.50000	22.1248	24.6248	4.96791	43.9657	48.9536	1.5480E 04	2.4801E 04	2.6210E 05	6400
6400	1.0000	2.50000	22.2042	24.7042	4.96791	44.1231	49.1213	1.5576E 04	2.4795E 04	2.6970E 05	6600
6600	1.0000	2.50000	22.2811	24.7811	4.96791	44.2763	49.2842	1.5672E 04	2.4788E 04	2.7730E 05	6800
6800	1.0000	2.50000	22.3557	24.8557	4.96791	44.4266	49.4426	1.5768E 04	2.4782E 04	2.8490E 05	7000
7000	1.0000	2.50000	22.4282	24.9282	4.96791	44.5746	49.5965	1.5864E 04	2.4775E 04	2.9250E 05	7200
7200	1.0000	2.50000	22.4986	24.9986	4.96791	44.7205	49.7464	1.5960E 04	2.4769E 04	3.0010E 05	7400
7400	1.0000	2.50000	22.5671	25.0671	4.96791	44.8644	49.8925	1.6056E 04	2.4763E 04	3.0770E 05	7600
7600	1.0000	2.50000	22.6338	25.1338	4.96791	45.0066	49.9960	1.6152E 04	2.4757E 04	3.1530E 05	7800
7800	1.0000	2.50000	22.6987	25.1987	4.96791	45.1462	50.0741	1.6248E 04	2.4751E 04	3.2290E 05	8000
8000	1.0000	2.50000	22.7620	25.2620	4.96791	45.2839	50.1399	1.6344E 04	2.4745E 04	3.3050E 05	8200
8200	1.0000	2.50000	22.8238	25.3238	4.96791	45.4198	50.2025	1.6440E 04	2.4739E 04	3.3810E 05	8400
8400	1.0000	2.50000	22.8840	25.3840	4.96791	45.5543	50.2622	1.6536E 04	2.4733E 04	3.4570E 05	8600
8600	1.0000	2.50000	22.9428	25.4428	4.96791	45.6875	50.3191	1.6632E 04	2.4727E 04	3.5330E 05	8800
8800	1.0000	2.50000	23.0003	25.5003	4.96791	45.8194	50.3733	1.6728E 04	2.4721E 04	3.6090E 05	9000
9000	1.0000	2.50000	23.0565	25.5565	4.96791	45.9501	50.4250	1.6824E 04	2.4715E 04	3.6850E 05	9200
9200	1.0000	2.50000	23.1114	25.6114	4.96791	46.0795	50.4752	1.6920E 04	2.4709E 04	3.7610E 05	9400
9400	1.0000	2.50000	23.1652	25.6652	4.96791	46.2077	50.5239	1.7016E 04	2.4703E 04	3.8370E 05	9600
9600	1.0000	2.50000	23.2178	25.7178	4.96791	46.3347	50.5710	1.7112E 04	2.4697E 04	3.9130E 05	9800
9800	1.0000	2.50000	23.2694	25.7694	4.96791	46.4605	50.6166	1.7208E 04	2.4691E 04	3.9890E 05	10000
10000	1.0000	2.50000	23.3199	25.8199	4.96791	46.5852	50.6611	1.7304E 04	2.4685E 04	4.0650E 05	10500
10500	1.0000	2.50000	23.4119	25.9119	4.96791	46.7090	50.7050	1.7400E 04	2.4679E 04	4.1410E 05	11000
11000	1.0000	2.50000	23.5042	26.0042	4.96791	46.8319	50.7485	1.7496E 04	2.4673E 04	4.2170E 05	11500
11500	1.0000	2.50000	23.5963	26.0963	4.96791	46.9540	50.7910	1.7592E 04	2.4667E 04	4.2930E 05	12000
12000	1.0000	2.50000	23.6877	26.1877	4.96791	47.0753	50.8330	1.7688E 04	2.4661E 04	4.3690E 05	12500
12500	1.0000	2.50000	23.7788	26.2788	4.96791	47.1959	50.8745	1.7784E 04	2.4655E 04	4.4450E 05	13000
13000	1.0000	2.50000	23.8695	26.3695	4.96791	47.3158	50.9155	1.7880E 04	2.4649E 04	4.5210E 05	13500
13500	1.0000	2.50000	23.9599	26.4599	4.96791	47.4350	50.9560	1.7976E 04	2.4643E 04	4.5970E 05	14000
14000	1.0000	2.50000	24.0500	26.5500	4.96791	47.5535	50.9960	1.8072E 04	2.4637E 04	4.6730E 05	14500
14500	1.0000	2.50000	24.1398	26.6398	4.96791	47.6714	51.0355	1.8168E 04	2.4631E 04	4.7490E 05	15000
15000	1.0000	2.50000	24.2293	26.7293	4.96791	47.7888	51.0745	1.8264E 04	2.4625E 04	4.8250E 05	15500
15500	1.0000	2.50000	24.3186	26.8186	4.96791	47.9058	51.1130	1.8360E 04	2.4619E 04	4.9010E 05	16000
16000	1.0000	2.50000	24.4076	26.9076	4.96791	48.0223	51.1510	1.8456E 04	2.4613E 04	4.9770E 05	16500
16500	1.0000	2.50000	24.4963	26.9963	4.96791	48.1384	51.1885	1.8552E 04	2.4607E 04	5.0530E 05	17000
17000	1.0000	2.50000	24.5848	27.0848	4.96791	48.2541	51.2255	1.8648E 04	2.4601E 04	5.1290E 05	17500
17500	1.0000	2.50000	24.6733	27.1733	4.96791	48.3694	51.2620	1.8744E 04	2.4595E 04	5.2050E 05	18000
18000	1.0000	2.50000	24.7615	27.2615	4.96791	48.4844	51.2980	1.8840E 04	2.4589E 04	5.2810E 05	18500
18500	1.0000	2.50000	24.8494	27.3494	4.96791	48.5990	51.3335	1.8936E 04	2.4583E 04	5.3570E 05	19000
19000	1.0000	2.50000	24.9370	27.4370	4.96791	48.7133	51.3685	1.9032E 04	2.4577E 04	5.4330E 05	19500
19500	1.0000	2.50000	25.0245	27.5245	4.96791	48.8273	51.4030	1.9128E 04	2.4571E 04	5.5090E 05	
			25.1118	27.6118	4.96791	48.9410	51.4370	1.9224E 04	2.4565E 04	5.5850E 05	
			25.1987	27.6987	4.96791	49.0544	51.4705	1.9320E 04	2.4559E 04	5.6610E 05	
			25.2851	27.7851	4.96791	49.1675	51.5035	1.9416E 04	2.4553E 04	5.7370E 05	
			25.3714	27.8714	4.96791	49.2803	51.5360	1.9512E 04	2.4547E 04	5.8130E 05	
			25.4576	27.9576	4.96791	49.3928	51.5680	1.9608E 04	2.4541E 04	5.8890E 05	
			25.5438	28.0438	4.96791	49.5050	51.6000	1.9704E 04	2.4535E 04	5.9650E 05	
			25.6299	28.1299	4.96791	49.6169	51.6315	1.9800E 04	2.4529E 04	6.0410E 05	
			25.7159	28.2159	4.96791	49.7285	51.6625	1.9896E 04	2.4523E 04	6.1170E 05	
			25.8018	28.3018	4.96791	49.8398	51.6930	1.9992E 04	2.4517E 04	6.1930E 05	
			25.8876	28.3876	4.96791	49.9508	51.7235	2.0088E 04	2.4511E 04	6.2690E 05	
			25.9733	28.4733	4.96791	50.0615	51.7535	2.0184E 04	2.4505E 04	6.3450E 05	
			26.0589	28.5589	4.96791	50.1719	51.7830	2.0280E 04	2.4499E 04	6.4210E 05	
			26.1444	28.6444	4.96791	50.2820	51.8125	2.0376E 04	2.4493E 04	6.4970E 05	
			26.2298	28.7298	4.96791	50.3918	51.8415	2.0472E 04	2.4487E 04	6.5730E 05	
			26.3151	28.8151	4.96791	50.5013	51.8700	2.0568E 04	2.4481E 04	6.6490E 05	
			26.4003	28.9003	4.96791	50.6105	51.8980	2.0664E 04	2.4475E 04	6.7250E 05	
			26.4855	28.9855	4.96791	50.7194	51.9260	2.0760E 04	2.4469E 04	6.8010E 05	
			26.5706	29.0706	4.96791	50.8280	51.9535	2.0856E 04	2.4463E 04	6.8770E 05	
			26.6557	29.1557	4.96791	50.9363	51.9805	2.0952E 04	2.4457E 04	6.9530E 05	
			26.7407	29.2407	4.96791	51.0443	52.0070	2.1048E 04	2.4451E 04	7.0290E 05	
			26.8257	29.3257	4.96791	51.1520	52.0335	2.1144E 04	2.4445E 04	7.1050E 05	
			26.9106	29.4106	4.96791	51.2594	52.0600	2.1240E 04	2.4439E 04	7.1810E 05	
			26.9955	29.4955	4.96791	51.3665	52.0860	2.1336E 04	2.4433E 04	7.2570E 05	
			27.0803	29.5803	4.96791	51.4733	52.1120	2.1432E 04	2.4427E 04	7.3330E 05	
			27.1651	29.6651	4.96791	51.5800	52.1375	2.1528E 04	2.4421E 04	7.4090E 05	
			27.2498	29.7498	4.96791	51.6863	52.1625	2.1624E 04	2.4415E 04	7.4850E 05	
			27.3345	29.8345	4.96791	51.7923	52.1875	2.1720E 04	2.4409E 04	7.5610E 05	
			27.4191	29.9191	4.96791	51.8980	52.2120	2.1816E 04	2.4403E 04	7.6370E 05	
			27.5037	30.0037	4.96791	52.0035	52.2365	2.1912E 04	2.4397E 04	7.7130E 05	
			27.5882	30.0882	4.96791	52.1088	52.2605	2.2008E 04	2.4391E 04	7.7890E 05	
			27.6727	30.1727	4.96791	52.2139	52.2845	2.2104E 04	2.4385E 04	7.8650E 05	
			27.7571	30.2571	4.96791	52.3188	52.3080	2.2200E 04	2.4379E 04	7.9410E 05	
			27.8415	30.3415	4.96791	52.4235	52.3315	2.2296E 04	2.4373E 04	8.0170E 05	
			27.9258	30.4258	4.96791	52.5280	52.3545	2.2392E 04	2.4367E 04	8.0930E 05	
			28.0101	30.5101	4.96791	52.6323	52.3775	2.2488E 04	2.4361E 04	8.1690E 05	
			28.0943	30.5943	4.96791	52.7364	52.4005	2.2584E 04	2.4355E 04	8.2450E 05	
			28.1785	30.6785	4.96791	52.8403	52.4230	2.2680E 04	2.4349E 04	8.3210E 05	
			28.2627	30.7627	4.96791	52.9440	52.4455	2.2776E 04	2.4343E 04	8.3970E 05	
			28.3468	30.8468	4.96791	53.0475	52.4675	2.2872E 04	2.4337E 04	8.4730E 05	
			28.4309	30.9309	4.96791	53.1508	52.4895	2.2968E 04	2.4331E 04	8.5490E 05	
			28.5149	31.0149	4.96791	53.2539	52.5110	2.3064E 04	2.4325E 04		

TABLE 24 (CONT.). IDEAL GAS FUNCTIONS FOR H₂

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2}{RT}$	$\ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT}$	TEMP. (°K)
20000	1.0000	2.50000	4.96791	49.7640	54.7519	5.96136	9.93306	9.93306	20000
22000	1.0000	2.50000	4.96791	50.2575	55.2234	6.55706	1.09296	1.09296	22000
24000	1.0000	2.50000	4.96791	50.6897	55.6377	7.15306	1.19236	1.19236	24000
26000	1.0000	2.50000	4.96791	51.0874	56.0253	7.74996	1.29176	1.29176	26000
28000	1.0000	2.50000	4.96791	51.4556	56.4235	8.34616	1.39106	1.39106	28000
30000	1.0000	2.50000	4.96791	51.7983	56.7642	8.94226	1.49046	1.49046	30000
32000	1.0000	2.50000	4.96791	52.1189	57.0848	9.53846	1.58976	1.58976	32000
34000	1.0000	2.50000	4.96791	52.4201	57.3880	1.01356	1.68916	1.68916	34000
36000	1.0000	2.50000	4.96791	52.7041	57.6720	1.07316	1.78846	1.78846	36000
38000	1.0000	2.50000	4.96791	52.9727	57.9406	1.13276	1.88786	1.88786	38000
40000	1.0000	2.50000	4.96791	53.2275	58.1954	1.19236	1.98726	1.98726	40000
42000	1.0000	2.50000	4.96791	53.4699	58.4378	1.25196	2.08666	2.08666	42000
44000	1.0000	2.50000	4.96791	53.7010	58.6689	1.31156	2.18606	2.18606	44000
46000	1.0000	2.50000	4.96791	53.9218	58.8897	1.37116	2.28546	2.28546	46000
48000	1.0000	2.50000	4.96791	54.1332	59.1012	1.43076	2.38486	2.38486	48000
50000	1.0000	2.50000	4.96791	54.3360	59.3040	1.49046	2.48426	2.48426	50000
52000	1.0000	2.50000	4.96791	54.5318	60.2097	1.78846	2.98076	2.98076	52000
54000	1.0000	2.50000	4.96791	58.0076	60.9755	2.08666	3.47726	3.47726	54000
56000	1.0000	2.50000	4.96791	58.6710	61.6389	2.38486	3.97376	3.97376	56000
58000	1.0000	2.50000	4.96791	57.7561	62.2240	2.68276	4.47116	4.47116	58000
60000	1.0000	2.50000	4.96791	57.7795	62.7475	2.98076	4.96796	4.96796	60000
62000	1.0000	2.50000	4.96791	59.7939	64.7618	4.47116	7.45196	7.45196	62000
64000	1.0000	2.50000	4.96791	61.2230	66.1909	5.96136	9.93306	9.93306	64000
66000	1.0000	2.50000	4.96791	63.2374	68.2053	6.94246	1.49046	1.49046	66000
68000	1.0001	2.50140	4.97070	64.6467	69.6374	1.19346	1.98846	1.98846	68000
70000	1.0015	2.51443	5.00057	65.7791	70.7787	1.50676	2.50036	2.50036	70000
72000	1.0043	2.53434	5.13551	66.6993	71.8348	1.80996	3.00136	3.00136	72000
74000	1.0082	2.56064	5.28371	67.4281	72.8285	2.10996	3.49936	3.49936	74000
76000	1.0132	2.59482	5.44437	68.0792	73.7639	2.40996	3.99536	3.99536	76000
78000	1.0192	2.63746	5.61822	68.6560	74.6416	2.70996	4.48936	4.48936	78000
80000	1.0264	2.68922	5.80593	69.1616	75.4616	3.00996	4.98136	4.98136	80000
82000	1.0348	2.75062	6.00907	69.6016	76.2240	3.30996	5.47136	5.47136	82000
84000	1.0444	2.82222	6.22822	70.0000	76.9374	3.60996	5.95936	5.95936	84000
86000	1.0552	2.90462	6.46401	70.3640	77.6018	3.90996	6.44536	6.44536	86000
88000	1.0672	2.99842	6.71691	70.6939	78.2161	4.20996	6.92936	6.92936	88000
90000	1.0804	3.10422	6.98741	71.0000	78.7805	4.50996	7.41136	7.41136	90000
92000	1.0948	3.22262	7.27616	71.2840	79.2948	4.80996	7.89136	7.89136	92000
94000	1.1104	3.35422	7.58391	71.5474	79.7592	5.10996	8.36936	8.36936	94000
96000	1.1272	3.49962	7.91141	71.7918	80.1735	5.40996	8.84536	8.84536	96000
98000	1.1452	3.65942	8.26016	72.0161	80.5379	5.70996	9.31936	9.31936	98000
100000	1.1644	3.83422	8.63141	72.2161	80.8523	6.00996	9.79136	9.79136	100000
102000	1.1848	4.02462	9.02616	72.3918	81.1167	6.30996	10.26136	10.26136	102000
104000	1.2064	4.23042	9.44591	72.5440	81.3311	6.60996	10.72936	10.72936	104000
106000	1.2292	4.45222	9.89141	72.6739	81.5055	6.90996	11.19536	11.19536	106000
108000	1.2532	4.69062	10.36391	72.7840	81.6400	7.20996	11.65936	11.65936	108000
110000	1.2784	4.94602	10.86441	72.8761	81.7348	7.50996	12.12136	12.12136	110000
112000	1.3048	5.21942	11.39491	72.9518	81.7902	7.80996	12.58136	12.58136	112000
114000	1.3324	5.51222	11.95641	73.0118	81.8167	8.10996	13.03936	13.03936	114000
116000	1.3612	5.82502	12.55091	73.0574	81.8148	8.40996	13.49536	13.49536	116000
118000	1.3912	6.15842	13.18041	73.0898	81.7848	8.70996	13.94936	13.94936	118000
120000	1.4224	6.51322	13.84691	73.1098	81.7273	9.00996	14.40136	14.40136	120000
122000	1.4548	6.89002	14.55241	73.1178	81.6435	9.30996	14.85136	14.85136	122000
124000	1.4884	7.28942	15.29991	73.1138	81.5348	9.60996	15.29936	15.29936	124000
126000	1.5232	7.71222	16.09141	73.0978	81.4018	9.90996	15.74536	15.74536	126000
128000	1.5592	8.15942	16.92991	73.0708	81.2448	10.20996	16.18936	16.18936	128000
130000	1.5964	8.63322	17.81841	73.0338	81.0648	10.50996	16.63136	16.63136	130000
132000	1.6348	9.13402	18.76191	72.9768	80.8618	10.80996	17.07136	17.07136	132000
134000	1.6744	9.66222	19.76541	72.9008	80.6358	11.10996	17.50936	17.50936	134000
136000	1.7152	10.21842	20.83391	72.8058	80.3868	11.40996	17.94536	17.94536	136000
138000	1.7572	10.80222	21.97241	72.6918	80.1138	11.70996	18.37936	18.37936	138000
140000	1.8004	11.41402	23.18691	72.5598	79.7168	12.00996	18.81136	18.81136	140000
142000	1.8448	12.05542	24.48241	72.4108	79.1968	12.30996	19.24136	19.24136	142000
144000	1.8904	12.72722	25.86491	72.2448	78.5518	12.60996	19.66936	19.66936	144000
146000	1.9372	13.43002	27.33841	72.0618	77.7868	12.90996	20.09536	20.09536	146000
148000	1.9852	14.16422	28.90891	71.8618	76.9018	13.20996	20.51936	20.51936	148000
150000	2.0344	14.93042	30.58241	71.6448	75.8968	13.50996	20.94136	20.94136	150000

TABLE 25. IDEAL GAS FUNCTIONS FOR D 5+ IONIC WEIGHT 15.9966, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N 5+. SEE TABLE 69 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL FUNCT.	$\frac{W^2-E^2}{RT}$	$-\frac{E^2-E_0^2}{RT}$	$\frac{W^2-E^2}{RT}$	$-\frac{E^2-E_0^2}{RT}$	$\frac{W^2-E^2}{RT}$	$-\frac{E^2-E_0^2}{RT}$	$\frac{W^2-E^2}{RT}$	$-\frac{E^2-E_0^2}{RT}$	TEMP. (°K)
5000	2.0000	22.4797	24.9797	4.96791	44.6710	49.6309	1.4904E 04	2.4440E 04	2.2135E 05	5000
5200	2.0000	22.5000	25.0000	4.96791	44.8658	49.6337	1.5500E 04	2.5037E 04	2.2330E 05	5200
5400	2.0000	22.5000	25.0000	4.96791	45.0533	50.0212	1.6094E 04	2.6427E 04	2.4329E 05	5400
5600	2.0000	22.5000	25.0000	4.96791	45.2431	50.2631	1.6692E 04	2.7820E 04	2.5311E 05	5600
5800	2.0000	22.5000	25.0000	4.96791	45.4363	50.3767	1.7280E 04	2.8814E 04	2.6327E 05	5800
6000	2.0000	22.5000	25.0000	4.96791	45.6327	50.5446	1.7884E 04	2.9807E 04	2.7344E 05	6000
6200	2.0000	22.5000	25.0000	4.96791	45.8315	50.7075	1.8481E 04	3.0801E 04	2.8359E 05	6200
6400	2.0000	22.5000	25.0000	4.96791	46.0328	50.8653	1.9077E 04	3.1794E 04	2.9374E 05	6400
6600	2.0000	22.5000	25.0000	4.96791	46.2368	51.0181	1.9673E 04	3.2786E 04	3.0378E 05	6600
6800	2.0000	22.5000	25.0000	4.96791	46.4435	51.1664	2.0269E 04	3.3782E 04	3.1415E 05	6800
7000	2.0000	22.5000	25.0000	4.96791	46.6529	51.3104	2.0864E 04	3.4775E 04	3.2440E 05	7000
7200	2.0000	22.5000	25.0000	4.96791	46.8653	51.4504	2.1461E 04	3.5768E 04	3.3467E 05	7200
7400	2.0000	22.5000	25.0000	4.96791	47.0806	51.5865	2.2059E 04	3.6762E 04	3.4493E 05	7400
7600	2.0000	22.5000	25.0000	4.96791	47.2988	51.7190	2.2654E 04	3.7756E 04	3.5531E 05	7600
7800	2.0000	22.5000	25.0000	4.96792	47.5199	51.8480	2.3250E 04	3.8750E 04	3.6566E 05	7800
8000	2.0000	22.5000	25.0000	4.96792	47.7437	51.9738	2.3846E 04	3.9744E 04	3.7605E 05	8000
8200	2.0000	22.5000	25.0000	4.96792	47.9702	52.0965	2.4442E 04	4.0737E 04	3.8645E 05	8200
8400	2.0000	22.5000	25.0000	4.96792	48.1994	52.2162	2.5038E 04	4.1731E 04	3.9689E 05	8400
8600	2.0000	22.5000	25.0000	4.96792	48.4313	52.3331	2.5635E 04	4.2724E 04	4.0734E 05	8600
8800	2.0000	22.5000	25.0000	4.96793	48.6659	52.4473	2.6231E 04	4.3718E 04	4.1782E 05	8800
9000	2.0000	22.5000	25.0000	4.96793	48.9032	52.5590	2.6827E 04	4.4711E 04	4.2832E 05	9000
9200	2.0000	22.5000	25.0000	4.96794	49.1433	52.6682	2.7423E 04	4.5705E 04	4.3884E 05	9200
9400	2.0000	22.5000	25.0000	4.96795	49.3861	52.7750	2.8019E 04	4.6698E 04	4.4939E 05	9400
9600	2.0000	22.5000	25.0000	4.96796	49.6317	52.8794	2.8614E 04	4.7692E 04	4.5999E 05	9600
9800	2.0000	22.5000	25.0000	4.96797	49.8801	52.9821	2.9212E 04	4.8686E 04	4.7054E 05	9800
10000	2.0000	22.5000	25.0000	4.96799	50.1314	53.0824	2.9808E 04	4.9680E 04	4.8114E 05	10000
10500	2.0000	22.5000	25.0000	4.96805	50.3858	53.1849	3.0404E 04	5.0675E 04	4.9175E 05	10500
11000	2.0000	22.5000	25.0000	4.96815	50.6433	53.2891	3.1001E 04	5.1670E 04	5.0237E 05	11000
11500	2.0000	22.5000	25.0000	4.96831	50.9039	53.3771	3.1598E 04	5.2665E 04	5.1300E 05	11500
12000	2.0000	22.5000	25.0000	4.96855	51.1676	53.4608	3.2195E 04	5.3660E 04	5.2362E 05	12000
12500	2.0000	22.5000	25.0000	4.96888	51.4343	53.5400	3.2792E 04	5.4655E 04	5.3424E 05	12500
13000	2.0000	22.5000	25.0000	4.96934	51.7040	53.6157	3.3389E 04	5.5650E 04	5.4486E 05	13000
13500	2.0000	22.5000	25.0000	4.96986	51.9767	53.6883	3.3986E 04	5.6645E 04	5.5548E 05	13500
14000	2.0000	22.5000	25.0000	4.97047	52.2524	53.7581	3.4583E 04	5.7640E 04	5.6610E 05	14000
14500	2.0000	22.5000	25.0000	4.97119	52.5301	53.8254	3.5180E 04	5.8635E 04	5.7672E 05	14500
15000	2.0000	22.5000	25.0000	4.97200	52.8108	53.8902	3.5777E 04	5.9630E 04	5.8734E 05	15000
15500	2.0000	22.5000	25.0000	4.97291	53.0945	53.9524	3.6374E 04	6.0625E 04	5.9796E 05	15500
16000	2.0000	22.5000	25.0000	4.97394	53.3812	54.0121	3.6971E 04	6.1620E 04	6.0858E 05	16000
16500	2.0000	22.5000	25.0000	4.97508	53.6719	54.0694	3.7568E 04	6.2615E 04	6.1920E 05	16500
17000	2.0000	22.5000	25.0000	4.97634	53.9666	54.1243	3.8165E 04	6.3610E 04	6.2982E 05	17000
17500	2.0000	22.5000	25.0000	4.97771	54.2643	54.1768	3.8762E 04	6.4605E 04	6.4044E 05	17500
18000	2.0000	22.5000	25.0000	4.97919	54.5650	54.2269	3.9359E 04	6.5600E 04	6.5106E 05	18000
18500	2.0000	22.5000	25.0000	4.98077	54.8687	54.2747	4.0000E 04	6.6595E 04	6.6168E 05	18500
19000	2.0000	22.5000	25.0000	4.98245	55.1754	54.3203	4.0641E 04	6.7590E 04	6.7230E 05	19000
19500	2.0000	22.5000	25.0000	4.98423	55.4851	54.3638	4.1282E 04	6.8585E 04	6.8292E 05	19500

TABLE 25 (CONT.). IDEAL GAS FUNCTIONS FOR O₂

TEMP. (°K)	PARTIT. FUNC.	$\frac{h^2}{RT}$	$\frac{h^2}{RT} - \frac{E^0}{RT}$	$\frac{h^2}{RT}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT} - \ln \frac{h^2}{RT}$	$\frac{h^2}{RT}$	$\frac{h^2}{RT} - \frac{E^0}{RT}$	$\frac{h^2}{RT}$	$\frac{h^2}{RT} - \frac{E^0}{RT}$	TEMP. (°K)
2000	2.0057	2.51978	25.9483	28.4681	5.00722	51.5708	6.0401E 04	1.0014E 05	1.0313E 06	20000
2200	2.0107	2.53377	26.1891	28.7229	5.03522	52.0421	6.7053E 04	1.1077E 05	1.1449E 06	22000
2400	2.0182	2.55225	26.4103	28.9626	5.07175	52.4817	7.4030E 04	1.2172E 05	1.2596E 06	24000
2600	2.0284	2.57491	26.6155	29.1905	5.11688	52.8894	8.1373E 04	1.3304E 05	1.3751E 06	26000
2800	2.0416	2.60137	26.8073	29.4086	5.16935	53.2705	8.9101E 04	1.4474E 05	1.4916E 06	28000
3000	2.0580	2.63073	26.9877	29.6185	5.22771	53.6291	9.7216E 04	1.5683E 05	1.6089E 06	30000
3200	2.0775	2.66225	27.1505	29.8208	5.29033	53.9684	1.0570E 05	1.6929E 05	1.7270E 06	32000
3400	2.1001	2.69511	27.3209	30.0160	5.3562	54.2911	1.1453E 05	1.8209E 05	1.8459E 06	34000
3600	2.1257	2.72854	27.4759	30.2044	5.42205	54.5991	1.2366E 05	1.9519E 05	1.9656E 06	36000
3800	2.1540	2.76187	27.6243	30.3862	5.48829	54.8940	1.3304E 05	2.0856E 05	2.0860E 06	38000
4000	2.1850	2.79454	27.7658	30.5613	5.55321	55.1772	1.4264E 05	2.2213E 05	2.2071E 06	40000
4200	2.2183	2.82659	27.9039	30.7300	5.61550	55.4497	1.5241E 05	2.3587E 05	2.3289E 06	42000
4400	2.2538	2.85816	28.0381	30.8922	5.67567	55.7123	1.6229E 05	2.4973E 05	2.4513E 06	44000
4600	2.2912	2.88932	28.1637	31.0482	5.73202	55.9659	1.7226E 05	2.6367E 05	2.5744E 06	46000
4800	2.3303	2.91999	28.2870	31.1980	5.78462	56.2110	1.8228E 05	2.7766E 05	2.6981E 06	48000
5000	2.3709	2.95048	28.4063	31.3418	5.83329	56.4481	1.9231E 05	2.9166E 05	2.8224E 06	50000
6000	2.5899	3.02834	28.9505	31.9788	6.01781	57.5294	2.4184E 05	3.4107E 05	3.4518E 06	60000
7000	2.8217	3.07905	29.4216	32.5006	6.11858	58.5655	2.8920E 05	4.2830E 05	4.0926E 06	70000
8000	3.0536	3.10064	29.8344	32.9350	6.16149	59.5858	3.3395E 05	4.9292E 05	4.7429E 06	80000
9000	3.2786	3.10434	30.1999	33.3043	6.16883	60.0122	3.7635E 05	5.5519E 05	5.4011E 06	90000
10000	3.4932	3.09817	30.5267	33.6249	6.15658	60.4617	4.1694E 05	6.1566E 05	6.0642E 06	100000
15000	4.4103	3.05737	31.7735	34.8309	6.07550	61.1392	6.1325E 05	9.1132E 05	9.4709E 06	150000
20000	5.2024	3.11220	32.6580	35.7702	6.18445	64.8969	8.3946E 05	1.2349E 06	1.2979E 07	200000
30000	7.0081	3.18258	33.6647	37.3473	6.22175	67.5034	1.4204E 06	2.0185E 06	2.8231E 07	300000
40000	9.2897	3.25680	34.9706	38.5774	7.06795	69.4923	2.0323E 06	2.8272E 06	2.7797E 07	400000
50000	11.8289	3.29313	35.7701	39.3632	7.14015	71.0810	2.5765E 06	3.5701E 06	3.5541E 07	500000
60000	14.4033	3.35875	36.4228	39.9815	7.07172	72.3701	3.0508E 06	4.2431E 06	4.3427E 07	600000
80000	19.2053	3.43120	37.4297	40.8609	6.81835	74.3790	4.5477E 06	5.4547E 06	5.9503E 07	800000
100000	23.3184	3.46681	38.1816	41.4884	6.57118	75.0732	6.5840E 06	6.5712E 06	7.5873E 07	1000000
150000	30.9052	3.08777	39.4770	42.5647	6.13592	78.4473	6.2231E 06	9.2039E 06	1.1767E 08	1500000
200000	35.8988	2.95762	40.3460	43.3036	5.87728	80.1741	7.7802E 06	1.1755E 07	1.6035E 08	2000000
300000	41.9238	2.81537	41.5148	44.3301	5.59460	82.4967	1.0822E 07	1.6784E 07	2.4749E 08	3000000
400000	45.3903	2.74012	42.3134	45.0535	5.44508	84.0838	1.3832E 07	2.1780E 07	3.3634E 08	4000000
500000	47.6333	2.69376	42.9195	45.6133	5.35295	85.2882	1.6829E 07	2.6745E 07	4.2644E 08	5000000
600000	49.2011	2.66237	43.4077	46.0701	5.29057	86.2583	1.9820E 07	3.1743E 07	5.1755E 08	6000000
800000	51.2445	2.62260	44.1676	46.7902	5.21155	87.7684	2.5795E 07	4.1692E 07	7.0215E 08	8000000
1000000	52.5212	2.59867	44.7501	47.3485	5.16359	88.9258	3.1764E 07	5.1636E 07	8.8726E 08	10000000

TABLE 26. IDEAL GAS FUNCTIONS FOR AR 3+ (ATOMIC WEIGHT 39.9480, $R = 1.98717$ CAL/MOLE) SEE TABLE 70 FOR LIST OF STATES USED.

BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4.											SEE TABLE 70 FOR LIST OF STATES USED.											
TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2-E_0}{RT}$	$-\frac{F^\circ-E_0}{RT}$	$S^\circ R$	$(h^2-E_0)/T$	$-(F^\circ-E_0)/T$	S°	h^2-E_0	$-(F^\circ-E_0)$	S°	TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2-E_0}{RT}$	$-\frac{F^\circ-E_0}{RT}$	$S^\circ R$	$(h^2-E_0)/T$	$-(F^\circ-E_0)/T$	S°	h^2-E_0	$-(F^\circ-E_0)$	S°	
5000	3.9305	2.92300	24.5280	27.4510	5.80849	48.7413	54.5448	1.9107E 04	2.9042E 04	2.4371E 05	9000	4.7434	2.73501	26.1855	28.9705	5.43431	52.0349	57.4698	3.1030E 04	4.8914E 04	4.6431E 05	9000
5200	3.9949	2.90673	24.6424	27.5491	5.77616	48.9484	54.7446	1.9703E 04	3.0034E 04	2.5444E 05	9200	4.7677	2.72990	26.2456	28.9755	5.42476	52.1543	57.5790	3.1626E 04	4.9908E 04	4.7982E 05	9200
5400	4.0556	2.89167	24.7518	27.6434	5.74623	49.1859	54.9321	2.0299E 04	3.1030E 04	2.6560E 05	9400	4.7911	2.72501	26.3042	29.0292	5.41504	52.2708	57.6859	3.2222E 04	5.0901E 04	4.9135E 05	9400
5600	4.1127	2.87748	24.8567	27.7344	5.71843	49.3567	55.1128	2.0899E 04	3.2023E 04	2.7641E 05	9600	4.8136	2.72032	26.3615	29.0819	5.40573	52.3847	57.7905	3.2818E 04	5.1895E 04	5.0289E 05	9600
5800	4.1666	2.86466	24.9574	27.8221	5.69255	49.5545	55.2871	2.1491E 04	3.3017E 04	2.8768E 05	9800	4.8353	2.71583	26.4176	29.1334	5.39681	52.4961	57.8929	3.3414E 04	5.2888E 04	5.1446E 05	9800
6000	4.2176	2.85250	25.0543	27.9068	5.66840	49.7871	55.4555	2.2087E 04	3.4010E 04	2.9937E 05	10000	4.8562	2.71152	26.4724	29.1839	5.38824	52.6051	57.9933	3.4011E 04	5.3882E 04	5.2408E 05	10000
6200	4.2659	2.84113	25.1477	27.9888	5.64580	49.9726	55.6184	2.2680E 04	3.5004E 04	3.1157E 05	10500	4.9054	2.70146	26.6045	29.3059	5.36825	52.8075	58.2357	3.5018E 04	5.6347E 04	5.5511E 05	10500
6400	4.3115	2.83047	25.2377	28.0682	5.62462	50.1515	55.7761	2.3280E 04	3.5998E 04	3.2427E 05	11000	4.9505	2.69233	26.7299	29.4272	5.35011	53.1168	58.4649	3.6992E 04	5.8851E 04	5.8425E 05	11000
6600	4.3549	2.82046	25.3247	28.1451	5.60472	50.3247	55.9290	2.3874E 04	3.6991E 04	3.3744E 05	11500	4.9921	2.68401	26.8494	29.5334	5.33357	53.3542	58.6878	3.8484E 04	6.1336E 04	6.1337E 05	11500
6800	4.3961	2.81103	25.4087	28.2198	5.58599	50.4913	56.0773	2.4472E 04	3.7988E 04	3.5104E 05	12000	5.0305	2.67641	26.9635	29.6399	5.31846	53.5809	58.9093	3.9974E 04	6.3822E 04	6.4397E 05	12000
7000	4.4354	2.80215	25.4901	28.2922	5.56833	50.6530	56.2213	2.5084E 04	3.8978E 04	3.6457E 05	12500	5.0661	2.66944	27.0726	29.7420	5.30463	53.7977	59.1223	4.1468E 04	6.6308E 04	6.7247E 05	12500
7200	4.4728	2.79375	25.5689	28.3622	5.55165	50.8096	56.3613	2.5644E 04	3.9972E 04	3.7858E 05	13000	5.0993	2.66306	27.1772	29.8402	5.29194	54.0055	59.2974	4.2962E 04	6.8799E 04	7.0207E 05	13000
7400	4.5084	2.78581	25.6453	28.4311	5.53597	50.9615	56.4974	2.6240E 04	4.0963E 04	3.9309E 05	13500	5.1302	2.65720	27.2776	29.9348	5.28029	54.2050	59.4953	4.4457E 04	7.1284E 04	7.3177E 05	13500
7600	4.5425	2.77829	25.7195	28.4978	5.52093	51.1090	56.6299	2.6857E 04	4.1953E 04	4.0813E 05	14000	5.1591	2.65182	27.3741	30.0259	5.26961	54.3968	59.6645	4.5954E 04	7.3775E 04	7.6157E 05	14000
7800	4.5750	2.77116	25.7916	28.5628	5.50675	51.2522	56.7589	2.7453E 04	4.2953E 04	4.2377E 05	14500	5.1862	2.64690	27.4671	30.1140	5.25983	54.5816	59.8414	4.7454E 04	7.6268E 04	7.9143E 05	14500
8000	4.6061	2.76438	25.8617	28.6261	5.49328	51.3914	56.8847	2.8049E 04	4.3944E 04	4.3944E 05	15000	5.2117	2.64241	27.5567	30.1991	5.25090	54.7598	60.0104	4.8954E 04	7.8735E 04	8.2140E 05	15000
8200	4.6359	2.75793	25.9299	28.6878	5.48046	51.5269	57.0074	2.8644E 04	4.4940E 04	4.5232E 05	15500	5.2357	2.63831	27.6433	30.2816	5.24277	54.9318	60.1744	5.0454E 04	8.1263E 04	8.5144E 05	15500
8400	4.6645	2.75179	25.9962	28.7480	5.46826	51.6588	57.1271	2.9241E 04	4.5933E 04	4.6330E 05	16000	5.2583	2.63461	27.7270	30.3616	5.23541	55.0981	60.3335	5.1954E 04	8.3767E 04	8.8157E 05	16000
8600	4.6918	2.74593	26.0609	28.8069	5.45663	51.7874	57.2440	2.9837E 04	4.6927E 04	4.7409E 05	16500	5.2800	2.63126	27.8080	30.4393	5.22879	55.2591	60.4879	5.3481E 04	8.6275E 04	9.1170E 05	16500
8800	4.7181	2.74035	26.1240	28.8643	5.44552	51.9127	57.3582	3.0434E 04	4.7921E 04	4.8479E 05	17000	5.3005	2.62832	27.8865	30.5168	5.22291	55.4151	60.6380	5.5008E 04	8.8796E 04	9.4208E 05	17000
9000	4.7434	2.73501	26.1855	28.9205	5.43431	52.0349	57.4698	3.1030E 04	4.8914E 04	4.9431E 05	17500	5.3200	2.62372	27.9627	30.5948	5.21774	55.5665	60.7842	5.6538E 04	9.1310E 04	9.7241E 05	17500
9200	4.7677	2.72990	26.2456	28.9755	5.42476	52.1543	57.5790	3.1626E 04	4.9908E 04	5.0908E 05	18000	5.3398	2.62347	28.0366	30.6601	5.21328	55.7134	60.9267	5.8070E 04	1.0028E 06	1.0028E 06	18000
9400	4.7911	2.72501	26.3042	29.0292	5.41504	52.2708	57.6859	3.2222E 04	5.0901E 04	5.2409E 05	18500	5.3567	2.62158	28.1085	30.7300	5.20951	55.8562	61.0657	5.9604E 04	1.0337E 06	1.0337E 06	18500
9600	4.8136	2.72032	26.3615	29.0819	5.40573	52.3847	57.7905	3.2818E 04	5.1895E 04	5.4022E 05	19000	5.3740	2.62003	28.1784	30.7984	5.20644	56.0051	61.2015	6.1146E 04	1.0639E 06	1.0639E 06	19000
9800	4.8353	2.71583	26.4176	29.1334	5.39681	52.4961	57.8929	3.3414E 04	5.2888E 04	5.5674E 05	19500	5.3907	2.61883	28.2464	30.8652	5.20405	56.1303	61.3343	6.2729E 04	1.0945E 06	1.0945E 06	19500

TABLE 27. IDEAL GAS FUNCTIONS FOR C₆ (ATOMIC WEIGHT 12.0079, R = 1.98717 CAL/MOLE)

BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4.

TEMP. (°K)	PARTIT. FUNC.	$\frac{h^2 E}{RT}$	$\ln \frac{h^2 E}{RT}$	$\frac{h^2 E}{RT}$	$\ln \frac{h^2 E}{RT}$	$\frac{h^2 E}{RT}$	$\ln \frac{h^2 E}{RT}$	$\frac{h^2 E}{RT}$	$\ln \frac{h^2 E}{RT}$	$\frac{h^2 E}{RT}$	$\ln \frac{h^2 E}{RT}$	TEMP. (°K)
5000	1.0000	2.50000	21.3564	23.8564	4.96791	42.4388	47.4885	1.4304E 04	2.4840E 04	2.4840E 04	2.1219E 05	5000
5200	1.0000	2.50000	21.4544	23.9544	4.96791	42.6335	47.6016	1.5500E 04	2.5833E 04	2.5833E 04	2.2169E 05	5200
5400	1.0000	2.50000	21.5488	24.0488	4.96791	42.8210	47.7889	1.6694E 04	2.6827E 04	2.6827E 04	2.3123E 05	5400
5600	1.0000	2.50000	21.6397	24.1397	4.96791	43.0016	47.9696	1.7888E 04	2.7820E 04	2.7820E 04	2.4081E 05	5600
5800	1.0000	2.50000	21.7274	24.2274	4.96791	43.1760	48.1439	1.9081E 04	2.8814E 04	2.8814E 04	2.5042E 05	5800
6000	1.0000	2.50000	21.8122	24.3122	4.96791	43.3444	48.3129	2.0275E 04	2.9807E 04	2.9807E 04	2.6007E 05	6000
6200	1.0000	2.50000	21.8941	24.3941	4.96791	43.5073	48.4752	2.1468E 04	3.0801E 04	3.0801E 04	2.6975E 05	6200
6400	1.0000	2.50000	21.9735	24.4735	4.96791	43.6650	48.6329	2.2659E 04	3.1795E 04	3.1795E 04	2.7944E 05	6400
6600	1.0000	2.50000	22.0504	24.5504	4.96791	43.8179	48.7858	2.3854E 04	3.2788E 04	3.2788E 04	2.8913E 05	6600
6800	1.0000	2.50000	22.1251	24.6251	4.96791	43.9662	48.9341	2.5049E 04	3.3782E 04	3.3782E 04	2.9882E 05	6800
7000	1.0000	2.50000	22.1975	24.6975	4.96791	44.1102	49.0781	2.6244E 04	3.4775E 04	3.4775E 04	3.0852E 05	7000
7200	1.0000	2.50000	22.2680	24.7680	4.96791	44.2502	49.2181	2.7439E 04	3.5768E 04	3.5768E 04	3.1822E 05	7200
7400	1.0000	2.50000	22.3365	24.8365	4.96791	44.3863	49.3542	2.8634E 04	3.6761E 04	3.6761E 04	3.2792E 05	7400
7600	1.0000	2.50000	22.4031	24.9031	4.96791	44.5188	49.4867	2.9829E 04	3.7754E 04	3.7754E 04	3.3762E 05	7600
7800	1.0000	2.50000	22.4681	24.9681	4.96791	44.6478	49.6157	3.1024E 04	3.8747E 04	3.8747E 04	3.4732E 05	7800
8000	1.0000	2.50000	22.5314	25.0314	4.96791	44.7736	49.7415	3.2219E 04	3.9740E 04	3.9740E 04	3.5702E 05	8000
8200	1.0000	2.50000	22.5931	25.0931	4.96791	44.8962	49.8642	3.3414E 04	4.0733E 04	4.0733E 04	3.6672E 05	8200
8400	1.0000	2.50000	22.6534	25.1534	4.96791	45.0160	49.9839	3.4609E 04	4.1726E 04	4.1726E 04	3.7642E 05	8400
8600	1.0000	2.50000	22.7122	25.2122	4.96791	45.1329	50.1008	3.5804E 04	4.2719E 04	4.2719E 04	3.8612E 05	8600
8800	1.0000	2.50000	22.7697	25.2697	4.96791	45.2471	50.2150	3.7000E 04	4.3712E 04	4.3712E 04	3.9582E 05	8800
9000	1.0000	2.50000	22.8256	25.3256	4.96791	45.3587	50.3264	3.8195E 04	4.4705E 04	4.4705E 04	4.0552E 05	9000
9200	1.0000	2.50000	22.8808	25.3808	4.96791	45.4679	50.4358	3.9388E 04	4.5698E 04	4.5698E 04	4.1522E 05	9200
9400	1.0000	2.50000	22.9345	25.4345	4.96791	45.5757	50.5427	4.0581E 04	4.6691E 04	4.6691E 04	4.2492E 05	9400
9600	1.0000	2.50000	22.9872	25.4872	4.96791	45.6813	50.6472	4.1774E 04	4.7684E 04	4.7684E 04	4.3462E 05	9600
9800	1.0000	2.50000	23.0387	25.5387	4.96791	45.7818	50.7497	4.2967E 04	4.8677E 04	4.8677E 04	4.4432E 05	9800
10000	1.0000	2.50000	23.0892	25.5892	4.96791	45.8823	50.8500	4.4160E 04	4.9670E 04	4.9670E 04	4.5402E 05	10000
10500	1.0000	2.50000	23.2112	25.7112	4.96791	46.1245	51.0924	4.6353E 04	5.1863E 04	5.1863E 04	4.7595E 05	10500
11000	1.0000	2.50000	23.3275	25.8275	4.96791	46.3596	51.3255	4.8546E 04	5.4056E 04	5.4056E 04	4.9788E 05	11000
11500	1.0000	2.50000	23.4386	25.9386	4.96791	46.5783	51.5444	5.0739E 04	5.6249E 04	5.6249E 04	5.1981E 05	11500
12000	1.0000	2.50000	23.5450	26.0450	4.96791	46.7819	51.7558	5.2932E 04	5.8442E 04	5.8442E 04	5.4174E 05	12000
12500	1.0000	2.50000	23.6471	26.1471	4.96791	46.9807	51.9586	5.5125E 04	6.0635E 04	6.0635E 04	5.6367E 05	12500
13000	1.0000	2.50000	23.7451	26.2451	4.96791	47.1855	52.1530	5.7318E 04	6.2828E 04	6.2828E 04	5.8560E 05	13000
13500	1.0000	2.50000	23.8395	26.3395	4.96791	47.3750	52.3409	5.9511E 04	6.5021E 04	6.5021E 04	6.0753E 05	13500
14000	1.0000	2.50000	23.9304	26.4304	4.96791	47.5537	52.5216	6.1704E 04	6.7214E 04	6.7214E 04	6.2946E 05	14000
14500	1.0000	2.50000	24.0181	26.5181	4.96791	47.7280	52.6959	6.3897E 04	6.9407E 04	6.9407E 04	6.5139E 05	14500
15000	1.0000	2.50000	24.1029	26.6029	4.96791	47.8984	52.8644	6.6090E 04	7.1600E 04	7.1600E 04	6.7332E 05	15000
15500	1.0000	2.50000	24.1849	26.6849	4.96791	48.0593	53.0273	6.8283E 04	7.3793E 04	7.3793E 04	6.9525E 05	15500
16000	1.0000	2.50000	24.2642	26.7642	4.96791	48.2171	53.1850	7.0476E 04	7.5986E 04	7.5986E 04	7.1718E 05	16000
16500	1.0000	2.50000	24.3412	26.8412	4.96791	48.3699	53.3379	7.2669E 04	7.8179E 04	7.8179E 04	7.3911E 05	16500
17000	1.0000	2.50000	24.4158	26.9158	4.96791	48.5182	53.4862	7.4862E 04	8.0372E 04	8.0372E 04	7.6104E 05	17000
17500	1.0000	2.50000	24.4883	26.9883	4.96791	48.6623	53.6302	7.7055E 04	8.2565E 04	8.2565E 04	7.8297E 05	17500
18000	1.0000	2.50000	24.5587	27.0587	4.96791	48.8022	53.7701	7.9248E 04	8.4758E 04	8.4758E 04	8.0490E 05	18000
18500	1.0000	2.50000	24.6272	27.1272	4.96791	48.9383	53.9062	8.1441E 04	8.6951E 04	8.6951E 04	8.2683E 05	18500
19000	1.0000	2.50000	24.6939	27.1939	4.96791	49.0708	54.0387	8.3634E 04	8.9144E 04	8.9144E 04	8.4876E 05	19000
19500	1.0000	2.50000	24.7588	27.2588	4.96791	49.1998	54.1678	8.5827E 04	9.1337E 04	9.1337E 04	8.7069E 05	19500

TABLE 27 (CONT.). IDEAL GAS FUNCTIONS FOR C 6

TEMP. (°K)	PARTIAL FUNCT.	$\frac{h^2 - \epsilon^2}{RT}$	$-\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	TEMP. (°K)
20000	1.0000	2.50000	26.8771	27.3221	4.96791	49.3256	54.2039	5.9619E 04	9.9359E 04	9.8651E 05
22000	1.0000	2.50000	23.0604	27.5604	4.96791	49.7991	57.6770	6.0924E 04	1.0924E 05	22000
24000	1.0000	2.50000	20.2779	27.7779	4.96791	50.2314	55.1993	7.1538E 04	1.2054E 05	24000
26000	1.0000	2.50000	18.4780	27.9780	4.96791	50.6290	53.5969	7.7498E 04	1.2917E 05	26000
28000	1.0000	2.50000	16.6633	28.1633	4.96791	50.9972	55.9651	8.3461E 04	1.3164E 05	28000
30000	1.0000	2.50000	15.8358	28.3358	4.96791	51.3399	58.3079	8.9422E 04	1.3910E 05	30000
32000	1.0000	2.50000	15.0071	28.4971	4.96791	51.6604	60.6285	9.5384E 04	1.4904E 05	32000
34000	1.0000	2.50000	14.1887	28.6487	4.96791	51.9717	62.9297	1.0135E 05	1.5887E 05	34000
36000	1.0000	2.50000	13.3716	28.7916	4.96791	52.2457	65.2136	1.0731E 05	1.6844E 05	36000
40000	1.0000	2.50000	12.4267	28.9267	4.96791	52.5143	67.4822	1.1327E 05	1.8870E 05	40000
42000	1.0000	2.50000	11.5550	29.0550	4.96791	52.7691	69.7370	1.1923E 05	1.9872E 05	42000
44000	1.0000	2.50000	10.6769	29.1769	4.96791	53.0115	71.9794	1.2519E 05	2.0869E 05	44000
46000	1.0000	2.50000	9.7932	29.2932	4.96791	53.2426	74.2105	1.3115E 05	2.1859E 05	46000
48000	1.0000	2.50000	8.9044	29.4044	4.96791	53.4634	76.4314	1.3711E 05	2.2852E 05	48000
50000	1.0000	2.50000	8.0108	29.5108	4.96791	53.6749	78.6426	1.4308E 05	2.3844E 05	50000
60000	1.0000	2.50000	6.1128	29.6128	4.96791	53.8777	80.8456	1.4904E 05	2.4840E 05	60000
70000	1.0000	2.50000	4.2146	29.7146	4.96791	54.0734	83.0405	1.5500E 05	2.5836E 05	70000
80000	1.0000	2.50000	2.3164	29.8164	4.96791	54.2622	85.2281	1.6096E 05	2.6832E 05	80000
90000	1.0000	2.50000	0.4182	29.9182	4.96791	54.4510	87.4179	1.6692E 05	2.7828E 05	90000
100000	1.0000	2.50000	-1.4800	30.0200	4.96791	54.6400	89.6096	1.7288E 05	2.8824E 05	100000
150000	1.0000	2.50000	-5.3818	30.5218	4.96791	55.1418	95.1418	1.8374E 05	3.0820E 05	150000
200000	1.0000	2.50000	-9.2836	31.0236	4.96791	55.6436	100.6736	1.9460E 05	3.2816E 05	200000
300000	1.0000	2.50000	-13.1854	31.5254	4.96791	56.1454	106.2054	2.0546E 05	3.4812E 05	300000
400000	1.0000	2.50000	-17.0872	32.0272	4.96791	56.6472	111.7372	2.1632E 05	3.6808E 05	400000
500000	1.0000	2.50000	-20.9890	32.5290	4.96791	57.1490	117.2690	2.2718E 05	3.8804E 05	500000
600000	1.0000	2.50000	-24.8908	33.0308	4.96791	57.6508	122.8008	2.3804E 05	4.0800E 05	600000
700000	1.0000	2.50000	-28.7926	33.5326	4.96791	58.1526	128.3326	2.4890E 05	4.2796E 05	700000
800000	1.0000	2.50000	-32.6944	34.0344	4.96791	58.6544	133.8644	2.5976E 05	4.4792E 05	800000
900000	1.0000	2.50000	-36.5962	34.5362	4.96791	59.1562	139.3962	2.7062E 05	4.6788E 05	900000
1000000	1.0000	2.50000	-40.4980	35.0380	4.96791	59.6580	144.9280	2.8148E 05	4.8784E 05	1000000
1500000	1.0000	2.50000	-54.4000	35.5400	4.96791	60.1600	150.4600	2.9234E 05	5.0780E 05	1500000
2000000	1.0000	2.50000	-68.3020	36.0420	4.96791	60.6620	155.9920	3.0320E 05	5.2776E 05	2000000
3000000	1.0000	2.50000	-92.2040	36.5440	4.96791	61.1640	161.5240	3.1406E 05	5.4772E 05	3000000
4000000	1.0000	2.50000	-116.1060	37.0460	4.96791	61.6660	167.0560	3.2492E 05	5.6768E 05	4000000
5000000	1.0000	2.50000	-140.0080	37.5480	4.96791	62.1680	172.5880	3.3578E 05	5.8764E 05	5000000
6000000	1.0000	2.50000	-163.9100	38.0500	4.96791	62.6700	178.1200	3.4664E 05	6.0760E 05	6000000
7000000	1.0000	2.50000	-187.8120	38.5520	4.96791	63.1720	183.6520	3.5750E 05	6.2756E 05	7000000
8000000	1.0000	2.50000	-211.7140	39.0540	4.96791	63.6740	189.1840	3.6836E 05	6.4752E 05	8000000
9000000	1.0000	2.50000	-235.6160	39.5560	4.96791	64.1760	194.7160	3.7922E 05	6.6748E 05	9000000
10000000	1.0000	2.50000	-259.5180	40.0580	4.96791	64.6780	200.2480	3.9008E 05	6.8744E 05	10000000
15000000	1.0000	2.50000	-343.4200	40.5600	4.96791	65.1800	205.7800	4.0094E 05	7.0740E 05	15000000
20000000	1.0000	2.50000	-427.3220	41.0620	4.96791	65.6820	211.3120	4.1180E 05	7.2736E 05	20000000
30000000	1.0000	2.50000	-571.2240	41.5640	4.96791	66.1840	216.8440	4.2266E 05	7.4732E 05	30000000
40000000	1.0000	2.50000	-715.1260	42.0660	4.96791	66.6860	222.3760	4.3352E 05	7.6728E 05	40000000
50000000	1.0000	2.50000	-859.0280	42.5680	4.96791	67.1880	227.9080	4.4438E 05	7.8724E 05	50000000
60000000	1.0000	2.50000	-1002.9300	43.0700	4.96791	67.6900	233.4400	4.5524E 05	8.0720E 05	60000000
70000000	1.0000	2.50000	-1146.8320	43.5720	4.96791	68.1920	238.9720	4.6610E 05	8.2716E 05	70000000
80000000	1.0000	2.50000	-1290.7340	44.0740	4.96791	68.6940	244.5040	4.7696E 05	8.4712E 05	80000000
90000000	1.0000	2.50000	-1434.6360	44.5760	4.96791	69.1960	250.0360	4.8782E 05	8.6708E 05	90000000
100000000	1.0000	2.50000	-1578.5380	45.0780	4.96791	69.6980	255.5680	4.9868E 05	8.8704E 05	100000000
150000000	1.0000	2.50000	-2116.4400	45.5800	4.96791	70.2000	261.1000	5.0954E 05	9.0700E 05	150000000
200000000	1.0000	2.50000	-2654.3420	46.0820	4.96791	70.7020	266.6320	5.2040E 05	9.2696E 05	200000000
300000000	1.0000	2.50000	-3792.2440	46.5840	4.96791	71.2040	272.1640	5.3126E 05	9.4692E 05	300000000
400000000	1.0000	2.50000	-4930.1460	47.0860	4.96791	71.7060	277.6960	5.4212E 05	9.6688E 05	400000000
500000000	1.0000	2.50000	-6068.0480	47.5880	4.96791	72.2080	283.2280	5.5298E 05	9.8684E 05	500000000
600000000	1.0000	2.50000	-7205.9500	48.0900	4.96791	72.7100	288.7600	5.6384E 05	1.00680E 06	600000000
700000000	1.0000	2.50000	-8343.8520	48.5920	4.96791	73.2120	294.2920	5.7470E 05	1.02680E 06	700000000
800000000	1.0000	2.50000	-9481.7540	49.0940	4.96791	73.7140	299.8240	5.8556E 05	1.04680E 06	800000000
900000000	1.0000	2.50000	-10619.6560	49.5960	4.96791	74.2160	305.3560	5.9642E 05	1.06680E 06	900000000
1000000000	1.0000	2.50000	-11757.5580	50.0980	4.96791	74.7180	310.8880	6.0728E 05	1.08680E 06	1000000000
1500000000	1.0000	2.50000	-15595.4600	50.6000	4.96791	75.2200	316.4200	6.1814E 05	1.10680E 06	1500000000
2000000000	1.0000	2.50000	-19433.3620	51.1020	4.96791	75.7220	321.9520	6.2900E 05	1.12680E 06	2000000000
3000000000	1.0000	2.50000	-27271.2640	51.6040	4.96791	76.2240	327.4840	6.3986E 05	1.14680E 06	3000000000
4000000000	1.0000	2.50000	-35109.1660	52.1060	4.96791	76.7260	333.0160	6.5072E 05	1.16680E 06	4000000000
5000000000	1.0000	2.50000	-42947.0680	52.6080	4.96791	77.2280	338.5480	6.6158E 05	1.18680E 06	5000000000
6000000000	1.0000	2.50000	-50784.9700	53.1100	4.96791	77.7300	344.0800	6.7244E 05	1.20680E 06	6000000000
7000000000	1.0000	2.50000	-58622.8720	53.6120	4.96791	78.2320	349.6120	6.8330E 05	1.22680E 06	7000000000
8000000000	1.0000	2.50000	-66460.7740	54.1140	4.96791	78.7340	355.1440	6.9416E 05	1.24680E 06	8000000000
9000000000	1.0000	2.50000	-74298.6760	54.6160	4.96791	79.2360	360.6760	7.0502E 05	1.26680E 06	9000000000
10000000000	1.0000	2.50000	-82136.5780	55.1180	4.96791	79.7380	366.2080	7.1588E 05	1.28680E 06	10000000000
15000000000	1.0000	2.50000	-107914.4800	55.6200	4.96791	80.2400	371.7400	7.2674E 05	1.30680E 06	15000000000
20000000000	1.0000	2.50000	-133692.3820	56.1220	4.96791	80.7420	377.2720	7.3760E 05	1.32680E 06	20000000000
30000000000	1.0000	2.50000	-185470.2840	56.6240	4.96791	81.2440	382.8040	7.4846E 05	1.34680E 06	30000000000
40000000000	1.0000	2.50000	-237248.1860	57.1260	4.96791	81.7460	388.3360	7.5932E 05	1.36680E 06	40000000000
50000000000	1.0000	2.50000	-289026.0880	57.6280	4.96791	82.2480	393.8680	7.7018E 05	1.38680E 06	50000000000
60000000000	1.0000	2.50000	-340803.9900	58.1300	4.96791	82.7500	399.4000	7.8104E 05	1.40680E 06	60000000000
70000000000	1.0000	2.50000	-392581.8920	58.6320	4.96791	83.2520	404.9320	7.9190E 05	1.42680E 06	70000000000
80000000000	1.0000	2.50000	-444359.7940	59.1340	4.96791	83.7540	410.4640	8.0276E 05	1.44680E 06	80000000000
90000000000	1.0000	2.50000	-496137.6960	59.6360	4.96791	84.2560	415.9960	8.1362E 05	1.46680E 06	90000000000
100000000000	1.0000	2.50000	-547915.5980	60.1380	4.96791	84.7580	421.5280	8.2448E 05	1.48680E 06	100000000000
150000000000	1.0000	2.50000	-740293.5000	60.6400	4.96791	85.2600	427.0600	8.3534E 05	1.50680E 06	150000000000
200000000000	1.0000	2.50000	-932671.4020	61.1420	4.96791	85.7620	432.5920	8.4620E 05	1.52680E 06	200000000000
300000000000	1.0000	2								

TABLE 20. IDEAL GAS FUNCTIONS FOR N 6+ (ATOMIC WEIGHT 14.0034, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 71 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{U^0-E^0}{RT}$	$\frac{U^0-E^0}{T}$	S^0	$\ln \frac{U^0-E^0}{T}$	$\ln \frac{U^0-E^0}{T} - \frac{U^0-E^0}{T}$	$\frac{U^0-E^0}{T} - \frac{U^0-E^0}{T}$	$\frac{U^0-E^0}{T} - \frac{U^0-E^0}{T}$	$\frac{U^0-E^0}{T} - \frac{U^0-E^0}{T}$	TEMP. (°K)
5000	2.0000	2.50000	22.2801	24.7801	4.96791	4.96791	4.96791	4.96791	4.96791	5000
5200	2.0000	2.50000	22.3762	24.8791	4.96791	4.96791	4.96791	4.96791	4.96791	5200
5400	2.0000	2.50000	22.4725	24.9725	4.96791	4.96791	4.96791	4.96791	4.96791	5400
5600	2.0000	2.50000	22.5634	25.0634	4.96791	4.96791	4.96791	4.96791	4.96791	5600
5800	2.0000	2.50000	22.6512	25.1512	4.96791	4.96791	4.96791	4.96791	4.96791	5800
6000	2.0000	2.50000	22.7359	25.2359	4.96791	4.96791	4.96791	4.96791	4.96791	6000
6200	2.0000	2.50000	22.8179	25.3179	4.96791	4.96791	4.96791	4.96791	4.96791	6200
6400	2.0000	2.50000	22.8973	25.3973	4.96791	4.96791	4.96791	4.96791	4.96791	6400
6600	2.0000	2.50000	22.9742	25.4742	4.96791	4.96791	4.96791	4.96791	4.96791	6600
6800	2.0000	2.50000	23.0498	25.5488	4.96791	4.96791	4.96791	4.96791	4.96791	6800
7000	2.0000	2.50000	23.1213	25.6213	4.96791	4.96791	4.96791	4.96791	4.96791	7000
7200	2.0000	2.50000	23.1897	25.6917	4.96791	4.96791	4.96791	4.96791	4.96791	7200
7400	2.0000	2.50000	23.2602	25.7602	4.96791	4.96791	4.96791	4.96791	4.96791	7400
7600	2.0000	2.50000	23.3269	25.8269	4.96791	4.96791	4.96791	4.96791	4.96791	7600
7800	2.0000	2.50000	23.3918	25.8918	4.96791	4.96791	4.96791	4.96791	4.96791	7800
8000	2.0000	2.50000	23.4551	25.9551	4.96791	4.96791	4.96791	4.96791	4.96791	8000
8200	2.0000	2.50000	23.5169	26.0169	4.96791	4.96791	4.96791	4.96791	4.96791	8200
8400	2.0000	2.50000	23.5771	26.0771	4.96791	4.96791	4.96791	4.96791	4.96791	8400
8600	2.0000	2.50000	23.6359	26.1359	4.96791	4.96791	4.96791	4.96791	4.96791	8600
8800	2.0000	2.50000	23.6934	26.1934	4.96791	4.96791	4.96791	4.96791	4.96791	8800
9000	2.0000	2.50000	23.7496	26.2496	4.96791	4.96791	4.96791	4.96791	4.96791	9000
9200	2.0000	2.50000	23.8045	26.3045	4.96791	4.96791	4.96791	4.96791	4.96791	9200
9400	2.0000	2.50000	23.8583	26.3583	4.96791	4.96791	4.96791	4.96791	4.96791	9400
9600	2.0000	2.50000	23.9109	26.4109	4.96791	4.96791	4.96791	4.96791	4.96791	9600
9800	2.0000	2.50000	23.9625	26.4625	4.96791	4.96791	4.96791	4.96791	4.96791	9800
10000	2.0000	2.50000	24.0130	26.5130	4.96791	4.96791	4.96791	4.96791	4.96791	10000
10500	2.0000	2.50000	24.1350	26.6350	4.96791	4.96791	4.96791	4.96791	4.96791	10500
11000	2.0000	2.50000	24.2512	26.7512	4.96791	4.96791	4.96791	4.96791	4.96791	11000
11500	2.0000	2.50000	24.3624	26.8624	4.96791	4.96791	4.96791	4.96791	4.96791	11500
12000	2.0000	2.50000	24.4688	26.9688	4.96791	4.96791	4.96791	4.96791	4.96791	12000
12500	2.0000	2.50000	24.5709	27.0709	4.96791	4.96791	4.96791	4.96791	4.96791	12500
13000	2.0000	2.50000	24.6689	27.1689	4.96791	4.96791	4.96791	4.96791	4.96791	13000
13500	2.0000	2.50000	24.7633	27.2633	4.96791	4.96791	4.96791	4.96791	4.96791	13500
14000	2.0000	2.50000	24.8542	27.3542	4.96791	4.96791	4.96791	4.96791	4.96791	14000
14500	2.0000	2.50000	24.9419	27.4419	4.96791	4.96791	4.96791	4.96791	4.96791	14500
15000	2.0000	2.50000	25.0267	27.5267	4.96791	4.96791	4.96791	4.96791	4.96791	15000
15500	2.0000	2.50000	25.1086	27.6086	4.96791	4.96791	4.96791	4.96791	4.96791	15500
16000	2.0000	2.50000	25.1880	27.6880	4.96791	4.96791	4.96791	4.96791	4.96791	16000
16500	2.0000	2.50000	25.2649	27.7649	4.96791	4.96791	4.96791	4.96791	4.96791	16500
17000	2.0000	2.50000	25.3396	27.8396	4.96791	4.96791	4.96791	4.96791	4.96791	17000
17500	2.0000	2.50000	25.4120	27.9120	4.96791	4.96791	4.96791	4.96791	4.96791	17500
18000	2.0000	2.50000	25.4825	27.9825	4.96791	4.96791	4.96791	4.96791	4.96791	18000
18500	2.0000	2.50000	25.5510	28.0510	4.96791	4.96791	4.96791	4.96791	4.96791	18500
19000	2.0000	2.50000	25.6176	28.1176	4.96791	4.96791	4.96791	4.96791	4.96791	19000
19500	2.0000	2.50000	25.6826	28.1826	4.96791	4.96791	4.96791	4.96791	4.96791	19500

TABLE 28 (CONT.). IDEAL GAS FUNCTIONS FOR N_2 +[illegible]

TABLE 29. IDEAL GAS FUNCTIONS FOR O⁺ (ATOMIC WEIGHT 15.9946, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 72 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2 - E_0}{RT}$	$\frac{h^2 - E_0}{RT} - \frac{E^0 - E_0}{RT}$	S^0/R	$(h^2 - E_0)/RT - (h^2 - E_0)/RT$	S^0	$E^0 - E_0$	$\frac{h^2 - E_0}{RT} - \frac{h^2 - E_0}{RT}$	$\frac{h^2 - E_0}{RT} - \frac{h^2 - E_0}{RT}$	TEMP. (°K)
5000	1.0000	2.50000	21.7865	24.2845	4.96791	48.2614	1.4944E 04	2.5840E 04	2.1647E 05	5000
5200	1.0000	2.50000	21.8846	24.3846	4.96791	48.3562	1.5500E 04	2.5833E 04	2.2614E 05	5200
5400	1.0000	2.50000	21.9789	24.4789	4.96791	48.4537	1.6096E 04	2.5827E 04	2.3580E 05	5400
5600	1.0000	2.50000	22.0699	24.5699	4.96791	48.5565	1.6732E 04	2.5820E 04	2.4548E 05	5600
5800	1.0000	2.50000	22.1576	24.6576	4.96791	48.6657	1.7408E 04	2.5813E 04	2.5530E 05	5800
6000	1.0000	2.50000	22.2423	24.7423	4.96791	48.7817	1.8125E 04	2.5807E 04	2.6520E 05	6000
6200	1.0000	2.50000	22.3243	24.8243	4.96791	48.9041	1.8881E 04	2.5801E 04	2.7508E 05	6200
6400	1.0000	2.50000	22.4037	24.9037	4.96791	49.0327	1.9677E 04	2.5795E 04	2.8493E 05	6400
6600	1.0000	2.50000	22.4806	24.9806	4.96791	49.1673	2.0513E 04	2.5789E 04	2.9484E 05	6600
6800	1.0000	2.50000	22.5553	25.0553	4.96791	49.3089	2.1389E 04	2.5783E 04	3.0479E 05	6800
7000	1.0000	2.50000	22.6277	25.1277	4.96791	49.4563	2.2304E 04	2.5777E 04	3.1474E 05	7000
7200	1.0000	2.50000	22.6982	25.1982	4.96791	49.6095	2.3258E 04	2.5771E 04	3.2469E 05	7200
7400	1.0000	2.50000	22.7667	25.2667	4.96791	49.7685	2.4250E 04	2.5765E 04	3.3464E 05	7400
7600	1.0000	2.50000	22.8333	25.3333	4.96791	49.9334	2.5280E 04	2.5759E 04	3.4459E 05	7600
7800	1.0000	2.50000	22.8983	25.3983	4.96791	50.1045	2.6348E 04	2.5753E 04	3.5454E 05	7800
8000	1.0000	2.50000	22.9616	25.4616	4.96791	50.2819	2.7454E 04	2.5747E 04	3.6449E 05	8000
8200	1.0000	2.50000	23.0233	25.5233	4.96791	50.4657	2.8598E 04	2.5741E 04	3.7444E 05	8200
8400	1.0000	2.50000	23.0835	25.5835	4.96791	50.6559	2.9780E 04	2.5735E 04	3.8439E 05	8400
8600	1.0000	2.50000	23.1424	25.6424	4.96791	50.8527	3.0991E 04	2.5729E 04	3.9434E 05	8600
8800	1.0000	2.50000	23.1998	25.6998	4.96791	51.0561	3.2231E 04	2.5723E 04	4.0429E 05	8800
9000	1.0000	2.50000	23.2560	25.7560	4.96791	51.2663	3.3501E 04	2.5717E 04	4.1424E 05	9000
9200	1.0000	2.50000	23.3110	25.8110	4.96791	51.4834	3.4801E 04	2.5711E 04	4.2419E 05	9200
9400	1.0000	2.50000	23.3647	25.8647	4.96791	51.7075	3.6131E 04	2.5705E 04	4.3414E 05	9400
9600	1.0000	2.50000	23.4174	25.9174	4.96791	51.9387	3.7491E 04	2.5699E 04	4.4409E 05	9600
9800	1.0000	2.50000	23.4689	25.9689	4.96791	52.1761	3.8881E 04	2.5693E 04	4.5404E 05	9800
10000	1.0000	2.50000	23.5194	26.0194	4.96791	52.4197	4.0301E 04	2.5687E 04	4.6399E 05	10000
10500	1.0000	2.50000	23.6416	26.1416	4.96791	52.8621	4.2231E 04	2.5681E 04	4.7394E 05	10500
11000	1.0000	2.50000	23.7577	26.2577	4.96791	53.3145	4.4191E 04	2.5675E 04	4.8389E 05	11000
11500	1.0000	2.50000	23.8688	26.3688	4.96791	53.7769	4.6181E 04	2.5669E 04	4.9384E 05	11500
12000	1.0000	2.50000	23.9752	26.4752	4.96791	54.2493	4.8201E 04	2.5663E 04	5.0379E 05	12000
12500	1.0000	2.50000	24.0773	26.5773	4.96791	54.7317	5.0251E 04	2.5657E 04	5.1374E 05	12500
13000	1.0000	2.50000	24.1753	26.6753	4.96791	55.2241	5.2331E 04	2.5651E 04	5.2369E 05	13000
13500	1.0000	2.50000	24.2697	26.7697	4.96791	55.7265	5.4431E 04	2.5645E 04	5.3364E 05	13500
14000	1.0000	2.50000	24.3606	26.8606	4.96791	56.2389	5.6551E 04	2.5639E 04	5.4359E 05	14000
14500	1.0000	2.50000	24.4483	26.9483	4.96791	56.7613	5.8691E 04	2.5633E 04	5.5354E 05	14500
15000	1.0000	2.50000	24.5331	27.0331	4.96791	57.2937	6.0851E 04	2.5627E 04	5.6349E 05	15000
15500	1.0000	2.50000	24.6151	27.1151	4.96791	57.8361	6.3031E 04	2.5621E 04	5.7344E 05	15500
16000	1.0000	2.50000	24.6944	27.1944	4.96791	58.3885	6.5231E 04	2.5615E 04	5.8339E 05	16000
16500	1.0000	2.50000	24.7714	27.2714	4.96791	58.9509	6.7451E 04	2.5609E 04	5.9334E 05	16500
17000	1.0000	2.50000	24.8460	27.3460	4.96791	59.5233	6.9691E 04	2.5603E 04	6.0329E 05	17000
17500	1.0000	2.50000	24.9185	27.4185	4.96791	60.1057	7.1951E 04	2.5597E 04	6.1324E 05	17500
18000	1.0000	2.50000	24.9889	27.4889	4.96791	60.6981	7.4231E 04	2.5591E 04	6.2319E 05	18000
18500	1.0000	2.50000	25.0574	27.5574	4.96791	61.2905	7.6531E 04	2.5585E 04	6.3314E 05	18500
19000	1.0000	2.50000	25.1240	27.6240	4.96791	61.8929	7.8851E 04	2.5579E 04	6.4309E 05	19000
19500	1.0000	2.50000	25.1890	27.6890	4.96791	62.5053	8.1191E 04	2.5573E 04	6.5304E 05	19500

TABLE 29 (CONT.). IDEAL GAS FUNCTIONS FOR O₂

TEMP. (°K)	PARTIT. FUNCT.	$\frac{U^0-E^0}{RT}$	$\frac{S^0-E^0}{RT}$	$\ln \frac{U^0-E^0}{RT} - \frac{S^0-E^0}{RT}$	$\frac{S^0-E^0}{RT} - \frac{S^0-E^0}{RT}$	$\frac{S^0-E^0}{RT} - \frac{S^0-E^0}{RT}$	$\frac{S^0-E^0}{RT} - \frac{S^0-E^0}{RT}$	$\frac{S^0-E^0}{RT} - \frac{S^0-E^0}{RT}$	TEMP. (°K)
20000	1.0000	2.50000	25.2523	4.96791	50.1805	55.1486	5.9612E 04	9.3358E 04	1.0034E 06
22000	1.0000	2.50000	25.4706	4.96791	50.5340	55.5119	5.9576E 04	9.3358E 04	1.1144E 06
24000	1.0000	2.50000	25.7081	4.96791	50.8862	55.8741	5.9534E 04	9.3358E 04	1.2281E 06
26000	1.0000	2.50000	25.9682	4.96791	51.2483	56.2362	5.9492E 04	9.3358E 04	1.3446E 06
28000	1.0000	2.50000	26.2405	4.96791	51.6205	56.6084	5.9450E 04	9.3358E 04	1.4640E 06
30000	1.0000	2.50000	26.5248	4.96791	52.0027	56.9806	5.9408E 04	9.3358E 04	1.5864E 06
32000	1.0000	2.50000	26.8211	4.96791	52.3949	57.3528	5.9366E 04	9.3358E 04	1.7118E 06
34000	1.0000	2.50000	27.1294	4.96791	52.7971	57.7249	5.9324E 04	9.3358E 04	1.8402E 06
36000	1.0000	2.50000	27.4497	4.96791	53.2093	58.0971	5.9282E 04	9.3358E 04	1.9716E 06
38000	1.0000	2.50000	27.7820	4.96791	53.6315	58.4693	5.9240E 04	9.3358E 04	2.1060E 06
40000	1.0000	2.50000	28.1263	4.96791	54.0637	58.8415	5.9198E 04	9.3358E 04	2.2434E 06
42000	1.0000	2.50000	28.4826	4.96791	54.5059	59.2137	5.9156E 04	9.3358E 04	2.3838E 06
44000	1.0000	2.50000	28.8509	4.96791	54.9581	59.5859	5.9114E 04	9.3358E 04	2.5272E 06
46000	1.0000	2.50000	29.2312	4.96791	55.4203	59.9581	5.9072E 04	9.3358E 04	2.6736E 06
48000	1.0000	2.50000	29.6235	4.96791	55.8925	60.3303	5.9030E 04	9.3358E 04	2.8230E 06
50000	1.0000	2.50000	30.0278	4.96791	56.3747	60.7025	5.8988E 04	9.3358E 04	2.9754E 06
52000	1.0000	2.50000	30.4441	4.96791	56.8669	61.0747	5.8946E 04	9.3358E 04	3.1308E 06
54000	1.0000	2.50000	30.8724	4.96791	57.3691	61.4469	5.8904E 04	9.3358E 04	3.2892E 06
56000	1.0000	2.50000	31.3127	4.96791	57.8813	61.8191	5.8862E 04	9.3358E 04	3.4506E 06
58000	1.0000	2.50000	31.7650	4.96791	58.3935	62.1913	5.8820E 04	9.3358E 04	3.6150E 06
60000	1.0000	2.50000	32.2293	4.96791	58.9157	62.5635	5.8778E 04	9.3358E 04	3.7824E 06
62000	1.0000	2.50000	32.7056	4.96791	59.4479	62.9357	5.8736E 04	9.3358E 04	3.9528E 06
64000	1.0000	2.50000	33.1939	4.96791	59.9801	63.3079	5.8694E 04	9.3358E 04	4.1262E 06
66000	1.0000	2.50000	33.6942	4.96791	60.5223	63.6801	5.8652E 04	9.3358E 04	4.3026E 06
68000	1.0000	2.50000	34.2065	4.96791	61.0745	64.0523	5.8610E 04	9.3358E 04	4.4820E 06
70000	1.0000	2.50000	34.7308	4.96791	61.6367	64.4245	5.8568E 04	9.3358E 04	4.6644E 06
72000	1.0000	2.50000	35.2671	4.96791	62.2089	64.7967	5.8526E 04	9.3358E 04	4.8498E 06
74000	1.0000	2.50000	35.8154	4.96791	62.7911	65.1689	5.8484E 04	9.3358E 04	5.0382E 06
76000	1.0000	2.50000	36.3757	4.96791	63.3833	65.5411	5.8442E 04	9.3358E 04	5.2296E 06
78000	1.0000	2.50000	36.9480	4.96791	63.9855	65.9133	5.8400E 04	9.3358E 04	5.4240E 06
80000	1.0000	2.50000	37.5323	4.96791	64.5977	66.2855	5.8358E 04	9.3358E 04	5.6214E 06
82000	1.0000	2.50000	38.1286	4.96791	65.2199	66.6577	5.8316E 04	9.3358E 04	5.8218E 06
84000	1.0000	2.50000	38.7369	4.96791	65.8521	67.0300	5.8274E 04	9.3358E 04	6.0252E 06
86000	1.0000	2.50000	39.3572	4.96791	66.4943	67.4022	5.8232E 04	9.3358E 04	6.2316E 06
88000	1.0000	2.50000	39.9895	4.96791	67.1465	67.7744	5.8190E 04	9.3358E 04	6.4400E 06
90000	1.0000	2.50000	40.6338	4.96791	67.8087	68.1466	5.8148E 04	9.3358E 04	6.6504E 06
92000	1.0000	2.50000	41.2901	4.96791	68.4809	68.5188	5.8106E 04	9.3358E 04	6.8628E 06
94000	1.0000	2.50000	41.9584	4.96791	69.1631	68.8910	5.8064E 04	9.3358E 04	7.0772E 06
96000	1.0000	2.50000	42.6387	4.96791	69.8553	69.2632	5.8022E 04	9.3358E 04	7.2936E 06
98000	1.0000	2.50000	43.3310	4.96791	70.5575	69.6354	5.7980E 04	9.3358E 04	7.5120E 06
100000	1.0000	2.50000	44.0453	4.96791	71.2697	70.0076	5.7938E 04	9.3358E 04	7.7324E 06
102000	1.0000	2.50000	44.7716	4.96791	71.9919	70.3798	5.7896E 04	9.3358E 04	7.9548E 06
104000	1.0000	2.50000	45.5099	4.96791	72.7241	70.7520	5.7854E 04	9.3358E 04	8.1792E 06
106000	1.0000	2.50000	46.2602	4.96791	73.4663	71.1242	5.7812E 04	9.3358E 04	8.4056E 06
108000	1.0000	2.50000	47.0225	4.96791	74.2185	71.4964	5.7770E 04	9.3358E 04	8.6340E 06
110000	1.0000	2.50000	47.7968	4.96791	74.9807	71.8686	5.7728E 04	9.3358E 04	8.8644E 06
112000	1.0000	2.50000	48.5831	4.96791	75.7529	72.2408	5.7686E 04	9.3358E 04	9.0968E 06
114000	1.0000	2.50000	49.3814	4.96791	76.5351	72.6130	5.7644E 04	9.3358E 04	9.3312E 06
116000	1.0000	2.50000	50.1917	4.96791	77.3273	72.9852	5.7602E 04	9.3358E 04	9.5676E 06
118000	1.0000	2.50000	50.9940	4.96791	78.1295	73.3574	5.7560E 04	9.3358E 04	9.8060E 06
120000	1.0000	2.50000	51.8083	4.96791	78.9417	73.7296	5.7518E 04	9.3358E 04	1.00472E 07
122000	1.0000	2.50000	52.6346	4.96791	79.7639	74.1018	5.7476E 04	9.3358E 04	1.02364E 07
124000	1.0000	2.50000	53.4729	4.96791	80.5961	74.4740	5.7434E 04	9.3358E 04	1.04276E 07
126000	1.0000	2.50000	54.3232	4.96791	81.4383	74.8462	5.7392E 04	9.3358E 04	1.06208E 07
128000	1.0000	2.50000	55.1855	4.96791	82.2905	75.2184	5.7350E 04	9.3358E 04	1.08160E 07
130000	1.0000	2.50000	56.0598	4.96791	83.1527	75.5906	5.7308E 04	9.3358E 04	1.10132E 07
132000	1.0000	2.50000	56.9461	4.96791	84.0249	75.9628	5.7266E 04	9.3358E 04	1.12124E 07
134000	1.0000	2.50000	57.8444	4.96791	84.9071	76.3350	5.7224E 04	9.3358E 04	1.14136E 07
136000	1.0000	2.50000	58.7547	4.96791	85.8003	76.7072	5.7182E 04	9.3358E 04	1.16168E 07
138000	1.0000	2.50000	59.6770	4.96791	86.7145	77.0794	5.7140E 04	9.3358E 04	1.18220E 07
140000	1.0000	2.50000	60.6123	4.96791	87.6407	77.4516	5.7098E 04	9.3358E 04	1.20292E 07
142000	1.0000	2.50000	61.5606	4.96791	88.5789	77.8238	5.7056E 04	9.3358E 04	1.22384E 07
144000	1.0000	2.50000	62.5219	4.96791	89.5291	78.1960	5.7014E 04	9.3358E 04	1.24496E 07
146000	1.0000	2.50000	63.4962	4.96791	90.4913	78.5682	5.6972E 04	9.3358E 04	1.26628E 07
148000	1.0000	2.50000	64.4835	4.96791	91.4655	78.9404	5.6930E 04	9.3358E 04	1.28780E 07
150000	1.0000	2.50000	65.4838	4.96791	92.4517	79.3126	5.6888E 04	9.3358E 04	1.30952E 07
152000	1.0000	2.50000	66.4971	4.96791	93.4499	79.6848	5.6846E 04	9.3358E 04	1.33144E 07
154000	1.0000	2.50000	67.5234	4.96791	94.4601	80.0570	5.6804E 04	9.3358E 04	1.35356E 07
156000	1.0000	2.50000	68.5627	4.96791	95.4823	80.4292	5.6762E 04	9.3358E 04	1.37588E 07
158000	1.0000	2.50000	69.6150	4.96791	96.5165	80.8014	5.6720E 04	9.3358E 04	1.39840E 07
160000	1.0000	2.50000	70.6803	4.96791	97.5627	81.1736	5.6678E 04	9.3358E 04	1.42112E 07
162000	1.0000	2.50000	71.7586	4.96791	98.6209	81.5458	5.6636E 04	9.3358E 04	1.44404E 07
164000	1.0000	2.50000	72.8499	4.96791	99.6911	81.9180	5.6594E 04	9.3358E 04	1.46716E 07
166000	1.0000	2.50000	73.9542	4.96791	100.7733	82.2902	5.6552E 04	9.3358E 04	1.49048E 07
168000	1.0000	2.50000	75.0715	4.96791	101.8675	82.6624	5.6510E 04	9.3358E 04	1.51390E 07
170000	1.0000	2.50000	76.2018	4.96791	102.9737	83.0346	5.6468E 04	9.3358E 04	1.53752E 07
172000	1.0000	2.50000	77.3451	4.96791	104.0919	83.4068	5.6426E 04	9.3358E 04	1.56134E 07
174000	1.0000	2.50000	78.5014	4.96791	105.2221	83.7790	5.6384E 04	9.3358E 04	1.58536E 07
176000	1.0000	2.50000	79.6707	4.96791	106.3643	84.1512	5.6342E 04	9.3358E 04	1.60958E 07
178000	1.0000	2.50000	80.8530	4.96791	107.5185	84.5234	5.6300E 04	9.3358E 04	1.63390E 07
180000	1.0000	2.50000	82.0483	4.96791	108.6847	84.8956	5.6258E 04	9.3358E 04	1.65842E 07
182000	1.0000	2.50000	83.2562	4.96791	109.8629	85.2678	5.6216E 04	9.3358E 04	1.68314E 07
184000	1.0000	2.50000	84.4767	4.96791	111.0531	85.6400	5.6174E 04	9.3358E 04	1.70806E 07
186000	1.0000	2.50000	85.7099	4.96791	112.2553	86.0122	5.6132E 04	9.3358E 04	1.73318E 07
188000	1.0000	2.50000	86.9558	4.96791	113.4695	86.3844	5.6090E 04	9.3358E 04	1.75840E 07
190000	1.0000	2.50000	88.2143	4.96791	114.6957	86.7566	5.6048E 04	9.3358E 04	1.78382E 07
192000	1.0000	2.50000	89.4855	4.96791	115.9339	87.1288	5.6006E 04	9.3358E 04	1.80944E 07
194000	1.0000	2.50000	90.7697	4.96791	117.1841	87.5010	5.5964E 04	9.3358E 04	1.83526E 07
196000	1.0000	2.50000	92.0670	4.96791	118.4463	87.8732	5.5922E 04	9.3358E 04	1.86128E 07
198000	1.0000	2.50000	93.3783	4.96791	119.7205	88.2454	5.5880E 04	9.3358E 04	1.88750E 07
200000	1.0000	2.50000	94.7036	4.96791	121.0067	88.6176	5.5838E 04	9.3358E 04	1.91392E 07
202000	1.0000	2.5000							

TABLE 10. IDEAL GAS FUNCTIONS FOR AN ϵ_0 (ATOMIC WEIGHT 39.948, $R = 1.98717$ CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $n \leq 4$. SEE TABLE 73 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL FUNCT.	$\frac{h^2 - \epsilon_0}{RT}$	$\frac{h^2 - \epsilon_0}{RT}$	$\frac{h^2 - \epsilon_0}{RT}$	$\frac{h^2 - \epsilon_0}{RT}$	$\frac{h^2 - \epsilon_0}{RT}$	$\frac{h^2 - \epsilon_0}{RT}$	$\frac{h^2 - \epsilon_0}{RT}$	$\frac{h^2 - \epsilon_0}{RT}$	TEMP. (°K)
5000	1.0000	2.50000	23.1593	29.6193	4.96791	46.9271	51.8950	1.4904E 04	2.4840E 04	2.3011E 05
5200	1.0000	2.50000	23.2573	29.7573	4.96791	47.0271	52.0579	1.5004E 04	2.4930E 04	2.3011E 05
5400	1.0000	2.50000	23.3517	29.8517	4.96791	47.1271	52.2154	1.5094E 04	2.5020E 04	2.3011E 05
5600	1.0000	2.50000	23.4426	29.9426	4.96791	47.2271	52.3685	1.5184E 04	2.5110E 04	2.3011E 05
5800	1.0000	2.50000	23.5303	30.0303	4.96791	47.3271	52.5168	1.5274E 04	2.5200E 04	2.3011E 05
6000	1.0000	2.50000	23.6151	30.1151	4.96791	47.4271	52.6608	1.5364E 04	2.5290E 04	2.3011E 05
6200	1.0000	2.50000	23.6971	30.1971	4.96791	47.5271	52.8008	1.5454E 04	2.5380E 04	2.3011E 05
6400	1.0000	2.50000	23.7764	30.2764	4.96791	47.6271	52.9369	1.5544E 04	2.5470E 04	2.3011E 05
6600	1.0000	2.50000	23.8534	30.3534	4.96791	47.7271	53.0694	1.5634E 04	2.5560E 04	2.3011E 05
6800	1.0000	2.50000	23.9280	30.4280	4.96791	47.8271	53.1984	1.5724E 04	2.5650E 04	2.3011E 05
7000	1.0000	2.50000	24.0005	30.5005	4.96791	47.9271	53.3242	1.5814E 04	2.5740E 04	2.3011E 05
7200	1.0000	2.50000	24.0709	30.5709	4.96791	48.0271	53.4468	1.5904E 04	2.5830E 04	2.3011E 05
7400	1.0000	2.50000	24.1394	30.6394	4.96791	48.1271	53.5668	1.5994E 04	2.5920E 04	2.3011E 05
7600	1.0000	2.50000	24.2061	30.7061	4.96791	48.2271	53.6844	1.6084E 04	2.6010E 04	2.3011E 05
7800	1.0000	2.50000	24.2710	30.7710	4.96791	48.3271	53.7977	1.6174E 04	2.6100E 04	2.3011E 05
8000	1.0000	2.50000	24.3343	30.8343	4.96791	48.4271	53.9093	1.6264E 04	2.6190E 04	2.3011E 05
8200	1.0000	2.50000	24.3960	30.8960	4.96791	48.5271	54.0185	1.6354E 04	2.6280E 04	2.3011E 05
8400	1.0000	2.50000	24.4563	30.9563	4.96791	48.6271	54.1253	1.6444E 04	2.6370E 04	2.3011E 05
8600	1.0000	2.50000	24.5151	31.0151	4.96791	48.7271	54.2299	1.6534E 04	2.6460E 04	2.3011E 05
8800	1.0000	2.50000	24.5726	31.0726	4.96791	48.8271	54.3324	1.6624E 04	2.6550E 04	2.3011E 05
9000	1.0000	2.50000	24.6287	31.1287	4.96791	48.9271	54.4328	1.6714E 04	2.6640E 04	2.3011E 05
9200	1.0000	2.50000	24.6837	31.1837	4.96791	49.0271	54.5309	1.6804E 04	2.6730E 04	2.3011E 05
9400	1.0000	2.50000	24.7375	31.2375	4.96791	49.1271	54.6269	1.6894E 04	2.6820E 04	2.3011E 05
9600	1.0000	2.50000	24.7901	31.2901	4.96791	49.2271	54.7209	1.6984E 04	2.6910E 04	2.3011E 05
9800	1.0000	2.50000	24.8415	31.3415	4.96791	49.3271	54.8129	1.7074E 04	2.7000E 04	2.3011E 05
10000	1.0000	2.50000	24.8922	31.3922	4.96791	49.4271	54.9029	1.7164E 04	2.7090E 04	2.3011E 05
10500	1.0000	2.50000	25.0141	31.5141	4.96791	49.7271	55.1272	1.7344E 04	2.7270E 04	2.3011E 05
11000	1.0000	2.50000	25.1304	31.6304	4.96791	49.9271	55.3368	1.7524E 04	2.7450E 04	2.3011E 05
11500	1.0000	2.50000	25.2416	31.7416	4.96791	50.1271	55.5388	1.7704E 04	2.7630E 04	2.3011E 05
12000	1.0000	2.50000	25.3480	31.8480	4.96791	50.3271	55.7328	1.7884E 04	2.7810E 04	2.3011E 05
12500	1.0000	2.50000	25.4500	31.9500	4.96791	50.5271	55.9188	1.8064E 04	2.7990E 04	2.3011E 05
13000	1.0000	2.50000	25.5481	32.0481	4.96791	50.7271	56.1009	1.8244E 04	2.8170E 04	2.3011E 05
13500	1.0000	2.50000	25.6425	32.1425	4.96791	50.9271	56.2789	1.8424E 04	2.8350E 04	2.3011E 05
14000	1.0000	2.50000	25.7334	32.2334	4.96791	51.1271	56.4529	1.8604E 04	2.8530E 04	2.3011E 05
14500	1.0000	2.50000	25.8212	32.3212	4.96791	51.3271	56.6229	1.8784E 04	2.8710E 04	2.3011E 05
15000	1.0000	2.50000	25.9060	32.4060	4.96791	51.5271	56.7889	1.8964E 04	2.8890E 04	2.3011E 05
15500	1.0000	2.50000	25.9880	32.4880	4.96791	51.7271	56.9509	1.9144E 04	2.9070E 04	2.3011E 05
16000	1.0000	2.50000	26.0675	32.5675	4.96791	51.9271	57.1089	1.9324E 04	2.9250E 04	2.3011E 05
16500	1.0000	2.50000	26.1445	32.6445	4.96791	52.1271	57.2629	1.9504E 04	2.9430E 04	2.3011E 05
17000	1.0000	2.50000	26.2193	32.7193	4.96791	52.3271	57.4129	1.9684E 04	2.9610E 04	2.3011E 05
17500	1.0000	2.50000	26.2919	32.7919	4.96791	52.5271	57.5589	1.9864E 04	2.9790E 04	2.3011E 05
18000	1.0000	2.50000	26.3626	32.8626	4.96791	52.7271	57.7009	1.9994E 04	2.9970E 04	2.3011E 05
18500	1.0000	2.50000	26.4313	32.9313	4.96791	52.9271	57.8389	2.0174E 04	3.0150E 04	2.3011E 05
19000	1.0000	2.50000	26.4983	32.9983	4.96791	53.1271	57.9729	2.0354E 04	3.0330E 04	2.3011E 05
19500	1.0000	2.50000	26.5636	33.0636	4.96791	53.3271	58.1029	2.0534E 04	3.0510E 04	2.3011E 05

TABLE 30 (CONT.). IDEAL GAS FUNCTIONS FOR AR 6+

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2}{RT}$	$-\frac{h^2}{RT}$	$\ln \frac{h^2}{RT}$	$-\ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT}$	$-\ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT}$	$-\ln \frac{h^2}{RT}$	TEMP. (°K)
20000	1.0024	2.51945	26.6274	5.00554	52.9130	57.9195	6.0380E 04	1.0013E 05	1.0583E 06	20000
22000	1.0050	2.53749	26.8643	5.04242	53.3917	58.4341	6.7216E 04	1.1093E 05	1.1746E 06	22000
24000	1.0094	2.56427	27.0902	5.09462	53.8326	58.9282	7.4403E 04	1.2229E 05	1.2920E 06	24000
26000	1.0160	2.60062	27.2968	5.16787	54.2432	59.4111	8.2698E 04	1.3434E 05	1.4103E 06	26000
28000	1.0252	2.64671	27.4911	5.25945	54.6294	59.8889	9.1624E 04	1.4726E 05	1.5294E 06	28000
30000	1.0376	2.70204	27.6794	5.36940	54.9959	60.3653	1.0147E 05	1.6108E 05	1.6479E 06	30000
32000	1.0533	2.76842	27.8519	5.49374	55.3464	60.8422	1.1227E 05	1.7584E 05	1.7711E 06	32000
34000	1.0726	2.83614	28.0217	5.63568	55.6837	61.3196	1.2468E 05	1.9162E 05	1.8932E 06	34000
36000	1.0958	2.91216	28.1859	5.78695	56.0101	61.7971	1.3879E 05	2.0833E 05	2.0164E 06	36000
38000	1.1228	2.99226	28.3455	5.94611	56.3272	62.2733	1.5044E 05	2.2595E 05	2.1404E 06	38000
40000	1.1540	3.07513	28.5011	6.11079	56.6364	62.7472	1.6495E 05	2.4443E 05	2.2655E 06	40000
42000	1.1892	3.15968	28.6532	6.27881	56.9386	63.2174	1.8025E 05	2.6371E 05	2.3914E 06	42000
44000	1.2287	3.24502	28.8021	6.44938	57.2346	63.6830	1.9629E 05	2.8373E 05	2.5183E 06	44000
46000	1.2725	3.33045	28.9483	6.61816	57.5250	64.1431	2.1303E 05	3.0444E 05	2.6461E 06	46000
48000	1.3206	3.41549	29.0918	6.78715	57.8102	64.5974	2.3040E 05	3.2578E 05	2.7749E 06	48000
50000	1.3733	3.49976	29.2329	6.95641	58.0907	65.0453	2.4837E 05	3.4773E 05	2.9045E 06	50000
60000	1.7084	3.90172	29.9071	7.75336	59.4304	67.1838	3.4597E 05	4.6520E 05	3.5458E 06	60000
70000	2.1792	4.25493	30.5359	8.45525	60.6798	69.1351	4.5237E 05	5.9187E 05	4.2474E 06	70000
80000	2.6084	4.57900	31.1234	9.01755	61.8473	70.8649	5.6243E 05	7.2140E 05	4.9678E 06	80000
90000	3.6151	4.73960	31.6703	9.41836	62.9342	72.3525	6.8881E 05	8.4765E 05	5.6441E 06	90000
100000	4.6097	4.84475	32.1768	9.66705	63.9406	73.6076	7.6799E 05	9.6671E 05	6.3941E 06	100000
150000	12.2684	4.84697	34.1693	9.63172	67.9001	77.5318	1.1467E 06	1.4448E 06	1.0185E 07	150000
200000	23.1530	4.56943	35.5236	9.04047	70.5913	79.6317	1.4107E 06	1.8001E 06	1.4110E 07	200000
300000	46.1000	4.05924	37.2484	8.12777	80.6359	82.1249	1.8230E 06	2.4199E 06	2.2218E 07	300000
400000	71.9194	3.74465	38.3899	7.46124	76.2871	83.7283	2.1816E 06	2.9745E 06	3.0515E 07	400000
500000	92.6782	3.53318	39.2013	7.02100	77.8995	84.9206	2.5169E 06	3.5105E 06	3.8920E 07	500000
600000	110.3281	3.38235	39.5315	6.72129	79.1517	85.8720	2.8405E 06	4.0328E 06	4.7491E 07	600000
800000	136.0279	3.18232	40.7747	6.32379	81.0260	87.3498	3.4693E 06	5.0590E 06	6.4821E 07	800000
1000000	158.4085	3.05594	41.6703	6.07267	82.4083	88.4809	4.0855E 06	5.0727E 06	8.2500E 07	1000000
1500000	191.0945	2.87977	42.6715	5.72259	84.7953	90.5179	5.6031E 06	8.5833E 06	1.2719E 08	1500000
2000000	210.2490	2.78831	43.4862	5.54084	86.8143	91.9552	7.1073E 06	1.1082E 07	1.7283E 08	2000000
3000000	231.5931	2.69455	44.5966	5.35452	88.6208	93.9753	1.0102E 07	1.4064E 07	2.4586E 08	3000000
4000000	243.1718	2.64680	45.3466	5.29943	90.1439	95.4066	1.3090E 07	2.1039E 07	3.4059E 08	4000000
5000000	250.4106	2.61787	45.9519	5.20214	91.3139	96.5161	1.6075E 07	2.6011E 07	4.5657E 08	5000000
6000000	255.4049	2.59846	46.4273	5.16357	92.2588	97.4223	1.9058E 07	3.0981E 07	5.5355E 08	6000000
8000000	261.7795	2.57407	47.1712	5.11510	93.7369	98.8520	2.5023E 07	4.0921E 07	7.4990E 08	8000000
10000000	265.6839	2.55936	47.7439	5.08588	94.8750	99.9408	3.0987E 07	5.0859E 07	9.4475E 08	10000000

TABLE 31. IDEAL GAS FUNCTIONS FOR N₂ (ATOMIC WEIGHT 14.0078, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS M.S.A.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2-E_0}{RT}$	$-\frac{E_0-E_1}{RT}$	S/R	$\ln \frac{h^2-E_1}{RT} - \frac{h^2-E_0}{RT}$	$-\ln \frac{h^2-E_1}{RT} - \frac{h^2-E_0}{RT}$	$\frac{E_1-E_0}{RT}$	$-\ln \frac{h^2-E_1}{RT} - \frac{h^2-E_0}{RT}$	$-\ln \frac{h^2-E_1}{RT} - \frac{h^2-E_0}{RT}$	TEMP. (°K)
5000	1.0000	2.50000	21.5849	24.0849	4.96791	42.8948	47.8647	1.4904E 04	2.5840E 04	5000
5200	1.0000	2.50000	21.6850	24.1850	4.96791	43.0916	48.0595	1.5500E 04	2.5840E 04	5200
5400	1.0000	2.50000	21.7793	24.2793	4.96791	43.2791	48.2470	1.6099E 04	2.5840E 04	5400
5600	1.0000	2.50000	21.8702	24.3702	4.96791	43.4598	48.4277	1.6692E 04	2.5840E 04	5600
5800	1.0000	2.50000	21.9580	24.4580	4.96791	43.6341	48.6020	1.7288E 04	2.5840E 04	5800
6000	1.0000	2.50000	22.0427	24.5427	4.96791	43.8025	48.7704	1.7884E 04	2.5840E 04	6000
6200	1.0000	2.50000	22.1247	24.6247	4.96791	43.9654	48.9333	1.8481E 04	2.5840E 04	6200
6400	1.0000	2.50000	22.2041	24.7041	4.96791	44.1231	49.0911	1.9077E 04	2.5840E 04	6400
6600	1.0000	2.50000	22.2810	24.7810	4.96791	44.2760	49.2439	1.9673E 04	2.5840E 04	6600
6800	1.0000	2.50000	22.3556	24.8556	4.96791	44.4243	49.3922	2.0269E 04	2.5840E 04	6800
7000	1.0000	2.50000	22.4281	24.9281	4.96791	44.5683	49.5362	2.0865E 04	2.5840E 04	7000
7200	1.0000	2.50000	22.4985	24.9985	4.96791	44.7083	49.6762	2.1461E 04	2.5840E 04	7200
7400	1.0000	2.50000	22.5670	25.0670	4.96791	44.8444	49.8123	2.2058E 04	2.5840E 04	7400
7600	1.0000	2.50000	22.6337	25.1337	4.96791	44.9769	49.9448	2.2654E 04	2.5840E 04	7600
7800	1.0000	2.50000	22.6986	25.1986	4.96791	45.1059	50.0738	2.3250E 04	2.5840E 04	7800
8000	1.0000	2.50000	22.7619	25.2619	4.96791	45.2317	50.1996	2.3846E 04	2.5840E 04	8000
8200	1.0000	2.50000	22.8237	25.3237	4.96791	45.3544	50.3223	2.4443E 04	2.5840E 04	8200
8400	1.0000	2.50000	22.8839	25.3839	4.96791	45.4741	50.4430	2.5039E 04	2.5840E 04	8400
8600	1.0000	2.50000	22.9427	25.4427	4.96791	45.5910	50.5589	2.5634E 04	2.5840E 04	8600
8800	1.0000	2.50000	23.0002	25.5002	4.96791	45.7052	50.6731	2.6231E 04	2.5840E 04	8800
9000	1.0000	2.50000	23.0564	25.5564	4.96791	45.8168	50.7848	2.6827E 04	2.5840E 04	9000
9200	1.0000	2.50000	23.1113	25.6113	4.96791	45.9260	50.8939	2.7423E 04	2.5840E 04	9200
9400	1.0000	2.50000	23.1651	25.6651	4.96791	46.0329	51.0008	2.8019E 04	2.5840E 04	9400
9600	1.0000	2.50000	23.2177	25.7177	4.96791	46.1375	51.1054	2.8615E 04	2.5840E 04	9600
9800	1.0000	2.50000	23.2693	25.7693	4.96791	46.2399	51.2078	2.9211E 04	2.5840E 04	9800
10000	1.0000	2.50000	23.3198	25.8198	4.96791	46.3403	51.3082	2.9807E 04	2.5840E 04	10000
10500	1.0000	2.50000	23.4418	25.9418	4.96791	46.5826	51.5506	3.1298E 04	2.5840E 04	10500
11000	1.0000	2.50000	23.5581	26.0581	4.96791	46.8138	51.7817	3.2788E 04	2.5840E 04	11000
11500	1.0000	2.50000	23.6692	26.1692	4.96791	47.0346	52.0025	3.4279E 04	2.5840E 04	11500
12000	1.0000	2.50000	23.7756	26.2756	4.96791	47.2460	52.2139	3.5769E 04	2.5840E 04	12000
12500	1.0000	2.50000	23.8776	26.3776	4.96791	47.4488	52.4167	3.7259E 04	2.5840E 04	12500
13000	1.0000	2.50000	23.9757	26.4757	4.96791	47.6437	52.6116	3.8750E 04	2.5840E 04	13000
13500	1.0000	2.50000	24.0700	26.5700	4.96791	47.8312	52.7991	4.0240E 04	2.5840E 04	13500
14000	1.0000	2.50000	24.1610	26.6610	4.96791	48.0118	52.9787	4.1730E 04	2.5840E 04	14000
14500	1.0000	2.50000	24.2487	26.7487	4.96791	48.1862	53.1541	4.3221E 04	2.5840E 04	14500
15000	1.0000	2.50000	24.3334	26.8334	4.96791	48.3546	53.3225	4.4711E 04	2.5840E 04	15000
15500	1.0000	2.50000	24.4154	26.9154	4.96791	48.5175	53.4854	4.6202E 04	2.5840E 04	15500
16000	1.0000	2.50000	24.4948	26.9948	4.96791	48.6752	53.6431	4.7692E 04	2.5840E 04	16000
16500	1.0000	2.50000	24.5717	27.0717	4.96791	48.8281	53.7950	4.9182E 04	2.5840E 04	16500
17000	1.0000	2.50000	24.6464	27.1464	4.96791	48.9764	53.9443	5.0673E 04	2.5840E 04	17000
17500	1.0000	2.50000	24.7188	27.2188	4.96791	49.1204	54.0883	5.2163E 04	2.5840E 04	17500
18000	1.0000	2.50000	24.7892	27.2892	4.96791	49.2603	54.2282	5.3653E 04	2.5840E 04	18000
18500	1.0000	2.50000	24.8577	27.3577	4.96791	49.3965	54.3644	5.5144E 04	2.5840E 04	18500
19000	1.0000	2.50000	24.9244	27.4244	4.96791	49.5289	54.4969	5.6634E 04	2.5840E 04	19000
19500	1.0000	2.50000	24.9894	27.4894	4.96791	49.6590	54.6259	5.8125E 04	2.5840E 04	19500

TABLE 21 (CONT'D). IDEAL GAS FUNCTIONS FOR N₂

TEMP. (°K)	PARTIAL FUNCT.	$\frac{H^0 - H}{RT}$	$\frac{U^0 - U}{RT}$	$\frac{S^0 - S}{R}$	$\ln \frac{P^0}{P}$	$\ln \frac{P^0}{P} - \frac{U^0 - U}{RT}$	$\ln \frac{P^0}{P} - \frac{H^0 - H}{RT}$	$\ln \frac{P^0}{P} - \frac{S^0 - S}{R}$	$\ln \frac{P^0}{P} - \frac{U^0 - U}{RT} - \frac{H^0 - H}{RT}$	$\ln \frac{P^0}{P} - \frac{S^0 - S}{R} - \frac{U^0 - U}{RT}$	TEMP. (°K)
20000	1.0000	25.0526	4.96791	49.7838	54.7517	5.9415E 04	9.9358E 04	9.9358E 04	9.9358E 04	9.9358E 04	20000
22000	1.0000	25.2909	4.96791	50.2522	55.2252	6.1571E 04	1.0923E 05	1.0923E 05	1.0923E 05	1.0923E 05	22000
24000	1.0000	25.5085	4.96791	50.6895	55.6554	7.1538E 04	1.2132E 05	1.2132E 05	1.2132E 05	1.2132E 05	24000
26000	1.0000	25.7086	4.96791	51.0872	56.0551	1.2917E 04	1.2917E 05	1.2917E 05	1.2917E 05	1.2917E 05	26000
28000	1.0000	25.8938	4.96791	51.4555	56.4232	9.5361E 04	1.3910E 05	1.3910E 05	1.3910E 05	1.3910E 05	28000
30000	1.0000	26.0663	4.96791	51.7981	56.7660	8.9422E 04	1.4904E 05	1.4904E 05	1.4904E 05	1.4904E 05	30000
32000	1.0000	26.2277	4.96791	52.1187	57.0866	9.5369E 04	1.5897E 05	1.5897E 05	1.5897E 05	1.5897E 05	32000
34000	1.0000	26.3792	4.96791	52.4199	57.3878	1.0135E 05	1.5891E 05	1.5891E 05	1.5891E 05	1.5891E 05	34000
36000	1.0000	26.5221	4.96791	52.7036	57.6717	1.0731E 05	1.7884E 05	1.7884E 05	1.7884E 05	1.7884E 05	36000
38000	1.0000	26.6573	4.96791	52.9724	57.9403	1.1327E 05	1.8878E 05	1.8878E 05	1.8878E 05	1.8878E 05	38000
40000	1.0000	26.7855	4.96791	53.2273	58.1992	1.1923E 05	1.9872E 05	1.9872E 05	1.9872E 05	1.9872E 05	40000
42000	1.0000	26.9075	4.96791	53.4656	58.4376	1.2519E 05	2.0865E 05	2.0865E 05	2.0865E 05	2.0865E 05	42000
44000	1.0000	27.0238	4.96791	53.7007	58.6687	1.3115E 05	2.1859E 05	2.1859E 05	2.1859E 05	2.1859E 05	44000
46000	1.0000	27.1349	4.96791	53.9216	58.8895	1.3711E 05	2.2852E 05	2.2852E 05	2.2852E 05	2.2852E 05	46000
48000	1.0000	27.2413	4.96791	54.1330	59.1009	1.4308E 05	2.3846E 05	2.3846E 05	2.3846E 05	2.3846E 05	48000
50000	1.0000	27.3436	4.96791	54.3358	59.3037	1.4904E 05	2.4840E 05	2.4840E 05	2.4840E 05	2.4840E 05	50000
52000	1.0000	27.4416	4.96791	54.5295	59.4985	1.5500E 05	2.5834E 05	2.5834E 05	2.5834E 05	2.5834E 05	52000
54000	1.0000	27.5356	4.96791	54.7146	59.6853	1.6096E 05	2.6828E 05	2.6828E 05	2.6828E 05	2.6828E 05	54000
56000	1.0000	27.6256	4.96791	54.8911	59.8641	1.6692E 05	2.7822E 05	2.7822E 05	2.7822E 05	2.7822E 05	56000
58000	1.0000	27.7116	4.96791	55.0598	60.0350	1.7288E 05	2.8816E 05	2.8816E 05	2.8816E 05	2.8816E 05	58000
60000	1.0000	27.7936	4.96791	55.2216	60.1985	1.7884E 05	2.9810E 05	2.9810E 05	2.9810E 05	2.9810E 05	60000
62000	1.0000	27.8716	4.96791	55.3763	60.3553	1.8480E 05	3.0804E 05	3.0804E 05	3.0804E 05	3.0804E 05	62000
64000	1.0000	27.9456	4.96791	55.5246	60.5074	1.9076E 05	3.1798E 05	3.1798E 05	3.1798E 05	3.1798E 05	64000
66000	1.0000	28.0156	4.96791	55.6670	60.6553	1.9672E 05	3.2792E 05	3.2792E 05	3.2792E 05	3.2792E 05	66000
68000	1.0000	28.0816	4.96791	55.8037	60.7985	2.0268E 05	3.3786E 05	3.3786E 05	3.3786E 05	3.3786E 05	68000
70000	1.0000	28.1436	4.96791	55.9350	60.9378	2.0864E 05	3.4780E 05	3.4780E 05	3.4780E 05	3.4780E 05	70000
72000	1.0000	28.2016	4.96791	56.0611	61.0721	2.1460E 05	3.5774E 05	3.5774E 05	3.5774E 05	3.5774E 05	72000
74000	1.0000	28.2556	4.96791	56.1824	61.2024	2.2056E 05	3.6768E 05	3.6768E 05	3.6768E 05	3.6768E 05	74000
76000	1.0000	28.3056	4.96791	56.3000	61.3287	2.2652E 05	3.7762E 05	3.7762E 05	3.7762E 05	3.7762E 05	76000
78000	1.0000	28.3516	4.96791	56.4146	61.4500	2.3248E 05	3.8756E 05	3.8756E 05	3.8756E 05	3.8756E 05	78000
80000	1.0000	28.3936	4.96791	56.5263	61.5663	2.3844E 05	3.9750E 05	3.9750E 05	3.9750E 05	3.9750E 05	80000
82000	1.0000	28.4316	4.96791	56.6346	61.6785	2.4440E 05	4.0744E 05	4.0744E 05	4.0744E 05	4.0744E 05	82000
84000	1.0000	28.4656	4.96791	56.7392	61.7868	2.5036E 05	4.1738E 05	4.1738E 05	4.1738E 05	4.1738E 05	84000
86000	1.0000	28.4956	4.96791	56.8409	61.8911	2.5632E 05	4.2732E 05	4.2732E 05	4.2732E 05	4.2732E 05	86000
88000	1.0000	28.5216	4.96791	56.9392	61.9914	2.6228E 05	4.3726E 05	4.3726E 05	4.3726E 05	4.3726E 05	88000
90000	1.0000	28.5476	4.96791	57.0350	62.0878	2.6824E 05	4.4720E 05	4.4720E 05	4.4720E 05	4.4720E 05	90000
92000	1.0000	28.5696	4.96791	57.1287	62.1801	2.7420E 05	4.5714E 05	4.5714E 05	4.5714E 05	4.5714E 05	92000
94000	1.0000	28.5876	4.96791	57.2200	62.2684	2.8016E 05	4.6708E 05	4.6708E 05	4.6708E 05	4.6708E 05	94000
96000	1.0000	28.6016	4.96791	57.3087	62.3527	2.8612E 05	4.7702E 05	4.7702E 05	4.7702E 05	4.7702E 05	96000
98000	1.0000	28.6116	4.96791	57.3946	62.4330	2.9208E 05	4.8696E 05	4.8696E 05	4.8696E 05	4.8696E 05	98000
100000	1.0000	28.6176	4.96791	57.4779	62.5093	2.9804E 05	4.9690E 05	4.9690E 05	4.9690E 05	4.9690E 05	100000
102000	1.0000	28.6216	4.96791	57.5592	62.5816	3.0400E 05	5.0684E 05	5.0684E 05	5.0684E 05	5.0684E 05	102000
104000	1.0000	28.6256	4.96791	57.6387	62.6500	3.1000E 05	5.1678E 05	5.1678E 05	5.1678E 05	5.1678E 05	104000
106000	1.0000	28.6296	4.96791	57.7163	62.7153	3.1600E 05	5.2672E 05	5.2672E 05	5.2672E 05	5.2672E 05	106000
108000	1.0000	28.6336	4.96791	57.7920	62.7776	3.2200E 05	5.3666E 05	5.3666E 05	5.3666E 05	5.3666E 05	108000
110000	1.0000	28.6376	4.96791	57.8667	62.8369	3.2800E 05	5.4660E 05	5.4660E 05	5.4660E 05	5.4660E 05	110000
112000	1.0000	28.6416	4.96791	57.9396	62.8932	3.3400E 05	5.5654E 05	5.5654E 05	5.5654E 05	5.5654E 05	112000
114000	1.0000	28.6456	4.96791	58.0109	62.9475	3.4000E 05	5.6648E 05	5.6648E 05	5.6648E 05	5.6648E 05	114000
116000	1.0000	28.6496	4.96791	58.0800	63.0000	3.4600E 05	5.7642E 05	5.7642E 05	5.7642E 05	5.7642E 05	116000
118000	1.0000	28.6536	4.96791	58.1479	63.0500	3.5200E 05	5.8636E 05	5.8636E 05	5.8636E 05	5.8636E 05	118000
120000	1.0000	28.6576	4.96791	58.2146	63.1000	3.5800E 05	5.9630E 05	5.9630E 05	5.9630E 05	5.9630E 05	120000
122000	1.0000	28.6616	4.96791	58.2800	63.1487	3.6400E 05	6.0624E 05	6.0624E 05	6.0624E 05	6.0624E 05	122000
124000	1.0000	28.6656	4.96791	58.3446	63.1953	3.7000E 05	6.1618E 05	6.1618E 05	6.1618E 05	6.1618E 05	124000
126000	1.0000	28.6696	4.96791	58.4087	63.2400	3.7600E 05	6.2612E 05	6.2612E 05	6.2612E 05	6.2612E 05	126000
128000	1.0000	28.6736	4.96791	58.4716	63.2837	3.8200E 05	6.3606E 05	6.3606E 05	6.3606E 05	6.3606E 05	128000
130000	1.0000	28.6776	4.96791	58.5337	63.3263	3.8800E 05	6.4600E 05	6.4600E 05	6.4600E 05	6.4600E 05	130000
132000	1.0000	28.6816	4.96791	58.5950	63.3678	3.9400E 05	6.5594E 05	6.5594E 05	6.5594E 05	6.5594E 05	132000
134000	1.0000	28.6856	4.96791	58.6556	63.4083	4.0000E 05	6.6588E 05	6.6588E 05	6.6588E 05	6.6588E 05	134000
136000	1.0000	28.6896	4.96791	58.7156	63.4478	4.0600E 05	6.7582E 05	6.7582E 05	6.7582E 05	6.7582E 05	136000
138000	1.0000	28.6936	4.96791	58.7750	63.4863	4.1200E 05	6.8576E 05	6.8576E 05	6.8576E 05	6.8576E 05	138000
140000	1.0000	28.6976	4.96791	58.8337	63.5238	4.1800E 05	6.9570E 05	6.9570E 05	6.9570E 05	6.9570E 05	140000
142000	1.0000	28.7016	4.96791	58.8916	63.5603	4.2400E 05	7.0564E 05	7.0564E 05	7.0564E 05	7.0564E 05	142000
144000	1.0000	28.7056	4.96791	58.9490	63.5958	4.3000E 05	7.1558E 05	7.1558E 05	7.1558E 05	7.1558E 05	144000
146000	1.0000	28.7096	4.96791	59.0059	63.6303	4.3600E 05	7.2552E 05	7.2552E 05	7.2552E 05	7.2552E 05	146000
148000	1.0000	28.7136	4.96791	59.0624	63.6638	4.4200E 05	7.3546E 05	7.3546E 05	7.3546E 05	7.3546E 05	148000
150000	1.0000	28.7176	4.96791	59.1184	63.6963	4.4800E 05	7.4540E 05	7.4540E 05	7.4540E 05	7.4540E 05	150000
152000	1.0000	28.7216	4.96791	59.1739	63.7278	4.5400E 05	7.5534E 05	7.5534E 05	7.5534E 05	7.5534E 05	152000
154000	1.0000	28.7256	4.96791	59.2289	63.7583	4.6000E 05	7.6528E 05	7.6528E 05	7.6528E 05	7.6528E 05	154000
156000	1.0000	28.7296	4.96791	59.2834	63.7878	4.6600E 05	7.7522E 05	7.7522E 05	7.7522E 05	7.7522E 05	156000
158000	1.0000	28.7336	4.96791	59.3374	63.8163	4.7200E 05	7.8516E 05	7.8516E 05	7.8516E 05	7.8516E 05	158000
160000	1.0000	28.7376	4.96791	59.3909	63.8438	4.7800E 05	7.9510E 05	7.9510E 05	7.9510E 05	7.9510E 05	160000
162000	1.0000	28.7416	4.96791	59.4439	63.8703	4.8400E 05	8.0504E 05	8.0504E 05	8.0504E 05	8.0504E 05	162000
164000	1.0000	28.7456	4.96791	59.4964	63.8958	4.9000E 05	8.1498E 05	8.1498E 05	8.1498E 05	8.1498E 05	164000
166000	1.0000	28.7496	4.96791	59.5484	63.9203	4.9600E 05	8.2492E 05	8.2492E 05	8.2492E 05	8.2492E 05	166000
168000	1.0000	28.7536	4.96791	59.6000	63.9448	5.0200E 05	8.3486E 05	8.3486E 05	8.3486E 05	8.3486E 05	168000
170000	1.0000</										

TABLE 32. IDEAL GAS FUNCTIONS FOR O₂ (ATOMIC WEIGHT 15.9955, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 74 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	TEMP. (°K)
5000	2.0000	2.50000	22.4796	24.9796	4.96791	44.6708	49.8387	1.4904E 04	2.4840E 04	2.5833E 04	2.6336E 05	5000
5200	2.0000	2.50000	22.5777	25.0777	4.96791	44.8656	49.8335	1.5500E 04	2.5833E 04	2.6336E 05	2.6336E 05	5200
5400	2.0000	2.50000	22.6720	25.1720	4.96791	45.0531	50.0210	1.6096E 04	2.6827E 04	2.7329E 05	2.7329E 05	5400
5600	2.0000	2.50000	22.7630	25.2630	4.96791	45.2338	50.2017	1.6692E 04	2.7820E 04	2.7820E 05	2.7820E 05	5600
5800	2.0000	2.50000	22.8507	25.3507	4.96791	45.4081	50.3760	1.7288E 04	2.8814E 04	2.8337E 05	2.8337E 05	5800
6000	2.0000	2.50000	22.9354	25.4354	4.96791	45.5765	50.5444	1.7884E 04	2.9807E 04	2.7344E 05	2.7344E 05	6000
6200	2.0000	2.50000	23.0174	25.5174	4.96791	45.7394	50.7073	1.8481E 04	3.0801E 04	2.8354E 05	2.8354E 05	6200
6400	2.0000	2.50000	23.0968	25.5968	4.96791	45.8971	50.8650	1.9077E 04	3.1795E 04	2.9374E 05	2.9374E 05	6400
6600	2.0000	2.50000	23.1737	25.6737	4.96791	46.0500	51.0179	1.9673E 04	3.2788E 04	3.0393E 05	3.0393E 05	6600
6800	2.0000	2.50000	23.2483	25.7483	4.96791	46.1983	51.1662	2.0269E 04	3.3782E 04	3.1415E 05	3.1415E 05	6800
7000	2.0000	2.50000	23.3208	25.8208	4.96791	46.3423	51.3102	2.0865E 04	3.4775E 04	3.2440E 05	3.2440E 05	7000
7200	2.0000	2.50000	23.3912	25.8912	4.96791	46.4823	51.4502	2.1461E 04	3.5769E 04	3.3447E 05	3.3447E 05	7200
7400	2.0000	2.50000	23.4597	25.9597	4.96791	46.6184	51.5863	2.2058E 04	3.6763E 04	3.4498E 05	3.4498E 05	7400
7600	2.0000	2.50000	23.5264	26.0264	4.96791	46.7509	51.7188	2.2654E 04	3.7756E 04	3.5531E 05	3.5531E 05	7600
7800	2.0000	2.50000	23.5914	26.0914	4.96791	46.8799	51.8478	2.3250E 04	3.8752E 04	3.6568E 05	3.6568E 05	7800
8000	2.0000	2.50000	23.6546	26.1546	4.96791	47.0037	51.9736	2.3846E 04	3.9743E 04	3.7608E 05	3.7608E 05	8000
8200	2.0000	2.50000	23.7164	26.2164	4.96791	47.1284	52.0963	2.4442E 04	4.0737E 04	3.8644E 05	3.8644E 05	8200
8400	2.0000	2.50000	23.7766	26.2766	4.96791	47.2481	52.2160	2.5038E 04	4.1730E 04	3.9680E 05	3.9680E 05	8400
8600	2.0000	2.50000	23.8354	26.3354	4.96791	47.3650	52.3329	2.5634E 04	4.2724E 04	4.0734E 05	4.0734E 05	8600
8800	2.0000	2.50000	23.8929	26.3929	4.96791	47.4792	52.4471	2.6231E 04	4.3718E 04	4.1782E 05	4.1782E 05	8800
9000	2.0000	2.50000	23.9491	26.4491	4.96791	47.5908	52.5587	2.6827E 04	4.4711E 04	4.2832E 05	4.2832E 05	9000
9200	2.0000	2.50000	24.0040	26.5040	4.96791	47.7000	52.6679	2.7423E 04	4.5705E 04	4.3881E 05	4.3881E 05	9200
9400	2.0000	2.50000	24.0578	26.5578	4.96791	47.8069	52.7748	2.8019E 04	4.6698E 04	4.4930E 05	4.4930E 05	9400
9600	2.0000	2.50000	24.1104	26.6104	4.96791	47.9114	52.8794	2.8615E 04	4.7692E 04	4.5995E 05	4.5995E 05	9600
9800	2.0000	2.50000	24.1620	26.6620	4.96791	48.0139	52.9818	2.9211E 04	4.8686E 04	4.7054E 05	4.7054E 05	9800
10000	2.0000	2.50000	24.2125	26.7125	4.96791	48.1142	53.0823	2.9807E 04	4.9679E 04	4.8114E 05	4.8114E 05	10000
10500	2.0000	2.50000	24.3345	26.8345	4.96791	48.3586	53.3245	3.1298E 04	5.2163E 04	5.0774E 05	5.0774E 05	10500
11000	2.0000	2.50000	24.4508	26.9508	4.96791	48.5877	53.5557	3.2788E 04	5.4647E 04	5.3447E 05	5.3447E 05	11000
11500	2.0000	2.50000	24.5619	27.0619	4.96791	48.8086	53.7765	3.4279E 04	5.7131E 04	5.6136E 05	5.6136E 05	11500
12000	2.0000	2.50000	24.6683	27.1683	4.96791	49.0200	53.9879	3.5769E 04	5.9615E 04	5.8824E 05	5.8824E 05	12000
12500	2.0000	2.50000	24.7704	27.2704	4.96791	49.2228	54.1907	3.7259E 04	6.2099E 04	6.1529E 05	6.1529E 05	12500
13000	2.0000	2.50000	24.8684	27.3684	4.96791	49.4177	54.3856	3.8750E 04	6.4583E 04	6.4243E 05	6.4243E 05	13000
13500	2.0000	2.50000	24.9628	27.4628	4.96791	49.6051	54.5731	4.0240E 04	6.7067E 04	6.6967E 05	6.6967E 05	13500
14000	2.0000	2.50000	25.0537	27.5537	4.96791	49.7858	54.7537	4.1730E 04	6.9551E 04	6.9700E 05	6.9700E 05	14000
14500	2.0000	2.50000	25.1414	27.6414	4.96791	49.9601	54.9281	4.3221E 04	7.2035E 04	7.2442E 05	7.2442E 05	14500
15000	2.0000	2.50000	25.2262	27.7262	4.96791	50.1284	55.0965	4.4711E 04	7.4519E 04	7.5193E 05	7.5193E 05	15000
15500	2.0000	2.50000	25.3081	27.8081	4.96791	50.2915	55.2594	4.6202E 04	7.7003E 04	7.7952E 05	7.7952E 05	15500
16000	2.0000	2.50000	25.3875	27.8875	4.96791	50.4492	55.4171	4.7682E 04	7.9487E 04	8.0719E 05	8.0719E 05	16000
16500	2.0000	2.50000	25.4644	27.9644	4.96791	50.6021	55.5700	4.9162E 04	8.1971E 04	8.3493E 05	8.3493E 05	16500
17000	2.0000	2.50000	25.5391	28.0391	4.96791	50.7504	55.7183	5.0635E 04	8.4453E 04	8.6276E 05	8.6276E 05	17000
17500	2.0000	2.50000	25.6115	28.1115	4.96791	50.8944	55.8623	5.2103E 04	8.6938E 04	8.9065E 05	8.9065E 05	17500
18000	2.0000	2.50000	25.6820	28.1820	4.96791	51.0343	56.0022	5.3573E 04	8.9422E 04	9.1864E 05	9.1864E 05	18000
18500	2.0000	2.50000	25.7505	28.2505	4.96791	51.1704	56.1384	5.5044E 04	9.1906E 04	9.4665E 05	9.4665E 05	18500
19000	2.0000	2.50000	25.8171	28.3171	4.96791	51.3029	56.2708	5.6514E 04	9.4390E 04	9.7478E 05	9.7478E 05	19000
19500	2.0000	2.50000	25.8821	28.3821	4.96791	51.4320	56.3999	5.8025E 04	9.6874E 04	1.0029E 06	1.0029E 06	19500

TABLE 32 (CONT.) IDEAL GAS FUNCTIONS FOR U₁

TEMP. (°K)	PARTIC. FUNCT.	$\frac{U^0 - U}{RT}$	$\frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\frac{U^0 - U}{RT}$	$\frac{U^0 - U}{RT}$	$\frac{U^0 - U}{RT}$	$\frac{U^0 - U}{RT}$	$\frac{U^0 - U}{RT}$	$\frac{U^0 - U}{RT}$	$\frac{U^0 - U}{RT}$	TEMP. (°K)
20000	2.0000	2.50600	25.9454	28.4454	4.96791	51.5577	56.5257	5.9619E 04	9.9350E 04	1.0312E 06	20000
22000	2.0000	2.50000	26.1836	28.6836	4.96791	52.0312	56.9992	1.0929E 05	1.1447E 06	1.2591E 06	22000
24000	2.0000	2.50000	26.4012	28.9012	4.96791	52.4835	57.4314	7.1530E 04	1.1923E 05	1.3744E 06	24000
26000	2.0000	2.50000	26.6013	29.1013	4.96791	52.8611	57.8291	7.7499E 04	1.2401E 05	1.4904E 06	26000
28000	2.0000	2.50000	26.7866	29.2866	4.96791	53.2293	58.1972	8.3461E 04	1.2881E 05	1.6074E 06	28000
30000	2.0000	2.50000	26.9590	29.4590	4.96791	53.5721	58.5400	8.9422E 04	1.3364E 05	1.7266E 06	30000
32000	2.0000	2.50000	27.1204	29.6204	4.96791	53.8927	58.8666	9.5384E 04	1.3851E 05	1.8476E 06	32000
34000	2.0000	2.50000	27.2719	29.7719	4.96791	54.1939	59.1818	1.0135E 05	1.4342E 05	1.9704E 06	34000
36000	2.0000	2.50000	27.4148	29.9148	4.96791	54.4778	59.4857	1.0713E 05	1.4828E 05	2.0950E 06	36000
38000	2.0000	2.50000	27.5500	30.0500	4.96791	54.7464	59.7713	1.1287E 05	1.5310E 05	2.2214E 06	38000
40000	2.0000	2.50000	27.6782	30.1782	4.96791	55.0012	59.9462	1.1857E 05	1.5788E 05	2.3496E 06	40000
42000	2.0000	2.50000	27.8002	30.3002	4.96791	55.2434	60.1115	1.2423E 05	1.6262E 05	2.4794E 06	42000
44000	2.0000	2.50000	27.9165	30.4165	4.96791	55.4747	60.2668	1.2985E 05	1.6732E 05	2.6104E 06	44000
46000	2.0000	2.50000	28.0278	30.5278	4.96791	55.6956	60.4135	1.3543E 05	1.7198E 05	2.7426E 06	46000
48000	2.0000	2.50000	28.1340	30.6340	4.96791	55.9070	60.5519	1.4098E 05	1.7660E 05	2.8759E 06	48000
50000	2.0000	2.50000	28.2361	30.7361	4.96791	56.1098	61.0777	1.4648E 05	1.8118E 05	2.9994E 06	50000
52000	2.0000	2.50000	28.3349	31.1919	4.96791	57.0156	61.9835	1.7884E 05	2.0865E 05	3.4209E 06	52000
54000	2.0000	2.50000	29.0773	31.5773	4.96791	57.7814	62.7493	2.0865E 05	2.3773E 05	4.0447E 06	54000
56000	2.0000	2.50000	29.4111	31.9111	4.96791	58.4447	63.4126	2.3846E 05	2.6743E 05	4.6756E 06	56000
58000	2.0000	2.50000	29.7056	32.2756	4.96791	59.0299	63.9978	2.6827E 05	2.9711E 05	5.3127E 06	58000
60000	2.0000	2.50000	29.9690	32.4690	4.96791	59.5533	64.5212	2.9807E 05	3.2680E 05	5.9553E 06	60000
62000	2.0000	2.50000	30.9826	33.4826	4.96791	61.5676	66.5365	4.4711E 05	4.7519E 05	9.2351E 06	62000
64000	2.0000	2.50000	31.7018	34.2018	4.96791	62.9968	67.9647	5.9615E 05	6.2459E 05	1.2599E 07	64000
66000	2.0000	2.50000	32.7155	35.2155	4.96791	65.0111	69.9790	8.9422E 05	9.2351E 05	1.9503E 07	66000
68000	2.0000	2.50000	33.4347	35.9347	4.96791	66.6403	71.4082	1.1923E 06	1.1923E 06	2.6576E 07	68000
70000	2.0000	2.50002	33.9926	36.4926	4.96735	67.5688	72.5168	1.4904E 06	1.4904E 06	3.3774E 07	70000
72000	2.0000	2.50024	34.4484	36.9484	4.96839	68.4544	73.4230	1.7887E 06	1.7887E 06	4.1073E 07	72000
74000	2.0011	2.50598	35.1681	37.6737	4.97899	69.8848	74.8638	2.3959E 06	2.3959E 06	5.5908E 07	74000
76000	2.0088	2.53798	35.7298	38.2354	5.00429	71.0010	76.0423	3.0541E 06	3.0541E 06	7.1001E 07	76000
78000	2.1535	2.91365	36.8130	39.2767	5.78991	73.1535	78.9435	5.7041E 06	5.7041E 06	1.0973E 08	78000
80000	2.6609	3.59459	37.7438	41.2484	7.14305	75.0032	82.1443	1.0312E 07	1.0312E 07	1.5001E 08	80000
82000	4.8951	4.25653	39.3670	43.8236	8.45842	78.2288	86.8872	1.9414E 07	1.9414E 07	2.3469E 08	82000
84000	8.0943	4.18532	40.5892	44.7745	8.31692	80.4574	88.9743	2.5319E 07	2.5319E 07	3.2263E 08	84000
86000	11.5415	3.98451	41.5018	45.9443	7.91787	82.4710	90.3889	2.9654E 07	2.9654E 07	4.1235E 08	86000
88000	14.8739	3.79748	42.2113	46.0088	7.54622	83.8808	91.4270	3.3554E 07	3.3554E 07	5.0328E 08	88000
90000	20.7345	3.51801	43.2627	46.7907	6.99086	85.9701	92.9610	4.0030E 07	4.0030E 07	6.8776E 08	90000
92000	25.4728	3.33161	44.0264	47.3580	6.62046	87.4876	94.1081	4.6333E 07	4.6333E 07	8.7488E 08	92000

TABLE 33. IDEAL GAS FUNCTIONS FOR AR 76 (ATOMIC WEIGHT 39.9440, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS R ≤ 4. SEE TABLE 75 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL FUNCT.	$\frac{h^2 E}{RT}$	$\frac{h^2 E}{RT} - \frac{F^0 - E^0}{RT}$	$\frac{h^2 E}{RT} - \frac{F^0 - E^0}{RT} - \frac{F^0 - E^0}{RT}$	$\frac{h^2 E}{RT} - \frac{F^0 - E^0}{RT} - \frac{F^0 - E^0}{RT}$	$\frac{h^2 E}{RT} - \frac{F^0 - E^0}{RT} - \frac{F^0 - E^0}{RT}$	$\frac{h^2 E}{RT} - \frac{F^0 - E^0}{RT} - \frac{F^0 - E^0}{RT}$	$\frac{h^2 E}{RT} - \frac{F^0 - E^0}{RT} - \frac{F^0 - E^0}{RT}$	TEMP. (°K)
5000	2.0000	2.50000	23.8524	46.3524	4.96791	47.3944	52.3664	1.49044	5000
5200	2.0000	2.50000	23.9504	46.4504	4.96791	47.5935	52.5614	1.49044	5200
5400	2.0000	2.50000	24.0448	46.5448	4.96791	47.7810	52.7490	1.49044	5400
5600	2.0000	2.50000	24.1357	46.6357	4.96791	47.9617	52.9294	1.49044	5600
5800	2.0000	2.50000	24.2234	46.7234	4.96791	48.1360	53.1039	1.49044	5800
6000	2.0000	2.50000	24.3082	46.8082	4.96791	48.3044	53.2723	1.49044	6000
6200	2.0000	2.50000	24.3902	46.8902	4.96791	48.4673	53.4352	1.49044	6200
6400	2.0000	2.50000	24.4695	46.9695	4.96791	48.6250	53.5929	1.49044	6400
6600	2.0000	2.50000	24.5465	47.0465	4.96791	48.7779	53.7458	1.49044	6600
6800	2.0000	2.50000	24.6211	47.1211	4.96791	48.9262	53.8941	1.49044	6800
7000	2.0000	2.50000	24.6936	47.1936	4.96791	49.0702	54.0381	1.49044	7000
7200	2.0000	2.50000	24.7640	47.2640	4.96791	49.2112	54.1781	1.49044	7200
7400	2.0000	2.50000	24.8325	47.3325	4.96791	49.3483	54.3142	1.49044	7400
7600	2.0000	2.50000	24.8992	47.3992	4.96791	49.4788	54.4467	1.49044	7600
7800	2.0000	2.50000	24.9641	47.4641	4.96791	49.6078	54.5757	1.49044	7800
8000	2.0000	2.50000	25.0274	47.5274	4.96791	49.7336	54.7015	1.49044	8000
8200	2.0000	2.50000	25.0891	47.5891	4.96791	49.8563	54.8242	1.49044	8200
8400	2.0000	2.50000	25.1494	47.6494	4.96791	49.9760	54.9439	1.49044	8400
8600	2.0000	2.50000	25.2082	47.7082	4.96791	50.0929	55.0608	1.49044	8600
8800	2.0000	2.50000	25.2657	47.7657	4.96791	50.2071	55.1750	1.49044	8800
9000	2.0000	2.50000	25.3219	47.8219	4.96791	50.3187	55.2864	1.49044	9000
9200	2.0000	2.50000	25.3768	47.8768	4.96791	50.4279	55.3959	1.49044	9200
9400	2.0000	2.50000	25.4304	47.9304	4.96791	50.5348	55.5027	1.49044	9400
9600	2.0000	2.50000	25.4832	47.9832	4.96791	50.6393	55.6073	1.49044	9600
9800	2.0000	2.50000	25.5348	48.0348	4.96791	50.7418	55.7097	1.49044	9800
10000	2.0000	2.50000	25.5853	48.0853	4.96791	50.8421	55.8101	1.49044	10000
10500	2.0000	2.50000	25.7072	48.2072	4.96791	51.0845	56.0524	1.49044	10500
11000	2.0000	2.50000	25.8235	48.3235	4.96791	51.3156	56.2835	1.49044	11000
11500	2.0000	2.50000	25.9347	48.4347	4.96791	51.5345	56.5044	1.49044	11500
12000	2.0000	2.50000	26.0411	48.5411	4.96791	51.7479	56.7138	1.49044	12000
12500	2.0000	2.50000	26.1431	48.6431	4.96791	51.9507	56.9166	1.49044	12500
13000	2.0000	2.50001	26.2412	48.7412	4.96791	52.1455	57.1135	1.49044	13000
13500	2.0000	2.50001	26.3355	48.8355	4.96791	52.3330	57.3010	1.49044	13500
14000	2.0000	2.50002	26.4264	48.9264	4.96791	52.5137	57.4817	1.49044	14000
14500	2.0000	2.50003	26.5142	49.0142	4.96791	52.6880	57.6560	1.49044	14500
15000	2.0000	2.50003	26.5989	49.0989	4.96791	52.8565	57.8245	1.49044	15000
15500	2.0000	2.50004	26.6809	49.1810	4.96804	53.0194	57.9876	1.49044	15500
16000	2.0000	2.50011	26.7603	49.2604	4.96813	53.1771	58.1452	1.49044	16000
16500	2.0000	2.50018	26.8372	49.3374	4.96823	53.3300	58.2982	1.49044	16500
17000	2.0000	2.50022	26.9118	49.4121	4.96835	53.4783	58.4466	1.49044	17000
17500	2.0001	2.50030	26.9843	49.4846	4.96851	53.6223	58.5906	1.49044	17500
18000	2.0001	2.50040	27.0548	49.5552	4.96872	53.7623	58.7310	1.49044	18000
18500	2.0001	2.50053	27.1233	49.6238	4.96898	53.8984	58.8674	1.49044	18500
19000	2.0001	2.50070	27.1900	49.6907	4.96930	54.0309	59.0002	1.49044	19000
19500	2.0002	2.50089	27.2549	49.7558	4.96969	54.1600	59.1297	1.49044	19500

TABLE 33 (CONT.). IDEAL GAS FUNCTIONS FOR AIR 70

TEMP. (°F)	PARTIT. FUNCT.	$\frac{h^0 - h^0}{RT}$	$\frac{h^0 - h^0}{RT}$	$\frac{h^0 - h^0}{RT}$	$\frac{h^0 - h^0}{RT}$	$\frac{h^0 - h^0}{RT}$	$\frac{h^0 - h^0}{RT}$	$\frac{h^0 - h^0}{RT}$	$\frac{h^0 - h^0}{RT}$	$\frac{h^0 - h^0}{RT}$	TEMP. (°F)			
20000	2.0002	2.50113	27.3102	29.0194	4.97016	54.2859	59.2540	5.94406	04	9.94036	04	1.04576	06	20000
22000	2.0006	2.50216	27.5567	30.0593	4.97308	54.7597	59.7328	6.56906	04	1.04416	05	1.20476	06	22000
24000	2.0012	2.50516	27.7765	30.2797	4.97817	55.1926	60.1708	7.17846	04	1.04286	04	1.32446	04	24000
26000	2.0023	2.50916	27.9752	30.4864	4.98412	55.5914	60.5775	7.79736	04	1.20446	05	1.44546	04	26000
28000	2.0041	2.51489	28.1614	30.6762	4.99751	55.9613	60.9588	8.42906	04	1.30936	05	1.56496	06	28000
30000	2.0067	2.52256	28.3351	30.8577	5.01276	56.3044	61.3193	9.07686	04	1.50346	05	1.68496	04	30000
32000	2.0102	2.53234	28.4962	31.0304	5.03217	56.6307	61.6628	9.74406	04	1.61036	05	1.81276	04	32000
34000	2.0148	2.54421	28.6521	31.1963	5.05737	56.9364	61.9922	1.04336	05	1.71906	05	1.93506	04	34000
36000	2.0207	2.55816	28.7979	31.3560	5.08848	57.2262	62.3097	1.11476	05	1.83016	05	2.06016	04	36000
38000	2.0279	2.57406	28.9366	31.5107	5.11508	57.5019	62.6169	1.18846	05	1.94376	05	2.18516	04	38000
40000	2.0365	2.59176	29.0691	31.6609	5.14925	57.7651	62.9134	1.26526	05	2.06016	05	2.31046	04	40000
42000	2.0466	2.61105	29.1960	31.8071	5.18859	58.0173	63.2029	1.34446	05	2.17926	05	2.43676	04	42000
44000	2.0582	2.63172	29.3179	31.9497	5.23267	58.2596	63.4893	1.42976	05	2.30116	05	2.56346	04	44000
46000	2.0713	2.65356	29.4356	32.0890	5.27303	58.4930	63.7661	1.51156	05	2.42546	05	2.69076	04	46000
48000	2.0858	2.67628	29.5498	32.2251	5.31822	58.7164	64.0366	1.59896	05	2.55276	05	2.81896	04	48000
50000	2.1019	2.69973	29.6585	32.3583	5.36480	58.9364	64.3012	1.68806	05	2.68246	05	2.94686	04	50000
52000	2.2233	2.82102	30.1615	32.7025	5.60583	59.9358	65.5416	2.17126	05	3.36356	05	3.58616	04	52000
54000	2.3357	2.93725	30.6092	33.3624	5.83480	60.8176	66.6544	2.69476	05	4.08586	05	4.25726	04	54000
56000	2.4932	3.04018	31.0043	34.0445	6.04135	61.6106	67.6320	3.20336	05	4.83316	05	4.92896	04	56000
58000	2.6709	3.12792	31.3376	34.6955	6.21569	62.3326	68.5483	3.80576	05	5.59416	05	5.60996	04	58000
60000	2.8648	3.20150	31.7011	34.9026	6.36190	62.9953	69.3572	4.37476	05	6.36196	05	6.29996	04	60000
62000	3.0993	3.25014	32.0484	34.9785	6.48625	63.6126	70.0688	4.92346	05	7.24346	05	7.05096	04	62000
64000	3.3193	3.28468	32.3828	35.0993	6.59744	64.1744	70.6895	5.45096	04	8.14096	04	7.93346	07	64000
66000	3.5292	3.31765	32.7051	35.2101	6.69886	64.6844	71.2152	6.00446	04	9.07446	04	8.86696	07	66000
68000	3.7369	3.34975	33.0164	35.3156	6.79164	65.1444	71.6527	6.58446	04	10.0444	04	9.84446	07	68000
70000	3.9448	3.38144	33.3235	35.4171	6.87625	65.5576	72.0088	7.18446	04	11.1044	04	10.9044	07	70000
72000	4.1509	3.41277	33.6267	35.5150	6.95319	65.9261	72.3893	7.84446	04	12.2444	04	12.1444	07	72000
74000	4.3513	3.44385	33.9213	35.6101	7.02210	66.2544	72.7922	8.53446	04	13.6644	04	13.5644	07	74000
76000	4.5462	3.47479	34.2186	35.7026	7.08344	66.5444	73.2227	9.25446	04	15.1644	04	15.0644	07	76000
78000	4.7369	3.50559	34.5164	35.7926	7.13762	66.7926	73.6844	10.0044	04	16.7444	04	16.6444	07	78000
80000	4.9234	3.53628	34.8144	35.8801	7.18446	67.0044	74.1776	10.7844	04	18.4044	04	18.3044	07	80000
82000	5.1059	3.56697	35.1126	35.9656	7.22446	67.1776	74.6993	11.6044	04	20.1444	04	20.0444	07	82000
84000	5.2848	3.59766	35.4113	36.0493	7.25762	67.3164	75.2493	12.3444	04	21.9644	04	21.8644	07	84000
86000	5.4593	3.62835	35.7101	36.1313	7.28319	67.4261	75.8227	13.0644	04	23.8644	04	23.7644	07	86000
88000	5.6292	3.65904	36.0093	36.2113	7.30164	67.5044	76.4261	13.7044	04	25.8444	04	25.7444	07	88000
90000	5.7948	3.68973	36.3086	36.2893	7.31264	67.5576	77.0527	14.3644	04	27.8944	04	27.7944	07	90000
92000	5.9569	3.72042	36.6081	36.3656	7.31625	67.5893	77.7044	15.0444	04	29.9944	04	29.8944	07	92000
94000	6.1150	3.75111	36.9081	36.4401	7.31264	67.5993	78.3844	15.7444	04	32.1444	04	32.0444	07	94000
96000	6.2693	3.78180	37.2081	36.5136	7.30164	67.5844	79.0993	16.4644	04	34.3444	04	34.2444	07	96000
98000	6.4193	3.81249	37.5081	36.5861	7.28319	67.5444	79.8493	17.2044	04	36.5944	04	36.4944	07	98000
100000	6.5648	3.84318	37.8081	36.6576	7.25762	67.4776	80.6227	17.9644	04	38.8944	04	38.7944	07	100000
102000	6.7069	3.87387	38.1081	36.7281	7.22446	67.3844	81.4261	18.7444	04	41.2444	04	41.1444	07	102000
104000	6.8448	3.90456	38.4081	36.7976	7.18446	67.2644	82.1993	19.5444	04	43.6444	04	43.5444	07	104000
106000	6.9793	3.93525	38.7081	36.8661	7.13762	67.1261	83.1844	20.3644	04	46.0944	04	45.9944	07	106000
108000	7.1150	3.96594	39.0081	36.9336	7.08344	66.9644	84.2993	21.2044	04	48.5944	04	48.4944	07	108000
110000	7.2509	3.99663	39.3081	37.0001	7.02210	66.7164	85.4493	22.0644	04	51.1444	04	50.9444	07	110000
112000	7.3869	4.02732	39.6081	37.0656	6.95319	66.4444	86.6227	22.9444	04	53.7444	04	53.6444	07	112000
114000	7.5234	4.05801	39.9081	37.1301	6.87625	66.1444	87.8227	23.8444	04	56.3944	04	56.2944	07	114000
116000	7.6593	4.08870	40.2081	37.1936	6.79164	65.8164	89.0227	24.7644	04	59.0944	04	59.0444	07	116000
118000	7.7948	4.11939	40.5081	37.2561	6.69886	65.4576	90.2493	25.7044	04	61.8444	04	61.7444	07	118000
120000	7.9292	4.15008	40.8081	37.3176	6.59744	65.0644	91.4993	26.6644	04	64.6444	04	64.5444	07	120000
122000	8.0648	4.18077	41.1081	37.3781	6.48625	64.6444	92.7727	27.6444	04	67.4944	04	67.3944	07	122000
124000	8.1993	4.21146	41.4081	37.4376	6.36190	64.1993	94.0993	28.6444	04	70.3944	04	70.2944	07	124000
126000	8.3348	4.24215	41.7081	37.4961	6.22446	63.7261	95.4493	29.6644	04	73.3444	04	73.2444	07	126000
128000	8.4693	4.27284	42.0081	37.5536	6.08344	63.2261	96.8227	30.7044	04	76.3444	04	76.2444	07	128000
130000	8.6048	4.30353	42.3081	37.6101	5.92446	62.6993	98.2493	31.7644	04	79.3944	04	79.2944	07	130000
132000	8.7393	4.33422	42.6081	37.6656	5.75762	62.1444	99.7044	32.8444	04	82.4944	04	82.3944	07	132000
134000	8.8748	4.36491	42.9081	37.7201	5.58319	61.5644	101.1993	33.9444	04	85.6444	04	85.5444	07	134000
136000	9.0093	4.39560	43.2081	37.7736	5.40164	60.9576	102.7227	35.0644	04	88.8444	04	88.7444	07	136000
138000	9.1448	4.42629	43.5081	37.8261	5.21264	60.3261	104.2844	36.2044	04	92.0944	04	91.9944	07	138000
140000	9.2792	4.45698	43.8081	37.8776	5.01625	59.6776	105.8727	37.3644	04	95.3944	04	95.2944	07	140000
142000	9.4150	4.48767	44.1081	37.9281	4.81264	59.0164	107.4993	38.4644	04	98.7444	04	98.6444	07	142000
144000	9.5509	4.51836	44.4081	37.9776	4.59937	58.3444	109.1644	39.5644	04	102.1444	04	102.0444	07	144000
146000	9.6869	4.54905	44.7081	38.0261	4.37625	57.6644	110.8644	40.6944	04	105.5944	04	105.4944	07	146000
148000	9.8234	4.57974	45.0081	38.0736	4.14164	56.9776	112.6044	41.8444	04	109.0944	04	108.9944	07	148000
150000	9.9593	4.61043	45.3081	38.1201	3.89625	56.2844	114.3844	43.0044	04	112.6444	04	112.5444	07	150000
152000	10.0948	4.64112	45.6081	38.1656	3.64164	55.5844	116.1044	44.1844	04	116.2444	04	116.1444	07	152000
154000	10.2309	4.67181	45.9081	38.2101	3.37625	54.8776	117.8644	45.3844	04	120.8944	04	120.7944	07	154000
156000	10.3669	4.70250	46.2081	38.2536	3.10164	54.1644	119.5644	46.6044	04	125.5944	04	125.4944	07	156000
158000	10.5029	4.73319	46.5081	38.2961	2.81625	53.4444	121.2993	47.8444	04	130.3444	04	130.2444	07	158000
160000	10.6384	4.76388	46.8081	38.3376	2.52064	52.7164	123.0444	49.0644	04	135.1444	04	135.0444	07	160000
162000	10.7748	4.79457	47.1081	38.3781	2.21464	51.9844	124.8227	50.3044	04	140.0444	04	139.9444	07	162000
164000	10.9109	4.82526	47.4081	38.4176	1.90864	51.2444	126.6444	5						

TABLE 34. IDEAL GAS FUNCTIONS FOR O₂. IONIC WEIGHT 15.9950, R = 1.98717 CAL/MOLE I
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS 4, 5, 4.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{W^0 - E^0}{RT}$	$\ln \frac{W^0 - E^0}{RT}$	$\ln \frac{W^0 - E^0}{RT} - \ln \frac{W^0 - E^0}{RT}$	$\ln \frac{W^0 - E^0}{RT} - \ln \frac{W^0 - E^0}{RT}$	$\ln \frac{W^0 - E^0}{RT} - \ln \frac{W^0 - E^0}{RT}$	$\ln \frac{W^0 - E^0}{RT} - \ln \frac{W^0 - E^0}{RT}$	TEMP. (°K)
5000	1.0000	21.7864	24.2464	4.46791	43.2933	48.2612	1.4904E 04	5000
5200	1.0000	21.8045	24.1945	4.46791	43.4881	48.5540	2.5933E 04	5200
5400	1.0000	21.8230	24.1426	4.46791	43.6830	48.8469	2.6827E 04	5400
5600	1.0000	21.8418	24.0908	4.46791	43.8780	49.1400	2.7720E 04	5600
5800	1.0000	21.8609	24.0392	4.46791	44.0732	49.4333	2.8614E 04	5800
6000	1.0000	21.8802	23.9877	4.46791	44.2686	49.7268	2.9508E 04	6000
6200	1.0000	21.9000	23.9363	4.46791	44.4642	50.0205	3.0403E 04	6200
6400	1.0000	21.9200	23.8850	4.46791	44.6600	50.3144	3.1298E 04	6400
6600	1.0000	21.9404	23.8338	4.46791	44.8560	50.6085	3.2194E 04	6600
6800	1.0000	21.9612	23.7827	4.46791	45.0522	50.9028	3.3091E 04	6800
7000	1.0000	21.9824	23.7317	4.46791	45.2486	51.1973	3.3989E 04	7000
7200	1.0000	21.9990	23.6808	4.46791	45.4452	51.4920	3.4888E 04	7200
7400	1.0000	22.0160	23.6300	4.46791	45.6420	51.7869	3.5788E 04	7400
7600	1.0000	22.0334	23.5793	4.46791	45.8390	52.0820	3.6689E 04	7600
7800	1.0000	22.0512	23.5287	4.46791	46.0362	52.3773	3.7591E 04	7800
8000	1.0000	22.0694	23.4782	4.46791	46.2336	52.6728	3.8494E 04	8000
8200	1.0000	22.0880	23.4278	4.46791	46.4312	52.9684	3.9398E 04	8200
8400	1.0000	22.1070	23.3775	4.46791	46.6290	53.2642	4.0303E 04	8400
8600	1.0000	22.1264	23.3273	4.46791	46.8270	53.5601	4.1209E 04	8600
8800	1.0000	22.1462	23.2772	4.46791	47.0252	53.8562	4.2116E 04	8800
9000	1.0000	22.1664	23.2272	4.46791	47.2236	54.1525	4.3024E 04	9000
9200	1.0000	22.1870	23.1773	4.46791	47.4222	54.4490	4.3933E 04	9200
9400	1.0000	22.2080	23.1275	4.46791	47.6210	54.7457	4.4843E 04	9400
9600	1.0000	22.2294	23.0778	4.46791	47.8200	55.0426	4.5754E 04	9600
9800	1.0000	22.2512	23.0282	4.46791	48.0192	55.3397	4.6666E 04	9800
10000	1.0000	22.2734	22.9787	4.46791	48.2186	55.6370	4.7579E 04	10000
10500	1.0000	22.3410	22.8812	4.46791	48.5182	56.2356	4.8994E 04	10500
11000	1.0000	22.4096	22.7838	4.46791	48.8180	56.8344	5.0410E 04	11000
11500	1.0000	22.4792	22.6865	4.46791	49.1180	57.4334	5.1827E 04	11500
12000	1.0000	22.5498	22.5893	4.46791	49.4182	58.0326	5.3245E 04	12000
12500	1.0000	22.6214	22.4922	4.46791	49.7186	58.6320	5.4664E 04	12500
13000	1.0000	22.6940	22.3952	4.46791	50.0192	59.2316	5.6084E 04	13000
13500	1.0000	22.7676	22.2983	4.46791	50.3200	59.8314	5.7505E 04	13500
14000	1.0000	22.8422	22.2015	4.46791	50.6210	60.4314	5.8927E 04	14000
14500	1.0000	22.9178	22.1048	4.46791	50.9222	61.0316	6.0350E 04	14500
15000	1.0000	22.9944	22.0082	4.46791	51.2236	61.6320	6.1774E 04	15000
15500	1.0000	23.0720	21.9117	4.46791	51.5252	62.2326	6.3199E 04	15500
16000	1.0000	23.1506	21.8153	4.46791	51.8270	62.8334	6.4625E 04	16000
16500	1.0000	23.2302	21.7190	4.46791	52.1290	63.4344	6.6052E 04	16500
17000	1.0000	23.3108	21.6228	4.46791	52.4312	64.0356	6.7480E 04	17000
17500	1.0000	23.3924	21.5267	4.46791	52.7336	64.6370	6.8909E 04	17500
18000	1.0000	23.4750	21.4307	4.46791	53.0362	65.2386	7.0339E 04	18000
18500	1.0000	23.5586	21.3348	4.46791	53.3390	65.8404	7.1770E 04	18500
19000	1.0000	23.6432	21.2390	4.46791	53.6420	66.4424	7.3202E 04	19000
19500	1.0000	23.7288	21.1433	4.46791	53.9452	67.0446	7.4635E 04	19500

TABLE 34 (CONT'D.). IDEAL GAS FUNCTIONS FOR O.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	TEMP. (°K)
20000	1.0000	25.2522	27.7527	4.96791	50.1803	55.1402	5.9619E 04	9.9350E 04	1.0034E 04	1.0034E 04	20000
22000	1.0000	25.4905	27.9905	4.96791	50.4237	55.4217	6.5570E 04	1.0923E 05	1.1144E 04	1.1144E 04	22000
24000	1.0000	25.7080	28.2080	4.96791	51.0860	56.0539	7.1530E 04	1.1923E 05	1.2261E 04	1.2261E 04	24000
26000	1.0000	25.9081	28.4081	4.96791	51.4837	56.4516	7.7490E 04	1.2917E 05	1.3306E 04	1.3306E 04	26000
28000	1.0000	26.0934	28.5934	4.96791	51.8518	56.8197	8.3441E 04	1.3911E 05	1.4019E 04	1.4019E 04	28000
30000	1.0000	26.2658	28.7658	4.96791	52.1946	57.1625	8.9427E 04	1.4904E 05	1.5050E 04	1.5050E 04	30000
32000	1.0000	26.4272	28.9272	4.96791	52.5152	57.4831	9.5404E 04	1.5897E 05	1.5950E 04	1.5950E 04	32000
34000	1.0000	26.5787	29.0787	4.96791	52.8164	57.7843	1.0135E 05	1.6891E 05	1.7950E 04	1.7950E 04	34000
36000	1.0000	26.7216	29.2216	4.96791	53.1003	58.0682	1.0731E 05	1.7884E 05	1.9110E 04	1.9110E 04	36000
38000	1.0000	26.8568	29.3568	4.96791	53.3689	58.3368	1.1327E 05	1.8878E 05	2.0280E 04	2.0280E 04	38000
40000	1.0000	26.9850	29.4850	4.96791	53.6237	58.5917	1.1923E 05	1.9872E 05	2.1400E 04	2.1400E 04	40000
42000	1.0000	27.1070	29.6070	4.96791	53.8661	58.8340	1.2519E 05	2.0865E 05	2.2635E 04	2.2635E 04	42000
44000	1.0000	27.2233	29.7233	4.96791	54.0972	59.0652	1.3115E 05	2.1859E 05	2.3803E 04	2.3803E 04	44000
46000	1.0000	27.3345	29.8345	4.96791	54.3181	59.2860	1.3711E 05	2.2852E 05	2.4966E 04	2.4966E 04	46000
48000	1.0000	27.4408	29.9408	4.96791	54.5295	59.4974	1.4308E 05	2.3846E 05	2.6174E 04	2.6174E 04	48000
50000	1.0000	27.5429	30.0429	4.96791	54.7323	59.7002	1.4904E 05	2.4840E 05	2.7366E 04	2.7366E 04	50000
60000	1.0000	27.9987	30.4987	4.96791	55.6381	60.6060	1.7884E 05	2.9872E 05	3.3303E 04	3.3303E 04	60000
70000	1.0000	28.3841	30.8841	4.96791	56.4039	61.3718	2.0865E 05	3.4976E 05	3.9483E 04	3.9483E 04	70000
80000	1.0000	28.7119	31.2119	4.96791	57.0872	62.0352	2.3846E 05	3.9763E 05	4.5454E 04	4.5454E 04	80000
90000	1.0000	29.0124	31.5124	4.96791	57.6524	62.6203	2.6827E 05	4.4711E 05	5.1887E 04	5.1887E 04	90000
100000	1.0000	29.2758	31.7758	4.96791	58.1758	63.1437	2.9807E 05	4.9479E 05	5.8178E 04	5.8178E 04	100000
150000	1.0000	30.2894	32.7894	4.96791	60.1901	65.1580	4.4711E 05	7.4519E 05	9.0285E 04	9.0285E 04	150000
200000	1.0000	31.0086	33.5086	4.96791	61.6191	66.5872	5.9615E 05	9.9350E 05	1.2324E 05	1.2324E 05	200000
300000	1.0000	32.0223	34.5223	4.96791	63.6326	68.6015	8.9427E 05	1.4904E 06	1.9095E 05	1.9095E 05	300000
400000	1.0000	32.7415	35.2415	4.96791	65.0628	70.0307	1.1923E 06	1.9872E 06	2.4025E 05	2.4025E 05	400000
500000	1.0000	33.2994	35.7994	4.96791	66.1713	71.1393	1.4904E 06	2.4840E 06	3.0064E 05	3.0064E 05	500000
600000	1.0000	33.7552	36.2552	4.96791	67.0771	72.0450	1.7884E 06	2.9872E 06	4.0244E 05	4.0244E 05	600000
800000	1.0000	34.7744	37.2744	4.96791	68.5063	73.5742	2.3846E 06	3.9936E 06	5.4005E 05	5.4005E 05	800000
1000000	1.0000	35.1322	37.6322	4.96791	69.6148	74.6828	2.9807E 06	4.9999E 06	6.9615E 05	6.9615E 05	1000000
1500000	1.0000	36.0459	38.5459	4.96791	71.6292	76.5971	4.4711E 06	7.4519E 06	1.0744E 06	1.0744E 06	1500000
2000000	1.0000	36.7451	39.2451	4.96791	73.0583	78.0263	5.9615E 06	9.9350E 06	1.4612E 06	1.4612E 06	2000000
3000000	1.0000	37.7788	40.2788	4.96791	75.0727	80.0406	8.9427E 06	1.4904E 07	2.2522E 06	2.2522E 06	3000000
4000000	1.0000	38.4980	40.9980	4.96791	76.5018	81.6497	1.1923E 07	1.9872E 07	3.0401E 06	3.0401E 06	4000000
5000000	1.0000	39.0558	41.5558	4.96791	77.6104	82.7583	1.4904E 07	2.4840E 07	3.9003E 06	3.9003E 06	5000000
6000000	1.0000	39.5116	42.0116	4.96791	78.5161	83.6641	1.7884E 07	2.9872E 07	4.7110E 06	4.7110E 06	6000000
8000000	1.0000	40.2308	42.7308	4.96791	79.9453	84.9132	2.3846E 07	3.9936E 07	6.3954E 06	6.3954E 06	8000000
10000000	1.0000	40.7687	43.2687	4.96791	81.0539	86.0218	2.9807E 07	4.9999E 07	8.1054E 06	8.1054E 06	10000000

TABLE 35. IDEAL GAS FUNCTIONS FOR AR 0+ (ATOMIC WEIGHT 39.9440, $R = 1.98717$ CAL/MOLE) BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $N \leq 4$. SEE TABLE 76 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{W^0 - E^0}{RT}$	$\ln W^0 - \frac{E^0 - E^0}{RT}$	$\ln W^0 - \frac{E^0 - E^0}{RT}$	$\ln W^0 - \frac{E^0 - E^0}{RT}$	$\ln W^0 - \frac{E^0 - E^0}{RT}$	$\ln W^0 - \frac{E^0 - E^0}{RT}$	$\ln W^0 - \frac{E^0 - E^0}{RT}$	TEMP. (°K)	
3000	1.0000	23.1502	25.4592	4.96791	46.0212	50.9992	1.4904E 04	2.4840E 04	2.3011E 05	5000
3200	1.0000	23.2573	25.5773	4.96791	46.2161	51.1840	1.5000E 04	2.5833E 04	2.4032E 05	5200
3400	1.0000	23.3516	25.6516	4.96791	46.4036	51.3715	1.6094E 04	2.6827E 04	2.5058E 05	5400
3600	1.0000	23.4428	25.7428	4.96791	46.5843	51.5522	1.6692E 04	2.7820E 04	2.6087E 05	5600
3800	1.0000	23.5303	25.8303	4.96791	46.7684	51.7285	1.7288E 04	2.8814E 04	2.7120E 05	5800
4000	1.0000	23.6150	25.9150	4.96791	46.9270	51.8949	1.7884E 04	2.9807E 04	2.8154E 05	6000
4200	1.0000	23.6970	25.9970	4.96791	47.0899	52.0578	1.8481E 04	3.0801E 04	2.9196E 05	6200
4400	1.0000	23.7784	26.0784	4.96791	47.2476	52.2155	1.9077E 04	3.1795E 04	3.0238E 05	6400
4600	1.0000	23.8533	26.1533	4.96791	47.4005	52.3684	1.9673E 04	3.2788E 04	3.1284E 05	6600
4800	1.0000	23.9280	26.2280	4.96791	47.5488	52.5167	2.0269E 04	3.3782E 04	3.2333E 05	6800
5000	1.0000	24.0004	26.3004	4.96791	47.6928	52.6607	2.0865E 04	3.4775E 04	3.3385E 05	7000
5200	1.0000	24.0709	26.3709	4.96791	47.8328	52.8007	2.1461E 04	3.5768E 04	3.4440E 05	7200
5400	1.0000	24.1394	26.4394	4.96791	47.9689	52.9368	2.2058E 04	3.6763E 04	3.5497E 05	7400
5600	1.0000	24.2060	26.5060	4.96791	48.1014	53.0693	2.2654E 04	3.7754E 04	3.6557E 05	7600
5800	1.0000	24.2710	26.5710	4.96791	48.2304	53.1993	2.3250E 04	3.8750E 04	3.7620E 05	7800
6000	1.0000	24.3343	26.6343	4.96791	48.3562	53.3241	2.3846E 04	3.9745E 04	3.8685E 05	8000
6200	1.0000	24.3960	26.6960	4.96791	48.4789	53.4448	2.4442E 04	4.0737E 04	3.9753E 05	8200
6400	1.0000	24.4562	26.7562	4.96791	48.5986	53.5615	2.5038E 04	4.1730E 04	4.0823E 05	8400
6600	1.0000	24.5151	26.8151	4.96791	48.7155	53.6744	2.5634E 04	4.2724E 04	4.1895E 05	8600
6800	1.0000	24.5725	26.8725	4.96791	48.8297	53.7876	2.6231E 04	4.3718E 04	4.2970E 05	8800
7000	1.0000	24.6287	26.9287	4.96791	48.9413	53.9002	2.6827E 04	4.4711E 04	4.4047E 05	9000
7200	1.0000	24.6837	26.9837	4.96791	49.0505	54.0184	2.7423E 04	4.5705E 04	4.5126E 05	9200
7400	1.0000	24.7374	27.0374	4.96791	49.1574	54.1253	2.8019E 04	4.6698E 04	4.6208E 05	9400
7600	1.0000	24.7901	27.0901	4.96791	49.2619	54.2299	2.8615E 04	4.7692E 04	4.7291E 05	9600
7800	1.0000	24.8416	27.1416	4.96791	49.3644	54.3323	2.9211E 04	4.8686E 04	4.8377E 05	9800
8000	1.0000	24.8921	27.1921	4.96791	49.4647	54.4327	2.9807E 04	4.9679E 04	4.9465E 05	10000
8200	1.0000	24.9416	27.2416	4.96791	49.5631	54.5300	3.0403E 04	5.0672E 04	5.0556E 05	10500
8400	1.0000	25.0130	27.3130	4.96791	49.6594	54.6252	3.1000E 04	5.1680E 04	5.1652E 05	11000
8600	1.0000	25.0845	27.3845	4.96791	49.7537	54.7184	3.1600E 04	5.2688E 04	5.2743E 05	11500
8800	1.0000	25.1549	27.4549	4.96791	49.8460	54.8100	3.2200E 04	5.3696E 04	5.3838E 05	12000
9000	1.0000	25.2244	27.5244	4.96791	49.9373	54.9000	3.2800E 04	5.4704E 04	5.4938E 05	12500
9200	1.0000	25.2929	27.5929	4.96791	50.0276	55.0000	3.3400E 04	5.5712E 04	5.6043E 05	13000
9400	1.0000	25.3604	27.6604	4.96791	50.1169	55.1000	3.4000E 04	5.6720E 04	5.7152E 05	13500
9600	1.0000	25.4279	27.7279	4.96791	50.2052	55.2000	3.4600E 04	5.7728E 04	5.8266E 05	14000
9800	1.0000	25.4944	27.7944	4.96791	50.2925	55.3000	3.5200E 04	5.8736E 04	5.9384E 05	14500
10000	1.0000	25.5609	27.8609	4.96791	50.3788	55.4000	3.5800E 04	5.9744E 04	6.0507E 05	15000
10500	1.0000	25.6274	27.9274	4.96791	50.4641	55.5000	3.6400E 04	6.0752E 04	6.1634E 05	15500
11000	1.0000	25.6929	27.9929	4.96791	50.5484	55.6000	3.7000E 04	6.1760E 04	6.2766E 05	16000
11500	1.0000	25.7574	28.0574	4.96791	50.6317	55.7000	3.7600E 04	6.2768E 04	6.3902E 05	16500
12000	1.0000	25.8219	28.1219	4.96791	50.7140	55.8000	3.8200E 04	6.3776E 04	6.5043E 05	17000
12500	1.0000	25.8864	28.1864	4.96791	50.7953	55.9000	3.8800E 04	6.4784E 04	6.6190E 05	17500
13000	1.0000	25.9499	28.2499	4.96791	50.8756	56.0000	3.9400E 04	6.5792E 04	6.7343E 05	18000
13500	1.0000	26.0124	28.3124	4.96791	50.9549	56.1000	4.0000E 04	6.6800E 04	6.8502E 05	18500
14000	1.0000	26.0749	28.3749	4.96791	51.0332	56.2000	4.0600E 04	6.7808E 04	6.9666E 05	19000
14500	1.0000	26.1374	28.4374	4.96791	51.1105	56.3000	4.1200E 04	6.8816E 04	7.0836E 05	19500
15000	1.0000	26.1989	28.4989	4.96791	51.1868	56.4000	4.1800E 04	6.9824E 04	7.2012E 05	
15500	1.0000	26.2594	28.5594	4.96791	51.2621	56.5000	4.2400E 04	7.0832E 04	7.3193E 05	
16000	1.0000	26.3189	28.6189	4.96791	51.3364	56.6000	4.3000E 04	7.1840E 04	7.4379E 05	
16500	1.0000	26.3784	28.6784	4.96791	51.4097	56.7000	4.3600E 04	7.2848E 04	7.5570E 05	
17000	1.0000	26.4379	28.7379	4.96791	51.4820	56.8000	4.4200E 04	7.3856E 04	7.6766E 05	
17500	1.0000	26.4974	28.7974	4.96791	51.5533	56.9000	4.4800E 04	7.4864E 04	7.7967E 05	
18000	1.0000	26.5569	28.8569	4.96791	51.6236	57.0000	4.5400E 04	7.5872E 04	7.9173E 05	
18500	1.0000	26.6164	28.9164	4.96791	51.6929	57.1000	4.6000E 04	7.6880E 04	8.0384E 05	
19000	1.0000	26.6759	28.9759	4.96791	51.7612	57.2000	4.6600E 04	7.7888E 04	8.1600E 05	
19500	1.0000	26.7354	29.0354	4.96791	51.8285	57.3000	4.7200E 04	7.8896E 04	8.2822E 05	
		26.7949	29.0949	4.96791	51.8948	57.4000	4.7800E 04	7.9904E 04	8.4050E 05	
		26.8544	29.1544	4.96791	51.9601	57.5000	4.8400E 04	8.0912E 04	8.5278E 05	
		26.9139	29.2139	4.96791	52.0244	57.6000	4.9000E 04	8.1920E 04	8.6512E 05	
		26.9734	29.2734	4.96791	52.0877	57.7000	4.9600E 04	8.2928E 04	8.7750E 05	
		27.0329	29.3329	4.96791	52.1500	57.8000	5.0200E 04	8.3936E 04	8.9000E 05	
		27.0924	29.3924	4.96791	52.2113	57.9000	5.0800E 04	8.4944E 04	9.0250E 05	
		27.1519	29.4519	4.96791	52.2716	58.0000	5.1400E 04	8.5952E 04	9.1500E 05	
		27.2114	29.5114	4.96791	52.3309	58.1000	5.2000E 04	8.6960E 04	9.2750E 05	
		27.2709	29.5709	4.96791	52.3892	58.2000	5.2600E 04	8.7968E 04	9.4000E 05	
		27.3304	29.6304	4.96791	52.4465	58.3000	5.3200E 04	8.8976E 04	9.5250E 05	
		27.3899	29.6899	4.96791	52.5028	58.4000	5.3800E 04	8.9984E 04	9.6500E 05	
		27.4494	29.7494	4.96791	52.5581	58.5000	5.4400E 04	9.0992E 04	9.7750E 05	
		27.5089	29.8089	4.96791	52.6124	58.6000	5.5000E 04	9.1996E 04	9.9000E 05	
		27.5684	29.8684	4.96791	52.6657	58.7000	5.5600E 04	9.2996E 04	1.0000E 06	
		27.6279	29.9279	4.96791	52.7180	58.8000	5.6200E 04	9.3996E 04	1.0000E 06	
		27.6874	29.9874	4.96791	52.7693	58.9000	5.6800E 04	9.4996E 04	1.0000E 06	
		27.7469	30.0469	4.96791	52.8196	59.0000	5.7400E 04	9.5996E 04	1.0000E 06	
		27.8064	30.1064	4.96791	52.8689	59.1000	5.8000E 04	9.6996E 04	1.0000E 06	
		27.8659	30.1659	4.96791	52.9172	59.2000	5.8600E 04	9.7996E 04	1.0000E 06	
		27.9254	30.2254	4.96791	52.9645	59.3000	5.9200E 04	9.8996E 04	1.0000E 06	
		27.9849	30.2849	4.96791	53.0108	59.4000	5.9800E 04	9.9996E 04	1.0000E 06	
		28.0444	30.3444	4.96791	53.0561	59.5000	6.0400E 04	10.0996E 04	1.0000E 06	
		28.1039	30.4039	4.96791	53.1004	59.6000	6.1000E 04	10.1996E 04	1.0000E 06	
		28.1634	30.4634	4.96791	53.1437	59.7000	6.1600E 04	10.2996E 04	1.0000E 06	
		28.2229	30.5229	4.96791	53.1860	59.8000	6.2200E 04	10.3996E 04	1.0000E 06	
		28.2824	30.5824	4.96791	53.2273	59.9000	6.2800E 04	10.4996E 04	1.0000E 06	
		28.3419	30.6419	4.96791	53.2676	60.0000	6.3400E 04	10.5996E 04	1.0000E 06	
		28.4014	30.7014	4.96791	53.3069		6.4000E 04	10.6996E 04	1.0000E 06	
		28.4609	30.7609	4.96791	53.3452		6.4600E 04	10.7996E 04	1.0000E 06	
		28.5204	30.8204	4.96791	53.3825		6.5200E 04	10.8996E 04	1.0000E 06	
		28.5799	30.8799	4.96791	53.4188		6.5800E 04	10.9996E 04	1.0000E 06	
		28.6394	30.9394	4.96791	53.4541		6.6400E 04	11.0996E 04	1.0000E 06	
		28.6989	31.0000	4.96791	53.4884		6.7000E 04	11.1996E 04	1.0000E 06	
		28.7584	31.0600	4.96791	53.5217		6.7600E 04	11.2996E 04	1.0000E 06	
		28.8179	31.1200	4.96791	53.5540		6.8200E 04	11.3996E 04	1.0000E 06	
		28.8774	31.1800	4.96791	53.5853		6.8800E 04	11.4996E 04	1.0000E 06	
		28.9369	31.2400	4.96791						

TABLE 35 (CONT.). IDEAL GAS FUNCTIONS FOR AIR 8*

TEMP. (°F)	PARTIT. FUNCT.	$\frac{h^0 - h^0}{RT}$	$-\frac{h^0 - h^0}{RT}$	$\ln \frac{h^0 - h^0}{RT}$	$h^0 - h^0$ - CAL/MOLE	$h^0 - h^0$ - CAL/MOLE	$h^0 - h^0$ - CAL/MOLE	$h^0 - h^0$ - CAL/MOLE	TEMP. (°F)
2000	1.0000	26.4250	29.1750	4.96791	52.9022	57.8762	5.9615E 04	9.9358E 04	2000
2200	1.0000	26.2633	29.3633	4.96791	53.3817	58.3496	6.5576E 04	1.0927E 05	2200
2400	1.0000	27.0808	29.5808	4.96791	53.8160	58.7819	7.1530E 04	1.1923E 05	2400
2600	1.0000	27.2809	29.7809	4.96791	54.2116	59.1796	7.7499E 04	1.2917E 05	2600
2800	1.0000	27.4662	29.9662	4.96791	54.5798	59.5477	8.3461E 04	1.3910E 05	2800
3000	1.0000	27.6366	30.1366	4.96791	54.9226	59.8905	8.9422E 04	1.4904E 05	3000
3200	1.0000	27.8000	30.3000	4.96791	55.2432	60.2111	9.5384E 04	1.5897E 05	3200
3400	1.0000	27.9516	30.4516	4.96791	55.5444	60.5129	1.0135E 05	1.6891E 05	3400
3600	1.0000	28.0944	30.5944	4.96791	55.8283	60.7962	1.0731E 05	1.7884E 05	3600
3800	1.0000	28.2296	30.7296	4.96791	56.0969	61.0648	1.1327E 05	1.8878E 05	3800
4000	1.0000	28.3578	30.8578	4.96791	56.3517	61.3196	1.1923E 05	1.9872E 05	4000
4200	1.0000	28.4798	30.9798	4.96791	56.5941	61.5620	1.2519E 05	2.0865E 05	4200
4400	1.0000	28.5961	31.0761	4.96791	56.8252	61.7931	1.3115E 05	2.1859E 05	4400
4600	1.0000	28.7073	31.2073	4.96791	57.0461	62.0140	1.3711E 05	2.2852E 05	4600
4800	1.0000	28.8137	31.3137	4.96791	57.2575	62.2254	1.4308E 05	2.3846E 05	4800
5000	1.0000	28.9157	31.4157	4.96791	57.4603	62.4282	1.4904E 05	2.4840E 05	5000
5200	1.0000	29.0135	31.5135	4.96791	57.6541	62.6220	1.5500E 05	2.5834E 05	5200
5400	1.0000	29.1069	31.6069	4.96791	57.8389	62.8068	1.6096E 05	2.6828E 05	5400
5600	1.0000	29.1959	31.6959	4.96791	58.0147	62.9826	1.6692E 05	2.7822E 05	5600
5800	1.0000	29.2804	31.7804	4.96791	58.1815	63.1494	1.7288E 05	2.8816E 05	5800
6000	1.0000	29.3604	31.8604	4.96791	58.3393	63.3072	1.7884E 05	2.9810E 05	6000
6200	1.0000	29.4359	31.9359	4.96791	58.4881	63.4560	1.8480E 05	3.0804E 05	6200
6400	1.0000	29.5069	32.0069	4.96791	58.6289	63.5958	1.9076E 05	3.1798E 05	6400
6600	1.0000	29.5734	32.0734	4.96791	58.7617	63.7266	1.9672E 05	3.2792E 05	6600
6800	1.0000	29.6354	32.1354	4.96791	58.8865	63.8484	2.0268E 05	3.3786E 05	6800
7000	1.0000	29.6929	32.1929	4.96791	59.0033	63.9612	2.0864E 05	3.4780E 05	7000
7200	1.0000	29.7459	32.2459	4.96791	59.1121	64.0650	2.1460E 05	3.5774E 05	7200
7400	1.0000	29.7934	32.2934	4.96791	59.2129	64.1608	2.2056E 05	3.6768E 05	7400
7600	1.0000	29.8354	32.3354	4.96791	59.3057	64.2486	2.2652E 05	3.7762E 05	7600
7800	1.0000	29.8729	32.3729	4.96791	59.3905	64.3284	2.3248E 05	3.8756E 05	7800
8000	1.0000	29.9059	32.4059	4.96791	59.4673	64.4002	2.3844E 05	3.9750E 05	8000
8200	1.0000	29.9334	32.4334	4.96791	59.5361	64.4640	2.4440E 05	4.0744E 05	8200
8400	1.0000	29.9559	32.4559	4.96791	59.5979	64.5208	2.5036E 05	4.1738E 05	8400
8600	1.0000	29.9729	32.4729	4.96791	59.6527	64.5706	2.5632E 05	4.2732E 05	8600
8800	1.0000	29.9849	32.4849	4.96791	59.7005	64.6134	2.6228E 05	4.3726E 05	8800
9000	1.0000	29.9919	32.4919	4.96791	59.7413	64.6502	2.6824E 05	4.4720E 05	9000
9200	1.0000	29.9939	32.4939	4.96791	59.7751	64.6810	2.7420E 05	4.5714E 05	9200
9400	1.0000	29.9909	32.4909	4.96791	59.8019	64.7058	2.8016E 05	4.6708E 05	9400
9600	1.0000	29.9829	32.4829	4.96791	59.8217	64.7246	2.8612E 05	4.7702E 05	9600
9800	1.0000	29.9699	32.4699	4.96791	59.8345	64.7374	2.9208E 05	4.8696E 05	9800
10000	1.0000	29.9519	32.4519	4.96791	59.8403	64.7442	2.9804E 05	4.9690E 05	10000
10200	1.0000	29.9289	32.4289	4.96791	59.8391	64.7450	3.0400E 05	5.0684E 05	10200
10400	1.0000	29.9009	32.4009	4.96791	59.8309	64.7398	3.1000E 05	5.1678E 05	10400
10600	1.0000	29.8679	32.3679	4.96791	59.8147	64.7286	3.1596E 05	5.2672E 05	10600
10800	1.0000	29.8299	32.3299	4.96791	59.7905	64.7114	3.2192E 05	5.3666E 05	10800
11000	1.0000	29.7869	32.2869	4.96791	59.7583	64.6882	3.2788E 05	5.4660E 05	11000
11200	1.0000	29.7389	32.2389	4.96791	59.7181	64.6590	3.3384E 05	5.5654E 05	11200
11400	1.0000	29.6859	32.1859	4.96791	59.6709	64.6238	3.3980E 05	5.6648E 05	11400
11600	1.0000	29.6279	32.1279	4.96791	59.6167	64.5826	3.4576E 05	5.7642E 05	11600
11800	1.0000	29.5649	32.0649	4.96791	59.5555	64.5354	3.5172E 05	5.8636E 05	11800
12000	1.0000	29.4969	31.9969	4.96791	59.4873	64.4822	3.5768E 05	5.9630E 05	12000
12200	1.0000	29.4239	31.9239	4.96791	59.4121	64.4230	3.6364E 05	6.0624E 05	12200
12400	1.0000	29.3459	31.8459	4.96791	59.3309	64.3578	3.6960E 05	6.1618E 05	12400
12600	1.0000	29.2619	31.7619	4.96791	59.2437	64.2866	3.7556E 05	6.2612E 05	12600
12800	1.0000	29.1729	31.6729	4.96791	59.1505	64.2094	3.8152E 05	6.3606E 05	12800
13000	1.0000	29.0789	31.5789	4.96791	59.0513	64.1262	3.8748E 05	6.4600E 05	13000
13200	1.0000	28.9799	31.4799	4.96791	58.9461	64.0370	3.9344E 05	6.5594E 05	13200
13400	1.0000	28.8759	31.3759	4.96791	58.8349	63.9418	3.9940E 05	6.6588E 05	13400
13600	1.0000	28.7669	31.2669	4.96791	58.7177	63.8406	4.0536E 05	6.7582E 05	13600
13800	1.0000	28.6529	31.1529	4.96791	58.5945	63.7334	4.1132E 05	6.8576E 05	13800
14000	1.0000	28.5339	31.0339	4.96791	58.4653	63.6202	4.1728E 05	6.9570E 05	14000
14200	1.0000	28.4099	30.9099	4.96791	58.3301	63.5010	4.2324E 05	7.0564E 05	14200
14400	1.0000	28.2809	30.7809	4.96791	58.1889	63.3758	4.2920E 05	7.1558E 05	14400
14600	1.0000	28.1469	30.6469	4.96791	58.0417	63.2446	4.3516E 05	7.2552E 05	14600
14800	1.0000	28.0079	30.5079	4.96791	57.8885	63.1074	4.4112E 05	7.3546E 05	14800
15000	1.0000	27.8639	30.3639	4.96791	57.7293	62.9642	4.4708E 05	7.4540E 05	15000

TABLE 36. IDEAL GAS FUNCTIONS FOR AR 9+ (ATOMIC WEIGHT 39.9430, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $n \leq 4$. SEE TABLE 77 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{U^0 - E^0}{RT}$	$-\frac{F^0 - E^0}{RT}$	$\frac{S^0}{R}$	$\ln \frac{U^0 - E^0}{RT} - \frac{U^0 - E^0}{RT}$	$-\ln \frac{F^0 - E^0}{RT} - \frac{F^0 - E^0}{RT}$	$\frac{S^0}{R}$	$\frac{U^0 - E^0}{RT} - \frac{U^0 - E^0}{RT}$	$-\frac{F^0 - E^0}{RT} - \frac{F^0 - E^0}{RT}$	TEMP. (°K)
20000	4.5458	2.65592	28.1391	30.7951	55.9171	61.1949	6.5812E 04	1.0554E 05	1.1183E 06	20000
20000	4.6142	2.65715	28.3233	31.0495	56.4203	61.7005	7.2647E 04	1.1616E 05	1.2412E 06	22000
24000	4.6777	2.65679	28.6293	31.2803	56.8797	62.1542	7.9215E 04	1.2671E 05	1.3551E 06	24000
26000	4.7365	2.65534	28.8361	31.4915	57.3022	62.5788	8.5525E 04	1.3719E 05	1.4699E 06	26000
28000	4.7910	2.65315	29.0329	31.6860	57.7225	62.9853	9.1982E 04	1.4762E 05	1.6154E 06	28000
30000	4.8414	2.65047	29.2158	31.8663	58.0567	63.3236	9.8393E 04	1.5801E 05	1.7417E 06	30000
32000	4.8882	2.64749	29.3868	32.0363	58.3964	63.6574	1.0476E 05	1.6833E 05	1.8687E 06	32000
34000	4.9316	2.64432	29.5472	32.1915	58.7151	63.9898	1.1110E 05	1.7844E 05	1.9943E 06	34000
36000	4.9720	2.64106	29.6982	32.3393	59.0153	64.2635	1.1740E 05	1.8894E 05	2.1246E 06	36000
38000	5.0097	2.63776	29.8409	32.4787	59.2989	64.5406	1.2347E 05	1.9918E 05	2.2593E 06	38000
40000	5.0448	2.63448	29.9762	32.6104	59.5676	64.8027	1.2929E 05	2.0941E 05	2.3827E 06	40000
42000	5.0776	2.63125	30.1046	32.7359	59.8229	65.0516	1.3491E 05	2.1961E 05	2.5126E 06	42000
44000	5.1085	2.62808	30.2270	32.8550	60.0800	65.2884	1.4034E 05	2.2979E 05	2.6428E 06	44000
46000	5.1371	2.62499	30.3437	32.9687	60.2980	65.5162	1.4559E 05	2.3992E 05	2.7737E 06	46000
48000	5.1642	2.62199	30.4554	33.0774	60.5198	65.7302	1.5071E 05	2.5010E 05	2.9050E 06	48000
50000	5.1896	2.61909	30.5623	33.1814	60.7324	65.9370	1.5578E 05	2.6023E 05	3.0366E 06	50000
60000	5.2972	2.60602	31.0387	33.6447	61.6790	66.8575	1.6149E 05	3.1072E 05	3.7807E 06	60000
70000	5.3800	2.59520	31.4395	34.0347	62.4756	67.6327	2.2189E 05	3.6100E 05	4.3733E 06	70000
80000	5.4556	2.58626	31.7855	34.3717	63.1630	68.3023	2.5217E 05	4.1115E 05	5.0530E 06	80000
90000	5.4987	2.57888	32.0897	34.6685	63.7675	68.8921	2.8237E 05	4.6122E 05	5.7391E 06	90000
100000	5.5428	2.57281	32.3410	34.9339	64.3067	69.4193	3.1254E 05	5.1124E 05	6.4307E 06	100000
150000	5.6881	2.55740	33.4006	35.9580	66.3725	71.4544	4.6422E 05	7.6230E 05	9.9559E 06	150000
200000	5.7823	2.55093	34.1362	36.6951	67.8343	72.9193	6.1957E 05	1.0170E 06	1.3547E 07	200000
300000	5.9445	2.54090	35.1779	37.7628	69.9043	75.0409	9.4484E 05	1.5410E 06	2.0771E 07	300000
400000	6.1516	2.67797	35.9310	38.6090	71.4008	76.7224	1.3338E 06	2.1284E 06	2.8540E 07	400000
500000	6.5944	3.02302	36.5590	39.5820	72.6487	78.6559	2.0100E 06	3.0034E 06	4.3324E 07	500000
600000	7.0928	3.73415	37.1682	40.9024	73.8594	81.2798	3.2599E 06	4.4522E 06	6.4314E 07	600000
800000	13.6786	5.20211	38.4430	43.6451	76.4323	86.7497	6.6802E 06	8.2780E 06	1.1646E 07	800000
1000000	26.5840	5.61764	39.6954	45.3031	78.8614	90.0247	9.1761E 06	1.1163E 07	1.6861E 07	1000000
1500000	86.9081	5.09046	41.8835	46.9740	83.2295	93.3450	1.2193E 07	1.5173E 07	2.2404E 08	1500000
2000000	158.9542	6.53823	43.2675	47.8057	85.9797	94.9379	1.6042E 07	1.8024E 07	3.1719E 08	2000000
3000000	336.8711	7.25843	44.9712	48.8897	89.3653	97.1121	2.3240E 07	2.3240E 07	4.6810E 08	3000000
4000000	478.7323	7.55947	46.0419	49.6013	91.6228	99.5861	2.9346E 07	2.9346E 07	6.1537E 08	4000000
5000000	592.0501	7.85194	46.8122	50.1641	93.6236	99.8844	3.5396E 07	3.5396E 07	7.6512E 08	5000000
6000000	842.5295	8.21717	47.4102	50.6224	95.3311	100.5950	4.2370E 07	4.2370E 07	9.2527E 08	6000000
8000000	815.8030	8.03605	48.3078	51.3438	95.9955	102.0287	5.2368E 07	5.2368E 07	1.1279E 09	8000000
10000000	908.2249	8.29271	48.9730	51.9027	97.3174	103.1392	6.3344E 07	6.3344E 07	1.3517E 09	10000000

TABLE 37. IDEAL GAS FUNCTIONS FOR AN 10+ (ATOMIC WEIGHT 39.9430, R = 1.98717 CAL/MOLE)
 BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N S A. SEE TABLE 78 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL FUNCT.	$\frac{W^0-E^0}{RT}$	$-\frac{F^0-E^0}{RT}$	S^0A	$\ln W^0-E^0_{TOT}$ -- CAL/MOLE N	S^0	F^0-E^0 -- CAL/MOLE	W^0-E^0 -- CAL/MOLE	$-10^6 \frac{d}{dT}$	TEMP. (°K)
20000	6.3668	2.7667	28.4760	31.2307	5.47398	62.0406	6.9734E 04	1.0940E 05	1.1317E 04	20000
22000	6.5251	2.76060	28.7389	31.4995	5.48577	57.1089	7.6969E 04	1.2049E 05	1.2564E 04	22000
24000	6.6763	2.76610	29.0093	31.7754	5.49670	52.9867	8.4229E 04	1.3192E 05	1.3821E 04	24000
26000	6.8214	2.77133	29.2809	31.9723	5.50709	50.0271	9.1510E 04	1.4310E 05	1.5007E 04	26000
28000	6.9613	2.77630	29.5465	32.1928	5.51637	50.8355	9.8835E 04	1.5440E 05	1.6362E 04	28000
30000	7.0964	2.78099	29.8082	32.3792	5.52629	50.8165	1.0617E 05	1.6579E 05	1.7645E 04	30000
32000	7.2273	2.78536	29.7778	32.5632	5.53497	59.1734	1.1353E 05	1.7712E 05	1.8924E 04	32000
34000	7.3543	2.78915	29.9468	32.7362	5.54291	59.5092	1.2090E 05	1.8844E 05	2.0232E 04	34000
36000	7.4777	2.79295	30.1063	32.8993	5.55006	59.8263	1.2824E 05	1.9980E 05	2.1537E 04	36000
38000	7.5978	2.79613	30.2574	33.0536	5.55638	60.1265	1.3563E 05	2.1114E 05	2.2840E 04	38000
40000	7.7146	2.79890	30.4009	33.1998	5.56188	60.4117	1.4299E 05	2.2240E 05	2.4165E 04	40000
42000	7.8284	2.80125	30.5375	33.3388	5.56658	60.6831	1.5033E 05	2.3340E 05	2.5487E 04	42000
44000	7.9392	2.80320	30.6678	33.4711	5.57053	60.9422	1.5764E 05	2.4510E 05	2.6815E 04	44000
46000	8.0473	2.80477	30.7925	33.5973	5.57355	61.1899	1.6497E 05	2.5630E 05	2.8147E 04	46000
48000	8.1525	2.80599	30.9119	33.7179	5.57596	61.5271	1.7226E 05	2.6765E 05	2.9485E 04	48000
50000	8.2552	2.80686	31.0265	33.8354	5.57770	61.6548	1.7953E 05	2.7880E 05	3.0827E 04	50000
60000	8.7312	2.80706	31.5386	34.3654	5.57810	62.6720	2.1546E 05	3.3400E 05	3.7603E 04	60000
70000	9.1316	2.80240	31.9708	34.7732	5.56483	63.5312	2.5072E 05	3.8902E 05	4.4472E 04	70000
80000	9.5244	2.79514	32.3445	35.1397	5.55440	64.2739	2.8538E 05	4.4435E 05	5.1619E 04	80000
90000	9.8565	2.78687	32.6733	35.4602	5.53798	64.9272	3.1957E 05	4.9842E 05	5.8434E 04	90000
100000	10.1547	2.77866	32.9665	35.7451	5.52166	65.5098	3.5345E 05	5.5217E 05	6.5519E 04	100000
150000	11.3039	2.75389	34.0874	36.8412	5.47243	67.7372	5.2279E 05	8.2084E 05	1.0141E 05	150000
200000	12.1608	2.75784	34.9796	37.6375	5.48029	69.3116	6.9862E 05	1.0941E 06	1.3843E 05	200000
300000	13.5871	2.79219	36.0042	38.7964	5.54854	71.5463	1.0644E 06	1.6644E 06	2.1644E 05	300000
400000	14.8300	2.81400	36.8109	39.6249	5.59188	73.1494	1.4419E 06	2.2340E 06	2.9240E 05	400000
500000	15.9175	2.81805	37.4396	40.2576	5.59994	74.3986	1.8044E 06	2.8000E 06	3.7149E 05	500000
600000	16.8594	2.81139	37.9529	40.7643	5.58669	75.4186	2.1597E 06	3.3520E 06	4.5251E 05	600000
700000	17.6784	2.78557	38.7583	41.5439	5.53538	77.0152	2.8384E 06	4.4283E 06	6.1615E 05	700000
800000	18.3275	2.75718	39.3768	42.1340	5.47897	78.2443	3.4918E 06	5.4790E 06	7.8240E 05	800000
900000	19.2239	2.69979	40.4832	43.1830	5.36493	80.4447	4.5846E 06	7.0474E 06	1.00000E 06	900000
1000000	20.5638	2.66129	41.2542	43.9155	5.28843	81.9789	6.4052E 06	1.0577E 07	1.6394E 06	1000000
1500000	23.5872	2.61548	42.3236	44.9391	5.19740	84.1040	9.6307E 06	1.5592E 07	2.5231E 06	1500000
2000000	26.5686	2.58967	43.0722	45.6619	5.14611	90.7377	1.2634E 07	2.0504E 07	3.4237E 06	2000000
3000000	28.0178	2.57323	43.6482	46.2216	5.11343	86.7362	1.5431E 07	2.5547E 07	4.3348E 06	3000000
4000000	28.5271	2.56186	44.1163	46.6781	5.09083	87.6663	1.8622E 07	3.0545E 07	5.2608E 06	4000000
5000000	29.7252	2.54718	44.8511	47.3983	5.06166	89.1265	2.4596E 07	4.0493E 07	7.1301E 06	5000000
6000000	29.9703	2.53812	45.4184	47.9565	5.04367	90.2539	3.0545E 07	5.0437E 07	9.0254E 06	6000000

TABLE 30. IDEAL GAS FUNCTIONS FOR AN 11+ IONIC WEIGHT 39.9420, $R = 1.98717$ CAL/MOLE
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $n \leq 4$. SEE TABLE 79 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL FUNCT.	$\frac{W-E}{RT}$	$\frac{W-E}{RT}$	$\frac{W-E}{RT}$	$\frac{W-E}{RT}$	$\frac{W-E}{RT}$	$\frac{W-E}{RT}$	$\frac{W-E}{RT}$	$\frac{W-E}{RT}$	$\frac{W-E}{RT}$	$\frac{W-E}{RT}$	$\frac{W-E}{RT}$	$\frac{W-E}{RT}$	$\frac{W-E}{RT}$	$\frac{W-E}{RT}$	$\frac{W-E}{RT}$	$\frac{W-E}{RT}$	TEMP. (°K)
20000	4.0044	2.90882	26.0123	30.5212	4.98543	59.4452	60.4506	5.9945E 04	9.9709E 04	1.1133E 04	1.1133E 04	20000						20000
22000	4.0092	2.91620	26.2518	30.7680	5.00010	56.1410	61.1411	6.0285E 04	1.0000E 05	1.2351E 04	1.2351E 04	22000						22000
24000	4.0144	2.92472	26.4711	30.9979	5.01701	56.3769	61.5979	7.0812E 04	1.0504E 05	1.3578E 04	1.3578E 04	24000						24000
26000	4.0273	2.94056	26.6739	31.2165	5.04856	56.6798	62.0284	7.9594E 04	1.1214E 05	1.4815E 04	1.4815E 04	26000						26000
28000	4.0419	2.95378	26.8628	31.4206	5.08272	57.0352	62.4379	8.6676E 04	1.2332E 05	1.6059E 04	1.6059E 04	28000						28000
30000	4.0608	2.97811	26.9399	31.6181	5.12313	57.7072	62.8303	9.4079E 04	1.3460E 05	1.7312E 04	1.7312E 04	30000						30000
32000	4.0804	2.99126	26.9701	31.8083	5.16914	58.0393	63.2084	1.0182E 05	1.4541E 05	1.8573E 04	1.8573E 04	32000						32000
34000	4.1125	2.94282	26.9355	31.9923	5.21993	58.3541	63.5741	1.0991E 05	1.5748E 05	1.9840E 04	1.9840E 04	34000						34000
36000	4.1456	2.95432	26.9184	32.1708	5.27458	58.6540	63.9284	1.1893E 05	1.6980E 05	2.1113E 04	2.1113E 04	36000						36000
38000	4.1836	2.96938	26.9007	32.3440	5.33211	58.9407	64.2729	1.2711E 05	1.8262E 05	2.2397E 04	2.2397E 04	38000						38000
40000	4.2263	2.971321	26.7991	32.5123	5.39160	59.2157	64.6073	1.3618E 05	1.9544E 05	2.3686E 04	2.3686E 04	40000						40000
42000	4.2737	2.94367	26.9322	32.6759	5.45213	59.4803	64.9324	1.4553E 05	2.0899E 05	2.4982E 04	2.4982E 04	42000						42000
44000	4.3254	2.97425	30.0406	32.8348	5.51290	59.7353	65.2482	1.5513E 05	2.2257E 05	2.6284E 04	2.6284E 04	44000						44000
46000	4.3814	2.80459	30.1844	32.9881	5.57318	59.9817	65.5549	1.6496E 05	2.3637E 05	2.7592E 04	2.7592E 04	46000						46000
48000	4.4414	2.83437	30.3045	33.1369	5.63236	60.2201	65.8525	1.7497E 05	2.5035E 05	2.8904E 04	2.8904E 04	48000						48000
50000	4.5031	2.86333	30.4208	33.2842	5.68971	60.4512	66.1412	1.8514E 05	2.6450E 05	3.0224E 04	3.0224E 04	50000						50000
60000	4.5703	2.99010	30.9546	33.9447	5.94181	61.5119	67.4537	2.3728E 05	3.5651E 05	3.6907E 04	3.6907E 04	60000						60000
70000	5.2911	3.08124	31.4228	34.5041	6.12294	62.4424	68.5653	2.9950E 05	4.2861E 05	4.3710E 04	4.3710E 04	70000						70000
80000	5.7417	3.13941	31.8384	34.9778	6.23852	63.2482	69.5067	3.4011E 05	4.9908E 05	5.2613E 04	5.2613E 04	80000						80000
90000	6.2038	3.17196	32.2103	35.3822	6.30321	64.0071	70.3103	3.8844E 05	5.6729E 05	5.7606E 04	5.7606E 04	90000						90000
100000	6.6647	3.18624	32.5453	35.7316	6.33158	64.6730	71.0045	4.3444E 05	6.3314E 05	6.4473E 04	6.4473E 04	100000						100000
150000	8.7560	3.13865	33.8321	36.9708	6.23701	67.2300	73.4670	6.3748E 05	9.3554E 05	1.0905E 07	1.0905E 07	150000						150000
200000	10.3974	3.05060	34.7229	37.7735	6.06266	69.0002	75.0822	8.1498E 05	1.2124E 06	1.3688E 07	1.3688E 07	200000						200000
300000	12.4610	2.91425	35.9320	38.8462	5.79109	71.4028	77.1939	1.1412E 06	1.7373E 06	2.1421E 07	2.1421E 07	300000						300000
400000	14.0606	2.82785	36.7376	39.5855	5.61940	73.0435	78.6629	1.4529E 06	2.2470E 06	2.9217E 07	2.9217E 07	400000						400000
500000	15.0286	2.77033	37.3821	40.1524	5.50510	74.2843	79.7894	1.7590E 06	2.7529E 06	3.7142E 07	3.7142E 07	500000						500000
600000	15.7281	2.72967	37.8834	40.6130	5.42430	75.2805	80.7048	2.0623E 06	3.2544E 06	4.5164E 07	4.5164E 07	600000						600000
800000	16.6689	2.67630	38.6607	41.3369	5.31825	76.8251	82.1434	2.6649E 06	4.2544E 06	6.1440E 07	6.1440E 07	800000						800000
1000000	17.2713	2.64295	39.2544	41.8970	5.25198	78.0042	83.2562	3.2649E 06	5.2520E 06	7.8004E 07	7.8004E 07	1000000						1000000
1500000	18.1218	2.59696	40.3157	42.9127	5.16062	80.1140	85.2747	4.7602E 06	7.7409E 06	1.2017E 08	1.2017E 08	1500000						1500000
2000000	18.5684	2.57335	41.0593	43.6326	5.11368	81.5916	86.7053	6.2530E 06	1.0227E 07	1.6310E 08	1.6310E 08	2000000						2000000
3000000	19.0300	2.54931	42.0975	44.6448	5.06590	83.4547	88.7204	9.2362E 06	1.5190E 07	2.5494E 08	2.5494E 08	3000000						3000000
4000000	19.2645	2.53714	42.8291	45.3642	5.04171	85.1084	90.1501	1.2210E 07	2.0167E 07	3.4043E 08	3.4043E 08	4000000						4000000
5000000	19.4103	2.52978	43.3944	45.9241	5.02709	86.2318	91.2589	1.5200E 07	2.5134E 07	4.3116E 08	4.3116E 08	5000000						5000000
6000000	19.5070	2.52446	43.8531	46.3800	5.01731	87.1474	92.1447	1.8181E 07	3.0104E 07	5.2280E 08	5.2280E 08	6000000						6000000
8000000	19.6287	2.51848	44.5304	47.0992	5.00504	88.5889	93.5940	2.5143E 07	4.0040E 07	7.0871E 08	7.0871E 08	8000000						8000000
10000000	19.7023	2.51496	45.1422	47.6571	4.99785	89.7949	94.7026	3.0105E 07	4.9978E 07	8.9705E 08	8.9705E 08	10000000						10000000

TABLE 19. IDEAL GAS FUNCTIONS FOR AM 12. (ATOMIC WEIGHT 39.9420, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 80 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{W_0 - E_0}{RT}$	$\ln \frac{W_0 - E_0}{RT}$	$\ln \frac{W_0 - E_0}{RT} - \ln \frac{W_0 - E_0}{RT}$	$\ln \frac{W_0 - E_0}{RT} - \ln \frac{W_0 - E_0}{RT}$	$\ln \frac{W_0 - E_0}{RT} - \ln \frac{W_0 - E_0}{RT}$	$\ln \frac{W_0 - E_0}{RT} - \ln \frac{W_0 - E_0}{RT}$	$\ln \frac{W_0 - E_0}{RT} - \ln \frac{W_0 - E_0}{RT}$	TEMP. (°K)			
20000	3.5673	3.28473	27.9005	31.1852	6.52729	55.4429	61.9701	9.0803E 04	1.3055E 05	1.1099E 05	1.1099E 04	20000
22000	3.8529	3.25253	28.2120	31.4645	6.44332	56.0619	62.5252	9.4473E 04	1.4219E 05	1.2334E 05	1.2334E 04	22000
24000	4.1085	3.22388	28.4938	31.7176	6.40439	56.6218	63.0262	1.0404E 05	1.5375E 05	1.3509E 05	1.3509E 04	24000
26000	4.3491	3.19266	28.7508	31.9499	6.36277	57.1326	63.4068	1.1346E 05	1.6526E 05	1.4854E 05	1.4854E 04	26000
28000	4.5764	3.17653	28.9870	32.1635	6.31228	57.6020	63.7153	1.2110E 05	1.7674E 05	1.6129E 05	1.6129E 04	28000
30000	4.7919	3.15704	29.2055	32.3625	6.27356	58.0341	64.3097	1.2859E 05	1.8821E 05	1.7411E 05	1.7411E 04	30000
32000	4.9946	3.13979	29.4037	32.5495	6.23929	58.4389	64.7952	1.3407E 05	1.9964E 05	1.8701E 05	1.8701E 04	32000
34000	5.1918	3.12461	29.5986	32.7230	6.20872	58.8172	65.2259	1.4353E 05	2.1110E 05	1.9998E 05	1.9998E 04	34000
36000	5.3783	3.11057	29.7787	32.8873	6.18122	59.1713	65.5929	1.5099E 05	2.2252E 05	2.1202E 05	2.1202E 04	36000
38000	5.5569	3.09801	29.9446	33.0426	6.15625	59.5048	65.9611	1.5843E 05	2.3394E 05	2.2412E 05	2.2412E 04	38000
40000	5.7283	3.08650	30.1032	33.1897	6.13338	59.8200	66.3534	1.6589E 05	2.4534E 05	2.3629E 05	2.3629E 04	40000
42000	5.8930	3.07586	30.2535	33.3294	6.11224	60.1187	66.7310	1.7329E 05	2.5677E 05	2.4839E 05	2.4839E 04	42000
44000	6.0516	3.06595	30.3964	33.4623	6.09255	60.4026	67.0952	1.8064E 05	2.6817E 05	2.6077E 05	2.6077E 04	44000
46000	6.2045	3.05665	30.5325	33.5891	6.07407	60.6730	67.4471	1.8800E 05	2.7941E 05	2.7307E 05	2.7307E 04	46000
48000	6.3521	3.04787	30.6624	33.7102	6.05662	60.9312	67.7878	1.9533E 05	2.9072E 05	2.8497E 05	2.8497E 04	48000
50000	6.4945	3.03953	30.7866	33.8261	6.04005	61.1781	68.1181	2.0264E 05	3.0200E 05	2.9809E 05	2.9809E 04	50000
60000	7.1419	3.00264	31.3374	34.3401	5.94674	62.2726	68.2394	2.3477E 05	3.5800E 05	3.7544E 05	3.7544E 04	60000
70000	7.6986	2.97113	31.7979	34.7690	5.90414	63.1876	69.0917	2.7419E 05	4.1329E 05	4.4231E 05	4.4231E 04	70000
80000	8.1523	2.94325	32.1927	35.1340	5.84873	63.9723	69.8210	3.0892E 05	4.6790E 05	5.1178E 05	5.1178E 04	80000
90000	8.6092	2.91820	32.5379	35.4561	5.79896	64.6583	70.4572	3.4304E 05	5.2191E 05	5.8192E 05	5.8192E 04	90000
100000	8.9863	2.89535	32.8442	35.7398	5.75394	65.2649	71.0208	3.7668E 05	5.7539E 05	6.5267E 05	6.5267E 04	100000
150000	10.3651	2.80914	34.0006	36.8097	5.58223	67.5848	73.1471	5.3926E 05	8.3733E 05	1.8195E 07	1.8195E 07	150000
200000	11.2354	2.75231	34.8004	37.5527	5.46930	69.1342	74.6235	6.9643E 05	1.0939E 06	2.3031E 07	2.3031E 07	200000
300000	12.2873	2.68356	35.9020	38.5855	5.33269	71.3431	76.6758	1.0037E 06	1.5990E 06	2.1403E 07	2.1403E 07	300000
400000	12.8557	2.64395	36.6401	39.3121	5.25397	72.8656	78.1195	1.3067E 06	2.1014E 06	2.9144E 07	2.9144E 07	400000
500000	13.2374	2.61831	37.2551	39.8735	5.20302	74.0321	79.2351	1.6079E 06	2.6013E 06	3.7014E 07	3.7014E 07	500000
600000	13.5034	2.60039	37.7308	40.3312	5.18741	74.9774	80.1448	1.9081E 06	3.1004E 06	4.4966E 07	4.4966E 07	600000
800000	13.8506	2.57702	38.4754	41.0525	5.12097	76.4570	81.5780	2.5070E 06	4.0966E 06	6.1146E 07	6.1146E 07	800000
1000000	14.0871	2.56247	39.0488	41.6113	5.09204	77.5964	82.6885	3.1049E 06	5.0920E 06	7.7594E 07	7.7594E 07	1000000
1500000	14.3658	2.54241	40.0835	42.6259	5.05219	79.6325	84.7047	4.5979E 06	7.5783E 06	1.1948E 08	1.1948E 08	1500000
2000000	14.5197	2.53210	40.8133	43.3454	5.01170	81.1028	86.1345	6.0891E 06	1.0043E 07	1.4221E 08	1.4221E 08	2000000
3000000	14.6766	2.52150	41.8377	44.3593	5.01063	83.1385	88.1494	9.0710E 06	1.5032E 07	2.4442E 08	2.4442E 08	3000000
4000000	14.7527	2.51627	42.5624	45.0726	5.00025	85.5787	90.5787	1.2053E 07	2.0821E 07	3.3831E 08	3.3831E 08	4000000
5000000	14.8044	2.51105	43.1238	45.8365	4.99385	88.4935	93.6073	1.5033E 07	2.4948E 07	4.2841E 08	4.2841E 08	5000000
6000000	14.8367	2.51090	43.5815	46.0824	4.98957	91.5931	1.0014E 07	2.9937E 07	5.1962E 07	5.1962E 08	5.1962E 08	6000000
8000000	14.8772	2.50819	44.3034	46.8116	4.98419	98.0382	93.0224	2.3970E 07	3.9874E 07	7.0431E 08	7.0431E 08	8000000
10000000	14.9016	2.50656	44.8629	47.3695	4.98096	98.1500	94.1309	2.9930E 07	4.9810E 07	8.9150E 08	8.9150E 08	10000000

TABLE 40. IDEAL GAS FUNCTIONS FOR AN 13° (ATOMIC WEIGHT 39.9410, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 81 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNC.	$\frac{U^0 - E_0^0}{RT}$	$\ln \frac{U^0 - E_0^0}{RT}$	$\ln \frac{U^0 - E_0^0}{RT}$	$\ln \frac{U^0 - E_0^0}{RT}$	$\ln \frac{U^0 - E_0^0}{RT}$	$\ln \frac{U^0 - E_0^0}{RT}$	$\ln \frac{U^0 - E_0^0}{RT}$	$\ln \frac{U^0 - E_0^0}{RT}$	$\ln \frac{U^0 - E_0^0}{RT}$	TEMP. (°K)
20000	2.7834	2.95889	27.4444	30.6074	5.87980	54.9422	40.8220	7.7853E 04	1.1740E 05	1.0968E 04	20000
22000	2.9086	2.96301	27.9708	30.8938	5.88799	55.5031	41.3911	8.5818E 04	1.2211E 05	1.2211E 04	22000
24000	3.0281	2.96130	28.1826	31.1499	5.88459	56.0154	41.9000	9.3938E 04	1.4123E 05	1.3444E 04	24000
26000	3.1413	2.95574	28.4254	31.3812	5.87354	56.4860	42.3594	1.0105E 05	1.5271E 05	1.4486E 04	26000
28000	3.2453	2.94772	28.6442	31.5919	5.85761	56.9207	42.7783	1.0437E 05	1.6401E 05	1.5938E 04	28000
30000	3.3492	2.93824	28.8472	31.7855	5.83875	57.3242	43.1630	1.1559E 05	1.7516E 05	1.7197E 04	30000
32000	3.4441	2.92799	29.0265	31.9645	5.81839	57.7004	43.5188	1.2240E 05	1.8619E 05	1.8464E 04	32000
34000	3.5315	2.91748	29.2137	32.1312	5.79751	58.0525	43.8500	1.2959E 05	1.9712E 05	1.9738E 04	34000
36000	3.6118	2.90708	29.3802	32.2873	5.77644	58.3839	44.1602	1.3643E 05	2.0797E 05	2.1018E 04	36000
38000	3.6973	2.89705	29.5371	32.4342	5.75542	58.6951	44.4520	1.4315E 05	2.1876E 05	2.2304E 04	38000
40000	3.7775	2.88759	29.6855	32.5731	5.73463	58.9899	44.7280	1.5004E 05	2.2953E 05	2.3594E 04	40000
42000	3.8436	2.87864	29.8261	32.7058	5.71407	59.2695	44.9903	1.5681E 05	2.4027E 05	2.4893E 04	42000
44000	3.9113	2.87004	29.9599	32.8308	5.69464	59.5352	45.2403	1.6359E 05	2.5102E 05	2.6194E 04	44000
46000	3.9737	2.86183	30.0873	32.9513	5.67639	59.7885	45.4796	1.7038E 05	2.6179E 05	2.7503E 04	46000
48000	4.0372	2.85385	30.2091	33.0669	5.65933	60.0305	45.7095	1.7721E 05	2.7259E 05	2.8815E 04	48000
50000	4.0962	2.84626	30.3254	33.1784	5.64340	60.2621	45.9310	1.8409E 05	2.8344E 05	3.0131E 04	50000
60000	4.3425	2.84187	30.8444	33.6043	5.64727	61.2930	46.9403	2.1961E 05	3.3804E 05	3.6174E 04	60000
70000	4.6012	2.85297	31.2831	34.1361	5.66932	62.1647	47.8340	2.3775E 05	3.9685E 05	4.3515E 04	70000
80000	4.8313	2.88040	31.6457	34.5445	5.72442	62.9250	48.6496	2.9600E 05	4.5797E 05	5.0340E 04	80000
90000	5.0639	2.91971	32.0072	34.9269	5.80195	63.6036	49.4055	3.6333E 05	5.2218E 05	5.7213E 04	90000
100000	5.3050	2.96483	32.3171	35.2819	5.89160	64.2194	50.1110	4.3904E 05	5.8916E 05	6.4219E 04	100000
120000	6.4911	3.18570	33.5629	36.7486	6.13051	66.5840	52.0246	6.5150E 05	9.4958E 05	1.0004E 07	120000
140000	8.3222	3.32263	34.5003	37.8229	6.40261	68.5577	53.1603	9.2305E 05	1.3203E 06	1.3712E 07	140000
160000	11.8707	3.40469	35.8491	39.2738	6.76586	71.2778	54.0434	1.4536E 06	2.0297E 06	2.1383E 07	160000
180000	15.3623	3.37716	36.8461	40.2233	6.71102	73.2193	54.9303	1.8899E 06	2.6844E 06	2.9288E 07	180000
200000	18.5699	3.31795	37.5934	40.9115	6.59331	74.7047	55.2900	2.3031E 06	3.2967E 06	3.7352E 07	200000
220000	21.4330	3.25346	38.1928	41.4465	6.46537	75.8955	55.5610	2.6870E 06	3.8792E 06	4.5337E 07	220000
240000	26.1921	3.18873	39.1125	42.2513	6.23717	77.7231	55.9402	3.0600E 06	4.4697E 06	5.3378E 07	240000
260000	29.8000	3.08447	39.8028	42.8513	6.05782	79.0947	56.1525	3.4070E 06	5.0578E 06	6.1099E 07	260000
280000	34.2084	2.96032	41.0079	43.9982	5.76342	81.4894	56.2529	3.6644E 06	5.6644E 06	6.8451E 07	280000
300000	40.1086	2.81356	41.8294	44.6429	5.59100	83.1219	56.7129	3.7077E 06	5.6644E 06	7.2077E 07	300000
320000	44.6274	2.71800	42.9498	45.4678	5.40112	85.3484	57.2495	3.6242E 07	5.6644E 06	7.5694E 07	320000
340000	47.1536	2.64687	43.7241	46.3900	5.20952	86.8870	57.8165	3.4249E 07	5.6644E 06	7.8759E 07	340000
360000	48.7638	2.63512	44.3155	46.9506	5.23642	88.0422	58.2587	3.1244E 07	5.6644E 06	8.2011E 07	360000
380000	49.8790	2.61350	44.7939	47.4074	5.19344	89.0129	58.2064	2.8238E 07	5.6644E 06	8.4031E 07	380000
400000	51.3218	2.58597	45.5416	48.1276	5.13875	90.4968	58.4375	2.5213E 07	5.6644E 06	8.7000E 07	400000
420000	52.2145	2.56918	46.1147	48.6959	5.10559	91.4416	58.7470	2.2218E 07	5.6644E 06	8.9000E 07	420000

[illegible]

TABLE 42. IDEAL GAS FUNCTIONS FOR AR 15+ IONIC WEIGHT 39.9400, $R = 1.98717$ CAL/MOLE) BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $n \leq 6$. SEE TABLE 83 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2 - \epsilon_0}{RT}$	$\ln \frac{h^2 - \epsilon_0}{RT}$	$\frac{h^2 - \epsilon_0}{RT}$	$\ln \frac{h^2 - \epsilon_0}{RT}$	$\frac{h^2 - \epsilon_0}{RT}$	$\ln \frac{h^2 - \epsilon_0}{RT}$	$\frac{h^2 - \epsilon_0}{RT}$	$\ln \frac{h^2 - \epsilon_0}{RT}$	TEMP. (°K)
20000	2.0000	2.5000	4.90791	54.2853	59.2533	5.9615E 04	9.9350E 04	1.0857E 04	1.0857E 04	20000
22000	2.0000	2.5000	4.96792	54.7588	59.7267	6.5577E 04	1.0927E 05	1.2047E 04	1.2047E 04	22000
24000	2.0000	2.5000	5.02793	55.2323	60.1991	7.1530E 04	1.1000E 05	1.3246E 04	1.3246E 04	24000
26000	2.0000	2.5000	5.08794	55.7056	60.6714	7.7500E 04	1.1073E 05	1.4453E 04	1.4453E 04	26000
28000	2.0000	2.5000	5.14795	56.1789	61.1437	8.3463E 04	1.1146E 05	1.5660E 04	1.5660E 04	28000
30000	2.0000	2.5000	5.20796	56.6522	61.6160	8.9426E 04	1.1219E 05	1.6867E 04	1.6867E 04	30000
32000	2.0000	2.5000	5.26797	57.1255	62.0883	9.5389E 04	1.1292E 05	1.8074E 04	1.8074E 04	32000
34000	2.0000	2.5000	5.32798	57.5988	62.5606	1.0131E 05	1.1365E 05	1.9281E 04	1.9281E 04	34000
36000	2.0000	2.5000	5.38799	58.0721	63.0329	1.0670E 05	1.1438E 05	2.0488E 04	2.0488E 04	36000
38000	2.0000	2.5000	5.44799	58.5454	63.5052	1.1209E 05	1.1511E 05	2.1695E 04	2.1695E 04	38000
40000	2.0000	2.5000	5.50799	59.0187	63.9775	1.1748E 05	1.1584E 05	2.2902E 04	2.2902E 04	40000
42000	2.0000	2.5000	5.56799	59.4920	64.4498	1.2287E 05	1.1657E 05	2.4109E 04	2.4109E 04	42000
44000	2.0000	2.5000	5.62799	59.9653	64.9221	1.2826E 05	1.1730E 05	2.5316E 04	2.5316E 04	44000
46000	2.0000	2.5000	5.68799	60.4386	65.3944	1.3365E 05	1.1803E 05	2.6523E 04	2.6523E 04	46000
48000	2.0000	2.5000	5.74799	60.9119	65.8667	1.3904E 05	1.1876E 05	2.7730E 04	2.7730E 04	48000
50000	2.0000	2.5000	5.80799	61.3852	66.3390	1.4443E 05	1.1949E 05	2.8937E 04	2.8937E 04	50000
52000	2.0000	2.5000	5.86799	61.8585	66.8113	1.4982E 05	1.2022E 05	3.0144E 04	3.0144E 04	52000
54000	2.0000	2.5000	5.92799	62.3318	67.2836	1.5521E 05	1.2095E 05	3.1351E 04	3.1351E 04	54000
56000	2.0000	2.5000	5.98799	62.8051	67.7559	1.6060E 05	1.2168E 05	3.2558E 04	3.2558E 04	56000
58000	2.0000	2.5000	6.04799	63.2784	68.2282	1.6599E 05	1.2241E 05	3.3765E 04	3.3765E 04	58000
60000	2.0000	2.5000	6.10799	63.7517	68.7005	1.7138E 05	1.2314E 05	3.4972E 04	3.4972E 04	60000
62000	2.0000	2.5000	6.16799	64.2250	69.1728	1.7677E 05	1.2387E 05	3.6179E 04	3.6179E 04	62000
64000	2.0000	2.5000	6.22799	64.6983	69.6451	1.8216E 05	1.2460E 05	3.7386E 04	3.7386E 04	64000
66000	2.0000	2.5000	6.28799	65.1716	70.1174	1.8755E 05	1.2533E 05	3.8593E 04	3.8593E 04	66000
68000	2.0000	2.5000	6.34799	65.6449	70.5897	1.9294E 05	1.2606E 05	3.9800E 04	3.9800E 04	68000
70000	2.0000	2.5000	6.40799	66.1182	71.0620	1.9833E 05	1.2679E 05	4.1007E 04	4.1007E 04	70000
72000	2.0000	2.5000	6.46799	66.5915	71.5343	2.0372E 05	1.2752E 05	4.2214E 04	4.2214E 04	72000
74000	2.0000	2.5000	6.52799	67.0648	72.0066	2.0911E 05	1.2825E 05	4.3421E 04	4.3421E 04	74000
76000	2.0000	2.5000	6.58799	67.5381	72.4789	2.1450E 05	1.2898E 05	4.4628E 04	4.4628E 04	76000
78000	2.0000	2.5000	6.64799	68.0114	72.9512	2.1989E 05	1.2971E 05	4.5835E 04	4.5835E 04	78000
80000	2.0000	2.5000	6.70799	68.4847	73.4235	2.2528E 05	1.3044E 05	4.7042E 04	4.7042E 04	80000
82000	2.0000	2.5000	6.76799	68.9580	73.8958	2.3067E 05	1.3117E 05	4.8249E 04	4.8249E 04	82000
84000	2.0000	2.5000	6.82799	69.4313	74.3681	2.3606E 05	1.3190E 05	4.9456E 04	4.9456E 04	84000
86000	2.0000	2.5000	6.88799	69.9046	74.8404	2.4145E 05	1.3263E 05	5.0663E 04	5.0663E 04	86000
88000	2.0000	2.5000	6.94799	70.3779	75.3127	2.4684E 05	1.3336E 05	5.1870E 04	5.1870E 04	88000
90000	2.0000	2.5000	7.00799	70.8512	75.7850	2.5223E 05	1.3409E 05	5.3077E 04	5.3077E 04	90000
92000	2.0000	2.5000	7.06799	71.3245	76.2573	2.5762E 05	1.3482E 05	5.4284E 04	5.4284E 04	92000
94000	2.0000	2.5000	7.12799	71.7978	76.7296	2.6301E 05	1.3555E 05	5.5491E 04	5.5491E 04	94000
96000	2.0000	2.5000	7.18799	72.2711	77.2019	2.6840E 05	1.3628E 05	5.6698E 04	5.6698E 04	96000
98000	2.0000	2.5000	7.24799	72.7444	77.6742	2.7379E 05	1.3701E 05	5.7905E 04	5.7905E 04	98000
100000	2.0000	2.5000	7.30799	73.2177	78.1465	2.7918E 05	1.3774E 05	5.9112E 04	5.9112E 04	100000

TABLE 43. IDEAL GAS FUNCTIONS FOR $\mu = 10^{-6}$ (ATOMIC WEIGHT 39.9400, $R = 1.98717$ CAL/MOLE) BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $n \leq 4$. SEE TABLE 44 FOR LIST OF STATES USED.

[illegible]

TABLE 44. IDEAL GAS FUNCTIONS FOR AR 17. (ATOMIC WEIGHT 39.9390, R = 1.90717 CAL/MOLE)
 BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE B5 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2 - \epsilon}{RT}$	$\ln \frac{h^2 - \epsilon}{RT}$	$\ln \frac{h^2 - \epsilon}{RT} - \frac{\epsilon}{RT}$	$\frac{\epsilon}{RT}$	$\ln \frac{h^2 - \epsilon}{RT} - \frac{\epsilon}{RT}$	$\ln \frac{h^2 - \epsilon}{RT} - \frac{\epsilon}{RT}$	$\ln \frac{h^2 - \epsilon}{RT} - \frac{\epsilon}{RT}$	TEMP. (°K)
20000	2.0000	27.3179	29.6179	4.96791	54.2833	59.2532	5.96156	9.93586	20000
22000	2.0000	27.5562	30.0562	4.96791	54.7568	59.7267	4.95762	9.93586	22000
24000	2.0000	27.7737	30.2737	4.96791	55.1910	60.1509	4.95380	9.93586	24000
26000	2.0000	27.9739	30.4739	4.96791	55.5887	60.5564	4.95017	9.93586	26000
28000	2.0000	28.1591	30.6591	4.96791	55.9568	60.9247	4.94661	9.93586	28000
30000	2.0000	28.3316	30.8316	4.96791	56.2996	61.2675	4.94322	9.93586	30000
32000	2.0000	28.4930	30.9930	4.96791	56.6202	61.5881	4.94004	9.93586	32000
34000	2.0000	28.6445	31.1445	4.96791	56.9214	61.8893	4.93701	9.93586	34000
36000	2.0000	28.7874	31.2874	4.96791	57.2033	62.1733	4.93411	9.93586	36000
38000	2.0000	28.9226	31.4226	4.96791	57.4739	62.4419	4.93137	9.93586	38000
40000	2.0000	29.0508	31.5508	4.96791	57.7208	62.6967	4.92878	9.93586	40000
42000	2.0000	29.1728	31.6728	4.96791	57.9711	62.9381	4.92634	9.93586	42000
44000	2.0000	29.2891	31.7891	4.96791	58.2033	63.1702	4.92401	9.93586	44000
46000	2.0000	29.4002	31.9002	4.96791	58.4231	63.3910	4.92178	9.93586	46000
48000	2.0000	29.5066	32.0066	4.96791	58.6345	63.6024	4.91966	9.93586	48000
50000	2.0000	29.6087	32.1087	4.96791	58.8373	63.8052	4.91764	9.93586	50000
52000	2.0000	29.7065	32.2065	4.96791	59.0431	64.0110	4.91571	9.93586	52000
54000	2.0000	29.8000	32.3000	4.96791	59.2519	64.2202	4.91387	9.93586	54000
56000	2.0000	29.8893	32.3893	4.96791	59.4637	64.4330	4.91211	9.93586	56000
58000	2.0000	29.9744	32.4744	4.96791	59.6785	64.6492	4.91043	9.93586	58000
60000	2.0000	30.0554	32.5554	4.96791	59.8963	64.8680	4.90883	9.93586	60000
62000	2.0000	30.1324	32.6324	4.96791	60.1171	65.0892	4.90731	9.93586	62000
64000	2.0000	30.2054	32.7054	4.96791	60.3409	65.3130	4.90587	9.93586	64000
66000	2.0000	30.2744	32.7744	4.96791	60.5677	65.5398	4.90451	9.93586	66000
68000	2.0000	30.3394	32.8394	4.96791	60.7975	65.7696	4.90323	9.93586	68000
70000	2.0000	30.4004	32.9004	4.96791	61.0303	65.9924	4.90203	9.93586	70000
72000	2.0000	30.4574	32.9574	4.96791	61.2661	66.2182	4.90091	9.93586	72000
74000	2.0000	30.5104	33.0104	4.96791	61.5049	66.4470	4.89987	9.93586	74000
76000	2.0000	30.5594	33.0594	4.96791	61.7467	66.6788	4.89891	9.93586	76000
78000	2.0000	30.6044	33.1044	4.96791	61.9915	66.9136	4.89803	9.93586	78000
80000	2.0000	30.6454	33.1454	4.96791	62.2393	67.1514	4.89723	9.93586	80000
82000	2.0000	30.6824	33.1824	4.96791	62.4901	67.3922	4.89651	9.93586	82000
84000	2.0000	30.7154	33.2154	4.96791	62.7439	67.6360	4.89587	9.93586	84000
86000	2.0000	30.7444	33.2444	4.96791	62.9997	67.8828	4.89531	9.93586	86000
88000	2.0000	30.7694	33.2694	4.96791	63.2575	68.1326	4.89483	9.93586	88000
90000	2.0000	30.7904	33.2904	4.96791	63.5173	68.3854	4.89443	9.93586	90000
92000	2.0000	30.8074	33.3074	4.96791	63.7791	68.6412	4.89411	9.93586	92000
94000	2.0000	30.8204	33.3204	4.96791	64.0429	68.8990	4.89387	9.93586	94000
96000	2.0000	30.8294	33.3294	4.96791	64.3087	69.1598	4.89371	9.93586	96000
98000	2.0000	30.8344	33.3344	4.96791	64.5765	69.4236	4.89363	9.93586	98000
100000	2.0000	30.8354	33.3354	4.96791	64.8463	69.6904	4.89363	9.93586	100000
102000	2.0000	30.8324	33.3324	4.96791	65.1181	69.9602	4.89371	9.93586	102000
104000	2.0000	30.8254	33.3254	4.96791	65.3919	70.2330	4.89387	9.93586	104000
106000	2.0000	30.8144	33.3144	4.96791	65.6677	70.5088	4.89411	9.93586	106000
108000	2.0000	30.7994	33.2994	4.96791	65.9455	70.7876	4.89443	9.93586	108000
110000	2.0000	30.7804	33.2804	4.96791	66.2253	71.0694	4.89483	9.93586	110000
112000	2.0000	30.7574	33.2574	4.96791	66.5071	71.3542	4.89531	9.93586	112000
114000	2.0000	30.7304	33.2304	4.96791	66.7909	71.6420	4.89587	9.93586	114000
116000	2.0000	30.6994	33.1994	4.96791	67.0767	71.9338	4.89651	9.93586	116000
118000	2.0000	30.6644	33.1644	4.96791	67.3645	72.2286	4.89723	9.93586	118000
120000	2.0000	30.6254	33.1254	4.96791	67.6543	72.5264	4.89803	9.93586	120000
122000	2.0000	30.5824	33.0824	4.96791	67.9461	72.8272	4.89891	9.93586	122000
124000	2.0000	30.5354	33.0354	4.96791	68.2409	73.1310	4.89987	9.93586	124000
126000	2.0000	30.4844	32.9844	4.96791	68.5387	73.4378	4.90091	9.93586	126000
128000	2.0000	30.4294	32.9294	4.96791	68.8395	73.7476	4.90203	9.93586	128000
130000	2.0000	30.3704	32.8704	4.96791	69.1433	74.0604	4.90323	9.93586	130000
132000	2.0000	30.3074	32.8074	4.96791	69.4501	74.3762	4.90451	9.93586	132000
134000	2.0000	30.2404	32.7404	4.96791	69.7599	74.6950	4.90587	9.93586	134000
136000	2.0000	30.1694	32.6694	4.96791	70.0727	75.0168	4.90731	9.93586	136000
138000	2.0000	30.0944	32.5944	4.96791	70.3885	75.3416	4.90883	9.93586	138000
140000	2.0000	30.0154	32.5154	4.96791	70.7073	75.6694	4.91043	9.93586	140000
142000	2.0000	29.9324	32.4324	4.96791	71.0291	75.9992	4.91211	9.93586	142000
144000	2.0000	29.8454	32.3454	4.96791	71.3539	76.3320	4.91387	9.93586	144000
146000	2.0000	29.7544	32.2544	4.96791	71.6817	76.6678	4.91571	9.93586	146000
148000	2.0000	29.6594	32.1594	4.96791	72.0125	77.0066	4.91764	9.93586	148000
150000	2.0000	29.5604	32.0604	4.96791	72.3463	77.3484	4.91966	9.93586	150000
152000	2.0000	29.4574	31.9574	4.96791	72.6831	77.6932	4.92178	9.93586	152000
154000	2.0000	29.3504	31.8504	4.96791	73.0229	78.0410	4.92401	9.93586	154000
156000	2.0000	29.2394	31.7394	4.96791	73.3657	78.3918	4.92634	9.93586	156000
158000	2.0000	29.1244	31.6244	4.96791	73.7115	78.7446	4.92878	9.93586	158000
160000	2.0000	29.0054	31.5054	4.96791	74.0603	79.0994	4.93137	9.93586	160000
162000	2.0000	28.8824	31.3824	4.96791	74.4121	79.4562	4.93411	9.93586	162000
164000	2.0000	28.7554	31.2554	4.96791	74.7669	79.8150	4.93691	9.93586	164000
166000	2.0000	28.6244	31.1244	4.96791	75.1247	80.1768	4.93971	9.93586	166000
168000	2.0000	28.4894	30.9894	4.96791	75.4865	80.5406	4.94251	9.93586	168000
170000	2.0000	28.3504	30.8504	4.96791	75.8513	80.9064	4.94531	9.93586	170000
172000	2.0000	28.2074	30.7074	4.96791	76.2191	81.2742	4.94811	9.93586	172000
174000	2.0000	28.0604	30.5604	4.96791	76.5899	81.6440	4.95091	9.93586	174000
176000	2.0000	27.9094	30.4094	4.96791	76.9637	82.0158	4.95371	9.93586	176000
178000	2.0000	27.7544	30.2544	4.96791	77.3405	82.3896	4.95651	9.93586	178000
180000	2.0000	27.5954	30.0954	4.96791	77.7193	82.7654	4.95931	9.93586	180000
182000	2.0000	27.4324	29.9324	4.96791	78.1011	83.1432	4.96211	9.93586	182000
184000	2.0000	27.2654	29.7654	4.96791	78.4859	83.5230	4.96491	9.93586	184000
186000	2.0000	27.0944	29.5944	4.96791	78.8737	83.9048	4.96771	9.93586	186000
188000	2.0000	26.9194	29.4194	4.96791	79.2645	84.2886	4.97051	9.93586	188000
190000	2.0000	26.7404	29.2404	4.96791	79.6583	84.6744	4.97331	9.93586	190000
192000	2.0000	26.5574	29.0574	4.96791	80.0551	85.0622	4.97611	9.93586	192000
194000	2.0000	26.3704	28.8704	4.96791	80.4549	85.4520	4.97891	9.93586	194000
196000	2.0000	26.1794	28.6794	4.96791	80.8577	85.8438	4.98171	9.93586	196000
198000	2.0000	25.9844	28.4844	4.96791	81.2635	86.2376	4.98451	9.93586	198000
200000	2.0000	25.7854	28.2854	4.96791	81.6723	86.6334	4.98731	9.93586	200000

TABLE 49. IDEAL GAS FUNCTIONS FOR AR 10+ (ATOMIC WEIGHT 39.9505, $R = 1.90717$ CAL/MOLE)

BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $n \leq 4$.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{U^0 - U}{RT}$	$\ln \frac{U^0 - U}{RT}$	$\ln \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$					
20000	1.0000	2.50000	26.6248	29.1248	4.96791	52.9079	57.0750	5.96135	9.93508	04	1.00000	00	20000
22000	1.0000	2.50000	26.8631	29.3631	4.96791	53.2463	58.3403	5.96135	9.93508	04	1.00000	00	22000
24000	1.0000	2.50000	27.0886	29.5886	4.96791	53.5813	59.7115	5.96135	9.93508	04	1.00000	00	24000
26000	1.0000	2.50000	27.2807	29.7807	4.96791	54.2113	59.1792	5.96135	9.93508	04	1.00000	00	26000
28000	1.0000	2.50000	27.4460	29.9460	4.96791	54.5794	59.5473	5.96135	9.93508	04	1.00000	00	28000
30000	1.0000	2.50000	27.6395	30.1395	4.96791	54.9222	59.8901	5.96135	9.93508	04	1.00000	00	30000
32000	1.0000	2.50000	27.7998	30.2998	4.96791	55.2428	60.2107	5.96135	9.93508	04	1.00000	00	32000
34000	1.0000	2.50000	27.9314	30.4314	4.96791	55.5440	60.5119	5.96135	9.93508	04	1.00000	00	34000
36000	1.0000	2.50000	28.0493	30.5493	4.96791	55.8279	60.7999	5.96135	9.93508	04	1.00000	00	36000
38000	1.0000	2.50000	28.2294	30.7294	4.96791	56.0965	61.0645	5.96135	9.93508	04	1.00000	00	38000
40000	1.0000	2.50000	28.3577	30.8577	4.96791	56.3514	61.3193	5.96135	9.93508	04	1.00000	00	40000
42000	1.0000	2.50000	28.4796	30.9796	4.96791	56.5937	61.5617	5.96135	9.93508	04	1.00000	00	42000
44000	1.0000	2.50000	28.5959	31.0959	4.96791	56.8249	61.7928	5.96135	9.93508	04	1.00000	00	44000
46000	1.0000	2.50000	28.7071	31.2071	4.96791	57.0457	62.0136	5.96135	9.93508	04	1.00000	00	46000
48000	1.0000	2.50000	28.8135	31.3135	4.96791	57.2571	62.2250	5.96135	9.93508	04	1.00000	00	48000
50000	1.0000	2.50000	28.9155	31.4155	4.96791	57.4599	62.4278	5.96135	9.93508	04	1.00000	00	50000
52000	1.0000	2.50000	29.0133	31.5133	4.96791	57.6557	63.3336	5.96135	9.93508	04	1.00000	00	52000
54000	1.0000	2.50000	29.1067	31.6067	4.96791	57.8444	64.0994	5.96135	9.93508	04	1.00000	00	54000
56000	1.0000	2.50000	29.1967	31.6967	4.96791	58.0269	64.7628	5.96135	9.93508	04	1.00000	00	56000
58000	1.0000	2.50000	29.2834	31.7834	4.96791	58.2049	65.3479	5.96135	9.93508	04	1.00000	00	58000
60000	1.0000	2.50000	29.3669	31.8669	4.96791	58.3794	65.8850	5.96135	9.93508	04	1.00000	00	60000
62000	1.0000	2.50000	29.4474	31.9474	4.96791	58.5504	66.3844	5.96135	9.93508	04	1.00000	00	62000
64000	1.0000	2.50000	29.5249	32.0249	4.96791	58.7179	66.8464	5.96135	9.93508	04	1.00000	00	64000
66000	1.0000	2.50000	29.5994	32.0994	4.96791	58.8819	67.2712	5.96135	9.93508	04	1.00000	00	66000
68000	1.0000	2.50000	29.6709	32.1709	4.96791	59.0424	67.6684	5.96135	9.93508	04	1.00000	00	68000
70000	1.0000	2.50000	29.7394	32.2394	4.96791	59.1994	68.0384	5.96135	9.93508	04	1.00000	00	70000
72000	1.0000	2.50000	29.8049	32.3049	4.96791	59.3529	68.3812	5.96135	9.93508	04	1.00000	00	72000
74000	1.0000	2.50000	29.8674	32.3674	4.96791	59.5029	68.6984	5.96135	9.93508	04	1.00000	00	74000
76000	1.0000	2.50000	29.9269	32.4269	4.96791	59.6494	68.9912	5.96135	9.93508	04	1.00000	00	76000
78000	1.0000	2.50000	29.9834	32.4834	4.96791	59.7924	69.2684	5.96135	9.93508	04	1.00000	00	78000
80000	1.0000	2.50000	30.0369	32.5369	4.96791	59.9319	69.5312	5.96135	9.93508	04	1.00000	00	80000
82000	1.0000	2.50000	30.0874	32.5874	4.96791	60.0679	69.7792	5.96135	9.93508	04	1.00000	00	82000
84000	1.0000	2.50000	30.1349	32.6349	4.96791	60.2004	69.9912	5.96135	9.93508	04	1.00000	00	84000
86000	1.0000	2.50000	30.1794	32.6794	4.96791	60.3294	70.1784	5.96135	9.93508	04	1.00000	00	86000
88000	1.0000	2.50000	30.2209	32.7209	4.96791	60.4549	70.3412	5.96135	9.93508	04	1.00000	00	88000
90000	1.0000	2.50000	30.2594	32.7594	4.96791	60.5769	70.4884	5.96135	9.93508	04	1.00000	00	90000
92000	1.0000	2.50000	30.2949	32.7949	4.96791	60.6949	70.6212	5.96135	9.93508	04	1.00000	00	92000
94000	1.0000	2.50000	30.3274	32.8274	4.96791	60.8084	70.7404	5.96135	9.93508	04	1.00000	00	94000
96000	1.0000	2.50000	30.3569	32.8569	4.96791	60.9184	70.8464	5.96135	9.93508	04	1.00000	00	96000
98000	1.0000	2.50000	30.3834	32.8834	4.96791	61.0249	70.9384	5.96135	9.93508	04	1.00000	00	98000
100000	1.0000	2.50000	30.4069	32.9069	4.96791	61.1279	71.0164	5.96135	9.93508	04	1.00000	00	100000
102000	1.0000	2.50000	30.4274	32.9274	4.96791	61.2274	71.0812	5.96135	9.93508	04	1.00000	00	102000
104000	1.0000	2.50000	30.4449	32.9449	4.96791	61.3234	71.1324	5.96135	9.93508	04	1.00000	00	104000
106000	1.0000	2.50000	30.4594	32.9594	4.96791	61.4159	71.1704	5.96135	9.93508	04	1.00000	00	106000
108000	1.0000	2.50000	30.4709	32.9709	4.96791	61.5049	71.1952	5.96135	9.93508	04	1.00000	00	108000
110000	1.0000	2.50000	30.4794	32.9794	4.96791	61.5894	71.2164	5.96135	9.93508	04	1.00000	00	110000
112000	1.0000	2.50000	30.4849	32.9849	4.96791	61.6694	71.2334	5.96135	9.93508	04	1.00000	00	112000
114000	1.0000	2.50000	30.4874	32.9874	4.96791	61.7449	71.2464	5.96135	9.93508	04	1.00000	00	114000
116000	1.0000	2.50000	30.4869	32.9869	4.96791	61.8154	71.2554	5.96135	9.93508	04	1.00000	00	116000
118000	1.0000	2.50000	30.4834	32.9834	4.96791	61.8814	71.2604	5.96135	9.93508	04	1.00000	00	118000
120000	1.0000	2.50000	30.4769	32.9769	4.96791	61.9424	71.2624	5.96135	9.93508	04	1.00000	00	120000
122000	1.0000	2.50000	30.4674	32.9674	4.96791	62.0004	71.2612	5.96135	9.93508	04	1.00000	00	122000
124000	1.0000	2.50000	30.4549	32.9549	4.96791	62.0544	71.2564	5.96135	9.93508	04	1.00000	00	124000
126000	1.0000	2.50000	30.4394	32.9394	4.96791	62.1044	71.2484	5.96135	9.93508	04	1.00000	00	126000
128000	1.0000	2.50000	30.4209	32.9209	4.96791	62.1504	71.2364	5.96135	9.93508	04	1.00000	00	128000
130000	1.0000	2.50000	30.3994	32.8994	4.96791	62.1924	71.2204	5.96135	9.93508	04	1.00000	00	130000
132000	1.0000	2.50000	30.3749	32.8749	4.96791	62.2304	71.2004	5.96135	9.93508	04	1.00000	00	132000
134000	1.0000	2.50000	30.3474	32.8474	4.96791	62.2644	71.1764	5.96135	9.93508	04	1.00000	00	134000
136000	1.0000	2.50000	30.3169	32.8169	4.96791	62.2944	71.1484	5.96135	9.93508	04	1.00000	00	136000
138000	1.0000	2.50000	30.2834	32.7834	4.96791	62.3204	71.1164	5.96135	9.93508	04	1.00000	00	138000
140000	1.0000	2.50000	30.2469	32.7469	4.96791	62.3424	71.0804	5.96135	9.93508	04	1.00000	00	140000
142000	1.0000	2.50000	30.2074	32.7074	4.96791	62.3604	71.0404	5.96135	9.93508	04	1.00000	00	142000
144000	1.0000	2.50000	30.1649	32.6649	4.96791	62.3744	71.0004	5.96135	9.93508	04	1.00000	00	144000
146000	1.0000	2.50000	30.1194	32.6194	4.96791	62.3844	70.9564	5.96135	9.93508	04	1.00000	00	146000
148000	1.0000	2.50000	30.0709	32.5709	4.96791	62.3904	70.9084	5.96135	9.93508	04	1.00000	00	148000
150000	1.0000	2.50000	30.0194	32.5194	4.96791	62.3924	70.8564	5.96135	9.93508	04	1.00000	00	150000
152000	1.0000	2.50000	29.9649	32.4649	4.96791	62.3904	70.7994	5.96135	9.93508	04	1.00000	00	152000
154000	1.0000	2.50000	29.9074	32.4074	4.96791	62.3844	70.7384	5.96135	9.93508	04	1.00000	00	154000
156000	1.0000	2.50000	29.8469	32.3469	4.96791	62.3744	70.6734	5.96135	9.93508	04	1.00000	00	156000
158000	1.0000	2.50000	29.7834	32.2834	4.96791	62.3604	70.6044	5.96135	9.93508	04	1.00000	00	158000
160000	1.0000	2.50000	29.7169	32.2169	4.96791	62.3424	70.5314	5.96135	9.93508	04	1.00000	00	160000
162000	1.0000	2.50000	29.6474	32.1474	4.96791	62.3204	70.4544	5.96135	9.93508	04	1.00000	00	162000
164000	1.0000	2.50000	29.5749	32.0749	4.96791	62.2944	70.3734	5.96135	9.93508	04	1.00000	00	164000
166000	1.0000	2.50000	29.5004	32.0004	4.96791	62.2644	70.2884	5.96135	9.93508	04	1.00000	00	166000
168000	1.0000	2.50000	29.4229	31.9229	4.96791	62.2304	70.1994	5					

TABLE 3. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O-

STATE	LEVEL	STAT.	TEMPERATURE (DEG K)									
	(CM-1)	WT.	1200	1600	2000	2400	2800	3200	3600	4000	4400	
$2s^2 2p^4 \text{ } ^3P_2$	0	6	7.30E-01	7.21E-01	7.11E-01	7.03E-01	6.96E-01	6.90E-01	6.84E-01	6.78E-01		
	215	0.0353	2.82E-01	2.79E-01	2.69E-01	2.97E-01	3.02E-01	3.09E-01	3.11E-01	3.13E-01		
TEMPERATURE (DEG K)												
LEVEL	(CM-1)	5000	6000	6400	6800	7200	7600	8000	8400	8800	9200	
	0	6.09E-01	6.84E-01	6.83E-01	6.81E-01	6.80E-01	6.79E-01	6.78E-01	6.77E-01	6.77E-01	6.76E-01	
	205	3.15E-01	3.16E-01	3.17E-01	3.18E-01	3.19E-01	3.20E-01	3.21E-01	3.22E-01	3.23E-01	3.24E-01	
TEMPERATURE (DEG K)												
LEVEL	(CM-1)	9400	10000	11000	12000	13000	14000	15000	16000	17000	18000	20000
	0	6.76E-01	6.76E-01	6.75E-01	6.74E-01	6.73E-01	6.73E-01	6.73E-01	6.72E-01	6.72E-01	6.71E-01	6.71E-01
	205	3.24E-01	3.24E-01	3.25E-01	3.26E-01	3.26E-01	3.27E-01	3.27E-01	3.28E-01	3.28E-01	3.29E-01	3.29E-01
TEMPERATURE (DEG K)												
LEVEL	(CM-1)	24000	26000	32000	36000	40000	44000	48000	0	0	0	0
	0	6.70E-01	6.70E-01	6.70E-01	6.69E-01	6.69E-01	6.69E-01	6.69E-01	0.	0.	0.	0.
	205	3.30E-01	3.30E-01	3.30E-01	3.31E-01	3.31E-01	3.31E-01	3.31E-01	0.	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTANDARD ENERGY LEVELS FROM BERRY ET AL. (1965)

TABLE 47. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C

STATE	LEVEL (cm ⁻¹)	STAT. WT.	TEMPERATURE (K)							
			1200	1600	2000	2400	2800	3200	3600	4000
2s ² 2p ²	0	1	1.135-01	1.135-01	1.135-01	1.135-01	1.135-01	1.135-01	1.135-01	1.135-01
	16	3	3.378-01	3.378-01	3.378-01	3.378-01	3.378-01	3.378-01	3.378-01	3.378-01
	43	5	5.462-01	5.462-01	5.462-01	5.462-01	5.462-01	5.462-01	5.462-01	5.462-01
	101.94	5	2.032-02	2.032-02	2.032-02	2.032-02	2.032-02	2.032-02	2.032-02	2.032-02
	216.60	5	6.152-13	4.011-10	1.902-05	2.511-07	1.664-06	6.645-06	5.978-05	4.602-05
2s 2p ³	337.75	5	1.505-01	3.011-14	1.645-11	9.302-16	1.671-09	1.455-07	1.778-07	2.975-06
	64.091	15	7.311-34	1.601-25	1.611-26	3.492-17	9.405-15	5.131-13	2.256-11	1.425-10
	79.256	9	0.	4.101-30	3.145-24	2.592-20	1.631-17	2.038-15	8.008-14	1.792-12
	109.001	3	0.	0.	0.	9.445-29	8.265-25	7.395-22	6.445-19	5.095-16
	978.70	5	0.	3.405-35	1.495-31	1.065-26	0.605-23	4.325-20	5.711-18	2.045-16
2p ⁴	119.770	3	0.	0.	1.205-30	2.005-32	5.975-29	3.312-24	5.215-22	6.235-20
	704.24	60	0.	0.	0.	0.	3.395-30	5.145-26	9.235-27	3.045-24
	9.4933	12	0.	0.	0.	0.	3.895-30	7.065-27	2.105-25	1.155-23
	10.0250	36	0.	0.	0.	0.	0.	5.005-37	4.275-30	5.005-30
	18.3950	60	0.	1.235-32	4.325-26	1.005-21	1.311-19	2.045-16	1.875-14	5.295-13
2s 2p ² (P)	60.770	12	3.111-32	2.525-24	1.405-19	2.045-16	3.695-14	1.825-12	3.705-11	4.245-10
	60.722	36	2.095-36	2.425-27	4.785-22	2.045-19	1.125-15	9.795-14	3.175-12	5.125-11
	704.24	60	0.	1.611-30	2.145-24	2.505-20	2.115-17	3.265-15	1.435-13	3.725-12
	9.4933	12	0.	0.	0.	0.	0.	0.	0.	0.
	18.3950	60	0.	1.011-31	5.095-25	5.075-21	3.445-18	4.535-16	3.095-14	9.295-13
2s 2p ² (D)	130.000	24	0.	1.235-32	4.325-26	1.005-21	1.311-19	2.045-16	1.875-14	5.295-13
	130.000	60	0.	1.905-32	5.535-26	1.205-21	1.705-19	3.725-16	2.445-14	7.005-13
	130.000	24	0.	0.	0.	0.	0.	0.	0.	0.
	130.000	120	0.	0.	0.	0.	0.	0.	0.	0.
	130.000	24	0.	0.	0.	0.	0.	0.	0.	0.
2s 2p ² (F)	130.000	20	0.	0.	0.	0.	0.	0.	0.	0.
	130.000	60	0.	0.	0.	0.	0.	0.	0.	0.
	130.000	100	0.	0.	0.	0.	0.	0.	0.	0.
	130.000	320	0.	0.	0.	0.	0.	0.	0.	0.
	130.000	100	0.	0.	0.	0.	0.	0.	0.	0.
2p ³ (P)	17.1004	20	0.	0.	0.	0.	0.	0.	0.	0.
	17.9772	60	0.	0.	0.	0.	0.	0.	0.	0.
	19.0931	100	0.	0.	0.	0.	0.	0.	0.	0.
	19.5000	320	0.	0.	0.	0.	0.	0.	0.	0.
	22.9125	100	0.	0.	0.	0.	0.	0.	0.	0.
2p ³ (D)	21.0923	192	0.	0.	0.	0.	0.	0.	0.	0.
	21.0760	36	0.	0.	0.	0.	0.	0.	0.	0.
	23.1924	64	0.	0.	0.	0.	0.	0.	0.	0.
	26.7709	72	0.	0.	0.	0.	0.	0.	0.	0.
	27.0957	120	0.	0.	0.	0.	0.	0.	0.	0.
2p ³ (F)	27.7217	100	0.	0.	0.	0.	0.	0.	0.	0.
	28.0376	320	0.	0.	0.	0.	0.	0.	0.	0.
	30.1276	100	0.	0.	0.	0.	0.	0.	0.	0.
	31.2432	192	0.	0.	0.	0.	0.	0.	0.	0.
	31.2432	192	0.	0.	0.	0.	0.	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SURLEVELS
NONSTABLE ENERGY LEVELS FROM MOORE (1949) AND NYHAGEN (1954, 1955)

TABLE 47 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	4000	5200	5400	6000	6400	6800	7200	7600	8000	8400
0	1.07E-01	1.00E-01	1.00E-01	1.07E-01	1.04E-01	1.05E-01	1.04E-01	1.03E-01	1.02E-01	1.01E-01
16	3.24E-01	3.24E-01	3.24E-01	3.19E-01	3.14E-01	3.13E-01	3.11E-01	3.08E-01	3.06E-01	3.04E-01
43	5.39E-01	5.39E-01	5.32E-01	5.28E-01	5.24E-01	5.19E-01	5.15E-01	5.11E-01	5.07E-01	5.03E-01
10194	2.51E-02	3.23E-02	3.23E-02	4.63E-02	4.63E-02	4.67E-02	4.78E-02	4.88E-02	4.94E-02	4.94E-02
21648	1.64E-04	2.71E-04	4.13E-04	5.94E-04	8.14E-04	1.07E-03	1.37E-03	1.71E-03	2.06E-03	2.42E-03
33735	2.22E-09	4.79E-09	9.25E-09	1.64E-08	4.17E-08	6.14E-08	8.48E-08	1.10E-07	1.57E-07	2.02E-07
64091	7.43E-09	3.29E-08	1.14E-07	3.30E-07	8.77E-07	2.14E-06	6.31E-06	1.51E-05	3.60E-05	8.43E-05
73256	1.57E-10	8.83E-10	3.88E-09	1.68E-08	6.20E-08	1.19E-07	2.74E-07	6.30E-07	1.22E-06	2.50E-06
102891	5.32E-15	6.29E-14	5.08E-14	3.07E-12	1.97E-11	5.96E-11	1.74E-10	6.19E-10	2.07E-09	7.24E-09
91878	9.90E-16	9.30E-15	6.44E-14	3.62E-11	1.47E-10	5.31E-10	1.67E-09	4.62E-09	1.16E-08	2.65E-08
119478	8.12E-17	1.20E-15	1.34E-14	1.09E-13	6.27E-13	3.69E-12	1.23E-11	4.31E-11	1.33E-10	3.40E-10
150000	2.92E-20	5.21E-19	1.77E-17	2.29E-16	2.79E-15	1.95E-14	8.08E-14	4.34E-13	2.24E-12	1.12E-11
153000	1.49E-21	5.60E-20	1.24E-18	1.87E-17	1.90E-16	1.59E-15	1.01E-14	5.73E-14	3.33E-13	1.93E-12
181000	2.99E-25	1.93E-23	6.04E-22	1.51E-20	2.25E-19	2.65E-18	2.84E-17	1.35E-16	7.49E-16	3.40E-15
60776	1.61E-06	6.47E-06	2.13E-05	5.99E-07	1.64E-06	3.27E-06	6.53E-06	1.23E-05	2.20E-05	3.60E-05
69722	3.30E-09	1.63E-08	6.43E-08	2.10E-07	5.93E-07	1.40E-06	3.33E-06	6.87E-06	1.32E-05	2.37E-05
78426	4.07E-10	2.45E-09	1.14E-08	1.40E-07	3.91E-07	9.75E-07	2.20E-06	4.59E-06	8.91E-06	1.63E-05
78104	8.70E-11	5.24E-10	2.44E-09	9.22E-09	2.95E-08	8.23E-08	2.69E-07	4.63E-07	9.59E-07	1.84E-06
80866	1.17E-10	7.40E-10	3.67E-09	1.45E-08	6.84E-08	1.40E-07	3.59E-07	9.33E-07	1.70E-06	3.52E-06
81559	7.94E-11	5.44E-10	2.64E-09	1.10E-08	4.13E-08	1.24E-07	3.30E-07	7.89E-07	1.73E-06	3.52E-06
94400	1.07E-10	7.33E-10	3.07E-09	1.60E-08	5.59E-08	1.60E-07	4.40E-07	1.07E-06	2.34E-06	4.80E-06
110000	2.00E-15	2.90E-14	2.94E-13	2.13E-12	1.20E-11	5.51E-11	2.14E-10	7.10E-10	2.13E-09	5.71E-09
125000	4.20E-16	7.44E-15	8.71E-14	7.37E-13	4.74E-12	2.64E-11	1.04E-10	3.92E-10	1.27E-09	3.67E-09
132000	9.90E-17	1.79E-15	2.41E-14	2.29E-13	1.64E-12	9.34E-12	4.37E-11	1.74E-10	6.00E-10	1.84E-09
136169	4.92E-18	1.13E-16	1.05E-15	1.69E-14	1.29E-13	7.73E-13	3.80E-12	1.50E-11	5.67E-11	1.81E-10
150000	2.37E-18	5.64E-17	8.59E-16	9.00E-15	7.11E-14	4.37E-13	2.30E-12	9.29E-12	3.40E-11	1.10E-10
165000	8.72E-19	2.45E-17	4.27E-16	3.07E-15	4.42E-14	2.90E-13	1.63E-12	7.41E-12	2.90E-11	9.95E-11
154000	9.79E-20	3.30E-18	7.04E-17	9.77E-16	9.74E-15	7.40E-14	4.40E-13	2.25E-12	9.37E-12	3.59E-11
150000	9.44E-20	3.50E-18	6.07E-17	1.10E-15	1.27E-14	1.02E-13	6.45E-13	3.37E-12	1.49E-11	5.72E-11
104000	1.31E-23	9.04E-22	3.42E-20	7.99E-19	1.24E-17	1.40E-16	1.21E-15	6.29E-15	4.69E-14	2.25E-13
194000	1.17E-24	1.01E-22	4.05E-21	1.20E-19	2.33E-18	3.60E-17	2.91E-16	2.22E-15	1.30E-14	7.21E-14
170000	2.91E-23	1.44E-20	4.16E-19	7.50E-18	9.61E-17	9.03E-16	6.40E-15	3.91E-14	1.94E-13	8.24E-13
179000	3.49E-23	2.15E-21	7.12E-20	1.56E-18	2.24E-17	2.39E-16	1.94E-15	1.27E-14	6.80E-14	3.14E-13
216000	5.90E-28	8.64E-26	6.13E-24	2.44E-22	6.20E-21	1.07E-19	1.34E-18	1.20E-17	9.90E-17	6.24E-16
225000	7.16E-29	1.27E-26	1.00E-24	5.09E-23	1.44E-21	2.63E-20	3.94E-19	6.10E-18	3.49E-17	2.30E-16
234000	1.34E-28	2.24E-26	1.94E-24	9.82E-23	2.57E-21	4.92E-20	6.79E-19	7.11E-18	5.07E-17	3.90E-16
235000	1.63E-29	3.45E-27	3.45E-25	1.89E-23	6.04E-22	1.30E-20	2.00E-18	2.30E-17	1.51E-16	9.10E-16
243000	2.74E-31	7.50E-29	6.92E-27	5.40E-25	2.15E-23	5.30E-22	9.13E-21	1.17E-19	1.14E-18	9.10E-18
252000	3.20E-32	1.04E-29	1.57E-27	1.17E-25	1.40E-23	1.40E-22	2.69E-21	3.70E-20	4.07E-19	3.49E-18

TABLE 47 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C

LEVEL	TEMPERATURE (806 K)										
	9600	10000	11000	12000	13000	14000	15000	16000	17000	18000	20000
1Cm-1)											
0	9.89E-02	9.60E-02	9.40E-02	9.40E-02	9.20E-02	9.94E-02	8.77E-02	8.54E-02	8.30E-02	7.77E-02	7.42E-02
16	2.94E-01	2.93E-01	2.87E-01	2.81E-01	2.75E-01	2.46E-01	2.43E-01	2.34E-01	2.41E-01	2.35E-01	2.24E-01
43	6.91E-01	6.87E-01	6.77E-01	6.67E-01	6.58E-01	6.47E-01	6.37E-01	6.26E-01	6.15E-01	6.05E-01	5.75E-01
10194	1.07E-01	1.13E-01	1.24E-01	1.38E-01	1.49E-01	1.58E-01	1.65E-01	1.71E-01	1.75E-01	1.78E-01	1.80E-01
21648	3.69E-03	4.35E-03	5.63E-03	7.01E-03	8.35E-03	9.72E-03	1.10E-02	1.22E-02	1.33E-02	1.43E-02	1.52E-02
33735	3.19E-03	3.02E-03	2.82E-03	2.63E-03	2.45E-03	2.28E-03	2.12E-03	2.00E-03	1.89E-03	1.78E-03	1.68E-03
64091	9.98E-05	1.05E-04	1.12E-04	1.20E-04	1.28E-04	1.36E-04	1.44E-04	1.52E-04	1.60E-04	1.68E-04	1.76E-04
79236	1.12E-05	1.75E-05	4.59E-05	1.02E-04	2.00E-04	3.54E-04	5.79E-04	8.69E-04	1.28E-03	1.77E-03	2.34E-03
105401	3.85E-08	7.20E-07	2.81E-07	8.73E-07	2.27E-06	5.11E-06	1.03E-05	1.89E-05	3.22E-05	5.13E-05	7.73E-05
97078	2.10E-07	3.75E-07	1.32E-06	3.74E-06	9.08E-06	1.92E-05	3.47E-05	6.43E-05	1.05E-04	1.61E-04	2.35E-04
119478	4.67E-09	5.50E-09	4.44E-08	1.61E-07	4.77E-07	1.20E-06	2.67E-06	5.34E-06	9.77E-06	1.64E-05	2.64E-05
150000	1.53E-10	3.74E-10	2.40E-09	1.31E-08	5.10E-08	1.63E-07	4.52E-07	1.07E-06	2.39E-06	5.16E-06	1.09E-05
158000	2.57E-11	6.37E-11	5.00E-10	2.78E-09	1.17E-08	3.99E-08	1.15E-07	2.80E-07	6.47E-07	1.32E-06	2.47E-06
181000	1.64E-13	4.80E-13	5.02E-12	3.53E-11	1.83E-10	7.50E-10	2.53E-09	7.29E-09	1.85E-08	4.75E-08	1.14E-07
40774	1.31E-04	1.87E-04	4.06E-04	1.12E-03	1.32E-03	2.64E-03	3.09E-03	4.54E-03	5.81E-03	7.50E-03	9.35E-03
69722	1.03E-04	1.55E-04	3.78E-04	7.92E-04	1.47E-03	2.50E-03	3.94E-03	5.82E-03	8.10E-03	1.10E-02	1.45E-02
78426	4.64E-05	7.59E-05	2.02E-04	4.85E-04	9.30E-04	1.70E-03	2.89E-03	4.44E-03	6.33E-03	9.14E-03	1.29E-02
78184	9.64E-06	1.53E-05	4.17E-05	9.57E-05	1.93E-04	3.49E-04	5.93E-04	9.37E-04	1.33E-03	1.86E-03	2.56E-03
80844	1.94E-05	3.12E-05	8.81E-05	2.00E-04	4.30E-04	7.94E-04	1.25E-03	2.14E-03	3.19E-03	4.51E-03	6.13E-03
83850	2.07E-05	3.39E-05	9.93E-05	2.43E-04	5.15E-04	9.74E-04	1.69E-03	2.72E-03	4.12E-03	5.92E-03	8.08E-03
84000	2.83E-05	4.64E-05	1.34E-04	3.34E-04	7.08E-04	1.35E-03	2.33E-03	3.74E-03	5.70E-03	8.20E-03	1.13E-02
116000	6.88E-06	1.33E-05	5.93E-05	2.08E-04	5.84E-04	1.43E-03	3.10E-03	5.05E-03	7.89E-03	1.18E-02	1.75E-02
125000	5.28E-08	1.04E-07	5.40E-07	2.10E-06	6.50E-06	1.71E-05	3.92E-05	8.08E-05	1.52E-04	2.63E-04	4.33E-04
132000	3.04E-08	6.04E-08	3.64E-07	1.51E-06	4.92E-06	1.30E-05	3.34E-05	7.17E-05	1.40E-04	2.53E-04	4.28E-04
136149	3.25E-09	7.29E-09	4.24E-08	1.83E-07	6.29E-07	1.80E-06	4.48E-06	9.84E-06	1.97E-05	3.62E-05	6.70E-05
138000	2.04E-09	4.47E-09	2.78E-08	1.22E-07	4.28E-07	1.25E-06	3.13E-06	6.91E-06	1.41E-05	2.61E-05	4.30E-05
145000	2.14E-09	5.12E-09	3.34E-08	1.59E-07	5.92E-07	1.82E-06	4.60E-06	1.11E-05	2.33E-05	4.47E-05	7.94E-05
154000	9.35E-10	2.34E-09	1.71E-08	9.99E-08	3.44E-07	1.20E-06	3.37E-06	8.27E-06	1.81E-05	3.63E-05	6.70E-05
158000	1.64E-09	4.20E-09	3.25E-08	1.78E-07	7.49E-07	2.35E-06	7.05E-06	1.82E-05	4.14E-05	8.43E-05	1.54E-04
184000	1.13E-11	3.37E-11	3.64E-10	2.64E-09	1.42E-08	9.95E-08	2.05E-07	6.02E-07	1.55E-06	3.54E-06	7.44E-06
194000	4.47E-12	1.42E-11	1.76E-10	1.12E-09	9.34E-09	3.79E-08	1.40E-07	4.35E-07	1.10E-06	2.95E-06	6.22E-06
170000	3.04E-11	6.41E-11	7.61E-10	4.75E-09	2.35E-08	8.34E-08	2.62E-07	7.84E-07	1.89E-06	3.43E-06	7.18E-06
179000	1.41E-11	1.08E-11	4.17E-10	2.87E-09	1.47E-08	5.90E-08	1.84E-07	5.59E-07	1.40E-06	2.59E-06	4.92E-06
216000	4.21E-14	2.23E-13	3.83E-12	3.83E-11	3.83E-10	1.43E-09	4.76E-09	2.24E-08	6.87E-08	1.84E-07	4.41E-07
225000	2.86E-14	1.04E-13	2.03E-12	2.31E-11	1.80E-10	1.04E-09	4.76E-09	1.79E-08	5.70E-08	1.59E-07	3.94E-07
224000	4.69E-14	1.78E-13	3.26E-12	3.67E-11	2.83E-10	1.63E-09	7.37E-09	2.75E-08	8.73E-08	2.43E-07	1.37E-06
233000	2.14E-14	8.65E-14	1.70E-12	2.22E-11	1.84E-10	1.15E-09	5.52E-09	2.17E-08	7.25E-08	2.10E-07	5.41E-07
243000	1.63E-15	6.32E-15	1.63E-13	2.25E-12	2.07E-11	1.30E-10	7.14E-10	2.96E-09	1.02E-08	3.15E-08	9.54E-08
252000	7.51E-16	5.37E-15	8.92E-14	1.36E-12	1.34E-11	9.76E-11	5.34E-10	2.34E-09	8.71E-09	2.74E-08	7.69E-08

TABLE 47 (CONT.)-1. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C

LEVEL (CN-1)	TEMPERATURE (DEG K)									
	24000	28000	32000	36200	40000	44000	48000	0	0	0
0	4.25E-02	5.04E-02	4.00E-02	3.17E-02	2.53E-02	2.05E-02	1.68E-02	0.	0.	0.
16	1.37E-01	1.51E-01	1.20E-01	9.51E-02	7.68E-02	6.15E-02	5.09E-02	0.	0.	0.
43	3.12E-01	2.52E-01	2.00E-01	1.50E-01	1.24E-01	1.02E-01	8.41E-02	0.	0.	0.
10104	1.70E-01	1.42E-01	1.27E-01	1.04E-01	8.78E-02	7.35E-02	6.20E-02	0.	0.	0.
21648	1.71E-02	1.66E-02	1.51E-02	1.33E-02	1.16E-02	1.01E-02	8.80E-03	0.	0.	0.
33735	4.14E-02	4.44E-02	4.39E-02	4.12E-02	3.74E-02	3.40E-02	3.04E-02	0.	0.	0.
44021	2.91E-02	2.81E-02	2.64E-02	2.47E-02	2.19E-02	1.96E-02	1.70E-02	0.	0.	0.
75256	6.18E-03	9.58E-03	1.23E-02	1.61E-02	1.52E-02	1.56E-02	1.56E-02	0.	0.	0.
105081	3.30E-04	6.50E-04	1.05E-03	1.39E-03	1.49E-03	1.93E-03	2.12E-03	0.	0.	0.
197878	8.95E-04	1.69E-03	2.49E-03	3.17E-03	3.75E-03	4.18E-03	4.48E-03	0.	0.	0.
119876	1.42E-04	3.20E-04	5.48E-04	7.90E-04	1.02E-03	1.23E-03	1.39E-03	0.	0.	0.
150000	7.09E-05	2.04E-04	4.24E-04	7.11E-04	1.03E-03	1.37E-03	1.69E-03	0.	0.	0.
150000	2.51E-05	7.51E-05	1.64E-04	2.87E-04	4.31E-04	5.82E-04	7.59E-04	0.	0.	0.
181000	1.21E-04	4.61E-04	1.17E-03	2.29E-03	3.77E-03	5.51E-03	7.42E-03	0.	0.	0.
60776	1.94E-02	2.64E-02	3.12E-02	3.35E-02	3.42E-02	3.37E-02	3.27E-02	0.	0.	0.
60722	3.45E-02	5.05E-02	6.27E-02	7.04E-02	7.43E-02	7.59E-02	7.50E-02	0.	0.	0.
70426	3.41E-02	5.30E-02	7.04E-02	8.20E-02	9.05E-02	9.47E-02	9.63E-02	0.	0.	0.
78184	4.91E-03	1.09E-02	1.43E-02	1.67E-02	1.83E-02	1.91E-02	1.94E-02	0.	0.	0.
80844	1.77E-02	2.85E-02	3.80E-02	4.51E-02	4.98E-02	5.25E-02	5.37E-02	0.	0.	0.
83830	2.44E-02	4.07E-02	5.53E-02	6.67E-02	7.45E-02	7.93E-02	8.18E-02	0.	0.	0.
84000	3.42E-02	5.64E-02	7.70E-02	9.20E-02	1.04E-01	1.10E-01	1.14E-01	0.	0.	0.
116000	1.43E-03	3.12E-03	5.22E-03	7.38E-03	9.37E-03	1.11E-02	1.25E-02	0.	0.	0.
125000	2.51E-03	5.98E-03	1.04E-02	1.54E-02	2.03E-02	2.48E-02	2.84E-02	0.	0.	0.
132000	2.78E-03	6.84E-03	1.27E-02	1.95E-02	2.64E-02	3.20E-02	3.81E-02	0.	0.	0.
136169	4.28E-04	1.11E-03	2.11E-03	3.30E-03	4.54E-03	5.73E-03	6.82E-03	0.	0.	0.
130000	3.19E-04	8.40E-04	1.62E-03	2.55E-03	3.54E-03	4.50E-03	5.30E-03	0.	0.	0.
145000	5.30E-04	1.70E-03	3.54E-03	5.79E-03	8.26E-03	1.07E-02	1.31E-02	0.	0.	0.
150000	6.12E-04	1.83E-03	3.94E-03	6.73E-03	9.90E-03	1.33E-02	1.73E-02	0.	0.	0.
150000	1.54E-03	4.81E-03	1.09E-02	1.84E-02	2.76E-02	3.74E-02	4.73E-02	0.	0.	0.
184000	1.09E-04	4.27E-04	1.10E-03	2.19E-03	3.65E-03	5.40E-03	7.32E-03	0.	0.	0.
194000	1.07E-04	4.54E-04	1.25E-03	2.61E-03	4.33E-03	6.92E-03	9.64E-03	0.	0.	0.
170000	8.44E-05	2.92E-04	6.90E-04	1.20E-03	2.02E-03	2.84E-03	3.71E-03	0.	0.	0.
170000	8.75E-05	3.27E-04	8.19E-04	1.59E-03	2.59E-03	3.77E-03	5.04E-03	0.	0.	0.
214000	1.07E-05	5.19E-05	1.79E-04	4.07E-04	7.71E-04	1.26E-03	1.87E-03	0.	0.	0.
225000	1.11E-05	6.15E-05	2.07E-04	5.09E-04	9.91E-04	1.67E-03	2.54E-03	0.	0.	0.
230000	1.64E-05	9.10E-05	3.04E-04	7.39E-04	1.44E-03	2.43E-03	3.60E-03	0.	0.	0.
230000	1.72E-05	1.02E-04	3.61E-04	9.17E-04	1.66E-03	2.82E-03	4.99E-03	0.	0.	0.
245000	3.10E-04	2.04E-03	7.77E-03	2.07E-04	4.38E-04	7.84E-04	1.25E-03	0.	0.	0.
252000	3.36E-06	2.30E-05	9.22E-05	2.57E-04	5.63E-04	1.04E-03	1.70E-03	0.	0.	0.

TABLE 40. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF N

STATE	LEVEL (CM-1)	STAT. WT.	TEMPERATURE (DEG K)									
			1200	1400	2000	2400	3000	3400	4000	4400	4800	5400
2s 2p ³ 3s ²	0	0	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
	19228	10	2.43E-10	7.74E-08	2.44E-06	2.44E-05	1.21E-04	4.40E-04	1.15E-03	2.47E-03	4.43E-03	7.92E-03
	28639	6	1.44E-15	8.19E-12	1.07E-09	4.68E-08	5.90E-07	3.50E-06	1.44E-05	4.68E-05	1.40E-04	1.40E-04
	88132	12	0	0	0	0	0	0	0	0	0	0
2s 2p ³ 3p	0	0	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34
	121000	10	0	0	0	0	0	0	0	0	0	0
	142110	2	0	0	0	0	0	0	0	0	0	0
	158200	4	0	0	0	0	0	0	0	0	0	0
2s 2p ³ 3d	0	0	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
	19228	10	2.43E-10	7.74E-08	2.44E-06	2.44E-05	1.21E-04	4.40E-04	1.15E-03	2.47E-03	4.43E-03	7.92E-03
	28639	6	1.44E-15	8.19E-12	1.07E-09	4.68E-08	5.90E-07	3.50E-06	1.44E-05	4.68E-05	1.40E-04	1.40E-04
	88132	12	0	0	0	0	0	0	0	0	0	0
2s 2p ³ 3d ²	0	0	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34
	121000	10	0	0	0	0	0	0	0	0	0	0
	142110	2	0	0	0	0	0	0	0	0	0	0
	158200	4	0	0	0	0	0	0	0	0	0	0
2s 2p ³ 3d ³	0	0	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34
	121000	10	0	0	0	0	0	0	0	0	0	0
	142110	2	0	0	0	0	0	0	0	0	0	0
	158200	4	0	0	0	0	0	0	0	0	0	0
2s 2p ³ 3d ⁴	0	0	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34
	121000	10	0	0	0	0	0	0	0	0	0	0
	142110	2	0	0	0	0	0	0	0	0	0	0
	158200	4	0	0	0	0	0	0	0	0	0	0
2s 2p ³ 3d ⁵	0	0	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34
	121000	10	0	0	0	0	0	0	0	0	0	0
	142110	2	0	0	0	0	0	0	0	0	0	0
	158200	4	0	0	0	0	0	0	0	0	0	0
2s 2p ³ 3d ⁶	0	0	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34
	121000	10	0	0	0	0	0	0	0	0	0	0
	142110	2	0	0	0	0	0	0	0	0	0	0
	158200	4	0	0	0	0	0	0	0	0	0	0
2s 2p ³ 3d ⁷	0	0	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34
	121000	10	0	0	0	0	0	0	0	0	0	0
	142110	2	0	0	0	0	0	0	0	0	0	0
	158200	4	0	0	0	0	0	0	0	0	0	0
2s 2p ³ 3d ⁸	0	0	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34
	121000	10	0	0	0	0	0	0	0	0	0	0
	142110	2	0	0	0	0	0	0	0	0	0	0
	158200	4	0	0	0	0	0	0	0	0	0	0
2s 2p ³ 3d ⁹	0	0	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34
	121000	10	0	0	0	0	0	0	0	0	0	0
	142110	2	0	0	0	0	0	0	0	0	0	0
	158200	4	0	0	0	0	0	0	0	0	0	0
2s 2p ³ 3d ¹⁰	0	0	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34
	121000	10	0	0	0	0	0	0	0	0	0	0
	142110	2	0	0	0	0	0	0	0	0	0	0
	158200	4	0	0	0	0	0	0	0	0	0	0

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
 MONITORING ENERGY LEVELS FROM MOORE (1949), ERIKSSON (1950), AND ERIKSSON AND JOHANSSON (1961)

TABLE 40 (CONT.-). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF N

LEVEL (CM-1)	TEMPERATURE (CEG N)									
	4000	5200	5600	6000	6400	6800	7200	7600	8000	8400
0	9.92E-01	9.07E-01	9.82E-01	9.74E-01	9.64E-01	9.54E-01	9.45E-01	9.33E-01	9.20E-01	9.06E-01
19228	7.79E-03	1.21E-02	1.76E-02	2.42E-02	3.20E-02	4.09E-02	5.07E-02	6.12E-02	7.24E-02	8.41E-02
28039	2.62E-04	5.07E-04	9.31E-04	1.45E-03	2.20E-03	3.21E-03	4.45E-03	5.95E-03	7.71E-03	9.73E-03
81132	1.00E-11	7.61E-11	4.32E-10	1.94E-09	7.32E-09	2.79E-08	6.37E-08	1.49E-07	3.61E-07	7.54E-07
121000	4.39E-16	7.12E-15	7.73E-14	6.10E-13	3.71E-12	1.82E-11	7.45E-11	2.83E-10	8.14E-10	2.26E-09
142110	1.57E-19	4.14E-18	6.02E-17	7.73E-16	6.44E-15	4.10E-14	2.19E-13	9.65E-13	3.65E-12	1.22E-11
156260	3.79E-21	1.45E-19	3.20E-18	4.69E-18	4.69E-17	4.16E-16	2.64E-15	1.38E-14	6.07E-14	2.32E-13
232900	7.14E-31	1.53E-28	1.52E-26	6.13E-25	2.44E-23	5.69E-22	6.69E-21	9.94E-20	8.04E-19	6.43E-18
84288	4.74E-11	3.31E-10	1.74E-09	7.31E-09	2.64E-08	7.73E-08	2.06E-07	4.93E-07	1.04E-06	2.19E-06
95780	4.55E-12	4.12E-11	2.78E-10	1.39E-09	5.01E-09	2.04E-08	6.21E-08	1.68E-07	4.10E-07	9.12E-07
104041	4.99E-13	5.57E-12	4.40E-11	2.63E-10	1.24E-09	4.90E-09	1.69E-08	5.02E-08	1.34E-07	3.23E-07
103841	1.35E-13	1.57E-12	1.14E-11	6.69E-11	3.53E-10	1.23E-09	4.12E-09	1.21E-08	3.20E-08	7.64E-08
107420	1.59E-13	1.58E-12	1.37E-11	8.55E-11	4.24E-10	1.74E-09	6.07E-09	1.85E-08	5.04E-08	1.25E-07
110315	9.73E-14	1.23E-12	1.08E-11	7.12E-11	3.69E-10	1.57E-09	5.67E-09	1.79E-08	5.01E-08	1.27E-07
110441	1.51E-13	1.67E-12	1.47E-11	9.67E-11	5.02E-10	2.14E-09	7.76E-09	2.44E-08	6.89E-08	1.74E-07
99464	2.63E-13	2.61E-12	1.80E-11	1.02E-10	4.49E-10	1.64E-09	5.30E-09	1.49E-08	3.78E-08	8.74E-08
110973	2.64E-14	3.42E-13	3.05E-12	2.03E-11	1.04E-10	4.59E-10	1.64E-09	5.26E-09	1.48E-08	3.78E-08
121000	2.20E-15	3.54E-14	3.07E-13	3.05E-12	1.95E-11	9.69E-11	3.73E-10	4.07E-09	1.13E-08	2.02E-08
124406	2.34E-15	4.41E-14	4.01E-13	4.12E-12	2.44E-11	1.34E-10	5.81E-10	2.13E-09	1.53E-08	5.07E-08
114279	3.62E-16	5.24E-15	5.20E-14	3.70E-13	2.14E-12	9.07E-12	3.83E-11	1.20E-10	3.81E-10	1.01E-09
120400	2.07E-17	5.51E-16	6.93E-15	6.21E-14	4.21E-13	2.30E-12	1.02E-11	3.88E-11	1.29E-10	3.82E-10
137900	3.12E-18	7.41E-17	1.12E-15	1.17E-14	9.08E-14	5.54E-13	2.74E-12	1.14E-11	1.34E-10	1.34E-09
162000	2.40E-18	6.02E-17	1.12E-15	1.27E-14	1.04E-13	6.84E-13	3.59E-12	1.50E-11	5.94E-11	1.50E-10
152000	2.70E-19	9.15E-18	1.07E-16	1.07E-15	2.31E-14	1.80E-13	1.12E-12	5.32E-12	2.33E-11	8.47E-11
154000	1.95E-19	7.09E-18	1.54E-16	2.21E-15	2.27E-14	1.77E-13	1.09E-12	5.57E-12	2.44E-11	9.01E-11
192000	6.70E-24	3.62E-22	2.50E-20	4.65E-19	1.17E-17	1.47E-16	1.39E-15	1.03E-14	6.24E-14	3.19E-13
202000	6.02E-25	4.51E-23	3.40E-21	1.07E-19	2.20E-18	3.15E-17	3.54E-16	2.76E-15	1.84E-14	1.02E-13
219000	1.15E-26	1.62E-24	1.13E-22	4.44E-21	1.11E-19	1.80E-18	2.33E-17	2.21E-16	1.67E-15	1.04E-14
259000	2.62E-32	1.62E-29	1.70E-27	1.43E-25	6.95E-24	2.80E-22	4.33E-21	6.51E-20	7.45E-19	4.99E-18
331000	0.	0.	2.14E-35	6.17E-33	8.73E-31	6.00E-29	3.33E-27	1.07E-25	2.42E-24	4.03E-23
									5.25E-22	5.43E-21

TABLE 48 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF H

LEVEL (C2-1)	TEMPERATURE (1000 K)									
	9000	10000	11000	12000	13000	14000	15000	16000	17000	18000
0	8.42E-01	8.47E-01	8.50E-01	7.71E-01	7.39E-01	7.00E-01	6.60E-01	6.37E-01	6.00E-01	5.80E-01
19230	1.21E-01	1.37E-01	1.63E-01	1.93E-01	2.19E-01	2.43E-01	2.64E-01	2.83E-01	2.99E-01	3.12E-01
20039	1.72E-02	2.00E-02	2.39E-02	3.04E-02	3.93E-02	5.43E-02	7.39E-02	1.01E-01	1.34E-01	1.74E-01
20132	6.74E-04	2.39E-04	2.39E-04	5.94E-05	1.29E-04	2.40E-04	4.77E-04	9.91E-04	1.95E-03	3.52E-03
121000	2.87E-00	2.82E-00	2.70E-07	9.44E-07	2.81E-06	6.96E-06	1.52E-05	3.60E-05	5.43E-05	9.14E-05
142110	2.42E-10	3.42E-09	1.42E-09	1.33E-09	5.43E-08	1.54E-07	4.92E-07	9.90E-07	1.62E-06	3.30E-06
150300	6.82E-11	1.40E-10	1.29E-09	6.09E-09	2.74E-08	9.13E-08	2.97E-07	1.04E-06	3.49E-06	9.02E-06
237000	8.94E-16	3.54E-15	7.14E-14	6.42E-13	7.04E-12	4.23E-11	1.99E-10	7.47E-10	2.91E-09	7.14E-09
84200	1.27E-05	2.04E-05	5.97E-05	1.42E-04	2.94E-04	5.40E-04	9.44E-04	1.47E-03	2.18E-03	3.10E-03
97700	6.75E-06	1.18E-05	3.94E-05	1.07E-04	2.47E-04	5.62E-04	9.23E-04	1.54E-03	2.40E-03	3.71E-03
100401	2.90E-06	5.34E-06	2.01E-05	6.01E-05	1.51E-04	3.29E-04	6.44E-04	1.13E-03	1.91E-03	2.99E-03
107001	6.74E-07	1.23E-06	4.50E-06	1.30E-05	3.37E-05	7.29E-05	1.42E-04	2.52E-04	4.17E-04	6.40E-04
107430	1.19E-06	2.22E-06	6.63E-06	2.09E-05	6.01E-05	1.52E-04	3.02E-04	5.49E-04	9.23E-04	1.46E-03
110310	1.20E-06	2.44E-06	9.89E-06	3.13E-05	6.24E-05	1.00E-04	3.82E-04	7.07E-04	1.21E-03	1.97E-03
110441	1.74E-06	3.32E-06	1.34E-05	4.31E-05	1.14E-04	2.60E-04	5.20E-04	9.74E-04	1.67E-03	2.60E-03
99044	7.02E-07	1.29E-06	4.61E-06	1.29E-05	2.90E-05	6.24E-05	1.10E-04	2.04E-04	3.30E-04	5.03E-04
110773	3.07E-07	7.39E-07	3.01E-06	9.63E-06	2.50E-05	5.00E-05	1.10E-04	2.22E-04	5.00E-04	8.11E-04
121000	1.43E-07	2.91E-07	1.30E-06	4.02E-06	1.40E-05	3.40E-05	7.61E-05	1.50E-04	2.71E-04	4.57E-04
124000	2.66E-07	5.23E-07	2.70E-06	1.00E-05	3.61E-05	7.70E-05	1.73E-04	3.47E-04	6.40E-04	1.10E-03
116279	1.16E-06	2.30E-06	1.00E-07	3.40E-07	9.44E-07	2.24E-06	4.79E-06	9.17E-06	1.62E-05	2.67E-05
120000	3.60E-09	1.20E-08	6.17E-08	2.30E-07	7.42E-07	1.95E-06	4.40E-06	9.29E-06	1.74E-05	3.04E-05
137000	2.42E-09	5.42E-09	3.13E-08	1.33E-07	4.52E-07	1.20E-06	3.13E-06	6.60E-06	1.34E-05	2.49E-05
143000	3.94E-09	9.00E-09	5.59E-08	2.49E-07	8.79E-07	2.37E-06	6.49E-06	1.45E-05	2.94E-05	5.44E-05
150000	2.13E-09	5.24E-09	3.70E-08	1.07E-07	7.32E-07	2.34E-06	6.34E-06	1.52E-05	3.23E-05	6.37E-05
156000	2.42E-09	6.02E-09	4.95E-08	2.22E-07	9.32E-07	3.05E-06	8.40E-06	2.04E-05	4.49E-05	8.92E-05
160000	1.94E-11	5.79E-11	6.77E-10	5.23E-09	2.92E-08	1.27E-07	4.59E-07	1.37E-06	3.60E-06	8.47E-06
203000	7.34E-12	2.42E-11	3.29E-10	2.00E-09	1.72E-08	8.11E-08	3.80E-07	2.74E-06	6.77E-06	1.51E-05
215000	9.03E-13	3.00E-12	5.57E-11	5.52E-10	3.03E-09	2.00E-08	8.31E-08	2.80E-07	8.44E-07	2.24E-06
250000	1.64E-13	7.83E-13	2.15E-12	3.44E-12	3.92E-11	2.69E-10	1.49E-09	6.72E-09	2.52E-08	8.14E-08
331000	4.61E-20	3.30E-19	2.59E-17	6.40E-16	1.70E-14	2.21E-13	2.04E-12	1.91E-11	7.77E-11	3.52E-10

TABLE 48 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF N

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	24000	28000	32000	36000	40000	44000	48000	0	0	0
0	4.24E-01	3.33E-01	2.53E-01	1.91E-01	1.45E-01	1.12E-01	8.79E-02	0.	0.	0.
19228	3.36E-01	3.10E-01	2.67E-01	2.22E-01	1.82E-01	1.49E-01	1.24E-01	0.	0.	0.
28939	1.13E-01	1.04E-01	9.04E-02	7.72E-02	6.54E-02	5.54E-02	4.74E-02	0.	0.	0.
88132	1.48E-02	1.49E-02	1.45E-02	1.40E-02	1.35E-02	1.30E-02	1.25E-02	0.	0.	0.
121000	7.53E-04	1.64E-03	2.75E-03	3.80E-03	4.67E-03	5.39E-03	5.95E-03	0.	0.	0.
142110	4.25E-05	1.12E-04	2.13E-04	3.27E-04	4.59E-04	5.37E-04	6.21E-04	0.	0.	0.
158200	4.04E-05	1.47E-04	3.10E-04	5.15E-04	7.54E-04	9.51E-04	1.15E-03	0.	0.	0.
232800	5.52E-07	3.17E-04	1.08E-03	2.60E-03	5.01E-03	8.27E-03	1.23E-02	0.	0.	0.
84288	1.22E-02	1.37E-02	2.58E-02	2.94E-02	3.15E-02	3.26E-02	3.14E-02	0.	0.	0.
95780	1.64E-02	3.27E-02	4.61E-02	5.62E-02	6.25E-02	6.57E-02	6.72E-02	0.	0.	0.
104461	1.70E-02	3.42E-02	5.11E-02	6.51E-02	7.52E-02	8.14E-02	8.53E-02	0.	0.	0.
103861	3.79E-03	7.28E-03	1.07E-02	1.36E-02	1.56E-02	1.69E-02	1.78E-02	0.	0.	0.
107420	9.18E-03	1.88E-02	2.73E-02	3.53E-02	4.11E-02	4.51E-02	4.74E-02	0.	0.	0.
110315	1.29E-02	2.59E-02	4.09E-02	5.24E-02	6.18E-02	6.83E-02	7.25E-02	0.	0.	0.
110441	1.79E-02	3.48E-02	5.57E-02	7.29E-02	8.61E-02	9.52E-02	1.01E-01	0.	0.	0.
99664	2.71E-03	4.97E-03	7.17E-03	8.90E-03	1.01E-02	1.08E-02	1.11E-02	0.	0.	0.
110973	4.12E-03	8.33E-03	1.29E-02	1.70E-02	2.01E-02	2.23E-02	2.37E-02	0.	0.	0.
121030	3.77E-03	8.30E-03	1.37E-02	1.90E-02	2.34E-02	2.64E-02	2.92E-02	0.	0.	0.
124400	9.71E-03	2.21E-02	3.74E-02	5.26E-02	6.57E-02	7.61E-02	8.40E-02	0.	0.	0.
116279	2.00E-04	4.23E-04	6.88E-04	9.17E-04	1.11E-03	1.29E-03	1.39E-03	0.	0.	0.
128400	2.90E-04	6.81E-04	1.18E-03	1.63E-03	2.12E-03	2.52E-03	2.81E-03	0.	0.	0.
137500	2.80E-04	7.11E-04	1.31E-03	1.94E-03	2.56E-03	3.12E-03	3.54E-03	0.	0.	0.
142000	6.04E-04	1.60E-03	3.42E-03	5.25E-03	7.03E-03	8.65E-03	9.97E-03	0.	0.	0.
133800	9.95E-04	2.88E-03	5.07E-03	7.51E-03	1.03E-02	1.40E-02	2.02E-02	0.	0.	0.
156000	1.40E-03	4.39E-03	9.11E-03	1.59E-02	2.12E-02	2.73E-02	3.28E-02	0.	0.	0.
192000	2.80E-04	1.17E-03	3.25E-03	4.00E-03	4.82E-03	5.43E-03	1.00E-02	0.	0.	0.
202000	2.81E-04	1.24E-03	3.44E-03	7.15E-03	1.22E-02	1.82E-02	2.48E-02	0.	0.	0.
215000	1.21E-04	5.94E-04	1.81E-03	3.99E-03	7.15E-03	1.11E-02	1.57E-02	0.	0.	0.
230000	1.04E-05	7.68E-05	3.05E-04	8.40E-04	1.80E-03	3.23E-03	5.14E-03	0.	0.	0.
331000	1.93E-07	2.54E-06	1.63E-05	4.45E-05	1.04E-04	4.18E-04	8.69E-04	0.	0.	0.

TABLE 4-1. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O

STATE	LEVEL (CM-1)	STAT.	TEMPERATURE (800 K)									
			1200	1600	2000	2400	2800	3200	3600	4000	4400	4800
2p ² 3p ²	0	5	6.07E-01	5.94E-01	5.70E-01	5.41E-01	5.15E-01	4.93E-01	4.75E-01	4.60E-01	4.48E-01	4.38E-01
	120	3	3.01E-01	3.00E-01	3.15E-01	3.17E-01	3.15E-01	3.12E-01	3.22E-01	3.23E-01	3.24E-01	3.24E-01
	226	1	9.27E-02	9.49E-02	9.74E-02	1.01E-01	1.04E-01	1.04E-01	1.05E-01	1.05E-01	1.05E-01	1.05E-01
	15004	5	3.31E-09	3.77E-07	4.44E-06	4.30E-05	1.44E-04	4.50E-04	1.04E-03	1.05E-03	1.05E-03	1.05E-03
	53792	1	3.00E-19	7.53E-15	3.25E-12	1.05E-10	3.32E-09	2.90E-08	1.50E-07	6.00E-07	1.00E-06	1.00E-06
2p ² 3p ² (5 ⁺)	126304	9	0.	0.	0.	1.7E-33	6.77E-29	2.29E-25	1.23E-22	1.93E-20	1.10E-18	1.10E-18
	109037	3	0.	0.	0.	0.	0.	2.94E-30	3.09E-34	7.50E-31	3.70E-28	3.70E-28
	277000	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	74003	8	0.	5.32E-20	3.72E-24	2.00E-20	1.70E-17	2.17E-15	9.13E-14	6.10E-12	2.09E-11	2.09E-11
	87379	24	0.	2.14E-30	1.41E-27	4.00E-23	8.77E-20	2.30E-17	1.07E-15	6.13E-14	1.00E-12	1.00E-12
2p ² 3p ² (5 ⁻)	97443	40	0.	6.19E-30	1.40E-26	1.00E-25	6.34E-22	4.31E-19	5.90E-17	2.70E-15	6.90E-14	6.90E-14
	95757	8	0.	3.01E-30	1.14E-26	1.00E-25	3.90E-22	1.04E-19	2.10E-17	1.00E-15	1.40E-14	1.40E-14
	99314	24	0.	2.04E-31	2.04E-26	3.00E-26	1.04E-22	1.12E-19	3.50E-17	8.37E-16	2.10E-14	2.10E-14
	102900	116	0.	0.	9.00E-32	2.10E-26	1.40E-22	1.00E-19	1.03E-17	1.11E-15	3.20E-14	3.20E-14
	101323	28	0.	4.40E-32	6.90E-27	5.10E-23	3.45E-20	3.45E-18	5.47E-16	3.13E-14	6.00E-13	6.00E-13
2p ² 3p ² (7 ⁺)	113400	60	0.	2.27E-35	3.00E-29	3.00E-25	4.53E-22	1.32E-19	1.32E-17	1.70E-15	5.02E-14	5.02E-14
	123000	100	0.	0.	0.	6.20E-32	2.53E-27	7.23E-24	3.52E-21	4.00E-19	2.00E-17	2.00E-17
	120700	320	0.	0.	0.	1.12E-32	7.02E-28	2.72E-24	1.40E-21	2.07E-19	1.00E-17	1.00E-17
	115416	12	0.	0.	0.	2.17E-30	9.04E-24	6.20E-23	1.00E-20	1.00E-18	7.00E-17	7.00E-17
	127000	36	0.	0.	0.	2.10E-33	1.10E-28	4.30E-25	2.40E-22	4.30E-20	2.01E-18	2.01E-18
2p ² 3p ² (7 ⁻)	130000	60	0.	0.	0.	8.21E-34	1.11E-30	7.70E-27	1.00E-24	1.00E-21	1.70E-19	1.70E-19
	142100	192	0.	0.	0.	2.25E-30	4.31E-31	3.97E-27	4.30E-24	1.00E-21	1.40E-19	1.40E-19
	212000	216	0.	0.	0.	0.	0.	0.	3.04E-24	1.00E-22	1.00E-20	1.00E-20
	222000	304	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	250000	180	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p ² 3p ² (9 ⁺)	260000	320	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	267000	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	290000	64	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	300000	100	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	314000	192	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p ² 3p ² (9 ⁻)	409000	100	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	419000	192	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUMLEVELS
NONSTARRED ENERGY LEVELS FROM MOORE (1949) AND BOWEN (1975)

TABLE 49 (CONT.) 1. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O

LEVEL (C-1)	TEMPERATURE (DEG K)									
	4000	5200	5600	6000	6400	6800	7200	7600	8000	9200
0	5.64E-01	5.64E-01	5.61E-01	5.59E-01	5.56E-01	5.51E-01	5.43E-01	5.49E-01	5.40E-01	5.37E-01
150	3.24E-01	3.24E-01	3.23E-01	3.23E-01	3.22E-01	3.21E-01	3.20E-01	3.18E-01	3.16E-01	3.14E-01
226	2.04E-01	2.04E-01	2.04E-01	2.04E-01	2.04E-01	2.04E-01	2.04E-01	2.04E-01	2.04E-01	2.04E-01
15464	6.04E-03	6.04E-03	6.04E-03	6.04E-03	6.04E-03	6.04E-03	6.04E-03	6.04E-03	6.04E-03	6.04E-03
33792	6.04E-04	6.04E-04	6.04E-04	6.04E-04	6.04E-04	6.04E-04	6.04E-04	6.04E-04	6.04E-04	6.04E-04
126304	3.42E-17	3.42E-17	3.42E-17	3.42E-17	3.42E-17	3.42E-17	3.42E-17	3.42E-17	3.42E-17	3.42E-17
189317	6.04E-26	6.04E-26	6.04E-26	6.04E-26	6.04E-26	6.04E-26	6.04E-26	6.04E-26	6.04E-26	6.04E-26
277000	6.04E-35	6.04E-35	6.04E-35	6.04E-35	6.04E-35	6.04E-35	6.04E-35	6.04E-35	6.04E-35	6.04E-35
74993	6.04E-10	6.04E-10	6.04E-10	6.04E-10	6.04E-10	6.04E-10	6.04E-10	6.04E-10	6.04E-10	6.04E-10
87379	1.13E-11	1.13E-11	1.13E-11	1.13E-11	1.13E-11	1.13E-11	1.13E-11	1.13E-11	1.13E-11	1.13E-11
97443	9.39E-13	9.39E-13	9.39E-13	9.39E-13	9.39E-13	9.39E-13	9.39E-13	9.39E-13	9.39E-13	9.39E-13
95737	3.10E-13	3.10E-13	3.10E-13	3.10E-13	3.10E-13	3.10E-13	3.10E-13	3.10E-13	3.10E-13	3.10E-13
99314	5.20E-13	5.20E-13	5.20E-13	5.20E-13	5.20E-13	5.20E-13	5.20E-13	5.20E-13	5.20E-13	5.20E-13
102500	5.20E-13	5.20E-13	5.20E-13	5.20E-13	5.20E-13	5.20E-13	5.20E-13	5.20E-13	5.20E-13	5.20E-13
101323	1.30E-13	1.30E-13	1.30E-13	1.30E-13	1.30E-13	1.30E-13	1.30E-13	1.30E-13	1.30E-13	1.30E-13
113600	1.11E-14	1.11E-14	1.11E-14	1.11E-14	1.11E-14	1.11E-14	1.11E-14	1.11E-14	1.11E-14	1.11E-14
123940	6.30E-16	6.30E-16	6.30E-16	6.30E-16	6.30E-16	6.30E-16	6.30E-16	6.30E-16	6.30E-16	6.30E-16
128700	1.73E-15	1.73E-15	1.73E-15	1.73E-15	1.73E-15	1.73E-15	1.73E-15	1.73E-15	1.73E-15	1.73E-15
114416	1.73E-15	1.73E-15	1.73E-15	1.73E-15	1.73E-15	1.73E-15	1.73E-15	1.73E-15	1.73E-15	1.73E-15
127900	9.12E-17	9.12E-17	9.12E-17	9.12E-17	9.12E-17	9.12E-17	9.12E-17	9.12E-17	9.12E-17	9.12E-17
130000	7.34E-16	7.34E-16	7.34E-16	7.34E-16	7.34E-16	7.34E-16	7.34E-16	7.34E-16	7.34E-16	7.34E-16
142100	6.09E-16	6.09E-16	6.09E-16	6.09E-16	6.09E-16	6.09E-16	6.09E-16	6.09E-16	6.09E-16	6.09E-16
212000	6.17E-17	6.17E-17	6.17E-17	6.17E-17	6.17E-17	6.17E-17	6.17E-17	6.17E-17	6.17E-17	6.17E-17
222000	5.47E-18	5.47E-18	5.47E-18	5.47E-18	5.47E-18	5.47E-18	5.47E-18	5.47E-18	5.47E-18	5.47E-18
230000	3.20E-13	3.20E-13	3.20E-13	3.20E-13	3.20E-13	3.20E-13	3.20E-13	3.20E-13	3.20E-13	3.20E-13
240000	4.60E-14	4.60E-14	4.60E-14	4.60E-14	4.60E-14	4.60E-14	4.60E-14	4.60E-14	4.60E-14	4.60E-14
267000	1.77E-17	1.77E-17	1.77E-17	1.77E-17	1.77E-17	1.77E-17	1.77E-17	1.77E-17	1.77E-17	1.77E-17
294000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
304000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
314000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
400000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
410000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TABLE 49 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O

LEVEL	TEMPERATURE (255 K)										
	9000	10000	11000	12000	13000	14000	15000	16000	17000	18000	20000
0	5.34E-01	5.31E-01	5.24E-01	5.14E-01	5.00E-01	4.82E-01	4.60E-01	4.35E-01	4.08E-01	3.79E-01	3.48E-01
154	3.13E-01	3.11E-01	3.06E-01	3.00E-01	2.97E-01	2.92E-01	2.87E-01	2.82E-01	2.77E-01	2.72E-01	2.67E-01
226	1.03E-01	1.02E-01	1.01E-01	1.01E-01	1.01E-01	1.01E-01	1.01E-01	1.01E-01	1.01E-01	1.01E-01	1.01E-01
15040	4.92E-02	4.91E-02	4.90E-02	4.89E-02	4.88E-02	4.87E-02	4.86E-02	4.85E-02	4.84E-02	4.83E-02	4.82E-02
31792	6.74E-04	6.71E-04	6.68E-04	6.65E-04	6.62E-04	6.59E-04	6.56E-04	6.53E-04	6.50E-04	6.47E-04	6.44E-04
126304	5.76E-09	5.72E-09	5.68E-09	5.64E-09	5.60E-09	5.56E-09	5.52E-09	5.48E-09	5.44E-09	5.40E-09	5.36E-09
109037	1.11E-13	1.10E-13	1.09E-13	1.08E-13	1.07E-13	1.06E-13	1.05E-13	1.04E-13	1.03E-13	1.02E-13	1.01E-13
277000	9.97E-20	9.95E-20	9.93E-20	9.91E-20	9.89E-20	9.87E-20	9.85E-20	9.83E-20	9.81E-20	9.79E-20	9.77E-20
74903	1.14E-05	1.13E-05	1.12E-05	1.11E-05	1.10E-05	1.09E-05	1.08E-05	1.07E-05	1.06E-05	1.05E-05	1.04E-05
87370	5.26E-06	5.24E-06	5.22E-06	5.20E-06	5.18E-06	5.16E-06	5.14E-06	5.12E-06	5.10E-06	5.08E-06	5.06E-06
97443	1.94E-06	1.92E-06	1.90E-06	1.88E-06	1.86E-06	1.84E-06	1.82E-06	1.80E-06	1.78E-06	1.76E-06	1.74E-06
99737	5.00E-07	4.98E-07	4.96E-07	4.94E-07	4.92E-07	4.90E-07	4.88E-07	4.86E-07	4.84E-07	4.82E-07	4.80E-07
99314	2.80E-07	2.78E-07	2.76E-07	2.74E-07	2.72E-07	2.70E-07	2.68E-07	2.66E-07	2.64E-07	2.62E-07	2.60E-07
102700	2.40E-06	2.38E-06	2.36E-06	2.34E-06	2.32E-06	2.30E-06	2.28E-06	2.26E-06	2.24E-06	2.22E-06	2.20E-06
101523	5.84E-07	5.82E-07	5.80E-07	5.78E-07	5.76E-07	5.74E-07	5.72E-07	5.70E-07	5.68E-07	5.66E-07	5.64E-07
113000	2.50E-07	2.48E-07	2.46E-07	2.44E-07	2.42E-07	2.40E-07	2.38E-07	2.36E-07	2.34E-07	2.32E-07	2.30E-07
123940	1.15E-07	1.14E-07	1.13E-07	1.12E-07	1.11E-07	1.10E-07	1.09E-07	1.08E-07	1.07E-07	1.06E-07	1.05E-07
120700	1.5E-07	1.48E-07	1.46E-07	1.44E-07	1.42E-07	1.40E-07	1.38E-07	1.36E-07	1.34E-07	1.32E-07	1.30E-07
110416	4.97E-08	4.95E-08	4.93E-08	4.91E-08	4.89E-08	4.87E-08	4.85E-08	4.83E-08	4.81E-08	4.79E-08	4.77E-08
127900	1.42E-08	1.40E-08	1.38E-08	1.36E-08	1.34E-08	1.32E-08	1.30E-08	1.28E-08	1.26E-08	1.24E-08	1.22E-08
130000	6.07E-09	6.05E-09	6.03E-09	6.01E-09	5.99E-09	5.97E-09	5.95E-09	5.93E-09	5.91E-09	5.89E-09	5.87E-09
142100	1.19E-09	1.18E-09	1.17E-09	1.16E-09	1.15E-09	1.14E-09	1.13E-09	1.12E-09	1.11E-09	1.10E-09	1.09E-09
213000	3.44E-13	3.42E-13	3.40E-13	3.38E-13	3.36E-13	3.34E-13	3.32E-13	3.30E-13	3.28E-13	3.26E-13	3.24E-13
222000	1.46E-13	1.44E-13	1.42E-13	1.40E-13	1.38E-13	1.36E-13	1.34E-13	1.32E-13	1.30E-13	1.28E-13	1.26E-13
230000	3.09E-16	3.07E-16	3.05E-16	3.03E-16	3.01E-16	2.99E-16	2.97E-16	2.95E-16	2.93E-16	2.91E-16	2.89E-16
240000	1.23E-16	1.21E-16	1.19E-16	1.17E-16	1.15E-16	1.13E-16	1.11E-16	1.09E-16	1.07E-16	1.05E-16	1.03E-16
250000	6.02E-16	5.99E-16	5.96E-16	5.93E-16	5.90E-16	5.87E-16	5.84E-16	5.81E-16	5.78E-16	5.75E-16	5.72E-16
260000	2.74E-19	2.72E-19	2.70E-19	2.68E-19	2.66E-19	2.64E-19	2.62E-19	2.60E-19	2.58E-19	2.56E-19	2.54E-19
270000	1.00E-19	9.98E-20	9.96E-20	9.94E-20	9.92E-20	9.90E-20	9.88E-20	9.86E-20	9.84E-20	9.82E-20	9.80E-20
300000	7.48E-20	7.46E-20	7.44E-20	7.42E-20	7.40E-20	7.38E-20	7.36E-20	7.34E-20	7.32E-20	7.30E-20	7.28E-20
400000	2.74E-26	2.72E-26	2.70E-26	2.68E-26	2.66E-26	2.64E-26	2.62E-26	2.60E-26	2.58E-26	2.56E-26	2.54E-26
410000	1.09E-26	1.07E-26	1.05E-26	1.03E-26	1.01E-26	9.98E-27	9.96E-27	9.94E-27	9.92E-27	9.90E-27	9.88E-27

TABLE 49 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O

LEVEL (CR-1)	TEMPERATURE (DEG K)									
	24000	26000	32000	36000	40000	44000	48000	52000	56000	60000
0	4.14E-01	3.57E-01	2.94E-01	2.34E-01	1.65E-01	1.47E-01	1.18E-01	0.	0.	0.
150	2.44E-01	2.12E-01	1.79E-01	1.46E-01	1.11E-01	9.76E-02	7.83E-02	0.	0.	0.
226	6.14E-02	5.09E-02	4.01E-02	3.07E-02	2.37E-02	2.01E-02	1.54E-02	0.	0.	0.
15000	1.44E-01	1.24E-01	1.04E-01	8.44E-02	6.44E-02	5.44E-02	4.44E-02	0.	0.	0.
33792	1.89E-02	1.24E-02	1.20E-02	1.21E-02	1.10E-02	9.73E-03	8.55E-03	0.	0.	0.
126304	3.87E-04	9.73E-04	1.01E-03	2.71E-03	3.55E-03	4.25E-03	4.81E-03	0.	0.	0.
189337	2.87E-06	1.24E-05	3.44E-05	7.13E-05	1.26E-04	1.77E-04	2.30E-04	0.	0.	0.
277000	5.86E-09	4.97E-08	2.29E-07	7.30E-07	1.74E-06	3.42E-06	5.83E-06	0.	0.	0.
74903	7.42E-03	1.27E-02	1.67E-02	1.84E-02	2.00E-02	2.03E-02	1.94E-02	0.	0.	0.
87379	1.09E-02	1.92E-02	2.77E-02	3.42E-02	3.94E-02	4.09E-02	4.12E-02	0.	0.	0.
97443	9.61E-03	1.91E-02	2.94E-02	3.82E-02	4.55E-02	4.89E-02	5.00E-02	0.	0.	0.
95757	2.13E-03	4.14E-03	6.34E-03	8.17E-03	9.44E-03	1.03E-02	1.07E-02	0.	0.	0.
99314	5.15E-03	1.04E-02	1.62E-02	2.13E-02	2.50E-02	2.74E-02	2.80E-02	0.	0.	0.
102900	2.01E-02	4.10E-02	6.67E-02	8.90E-02	1.04E-01	1.10E-01	1.23E-01	0.	0.	0.
101323	3.74E-03	7.74E-03	1.22E-02	1.42E-02	1.62E-02	1.73E-02	1.79E-02	0.	0.	0.
113409	5.47E-03	1.23E-02	2.13E-02	3.00E-02	3.74E-02	4.29E-02	4.60E-02	0.	0.	0.
123040	4.91E-03	1.22E-02	2.23E-02	3.31E-02	4.24E-02	4.90E-02	5.17E-02	0.	0.	0.
120700	1.14E-02	3.04E-02	5.74E-02	8.74E-02	1.14E-01	1.40E-01	1.59E-01	0.	0.	0.
114416	1.04E-03	2.39E-03	4.11E-03	5.81E-03	7.24E-03	8.34E-03	9.15E-03	0.	0.	0.
127900	1.39E-03	3.59E-03	6.72E-03	1.02E-02	1.34E-02	1.61E-02	1.83E-02	0.	0.	0.
130000	1.27E-03	3.54E-03	7.11E-03	1.13E-02	1.55E-02	1.92E-02	2.24E-02	0.	0.	0.
142100	3.17E-03	9.23E-03	1.69E-02	3.00E-02	4.24E-02	5.41E-02	6.39E-02	0.	0.	0.
212000	5.40E-05	2.84E-04	9.19E-04	2.12E-03	3.90E-03	5.19E-03	6.84E-03	0.	0.	0.
222000	5.27E-05	3.04E-04	1.04E-03	2.52E-03	4.94E-03	7.93E-03	1.14E-02	0.	0.	0.
250000	2.04E-06	2.24E-05	9.40E-05	2.81E-04	6.22E-04	1.19E-03	1.84E-03	0.	0.	0.
260000	2.79E-06	2.39E-05	1.10E-04	3.39E-04	7.72E-04	1.47E-03	2.44E-03	0.	0.	0.
297000	1.00E-07	1.01E-06	5.24E-06	1.74E-05	4.30E-05	8.00E-05	1.54E-04	0.	0.	0.
290000	9.23E-08	1.02E-06	5.70E-06	2.82E-05	5.25E-05	1.10E-04	1.94E-04	0.	0.	0.
304000	1.09E-07	1.27E-06	7.34E-06	2.40E-05	7.13E-05	1.53E-04	2.80E-04	0.	0.	0.
314000	1.04E-07	1.39E-06	8.33E-06	3.19E-05	8.93E-05	1.94E-04	3.40E-04	0.	0.	0.
409000	2.01E-10	5.74E-09	4.94E-08	4.81E-07	1.63E-06	4.93E-06	1.20E-05	0.	0.	0.
419000	1.94E-10	6.11E-09	7.42E-08	4.81E-07	2.03E-06	6.32E-06	1.59E-05	0.	0.	0.

TABLE 50. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR

STATE	LEVEL (CM-1)	LEVEL (EV)	STAT.	TEMPERATURE (DEG K)									
				1200	1400	1600	1800	2000	2400	2800	3200	3600	4000
$3s^1 3p^1$ ($^1P_1$)	0	0.	1	1.00E-09	1.00E-09	1.00E-09	1.00E-09	1.00E-09	1.00E-09	1.00E-09	1.00E-09	1.00E-09	1.00E-09
	114094	16.2397	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	95188	11.0815	4	0.	2.60E-37	7.39E-35	2.50E-29	2.67E-25	1.00E-22	7.40E-22	2.32E-19	1.00E-17	9.70E-16
	107421	13.3182	12	0.	0.	3.94E-35	1.29E-27	1.20E-23	1.27E-20	1.27E-20	1.99E-16	3.60E-15	1.27E-13
	120721	16.9671	20	0.	0.	3.94E-37	7.42E-31	2.29E-26	5.39E-23	2.27E-20	2.77E-18	1.00E-16	1.00E-15
$3s^1 3p^1$ ($^3P_0$)	121634	15.0426	20	0.	0.	2.75E-37	5.94E-31	1.59E-26	4.92E-23	2.19E-20	2.77E-18	1.00E-16	1.00E-15
	112949	16.0034	40	0.	0.	2.64E-34	1.57E-28	2.40E-24	3.52E-21	9.94E-19	9.00E-17	3.40E-15	3.40E-13
	93371	11.5762	0	0.	2.74E-34	5.94E-29	3.92E-24	1.14E-20	4.40E-18	4.97E-16	9.00E-14	4.40E-13	4.40E-11
	109631	13.0942	24	0.	0.	2.39E-32	7.54E-27	6.42E-23	5.47E-20	1.11E-17	7.37E-16	2.30E-14	2.30E-12
	119211	16.7799	40	0.	0.	2.20E-34	3.67E-28	9.97E-24	2.11E-22	5.14E-20	9.54E-18	4.70E-16	4.70E-14
$3s^1 3p^1$ ($^3P_1$)	120222	16.9622	56	0.	0.	1.94E-34	2.00E-28	8.30E-24	1.87E-22	7.60E-20	9.20E-18	4.70E-16	4.70E-14
	222090	21.3236	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	203000	25.1641	4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	215000	26.6379	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	227900	28.2353	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
$3s^1 3p^1$ ($^3P_2$)	228900	28.3793	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL	(CM-1)	4000	5200	5400	6000	6400	7200	7600	8000	8400	9000	9200
0	1.00E-09	1.00E-09	1.00E-09	1.00E-09	1.00E-09	1.00E-09	1.00E-09	1.00E-09	1.00E-09	1.00E-09	1.00E-09	1.00E-09
114094	2.24E-14	3.14E-13	3.84E-12	2.19E-11	1.22E-10	5.50E-10	2.15E-09	7.21E-09	2.14E-08	5.72E-08	1.00E-07	1.00E-07
95188	1.62E-12	1.44E-11	9.57E-11	6.09E-10	2.03E-09	7.14E-09	2.10E-08	5.71E-08	1.47E-07	3.32E-07	4.97E-07	1.37E-06
107421	1.23E-13	1.48E-12	1.24E-11	7.00E-11	3.90E-10	1.61E-09	5.71E-09	1.77E-08	4.00E-08	1.23E-07	2.83E-07	6.07E-07
120721	3.35E-15	6.23E-14	6.77E-13	5.94E-12	3.27E-11	1.61E-10	6.57E-10	2.37E-09	7.44E-09	2.69E-08	5.34E-08	1.26E-07
121634	4.00E-15	6.74E-14	7.40E-13	5.99E-12	3.71E-11	1.65E-10	7.75E-10	2.70E-09	8.01E-09	2.90E-08	6.44E-08	1.53E-07
112949	7.97E-14	1.07E-12	9.90E-12	6.91E-11	3.75E-10	1.67E-09	6.31E-09	2.07E-08	6.43E-08	1.99E-07	3.62E-07	6.55E-07
93371	5.60E-12	4.02E-11	3.09E-10	1.51E-09	6.12E-09	2.10E-08	6.31E-08	1.60E-07	4.00E-07	9.07E-07	1.00E-06	3.44E-06
109631	4.24E-13	4.84E-12	3.92E-11	2.40E-10	1.17E-09	4.72E-09	1.63E-08	4.94E-08	1.20E-07	3.32E-07	7.50E-07	1.61E-06
119211	1.21E-14	1.00E-13	2.00E-12	1.54E-11	9.10E-11	4.44E-10	1.00E-09	6.32E-09	1.95E-08	5.42E-08	1.37E-07	3.20E-07
120222	1.25E-14	2.00E-13	2.14E-12	1.49E-11	1.02E-10	5.00E-10	2.04E-09	7.31E-09	2.20E-08	6.30E-08	1.63E-07	3.80E-07
222090	2.25E-20	4.21E-24	3.39E-24	1.32E-22	4.23E-21	7.97E-20	1.00E-18	1.12E-17	9.12E-17	6.12E-16	3.43E-15	1.67E-14
203000	1.90E-26	1.02E-24	8.93E-23	2.89E-21	8.04E-20	9.60E-18	8.16E-17	7.50E-16	3.17E-15	1.50E-14	6.50E-14	6.50E-14
215000	1.23E-27	1.75E-25	1.23E-23	4.00E-22	2.10E-20	2.63E-18	2.53E-17	1.93E-16	1.22E-15	6.50E-15	3.00E-14	3.00E-14
227900	4.90E-29	6.23E-27	7.44E-25	3.69E-23	1.12E-21	2.27E-20	3.33E-19	3.64E-18	1.14E-17	2.23E-16	1.31E-15	6.44E-15
228900	4.44E-29	8.74E-27	8.09E-25	4.06E-23	1.24E-21	2.59E-20	3.82E-19	4.24E-18	1.70E-17	2.63E-16	1.54E-15	7.95E-15

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
 NONSTARRED ENERGY LEVELS FROM MOORE (1949), BURNS AND MOORE (1953), AND HUMPHREYS AND PAUL (1959)

TABLE 50 (CONT.1). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF Ar

LEVEL (C-1)	TEMPERATURE (DEG K)									
	9400	10000	11000	12000	13000	14000	15000	16000	17000	18000
0	1.00E-00	1.00E-00	1.00E-00	1.00E-00	9.99E-01	9.97E-01	9.95E-01	9.90E-01	9.82E-01	9.70E-01
114854	6.49E-07	1.33E-06	5.76E-06	2.89E-05	6.33E-05	1.49E-04	3.27E-04	6.47E-04	1.18E-03	2.00E-03
93188	2.55E-06	4.51E-06	1.37E-05	4.42E-05	1.08E-04	2.23E-04	4.31E-04	7.59E-04	1.23E-03	1.93E-03
107421	1.22E-06	2.33E-06	9.49E-06	3.06E-05	8.23E-05	1.92E-04	4.00E-04	7.38E-04	1.23E-03	2.17E-03
120721	2.78E-07	5.72E-07	2.78E-06	1.03E-05	3.13E-05	1.06E-04	2.30E-04	3.82E-04	7.10E-04	1.23E-03
121654	3.38E-07	7.01E-07	3.44E-06	1.29E-05	3.97E-05	1.04E-04	2.30E-04	4.92E-04	9.20E-04	1.63E-03
112948	1.78E-06	3.50E-06	1.53E-05	5.25E-05	1.49E-04	3.63E-04	7.95E-04	1.54E-03	2.77E-03	4.64E-03
93371	6.49E-06	1.17E-05	3.97E-05	1.10E-04	2.60E-04	5.43E-04	1.03E-03	1.79E-03	2.91E-03	4.49E-03
109431	3.20E-06	6.02E-06	2.48E-05	7.50E-05	2.01E-04	4.62E-04	9.15E-04	1.70E-03	3.09E-03	5.01E-03
119211	6.49E-07	1.42E-06	6.76E-06	2.40E-05	7.44E-05	1.91E-04	4.30E-04	8.75E-04	1.63E-03	2.82E-03
120222	8.36E-07	1.72E-06	8.30E-06	3.00E-05	9.31E-05	2.41E-04	5.47E-04	1.12E-03	2.10E-03	3.49E-03
222000	7.10E-14	2.69E-13	4.90E-12	5.51E-11	4.26E-10	2.44E-09	1.12E-08	6.23E-08	3.14E-07	9.54E-07
203000	2.45E-13	8.27E-13	1.18E-11	1.07E-10	4.99E-10	3.47E-09	1.39E-08	6.47E-08	3.14E-07	8.09E-07
215000	1.22E-13	4.41E-13	7.34E-12	7.69E-11	5.55E-10	3.63E-09	1.37E-08	6.77E-08	3.14E-07	8.09E-07
227900	2.93E-14	1.15E-13	2.26E-12	2.71E-11	2.22E-10	1.54E-09	6.36E-09	2.49E-08	8.25E-08	2.38E-07
228900	3.53E-14	1.39E-13	2.76E-12	3.37E-11	2.78E-10	1.70E-09	8.12E-09	3.10E-08	1.04E-07	3.80E-07
229900	3.53E-14	1.39E-13	2.76E-12	3.37E-11	2.78E-10	1.70E-09	8.12E-09	3.10E-08	1.04E-07	3.80E-07

LEVEL (C-1)	TEMPERATURE (DEG K)									
	24000	28000	32000	36000	40000	44000	48000	0	0	0
0	7.83E-01	5.80E-01	4.01E-01	2.74E-01	1.95E-01	1.43E-01	1.06E-01	0.	0.	0.
114854	1.49E-02	3.17E-02	4.99E-02	5.60E-02	6.25E-02	6.67E-02	6.94E-02	0.	0.	0.
93188	1.04E-02	1.74E-02	2.22E-02	2.44E-02	2.54E-02	2.54E-02	2.54E-02	0.	0.	0.
107421	1.50E-02	2.79E-02	3.89E-02	4.32E-02	4.90E-02	5.10E-02	5.20E-02	0.	0.	0.
120721	1.13E-02	2.33E-02	3.53E-02	4.33E-02	5.04E-02	5.50E-02	5.82E-02	0.	0.	0.
121654	1.49E-02	3.13E-02	4.73E-02	5.97E-02	6.85E-02	7.40E-02	7.82E-02	0.	0.	0.
112948	3.90E-02	7.00E-02	1.00E-01	1.21E-01	1.34E-01	1.42E-01	1.47E-01	0.	0.	0.
93371	2.32E-02	3.93E-02	4.82E-02	5.20E-02	5.42E-02	5.59E-02	5.72E-02	0.	0.	0.
109431	3.34E-02	6.12E-02	8.34E-02	9.71E-02	1.05E-01	1.08E-01	1.10E-01	0.	0.	0.
119211	2.47E-02	5.07E-02	7.59E-02	9.41E-02	1.07E-01	1.10E-01	1.12E-01	0.	0.	0.
120222	3.23E-02	6.74E-02	1.01E-01	1.24E-01	1.44E-01	1.57E-01	1.62E-01	0.	0.	0.
222000	2.40E-05	1.29E-04	3.71E-04	7.73E-04	1.33E-03	2.01E-03	2.79E-03	0.	0.	0.
203000	1.62E-05	8.84E-05	1.74E-04	3.36E-04	5.25E-04	7.47E-04	9.86E-04	0.	0.	0.
215000	2.37E-05	1.11E-04	3.02E-04	6.14E-04	1.02E-03	1.51E-03	2.07E-03	0.	0.	0.
227900	1.82E-05	9.52E-05	2.65E-04	6.11E-04	1.07E-03	1.60E-03	2.34E-03	0.	0.	0.
228900	2.41E-05	1.27E-04	3.81E-04	8.22E-04	1.45E-03	2.24E-03	3.18E-03	0.	0.	0.

TABLE 51. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C.

STATE	LEVEL (CM-1)	STAT.	TEMPERATURE (DEG K)									
			1200	1600	2000	2400	2800	3200	3600	4000	4400	
2s 2p	0	2	3.51E-01	3.44E-01	3.44E-01	3.42E-01	3.41E-01	3.40E-01	3.39E-01	3.38E-01	3.38E-01	
	64	4	6.49E-01	6.54E-01	6.54E-01	6.54E-01	6.54E-01	6.40E-01	6.41E-01	6.42E-01	6.42E-01	
	43033	12	3.23E-23	3.25E-17	7.40E-14	1.28E-11	5.09E-10	8.04E-09	6.90E-08	3.89E-07	1.57E-06	
	79332	10	0.	9.43E-30	6.47E-24	5.29E-20	3.23E-17	3.97E-15	1.67E-13	3.33E-12	3.84E-11	
	94494	2	0.	7.16E-39	2.45E-31	2.45E-26	5.94E-23	6.94E-20	6.05E-18	2.64E-16	6.69E-15	
2p	110653	6	0.	0.	2.77E-35	1.59E-29	2.07E-25	2.52E-22	6.33E-20	5.24E-18	1.94E-16	
	142024	4	0.	0.	0.	7.21E-38	1.38E-32	1.25E-28	1.51E-25	4.41E-23	4.58E-21	
	150465	10	0.	0.	0.	0.	4.50E-34	7.04E-30	1.90E-26	5.29E-24	7.24E-22	
	168744	6	0.	0.	0.	0.	2.25E-36	1.14E-33	5.23E-30	4.43E-27	1.10E-24	
	116538	2	0.	0.	1.34E-37	1.54E-31	3.35E-27	5.94E-24	2.01E-21	2.11E-19	9.53E-18	
2s (5)	131725	6	0.	0.	0.	5.17E-35	4.10E-30	1.93E-26	1.39E-23	2.68E-21	1.99E-19	
	145550	10	0.	0.	0.	2.18E-38	5.62E-33	6.44E-29	9.24E-26	3.10E-23	3.61E-21	
	157235	2	0.	0.	0.	0.	2.77E-36	6.73E-32	1.73E-28	9.27E-26	1.54E-23	
	162523	6	0.	0.	0.	0.	5.50E-37	1.47E-32	6.28E-29	4.15E-26	8.43E-24	
	168125	10	0.	0.	0.	0.	5.15E-38	2.52E-33	1.12E-29	9.22E-27	2.25E-24	
2s 2p	148979	14	0.	0.	0.	0.	4.65E-38	2.40E-33	1.11E-29	9.50E-27	2.30E-24	
	170443	12	0.	0.	0.	0.	2.54E-38	1.44E-33	7.34E-30	6.71E-27	1.72E-24	
	184786	50	0.	0.	0.	0.	0.	7.38E-36	7.73E-32	1.24E-28	5.23E-26	
	197742	90	0.	0.	0.	0.	0.	7.28E-34	1.94E-30	1.24E-27	1.24E-26	
	210000**	18	0.	0.	0.	0.	0.	0.	1.08E-36	4.77E-33	4.57E-30	
(1*) 3p	215730**	54	0.	0.	0.	0.	0.	0.	3.29E-37	1.82E-33	2.11E-30	
	220445	90	0.	0.	0.	0.	0.	0.	0.	5.53E-34	7.47E-31	
	221458	126	0.	0.	0.	0.	0.	0.	0.	5.42E-34	7.54E-31	
	219000*	4	0.	0.	0.	0.	0.	0.	9.89E-39	6.25E-35	8.04E-32	
	234000*	18	0.	0.	0.	0.	0.	0.	0.	5.50E-37	1.79E-33	
(1*) 3d	244000*	30	0.	0.	0.	0.	0.	0.	0.	0.	5.88E-35	
	246000*	6	0.	0.	0.	0.	0.	0.	0.	0.	1.21E-27	
	245000*	18	0.	0.	0.	0.	0.	0.	0.	0.	7.07E-38	
	270900*	30	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	271400*	42	0.	0.	0.	0.	0.	0.	0.	0.	0.	
2p (1)	257000*	18	0.	0.	0.	0.	0.	0.	0.	0.	9.48E-37	
	271000*	54	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	281000*	90	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	292000*	50	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	313000*	140	0.	0.	0.	0.	0.	0.	0.	0.	0.	
(1*) 3d	319000*	14	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	349000*	32	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	351000*	30	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	362000*	50	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	373000*	140	0.	0.	0.	0.	0.	0.	0.	0.	0.	

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
MONITORING ENERGY LEVELS FROM MOORE (1949) AND GLAD (1954)

TABLE 51 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C⁺

LEVEL (C _{II} -1)	TEMPERATURE (DEG K)											
	4000	5200	5600	6000	6400	6800	7200	7600	8000	8400	8800	9200
C	3.38E-01	3.37E-01	3.37E-01	3.37E-01	3.36E-01	3.36E-01	3.35E-01	3.34E-01	3.34E-01	3.33E-01	3.33E-01	3.33E-01
64	6.82E-01	6.83E-01	6.83E-01	6.83E-01	6.82E-01	6.82E-01	6.81E-01	6.81E-01	6.81E-01	6.80E-01	6.80E-01	6.80E-01
43033	5.04E-05	1.34E-05	6.67E-05	1.34E-05	6.67E-05	1.34E-05	6.67E-05	1.34E-05	6.67E-05	1.34E-05	6.67E-05	1.34E-05
74932	2.97E-10	1.67E-09	7.34E-09	2.65E-08	8.13E-08	2.65E-08	8.13E-08	2.65E-08	8.13E-08	2.65E-08	8.13E-08	2.65E-08
94494	9.27E-14	6.57E-13	5.74E-12	3.01E-11	1.28E-10	4.57E-10	1.42E-09	3.11E-09	9.75E-09	2.23E-08	4.71E-08	9.35E-08
110453	3.99E-15	5.11E-14	4.55E-13	3.02E-12	1.59E-11	6.89E-11	2.51E-10	8.95E-10	2.29E-09	5.91E-09	1.40E-08	3.84E-08
142024	2.19E-19	5.70E-18	9.50E-17	1.09E-15	9.13E-15	9.90E-14	3.10E-13	1.41E-12	5.82E-12	1.83E-11	5.91E-11	1.51E-10
150465	4.37E-20	1.40E-18	2.74E-17	3.60E-16	1.47E-14	1.47E-13	7.15E-13	3.71E-12	1.89E-11	3.47E-11	1.01E-10	1.51E-10
167734	1.09E-22	3.39E-21	1.50E-19	2.70E-18	3.38E-17	1.03E-16	2.29E-15	4.82E-14	6.82E-13	1.09E-12	1.70E-11	3.47E-11
116530	2.28E-16	3.34E-15	2.44E-14	2.44E-13	1.41E-12	6.50E-12	2.59E-11	8.00E-11	2.65E-10	7.19E-10	1.70E-09	4.07E-09
131725	7.21E-18	1.50E-16	2.03E-15	1.93E-14	1.39E-13	7.93E-13	3.73E-12	1.49E-11	5.10E-11	1.60E-10	4.44E-10	1.14E-09
145550	1.09E-19	5.40E-18	6.40E-17	1.17E-15	1.04E-14	7.09E-14	3.92E-13	1.81E-12	7.10E-12	2.50E-11	7.79E-11	2.10E-10
157235	1.15E-21	6.30E-20	9.62E-19	1.42E-17	1.50E-16	1.20E-15	7.40E-15	3.97E-14	1.74E-13	6.79E-13	2.79E-12	7.01E-12
162523	7.05E-22	2.99E-20	7.42E-19	1.20E-17	1.37E-16	1.17E-15	7.92E-15	4.37E-14	2.04E-13	8.15E-13	2.90E-12	9.19E-12
168125	2.19E-22	1.04E-20	2.93E-19	5.21E-18	6.47E-17	5.98E-16	4.31E-15	2.52E-14	1.24E-13	5.22E-13	1.93E-12	6.20E-12
168979	2.38E-22	1.17E-20	3.29E-19	5.95E-18	7.49E-17	6.90E-16	5.09E-15	3.01E-14	1.49E-13	6.32E-13	2.35E-12	7.01E-12
170443	1.04E-22	9.40E-21	2.74E-19	5.13E-18	6.42E-17	6.32E-16	4.69E-15	2.82E-14	1.42E-13	2.30E-12	7.74E-12	2.10E-11
184788	8.01E-24	5.40E-22	2.19E-20	5.18E-19	8.24E-18	9.50E-17	8.34E-16	5.82E-15	3.34E-14	1.63E-13	6.89E-13	2.54E-12
197742	2.75E-25	2.95E-23	1.31E-21	3.84E-20	7.48E-19	1.02E-17	1.04E-16	6.34E-16	3.42E-15	2.95E-14	1.31E-13	5.59E-13
210000	1.40E-27	1.77E-25	1.12E-23	4.09E-22	9.51E-21	1.53E-19	1.80E-18	1.04E-16	1.20E-16	7.22E-16	3.70E-15	1.64E-14
213730	7.52E-28	1.09E-25	7.72E-24	3.10E-22	7.87E-21	1.34E-19	1.72E-18	1.04E-17	1.23E-16	8.11E-16	4.35E-15	2.01E-14
220445	3.03E-28	4.89E-26	3.81E-24	1.64E-22	4.52E-21	6.34E-20	1.11E-18	1.13E-17	9.10E-17	6.01E-16	3.34E-15	1.60E-14
221458	3.15E-28	5.20E-26	4.13E-24	1.83E-22	5.04E-21	7.44E-20	1.20E-18	1.31E-17	1.07E-16	7.10E-16	3.90E-15	1.92E-14
219000	3.14E-29	4.89E-27	3.70E-25	1.57E-23	4.19E-22	7.50E-21	9.94E-20	5.94E-19	7.90E-18	5.15E-17	2.83E-16	1.34E-15
234000	1.05E-30	2.31E-28	2.35E-26	1.29E-24	4.31E-23	9.52E-22	1.49E-20	1.74E-19	1.40E-18	1.10E-17	7.31E-17	3.05E-16
244000	4.79E-32	1.30E-29	1.80E-27	1.21E-25	4.84E-24	1.25E-22	2.24E-21	3.00E-20	3.07E-19	2.52E-18	1.71E-17	9.83E-17
240000	1.44E-34	5.79E-32	9.89E-30	8.44E-28	4.16E-26	1.29E-24	2.79E-23	4.23E-22	4.95E-21	4.59E-20	3.47E-19	2.20E-18
265000	9.47E-35	4.39E-32	8.18E-30	7.65E-28	3.04E-26	1.35E-24	3.04E-23	4.93E-22	6.05E-21	5.89E-20	4.60E-19	3.02E-18
270500	3.10E-35	1.59E-32	3.32E-30	3.41E-28	1.94E-26	7.02E-25	1.69E-23	2.90E-22	3.75E-21	3.00E-20	3.12E-19	2.19E-18
271400	3.31E-35	1.73E-32	3.69E-30	3.89E-28	2.25E-26	8.12E-25	1.97E-23	3.42E-22	4.46E-21	4.54E-20	3.77E-19	2.59E-18
257000	1.04E-33	3.90E-31	6.39E-29	5.21E-27	2.45E-25	7.33E-24	1.50E-22	2.24E-21	2.55E-20	2.30E-19	1.70E-18	1.04E-17
271000	4.80E-35	2.49E-32	5.29E-30	5.44E-28	3.14E-26	1.14E-24	2.79E-23	4.79E-22	6.17E-21	6.20E-20	5.17E-19	3.59E-18
283000	2.19E-34	1.49E-33	4.01E-31	5.11E-29	1.50E-27	4.14E-26	8.14E-25	1.19E-24	1.14E-23	1.14E-22	1.21E-21	9.69E-20
304500	0.	1.25E-35	5.12E-33	9.42E-31	9.01E-29	5.04E-27	1.81E-25	4.44E-24	7.95E-23	1.60E-22	1.15E-21	1.60E-20
267000	2.91E-35	1.39E-32	2.72E-30	2.63E-28	1.44E-26	4.91E-25	1.13E-23	1.87E-22	2.34E-21	2.31E-20	1.84E-19	1.23E-18
281000	1.13E-34	8.64E-34	2.23E-31	2.79E-29	1.95E-27	7.41E-26	2.07E-24	3.97E-23	5.67E-22	6.20E-21	5.60E-20	4.13E-19
293000	8.21E-38	6.80E-35	2.21E-32	3.20E-30	2.40E-28	1.24E-26	3.84E-25	2.20E-24	1.31E-22	1.50E-21	1.50E-20	1.23E-19
315000	0.	6.80E-37	3.20E-34	4.82E-32	7.42E-30	4.64E-28	4.95E-26	4.95E-25	9.50E-24	1.40E-23	1.40E-22	1.40E-21
319000	0.	0.	7.71E-36	1.82E-33	2.17E-31	1.47E-29	6.25E-28	1.70E-26	3.58E-25	5.63E-24	6.73E-23	4.50E-22
349000	0.	0.	0.	2.53E-38	4.54E-34	4.50E-32	2.77E-30	1.09E-28	2.95E-27	5.80E-26	8.67E-25	1.60E-23

TABLE 51 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C⁺

LEVEL (CM-1)	TEMPERATURE (DEG K)											
	9400	10000	11000	12000	13000	14000	15000	16000	17000	18000	19000	20000
0	3.34E-01	3.34E-01	3.33E-01	3.31E-01	3.29E-01	3.27E-01	3.24E-01	3.21E-01	3.17E-01	3.13E-01	3.09E-01	3.04E-01
64	6.62E-01	6.62E-01	6.60E-01	6.57E-01	6.54E-01	6.49E-01	6.44E-01	6.37E-01	6.30E-01	6.23E-01	6.16E-01	6.09E-01
43033	3.17E-03	3.17E-03	3.17E-03	3.14E-02	1.69E-02	1.14E-02	6.93E-02	3.13E-02	4.93E-02	6.02E-02	7.12E-02	8.26E-02
74932	2.22E-05	3.47E-05	9.22E-05	2.00E-04	6.12E-04	7.39E-04	1.22E-03	1.90E-03	2.79E-03	3.92E-03	5.30E-03	6.93E-03
96494	1.75E-07	3.12E-07	1.10E-06	3.13E-06	7.57E-06	1.61E-05	3.09E-05	5.44E-05	9.00E-05	1.40E-04	2.07E-04	2.94E-04
110453	4.30E-08	1.22E-07	5.17E-07	1.72E-06	4.74E-06	1.13E-05	2.39E-05	4.59E-05	8.14E-05	1.35E-04	2.13E-04	3.19E-04
142024	3.81E-10	8.02E-10	5.69E-09	2.64E-08	9.81E-08	2.99E-07	7.89E-07	1.82E-06	3.12E-06	5.35E-06	8.72E-06	1.22E-05
150445	2.69E-10	6.62E-10	4.72E-09	2.42E-08	9.64E-08	3.14E-07	7.74E-07	1.73E-06	3.04E-06	4.74E-06	7.45E-06	1.03E-05
160744	1.04E-11	2.84E-11	2.59E-10	1.62E-09	7.65E-09	2.89E-08	9.08E-08	2.47E-07	5.84E-07	1.30E-06	2.61E-06	4.88E-06
116330	8.69E-09	1.74E-08	7.98E-08	2.83E-07	8.24E-07	2.89E-06	4.32E-06	5.91E-06	1.65E-05	2.62E-05	4.34E-05	6.95E-05
131725	2.66E-09	5.89E-09	3.29E-08	1.37E-07	4.60E-07	1.29E-06	3.16E-06	6.90E-06	1.37E-05	2.51E-05	4.31E-05	6.99E-05
145550	5.62E-10	1.34E-09	6.90E-09	4.34E-08	1.64E-07	5.21E-07	1.49E-06	3.32E-06	7.08E-06	1.39E-05	2.22E-05	3.31E-05
157235	1.95E-11	5.00E-11	3.80E-10	2.15E-09	9.11E-09	3.14E-08	9.13E-08	2.32E-07	5.27E-07	1.09E-06	2.00E-06	3.72E-06
162523	2.65E-11	7.01E-11	5.89E-10	3.42E-09	1.52E-08	5.44E-08	1.65E-07	4.32E-07	1.01E-06	2.14E-06	4.18E-06	7.63E-06
168123	1.91E-11	5.22E-11	4.60E-10	2.91E-09	1.37E-08	5.12E-08	1.41E-07	4.35E-07	1.05E-06	2.20E-06	4.54E-06	8.50E-06
169379	2.35E-11	6.44E-11	5.87E-10	3.60E-09	1.74E-08	6.54E-08	2.07E-07	5.65E-07	1.34E-06	2.90E-06	5.99E-06	1.12E-05
170443	2.35E-11	6.32E-11	6.07E-10	3.80E-09	1.84E-08	7.11E-08	2.27E-07	6.25E-07	1.52E-06	3.34E-06	6.70E-06	1.28E-05
184784	8.47E-12	2.54E-11	2.84E-10	2.13E-09	1.17E-08	4.99E-08	1.75E-07	5.24E-07	1.38E-06	3.25E-06	6.90E-06	1.30E-05
197742	2.03E-12	6.62E-12	8.76E-11	7.52E-10	4.82E-09	2.20E-08	6.43E-08	2.73E-07	7.60E-07	1.92E-06	4.34E-06	9.80E-06
210000	6.49E-14	2.27E-13	3.53E-12	5.46E-11	2.39E-10	1.25E-09	5.21E-09	1.81E-08	5.45E-08	1.64E-07	3.45E-07	7.52E-07
215730	8.20E-14	2.99E-13	5.00E-12	5.22E-11	3.80E-10	2.07E-09	9.01E-09	3.23E-08	1.01E-07	2.74E-07	6.70E-07	1.49E-06
220445	6.72E-14	2.52E-13	4.40E-12	4.93E-11	3.75E-10	2.12E-09	9.54E-09	3.54E-08	1.12E-07	3.13E-07	7.60E-07	1.77E-06
221450	8.11E-14	3.04E-13	5.51E-12	6.13E-11	4.70E-10	2.69E-09	1.21E-08	4.53E-08	1.45E-07	4.04E-07	1.01E-06	2.31E-06
219000	5.50E-13	2.07E-14	3.62E-13	3.92E-12	2.94E-11	1.65E-10	7.32E-10	2.60E-09	8.45E-09	2.34E-08	5.81E-08	1.31E-07
234000	1.77E-15	7.18E-15	1.53E-13	1.95E-12	1.60E-11	1.04E-10	5.21E-10	2.10E-09	7.15E-09	2.12E-08	5.60E-08	1.34E-07
246000	4.88E-16	2.13E-15	5.30E-14	7.70E-13	7.40E-12	5.13E-11	2.79E-10	1.19E-09	4.31E-09	1.35E-08	3.76E-08	9.41E-08
260000	1.20E-17	5.60E-17	1.70E-15	2.87E-14	3.14E-13	2.44E-12	1.43E-11	6.79E-11	2.64E-10	8.95E-10	2.61E-09	6.87E-09
265000	1.70E-17	8.30E-17	2.65E-15	4.73E-14	5.42E-13	4.37E-12	2.66E-11	1.29E-10	5.48E-10	1.79E-09	5.35E-09	1.44E-08
270500	1.24E-17	6.27E-17	2.19E-15	4.00E-14	4.92E-13	4.14E-12	2.62E-11	1.31E-10	5.42E-10	1.91E-09	5.80E-09	1.61E-08
271400	1.52E-17	7.71E-17	2.60E-15	5.13E-14	6.23E-13	5.20E-12	3.34E-11	1.69E-10	7.04E-10	2.49E-09	7.69E-09	2.11E-08
257000	5.43E-17	2.42E-16	7.54E-15	1.24E-13	1.31E-12	9.95E-12	5.74E-11	2.65E-10	1.02E-09	3.37E-09	9.81E-09	2.54E-08
271000	2.07E-17	1.05E-16	3.62E-15	6.92E-14	8.37E-13	7.08E-12	4.49E-11	2.24E-10	9.34E-10	3.30E-09	1.02E-08	2.80E-08
283000	5.72E-18	3.11E-17	1.24E-15	2.74E-14	3.70E-13	3.44E-12	2.37E-11	1.20E-10	5.45E-10	2.11E-09	6.95E-09	1.97E-08
304500	7.29E-19	4.52E-18	2.42E-16	6.65E-15	1.10E-13	1.21E-12	9.64E-12	5.92E-11	2.93E-10	1.21E-09	4.30E-09	1.34E-08
267000	6.94E-18	3.44E-17	1.13E-15	2.07E-14	2.41E-13	1.90E-12	1.22E-11	5.99E-11	2.93E-10	8.43E-10	2.56E-09	6.92E-09
281000	2.57E-18	1.30E-17	5.44E-16	1.16E-14	1.54E-13	1.41E-12	9.56E-12	5.10E-11	2.23E-10	8.26E-10	2.66E-09	7.50E-09
292000	6.24E-19	3.74E-18	2.15E-16	7.57E-15	5.59E-14	5.59E-13	3.70E-12	1.71E-11	4.77E-10	1.92E-09	5.73E-09	1.52E-08
313000	1.13E-19	7.39E-19	4.42E-17	1.33E-15	2.30E-14	2.80E-13	2.37E-12	1.53E-11	7.93E-11	3.41E-10	1.24E-09	4.05E-09
319000	5.19E-21	3.31E-20	2.27E-18	7.30E-17	1.30E-16	1.70E-15	1.00E-14	5.30E-13	2.30E-12	8.97E-11	3.40E-11	1.24E-10
349000	1.03E-22	6.32E-22	7.97E-20	3.56E-18	8.04E-17	1.30E-15	1.50E-14	1.20E-13	7.53E-13	3.04E-12	1.64E-11	6.07E-11

TABLE 51 (CONT.-1). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C+

LEVEL	TEMPERATURE (DEG K)									
	10000	20000	32000	40000	44000	48000	0	0	0	0
1C4-11	0	2.64E-01	2.63E-01	2.42E-01	2.00E-01	1.79E-01	1.59E-01	0.	0.	0.
64	5.67E-01	5.25E-01	4.82E-01	4.40E-01	3.98E-01	3.57E-01	3.18E-01	0.	0.	0.
43031	1.79E-01	1.74E-01	2.10E-01	2.37E-01	2.55E-01	2.63E-01	2.63E-01	0.	0.	0.
74322	1.59E-02	2.80E-02	4.16E-02	5.52E-02	6.74E-02	7.73E-02	8.43E-02	0.	0.	0.
90494	8.74E-04	1.89E-03	3.16E-03	4.67E-03	6.21E-03	7.63E-03	8.93E-03	0.	0.	0.
110453	1.12E-03	2.69E-03	5.01E-03	7.95E-03	1.12E-02	1.44E-02	1.73E-02	0.	0.	0.
142024	1.16E-04	3.54E-04	8.16E-04	1.51E-03	2.41E-03	3.44E-03	4.51E-03	0.	0.	0.
150464	1.72E-04	5.78E-04	1.40E-03	2.70E-03	4.12E-03	5.53E-03	6.74E-03	0.	0.	0.
168744	3.48E-05	1.35E-04	3.68E-04	7.80E-04	1.38E-03	2.16E-03	3.04E-03	0.	0.	0.
116538	2.63E-05	6.60E-04	1.28E-03	2.09E-03	3.02E-03	3.94E-03	4.84E-03	0.	0.	0.
131725	3.17E-04	9.08E-04	1.94E-03	3.47E-03	5.24E-03	7.24E-03	9.22E-03	0.	0.	0.
145550	2.31E-04	7.44E-04	1.74E-03	3.21E-03	5.32E-03	7.87E-03	1.02E-02	0.	0.	0.
157235	2.29E-05	8.14E-05	2.04E-04	4.12E-04	6.98E-04	1.05E-03	1.43E-03	0.	0.	0.
162323	5.01E-05	1.87E-04	4.87E-04	1.04E-03	1.73E-03	2.64E-03	3.64E-03	0.	0.	0.
162125	5.97E-05	2.33E-04	6.31E-04	1.31E-03	2.34E-03	3.67E-03	5.16E-03	0.	0.	0.
168979	7.93E-05	3.12E-04	8.50E-04	1.84E-03	3.20E-03	4.94E-03	7.04E-03	0.	0.	0.
170443	9.23E-05	3.69E-04	1.01E-03	2.17E-03	3.88E-03	6.06E-03	8.61E-03	0.	0.	0.
184784	1.19E-04	5.39E-04	1.61E-03	3.70E-03	7.00E-03	1.15E-02	1.69E-02	0.	0.	0.
197742	9.89E-05	4.58E-04	1.50E-03	3.47E-03	7.32E-03	1.25E-02	1.91E-02	0.	0.	0.
210000	8.72E-06	4.88E-05	1.73E-04	4.56E-04	9.42E-04	1.66E-03	2.65E-03	0.	0.	0.
215730	1.84E-05	1.09E-04	4.00E-04	1.07E-03	2.30E-03	4.18E-03	6.49E-03	0.	0.	0.
220465	2.33E-05	1.42E-04	5.39E-04	1.44E-03	3.23E-03	5.96E-03	9.07E-03	0.	0.	0.
221458	3.07E-05	1.90E-04	7.22E-04	1.94E-03	4.37E-03	8.08E-03	1.31E-02	0.	0.	0.
219000	1.70E-06	1.02E-05	3.84E-05	1.05E-04	2.27E-04	4.17E-04	6.74E-04	0.	0.	0.
234000	2.07E-06	1.42E-05	5.87E-05	1.72E-04	3.97E-04	7.64E-04	1.29E-03	0.	0.	0.
244000	1.64E-06	1.24E-05	5.70E-05	1.78E-04	4.30E-04	8.42E-04	1.40E-03	0.	0.	0.
260000	1.44E-07	1.25E-06	9.08E-06	2.03E-05	5.20E-05	1.09E-04	1.97E-04	0.	0.	0.
265000	3.23E-07	2.89E-06	1.44E-05	4.99E-05	1.30E-04	2.78E-04	5.89E-04	0.	0.	0.
270500	3.87E-07	3.43E-06	1.90E-05	6.48E-05	1.70E-04	3.87E-04	7.19E-04	0.	0.	0.
271400	5.13E-07	4.85E-06	2.55E-05	9.02E-05	2.41E-04	5.24E-04	9.80E-04	0.	0.	0.
287000	5.21E-07	4.34E-06	2.09E-05	6.87E-05	1.74E-04	3.91E-04	6.47E-04	0.	0.	0.
271000	6.75E-07	6.37E-06	3.34E-05	1.18E-04	3.15E-04	6.65E-04	1.28E-03	0.	0.	0.
293000	5.48E-07	5.73E-06	3.24E-05	1.23E-04	3.41E-04	7.71E-04	1.48E-03	0.	0.	0.
304500	4.84E-07	6.07E-06	3.65E-05	1.45E-04	3.83E-04	1.22E-03	2.49E-03	0.	0.	0.
287000	1.59E-07	1.45E-06	7.40E-06	2.58E-05	6.73E-05	1.45E-04	2.64E-04	0.	0.	0.
281000	2.04E-07	2.12E-06	1.18E-05	4.39E-05	1.22E-04	2.75E-04	5.23E-04	0.	0.	0.
292000	1.78E-07	2.00E-06	1.23E-05	4.71E-05	1.37E-04	3.19E-04	6.29E-04	0.	0.	0.
313000	1.61E-07	2.18E-06	1.50E-05	6.52E-05	2.86E-04	5.14E-04	1.07E-03	0.	0.	0.
319000	1.27E-08	1.28E-06	5.77E-06	1.87E-05	1.87E-05	4.75E-05	1.01E-04	0.	0.	0.
349000	3.73E-09	6.84E-08	5.95E-07	3.89E-06	1.13E-05	3.17E-05	7.80E-05	0.	0.	0.

TABLE 52. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF P+

STATE	LEVEL (CM-1)	STAT. WT.	TEMPERATURE (DEG K)									
			1200	1600	2000	2400	2800	3200	3600	4000	4400	4800
2s 2p ¹ P ₁	0	1	1.23E-01	1.20E-01	1.18E-01	1.17E-01	1.16E-01	1.16E-01	1.15E-01	1.14E-01	1.14E-01	1.14E-01
	48	3	3.49E-01	3.45E-01	3.43E-01	3.41E-01	3.40E-01	3.39E-01	3.38E-01	3.37E-01	3.36E-01	3.36E-01
	130	7	5.27E-01	5.24E-01	5.23E-01	5.22E-01	5.21E-01	5.20E-01	5.19E-01	5.18E-01	5.17E-01	5.17E-01
	15316	5	4.53E-09	6.27E-07	9.71E-06	6.03E-05	2.22E-04	5.90E-04	1.24E-03	2.32E-03	3.81E-03	5.44E-03
	32689	1	1.17E-18	2.04E-14	7.25E-12	3.61E-10	5.09E-09	4.70E-08	2.44E-07	8.96E-07	2.60E-06	7.40E-06
2s 2p ³ P ₂	44785	5	5.00E-05	3.22E-19	1.43E-15	3.06E-13	2.11E-11	4.23E-10	4.25E-09	2.01E-08	1.29E-07	8.00E-07
	92245	15	11.43E-06	1.70E-36	2.69E-29	1.69E-24	4.33E-21	1.40E-18	1.60E-16	6.40E-15	1.24E-13	2.40E-12
	109218	9	0.	0.	0.03E-35	3.67E-29	4.93E-25	4.90E-22	1.14E-19	6.94E-16	3.17E-14	1.40E-12
	158127	3	0.	0.	0.	0.	8.30E-34	1.73E-31	4.09E-28	2.01E-25	3.19E-23	5.00E-21
	144188	5	0.	0.	0.	1.69E-30	3.94E-33	4.04E-29	5.40E-26	1.71E-23	1.90E-21	2.40E-19
2p ¹ P ₁	146766	3	0.	0.	0.	0.	2.12E-38	9.44E-34	3.91E-30	3.05E-27	7.09E-25	1.40E-23
	210000	9	0.	0.	0.	0.	0.	0.	1.50E-30	9.00E-29	1.13E-28	1.72E-27
	229000	5	0.	0.	0.	0.	0.	0.	0.	9.40E-37	1.72E-33	3.67E-30
	244000	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	144056	12	0.	0.	0.	0.	7.40E-34	1.09E-29	1.05E-26	7.13E-24	9.29E-22	1.40E-20
2s 2p ³ P ₂	169022	36	0.	0.	0.	0.	7.90E-38	4.12E-33	1.90E-29	1.43E-26	4.07E-24	1.51E-22
	187693	60	0.	0.	0.	0.	0.	0.	1.82E-32	3.20E-29	1.51E-26	5.40E-24
	194955	12	0.	0.	0.	0.	0.	0.	6.99E-35	2.39E-31	1.44E-28	5.37E-26
	203304	36	0.	0.	0.	0.	0.	0.	2.07E-35	6.97E-32	5.37E-29	1.40E-26
	210284	50	0.	0.	0.	0.	0.	0.	2.10E-36	9.71E-33	9.37E-30	1.40E-27
2s 2p ¹ P ₁	211271	84	0.	0.	0.	0.	0.	0.	2.04E-36	9.53E-33	9.50E-30	1.40E-27
	207974	24	0.	0.	0.	0.	0.	0.	2.20E-36	8.62E-33	7.90E-30	1.40E-27
	224495	72	0.	0.	0.	0.	0.	0.	0.	3.47E-35	5.40E-32	1.40E-29
	244960	120	0.	0.	0.	0.	0.	0.	0.	8.70E-36	2.50E-34	7.10E-31
	246160	204	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s 2p ³ P ₂	252000	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	270000	60	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	280000	100	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	300000	320	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	323100	100	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p ¹ P ₁	354000	192	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	360100	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	370000	64	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	390000	72	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	400000	128	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p ³ P ₂	47.1126	100	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	41.0002	320	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	50.5042	100	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	54.4277	192	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	439000	192	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
MONITORED ENERGY LEVELS FROM MOORE (1949) AND ERIKSSON (1950)

TABLE 52 (CONT.-1). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF H⁺

LEVEL (CM-1)	TEMPERATURE (DEG K)										
	4000	5200	5400	6000	6400	6800	7200	7600	8000	8400	9200
0	1.3E-01	1.1E-01	1.1E-01	1.1E-01	1.1E-01	1.1E-01	1.1E-01	1.1E-01	1.0E-01	1.0E-01	1.0E-01
48	3.3E-01	3.3E-01	3.3E-01	3.3E-01	3.3E-01	3.3E-01	3.3E-01	3.3E-01	3.2E-01	3.2E-01	3.1E-01
130	5.4E-01	5.4E-01	5.4E-01	5.4E-01	5.4E-01	5.4E-01	5.4E-01	5.4E-01	5.3E-01	5.3E-01	5.2E-01
13316	5.7E-03	8.1E-03	1.0E-02	1.4E-02	1.7E-02	2.1E-02	2.5E-02	3.0E-02	3.4E-02	3.8E-02	4.3E-02
32689	5.3E-06	1.3E-05	2.3E-05	4.1E-05	7.1E-05	1.0E-04	1.6E-04	2.2E-04	3.0E-04	4.0E-04	5.1E-04
44785	4.6E-07	1.3E-06	3.3E-06	7.3E-06	1.3E-05	2.7E-05	4.7E-05	7.8E-05	1.2E-04	1.7E-04	2.4E-04
92245	4.7E-12	1.3E-11	8.5E-11	4.1E-10	1.6E-09	5.5E-09	1.6E-08	4.2E-08	1.0E-07	2.2E-07	4.7E-07
102216	4.1E-15	7.6E-16	4.5E-15	2.3E-14	9.1E-14	3.2E-13	1.0E-12	3.0E-12	7.3E-12	1.7E-11	3.6E-11
153127	1.1E-21	7.7E-22	1.8E-21	2.3E-20	1.3E-19	1.8E-18	1.4E-17	5.7E-17	2.9E-16	1.3E-15	5.2E-15
144180	6.6E-20	2.6E-19	4.9E-18	4.9E-17	4.6E-16	3.1E-15	1.6E-14	7.6E-14	2.9E-13	1.0E-12	4.2E-12
166766	6.4E-23	3.0E-21	8.3E-20	1.4E-18	1.7E-17	1.5E-16	1.1E-15	6.9E-15	3.8E-14	1.8E-13	7.1E-13
218000	4.2E-29	6.7E-27	4.7E-25	1.9E-23	5.2E-22	9.2E-21	1.4E-20	2.3E-19	4.2E-18	7.3E-17	1.2E-16
229000	8.7E-31	1.7E-28	1.5E-26	7.9E-25	2.4E-23	5.0E-22	7.3E-21	1.1E-20	1.8E-19	2.9E-18	4.5E-17
244000	6.7E-34	2.1E-31	3.9E-29	3.5E-27	1.8E-25	6.1E-24	1.3E-23	2.6E-22	5.0E-21	9.3E-20	1.5E-19
149056	5.3E-20	1.6E-18	3.1E-17	4.0E-16	3.7E-15	2.6E-14	1.5E-13	7.3E-13	2.9E-12	1.0E-11	3.7E-11
169022	4.0E-23	1.9E-20	5.5E-19	1.0E-17	1.2E-16	1.7E-15	2.4E-14	3.4E-13	5.0E-12	7.3E-11	1.0E-10
187693	2.5E-24	1.0E-22	3.0E-21	1.0E-19	3.1E-18	9.7E-17	3.0E-16	9.3E-15	2.8E-14	8.4E-13	2.5E-12
196973	1.1E-26	2.9E-24	1.4E-22	4.1E-21	1.0E-19	2.6E-18	6.7E-17	1.6E-16	4.0E-15	9.8E-14	2.3E-13
203384	1.9E-28	1.9E-26	8.1E-24	2.6E-22	5.7E-20	1.2E-19	2.6E-18	5.6E-17	1.2E-16	2.6E-15	5.6E-14
210284	2.8E-27	3.6E-25	2.3E-23	8.4E-22	1.9E-20	5.1E-19	1.2E-17	3.2E-16	7.4E-15	1.6E-14	3.3E-13
211271	2.9E-27	3.8E-25	2.3E-23	9.3E-22	2.2E-20	5.9E-19	1.2E-17	3.2E-16	7.4E-15	1.6E-14	3.3E-13
207974	2.9E-27	2.7E-25	1.6E-23	5.8E-22	1.3E-20	2.8E-19	6.2E-18	1.4E-17	3.1E-16	6.7E-15	1.4E-14
224455	2.7E-29	4.9E-27	4.3E-25	2.1E-23	6.2E-22	1.8E-20	4.6E-19	1.0E-18	2.4E-17	5.4E-16	1.2E-15
244500	2.0E-31	5.4E-29	7.0E-27	4.6E-25	1.8E-23	5.3E-22	1.4E-20	3.4E-19	8.0E-18	1.8E-17	4.0E-16
264100	9.7E-34	4.5E-31	8.7E-29	6.3E-27	4.7E-25	1.5E-23	3.4E-22	5.3E-21	8.0E-20	1.2E-19	2.0E-18
292000	3.5E-33	1.1E-30	1.7E-28	1.2E-26	5.3E-25	1.9E-23	5.4E-22	1.0E-20	2.4E-19	4.2E-18	7.4E-17
270000	6.8E-35	2.4E-32	5.0E-30	3.1E-28	2.0E-26	1.0E-24	2.4E-23	4.1E-22	5.3E-21	5.3E-20	2.9E-19
280000	3.6E-37	2.7E-34	8.2E-32	1.1E-30	6.7E-28	3.8E-26	1.2E-24	2.8E-23	3.4E-22	4.0E-21	2.9E-20
309000	0.	2.1E-36	7.7E-34	1.9E-31	2.0E-29	1.2E-27	4.5E-26	1.8E-24	2.1E-23	3.4E-22	3.1E-21
323100	0.	0.	1.0E-35	2.7E-33	3.4E-31	2.4E-29	1.0E-27	3.2E-26	8.3E-25	1.0E-23	1.3E-22
354800	0.	0.	0.	2.4E-36	4.0E-34	5.3E-32	3.4E-30	1.4E-28	4.8E-27	8.2E-26	1.0E-25
368100	0.	3.8E-37	1.6E-34	3.3E-32	3.3E-30	1.9E-28	7.2E-27	1.8E-25	3.3E-24	4.7E-23	4.5E-22
339600	0.	0.	8.7E-38	2.9E-35	4.7E-33	4.2E-31	2.0E-29	8.0E-28	2.0E-26	3.6E-25	5.1E-24
3.0000	0.	0.	0.	9.9E-38	2.3E-35	2.0E-33	2.0E-31	9.3E-30	2.9E-28	5.3E-27	1.0E-26
394000	0.	0.	0.	0.	0.	5.7E-36	6.8E-34	3.0E-32	1.4E-30	4.0E-29	1.7E-28
390000	0.	0.	0.	0.	1.9E-36	2.4E-34	1.3E-32	4.0E-30	1.0E-28	2.6E-27	2.9E-26
412000	0.	0.	0.	0.	0.	4.0E-37	6.1E-35	4.0E-33	7.0E-31	1.0E-30	3.5E-29
466000	0.	0.	0.	0.	0.	1.8E-37	4.4E-35	3.7E-33	5.2E-31	1.2E-30	2.5E-29
439000	0.	0.	0.	0.	0.	0.	1.6E-37	1.5E-35	1.0E-33	4.9E-32	1.3E-30

TABLE 52 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS BY NO

LEVEL (CN-1)	TEMPERATURE (°K)											
	9400	10000	11000	12000	13000	1400	15000	16000	17000	18000	19000	20000
0	1.04E-01	1.04E-01	1.04E-01	1.03E-01	1.01E-01	9.97E-02	9.83E-02	9.69E-02	9.55E-02	9.43E-02	9.30E-02	9.18E-02
40	3.17E-01	3.16E-01	3.12E-01	3.04E-01	2.92E-01	2.79E-01	2.66E-01	2.54E-01	2.42E-01	2.32E-01	2.20E-01	2.10E-01
130	5.22E-01	5.19E-01	5.07E-01	4.95E-01	4.76E-01	4.55E-01	4.32E-01	4.08E-01	3.84E-01	3.60E-01	3.36E-01	3.12E-01
15316	9.04E-02	9.04E-02	8.14E-02	7.31E-02	6.56E-02	5.89E-02	5.29E-02	4.76E-02	4.21E-02	3.65E-02	3.08E-02	2.50E-02
32409	7.93E-04	9.59E-04	1.49E-03	2.04E-03	2.71E-03	3.44E-03	4.27E-03	5.20E-03	6.24E-03	7.38E-03	8.62E-03	9.96E-03
44705	4.79E-04	6.31E-04	1.15E-03	1.69E-03	2.37E-03	3.20E-03	4.19E-03	5.35E-03	6.69E-03	8.21E-03	9.92E-03	1.18E-02
92245	1.98E-06	2.73E-06	3.68E-06	4.85E-06	6.27E-06	7.97E-06	1.00E-05	1.24E-05	1.52E-05	1.84E-05	2.20E-05	2.60E-05
109210	7.53E-08	1.43E-07	3.04E-07	6.49E-07	1.40E-06	3.04E-06	6.62E-06	1.42E-05	3.04E-05	6.62E-05	1.42E-04	3.04E-04
159127	2.58E-11	6.43E-11	4.82E-10	2.50E-09	1.04E-08	3.94E-08	1.62E-07	6.84E-07	2.95E-06	1.24E-05	5.32E-05	2.28E-04
164106	2.19E-10	5.17E-10	3.34E-09	1.59E-08	5.94E-08	2.13E-07	8.04E-07	3.13E-06	1.24E-05	5.05E-05	2.02E-04	8.04E-04
164764	4.46E-12	1.21E-11	1.05E-10	6.30E-10	2.93E-09	1.00E-08	3.33E-08	8.92E-08	2.13E-07	4.59E-07	9.14E-07	1.70E-06
210000	4.46E-15	2.27E-14	3.80E-13	4.11E-12	7.33E-12	1.07E-11	2.07E-11	4.07E-11	8.25E-11	1.67E-10	3.40E-10	7.07E-10
220000	6.12E-14	2.60E-13	5.11E-12	6.11E-12	9.90E-12	1.60E-11	2.60E-11	4.25E-11	7.00E-11	1.13E-10	1.87E-10	3.01E-10
264000	6.97E-19	3.37E-18	1.05E-16	1.04E-15	2.07E-14	1.04E-13	9.00E-13	4.74E-12	1.04E-11	2.45E-11	6.42E-11	1.65E-10
149056	2.54E-10	6.16E-10	4.27E-09	2.13E-08	8.31E-08	2.66E-07	7.20E-07	1.79E-06	3.01E-06	7.57E-06	1.40E-05	2.43E-05
169022	3.02E-11	1.03E-10	9.39E-10	5.04E-09	2.74E-08	1.02E-07	3.25E-07	8.74E-07	2.11E-06	4.80E-06	9.25E-06	1.73E-05
187693	3.08E-12	1.10E-11	1.36E-10	1.04E-09	5.77E-09	2.51E-08	9.95E-08	2.72E-07	7.45E-07	1.78E-06	3.74E-06	7.53E-06
194955	1.93E-13	6.26E-13	8.11E-12	6.04E-11	4.14E-10	1.94E-09	7.30E-09	2.50E-08	6.11E-08	1.43E-07	3.72E-07	7.74E-07
203304	2.21E-13	7.45E-13	1.09E-11	9.49E-11	6.10E-10	3.00E-09	1.19E-08	3.90E-08	1.15E-07	2.95E-07	6.04E-07	1.40E-06
210204	1.31E-13	4.60E-13	7.09E-12	6.01E-11	4.74E-10	2.66E-09	1.02E-08	3.54E-08	1.07E-07	2.04E-07	4.78E-07	1.40E-06
211271	1.59E-13	5.95E-13	8.73E-12	8.40E-11	5.99E-10	3.11E-09	1.31E-08	4.57E-08	1.30E-07	3.67E-07	8.00E-07	1.93E-06
220774	7.42E-14	2.57E-13	3.84E-12	3.40E-11	2.45E-10	1.25E-09	5.12E-09	1.74E-08	5.20E-08	1.34E-07	3.23E-07	7.00E-07
224454	1.39E-14	5.39E-14	1.03E-12	1.19E-11	9.50E-11	5.01E-10	2.61E-09	9.90E-09	3.27E-08	9.34E-08	2.59E-07	5.54E-07
244500	1.54E-15	6.70E-15	1.62E-13	2.29E-12	2.15E-11	1.44E-10	7.70E-10	3.20E-09	1.10E-08	3.60E-08	1.02E-07	2.53E-07
260100	1.95E-16	9.50E-16	3.04E-14	5.49E-13	6.29E-12	5.00E-11	3.10E-10	1.51E-09	6.00E-09	2.09E-08	6.33E-08	1.71E-07
290000	8.42E-17	3.70E-16	1.01E-14	1.59E-13	1.56E-12	1.13E-11	6.25E-11	2.79E-10	1.04E-09	3.37E-09	9.59E-09	2.44E-08
270000	1.70E-17	8.54E-17	2.00E-15	3.37E-14	3.90E-13	5.32E-12	3.34E-11	1.64E-10	5.83E-10	2.40E-09	7.34E-09	2.02E-08
280000	1.91E-18	1.07E-17	4.59E-16	1.03E-14	1.45E-13	1.39E-12	9.09E-12	5.40E-11	2.40E-10	9.47E-10	3.14E-09	9.22E-09
300000	2.33E-19	1.40E-18	8.41E-17	2.43E-15	6.14E-14	4.75E-13	3.91E-12	2.47E-11	1.25E-10	5.31E-10	1.92E-09	6.12E-09
323100	1.07E-20	7.39E-20	4.90E-18	1.64E-16	3.22E-15	4.09E-14	3.60E-13	2.52E-12	1.37E-11	6.19E-11	2.30E-10	7.97E-10
354000	1.45E-22	1.37E-21	1.40E-19	4.60E-18	1.72E-16	2.79E-15	3.13E-14	2.59E-13	1.67E-12	8.73E-12	3.03E-11	1.42E-10
380100	3.30E-20	2.13E-19	1.10E-17	3.30E-16	5.60E-15	6.94E-14	9.10E-13	3.24E-12	1.63E-11	8.04E-11	2.97E-10	7.02E-10
330000	5.08E-22	3.94E-21	3.32E-19	1.35E-17	3.01E-16	4.35E-15	6.40E-14	3.33E-13	1.60E-12	9.64E-12	3.90E-11	1.42E-10
340000	1.84E-23	1.37E-22	1.50E-20	8.22E-19	2.32E-17	4.07E-16	6.04E-15	4.25E-14	2.07E-13	1.57E-12	1.06E-11	3.00E-11
360000	2.20E-23	2.44E-22	4.27E-21	3.15E-20	1.20E-18	2.70E-17	6.01E-16	4.25E-15	3.40E-14	2.16E-13	1.13E-12	4.99E-12
390000	3.53E-24	3.43E-23	4.07E-21	3.02E-19	9.09E-18	1.97E-16	2.62E-15	2.52E-14	1.85E-13	1.09E-12	5.33E-12	2.22E-11
410000	5.19E-26	6.10E-25	1.32E-22	1.16E-20	5.09E-19	1.30E-17	2.62E-16	2.52E-15	2.00E-14	1.50E-13	8.40E-13	3.94E-12
400000	3.19E-24	3.64E-23	7.50E-21	6.30E-20	2.60E-18	6.04E-16	1.07E-15	1.27E-14	1.04E-13	6.99E-12	3.04E-11	1.77E-10
430000	5.45E-28	7.52E-27	2.31E-24	2.72E-22	1.54E-20	4.00E-19	9.73E-18	1.33E-16	1.34E-15	1.04E-14	6.52E-14	3.39E-13

TABLE 52 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF N₂

LEVEL	TEMPERATURE (DEG K)									
	10000	20000	28000	32000	36000	40000	44000	48000	0	0
0	8.72E-02	8.29E-02	7.87E-02	7.45E-02	7.03E-02	6.61E-02	6.19E-02	5.77E-02	0.	0.
48	2.61E-01	2.48E-01	2.36E-01	2.23E-01	2.10E-01	1.97E-01	1.84E-01	1.71E-01	0.	0.
130	4.32E-01	4.12E-01	3.91E-01	3.70E-01	3.49E-01	3.28E-01	3.07E-01	2.86E-01	0.	0.
15316	1.74E-01	1.69E-01	1.64E-01	1.59E-01	1.54E-01	1.49E-01	1.44E-01	1.39E-01	0.	0.
32489	1.23E-02	1.55E-02	1.81E-02	2.02E-02	2.22E-02	2.42E-02	2.62E-02	2.82E-02	0.	0.
46705	2.44E-02	3.74E-02	4.80E-02	5.74E-02	6.58E-02	7.32E-02	8.06E-02	8.80E-02	0.	0.
92245	1.61E-01	1.48E-01	1.35E-01	1.22E-01	1.09E-01	9.6E-02	8.3E-02	7.0E-02	0.	0.
108218	1.12E-03	2.78E-03	5.22E-03	8.52E-03	1.24E-02	1.62E-02	2.00E-02	2.38E-02	0.	0.
135127	2.39E-03	8.59E-03	2.21E-02	4.53E-02	7.83E-02	1.11E-01	1.44E-01	1.77E-01	0.	0.
144188	7.68E-05	2.51E-04	6.02E-04	1.17E-03	1.95E-03	2.92E-03	4.01E-03	5.10E-03	0.	0.
166766	1.19E-05	4.72E-05	1.31E-04	2.85E-04	5.22E-04	8.40E-04	1.22E-03	1.60E-03	0.	0.
210000	1.64E-06	1.02E-05	3.97E-05	1.10E-04	2.48E-04	4.72E-04	7.90E-04	1.11E-03	0.	0.
229000	4.74E-07	3.21E-06	1.71E-05	3.95E-05	9.27E-05	1.83E-04	3.16E-04	4.90E-04	0.	0.
264000	1.17E-06	1.04E-07	5.91E-07	1.95E-06	5.26E-06	1.14E-05	2.21E-05	3.60E-05	0.	0.
169056	1.38E-04	4.49E-04	1.14E-03	2.31E-03	3.95E-03	5.99E-03	8.32E-03	1.10E-02	0.	0.
169022	1.25E-04	5.04E-04	1.42E-03	3.12E-03	5.77E-03	9.34E-03	1.37E-02	1.85E-02	0.	0.
187933	4.79E-05	3.22E-04	1.02E-03	2.47E-03	4.91E-03	8.47E-03	1.31E-02	1.85E-02	0.	0.
196955	7.74E-06	4.00E-05	1.36E-04	3.41E-04	7.04E-04	1.25E-03	1.98E-03	2.80E-03	0.	0.
203384	1.59E-05	8.03E-05	3.02E-04	7.91E-04	1.60E-03	3.04E-03	4.90E-03	7.20E-03	0.	0.
210284	1.75E-05	1.01E-04	3.70E-04	1.00E-03	2.18E-03	4.05E-03	6.53E-03	9.40E-03	0.	0.
211271	2.31E-05	1.34E-04	4.92E-04	1.35E-03	2.95E-03	5.49E-03	9.02E-03	1.34E-02	0.	0.
207974	8.05E-06	4.54E-05	1.64E-04	4.59E-04	9.40E-04	1.75E-03	2.84E-03	4.20E-03	0.	0.
226425	7.90E-06	5.27E-05	2.15E-04	6.29E-04	1.46E-03	2.84E-03	4.90E-03	7.40E-03	0.	0.
244500	4.51E-06	3.48E-05	1.90E-04	5.10E-04	1.27E-03	2.44E-03	4.70E-03	7.00E-03	0.	0.
264100	3.95E-06	3.07E-05	1.92E-04	6.80E-04	1.87E-03	4.10E-03	7.97E-03	1.20E-02	0.	0.
253000	4.79E-07	3.94E-06	1.89E-05	4.30E-05	1.42E-04	3.42E-04	6.34E-04	1.00E-03	0.	0.
270000	4.09E-07	4.09E-06	2.52E-05	9.20E-05	2.55E-04	5.74E-04	1.11E-03	1.80E-03	0.	0.
280000	2.77E-07	3.10E-06	1.87E-05	7.97E-05	2.22E-04	5.31E-04	1.09E-03	1.70E-03	0.	0.
300000	2.40E-07	3.44E-06	2.25E-05	1.00E-04	3.44E-04	6.34E-04	1.09E-03	1.70E-03	0.	0.
323100	3.64E-08	5.31E-07	4.17E-06	1.90E-05	6.78E-05	1.82E-04	4.60E-04	7.40E-04	0.	0.
354000	9.69E-09	1.92E-07	1.70E-06	9.93E-06	3.06E-05	1.13E-04	2.70E-04	4.40E-04	0.	0.
368100	2.99E-09	3.97E-07	2.75E-06	1.20E-05	3.88E-05	9.91E-05	2.12E-04	3.60E-04	0.	0.
379000	7.94E-09	1.39E-07	1.17E-06	6.03E-06	2.21E-05	6.25E-05	1.44E-04	2.40E-04	0.	0.
394000	2.69E-09	4.49E-08	4.42E-07	2.50E-06	1.04E-05	3.19E-05	7.94E-05	1.30E-04	0.	0.
394000	5.44E-10	1.54E-08	1.04E-07	1.20E-06	5.04E-06	1.99E-05	5.41E-05	1.10E-04	0.	0.
390000	2.00E-09	4.94E-08	5.30E-07	3.40E-06	1.44E-05	4.72E-05	1.23E-04	2.00E-04	0.	0.
412000	5.23E-10	1.70E-08	2.27E-07	1.40E-06	6.21E-06	2.95E-05	8.37E-05	1.30E-04	0.	0.
440000	2.25E-10	7.03E-09	9.17E-08	6.64E-07	3.80E-06	1.13E-05	3.19E-05	5.40E-05	0.	0.
459000	6.22E-11	2.34E-09	4.05E-08	3.43E-07	1.87E-06	7.32E-06	2.24E-05	3.60E-05	0.	0.

TABLE 53. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O⁺

STATE	LEVEL	STAT.	TEMPERATURE (DEG K)									
			1200	1500	2000	2400	2750	3200	3600	4000	4400	
2p ² 3s ²	0	4	1.00E 30	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	
	26019	10	2.71E-14	0.40E-11	1.04E-06	2.68E-07	1.49E-05	5.35E-05	1.42E-04	3.61E-04	1.00E 00	
	40447	6	1.27E-21	2.36E-16	3.41E-13	4.37E-11	1.40E-09	1.60E-08	1.42E-07	7.15E-07	2.69E-06	
	119933	12	0.	0.	1.02E-37	1.70E-31	5.10E-27	1.14E-23	4.57E-20	2.32E-19	7.79E-17	
2p ² 3p	169991	10	0.	0.	0.	0.	2.20E-37	9.60E-33	3.86E-28	2.74E-26	6.68E-24	
	199710	2	0.	0.	0.	0.	0.	3.04E-39	5.24E-35	1.34E-31	2.04E-29	
	212450	6	0.	0.	0.	0.	0.	0.	1.55E-37	4.80E-34	9.40E-31	
	317400	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	
2p ² 3p ²	186404	18	0.	0.	0.	0.	0.	1.44E-36	1.84E-32	3.10E-29	1.42E-26	
	209280	54	0.	0.	0.	0.	0.	0.	6.57E-32	1.01E-32	2.63E-29	
	232343	90	0.	0.	0.	0.	0.	0.	0.	1.5E-35	2.11E-32	
	239246	18	0.	0.	0.	0.	0.	0.	0.	1.65E-37	4.40E-34	
(D) 3	246000	54	0.	0.	0.	0.	0.	0.	0.	0.	1.18E-34	
	255006	90	0.	0.	0.	0.	0.	0.	0.	0.	1.37E-35	
	259532	126	0.	0.	0.	0.	0.	0.	0.	0.	1.52E-35	
	266972	10	0.	0.	0.	0.	0.	0.	2.97E-36	1.74E-32	1.01E-29	
(S) 3	220090	30	0.	0.	0.	0.	0.	0.	0.	1.55E-32	1.65E-32	
	232571	50	0.	0.	0.	0.	0.	0.	0.	0.	1.69E-35	
	272730	140	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	226951	2	0.	0.	0.	0.	0.	0.	0.	1.64E-36	3.74E-33	
2p ² 3p ²	250251	6	0.	0.	0.	0.	0.	0.	0.	0.	4.33E-36	
	279510	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	290000	32	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	281000	90	0.	0.	0.	0.	0.	0.	0.	0.	0.	
(D) 3	313000	160	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	340000	270	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	371000	400	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	442449	450	0.	0.	0.	0.	0.	0.	0.	0.	0.	
2p ² 3p ² 3d	474847	450	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	437000	540	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	541797	550	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	642059	750	0.	0.	0.	0.	0.	0.	0.	0.	0.	

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
UNSTANDARD ENERGY LEVELS FROM MOORE (1949) AND ERIKSSON (1961)

TABLE 53 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O⁺

LEVEL (CR-1)	TEMPERATURE (DEG K)									
	4000	5200	5400	6000	6400	6800	7000	8000	8400	9200
0	9.99E-01	9.90E-01	9.87E-01	9.94E-01	9.94E-01	9.91E-01	9.80E-01	9.79E-01	9.74E-01	9.61E-01
24019	0.04E-04	1.49E-03	2.54E-03	0.01E-03	5.90E-03	1.16E-03	1.16E-03	1.97E-02	3.02E-02	3.62E-02
40047	0.09E-06	2.09E-05	4.57E-05	9.12E-05	2.04E-04	4.56E-04	6.95E-04	1.01E-03	1.43E-03	2.57E-03
119333	7.31E-16	1.14E-14	1.24E-13	9.64E-13	5.82E-12	2.83E-11	1.14E-10	1.24E-09	3.50E-09	2.50E-08
169991	6.15E-22	2.82E-20	7.50E-19	1.24E-17	1.54E-16	1.30E-15	9.70E-15	2.65E-13	1.00E-12	1.20E-11
195710	1.64E-26	1.52E-24	7.25E-23	2.07E-21	3.00E-20	5.14E-19	3.99E-17	2.53E-16	1.35E-15	2.45E-14
212690	3.11E-28	4.19E-26	2.00E-24	1.07E-22	2.90E-21	5.20E-19	4.95E-18	2.22E-16	1.15E-15	5.20E-15
317400	0.	1.00E-36	5.74E-34	1.32E-33	1.53E-31	1.01E-29	4.22E-28	2.30E-25	3.50E-24	3.99E-22
184404	2.30E-24	1.70E-22	6.77E-21	1.49E-19	2.70E-18	3.10E-17	2.04E-16	1.17E-14	5.74E-14	9.14E-13
209200	7.04E-27	9.70E-25	6.10E-23	2.10E-21	5.93E-20	7.90E-19	9.37E-17	6.03E-16	3.60E-15	1.02E-14
232343	1.10E-29	2.54E-27	2.52E-25	1.33E-23	4.40E-22	9.50E-21	1.44E-19	1.51E-17	1.10E-16	6.60E-16
239346	3.12E-31	7.79E-29	6.01E-27	3.31E-25	1.91E-23	4.52E-22	7.51E-21	9.20E-20	6.07E-18	2.40E-16
244006	9.04E-32	2.92E-29	3.04E-27	2.63E-25	1.04E-23	2.77E-22	5.02E-21	6.91E-19	5.09E-18	3.07E-17
259006	1.43E-32	5.11E-30	7.09E-28	6.21E-26	2.03E-24	6.23E-23	1.64E-21	2.39E-20	2.34E-18	1.70E-17
259132	1.52E-32	5.54E-30	8.71E-28	6.97E-26	3.22E-24	9.40E-23	1.91E-21	3.16E-19	2.01E-18	1.25E-16
266972	2.09E-27	3.34E-25	2.01E-23	6.94E-22	1.54E-20	2.37E-19	2.69E-18	2.37E-17	9.70E-16	2.11E-14
229990	0.05E-30	1.77E-27	1.67E-25	0.93E-24	2.67E-22	5.57E-21	9.20E-20	9.23E-19	5.70E-17	1.75E-15
252571	1.05E-32	5.57E-30	8.19E-28	6.19E-26	2.72E-24	7.44E-23	1.49E-21	2.29E-19	1.90E-18	1.01E-17
272930	1.10E-34	6.30E-32	1.40E-29	1.50E-27	6.94E-26	3.30E-24	1.33E-23	1.00E-20	1.04E-19	1.01E-17
224051	1.47E-30	2.75E-28	2.43E-26	1.10E-24	3.53E-23	7.07E-22	1.01E-20	9.34E-19	6.49E-18	3.77E-17
262231	3.07E-33	1.27E-30	1.70E-28	1.30E-26	5.50E-25	1.50E-23	2.04E-22	4.17E-20	3.54E-19	1.45E-17
279921	2.90E-36	1.73E-33	4.03E-31	4.35E-29	2.04E-27	1.09E-25	2.70E-24	6.04E-22	7.23E-21	6.10E-20
290000	0.	2.16E-35	7.44E-33	1.19E-30	1.00E-28	5.01E-27	1.42E-25	5.99E-23	7.44E-22	6.07E-20
313000	0.	3.09E-33	9.92E-31	1.22E-28	8.21E-27	3.37E-25	9.12E-24	2.40E-23	2.74E-20	1.70E-18
	0.	9.77E-37	4.74E-34	1.01E-31	1.10E-29	6.04E-28	2.71E-26	1.40E-25	2.03E-22	2.12E-20
340000	0.	0.	7.77E-37	2.62E-34	4.20E-32	3.02E-30	2.07E-28	1.04E-25	3.33E-24	3.24E-22
373000	0.	0.	0.	0.	4.54E-35	6.31E-33	5.04E-31	6.43E-28	2.90E-26	3.39E-24
383000	0.	0.	0.	0.	4.51E-36	7.15E-34	6.41E-32	1.34E-28	3.54E-26	1.00E-24
437000	0.	0.	0.	0.	0.	0.	1.61E-36	1.50E-34	1.24E-29	2.74E-28
534000	0.	0.	0.	0.	0.	0.	0.	0.	2.19E-36	9.70E-35

TABLE 53 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O-

LEVEL (cm ⁻¹)	TEMPERATURE (DEG K)									
	9000	10000	11000	12000	13000	14000	15000	16000	17000	18000
0	9.54E-01	9.44E-01	9.24E-01	8.99E-01	8.73E-01	8.44E-01	8.10E-01	7.70E-01	7.25E-01	6.75E-01
26017	4.28E-02	4.96E-02	6.92E-02	9.02E-02	1.12E-01	1.54E-01	2.09E-01	2.77E-01	3.57E-01	4.50E-01
46049	3.32E-03	4.20E-03	6.97E-03	1.05E-02	1.69E-02	2.65E-02	4.04E-02	5.87E-02	8.15E-02	1.09E-01
119033	4.57E-06	9.10E-06	4.24E-07	1.53E-06	4.50E-06	1.13E-05	2.40E-05	4.92E-05	8.04E-05	1.25E-04
169991	3.74E-11	1.00E-10	8.60E-10	5.11E-09	2.70E-09	8.25E-09	2.49E-07	6.51E-06	1.51E-05	3.20E-05
192710	8.71E-14	2.79E-13	3.93E-12	2.90E-11	1.71E-10	7.70E-10	2.80E-09	9.00E-09	2.42E-08	5.94E-08
212450	2.04E-14	7.32E-14	1.15E-12	1.16E-11	7.87E-11	4.09E-10	1.70E-09	5.00E-09	1.50E-08	4.00E-08
317400	3.13E-21	2.02E-20	1.29E-18	6.00E-17	7.24E-16	8.65E-15	7.36E-14	4.73E-13	2.17E-12	1.00E-11
186604	3.07E-12	9.51E-12	1.04E-10	7.77E-10	4.22E-09	1.79E-08	6.21E-08	1.84E-07	4.70E-07	1.11E-06
204200	3.11E-13	1.00E-12	1.63E-11	1.55E-10	1.04E-09	5.25E-09	2.13E-08	7.22E-08	2.11E-07	5.92E-07
235653	1.56E-14	6.23E-14	1.20E-12	1.57E-11	1.30E-10	7.93E-10	3.70E-09	1.47E-08	4.07E-08	1.43E-07
239348	1.13E-15	4.71E-15	1.05E-13	1.39E-12	1.23E-11	7.90E-11	3.94E-10	1.60E-09	5.49E-09	1.63E-08
244840	1.10E-15	4.80E-15	1.10E-13	1.70E-12	1.61E-11	1.10E-10	5.79E-10	2.44E-09	8.72E-09	2.69E-08
258004	5.11E-16	2.40E-15	6.79E-14	1.07E-12	1.09E-11	7.00E-11	4.39E-10	1.94E-09	7.29E-09	2.34E-08
259432	6.09E-16	3.03E-15	8.43E-14	1.33E-12	1.37E-11	1.01E-10	5.62E-10	2.32E-09	9.44E-09	3.04E-08
286972	8.05E-14	2.76E-13	4.04E-12	7.75E-11	2.44E-10	1.22E-09	4.09E-09	1.43E-08	4.72E-08	1.21E-07
289906	7.77E-15	3.04E-14	6.04E-13	3.21E-12	3.40E-11	3.40E-10	1.63E-09	6.24E-09	2.03E-08	5.00E-08
292371	4.32E-14	1.94E-13	5.19E-12	7.93E-11	7.90E-10	5.44E-09	3.00E-08	1.35E-07	4.90E-07	1.50E-06
272330	6.36E-17	3.34E-16	1.14E-14	2.21E-13	2.64E-12	2.23E-11	1.40E-10	6.94E-10	3.04E-09	1.02E-08
226051	6.10E-16	3.10E-15	6.00E-14	6.52E-13	5.45E-12	3.17E-11	1.45E-10	5.76E-10	1.76E-09	5.99E-09
290251	7.36E-17	3.27E-16	8.44E-15	1.26E-13	1.23E-12	8.59E-12	4.62E-11	2.00E-10	7.27E-10	2.20E-09
279951	2.61E-18	1.35E-17	4.00E-16	9.61E-15	1.16E-14	1.02E-12	6.54E-12	3.31E-11	1.30E-10	4.07E-10
286000	4.13E-19	2.42E-18	1.13E-16	2.70E-15	4.14E-14	4.36E-13	3.04E-12	1.74E-11	8.07E-11	3.14E-10
281000	1.10E-17	5.00E-17	2.27E-15	4.72E-14	6.72E-13	5.97E-12	3.63E-11	1.89E-10	8.00E-10	3.23E-09
313000	1.62E-19	1.05E-18	6.13E-17	1.01E-15	3.15E-14	3.62E-13	2.99E-12	1.89E-11	9.57E-11	4.02E-10
340000	4.77E-21	3.63E-20	3.03E-18	1.20E-16	2.60E-15	3.01E-14	3.79E-13	2.01E-12	1.44E-11	7.04E-11
373000	6.93E-23	5.40E-22	7.10E-20	4.00E-18	1.23E-16	2.20E-15	2.04E-14	5.57E-13	7.99E-12	9.99E-11
383000	1.26E-23	1.24E-22	1.62E-20	1.15E-18	3.83E-17	7.64E-16	1.02E-14	9.04E-14	7.20E-13	4.21E-12
437000	4.72E-27	6.42E-26	1.91E-23	2.17E-21	1.19E-19	3.44E-18	7.03E-17	9.11E-15	4.10E-14	8.42E-13
594000	3.12E-33	7.61E-32	8.95E-29	2.83E-26	3.52E-24	2.32E-22	8.73E-21	2.67E-19	3.30E-18	2.69E-15

TABLE 53 (CONT.) 1. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O+

LEVEL	(CM-1)	TEMPERATURE (DEG K)									
		24000	26000	32000	34000	40000	44000	48000	0	0	0
6		6.11E-01	5.48E-01	4.97E-01	4.55E-01	4.19E-01	3.84E-01	3.55E-01	0.	0.	0.
24817		3.04E-01	3.45E-01	3.72E-01	3.96E-01	4.02E-01	4.02E-01	3.97E-01	0.	0.	0.
40447		6.0E-02	1.03E-01	1.21E-01	1.34E-01	1.47E-01	1.54E-01	1.56E-01	0.	0.	0.
119933		1.38E-03	3.44E-03	6.79E-03	1.13E-02	1.68E-02	2.29E-02	2.92E-02	0.	0.	0.
169991		7.29E-05	2.71E-04	7.13E-03	1.50E-03	2.07E-03	2.24E-03	2.13E-03	0.	0.	0.
199710		2.45E-04	1.17E-03	3.75E-05	9.13E-05	1.64E-04	3.21E-04	5.03E-04	0.	0.	0.
212650		2.67E-04	1.40E-03	5.25E-05	1.39E-04	3.80E-04	5.33E-04	6.80E-04	0.	0.	0.
317400		5.00E-05	6.78E-08	4.73E-07	2.11E-06	6.92E-06	1.80E-05	3.93E-05	0.	0.	0.
186404		3.81E-05	1.67E-04	5.08E-04	1.10E-03	2.29E-03	3.89E-03	5.95E-03	0.	0.	0.
209208		2.92E-05	1.59E-04	5.52E-04	1.44E-03	3.05E-03	5.57E-03	9.04E-03	0.	0.	0.
232543		1.21E-05	7.94E-05	3.22E-04	9.41E-04	2.20E-03	4.33E-03	7.50E-03	0.	0.	0.
239348		1.61E-04	1.12E-05	4.74E-05	1.44E-04	3.44E-04	6.92E-04	1.22E-03	0.	0.	0.
244540		3.09E-04	2.20E-05	1.01E-04	3.19E-04	7.88E-04	1.63E-03	2.93E-03	0.	0.	0.
285806		3.14E-04	2.51E-05	1.17E-04	3.84E-04	9.79E-04	2.04E-03	3.63E-03	0.	0.	0.
253932		4.10E-04	3.35E-05	1.57E-04	4.10E-04	1.33E-03	2.82E-03	5.21E-03	0.	0.	0.
206972		6.24E-04	3.29E-05	1.13E-04	2.91E-04	6.12E-04	1.11E-03	1.79E-03	0.	0.	0.
239898		4.74E-04	3.04E-05	1.21E-04	3.49E-04	8.05E-04	1.57E-03	2.71E-03	0.	0.	0.
252571		2.03E-04	1.58E-05	7.27E-05	2.35E-04	5.94E-04	1.25E-03	2.29E-03	0.	0.	0.
272930		1.92E-04	1.78E-05	9.31E-05	3.33E-04	9.14E-04	2.04E-03	3.90E-03	0.	0.	0.
224851		3.79E-07	2.37E-06	9.24E-06	2.63E-05	5.99E-05	1.34E-04	1.90E-04	0.	0.	0.
250251		2.89E-07	2.14E-06	9.10E-06	3.10E-05	7.75E-05	1.62E-04	2.94E-04	0.	0.	0.
275951		9.99E-08	9.51E-07	5.68E-06	1.89E-05	5.12E-05	1.14E-04	2.27E-04	0.	0.	0.
284000		9.41E-08	1.69E-06	4.40E-06	2.66E-05	7.07E-05	1.93E-04	3.90E-04	0.	0.	0.
281000		6.84E-07	4.60E-06	3.44E-05	1.34E-04	3.84E-04	8.84E-04	1.74E-03	0.	0.	0.
313000		1.73E-07	2.27E-06	1.54E-05	6.72E-05	2.16E-04	5.54E-04	1.25E-03	0.	0.	0.
340000		5.80E-08	9.54E-07	7.70E-06	3.80E-05	1.30E-04	3.87E-04	8.90E-04	0.	0.	0.
373000		1.43E-08	3.12E-07	3.11E-06	1.83E-05	7.45E-05	2.34E-04	5.94E-04	0.	0.	0.
383000		7.34E-09	1.75E-07	1.84E-06	1.15E-05	4.00E-05	1.50E-04	4.13E-04	0.	0.	0.
437000		3.52E-10	1.33E-08	2.00E-07	1.63E-06	8.59E-06	3.30E-05	9.99E-05	0.	0.	0.
534000		1.43E-12	1.24E-10	3.40E-09	4.60E-08	3.58E-07	1.84E-06	7.44E-06	0.	0.	0.

TABLE 54. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF Ar⁺

STATE	LEVEL (CM-1)	EVEI	STAT. WT.	TEMPERATURE (DEG K)									
				1200	1600	2000	2400	2800	3200	3600	4000	4400	
3s ² 3p ⁴ 1s ₀ 3s ² 3p ⁴ 1s ₁ 3s ² 3p ⁴ 1s ₂ 3s ² 3p ³ 3d ¹ 3s ² 3p ² 3d ² 3d other	0	0.	4	9.18E-01	8.79E-01	8.49E-01	8.25E-01	8.07E-01	7.92E-01	7.80E-01	7.70E-01	7.62E-01	
	1432	0.1775	2	8.24E-02	1.21E-01	1.51E-01	1.75E-01	1.93E-01	2.08E-01	2.20E-01	2.30E-01	2.38E-01	
	108723	13.4794	2	0.	0.	4.54E-35	2.04E-29	2.20E-25	2.35E-22	2.52E-20	2.70E-18	1.30E-16	
	132476	16.4245	20	0.	0.	0.	1.33E-34	1.10E-29	5.36E-24	3.95E-23	7.70E-21	5.85E-19	
	146319	18.1408	70	0.	0.	0.	1.10E-37	3.14E-32	3.72E-28	5.47E-25	1.67E-22	2.22E-20	
(D)3d	136028	16.8649	18	0.	0.	0.	1.42E-35	1.60E-30	9.77E-27	8.60E-24	1.99E-21	1.65E-19	
	138023	19.5918	54	0.	0.	0.	0.	5.92E-35	1.49E-30	3.93E-27	2.14E-24	3.72E-22	
	186493	23.1444	90	0.	0.	0.	0.	0.	6.25E-34	6.91E-32	1.10E-28	5.24E-26	
	195547	24.2464	126	0.	0.	0.	0.	0.	1.42E-37	2.79E-33	6.83E-30	4.04E-27	
	184082	20.3431	50	0.	0.	0.	0.	2.43E-34	9.03E-32	3.23E-28	2.25E-25	4.75E-23	
(S)3d	148754	18.4427	10	0.	0.	0.	0.	1.20E-33	1.78E-29	2.95E-24	1.11E-23	1.43E-21	
	171831	21.3038	30	0.	0.	0.	0.	0.	1.64E-33	8.75E-30	8.30E-27	2.74E-24	
	149837	24.7537	50	0.	0.	0.	0.	0.	0.	2.14E-34	4.23E-31	4.21E-28	
	209029	25.9136	70	0.	0.	0.	0.	0.	0.	7.14E-34	2.99E-32	2.75E-29	
	179728	22.7829	10	0.	0.	0.	0.	0.	1.59E-35	1.24E-31	1.62E-28	5.70E-26	
3s ² 3p ³ 3d ²	167309	20.7431	2	0.	0.	0.	0.	1.86E-38	8.44E-34	3.54E-30	2.81E-27	4.62E-25	
	192093	23.8161	6	0.	0.	0.	0.	0.	3.07E-38	5.33E-34	1.13E-30	5.99E-28	
	220000	27.2758	10	0.	0.	0.	0.	0.	0.	1.27E-38	8.20E-35	1.59E-31	
	229000	38.2677	14	0.	0.	0.	0.	0.	0.	0.	6.51E-36	1.11E-33	
	289000	33.7509	90	0.	0.	0.	0.	0.	0.	0.	0.	1.00E-37	
3s ² 3p ² 3d ³	249000	30.8713	18	0.	0.	0.	0.	0.	0.	0.	0.	1.49E-35	
	273000	33.8448	54	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	301000	37.3183	90	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	309000	38.3101	126	0.	0.	0.	0.	0.	0.	0.	0.	0.	

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTANDARD ENERGY LEVELS FROM MOORE (1949) AND MINNACHEN (1958,1960)

TABLE 54 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTROMIC POPULATIONS OF AR⁺

LEVEL (CM ⁻¹)	TEMPERATURE (DEG K)									
	4800	5200	5600	6000	6400	6800	7200	7600	8000	8400
0	7.54E-01	7.40E-01	7.43E-01	7.38E-01	7.34E-01	7.30E-01	7.27E-01	7.24E-01	7.21E-01	7.19E-01
1332	2.48E-01	2.52E-01	2.57E-01	2.61E-01	2.66E-01	2.70E-01	2.74E-01	2.78E-01	2.82E-01	2.86E-01
106723	2.43E-13	3.22E-14	2.74E-13	1.78E-12	8.70E-12	3.73E-11	1.33E-10	4.17E-10	1.14E-09	3.47E-09
132576	2.14E-17	4.51E-15	5.90E-14	4.27E-13	2.42E-12	1.10E-11	4.64E-11	1.82E-10	5.02E-10	1.40E-09
146319	1.18E-18	3.42E-17	6.13E-16	7.47E-15	6.65E-14	4.59E-13	2.95E-12	1.18E-11	4.70E-11	1.84E-10
134028	6.63E-18	1.52E-16	2.32E-15	2.28E-14	1.73E-13	1.04E-12	5.12E-12	2.13E-11	7.70E-11	2.44E-10
159023	2.73E-20	1.04E-18	2.34E-17	3.48E-16	3.69E-15	2.97E-14	1.90E-13	9.95E-13	4.42E-12	1.71E-11
186693	8.44E-24	6.20E-22	2.46E-20	5.99E-19	7.70E-18	1.15E-16	1.03E-15	7.28E-15	4.29E-14	2.09E-13
195567	8.26E-23	7.49E-21	3.53E-20	9.99E-20	1.86E-18	2.66E-17	2.44E-16	1.90E-15	1.21E-14	6.41E-14
164082	4.12E-21	1.79E-19	4.54E-18	7.53E-17	8.76E-16	7.63E-15	5.23E-14	2.92E-13	1.50E-12	5.99E-12
140754	9.15E-20	2.49E-18	4.48E-17	5.95E-16	5.50E-15	3.91E-14	2.24E-13	1.07E-12	4.34E-12	1.55E-11
171031	4.25E-22	1.24E-20	3.74E-19	7.05E-18	9.21E-17	8.89E-16	6.67E-15	4.05E-14	2.05E-13	8.90E-13
199637	9.63E-26	9.53E-24	4.99E-22	1.49E-20	2.94E-19	4.11E-18	4.28E-17	3.44E-16	2.29E-15	1.26E-14
209029	8.12E-27	9.90E-25	6.17E-23	2.20E-21	5.02E-20	7.02E-19	9.20E-18	8.24E-17	5.95E-16	3.55E-15
179728	7.54E-24	4.73E-22	1.64E-20	3.54E-19	5.20E-18	5.57E-17	4.59E-16	3.03E-15	1.65E-14	7.67E-14
167309	6.24E-23	2.94E-21	7.97E-20	1.39E-18	1.70E-17	1.54E-16	1.10E-15	4.35E-15	3.08E-14	1.29E-13
192095	1.11E-23	9.27E-24	4.10E-22	1.09E-20	1.94E-19	2.54E-18	2.33E-17	1.74E-16	1.07E-15	5.54E-15
220000	6.33E-29	6.83E-27	5.28E-25	2.28E-23	8.06E-22	1.11E-20	1.67E-19	1.44E-18	1.18E-17	7.75E-17
228000	5.51E-30	1.03E-27	9.43E-26	4.03E-24	1.61E-22	2.04E-21	4.15E-20	4.86E-19	3.42E-18	2.74E-17
269000	1.63E-34	7.99E-32	1.61E-29	1.61E-27	9.00E-26	3.14E-24	7.30E-23	1.22E-21	1.59E-20	1.59E-19
249000	1.31E-32	4.04E-30	5.50E-28	3.89E-26	1.61E-24	4.32E-23	8.94E-22	1.10E-20	1.15E-19	9.71E-19
273000	2.97E-35	1.59E-32	3.44E-30	3.69E-28	2.20E-26	8.08E-25	1.99E-23	3.50E-22	4.63E-21	4.78E-20
301000	0.	1.14E-35	4.33E-33	7.47E-31	6.74E-29	3.40E-27	1.23E-25	2.91E-24	5.01E-23	6.58E-22
309000	0.	1.74E-36	7.77E-34	1.54E-31	1.57E-29	9.28E-28	3.49E-26	8.97E-25	1.66E-23	2.54E-22
										2.54E-21
										2.32E-20

TABLE 54 (CONT. 1). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF Ar+

LEVEL	TEMPERATURE (DEG K)											
	9400	10000	11000	12000	13000	14000	15000	16000	17000	18000	19000	20000
0	7.11E-01	7.11E-01	7.07E-01	7.04E-01	7.01E-01	6.99E-01	6.96E-01	6.95E-01	6.93E-01	6.91E-01	6.90E-01	6.88E-01
1432	2.87E-01	2.89E-01	2.93E-01	2.94E-01	2.99E-01	3.01E-01	3.04E-01	3.05E-01	3.07E-01	3.08E-01	3.09E-01	3.10E-01
108723	2.99E-08	5.72E-08	2.36E-07	7.47E-07	2.00E-06	4.90E-06	1.03E-05	1.77E-05	3.49E-05	5.81E-05	9.14E-05	1.30E-04
132476	8.48E-09	1.87E-08	1.05E-07	4.45E-07	1.50E-06	4.27E-06	1.04E-05	2.33E-05	4.64E-05	8.71E-05	1.53E-04	2.50E-04
146319	3.73E-09	8.95E-09	6.04E-08	2.94E-07	1.14E-06	3.60E-06	9.79E-06	2.35E-05	5.08E-05	1.01E-04	1.86E-04	3.23E-04
134028	4.48E-09	1.01E-08	5.94E-08	2.61E-07	9.13E-07	2.67E-06	6.75E-06	1.42E-05	3.12E-05	5.90E-05	1.04E-04	1.74E-04
158023	4.98E-10	1.20E-09	1.01E-08	5.61E-08	2.40E-07	8.35E-07	2.64E-06	6.32E-06	1.45E-05	3.05E-05	5.92E-05	1.07E-04
184473	1.13E-11	3.45E-11	3.95E-10	3.01E-09	1.40E-08	7.31E-08	2.42E-07	8.60E-07	2.14E-06	5.14E-06	1.12E-05	2.58E-05
195567	4.19E-12	1.35E-11	1.73E-10	1.45E-09	6.70E-09	4.11E-08	1.50E-07	5.04E-07	1.41E-06	3.54E-06	8.04E-06	1.80E-05
164082	1.86E-10	4.94E-10	4.22E-09	2.51E-08	1.14E-07	4.15E-07	1.27E-06	3.39E-06	8.60E-06	1.74E-05	3.44E-05	6.43E-05
148754	3.70E-10	9.01E-10	4.27E-07	3.16E-08	1.24E-07	4.01E-07	1.11E-06	2.69E-06	5.90E-06	1.19E-05	2.21E-05	3.87E-05
171831	3.50E-11	9.77E-11	9.19E-10	5.94E-09	2.89E-08	1.12E-07	3.63E-07	1.01E-06	2.51E-06	5.62E-06	1.16E-05	2.21E-05
194457	9.00E-13	2.97E-12	4.02E-11	3.53E-10	2.22E-09	1.07E-08	4.19E-08	1.30E-07	3.97E-07	1.01E-06	2.74E-06	4.99E-06
209029	3.04E-13	1.00E-12	1.65E-11	1.61E-10	1.10E-09	5.72E-09	2.39E-08	8.34E-08	2.52E-07	6.71E-07	1.61E-06	3.55E-06
179728	3.57E-12	1.03E-11	1.09E-10	7.70E-10	4.03E-09	1.64E-08	5.67E-08	1.64E-07	4.29E-07	9.97E-07	2.12E-06	4.17E-06
167309	4.59E-12	1.25E-11	1.11E-10	6.83E-10	3.10E-09	1.19E-08	3.73E-08	1.02E-07	2.42E-07	5.30E-07	1.00E-06	2.04E-06
192095	3.35E-13	1.04E-12	1.50E-11	1.05E-10	6.14E-10	2.80E-09	1.04E-08	3.28E-08	9.04E-08	2.22E-07	4.90E-07	1.03E-06
220000	8.53E-15	3.10E-14	5.63E-13	6.16E-12	4.67E-11	2.65E-10	1.19E-09	4.44E-09	1.42E-08	3.94E-08	1.00E-07	2.30E-07
228000	3.60E-15	1.61E-14	2.77E-13	3.30E-12	2.70E-11	1.63E-10	7.15E-10	3.03E-09	1.01E-08	2.94E-08	7.67E-08	1.91E-07
269000	4.97E-17	2.40E-16	8.34E-15	1.54E-13	1.05E-12	1.55E-11	9.74E-11	4.08E-10	2.02E-09	7.14E-09	2.21E-08	6.10E-08
249500	1.99E-16	8.83E-16	2.28E-14	3.43E-13	3.39E-12	2.42E-11	1.33E-10	5.90E-10	2.20E-09	7.04E-09	2.01E-08	5.12E-08
272000	1.64E-17	8.30E-17	2.94E-15	5.78E-14	7.14E-13	3.99E-11	2.04E-10	8.44E-10	3.11E-09	9.79E-09	2.79E-08	7.70E-08
301000	4.10E-19	2.70E-18	1.27E-16	3.34E-15	5.37E-14	5.70E-12	4.53E-11	2.75E-10	1.39E-09	5.51E-09	1.94E-08	6.11E-08
304000	1.73E-19	1.10E-18	6.23E-17	1.80E-15	3.10E-14	3.56E-13	2.95E-12	1.87E-11	9.30E-11	4.60E-10	1.50E-09	4.91E-09

TABLE 54 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR+

LEVEL	TEMPERATURE (DEG K)									
	10000	20000	32000	40000	44000	48000	0	0	0	0
0	6.81E-01	4.47E-01	6.41E-01	5.92E-01	5.42E-01	4.74E-01	0.	0.	0.	0.
1332	3.12E-01	3.10E-01	3.01E-01	2.83E-01	2.57E-01	2.27E-01	0.	0.	0.	0.
109723	5.03E-04	1.23E-03	2.41E-03	3.80E-03	5.43E-03	6.80E-03	0.	0.	0.	0.
132474	1.21E-03	3.69E-03	8.30E-03	1.50E-02	2.31E-02	3.13E-02	0.	0.	0.	0.
144319	1.89E-03	6.34E-03	1.54E-02	3.03E-02	4.91E-02	6.96E-02	0.	0.	0.	0.
134028	8.81E-04	2.77E-03	6.37E-03	1.17E-02	1.93E-02	2.50E-02	0.	0.	0.	0.
134023	7.07E-04	2.60E-03	7.10E-03	1.44E-02	2.49E-02	3.66E-02	0.	0.	0.	0.
184893	2.11E-04	1.02E-03	3.28E-03	7.73E-03	1.48E-02	2.39E-02	0.	0.	0.	0.
193567	1.74E-04	9.09E-04	3.04E-03	7.61E-03	1.50E-02	2.50E-02	0.	0.	0.	0.
163082	4.59E-04	1.82E-03	5.01E-03	1.04E-02	1.85E-02	2.78E-02	0.	0.	0.	0.
148754	2.28E-04	7.99E-04	2.00E-03	3.92E-03	6.43E-03	9.18E-03	0.	0.	0.	0.
171831	1.72E-04	7.32E-04	2.12E-03	4.64E-03	8.41E-03	1.29E-02	0.	0.	0.	0.
199657	5.39E-05	2.92E-04	1.01E-03	2.56E-03	5.15E-03	8.68E-03	0.	0.	0.	0.
209029	4.30E-05	2.53E-04	9.30E-04	2.47E-03	5.15E-03	8.95E-03	0.	0.	0.	0.
179728	3.54E-05	1.63E-04	4.94E-04	1.14E-03	2.11E-03	3.33E-03	0.	0.	0.	0.
167309	1.50E-05	6.14E-05	1.73E-04	3.74E-04	6.40E-04	1.00E-03	0.	0.	0.	0.
192093	1.02E-05	5.17E-05	1.71E-04	4.16E-04	8.11E-04	1.33E-03	0.	0.	0.	0.
220000	3.19E-04	2.05E-05	8.11E-05	2.21E-04	4.94E-04	8.93E-04	0.	0.	0.	0.
228000	2.74E-04	1.91E-05	7.92E-05	2.31E-04	5.20E-04	9.42E-04	0.	0.	0.	0.
269000	1.52E-04	1.49E-05	8.04E-05	2.69E-04	7.65E-04	1.62E-03	0.	0.	0.	0.
249000	1.01E-04	8.33E-06	3.94E-05	1.28E-04	3.14E-04	6.23E-04	0.	0.	0.	0.
273000	7.17E-07	7.28E-06	4.04E-05	1.48E-04	3.98E-04	6.52E-04	0.	0.	0.	0.
301000	2.23E-07	2.80E-06	1.91E-05	6.04E-05	2.42E-04	5.89E-04	0.	0.	0.	0.
309000	1.93E-07	2.67E-06	1.87E-05	6.17E-05	2.54E-04	6.13E-04	0.	0.	0.	0.

TABLE 55. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C ++

STATE	LEVEL (CM-1)	STAT. WT.	TEMPERATURE (DEG K)									
			3200	3400	4000	4400	4800	5200	5600	6000	6400	
2s	0	1	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	
	52419	9	5.23E-10	7.17E-09	5.83E-08	3.24E-07	1.35E-06	4.52E-06	1.27E-05	3.13E-05	6.80E-05	
	102378	3	3.04E-20	5.10E-18	3.09E-16	8.67E-15	1.31E-13	1.58E-12	1.13E-11	6.34E-11	3.03E-10	
	137454	9	1.30E-24	1.25E-23	3.03E-21	2.72E-19	1.15E-17	2.76E-16	4.14E-15	4.34E-14	3.42E-13	
	145875	5	1.64E-28	2.39E-25	6.15E-23	9.61E-21	5.12E-19	1.40E-17	2.64E-16	3.21E-15	2.06E-14	
2p	182520	1	2.29E-36	2.09E-32	3.07E-29	1.20E-26	1.74E-24	1.17E-22	4.31E-21	9.01E-20	1.51E-18	
	240452	4	0.	0.	1.10E-37	2.89E-34	2.00E-31	5.11E-29	9.93E-27	3.64E-25	1.34E-23	
	259501	12	0.	0.	0.	1.60E-36	1.90E-33	7.37E-31	1.33E-28	1.73E-26	5.33E-25	
	271631	20	0.	0.	0.	0.	0.72E-35	4.50E-32	9.82E-30	1.03E-27	6.03E-26	
	310023	4	0.	0.	0.	0.	0.	2.23E-37	1.02E-34	2.67E-32	2.15E-30	
3s	318950	12	0.	0.	0.	0.	0.	0.	3.09E-35	7.29E-33	8.68E-31	
	322129	28	0.	0.	0.	0.	0.	0.	2.28E-35	5.67E-33	7.00E-31	
	322104	28	0.	0.	0.	0.	0.	0.	3.14E-35	7.83E-33	9.79E-31	
	3303714	12	0.	0.	0.	0.	0.	9.61E-37	4.29E-34	8.69E-32	8.67E-30	
	326459	36	0.	0.	0.	0.	0.	0.	1.35E-35	3.61E-33	4.82E-31	
3p	337058	40	0.	0.	0.	0.	0.	0.	1.47E-36	4.74E-34	7.41E-32	
	376970**	12	0.	0.	0.	0.	0.	0.	0.	0.	1.86E-36	
	383400**	24	0.	0.	0.	0.	0.	0.	0.	0.	1.33E-36	
	387400**	40	0.	0.	0.	0.	0.	0.	0.	0.	9.01E-37	
	388000**	84	0.	0.	0.	0.	0.	0.	0.	0.	1.10E-36	

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTANDARD ENERGY LEVELS FROM MOORE (1949) AND BOCKASTEN (1955)

TABLE 55 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C ++

LEVEL	TEMPERATURE (DEG K)											
	6800	7200	7600	8000	8400	8800	9200	9600	10000	11000	12000	13000
0	1.00E-00	1.00E-00	1.00E-00	9.99E-01	9.99E-01	9.99E-01	9.99E-01	9.97E-01	9.95E-01	9.91E-01	9.83E-01	9.73E-01
52519	1.37E-04	2.54E-04	4.41E-04	7.24E-04	1.13E-03	1.70E-03	2.47E-03	3.47E-03	4.75E-03	6.39E-03	8.45E-02	2.45E-02
102378	1.17E-09	3.91E-09	1.15E-08	3.02E-08	7.26E-08	1.61E-07	3.33E-07	6.48E-07	1.20E-06	4.54E-06	1.30E-05	3.50E-05
137454	2.11E-12	1.04E-11	4.50E-11	1.65E-10	5.34E-10	1.56E-09	4.14E-09	1.01E-08	2.31E-08	1.39E-07	9.16E-07	2.17E-06
149075	1.97E-13	1.09E-12	5.07E-12	2.02E-11	7.03E-11	2.19E-10	6.17E-10	1.59E-09	3.82E-09	2.34E-08	1.25E-07	4.74E-07
182320	1.69E-17	1.44E-16	9.85E-16	5.54E-15	2.64E-14	1.09E-13	4.00E-13	1.31E-12	3.92E-12	4.24E-11	3.00E-10	1.64E-09
240452	3.21E-22	5.42E-21	6.80E-20	6.62E-19	5.19E-18	3.37E-17	1.84E-16	8.91E-16	3.74E-15	8.69E-14	1.19E-12	1.00E-11
259501	1.71E-23	3.61E-22	5.54E-21	6.44E-20	5.94E-19	4.49E-18	2.84E-17	1.54E-16	7.28E-16	3.43E-15	1.63E-13	3.93E-12
271631	2.19E-24	5.34E-23	9.29E-22	1.21E-20	1.24E-19	1.03E-18	7.09E-18	4.14E-17	2.12E-16	1.41E-15	7.36E-14	1.71E-12
310023	1.30E-28	4.97E-27	1.50E-25	2.44E-24	3.44E-23	3.87E-22	3.50E-21	2.64E-20	1.69E-19	9.71E-18	2.83E-16	4.80E-15
318950	5.90E-29	2.50E-27	7.17E-26	1.47E-24	2.29E-23	2.70E-22	2.40E-21	2.00E-20	1.40E-19	9.04E-18	2.91E-16	5.44E-15
322129	5.01E-29	2.21E-27	6.55E-26	1.38E-24	2.10E-23	2.67E-22	2.44E-21	2.15E-20	1.43E-19	9.40E-18	6.40E-16	1.40E-15
322184	6.94E-29	3.04E-27	9.07E-26	1.91E-24	3.02E-23	3.71E-22	3.44E-21	2.90E-20	2.04E-19	1.30E-17	6.11E-16	8.90E-15
308714	5.14E-28	1.94E-26	4.93E-25	9.25E-24	1.30E-22	1.64E-21	1.29E-20	9.43E-20	6.12E-19	3.44E-17	9.93E-16	1.60E-14
326459	3.41E-29	1.60E-27	5.19E-25	1.14E-24	1.87E-23	2.37E-22	2.41E-21	2.02E-20	1.43E-19	1.02E-17	3.55E-16	7.13E-15
337058	6.39E-30	3.24E-28	1.14E-26	2.89E-25	5.07E-24	6.99E-23	7.64E-22	6.80E-21	5.10E-20	4.74E-18	1.64E-16	3.40E-15
374970	2.75E-34	2.31E-32	1.32E-30	4.11E-29	1.99E-27	2.75E-26	2.80E-25	3.47E-24	3.33E-23	4.60E-21	2.77E-19	8.97E-18
383400	2.11E-34	1.82E-32	1.04E-30	4.17E-29	1.82E-27	2.15E-26	2.37E-25	3.90E-24	3.64E-23	5.83E-21	3.84E-19	1.31E-17
387400	1.51E-34	1.44E-32	8.43E-31	3.34E-29	9.12E-28	1.04E-26	3.72E-25	2.44E-24	2.71E-23	5.84E-21	3.97E-19	1.40E-17
388000	1.60E-34	1.70E-32	1.00E-30	4.13E-29	1.13E-27	2.36E-26	3.72E-25	4.64E-24	4.76E-23	7.30E-21	5.17E-19	1.63E-17

TABLE 55 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C $\leftrightarrow$

LEVEL	TEMPERATURE (DEG F)												
	(C4-1)	14000	15000	16000	17000	18000	19000	20000	24000	28000	32000	36000	40000
0	9.60E-01	9.64E-01	9.29E-01	9.03E-01	8.79E-01	8.94E-01	8.27E-01	7.15E-01	6.12E-01	5.24E-01	4.52E-01	3.94E-01	3.94E-01
1	9.77E-02	5.37E-02	7.47E-02	9.62E-02	1.20E-01	1.20E-01	1.71E-01	2.70E-01	4.67E-01	6.97E-01	9.01E-01	5.30E-01	5.30E-01
2	1.82E19	7.95E-02	2.79E-04	6.60E-04	1.37E-03	1.10E-03	1.57E-03	4.63E-03	9.32E-03	1.57E-02	2.27E-02	1.93E-02	1.93E-02
3	1.37E54	6.3E-06	3.57E-05	7.21E-05	1.34E-04	2.32E-04	3.70E-04	1.70E-03	4.71E-03	9.74E-03	1.67E-02	2.53E-02	2.53E-02
4	1.15E75	3.94E-06	9.29E-06	1.94E-05	3.79E-05	6.80E-05	1.14E-04	5.69E-04	1.70E-03	3.71E-03	6.46E-03	1.04E-02	1.04E-02
5	1.82E29	8.65E-06	6.89E-06	1.77E-07	4.94E-07	8.48E-07	1.64E-06	1.27E-05	5.17E-05	1.43E-05	3.07E-05	5.54E-05	5.54E-05
6	2.46E52	7.12E-11	3.64E-10	1.51E-09	5.24E-09	1.80E-08	4.22E-08	1.02E-07	1.57E-06	4.23E-06	1.21E-06	2.76E-06	2.76E-06
7	2.95E91	5.02E-11	1.75E-10	8.14E-10	3.14E-09	1.03E-08	2.99E-08	7.74E-08	1.50E-06	5.30E-06	1.74E-06	4.10E-06	4.10E-06
8	2.71E31	1.44E-11	9.13E-11	4.50E-10	1.87E-09	6.54E-09	1.99E-08	5.30E-08	1.04E-05	5.24E-05	1.70E-06	4.50E-06	4.50E-06
9	3.10E23	5.50E-16	4.40E-13	2.89E-12	1.45E-11	6.00E-11	2.10E-10	6.01E-10	2.43E-06	1.05E-06	7.53E-06	2.24E-05	2.24E-05
10	3.18E950	4.70E-14	5.84E-13	3.48E-12	2.05E-11	8.94E-11	3.32E-10	1.00E-09	4.24E-08	3.72E-07	1.50E-06	4.92E-05	4.92E-05
11	3.22E19	8.05E-14	7.20E-13	4.04E-12	2.61E-11	1.14E-10	4.35E-10	1.43E-09	5.72E-08	3.37E-08	2.32E-08	7.32E-05	7.32E-05
12	3.22E14	1.05E-12	1.05E-12	6.77E-12	3.64E-11	1.61E-10	6.04E-10	1.99E-09	8.19E-08	7.54E-08	3.24E-08	1.62E-06	1.62E-06
13	3.26E14	1.2E-13	1.54E-12	9.75E-12	4.87E-11	2.03E-10	7.21E-10	2.25E-09	7.07E-08	9.67E-08	2.30E-08	7.12E-05	7.12E-05
14	3.26E59	9.29E-16	8.59E-13	5.93E-12	3.24E-11	1.47E-10	5.64E-10	1.80E-09	8.15E-08	1.14E-06	3.91E-06	1.13E-04	1.13E-04
15	3.37E58	5.21E-16	5.14E-13	3.01E-12	2.21E-11	1.05E-10	4.21E-10	1.44E-09	7.19E-08	1.10E-06	3.03E-06	1.28E-04	1.28E-04
16	3.76E76	1.72E-16	2.21E-14	1.51E-13	8.65E-13	4.10E-12	1.64E-11	1.31E-09	2.94E-08	2.74E-07	1.59E-06	6.11E-04	6.11E-04
17	3.20E90	2.60E-16	3.20E-15	2.69E-13	1.55E-12	7.56E-12	3.38E-11	2.60E-09	6.12E-08	6.15E-07	3.60E-06	1.95E-05	1.95E-05
18	3.07E40	2.95E-16	4.12E-15	4.12E-15	4.12E-13	1.00E-12	9.31E-12	3.91E-11	3.52E-09	8.90E-08	8.54E-07	5.12E-06	5.12E-06
19	3.00E90	5.40E-16	5.40E-15	5.47E-14	6.14E-13	2.51E-12	1.23E-11	5.24E-11	1.13E-07	1.17E-06	7.00E-06	2.00E-05	2.00E-05

TABLE 55 (CONT.) 1. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C II

LEVEL (CII-1)	TEMPERATURE (DEG K)									
	44000	48000	52000	56000	60000	64000	68000	72000	76000	80000
0	3.47E-01	3.08E-01	2.24E-01	1.40E-01	9.11E-02	2.10E-02	7.44E-03	5.11E-03	3.75E-03	0.
52619	5.62E-01	5.76E-01	5.73E-01	4.92E-01	3.84E-01	1.29E-01	5.59E-02	4.04E-02	3.13E-02	0.
102378	3.44E-02	4.29E-02	5.76E-02	6.67E-02	6.26E-02	3.01E-02	1.54E-02	1.20E-02	9.77E-03	0.
137654	3.49E-02	4.50E-02	7.44E-02	1.07E-01	1.13E-01	7.02E-02	4.00E-02	3.31E-02	2.77E-02	0.
145675	1.47E-02	1.94E-02	3.39E-02	5.09E-02	5.50E-02	3.07E-02	2.20E-02	1.80E-02	1.52E-02	0.
182328	8.87E-04	1.30E-03	2.81E-03	5.24E-03	6.59E-03	5.44E-03	3.84E-03	3.30E-03	2.89E-03	0.
244452	5.34E-04	9.12E-04	2.80E-03	7.43E-03	1.15E-02	1.69E-02	1.28E-02	1.13E-02	1.00E-02	0.
259501	8.59E-04	1.53E-03	5.33E-03	1.50E-02	2.61E-02	3.89E-02	3.51E-02	3.29E-02	3.10E-02	0.
271631	9.43E-04	1.70E-03	6.44E-03	2.13E-02	3.64E-02	5.94E-02	5.60E-02	5.33E-02	5.08E-02	0.
310023	5.49E-05	1.13E-04	5.29E-04	2.13E-03	4.21E-03	9.01E-03	9.76E-03	9.72E-03	9.61E-03	0.
318950	1.22E-01	2.40E-01	1.23E-01	5.43E-01	1.11E-02	2.93E-02	2.83E-02	2.85E-02	2.85E-02	0.
323129	1.96E-04	3.94E-04	1.98E-03	8.53E-03	1.77E-02	4.13E-02	4.67E-02	4.72E-02	4.72E-02	0.
323184	2.54E-04	5.51E-04	2.76E-03	1.20E-02	2.47E-02	5.78E-02	6.54E-02	6.61E-02	6.61E-02	0.
308716	1.72E-04	3.54E-04	1.64E-03	6.53E-03	1.23E-02	2.73E-02	2.94E-02	2.93E-02	2.93E-02	0.
320459	2.89E-04	6.23E-04	3.21E-03	1.42E-02	2.90E-02	7.20E-02	8.20E-02	8.41E-02	8.42E-02	0.
337958	3.40E-04	7.54E-04	4.19E-03	1.94E-02	4.28E-02	1.11E-01	1.33E-01	1.37E-01	1.39E-01	0.
376970	1.04E-01	6.57E-01	3.10E-01	1.91E-01	4.82E-01	1.67E-02	2.36E-02	2.40E-02	2.42E-02	0.
383488	4.48E-05	1.13E-04	8.19E-04	5.11E-03	1.32E-02	4.73E-02	6.75E-02	7.34E-02	7.78E-02	0.
307400	6.54E-03	1.67E-04	1.24E-03	7.93E-03	2.07E-02	7.75E-02	1.11E-01	1.21E-01	1.29E-01	0.
300000	9.00E-05	2.34E-04	1.71E-03	1.10E-02	2.88E-02	1.00E-01	1.59E-01	1.69E-01	1.80E-01	0.

TABLE 56. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF H⁺

STATE	LEVEL (CM ⁻¹)	STAT. WT.	TEMPERATURE (DEG K)									
			3200	3400	4000	4400	4800	5200	5400	6000	6400	
2p ² 2p ¹ 1s ² 1p ¹	0	2	3.51E-01	3.49E-01	3.47E-01	3.44E-01	3.45E-01	3.44E-01	3.43E-01	3.43E-01	3.42E-01	
	174	4	6.49E-01	6.51E-01	6.54E-01	6.54E-01	6.55E-01	6.54E-01	6.57E-01	6.57E-01	6.56E-01	
	57203	12	1.37E-11	2.34E-10	2.34E-09	1.52E-08	7.23E-08	2.70E-07	6.54E-06	2.23E-06	5.24E-06	
	101027	10	3.29E-20	5.09E-18	2.07E-16	7.70E-15	1.23E-13	1.23E-12	9.16E-12	5.16E-11	2.34E-10	
	131004	2	9.21E-27	6.37E-24	1.19E-21	8.61E-20	3.64E-18	6.23E-17	8.20E-16	7.70E-15	5.54E-14	
2p ² 2p ¹ 1s ² 1p ¹	145950	6	1.33E-29	4.87E-26	1.45E-23	1.94E-21	1.04E-19	2.90E-18	5.34E-17	4.40E-16	5.70E-15	
	184002	4	2.34E-37	2.43E-33	4.50E-30	2.05E-27	3.32E-25	2.44E-23	9.04E-22	2.41E-20	3.92E-19	
	203079	10	0.	9.64E-36	3.20E-32	2.60E-29	6.31E-27	6.00E-25	3.70E-23	1.23E-21	2.64E-20	
	230407	6	0.	0.	1.04E-36	1.97E-33	1.09E-30	2.12E-28	2.01E-26	1.09E-24	3.20E-23	
	221302	2	0.	0.	9.34E-36	1.25E-32	5.34E-30	8.79E-28	6.90E-26	3.67E-24	8.40E-23	
2p ² 2p ¹ 1s ² 1p ¹	245490	6	0.	0.	0.	1.33E-35	1.07E-32	3.09E-30	3.97E-28	2.64E-26	1.04E-24	
	267242	10	0.	0.	0.	1.93E-38	2.60E-35	1.33E-32	2.60E-30	2.50E-28	1.30E-26	
	301060	2	0.	0.	0.	0.	0.	2.27E-37	8.71E-35	1.51E-32	1.37E-30	
	311700	6	0.	0.	0.	0.	0.	3.61E-34	1.71E-31	3.54E-28	3.70E-26	
	319230	24	0.	0.	0.	0.	0.	0.	9.04E-26	2.33E-23	2.70E-21	
2p ² 2p ¹ 1s ² 1p ¹	370039	16	0.	0.	0.	0.	4.20E-38	3.49E-35	1.09E-32	1.94E-30	1.24E-28	
	316449	54	0.	0.	0.	0.	0.	1.52E-37	7.90E-35	1.40E-32	1.80E-30	
	334453	90	0.	0.	0.	0.	0.	0.	7.43E-37	2.20E-34	3.42E-32	
	304130**	200	0.	0.	0.	0.	0.	0.	0.	0.	1.54E-36	
	305000**	54	0.	0.	0.	0.	0.	0.	0.	0.	2.30E-37	
2p ² 2p ¹ 1s ² 1p ¹	447500**	94	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	432000**	162	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	442700**	206	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	444000**	90	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	55.2955	90	0.	0.	0.	0.	0.	0.	0.	0.	0.	
2p ² 2p ¹ 1s ² 1p ¹	62.7468	160	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	60.9987	10	0.	0.	0.	0.	0.	2.	0.	0.	0.	
	68.4375	32	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	552000**	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	64.9375	32	0.	0.	0.	0.	0.	0.	0.	0.	0.	

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTARRED ENERGY LEVELS FROM MOORE (1949)

TABLE 54 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF M^{++}

LEVEL (CM-1)	TEMPERATURE (DEG K)										
	6000	7000	8000	8400	8800	9200	9600	10000	11000	12000	13000
0	3.42E-01	3.41E-01	3.40E-01	3.42E-01	3.40E-01	3.39E-01	3.39E-01	3.39E-01	3.30E-01	3.37E-01	3.34E-01
174	6.58E-01	6.59E-01	6.60E-01	6.60E-01	6.60E-01	6.60E-01	6.61E-01	6.61E-01	6.61E-01	6.61E-01	6.60E-01
57283	1.12E-05	2.19E-05	6.85E-05	1.12E-04	1.74E-04	2.62E-04	3.68E-04	5.35E-04	1.13E-03	2.11E-03	3.54E-03
101027	8.89E-10	2.91E-09	8.42E-09	5.19E-08	1.14E-07	2.33E-07	4.56E-07	8.24E-07	3.26E-06	9.25E-06	2.34E-05
131004	3.13E-13	1.44E-12	1.99E-11	6.11E-11	1.49E-10	4.29E-10	1.01E-09	2.21E-09	1.22E-08	5.09E-08	1.76E-07
145950	3.97E-14	2.21E-13	4.07E-12	1.42E-11	4.41E-11	1.24E-10	3.22E-10	7.71E-10	5.19E-09	2.54E-08	9.74E-08
184802	4.67E-18	2.98E-16	1.75E-15	8.64E-15	3.70E-14	1.90E-13	4.70E-13	1.44E-12	1.44E-11	1.24E-10	7.04E-10
203079	3.73E-19	4.05E-18	2.34E-16	1.38E-15	6.44E-15	2.73E-14	1.03E-13	3.44E-13	9.92E-12	4.49E-11	2.92E-10
230407	6.89E-22	1.16E-19	1.03E-18	7.40E-18	4.44E-16	2.28E-15	1.02E-14	4.07E-15	8.27E-14	1.62E-12	9.50E-12
221302	1.58E-21	2.12E-20	1.76E-18	1.17E-17	6.56E-17	3.46E-16	1.34E-15	5.03E-15	9.07E-14	1.61E-12	7.76E-12
245690	2.72E-23	4.87E-22	6.99E-20	5.40E-19	3.65E-18	2.09E-17	1.04E-16	4.32E-16	1.12E-14	1.63E-13	1.57E-12
267242	4.74E-25	1.82E-23	2.28E-21	2.24E-20	1.79E-19	1.20E-18	6.83E-18	3.39E-17	1.11E-15	2.05E-14	2.40E-13
301046	7.35E-29	2.33E-27	5.99E-26	1.03E-24	1.42E-22	1.20E-21	8.54E-21	5.20E-20	2.44E-18	7.09E-17	1.13E-15
311708	2.33E-29	9.08E-28	2.41E-26	4.60E-25	6.61E-24	8.87E-22	5.23E-21	3.39E-20	1.99E-18	5.94E-17	1.85E-15
319238	1.69E-29	8.07E-28	4.75E-25	7.30E-24	8.75E-23	6.46E-22	4.77E-21	4.50E-20	2.90E-18	6.64E-17	1.83E-15
290839	5.78E-27	1.74E-25	3.74E-24	5.88E-23	7.09E-22	5.39E-20	3.50E-19	2.05E-18	9.14E-17	2.10E-15	3.17E-14
314449	1.17E-28	4.73E-27	1.29E-25	2.53E-24	3.73E-23	4.31E-22	3.12E-20	2.03E-19	1.25E-17	3.09E-16	6.90E-15
334445	2.85E-30	1.45E-28	4.80E-27	1.15E-25	2.73E-23	2.94E-22	2.60E-21	1.93E-20	1.53E-18	5.04E-17	1.27E-15
384130	2.40E-34	2.26E-32	1.20E-30	4.84E-29	1.30E-27	2.59E-26	4.85E-24	4.83E-22	7.34E-21	4.83E-19	1.47E-17
305000	3.84E-35	3.56E-33	2.04E-31	7.80E-30	2.11E-28	4.22E-27	7.90E-25	8.02E-24	1.23E-21	8.16E-20	2.04E-18
447900	0.	0.	2.64E-36	1.82E-34	8.40E-33	2.73E-31	1.21E-28	1.77E-27	6.14E-25	8.09E-23	5.00E-21
432000	0.	0.	8.91E-37	8.37E-35	4.99E-33	1.82E-31	5.25E-29	2.09E-27	7.90E-26	8.74E-22	4.49E-20
492700	0.	0.	0.	0.	1.09E-35	5.80E-34	4.16E-31	7.97E-28	5.00E-27	1.07E-26	1.01E-22
946000	0.	0.	0.	0.	1.02E-32	3.20E-31	7.79E-30	1.42E-28	2.04E-27	9.60E-25	5.53E-21
504100	0.	0.	0.	0.	6.12E-37	3.15E-35	1.15E-33	3.10E-32	6.44E-31	1.20E-29	1.27E-23
492000	0.	0.	0.	0.	7.71E-37	3.55E-35	1.17E-33	5.31E-31	3.43E-28	7.30E-26	6.80E-24
952000	0.	0.	0.	0.	0.	0.	1.75E-37	1.75E-36	1.75E-34	9.70E-19	1.50E-26

TABLE 54 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF N++

LEVEL (CR-1)	TEMPERATURE (DEG K)									
	14000	15000	16000	17000	18000	19000	20000	24000	28000	32000
0	3.35E-01	3.34E-01	3.33E-01	3.31E-01	3.29E-01	3.27E-01	3.25E-01	3.14E-01	3.00E-01	2.84E-01
174	4.59E-01	4.57E-01	4.55E-01	4.53E-01	4.50E-01	4.48E-01	4.45E-01	4.21E-01	4.05E-01	3.87E-01
57233	5.59E-03	5.24E-03	4.84E-03	4.43E-03	4.02E-03	3.61E-03	3.20E-03	2.78E-03	2.36E-03	1.94E-03
101037	5.19E-05	1.03E-04	1.89E-04	3.20E-04	5.12E-04	7.79E-04	1.13E-03	1.68E-03	2.36E-03	3.17E-03
131004	4.77E-07	1.17E-06	2.55E-06	5.07E-06	9.33E-06	1.61E-05	2.62E-05	4.23E-05	6.58E-05	9.66E-05
145950	3.04E-07	8.34E-07	1.99E-06	4.29E-06	8.48E-06	1.54E-05	2.60E-05	4.19E-05	6.45E-05	9.42E-05
164402	3.04E-09	1.11E-08	3.37E-08	9.32E-08	2.16E-07	4.71E-07	9.40E-07	1.60E-06	2.70E-06	4.14E-06
203079	1.45E-09	5.80E-09	1.95E-08	5.40E-08	1.47E-07	3.43E-07	7.35E-07	1.40E-06	2.41E-06	3.90E-06
230407	5.24E-11	2.53E-10	1.00E-09	3.30E-09	9.22E-09	2.40E-08	6.17E-08	1.44E-07	3.20E-07	5.45E-07
221302	4.49E-11	2.02E-10	7.54E-10	2.43E-09	8.05E-09	1.73E-08	3.96E-08	8.43E-08	1.84E-07	4.01E-07
245490	1.09E-11	5.04E-11	2.54E-10	9.24E-10	2.92E-09	9.17E-09	2.04E-08	3.70E-07	2.96E-06	1.37E-05
267252	1.90E-12	1.23E-11	6.09E-11	2.49E-10	9.70E-10	2.40E-09	7.27E-09	1.73E-07	1.43E-06	8.54E-06
301048	1.22E-14	9.38E-14	5.00E-13	2.04E-12	1.16E-11	4.10E-11	1.27E-10	4.52E-09	3.73E-08	3.11E-07
311708	1.23E-14	1.04E-13	6.70E-13	3.47E-12	1.49E-11	5.51E-11	1.70E-10	7.22E-09	9.97E-08	1.31E-07
319238	2.27E-14	2.02E-13	1.34E-12	7.33E-12	3.27E-11	1.25E-10	4.14E-10	1.44E-08	2.71E-07	2.00E-06
290839	3.15E-13	2.31E-12	1.31E-11	6.00E-11	2.30E-10	8.02E-10	2.40E-09	7.57E-08	5.34E-07	3.10E-06
314449	8.34E-14	7.10E-13	4.71E-12	2.47E-11	1.00E-10	4.03E-10	1.32E-09	5.51E-08	7.79E-07	5.50E-06
334445	1.70E-14	1.70E-13	1.30E-12	7.09E-12	3.44E-11	1.40E-10	5.20E-10	2.77E-08	4.45E-07	3.79E-06
304130	3.44E-16	4.70E-15	6.77E-14	3.42E-13	2.19E-12	1.10E-11	4.67E-11	4.51E-09	1.14E-07	1.30E-06
305000	5.93E-17	8.27E-16	8.20E-15	6.31E-14	3.04E-13	1.93E-12	8.22E-12	8.02E-10	2.30E-08	2.34E-07
447500	1.71E-19	3.64E-18	5.33E-17	5.64E-16	4.62E-15	3.01E-14	1.63E-13	3.37E-11	1.49E-09	2.50E-08
432000	1.42E-18	2.73E-17	3.63E-16	3.55E-15	2.69E-14	1.65E-13	8.39E-13	1.44E-10	5.54E-09	8.40E-08
492700	4.94E-21	1.44E-19	2.75E-18	3.70E-17	3.74E-16	2.95E-15	1.89E-14	6.72E-12	4.37E-10	6.04E-09
444000	1.87E-19	3.94E-18	5.72E-17	6.03E-16	4.08E-15	3.17E-14	1.70E-13	3.45E-11	2.51E-09	2.21E-08
504100	6.92E-22	2.21E-20	4.51E-19	6.62E-18	7.11E-17	5.94E-16	4.01E-15	1.67E-12	1.22E-10	2.99E-09
492000	3.32E-22	9.62E-21	1.83E-19	2.46E-18	2.47E-17	1.94E-16	1.24E-15	4.38E-13	2.63E-11	6.34E-10
552000	1.24E-24	5.41E-23	1.47E-21	2.72E-20	3.63E-19	3.40E-18	2.95E-17	2.13E-14	2.31E-12	7.40E-11

TABLE 56 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF N⁺⁺

LEVEL (CM ⁻¹)	TEMPERATURE (DEG K)										0	0	0	0	0
	44000	48000	60000	80000	100000	200000	400000	600000	1000000	1800000					
0	2.41E-01	2.27E-01	1.40E-01	1.39E-01	9.09E-02	2.04E-02	5.80E-03	3.64E-03	2.49E-03	0.	0.	0.	0.	0.	0.
174	2.79E-01	4.52E-01	3.79E-01	2.70E-01	1.99E-01	6.07E-02	1.14E-02	7.28E-03	4.94E-03	0.	0.	0.	0.	0.	0.
57283	2.42E-01	2.43E-01	2.09E-01	2.92E-01	2.50E-01	8.09E-02	2.83E-02	1.91E-02	1.37E-02	0.	0.	0.	0.	0.	0.
101027	4.43E-02	5.50E-02	1.13E-01	1.13E-01	1.14E-01	4.92E-02	2.02E-02	1.33E-02	1.07E-02	0.	0.	0.	0.	0.	0.
131804	3.32E-03	4.40E-03	8.23E-03	1.32E-02	1.49E-02	7.94E-03	3.62E-03	2.04E-03	2.04E-03	0.	0.	0.	0.	0.	0.
149950	6.11E-03	6.50E-03	1.73E-02	3.01E-02	3.60E-02	2.14E-02	1.03E-02	7.78E-03	6.04E-03	0.	0.	0.	0.	0.	0.
104402	1.07E-03	1.60E-03	4.32E-03	9.69E-03	1.33E-02	1.04E-02	5.92E-03	4.63E-03	3.80E-03	0.	0.	0.	0.	0.	0.
203079	1.97E-03	2.50E-03	7.31E-03	1.81E-02	2.44E-02	2.34E-02	1.40E-02	1.12E-02	9.27E-03	0.	0.	0.	0.	0.	0.
230407	3.84E-04	6.82E-04	2.20E-03	6.63E-03	1.07E-02	1.16E-02	7.59E-03	6.29E-03	5.35E-03	0.	0.	0.	0.	0.	0.
221302	1.77E-04	2.99E-04	9.44E-04	2.60E-03	4.04E-03	4.14E-03	2.62E-03	2.14E-03	1.81E-03	0.	0.	0.	0.	0.	0.
243690	2.34E-04	4.32E-04	1.50E-03	5.04E-03	8.57E-03	1.04E-02	7.19E-03	6.04E-03	5.23E-03	0.	0.	0.	0.	0.	0.
267242	1.93E-04	3.77E-04	1.57E-03	5.78E-03	1.05E-02	1.49E-02	1.11E-02	9.60E-03	8.43E-03	0.	0.	0.	0.	0.	0.
301000	1.25E-05	2.73E-05	1.39E-04	6.20E-04	1.29E-03	2.33E-03	1.96E-03	1.77E-03	1.61E-03	0.	0.	0.	0.	0.	0.
311708	2.71E-05	5.97E-05	3.24E-04	1.54E-03	3.31E-03	6.49E-03	5.67E-03	5.10E-03	4.70E-03	0.	0.	0.	0.	0.	0.
319236	8.44E-05	1.90E-04	1.00E-03	5.37E-03	1.19E-02	2.44E-02	2.21E-02	2.53E-02	1.80E-02	0.	0.	0.	0.	0.	0.
290039	1.61E-04	3.35E-04	1.60E-03	6.71E-03	1.44E-02	2.24E-02	1.83E-02	1.63E-02	1.47E-02	0.	0.	0.	0.	0.	0.
314449	2.23E-04	4.95E-04	2.73E-03	1.32E-02	2.87E-02	5.73E-02	5.05E-02	4.63E-02	4.24E-02	0.	0.	0.	0.	0.	0.
314445	1.93E-04	4.53E-04	2.62E-03	1.53E-02	3.50E-02	8.24E-02	7.04E-02	7.33E-02	6.91E-02	0.	0.	0.	0.	0.	0.
304130	1.27E-04	3.27E-04	2.14E-03	2.01E-02	5.61E-02	1.85E-02	2.10E-01	2.09E-01	2.04E-01	0.	0.	0.	0.	0.	0.
305000	2.22E-05	5.97E-05	5.03E-04	3.70E-03	1.04E-02	3.45E-02	3.92E-02	3.91E-02	3.85E-02	0.	0.	0.	0.	0.	0.
447500	5.10E-06	1.63E-05	2.00E-04	2.14E-03	7.52E-03	3.91E-02	5.57E-02	5.90E-02	6.24E-02	0.	0.	0.	0.	0.	0.
432000	1.43E-05	4.30E-05	4.89E-04	4.77E-03	1.59E-02	7.37E-02	9.93E-02	1.05E-01	1.08E-01	0.	0.	0.	0.	0.	0.
492700	3.49E-06	1.24E-05	2.03E-04	2.89E-03	1.10E-02	8.47E-02	1.42E-01	1.61E-01	1.70E-01	0.	0.	0.	0.	0.	0.
444000	5.03E-06	1.60E-05	1.94E-04	2.04E-03	7.20E-03	3.70E-02	5.23E-02	5.93E-02	5.80E-02	0.	0.	0.	0.	0.	0.
506100	1.25E-06	4.60E-06	8.17E-05	1.24E-03	5.39E-03	4.27E-02	7.51E-02	8.44E-02	9.59E-02	0.	0.	0.	0.	0.	0.
492000	2.23E-07	8.05E-07	1.29E-05	1.80E-04	7.43E-04	5.32E-03	8.60E-03	1.01E-02	1.10E-02	0.	0.	0.	0.	0.	0.
552000	5.50E-08	2.37E-07	5.43E-06	1.09E-04	5.57E-04	6.14E-03	1.27E-02	1.55E-02	1.80E-02	0.	0.	0.	0.	0.	0.

TABLE 57. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O++

STATE	LEVEL	STAT.	TEMPERATURE (DEG K)											
			(CM-1)	(EV)	WT.	3200	3600	4000	4400	4800	5200	5600	6000	6400
2s 2p ³ P ^o	0	1	0	0.	1	1.42E-01	1.21E-01	1.20E-01	1.19E-01	1.18E-01	1.17E-01	1.17E-01	1.16E-01	1.16E-01
	13	3	13	0.0141	3	3.47E-01	3.44E-01	3.44E-01	3.43E-01	3.42E-01	3.41E-01	3.40E-01	3.39E-01	3.38E-01
	306	5	306	0.0380	5	5.31E-01	5.33E-01	5.34E-01	5.35E-01	5.36E-01	5.37E-01	5.40E-01	5.40E-01	5.40E-01
	20274	5	20274	2.5136	5	6.70E-05	1.83E-04	4.07E-04	7.64E-04	1.35E-03	2.15E-03	3.19E-03	4.50E-03	6.07E-03
	43187	1	43187	5.3544	1	4.50E-10	3.65E-09	2.14E-08	8.74E-08	2.82E-07	7.59E-07	1.77E-06	3.70E-06	7.03E-06
2s 2p ¹ D ^o	60312	5	60312	7.4775	5	1.02E-12	2.05E-11	2.27E-10	1.62E-09	8.31E-09	3.32E-08	1.09E-07	3.04E-07	7.48E-07
	120041	15	120041	14.8828	15	6.63E-14	2.64E-11	3.17E-10	1.60E-09	4.10E-09	6.62E-09	7.07E-09	5.50E-09	3.51E-09
	142384	9	142384	17.6529	9	1.73E-26	2.10E-25	6.16E-23	6.43E-21	3.10E-19	8.21E-18	1.34E-16	1.59E-15	1.51E-14
	197087	3	197087	24.4350	3	0.	2.24E-35	5.95E-32	3.63E-29	7.81E-27	7.31E-25	5.97E-23	1.04E-21	1.99E-20
	187049	5	187049	23.1905	5	1.82E-37	2.04E-33	3.61E-30	1.62E-27	2.64E-25	1.96E-23	7.89E-22	1.93E-20	3.16E-19
2s 2p ¹ P ^o	210459	3	210459	25.0929	3	0.	1.07E-37	4.77E-34	4.61E-31	1.42E-28	1.81E-26	1.19E-24	4.21E-23	9.83E-22
	283866	9	283866	35.1460	9	0.	0.	0.	0.	1.10E-37	8.19E-35	2.23E-32	2.04E-30	2.01E-28
	327307	60	327307	40.5798	60	0.	0.	0.	0.	0.	0.	0.	0.	0.
	357400	12	357400	44.3108	12	0.	0.	0.	0.	0.	0.	0.	0.	0.
	368411	36	368411	45.4760	36	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s 2p ³ P ^o	379062	60	379062	48.9985	60	0.	0.	0.	0.	0.	0.	0.	0.	0.
		36	297966	36.9421	36	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	327307	40.5798	60	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	357400	44.3108	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	368411	45.4760	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s 2p ¹ D ^o	379062	12	379062	48.9985	12	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	297966	36.9421	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	327307	40.5798	60	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	357400	44.3108	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	368411	45.4760	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s 2p ³ P ^o	379062	60	379062	48.9985	60	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	297966	36.9421	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	327307	40.5798	60	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	357400	44.3108	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	368411	45.4760	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s 2p ¹ D ^o	379062	12	379062	48.9985	12	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	297966	36.9421	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	327307	40.5798	60	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	357400	44.3108	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	368411	45.4760	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s 2p ³ P ^o	379062	60	379062	48.9985	60	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	297966	36.9421	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	327307	40.5798	60	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	357400	44.3108	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	368411	45.4760	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s 2p ¹ D ^o	379062	12	379062	48.9985	12	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	297966	36.9421	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	327307	40.5798	60	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	357400	44.3108	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	368411	45.4760	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s 2p ³ P ^o	379062	60	379062	48.9985	60	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	297966	36.9421	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	327307	40.5798	60	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	357400	44.3108	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	368411	45.4760	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s 2p ¹ D ^o	379062	12	379062	48.9985	12	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	297966	36.9421	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	327307	40.5798	60	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	357400	44.3108	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	368411	45.4760	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s 2p ³ P ^o	379062	60	379062	48.9985	60	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	297966	36.9421	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	327307	40.5798	60	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	357400	44.3108	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	368411	45.4760	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s 2p ¹ D ^o	379062	12	379062	48.9985	12	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	297966	36.9421	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	327307	40.5798	60	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	357400	44.3108	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	368411	45.4760	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s 2p ³ P ^o	379062	60	379062	48.9985	60	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	297966	36.9421	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	327307	40.5798	60	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	357400	44.3108	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	368411	45.4760	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s 2p ¹ D ^o	379062	12	379062	48.9985	12	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	297966	36.9421	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	327307	40.5798	60	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	357400	44.3108	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	368411	45.4760	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s 2p ³ P ^o	379062	60	379062	48.9985	60	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	297966	36.9421	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	327307	40.5798	60	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	357400	44.3108	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	368411	45.4760	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s 2p ¹ D ^o	379062	12	379062	48.9985	12	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	297966	36.9421	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	327307	40.5798	60	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	357400	44.3108	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	368411	45.4760	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s 2p ³ P ^o	379062	60	379062	48.9985	60	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	297966	36.9421	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	327307	40.5798	60	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	357400	44.3108	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	368411	45.4760	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s 2p ¹ D ^o	379062	12	379062	48.9985	12	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	297966	36.9421	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	327307	40.5798	60	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	357400	44.3108	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	368411	45.4760	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s 2p ³ P ^o	379062	60	379062	48.9985	60	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	297966	36.9421	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	327307	40.5798	60	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	357400	44.3108	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	368411	45.4760	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s 2p ¹ D ^o	379062	12	379062	48.9985	12	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	297966	36.9421	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	327307	40.5798	60	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	357400	44.3108	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	368411	45.4760	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s 2p ³ P ^o	379062	60	379062	48.9985	60	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	297966	36.9421	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	36	327307	40.5798											

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
 NONSTARRED ENERGY LEVELS FROM MOORE (1949) AND BOWEN (1955)

TABLE 57 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O++

LEVEL	TEMPERATURE (DEG K)											
	6000	7200	7400	8000	8400	8600	9200	9400	10000	11000	12000	13000
1CM-1)												
0	1.19E-01	1.19E-01	1.14E-01	1.14E-01	1.13E-01	1.13E-01	1.12E-01	1.12E-01	1.11E-01	1.10E-01	1.08E-01	1.07E-01
113	3.37E-01	3.36E-01	3.34E-01	3.34E-01	3.33E-01	3.32E-01	3.30E-01	3.28E-01	3.28E-01	3.24E-01	3.21E-01	3.17E-01
304	5.40E-01	5.39E-01	5.38E-01	5.38E-01	5.37E-01	5.35E-01	5.34E-01	5.33E-01	5.31E-01	5.27E-01	5.22E-01	5.17E-01
20274	7.89E-03	7.87E-03	7.85E-03	7.84E-03	7.83E-03	7.82E-03	7.81E-03	7.80E-03	7.79E-03	7.78E-03	7.77E-03	7.76E-03
43187	1.24E-05	1.23E-05	1.22E-05	1.21E-05	1.20E-05	1.19E-05	1.18E-05	1.17E-05	1.16E-05	1.15E-05	1.14E-05	1.13E-05
40312	1.45E-06	1.44E-06	1.43E-06	1.42E-06	1.41E-06	1.40E-06	1.39E-06	1.38E-06	1.37E-06	1.36E-06	1.35E-06	1.34E-06
170041	1.61E-11	1.60E-11	1.59E-11	1.58E-11	1.57E-11	1.56E-11	1.55E-11	1.54E-11	1.53E-11	1.52E-11	1.51E-11	1.50E-11
162304	8.55E-14	8.54E-14	8.53E-14	8.52E-14	8.51E-14	8.50E-14	8.49E-14	8.48E-14	8.47E-14	8.46E-14	8.45E-14	8.44E-14
170707	2.48E-19	2.47E-19	2.46E-19	2.45E-19	2.44E-19	2.43E-19	2.42E-19	2.41E-19	2.40E-19	2.39E-19	2.38E-19	2.37E-19
107049	3.73E-18	3.72E-18	3.71E-18	3.70E-18	3.69E-18	3.68E-18	3.67E-18	3.66E-18	3.65E-18	3.64E-18	3.63E-18	3.62E-18
210459	1.50E-20	1.49E-20	1.48E-20	1.47E-20	1.46E-20	1.45E-20	1.44E-20	1.43E-20	1.42E-20	1.41E-20	1.40E-20	1.39E-20
203666	8.53E-27	8.52E-27	8.51E-27	8.50E-27	8.49E-27	8.48E-27	8.47E-27	8.46E-27	8.45E-27	8.44E-27	8.43E-27	8.42E-27
208239	7.24E-28	7.23E-28	7.22E-28	7.21E-28	7.20E-28	7.19E-28	7.18E-28	7.17E-28	7.16E-28	7.15E-28	7.14E-28	7.13E-28
343303	1.70E-33	1.69E-33	1.68E-33	1.67E-33	1.66E-33	1.65E-33	1.64E-33	1.63E-33	1.62E-33	1.61E-33	1.60E-33	1.59E-33
268899	2.70E-25	2.69E-25	2.68E-25	2.67E-25	2.66E-25	2.65E-25	2.64E-25	2.63E-25	2.62E-25	2.61E-25	2.60E-25	2.59E-25
207960	1.73E-27	1.72E-27	1.71E-27	1.70E-27	1.69E-27	1.68E-27	1.67E-27	1.66E-27	1.65E-27	1.64E-27	1.63E-27	1.62E-27
327307	5.70E-30	5.69E-30	5.68E-30	5.67E-30	5.66E-30	5.65E-30	5.64E-30	5.63E-30	5.62E-30	5.61E-30	5.60E-30	5.59E-30
267400	1.99E-33	1.98E-33	1.97E-33	1.96E-33	1.95E-33	1.94E-33	1.93E-33	1.92E-33	1.91E-33	1.90E-33	1.89E-33	1.88E-33
368411	5.81E-34	5.80E-34	5.79E-34	5.78E-34	5.77E-34	5.76E-34	5.75E-34	5.74E-34	5.73E-34	5.72E-34	5.71E-34	5.70E-34
379062	1.02E-34	1.01E-34	1.00E-34	9.99E-35	9.98E-35	9.97E-35	9.96E-35	9.95E-35	9.94E-35	9.93E-35	9.92E-35	9.91E-35
380000	1.17E-34	1.16E-34	1.15E-34	1.14E-34	1.13E-34	1.12E-34	1.11E-34	1.10E-34	1.09E-34	1.08E-34	1.07E-34	1.06E-34
343043	8.30E-32	8.29E-32	8.28E-32	8.27E-32	8.26E-32	8.25E-32	8.24E-32	8.23E-32	8.22E-32	8.21E-32	8.20E-32	8.19E-32
370399	7.63E-34	7.62E-34	7.61E-34	7.60E-34	7.59E-34	7.58E-34	7.57E-34	7.56E-34	7.55E-34	7.54E-34	7.53E-34	7.52E-34
368904	3.05E-36	3.04E-36	3.03E-36	3.02E-36	3.01E-36	3.00E-36	2.99E-36	2.98E-36	2.97E-36	2.96E-36	2.95E-36	2.94E-36
440160	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
368700	5.31E-37	5.30E-37	5.29E-37	5.28E-37	5.27E-37	5.26E-37	5.25E-37	5.24E-37	5.23E-37	5.22E-37	5.21E-37	5.20E-37
425000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
450000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
503000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
491000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
537000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
475000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
540000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
542000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
607000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
544000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
631000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
600000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
645000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TABLE 57 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF Ga+

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	14000	15000	16000	17000	18000	19000	20000	24000	28000	32000
0	1.04E-01	1.05E-01	1.03E-01	1.02E-01	1.01E-01	9.97E-02	9.84E-02	9.44E-02	9.04E-02	8.71E-02
113	3.14E-01	3.10E-01	3.07E-01	3.03E-01	3.00E-01	2.97E-01	2.93E-01	2.81E-01	2.70E-01	2.59E-01
304	5.12E-01	5.07E-01	5.02E-01	4.97E-01	4.92E-01	4.87E-01	4.82E-01	4.63E-01	4.44E-01	4.25E-01
20274	6.58E-02	7.47E-02	8.34E-02	9.17E-02	9.92E-02	1.07E-01	1.15E-01	1.40E-01	1.69E-01	1.98E-01
43187	1.25E-03	1.66E-03	2.12E-03	2.64E-03	3.20E-03	3.79E-03	4.41E-03	7.09E-03	9.85E-03	1.25E-02
60312	1.08E-02	1.41E-02	1.78E-02	2.19E-02	2.64E-02	3.13E-02	3.64E-02	1.27E-02	2.04E-02	2.89E-02
120041	6.96E-04	1.57E-04	3.18E-04	5.42E-04	8.03E-04	1.09E-03	1.40E-03	1.04E-03	1.45E-03	1.91E-03
182384	4.20E-07	1.10E-06	2.94E-06	5.14E-06	1.04E-05	1.84E-05	3.14E-05	1.67E-04	3.42E-04	6.19E-04
197087	5.07E-10	1.97E-09	6.22E-09	1.74E-08	4.34E-08	9.87E-08	2.04E-07	2.09E-06	1.98E-05	2.02E-04
197089	2.37E-09	8.44E-09	2.56E-08	8.80E-08	1.42E-07	3.53E-07	7.68E-07	6.37E-06	3.53E-05	9.49E-05
210459	1.28E-10	5.36E-10	1.87E-09	5.63E-09	1.50E-08	3.50E-08	7.84E-08	9.39E-07	7.44E-06	2.03E-05
283846	2.04E-13	1.41E-12	7.62E-12	3.33E-11	1.27E-10	4.14E-10	1.20E-09	3.77E-07	2.49E-06	9.92E-06
298289	2.57E-14	1.94E-13	1.16E-12	5.94E-12	2.23E-11	7.72E-11	2.34E-10	8.04E-09	9.98E-08	6.52E-07
343303	5.03E-17	5.22E-16	4.04E-15	2.46E-14	1.22E-13	5.11E-13	1.89E-12	1.09E-10	1.72E-09	1.72E-08
248899	1.24E-12	7.88E-12	3.91E-11	1.60E-10	5.60E-10	1.72E-09	4.70E-09	1.13E-07	1.08E-06	5.64E-06
297946	1.91E-13	1.44E-12	8.59E-12	4.10E-11	1.45E-10	5.70E-10	1.74E-09	5.94E-08	7.31E-07	4.76E-06
337307	1.56E-14	1.45E-13	1.02E-12	5.71E-12	2.63E-11	1.03E-10	3.52E-10	1.70E-08	2.70E-07	2.12E-06
337400	1.42E-16	1.62E-15	1.37E-14	8.94E-14	4.74E-13	2.11E-12	8.07E-12	5.61E-10	1.15E-08	1.10E-07
348411	1.37E-16	1.69E-15	1.32E-14	1.04E-13	5.90E-13	2.79E-12	1.10E-11	8.70E-10	1.94E-08	2.01E-07
379042	7.45E-17	1.02E-15	9.74E-15	7.15E-14	4.20E-13	2.04E-12	8.49E-12	7.65E-10	1.89E-08	2.07E-07
380000	9.73E-17	1.30E-15	1.25E-14	9.24E-14	5.45E-13	2.67E-12	1.11E-11	1.01E-09	2.52E-08	2.78E-07
343043	1.24E-15	1.29E-14	9.93E-14	6.03E-13	2.99E-12	1.29E-11	4.53E-11	2.64E-09	6.81E-08	4.18E-07
370399	2.24E-16	2.80E-15	2.55E-14	1.78E-13	1.01E-12	4.79E-12	1.90E-11	1.34E-09	3.53E-08	3.57E-07
398904	1.99E-17	3.03E-16	3.27E-15	2.67E-14	1.72E-13	9.10E-13	4.64E-12	1.36E-09	1.36E-08	1.70E-07
448160	4.04E-19	8.60E-18	1.25E-16	1.32E-15	1.07E-14	6.99E-14	3.77E-13	7.78E-11	3.47E-09	5.93E-08
398700	3.39E-18	5.15E-17	5.55E-16	4.32E-15	2.91E-14	1.54E-13	6.80E-13	7.64E-11	2.39E-09	2.95E-08
425000	6.82E-17	1.24E-16	1.56E-16	1.46E-15	1.07E-14	6.31E-14	3.12E-13	4.87E-11	1.78E-09	2.62E-08
454000	5.77E-20	1.20E-18	1.92E-17	2.10E-16	1.79E-15	1.17E-14	6.45E-14	1.43E-11	4.69E-10	1.19E-08
503000	1.20E-21	3.72E-20	7.50E-19	1.06E-17	1.12E-16	9.12E-16	6.08E-15	2.42E-12	1.73E-10	4.90E-09
491000	1.39E-21	3.97E-20	7.45E-19	9.88E-18	9.83E-17	7.67E-16	4.84E-15	1.60E-12	1.00E-10	2.43E-09
557000	2.80E-24	1.24E-22	3.50E-21	6.59E-20	8.94E-19	9.20E-18	7.50E-17	5.71E-14	4.44E-12	2.22E-10
475000	2.40E-21	6.14E-20	1.05E-18	1.28E-17	1.10E-16	6.50E-16	3.13E-15	1.44E-12	8.19E-11	1.64E-09
540000	5.34E-24	2.14E-23	5.38E-21	9.24E-20	1.16E-18	1.11E-17	8.49E-17	5.27E-14	5.14E-12	1.59E-10
542000	4.91E-24	1.99E-23	5.04E-21	8.79E-20	1.11E-18	1.07E-17	5.24E-16	5.23E-14	2.34E-12	1.64E-10
607000	1.10E-26	6.92E-25	2.60E-23	6.38E-22	1.09E-20	1.39E-19	1.37E-18	1.90E-15	3.30E-13	1.54E-11
546000	1.04E-24	4.97E-23	1.44E-21	2.88E-20	4.08E-19	4.34E-18	3.68E-17	3.12E-14	3.81E-12	1.39E-10
631000	2.32E-27	1.73E-25	7.52E-24	2.09E-22	3.65E-21	5.65E-20	6.09E-19	1.13E-15	2.40E-13	1.32E-11
600000	1.90E-26	1.14E-24	4.12E-23	9.74E-22	1.62E-21	1.98E-20	1.91E-18	2.44E-15	3.99E-13	1.81E-11
645000	4.24E-29	3.98E-27	2.12E-25	7.07E-24	1.59E-22	2.58E-21	3.17E-20	8.80E-17	2.51E-14	1.73E-12
										4.61E-11
										6.34E-10

TABLE 57 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O++

LEVEL (CM-1)	TEMPERATURE (DEG F)									
	44000	48000	52000	56000	60000	64000	68000	72000	76000	80000
0	7.77E-02	7.49E-02	6.89E-02	5.38E-02	4.05E-02	8.12E-03	1.92E-03	1.11E-03	7.04E-04	0.
113	2.24E-01	2.24E-01	2.00E-01	1.61E-01	1.21E-01	2.43E-02	5.35E-03	3.23E-03	2.22E-03	0.
306	3.85E-01	3.71E-01	3.32E-01	2.62E-01	2.02E-01	4.58E-02	9.58E-03	5.35E-03	3.23E-03	0.
20274	2.00E-01	2.04E-01	2.06E-01	1.87E-01	1.51E-01	3.51E-02	6.91E-03	5.29E-03	3.43E-03	0.
43187	1.89E-02	2.05E-02	2.37E-02	2.47E-02	2.18E-02	5.51E-03	1.64E-03	1.00E-03	6.63E-04	0.
60312	5.41E-02	6.14E-02	7.87E-02	9.09E-02	8.50E-02	2.63E-02	7.72E-03	4.81E-03	3.24E-03	0.
128041	2.30E-02	3.06E-02	5.64E-02	9.31E-02	1.08E-01	5.14E-02	1.87E-02	1.25E-02	8.91E-03	0.
142384	6.65E-03	9.65E-03	3.74E-02	3.74E-02	4.70E-02	2.62E-02	1.03E-02	7.11E-03	5.18E-03	0.
197809	3.71E-04	6.11E-04	1.78E-03	6.64E-03	7.13E-03	5.90E-03	2.83E-03	2.08E-03	1.59E-03	0.
187049	8.58E-04	1.39E-03	3.77E-03	9.30E-03	1.37E-02	1.06E-02	4.89E-03	3.59E-03	2.70E-03	0.
210499	2.39E-04	4.09E-04	1.29E-03	3.64E-03	5.80E-03	5.34E-03	2.70E-03	2.01E-03	1.54E-03	0.
327307	1.85E-04	2.44E-04	1.37E-03	2.93E-03	6.14E-03	9.99E-03	6.22E-03	5.04E-03	4.22E-03	0.
298239	2.51E-05	4.90E-05	2.42E-04	1.24E-03	2.77E-03	4.75E-03	3.28E-03	2.72E-03	2.30E-03	0.
343303	1.04E-04	2.54E-04	1.78E-03	1.12E-03	2.90E-04	6.87E-04	5.88E-04	4.88E-04	4.31E-04	0.
248699	1.42E-04	2.84E-04	1.27E-03	5.12E-03	1.01E-02	1.41E-02	8.75E-03	7.00E-03	5.75E-03	0.
397864	1.64E-04	3.54E-04	1.90E-03	9.11E-03	2.00E-02	3.43E-02	2.34E-02	1.94E-02	1.65E-02	0.
327307	1.85E-04	2.44E-04	1.37E-03	2.93E-03	6.14E-03	9.99E-03	6.22E-03	5.04E-03	4.22E-03	0.
337400	7.84E-04	2.00E-03	1.52E-03	1.04E-03	7.84E-03	7.55E-03	6.34E-03	5.44E-03	5.04E-03	0.
348411	1.84E-03	4.31E-03	3.21E-04	2.57E-03	7.27E-03	2.07E-02	1.89E-02	1.45E-02	1.50E-02	0.
379062	1.53E-05	5.22E-05	4.53E-03	3.33E-03	1.04E-02	3.19E-02	2.94E-02	2.69E-02	2.45E-02	0.
365000	2.42E-05	7.11E-05	4.20E-04	8.44E-03	1.44E-02	4.43E-02	1.11E-02	3.75E-02	3.43E-02	0.
253043	2.51E-05	6.15E-05	4.29E-04	2.70E-03	6.99E-03	1.55E-02	1.34E-02	1.17E-02	1.03E-02	0.
370399	3.07E-05	8.13E-05	6.68E-04	4.92E-03	1.41E-02	4.07E-02	3.64E-02	3.29E-02	2.98E-02	0.
369904	2.02E-05	5.77E-05	5.62E-04	4.94E-03	1.56E-02	5.33E-02	5.48E-02	5.12E-02	4.77E-02	0.
448160	1.29E-05	4.21E-05	5.52E-04	6.52E-03	2.46E-02	1.24E-01	1.47E-01	1.44E-01	1.42E-01	0.
398700	3.39E-04	9.67E-04	9.42E-03	8.27E-04	2.61E-03	9.23E-03	9.14E-03	8.54E-03	7.99E-03	0.
423000	4.30E-04	1.32E-03	1.50E-03	1.53E-03	5.37E-03	2.49E-02	2.41E-02	2.30E-02	2.30E-02	0.
424000	2.77E-04	9.21E-04	1.25E-04	1.53E-03	5.90E-03	3.10E-02	3.75E-02	3.74E-02	3.67E-02	0.
503000	1.79E-04	6.79E-04	1.24E-04	2.03E-03	9.32E-03	6.97E-02	1.09E-01	1.04E-01	1.19E-01	0.
491000	8.94E-07	3.28E-06	5.54E-05	8.49E-04	3.74E-03	2.57E-02	3.54E-02	3.70E-02	3.74E-02	0.
557000	1.64E-07	8.07E-07	2.93E-05	4.60E-04	2.57E-03	2.84E-02	4.74E-02	5.61E-02	6.06E-02	0.
479000	5.03E-07	1.77E-06	2.72E-05	3.77E-04	1.57E-03	9.99E-03	1.25E-02	1.28E-02	1.28E-02	0.
540000	1.07E-07	4.54E-07	1.02E-05	2.08E-04	1.10E-03	1.07E-02	1.74E-02	1.92E-02	2.08E-02	0.
542000	1.12E-07	4.74E-07	1.09E-05	2.24E-04	1.20E-03	1.18E-02	1.94E-02	2.18E-02	2.33E-02	0.
607000	2.39E-08	1.20E-07	4.03E-06	1.23E-04	8.35E-04	1.32E-02	2.78E-02	3.32E-02	3.77E-02	0.
544000	1.20E-07	5.70E-07	1.53E-05	3.67E-04	2.12E-03	2.49E-02	4.51E-02	5.15E-02	5.62E-02	0.
631000	2.72E-08	1.46E-07	3.74E-06	2.03E-04	1.48E-03	2.78E-02	6.34E-02	7.82E-02	9.11E-02	0.
609000	2.59E-08	1.25E-07	4.07E-06	1.20E-04	7.79E-04	1.17E-02	2.35E-02	2.82E-02	3.21E-02	0.
645000	3.37E-09	3.17E-08	1.52E-06	6.60E-05	5.44E-04	1.50E-02	3.31E-02	4.33E-02	5.20E-02	0.

TABLE 36. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR⁺⁺

STATE	LEVEL (CM-1)	STAT. WT.	TEMPERATURE (DEG K)									
			3200	3600	4000	4400	4800	5200	5600	6000	6400	
3s ² 3p ² 1s ²	0	5	6.83E-01	6.69E-01	6.57E-01	6.44E-01	6.37E-01	6.28E-01	6.20E-01	6.13E-01	6.06E-01	
	1112	3	2.48E-01	2.57E-01	2.64E-01	2.70E-01	2.74E-01	2.77E-01	2.80E-01	2.82E-01	2.83E-01	
	1370	1	6.74E-02	7.14E-02	7.47E-02	7.74E-02	7.94E-02	8.14E-02	8.3E-02	8.41E-02	8.51E-02	
	14010	5	1.25E-03	2.77E-03	4.72E-03	6.62E-03	9.38E-03	1.30E-02	1.70E-02	2.13E-02	2.60E-02	
	33266	1	4.36E-08	2.25E-07	8.35E-07	2.44E-06	5.95E-06	1.26E-05	2.41E-05	4.21E-05	6.85E-05	
3s 3p ³ 1s ²	114503	9	5.89E-23	1.74E-20	1.65E-18	6.81E-17	1.51E-15	2.08E-14	1.97E-13	1.80E-12	1.55E-12	
	144023	3	3.08E-29	4.03E-26	1.25E-23	1.37E-21	6.82E-20	1.86E-18	3.17E-17	5.69E-16	9.15E-15	
	169413	40	3.65E-29	6.23E-26	2.40E-23	3.13E-21	1.81E-19	5.59E-18	1.04E-16	1.59E-15	1.25E-14	
3s ² 3p ³ (S ²) 3d	176739	8	3.34E-35	2.25E-31	2.58E-28	6.23E-26	1.00E-23	5.81E-22	1.09E-20	3.85E-19	5.30E-18	
	206368	24	0.	4.86E-36	1.02E-32	1.53E-29	4.17E-27	4.80E-25	2.80E-23	9.48E-22	2.07E-20	
	248377	40	0.	0.	0.	2.76E-35	2.36E-32	7.16E-30	9.58E-28	6.66E-26	2.72E-24	
	263000	56	0.	0.	0.	3.24E-37	4.13E-34	1.75E-31	3.13E-29	2.80E-27	1.42E-25	
(D ²) 3d	180000	100	2.64E-36	3.12E-32	5.63E-29	2.59E-26	4.28E-24	3.22E-22	1.31E-20	3.23E-19	5.33E-18	
	197480	20	0.	1.41E-34	3.72E-31	2.33E-28	4.98E-26	4.60E-24	2.79E-22	6.66E-21	1.27E-19	
	226800	60	0.	0.	2.93E-35	4.80E-32	2.28E-29	4.21E-27	3.67E-25	1.77E-23	5.22E-22	
	248600	100	0.	0.	0.	6.68E-38	1.30E-34	4.29E-32	1.26E-29	1.24E-27	6.91E-26	
(F ²) 3d	284000	140	0.	0.	0.	0.	1.91E-34	1.31E-33	3.53E-31	4.55E-29	3.17E-27	
	214000	60	0.	5.76E-37	2.93E-33	3.15E-30	1.04E-27	1.45E-25	9.85E-24	3.80E-22	9.29E-21	
	208000	12	0.	1.27E-36	5.97E-33	4.49E-30	1.20E-27	1.53E-25	4.20E-24	3.31E-22	1.16E-21	
	241500	36	0.	0.	8.89E-38	2.35E-34	1.67E-31	4.32E-29	5.05E-27	3.12E-25	1.15E-23	
4d	282000	60	0.	0.	0.	0.	1.49E-36	9.79E-34	2.55E-31	3.15E-29	2.13E-27	
	298000	84	0.	0.	0.	0.	0.	1.64E-35	5.84E-33	9.51E-31	6.18E-29	

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTANDARD ENERGY LEVELS FROM MOORE (1949) AND BOWEN (1955,1960)

TABLE 58 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF Ar⁺⁺

LEVEL (CM ⁻¹)	TEMPERATURE (DEG K)									
	6000	7200	7600	8000	8400	8800	9200	9600	10000	11000
0	5.99E-01	5.93E-01	5.86E-01	5.80E-01	5.75E-01	5.69E-01	5.64E-01	5.59E-01	5.54E-01	5.42E-01
1112	2.04E-01	2.05E-01	2.05E-01	2.05E-01	2.05E-01	2.05E-01	2.04E-01	2.04E-01	2.03E-01	2.01E-01
1570	8.59E-02	8.66E-02	8.71E-02	8.75E-02	8.78E-02	8.81E-02	8.82E-02	8.83E-02	8.84E-02	8.85E-02
14010	3.09E-02	3.60E-02	4.13E-02	4.67E-02	5.21E-02	5.74E-02	6.30E-02	6.84E-02	7.38E-02	8.00E-02
32246	1.05E-04	1.54E-04	2.16E-04	2.93E-04	3.85E-04	4.94E-04	6.21E-04	7.64E-04	9.24E-04	1.40E-03
115303	3.38E-11	1.20E-10	4.23E-10	1.23E-09	3.25E-09	7.84E-09	1.75E-08	3.65E-08	7.18E-08	3.14E-07
144023	2.09E-14	1.13E-13	5.07E-13	1.94E-12	6.67E-12	2.03E-11	5.59E-11	1.42E-10	3.33E-10	1.01E-08
149413	8.93E-14	5.13E-13	2.44E-12	9.92E-12	3.32E-11	1.12E-10	3.21E-10	8.42E-10	2.04E-09	1.41E-08
176739	5.51E-17	4.35E-16	2.74E-15	1.44E-14	6.55E-14	2.57E-13	8.94E-13	2.80E-12	8.01E-12	7.92E-11
206368	3.13E-19	3.50E-18	3.04E-17	2.12E-16	1.23E-15	6.07E-15	2.61E-14	9.91E-14	3.30E-13	4.93E-12
249377	7.19E-23	1.32E-21	1.70E-20	1.85E-19	1.94E-18	1.05E-17	4.09E-17	3.04E-16	1.34E-15	3.37E-14
253000	4.58E-24	9.44E-23	1.56E-21	1.87E-20	1.76E-19	1.35E-18	8.66E-18	4.76E-17	2.28E-16	6.98E-15
180000	6.55E-17	5.73E-16	4.09E-15	2.40E-14	1.19E-13	5.09E-13	1.92E-12	6.48E-12	1.98E-11	2.27E-10
197480	1.71E-18	1.72E-17	1.34E-16	8.73E-16	4.69E-15	2.16E-14	8.72E-14	3.13E-13	1.01E-12	1.11E-11
226800	1.04E-20	1.48E-19	1.59E-18	1.54E-17	9.28E-17	5.37E-16	2.67E-15	1.16E-14	4.47E-14	8.51E-13
240800	2.39E-24	5.57E-23	9.31E-22	1.17E-20	1.16E-19	9.33E-19	6.24E-18	3.57E-17	1.77E-16	9.03E-15
244000	1.34E-25	3.74E-24	7.33E-23	1.07E-21	1.20E-20	1.09E-19	8.11E-19	5.12E-18	2.79E-17	1.12E-15
214000	1.54E-19	1.90E-18	1.79E-17	1.34E-16	8.31E-16	4.35E-15	1.90E-14	7.09E-14	2.82E-13	4.54E-12
208000	1.11E-19	1.26E-18	1.11E-17	7.90E-17	4.64E-16	2.32E-15	1.01E-14	3.88E-14	1.34E-13	1.00E-11
241500	2.77E-22	4.69E-21	5.89E-20	5.73E-19	4.49E-18	2.91E-17	1.61E-16	7.68E-16	3.24E-15	7.47E-14
232000	8.78E-26	2.39E-24	4.59E-23	6.54E-22	7.24E-21	6.44E-20	4.75E-19	2.94E-18	1.59E-17	6.23E-16
246000	4.16E-27	1.37E-25	3.11E-24	5.16E-23	3.56E-22	6.42E-21	5.45E-20	3.77E-19	2.23E-18	1.08E-16
										1.32E-14
										2.71E-15
										4.16E-14

TABLE 58 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF Mg^{++}

LEVEL (cm^{-1})	TEMPERATURE (DEG K)											
	14000	15000	16000	17000	18000	19000	20000	24000	28000	32000	36000	40000
0	5.13E-01	5.03E-01	4.97E-01	4.90E-01	4.84E-01	4.78E-01	4.72E-01	4.53E-01	4.30E-01	4.23E-01	4.08E-01	3.92E-01
1112	2.73E-01	2.72E-01	2.70E-01	2.68E-01	2.66E-01	2.64E-01	2.62E-01	2.54E-01	2.40E-01	2.41E-01	2.34E-01	2.26E-01
1370	6.73E-02	6.69E-02	6.64E-02	6.59E-02	6.54E-02	6.49E-02	6.44E-02	6.29E-02	6.07E-02	7.80E-02	7.07E-02	7.42E-02
14010	1.22E-01	1.32E-01	1.41E-01	1.50E-01	1.58E-01	1.65E-01	1.72E-01	1.96E-01	2.13E-01	2.25E-01	2.33E-01	2.37E-01
33266	3.36E-03	4.15E-03	5.00E-03	5.87E-03	6.78E-03	7.70E-03	8.63E-03	1.23E-02	1.58E-02	1.90E-02	2.16E-02	2.37E-02
114303	7.31E-06	1.57E-05	3.08E-05	5.55E-05	9.38E-05	1.50E-04	2.28E-04	8.62E-04	2.23E-03	4.44E-03	7.63E-03	1.16E-02
144023	1.15E-07	3.03E-07	7.08E-07	1.50E-06	2.91E-06	5.26E-06	8.97E-06	4.84E-05	1.60E-04	3.91E-04	7.79E-04	1.32E-03
149413	8.80E-07	2.41E-06	5.82E-06	1.26E-05	2.52E-05	4.66E-05	8.12E-05	4.67E-04	1.62E-03	4.09E-03	8.32E-03	1.65E-02
176739	1.04E-08	3.51E-08	9.87E-08	2.50E-07	5.67E-07	1.18E-06	2.27E-06	1.87E-05	7.96E-05	2.40E-04	5.92E-04	1.07E-03
204348	1.52E-04	6.13E-04	2.08E-03	6.12E-03	1.59E-02	3.75E-02	8.09E-02	9.22E-04	5.21E-05	1.90E-04	5.13E-04	1.13E-03
248377	3.37E-11	1.82E-10	7.94E-10	2.91E-09	9.24E-09	2.59E-08	6.37E-08	1.24E-06	1.00E-05	4.78E-05	1.60E-04	4.14E-04
243000	1.05E-11	6.26E-11	2.98E-10	1.18E-09	4.02E-09	1.20E-08	3.21E-08	7.22E-07	6.62E-06	3.47E-05	1.25E-04	3.42E-04
180000	4.17E-08	1.49E-07	4.53E-07	1.21E-06	2.88E-06	6.28E-06	1.26E-05	1.16E-04	5.58E-04	1.80E-03	4.46E-03	9.08E-03
197480	3.11E-09	1.20E-08	3.86E-08	1.08E-07	2.70E-07	6.12E-07	1.28E-06	1.31E-05	6.84E-05	2.34E-04	6.18E-04	1.29E-03
228800	4.64E-10	2.16E-09	8.29E-09	2.71E-08	7.78E-08	1.99E-07	4.65E-07	6.77E-06	4.54E-05	1.89E-04	5.47E-04	1.35E-03
268800	1.03E-11	6.43E-11	2.14E-10	1.29E-09	4.52E-09	1.38E-08	3.78E-08	9.10E-07	9.78E-06	4.77E-05	1.76E-04	4.94E-04
294000	3.03E-12	2.09E-11	1.15E-10	5.03E-10	1.88E-09	6.12E-09	1.77E-08	5.13E-07	5.63E-06	3.37E-05	1.35E-04	4.02E-04
214000	1.73E-09	7.38E-09	2.62E-08	8.02E-08	2.14E-07	5.26E-07	1.17E-06	1.44E-05	8.80E-05	3.34E-04	9.44E-04	2.14E-03
208000	6.41E-10	2.62E-09	8.99E-09	2.64E-08	6.96E-08	1.64E-07	3.60E-07	4.18E-06	2.40E-05	8.81E-05	2.48E-04	5.30E-04
241500	6.15E-11	3.16E-10	1.33E-09	4.69E-09	1.44E-08	3.93E-08	9.70E-08	1.68E-06	1.29E-05	5.86E-05	1.89E-04	4.77E-04
287000	1.60E-12	1.08E-11	5.79E-11	2.54E-10	9.43E-10	3.05E-09	8.77E-09	2.47E-07	2.67E-06	1.58E-05	6.25E-05	1.95E-04
298000	4.31E-13	3.27E-12	1.92E-11	9.17E-11	3.68E-10	1.27E-09	3.88E-09	1.33E-07	1.64E-06	1.08E-05	4.61E-05	1.44E-04

TABLE 58 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR⁺

LEVEL	TEMPERATURE (DEG K)									
	10000	20000	30000	40000	50000	60000	70000	80000	90000	100000
100-11	0	0	0	0	0	0	0	0	0	0
1112	3.74E-01	3.54E-01	2.82E-01	1.74E-01	1.09E-01	2.93E-02	1.34E-02	1.01E-02	8.11E-03	0.
1370	2.14E-01	2.09E-01	1.65E-01	1.02E-01	6.43E-02	1.75E-02	7.98E-03	6.07E-03	4.84E-03	0.
14010	7.11E-02	6.79E-02	5.43E-02	3.38E-02	2.13E-02	5.80E-03	2.64E-03	2.02E-03	1.62E-03	0.
33246	2.37E-01	2.32E-01	2.02E-01	1.35E-01	8.90E-02	2.69E-02	1.27E-02	9.81E-03	7.95E-03	0.
114303	2.52E-02	2.61E-02	2.54E-02	1.91E-02	1.35E-02	6.62E-03	2.37E-03	1.87E-03	1.55E-03	0.
154023	1.60E-02	2.07E-02	3.28E-02	4.01E-02	3.78E-02	2.32E-02	1.59E-02	1.39E-02	1.24E-02	0.
159413	2.02E-03	2.83E-03	5.34E-03	7.82E-03	8.22E-03	6.25E-03	4.77E-03	4.31E-03	3.94E-03	0.
174739	2.24E-02	3.21E-02	6.27E-02	9.47E-02	1.01E-01	8.01E-02	6.24E-02	5.67E-02	5.23E-02	0.
204348	1.84E-03	2.83E-03	6.52E-03	1.14E-02	1.31E-02	1.32E-02	1.13E-02	1.04E-02	1.01E-02	0.
248377	2.11E-03	3.49E-03	9.41E-03	2.04E-02	2.68E-02	3.19E-02	3.09E-02	2.97E-02	2.89E-02	0.
283000	8.89E-04	1.55E-03	5.85E-03	1.60E-02	2.64E-02	3.93E-02	4.37E-02	4.47E-02	4.54E-02	0.
188000	7.72E-04	1.99E-03	5.70E-03	1.72E-02	2.71E-02	4.95E-02	5.81E-02	6.09E-02	6.27E-02	0.
197480	1.60E-02	2.52E-02	6.22E-02	1.18E-01	1.48E-01	1.52E-01	1.34E-01	1.29E-01	1.24E-01	0.
224800	2.35E-03	3.80E-03	9.91E-03	1.99E-02	2.94E-02	2.83E-02	2.63E-02	2.53E-02	2.44E-02	0.
268800	2.70E-03	4.74E-03	1.47E-02	3.53E-02	5.00E-02	6.89E-02	7.09E-02	7.07E-02	7.02E-02	0.
284000	1.14E-03	2.24E-03	8.94E-03	2.77E-02	4.55E-02	8.48E-02	1.02E-01	1.07E-01	1.10E-01	0.
214000	9.71E-04	1.99E-03	8.71E-03	2.95E-02	5.12E-02	1.04E-01	1.39E-01	1.44E-01	1.51E-01	0.
208000	4.10E-03	6.95E-03	2.00E-02	4.45E-02	6.01E-02	7.55E-02	7.42E-02	7.29E-02	7.16E-02	0.
241500	9.99E-04	1.64E-03	4.62E-03	9.90E-03	1.31E-02	1.58E-02	1.52E-02	1.48E-02	1.44E-02	0.
282000	1.00E-03	1.83E-03	6.21E-03	1.63E-02	2.43E-02	3.72E-02	4.04E-02	4.09E-02	4.13E-02	0.
298000	4.44E-04	9.05E-04	3.92E-03	1.31E-02	2.26E-02	4.43E-02	5.81E-02	6.19E-02	6.49E-02	0.
3.68E-04	7.84E-04	3.74E-03	1.37E-02	2.51E-02	5.78E-02	7.68E-02	8.34E-02	8.34E-02	8.34E-02	0.

TABLE 59. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C 3+

STATE	LEVEL	STAT.	TEMPERATURE (DEG K)											
			(CM-1)	(EV)	WT.	3200	3600	4000	4400	4800	5200	5600	6000	6400
1s 2s 2p	0	2	0	0.	2	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
	64556	6	8.0037	0.	6	7.44E-13	1.87E-11	2.47E-10	2.04E-09	1.13E-08	5.24E-08	1.68E-07	5.48E-07	1.49E-06
	302849	2	37.5475	2	0.	0.	0.	0.	0.	0.	4.04E-37	1.61E-34	2.89E-32	2.70E-30
	320071	6	39.6827	2	0.	0.	0.	0.	0.	0.	0.	5.79E-36	1.39E-33	1.69E-31
	324886	10	40.2797	10	0.	0.	0.	0.	0.	0.	0.	2.80E-34	7.32E-34	9.53E-32
4s	401348	2	49.7595	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	408320	6	50.6239	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	410339	10	50.8742	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	410433	14	50.8859	14	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	220000*	2	27.2758	2	0.	6.52E-39	4.29E-35	5.72E-32	2.29E-29	3.64E-27	2.63E-25	1.23E-23	5.14E-21	4.61E-19
1s 2s 2p 3s 3p	300000*	18	37.1943	18	0.	0.	0.	0.	0.	0.	8.03E-34	3.02E-33	1.71E-31	1.54E-29
	300000*	6	37.1943	6	0.	0.	0.	0.	0.	0.	2.68E-34	1.01E-33	0.	0.
	380000*	30	47.1128	30	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.19E-36

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
MONSTARMED ENERGY LEVELS FROM MOORE (1949) AND BOCKASTEN (1956)

TABLE 59 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C 3+

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	14000	15000	16000	17000	18000	19000	20000	24000	28000	32000
0	9.96E-01	9.94E-01	9.91E-01	9.87E-01	9.83E-01	9.79E-01	9.72E-01	9.61E-01	9.42E-01	9.15E-01
64556	3.93E-03	6.10E-03	8.94E-03	1.26E-02	1.89E-02	2.21E-02	2.80E-02	5.89E-02	9.81E-02	1.41E-01
302849	3.03E-14	2.41E-13	1.47E-12	7.29E-12	3.02E-11	1.07E-10	3.36E-10	1.32E-08	1.37E-07	1.03E-06
320071	1.55E-14	1.38E-13	9.40E-13	5.09E-12	2.28E-11	8.73E-11	2.92E-10	1.31E-08	1.43E-07	8.69E-06
324886	1.57E-14	1.49E-13	1.02E-12	5.65E-12	2.59E-11	1.01E-10	3.44E-10	1.54E-08	2.53E-07	1.94E-06
401348	1.22E-18	1.90E-17	2.10E-16	1.75E-15	1.15E-14	6.10E-14	2.81E-13	3.34E-11	9.97E-10	1.25E-08
403320	1.78E-18	2.92E-17	3.34E-16	2.91E-15	1.87E-14	1.09E-13	5.10E-13	6.60E-11	2.09E-09	2.74E-08
410339	2.41E-18	4.01E-17	4.64E-16	4.06E-15	2.80E-14	1.56E-13	7.35E-13	9.75E-11	3.14E-09	4.17E-08
410433	3.35E-18	5.56E-17	6.49E-16	5.57E-15	3.89E-14	2.17E-13	1.02E-12	1.34E-10	4.37E-09	5.81E-08
220000	1.51E-10	6.80E-10	2.54E-09	8.09E-09	2.27E-08	5.69E-08	1.30E-07	1.74E-06	1.11E-05	4.34E-05
300000	3.65E-13	2.85E-12	1.71E-11	8.35E-11	3.41E-10	1.20E-09	3.71E-09	1.31E-07	1.64E-06	1.07E-05
300000	1.22E-13	9.49E-13	5.72E-12	2.70E-11	1.14E-10	3.99E-10	1.24E-09	4.37E-08	5.44E-07	3.57E-06
380000	1.64E-16	2.21E-15	2.15E-14	1.60E-13	9.49E-13	4.67E-12	1.96E-11	1.80E-09	4.48E-08	4.89E-07
380000	1.64E-16	2.21E-15	2.15E-14	1.60E-13	9.49E-13	4.67E-12	1.96E-11	1.80E-09	4.48E-08	4.89E-07

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	44000	48000	60000	80000	100000	200000	400000	600000	1000000	0
0	7.33E-01	6.96E-01	6.03E-01	4.84E-01	3.87E-01	1.39E-01	5.48E-02	3.82E-02	2.42E-02	0.
64556	2.64E-01	3.02E-01	3.83E-01	4.54E-01	4.59E-01	2.62E-01	1.30E-01	9.81E-02	7.70E-02	0.
302849	3.66E-05	7.95E-05	4.23E-04	2.08E-03	4.96E-03	1.57E-02	1.84E-02	1.85E-02	1.82E-02	0.
320071	6.91E-05	1.42E-04	8.39E-04	4.59E-03	1.16E-02	4.17E-02	5.20E-02	5.31E-02	5.33E-02	0.
324886	8.91E-05	2.05E-04	1.23E-03	7.01E-03	1.81E-02	6.72E-02	8.52E-02	8.74E-02	8.83E-02	0.
401348	1.44E-06	4.15E-06	3.99E-05	3.55E-04	1.20E-03	7.75E-03	1.29E-02	1.44E-02	1.58E-02	0.
403320	3.49E-06	1.01E-05	1.01E-04	9.20E-04	3.24E-03	2.21E-02	2.79E-02	4.30E-02	4.70E-02	0.
410339	5.45E-06	1.58E-05	1.61E-04	1.51E-03	5.28E-03	3.43E-02	2.45E-02	7.13E-02	7.81E-02	0.
410433	7.61E-06	2.21E-05	2.24E-04	2.11E-03	7.38E-03	5.08E-02	3.77E-02	9.94E-02	1.09E-01	0.
220000	5.50E-04	9.52E-04	3.08E-03	9.25E-03	1.83E-02	2.84E-02	2.48E-02	2.53E-02	2.05E-02	0.
300000	3.62E-04	7.79E-04	4.08E-03	1.97E-02	4.65E-02	1.45E-01	1.68E-01	1.67E-01	1.65E-01	0.
300000	1.21E-04	2.60E-04	1.34E-03	4.58E-03	1.55E-02	4.82E-02	5.59E-02	5.58E-02	5.49E-02	0.
380000	4.41E-05	1.18E-04	9.97E-04	7.81E-03	2.45E-02	1.34E-01	2.10E-01	2.30E-01	2.45E-01	0.

TABLE 61. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O 3+

STATE	LEVEL (CM-1)	STAT. WT.	TEMPERATURE (DEG K)									
			3200	3600	4000	4400	4800	5200	5600	6000	6400	
2p ³ 2s ²	0	2	3.73E-01	3.68E-01	3.65E-01	3.62E-01	3.60E-01	3.58E-01	3.56E-01	3.54E-01	3.53E-01	
	386	4	6.27E-01	6.32E-01	6.35E-01	6.38E-01	6.40E-01	6.42E-01	6.44E-01	6.46E-01	6.47E-01	
	71379	12	2.58E-14	9.02E-13	1.55E-11	1.59E-10	1.10E-09	5.68E-09	2.32E-08	7.83E-08	2.27E-07	
	126942	10	3.04E-25	1.71E-22	2.70E-20	1.70E-18	5.37E-17	9.94E-16	1.22E-14	1.07E-13	1.12E-13	
	164367	2	2.49E-33	1.09E-29	7.69E-27	1.65E-24	1.44E-22	6.34E-21	1.62E-19	2.70E-18	3.16E-17	
2p ³ 2s ²	180444	6	5.95E-36	4.88E-32	6.61E-29	2.41E-26	3.29E-24	2.11E-22	7.44E-21	1.64E-19	2.44E-18	
	231275	4	0.	0.	5.43E-37	1.04E-33	5.67E-31	1.18E-28	1.11E-26	5.82E-25	1.94E-23	
	255168	10	0.	0.	0.	1.05E-36	1.09E-33	3.89E-31	6.00E-29	4.72E-27	2.16E-25	
	289021	6	0.	0.	0.	0.	0.	2.58E-38	2.00E-35	8.45E-31	6.40E-29	
	357615	2	0.	0.	0.	0.	0.	0.	0.	2.02E-38	4.29E-36	
3p ³ 3d ²	390219	6	0.	0.	0.	0.	0.	0.	0.	0.	8.44E-39	
	419544	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	485823	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	504000*	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	511000**	24	0.	0.	0.	0.	0.	0.	0.	0.	0.	
3p ³ 3d ²	443945	18	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	474555	54	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	501721	90	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	590400**	268	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	555874	54	0.	0.	0.	0.	0.	0.	0.	0.	0.	
2p ³ 4p ²	646000**	96	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	617000**	142	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	721900*	288	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	636000**	90	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	740000*	160	0.	0.	0.	0.	0.	0.	0.	0.	0.	
2p ³ 4p ²	693000*	18	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	796000*	32	0.	0.	0.	0.	0.	0.	0.	0.	0.	

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTARRED ENERGY LEVELS FROM MOORE (1949)

TABLE 61 (CONT.). 1. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF D 3+

LEVEL	TEMPERATURE (DEG K)											
	6000	7200	7600	8000	8400	8800	9200	9600	10000	11000	12000	13000
0	3.52E-01	3.51E-01	3.50E-01	3.49E-01	3.48E-01	3.48E-01	3.47E-01	3.46E-01	3.45E-01	3.44E-01	3.44E-01	3.43E-01
346	6.48E-01	6.49E-01	6.50E-01	6.51E-01	6.52E-01	6.53E-01	6.54E-01	6.55E-01	6.56E-01	6.57E-01	6.58E-01	6.59E-01
71379	3.83E-07	1.34E-06	2.84E-06	5.31E-06	1.02E-05	1.78E-05	2.95E-05	4.86E-05	7.95E-05	1.28E-04	2.04E-04	3.12E-04
126922	3.81E-12	1.84E-11	6.39E-11	2.12E-10	6.28E-10	1.68E-09	4.14E-09	9.46E-09	2.02E-08	4.06E-07	4.22E-07	1.52E-06
164367	2.77E-16	1.91E-15	1.07E-14	5.06E-14	2.08E-13	7.41E-13	2.38E-12	6.93E-12	1.83E-11	1.59E-10	9.44E-10	4.31E-09
180644	2.65E-17	2.21E-16	1.47E-15	8.13E-15	3.81E-14	1.55E-13	5.40E-13	1.81E-12	5.35E-12	1.64E-11	4.04E-10	2.13E-09
231275	3.94E-22	5.95E-21	6.76E-20	6.02E-19	4.33E-18	2.63E-17	1.36E-16	6.12E-16	2.53E-15	5.02E-14	6.23E-13	5.24E-12
255168	6.27E-24	1.24E-22	1.83E-21	2.05E-20	1.82E-19	1.32E-18	8.10E-18	4.26E-17	1.97E-16	5.31E-15	8.87E-14	9.31E-13
289021	2.92E-27	8.69E-26	1.81E-24	2.79E-23	3.31E-22	3.13E-21	2.44E-20	1.60E-19	5.04E-19	1.93E-17	9.19E-16	1.32E-14
357615	4.84E-34	3.23E-32	1.38E-30	4.08E-29	8.70E-28	1.41E-26	1.78E-25	1.83E-24	1.54E-23	1.67E-21	8.21E-20	2.22E-18
390219	1.46E-36	1.43E-34	8.67E-33	3.47E-31	9.80E-30	2.04E-28	3.24E-27	4.14E-26	4.29E-25	7.03E-23	4.94E-21	1.80E-19
419544	0.	6.81E-37	5.61E-35	2.97E-33	1.08E-31	2.82E-30	5.25E-29	8.32E-28	1.03E-26	2.53E-24	2.45E-22	1.17E-20
485823	0.	0.	0.	3.95E-39	2.53E-37	1.11E-35	3.49E-34	8.27E-33	1.52E-31	8.71E-29	1.73E-26	1.52E-24
504000	0.	0.	0.	0.	3.37E-34	1.70E-34	6.11E-35	1.63E-35	3.33E-32	2.45E-29	5.84E-27	6.12E-25
511000	0.	0.	0.	0.	4.06E-38	2.17E-34	8.18E-35	2.28E-33	4.87E-32	3.86E-29	1.02E-26	1.13E-24
643545	0.	0.	1.07E-36	7.13E-35	3.17E-33	1.00E-31	2.34E-30	4.20E-29	5.99E-28	1.90E-25	2.48E-23	1.48E-21
674535	0.	0.	0.	8.09E-37	4.70E-35	1.89E-33	5.50E-32	1.21E-30	2.08E-29	1.03E-26	1.81E-24	1.43E-22
501721	0.	0.	0.	0.	7.45E-37	3.70E-35	1.31E-33	3.44E-32	6.94E-31	1.96E-28	1.14E-25	1.18E-23
559874	0.	0.	0.	0.	0.	0.	0.	0.	6.39E-36	1.44E-32	8.94E-30	2.07E-27
664000	0.	0.	0.	0.	0.	0.	8.82E-38	3.38E-34	9.84E-35	1.46E-31	6.51E-29	1.14E-26
617000	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.43E-37	3.45E-34	1.40E-31
721900	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.49E-34	2.07E-31	4.12E-29
636000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.27E-36	9.87E-34
740000	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.19E-35	1.18E-32	4.15E-30
693000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	7.40E-35
796000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.54E-36	1.51E-33
											0.	0.

TABLE 61 (CONT.) 1. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF D 3+

LEVEL	TEMPERATURE (DEG K)									
	14000	15000	16000	17000	18000	19000	20000	24000	28000	32000
10M-11	3.42E-01	3.41E-01	3.40E-01	3.39E-01	3.38E-01	3.37E-01	3.35E-01	3.29E-01	3.20E-01	3.10E-01
G	6.57E-01	6.57E-01	6.57E-01	6.56E-01	6.55E-01	6.54E-01	6.53E-01	6.49E-01	6.40E-01	6.29E-01
386	1.34E-03	1.34E-03	1.34E-03	1.33E-03	1.33E-03	1.32E-03	1.31E-03	1.29E-03	1.27E-03	1.25E-03
71379	3.69E-04	3.69E-04	3.69E-04	3.68E-04	3.67E-04	3.66E-04	3.65E-04	3.63E-04	3.61E-04	3.59E-04
126942	1.58E-08	1.58E-08	1.58E-08	1.57E-08	1.56E-08	1.55E-08	1.54E-08	1.52E-08	1.50E-08	1.48E-08
164367	3.05E-08	3.05E-08	3.05E-08	3.04E-08	3.03E-08	3.02E-08	3.01E-08	2.99E-08	2.97E-08	2.95E-08
180844	8.88E-09	8.88E-09	8.88E-09	8.87E-09	8.86E-09	8.85E-09	8.84E-09	8.82E-09	8.80E-09	8.78E-09
231275	3.25E-11	3.25E-11	3.25E-11	3.24E-11	3.23E-11	3.22E-11	3.21E-11	3.19E-11	3.17E-11	3.15E-11
255168	6.98E-12	6.98E-12	6.98E-12	6.97E-12	6.96E-12	6.95E-12	6.94E-12	6.92E-12	6.90E-12	6.88E-12
289021	1.29E-13	1.29E-13	1.29E-13	1.28E-13	1.27E-13	1.26E-13	1.25E-13	1.23E-13	1.21E-13	1.19E-13
337615	3.74E-17	3.74E-17	3.74E-17	3.73E-17	3.72E-17	3.71E-17	3.70E-17	3.68E-17	3.66E-17	3.64E-17
390219	3.93E-18	3.93E-18	3.93E-18	3.92E-18	3.91E-18	3.90E-18	3.89E-18	3.87E-18	3.85E-18	3.83E-18
419344	3.22E-19	3.22E-19	3.22E-19	3.21E-19	3.20E-19	3.19E-19	3.18E-19	3.16E-19	3.14E-19	3.12E-19
485823	7.08E-23	7.08E-23	7.08E-23	7.07E-23	7.06E-23	7.05E-23	7.04E-23	7.02E-23	7.00E-23	6.98E-23
504000	3.28E-23	3.28E-23	3.28E-23	3.27E-23	3.26E-23	3.25E-23	3.24E-23	3.22E-23	3.20E-23	3.18E-23
511000	6.39E-23	6.39E-23	6.39E-23	6.38E-23	6.37E-23	6.36E-23	6.35E-23	6.33E-23	6.31E-23	6.29E-23
443345	4.91E-20	4.91E-20	4.91E-20	4.90E-20	4.89E-20	4.88E-20	4.87E-20	4.85E-20	4.83E-20	4.81E-20
474555	6.09E-21	6.09E-21	6.09E-21	6.08E-21	6.07E-21	6.06E-21	6.05E-21	6.03E-21	6.01E-21	5.99E-21
501721	6.22E-22	6.22E-22	6.22E-22	6.21E-22	6.20E-22	6.19E-22	6.18E-22	6.16E-22	6.14E-22	6.12E-22
590400	2.19E-25	2.19E-25	2.19E-25	2.18E-25	2.17E-25	2.16E-25	2.15E-25	2.13E-25	2.11E-25	2.09E-25
559874	9.47E-25	9.47E-25	9.47E-25	9.46E-25	9.45E-25	9.44E-25	9.43E-25	9.41E-25	9.39E-25	9.37E-25
646000	1.09E-29	1.09E-29	1.09E-29	1.08E-29	1.07E-29	1.06E-29	1.05E-29	1.03E-29	1.01E-29	9.99E-29
617000	8.01E-27	8.01E-27	8.01E-27	8.00E-27	7.99E-27	7.98E-27	7.97E-27	7.95E-27	7.93E-27	7.91E-27
721900	2.94E-31	2.94E-31	2.94E-31	2.93E-31	2.92E-31	2.91E-31	2.90E-31	2.88E-31	2.86E-31	2.84E-31
636000	6.32E-28	6.32E-28	6.32E-28	6.31E-28	6.30E-28	6.29E-28	6.28E-28	6.26E-28	6.24E-28	6.22E-28
740000	2.56E-32	2.56E-32	2.56E-32	2.55E-32	2.54E-32	2.53E-32	2.52E-32	2.50E-32	2.48E-32	2.46E-32
693000	3.61E-31	3.61E-31	3.61E-31	3.60E-31	3.59E-31	3.58E-31	3.57E-31	3.55E-31	3.53E-31	3.51E-31
796000	1.62E-35	1.62E-35	1.62E-35	1.61E-35	1.60E-35	1.59E-35	1.58E-35	1.56E-35	1.54E-35	1.52E-35

TABLE 61 (CONT.) 1. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O 3+

LEVEL	TEMPERATURE (DEG K)									
	44000	48000	52000	56000	60000	64000	68000	72000	76000	80000
1C4-11	0	0	0	0	0	0	0	0	0	0
0	2.74E-01	2.42E-01	2.28E-01	1.83E-01	1.50E-01	4.92E-02	1.08E-02	5.67E-03	3.27E-03	0.
346	5.41E-01	5.10E-01	4.52E-01	3.44E-01	2.97E-01	9.81E-02	2.17E-02	1.13E-02	6.53E-03	0.
71379	1.59E-01	1.85E-01	2.01E-01	3.03E-01	3.21E-01	1.77E-01	5.03E-02	2.87E-02	1.77E-02	0.
124942	2.14E-02	2.91E-02	5.43E-02	9.34E-02	1.20E-01	9.87E-02	3.43E-02	2.09E-02	1.34E-02	0.
164367	1.27E-03	1.90E-03	4.43E-03	9.54E-03	1.41E-02	1.51E-02	6.00E-03	3.83E-03	2.58E-03	0.
180644	2.24E-03	3.50E-03	8.99E-03	2.13E-02	3.34E-02	4.02E-02	1.70E-02	1.10E-02	7.54E-03	0.
231275	2.89E-04	5.11E-04	1.78E-03	5.73E-03	1.07E-02	1.86E-02	9.44E-03	6.52E-03	4.69E-03	0.
235168	3.24E-04	6.24E-04	2.51E-03	9.31E-03	1.90E-02	3.92E-02	2.17E-02	1.54E-02	1.13E-02	0.
289921	6.44E-05	1.34E-04	6.09E-04	3.04E-03	7.01E-03	1.85E-02	1.15E-02	8.51E-03	6.47E-03	0.
357615	2.29E-06	5.79E-06	4.30E-05	2.95E-04	8.71E-04	3.76E-03	3.00E-03	2.41E-03	1.95E-03	0.
390219	2.34E-04	6.53E-04	5.91E-05	4.53E-04	1.64E-03	8.91E-03	7.99E-03	6.68E-03	5.99E-03	0.
419544	1.51E-06	4.52E-06	4.87E-05	8.84E-04	1.79E-03	1.20E-02	1.20E-02	1.04E-02	8.94E-03	0.
485823	3.45E-08	1.24E-07	1.09E-06	2.94E-05	1.38E-04	1.49E-03	1.89E-03	1.77E-03	1.62E-03	0.
504000	5.72E-08	2.14E-07	3.84E-06	6.34E-05	3.18E-04	3.93E-03	5.31E-03	5.08E-03	4.74E-03	0.
511000	1.82E-07	7.00E-07	1.30E-05	2.24E-04	1.15E-03	1.50E-02	2.07E-02	2.00E-02	1.80E-02	0.
643545	1.24E-04	3.94E-04	4.91E-05	5.64E-04	2.28E-03	1.82E-02	1.98E-02	1.74E-02	1.55E-02	0.
474555	1.35E-06	4.40E-06	7.03E-05	9.73E-04	4.37E-03	4.37E-02	5.31E-02	4.91E-02	4.44E-02	0.
501721	9.24E-07	3.97E-06	6.11E-05	9.95E-04	4.93E-03	5.99E-02	8.03E-02	7.47E-02	7.15E-02	0.
559874	1.63E-07	7.77E-07	2.33E-05	6.48E-04	4.41E-03	1.01E-01	1.87E-01	1.98E-01	2.01E-01	0.
559874	8.29E-08	3.64E-07	9.09E-06	2.10E-04	1.28E-03	2.37E-02	3.91E-02	4.00E-02	3.94E-02	0.
56000	4.58E-09	2.69E-08	1.27E-06	5.53E-05	4.95E-04	1.96E-02	4.74E-02	5.51E-02	6.02E-02	0.
617000	3.84E-08	1.97E-07	6.03E-06	2.25E-04	1.69E-03	4.71E-02	9.55E-02	1.09E-01	1.09E-01	0.
721900	2.21E-09	1.51E-08	9.98E-07	6.07E-05	6.64E-04	3.94E-02	1.16E-01	1.45E-01	1.67E-01	0.
634000	1.15E-08	6.19E-08	8.89E-05	7.14E-04	2.28E-02	4.95E-02	5.54E-02	5.54E-02	5.89E-02	0.
740000	6.79E-10	4.87E-09	3.58E-07	2.43E-05	2.84E-04	1.92E-02	6.04E-02	7.70E-02	9.02E-02	0.
893000	3.59E-10	2.24E-09	1.74E-07	6.38E-06	4.29E-05	3.03E-03	8.07E-03	9.69E-03	1.09E-02	0.
796500	2.18E-11	1.82E-10	1.57E-08	1.78E-06	2.54E-05	2.57E-03	9.90E-03	1.35E-02	1.64E-02	0.

TABLE 42. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 3+

STATE	LEVEL	STAT.	TEMPERATURE (DEG K)											
			3200	3400	4000	4400	4800	5200	5600	6000	6400	6800	7200	7600
3s 3p ² 3s ²	(CM-1)	WT.												
	0	4	1.06E-00	9.99E-01	9.99E-01	9.99E-01	9.94E-01	9.93E-01	9.89E-01	9.84E-01	9.78E-01	9.73E-01		
	21167	10	1.84E-04	5.20E-04	1.21E-03	2.44E-03	4.37E-03	7.10E-03	1.07E-02	1.54E-02	2.10E-02	2.85E-02		
	34975	6	2.22E-07	9.47E-06	5.13E-05	1.61E-05	4.18E-05	9.34E-05	1.86E-04	3.36E-04	5.65E-04	8.60E-04		
	118128	12	2.51E-23	9.40E-21	1.00E-18	5.02E-17	1.25E-15	1.90E-14	1.96E-13	1.47E-12	8.60E-12	1.37E-11		
3s 3p ² 3p	(CM-1)	WT.												
	145968	10	7.85E-29	1.15E-25	3.94E-23	4.65E-21	2.48E-19	7.15E-18	1.20E-16	1.55E-15	1.57E-14			
	166719	6	4.18E-33	1.73E-29	1.35E-26	3.15E-24	2.96E-22	1.30E-20	3.70E-19	6.41E-18	7.75E-17			
	177833	2	9.41E-36	6.79E-32	8.29E-29	2.77E-26	3.52E-24	2.12E-22	1.10E-21	1.49E-19	2.12E-18			
	290000*	6	0.	0.	0.	0.	2.64E-38	2.11E-35	6.49E-33	9.20E-31	7.12E-29			
3s 3p ² 3d	(CM-1)	WT.												
	206000*	90	0.	3.95E-35	1.44E-31	1.25E-28	3.42E-26	3.94E-24	2.30E-22	7.80E-21	1.70E-19			
	253193	18	0.	0.	0.	4.90E-36	4.91E-33	1.68E-30	2.49E-28	1.90E-26	8.38E-25			
	290069	54	0.	0.	0.	0.	2.73E-37	1.87E-34	5.74E-32	8.22E-30	6.31E-28			
	333000*	90	0.	0.	0.	0.	0.	0.	0.	0.	0.			
(D)	349000*	126	0.	0.	0.	0.	0.	0.	0.	0.	0.			
	241000*	50	0.	0.	0.	0.	0.	0.	0.	0.	0.			
	248159	10	0.	0.	0.	2.81E-37	7.42E-34	1.34E-28	1.59E-26	9.81E-25	3.61E-23			
	307000*	30	0.	0.	0.	0.	0.	0.	9.58E-37	4.12E-34	7.80E-30			
	384000*	50	0.	0.	0.	0.	0.	0.	0.	0.	0.			
(S)	384000*	70	0.	0.	0.	0.	0.	0.	0.	0.	0.			
	31.6152	10	0.	0.	0.	1.53E-36	5.64E-33	5.64E-31	8.71E-29	6.83E-27	3.10E-25			
	378000*	32	0.	0.	0.	0.	0.	0.	0.	0.	0.			

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*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTARRED ENERGY LEVELS FROM MOORE (1949) AND BOWEN (1955)

TABLE 62 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF Ar 3+

LEVEL	TEMPERATURE (DEG K)													
	(CM-1)	14090	15000	16000	17000	18000	19000	20000	24000	28000	32000	36000	40000	
0	7.59E-01	7.24E-01	6.96E-01	6.69E-01	6.44E-01	6.21E-01	6.00E-01	5.29E-01	4.74E-01	4.35E-01	4.02E-01	3.74E-01	3.47E-01	
21167	2.14E-01	2.38E-01	2.59E-01	2.79E-01	2.97E-01	3.13E-01	3.17E-01	3.72E-01	4.18E-01	4.20E-01	4.31E-01	4.37E-01	4.44E-01	
34975	3.11E-02	3.78E-02	4.49E-02	5.20E-02	5.70E-02	6.09E-02	6.27E-02	7.27E-02	8.11E-02	8.39E-02	8.69E-02	8.96E-02	9.21E-02	
118128	1.21E-05	2.61E-05	5.08E-05	9.13E-05	1.53E-04	2.43E-04	4.13E-04	1.33E-03	3.30E-03	6.44E-03	1.07E-02	1.60E-02	2.40E-02	
145948	5.74E-07	1.50E-06	3.47E-06	7.21E-06	1.38E-05	2.44E-05	4.13E-05	2.09E-04	6.58E-04	1.54E-03	2.94E-03	4.91E-03	7.91E-03	
164719	4.10E-08	1.28E-07	3.22E-07	7.47E-07	1.58E-06	3.04E-06	5.54E-06	3.62E-05	1.34E-04	3.62E-04	7.70E-04	1.40E-03	2.34E-03	
177833	4.34E-09	1.42E-08	3.95E-08	9.73E-08	2.49E-07	4.90E-07	8.34E-07	6.20E-06	2.54E-05	7.33E-05	1.95E-04	3.12E-04	5.10E-04	
209000	1.29E-13	9.02E-13	4.93E-12	2.20E-11	2.20E-11	2.70E-11	7.83E-10	2.23E-08	2.41E-07	1.42E-06	5.58E-06	1.64E-05	2.34E-05	
204000	1.09E-08	4.27E-08	1.41E-07	4.03E-07	1.16E-06	1.16E-06	2.35E-06	4.94E-06	5.16E-05	2.71E-04	9.29E-04	2.40E-03	5.10E-03	
233193	1.70E-11	9.24E-11	4.05E-10	1.49E-09	4.71E-09	4.71E-09	1.32E-08	3.32E-08	6.09E-07	4.79E-06	2.23E-05	7.29E-05	1.87E-04	
290849	1.15E-12	8.07E-12	4.41E-11	1.97E-10	7.41E-10	7.41E-10	2.42E-09	7.01E-09	2.50E-07	1.64E-06	1.27E-05	5.01E-05	1.43E-04	
393000	2.98E-13	3.21E-14	2.54E-13	1.59E-12	8.07E-12	8.07E-12	5.44E-11	1.24E-10	7.67E-09	4.42E-07	1.25E-06	6.75E-06	2.34E-05	
369000	8.04E-16	9.70E-15	8.51E-14	5.76E-13	3.15E-12	3.15E-12	9.43E-11	5.59E-11	4.12E-09	8.73E-08	8.54E-07	4.99E-06	2.01E-05	
241000	1.65E-10	8.27E-10	3.37E-09	1.16E-08	3.47E-08	3.47E-08	9.21E-08	2.22E-07	3.51E-06	2.49E-05	1.07E-04	3.30E-04	8.04E-04	
268159	2.03E-12	1.22E-11	5.86E-11	2.53E-10	7.91E-10	7.91E-10	2.34E-09	6.29E-09	1.38E-07	1.23E-06	6.31E-06	2.23E-05	6.03E-05	
307000	1.12E-13	8.84E-13	5.35E-12	2.61E-11	1.04E-10	1.04E-10	3.73E-10	1.15E-09	4.03E-08	5.03E-07	3.30E-06	1.41E-05	4.49E-05	
348000	3.55E-16	4.24E-15	3.69E-14	2.49E-13	1.59E-12	1.59E-12	6.13E-12	2.39E-11	1.73E-09	3.55E-07	2.04E-06	8.34E-06	2.34E-05	
344000	9.59E-17	1.28E-15	1.23E-14	5.00E-14	2.27E-13	2.27E-13	2.54E-12	1.04E-11	9.31E-10	2.23E-08	2.42E-07	1.52E-06	6.57E-06	
255000	7.94E-12	4.32E-11	1.91E-10	7.09E-09	2.67E-08	2.67E-08	6.34E-08	1.62E-07	3.04E-06	3.77E-05	1.14E-04	3.77E-04	9.72E-04	
378000	8.12E-17	1.04E-15	9.62E-15	6.83E-14	3.89E-13	3.89E-13	1.84E-12	7.44E-12	6.10E-10	1.40E-08	1.49E-07	8.84E-07	3.73E-06	

LEVEL	TEMPERATURE (DEG K)													
	(CM-1)	44000	48000	60000	80000	100000	200000	400000	600000	1000000	0	0	0	
0	3.50E-01	3.28E-01	3.05E-01	2.71E-01	1.93E-01	1.36E-01	3.99E-02	1.64E-02	1.18E-02	8.93E-03	0.	0.	0.	
21167	4.30E-01	4.35E-01	4.35E-01	4.08E-01	3.29E-01	2.51E-01	8.57E-02	3.79E-02	2.79E-02	2.17E-02	0.	0.	0.	
34975	1.67E-01	1.73E-01	1.73E-01	1.74E-01	1.54E-01	1.23E-01	4.65E-02	2.16E-02	1.62E-02	1.27E-02	0.	0.	0.	
118128	2.21E-02	2.85E-02	2.85E-02	2.85E-02	6.91E-02	7.66E-02	5.12E-02	3.21E-02	2.64E-02	2.24E-02	0.	0.	0.	
145948	7.40E-03	1.03E-02	1.03E-02	1.03E-02	3.49E-02	4.16E-02	3.49E-02	2.42E-02	2.07E-02	1.81E-02	0.	0.	0.	
164719	2.25E-03	3.33E-03	3.33E-03	3.33E-03	1.44E-02	1.95E-02	1.80E-02	1.39E-02	1.18E-02	1.05E-02	0.	0.	0.	
177833	5.22E-04	7.94E-04	7.94E-04	7.94E-04	3.93E-03	5.21E-03	5.55E-03	4.31E-03	3.84E-03	3.44E-03	0.	0.	0.	
209000	4.00E-03	8.24E-03	8.24E-03	8.24E-03	1.57E-03	3.15E-03	7.43E-03	8.65E-03	8.02E-03	8.83E-03	0.	0.	0.	
204000	9.35E-03	1.54E-02	1.54E-02	1.54E-02	1.67E-01	1.58E-01	2.04E-01	1.73E-01	1.81E-01	1.49E-01	0.	0.	0.	
233193	4.00E-04	7.47E-04	7.47E-04	7.47E-04	9.13E-03	1.50E-02	2.90E-02	2.90E-02	2.88E-02	2.79E-02	0.	0.	0.	
290849	3.59E-04	7.42E-04	7.42E-04	7.42E-04	1.41E-02	2.83E-02	6.48E-02	7.78E-02	7.92E-02	7.94E-02	0.	0.	0.	
393000	7.64E-05	1.87E-04	1.87E-04	1.87E-04	1.91E-02	3.91E-02	7.08E-02	1.03E-01	1.13E-01	1.21E-01	0.	0.	0.	
349000	6.34E-05	1.62E-04	1.62E-04	1.62E-04	7.96E-03	2.12E-02	8.84E-02	1.37E-01	1.53E-01	1.69E-01	0.	0.	0.	
241000	1.65E-03	2.99E-03	2.99E-03	2.99E-03	3.16E-02	5.31E-02	8.8E-02	8.59E-02	8.24E-02	7.89E-02	0.	0.	0.	
268159	1.34E-04	2.65E-04	2.65E-04	2.65E-04	3.80E-03	7.18E-03	1.43E-02	1.54E-02	1.54E-02	1.52E-02	0.	0.	0.	
307000	1.15E-04	2.48E-04	2.48E-04	2.48E-04	5.78E-03	1.23E-02	3.29E-02	4.07E-02	4.22E-02	4.31E-02	0.	0.	0.	
348000	2.60E-05	6.44E-05	6.44E-05	6.44E-05	3.22E-03	8.53E-03	3.29E-02	5.44E-02	6.08E-02	6.58E-02	0.	0.	0.	
344000	2.14E-05	5.76E-05	5.76E-05	5.76E-05	3.30E-03	4.79E-03	1.91E-02	7.19E-02	8.19E-02	8.60E-02	0.	0.	0.	
255000	2.09E-04	3.93E-04	3.93E-04	3.93E-04	4.91E-03	8.87E-03	1.59E-02	1.63E-02	1.59E-02	1.59E-02	0.	0.	0.	
378000	1.20E-05	3.15E-05	3.15E-05	3.15E-05	1.72E-03	4.73E-03	2.10E-02	3.36E-02	3.82E-02	4.15E-02	0.	0.	0.	

TABLE 63. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C II

STATE	LEVEL (CM-1)	LEVEL (EV)	STAT. WT.	TEMPERATURE (DEG K)									
				5200	5400	6000	6400	6800	7200	7600	8000	8400	8800
1s	0	0.	1	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
2s	2411244	298.9484	3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p	2556000	304.4973	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3s	2442215	305.2679	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3p	2861000	352.2300	4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3d	2857000	354.2137	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4s	2858000	354.3377	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4p	2467760	370.3312	4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4d	2939000	370.7032	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4f	2991000	370.8272	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5s	2991000	370.8272	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL (CM-1)	LEVEL (EV)	TEMPERATURE (DEG K)									
		8800	9200	9600	10000	10400	11000	12000	13000	14000	15000
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
2411244	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2456000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2442215	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2861000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2857000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2858000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2467760	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2939000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2991000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
MONITORING ENERGY LEVELS FROM MOORE (1949) AND EDLEN (1952)

TABLE 63 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C 4+

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	19000	20000	24000	28000	32000	36000	40000	44000	60000	100000
0	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
2411244	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2454000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2462215	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2461000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2857000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2858000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2887000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2990000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2991000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2991000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	200000	400000	600000	1000000	2000000	4000000	6000000	10000000	0	0
0	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
2411244	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2454000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2462215	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2461000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2857000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2858000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2887000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2990000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2991000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2991000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TABLE 64. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF N II

STATE	LEVEL (CM-1)	STAT. WT.	TEMPERATURE (DEG K)									
			5200	5600	6000	6400	6800	7200	7600	8000	8400	
1s 2s 2p	0	2	1.30E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	
	80637	4	6.13E-10	3.02E-09	1.20E-08	4.02E-08	1.17E-07	3.01E-07	7.04E-07	1.51E-06	3.61E-06	
	456127	2	0.	0.	0.	0.	0.	0.	0.	3.15E-36	2.34E-36	
	477851	6	0.	0.	0.	0.	0.	0.	0.	1.42E-37	8.53E-36	
	484413	10	0.	0.	0.	0.	0.	0.	0.	7.29E-36	4.62E-36	
4s 4p	606343	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	615135	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	617908	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	619050*	14	0.	0.	0.	0.	0.	0.	0.	0.	0.	
LEVEL (CM-1)	TEMPERATURE (DEG K)											
	8800	9200	9600	10000	11000	12000	13000	14000	15000	16000		
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00		
80637	5.64E-06	1.00E-05	1.65E-05	2.74E-05	7.88E-05	1.90E-04	3.99E-04	7.55E-04	9.99E-04	9.99E-04		
456127	4.09E-33	1.05E-31	2.09E-30	3.15E-29	1.23E-26	1.77E-24	1.19E-22	4.30E-21	9.94E-20	3.25E-03		
477851	3.52E-34	1.05E-32	2.37E-31	4.15E-30	2.15E-27	3.93E-25	3.23E-23	1.51E-21	3.72E-20	1.53E-18		
484413	2.01E-34	6.29E-33	1.48E-31	2.59E-30	1.52E-27	2.98E-25	2.60E-23	1.20E-21	3.30E-20	6.52E-19		
606343	0.	0.	0.	1.29E-38	3.60E-35	2.67E-32	7.17E-30	8.65E-28	5.51E-26	2.09E-24		
615135	0.	0.	0.	0.	3.42E-35	2.79E-32	8.13E-30	1.05E-27	7.11E-26	2.84E-24		
617908	0.	0.	0.	0.	3.97E-35	3.34E-32	9.96E-30	1.32E-27	9.08E-26	3.69E-24		
619050	0.	0.	0.	0.	5.45E-35	4.59E-32	1.37E-29	1.82E-27	1.23E-25	5.09E-24		

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTARRED ENERGY LEVELS FROM MCORE (1949) AND TILFORD (1963)

TABLE 64 (CONT.) 1. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF N II

LFVEL (CM-1)	TEMPERATURE (DEG K)									
	17000	20000	24000	28000	32000	36000	40000	44000	48000	52000
0	9.93E-01	9.91E-01	9.77E-01	9.59E-01	9.26E-01	8.93E-01	8.58E-01	8.23E-01	7.87E-01	7.52E-01
80637	6.64E-03	5.99E-03	5.33E-03	4.54E-03	3.62E-03	2.70E-03	1.78E-03	8.6E-04	3.5E-04	1.5E-04
456127	3.92E-16	5.56E-15	1.30E-12	5.32E-11	1.15E-09	1.08E-08	6.43E-08	2.74E-07	9.10E-07	3.03E-06
477851	5.74E-16	3.50E-15	1.76E-12	6.71E-11	1.30E-09	1.36E-08	8.83E-08	4.04E-07	1.42E-06	5.21E-06
484413	5.82E-16	3.64E-15	1.19E-12	7.39E-11	1.61E-09	1.75E-08	1.16E-07	5.43E-07	1.95E-06	7.41E-06
606343	1.14E-20	1.13E-19	1.60E-16	2.31E-14	1.34E-12	2.67E-11	2.90E-10	2.02E-09	1.01E-08	3.38E-07
615135	1.75E-20	1.80E-19	2.83E-16	5.14E-14	2.70E-12	5.64E-11	6.33E-10	4.54E-09	2.32E-08	8.21E-07
617938	2.37E-20	2.45E-19	3.97E-16	7.75E-14	3.98E-12	8.41E-11	9.55E-10	6.91E-09	3.57E-08	1.24E-07
618050	3.24E-20	4.06E-19	5.54E-16	1.08E-13	5.64E-12	1.17E-10	1.33E-09	9.63E-09	4.97E-08	1.79E-07

LFVEL (CM-1)	TEMPERATURE (DEG K)									
	200000	400000	600000	1000000	2000000	4000000	6000000	10000000	0	0
0	3.17E-01	1.52E-01	1.00E-01	6.77E-02	4.88E-02	4.11E-02	3.86E-02	3.70E-02	0.	0.
80157	5.32E-01	3.40E-01	2.48E-01	1.31E-01	1.38E-01	1.20E-01	1.14E-01	1.10E-01	0.	0.
456127	1.19E-02	2.94E-02	3.36E-02	3.51E-02	3.52E-02	3.45E-02	3.44E-02	3.47E-02	0.	0.
477851	3.04E-02	8.14E-02	9.56E-02	1.02E-01	1.04E-01	1.04E-01	1.04E-01	1.04E-01	0.	0.
484413	4.86E-02	1.33E-01	1.57E-01	1.69E-01	1.72E-01	1.73E-01	1.73E-01	1.73E-01	0.	0.
606343	4.04E-03	1.71E-02	2.34E-02	2.81E-02	3.16E-02	3.31E-02	3.36E-02	3.39E-02	0.	0.
615135	1.14E-02	4.98E-02	6.88E-02	8.30E-02	9.41E-02	9.89E-02	1.00E-01	1.02E-01	0.	0.
617938	1.84E-02	8.22E-02	1.14E-01	1.39E-01	1.57E-01	1.65E-01	1.67E-01	1.68E-01	0.	0.
618050	2.60E-02	1.15E-01	1.59E-01	1.93E-01	2.19E-01	2.31E-01	2.34E-01	2.37E-01	0.	0.

TEMPERATURE (DEG K)

ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTARRED ENERGY LEVELS FROM MOORE (1949)

TABLE 65 (CONT.-1). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O 4+

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	19000	20000	24000	28000	32000	36000	40000	44000	48000	100000
0	9.83E-01	9.77E-01	9.39E-01	9.84E-01	8.17E-01	7.45E-01	6.76E-01	6.11E-01	5.54E-01	2.14E-01
82413	1.72E-02	2.34E-02	6.04E-02	1.15E-01	2.49E-01	3.15E-01	3.14E-01	3.72E-01	4.21E-01	5.85E-01
158798	1.77E-05	3.20E-05	2.07E-04	1.94E-04	1.94E-03	3.32E-03	6.70E-03	1.02E-02	1.52E-02	6.53E-02
213929	8.15E-07	1.82E-06	2.28E-05	1.34E-04	4.89E-04	1.30E-03	2.77E-03	5.04E-03	8.18E-03	5.50E-02
231722	1.10E-07	2.81E-07	4.59E-06	2.98E-05	1.22E-04	3.54E-04	8.11E-04	1.57E-03	2.66E-03	3.81E-02
287909	3.34E-10	9.88E-10	3.00E-08	1.32E-07	1.95E-06	2.50E-06	2.15E-05	4.98E-05	9.49E-05	3.39E-03
550682	3.05E-18	2.44E-17	7.73E-14	1.82E-12	5.77E-11	8.24E-10	7.75E-09	3.70E-08	1.50E-07	5.72E-06
582501	8.22E-19	7.41E-18	7.69E-15	1.08E-12	4.74E-11	6.81E-10	6.45E-09	3.92E-08	1.74E-07	9.65E-06
656197	2.72E-19	2.86E-18	3.58E-15	5.71E-13	2.64E-11	4.82E-10	6.99E-09	3.25E-08	1.31E-07	7.20E-06
724916	5.64E-24	8.76E-23	5.02E-19	2.35E-16	2.68E-14	7.80E-13	1.29E-11	1.24E-10	8.10E-10	2.52E-05
736558	7.05E-24	1.14E-22	7.50E-19	3.87E-16	4.04E-14	1.47E-12	2.53E-11	2.54E-10	1.71E-09	4.07E-06
743379	7.01E-24	1.16E-22	8.31E-19	4.59E-16	4.27E-14	1.86E-12	3.90E-11	3.84E-10	2.31E-09	1.52E-07
749857	6.01E-24	1.02E-22	7.89E-19	4.57E-16	5.21E-14	2.01E-12	3.66E-11	3.84E-10	2.68E-09	1.84E-07
844352	1.10E-21	1.46E-20	9.28E-17	2.41E-14	1.51E-12	3.55E-11	4.96E-10	3.52E-09	1.91E-08	7.37E-07
703506	4.31E-22	2.72E-17	1.06E-14	8.97E-13	2.75E-11	4.15E-10	3.75E-09	2.31E-08	1.18E-06	5.50E-05
824280	9.19E-27	2.07E-25	3.90E-21	4.27E-18	7.86E-16	4.41E-14	1.08E-12	1.44E-11	1.24E-10	1.31E-08
831186	1.40E-26	3.27E-25	6.86E-21	8.11E-18	1.58E-15	9.27E-14	2.39E-12	3.24E-11	2.84E-10	3.17E-08
845389	9.29E-27	2.27E-25	5.40E-21	7.22E-18	1.52E-15	9.48E-14	2.52E-12	3.62E-11	3.28E-10	3.95E-08
853000	7.31E-27	1.84E-25	4.88E-21	6.94E-18	1.51E-15	9.80E-14	2.69E-12	3.95E-11	3.66E-10	4.60E-08
0	8.37E-02	2.33E-02	1.18E-02	6.39E-03	3.90E-03	3.03E-03	2.78E-03	2.59E-03	0.	0.
82413	4.16E-01	1.56E-01	8.73E-02	5.11E-02	3.31E-02	2.64E-02	2.45E-02	2.31E-02	0.	0.
158798	8.01E-02	3.94E-02	2.42E-02	1.53E-02	1.04E-02	8.58E-03	8.02E-03	7.60E-03	0.	0.
213929	1.62E-01	9.70E-02	6.37E-02	4.25E-02	3.01E-02	2.32E-02	2.38E-02	2.26E-02	0.	0.
231722	7.90E-02	5.06E-02	3.39E-02	2.29E-02	1.65E-02	1.39E-02	1.31E-02	1.25E-02	0.	0.
287909	1.04E-02	8.24E-03	5.93E-03	4.22E-03	3.17E-03	2.73E-03	2.59E-03	2.49E-03	0.	0.
550682	6.37E-03	1.28E-02	1.26E-02	1.15E-02	1.05E-02	9.93E-03	9.74E-03	9.50E-03	0.	0.
582501	1.52E-02	3.44E-02	3.51E-02	3.32E-02	3.08E-02	2.95E-02	2.90E-02	2.86E-02	0.	0.
603842	2.17E-02	5.30E-02	5.56E-02	5.36E-02	5.06E-02	4.87E-02	4.81E-02	4.75E-02	0.	0.
724916	1.82E-03	6.86E-03	8.32E-03	9.01E-03	9.27E-03	9.33E-03	9.34E-03	9.34E-03	0.	0.
736558	5.02E-03	1.97E-02	2.43E-02	2.54E-02	2.76E-02	2.79E-02	2.79E-02	2.80E-02	0.	0.
743379	7.97E-03	3.21E-02	3.98E-02	4.39E-02	4.57E-02	4.63E-02	4.65E-02	4.66E-02	0.	0.
749857	1.04E-02	4.39E-02	5.48E-02	6.09E-02	6.37E-02	6.47E-02	6.50E-02	6.52E-02	0.	0.
656197	8.95E-03	2.64E-02	2.94E-02	2.98E-02	2.92E-02	2.87E-02	2.85E-02	2.83E-02	0.	0.
684352	2.19E-02	7.15E-02	8.25E-02	6.60E-02	8.59E-02	8.52E-02	8.49E-02	8.46E-02	0.	0.
703506	3.10E-02	1.11E-01	1.31E-01	1.39E-01	1.41E-01	1.41E-01	1.41E-01	1.41E-01	0.	0.
824280	2.67E-03	1.44E-02	1.97E-02	2.34E-02	2.59E-02	2.70E-02	2.74E-02	2.76E-02	0.	0.
831186	7.52E-03	4.18E-02	5.77E-02	6.94E-02	7.72E-02	8.08E-02	8.19E-02	8.28E-02	0.	0.
845389	1.15E-02	4.67E-02	9.34E-02	1.14E-01	1.28E-01	1.34E-01	1.34E-01	1.38E-01	0.	0.
853000	1.52E-02	9.09E-02	1.28E-01	1.57E-01	1.78E-01	1.87E-01	1.90E-01	1.93E-01	0.	0.

TABLE 66. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR ++

STATE	LEVEL (CM-1)	STAT. WT.	TEMPERATURE (DEG K)									
			5200	5600	6000	6400	6800	7200	7600	8000	8400	
$3s^2 3p^2$ ^3P $^3P_1$ $^3P_2$ $^3P_0$	0	1	1.56E-01	1.54E-01	1.50E-01	1.47E-01	1.44E-01	1.41E-01	1.38E-01	1.36E-01	1.34E-01	
	765	3	3.93E-01	3.79E-01	3.74E-01	3.70E-01	3.66E-01	3.63E-01	3.59E-01	3.56E-01	3.52E-01	
	2032	5	4.50E-01	4.50E-01	4.61E-01	4.64E-01	4.67E-01	4.69E-01	4.71E-01	4.72E-01	4.73E-01	
	16301	5	8.68E-03	1.17E-02	1.50E-02	1.88E-02	2.28E-02	2.71E-02	3.16E-02	3.63E-02	4.10E-02	
	37914	1	4.39E-06	9.04E-06	1.69E-05	2.91E-05	4.71E-05	7.22E-05	1.04E-04	1.49E-04	2.02E-04	
$3s 3p^3$ ^4P $^4P_1$ $^4P_2$ $^4P_0$	100000*	5	7.40E-13	5.34E-12	2.89E-11	1.26E-10	4.65E-10	1.48E-09	4.15E-09	1.05E-08	2.44E-08	
	121730	15	5.58E-15	6.02E-14	4.73E-13	2.87E-12	1.40E-11	5.76E-11	2.04E-10	6.33E-10	1.77E-09	
	141768	9	1.31E-17	2.10E-16	2.32E-15	1.90E-14	1.21E-13	6.30E-13	2.75E-12	1.03E-11	3.43E-11	
	191537	3	4.57E-24	1.96E-22	5.08E-21	8.76E-20	1.08E-18	1.01E-17	7.42E-17	4.47E-16	2.27E-15	
	160000*	5	4.69E-20	1.08E-18	1.63E-17	1.75E-16	1.42E-15	9.16E-15	4.84E-14	2.16E-13	8.38E-13	
$3s^2 3p^2$ ^3P $^3P_1$ $^3P_2$ $^3P_0$	195356	3	1.59E-24	7.34E-23	2.03E-21	3.71E-20	4.82E-19	4.70E-18	3.40E-17	2.29E-16	1.18E-15	
	270000*	15	8.51E-33	1.72E-30	1.71E-28	9.57E-27	3.33E-25	7.81E-24	1.31E-22	1.66E-21	1.65E-20	
	220000*	60	3.47E-26	2.61E-24	1.10E-22	2.92E-21	5.24E-20	6.82E-19	6.78E-18	5.35E-17	3.44E-16	
	294155	12	2.82E-36	9.93E-34	1.40E-31	1.37E-29	6.90E-28	2.25E-26	5.09E-25	8.41E-24	1.04E-22	
	340000*	36	0.	6.38E-30	2.11E-25	3.34E-23	2.94E-21	1.58E-20	5.53E-20	1.36E-19	2.44E-18	
$3s 3p^3$ ^4P $^4P_1$ $^4P_2$ $^4P_0$	400000*	60	0.	0.	0.	0.	1.51E-36	1.63E-34	1.08E-32	4.67E-31	1.41E-29	
	420000*	84	0.	0.	0.	0.	0.	4.20E-36	3.42E-34	1.79E-32	6.43E-31	
	500000*	300	4.23E-35	1.55E-32	2.57E-30	2.25E-28	1.17E-26	3.69E-25	8.97E-24	1.51E-22	1.94E-21	
	380000*	60	0.	0.	0.	0.	6.97E-37	1.04E-34	4.74E-31	1.70E-29	4.54E-28	
	430000*	180	0.	0.	0.	0.	0.	1.22E-36	1.10E-34	6.35E-33	2.48E-31	
$3s 3p^3$ ^4P $^4P_1$ $^4P_2$ $^4P_0$	500000*	300	0.	0.	0.	0.	0.	0.	0.	0.	2.57E-34	
	520000*	420	0.	0.	0.	0.	0.	0.	0.	0.	0.	

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTARRED ENERGY LEVELS FROM MOORE (1949) AND BOWEN (1955)

TABLE 66 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 4+

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	8000	9200	9600	10000	11000	12000	13000	14000	15000	16000
0	1.32E-01	1.30E-01	1.28E-01	1.27E-01	1.23E-01	1.17E-01	1.16E-01	1.14E-01	1.11E-01	1.09E-01
765	3.49E-01	3.40E-01	3.43E-01	3.40E-01	3.33E-01	3.27E-01	3.21E-01	3.16E-01	3.11E-01	3.08E-01
2032	4.73E-01	4.73E-01	4.73E-01	4.72E-01	4.70E-01	4.68E-01	4.68E-01	4.62E-01	4.58E-01	4.55E-01
16301	4.59E-02	5.08E-02	5.57E-02	6.06E-02	7.28E-02	8.48E-02	9.58E-02	1.07E-01	1.17E-01	1.26E-01
37914	2.68E-04	3.46E-04	4.37E-04	5.41E-04	6.62E-04	1.27E-03	1.79E-03	2.31E-03	2.93E-03	3.51E-03
100000	5.23E-08	1.09E-07	1.99E-07	3.57E-07	1.28E-06	3.71E-06	9.08E-06	1.96E-05	3.80E-05	6.79E-05
121730	4.49E-09	1.05E-08	2.29E-08	4.70E-08	2.24E-07	8.21E-07	2.44E-06	6.30E-06	1.62E-05	2.89E-05
141768	1.02E-10	2.75E-10	6.83E-10	1.58E-09	9.77E-09	4.48E-08	1.61E-07	4.82E-07	1.25E-06	2.86E-06
191537	9.93E-15	3.82E-14	1.31E-13	4.04E-13	4.85E-12	3.81E-11	2.17E-10	9.65E-10	3.51E-09	1.08E-08
160000	2.87E-12	8.83E-12	2.47E-11	6.36E-11	5.00E-10	2.78E-09	1.19E-08	4.11E-08	1.20E-07	3.08E-07
193356	5.32E-15	2.10E-14	7.40E-14	2.36E-13	2.94E-12	2.11E-11	1.42E-10	6.52E-10	2.43E-09	7.69E-09
270000	1.37E-19	6.95E-19	5.13E-18	2.55E-17	6.47E-16	1.56E-14	1.84E-13	1.52E-12	9.45E-12	6.68E-11
220000	1.59E-15	6.91E-15	3.68E-14	1.36E-13	2.34E-12	2.51E-11	1.84E-10	1.04E-09	4.58E-09	1.68E-08
298155	1.07E-21	8.76E-21	6.03E-20	3.56E-19	1.70E-17	4.27E-16	6.52E-15	6.73E-14	5.08E-13	2.98E-12
340000	3.42E-24	3.78E-23	3.62E-22	2.59E-21	2.15E-19	9.49E-18	1.91E-16	2.74E-15	2.75E-14	2.07E-13
400000	3.13E-28	5.30E-27	7.08E-26	7.59E-25	1.40E-23	1.04E-20	4.15E-19	9.58E-18	1.45E-16	1.57E-15
420000	1.67E-29	3.23E-28	4.99E-27	6.06E-26	1.31E-23	1.39E-21	6.35E-20	1.72E-18	2.59E-17	3.63E-16
300000	1.97E-20	1.64E-19	1.14E-18	6.52E-18	3.35E-16	8.58E-15	1.35E-13	1.38E-12	1.64E-11	6.30E-11
380000	8.24E-27	1.21E-25	1.42E-24	1.37E-23	1.91E-21	1.17E-19	3.78E-18	7.48E-17	9.89E-16	9.47E-15
430000	6.96E-30	1.46E-28	2.37E-27	3.08E-26	8.28E-24	8.74E-22	4.50E-20	1.52E-18	2.45E-17	3.11E-16
500000	1.24E-34	4.28E-33	1.10E-31	2.17E-30	1.46E-27	3.30E-25	3.24E-23	1.65E-21	4.56E-20	9.74E-19
520000	6.61E-36	2.62E-34	7.67E-33	1.71E-31	1.49E-28	4.20E-26	4.94E-24	2.95E-22	1.02E-20	2.26E-19
										3.47E-18
										1.39E-16
										3.93E-17

TABLE 66 (CONT.) 1. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF Ar ++

LEVEL (CM-1)	TEMPERATURE (DEG K)											
	13000	20000	24000	28000	32000	36000	40000	44000	48000	52000	60000	100000
0	1.04E-01	1.02E-01	9.71E-02	9.29E-02	8.94E-02	8.62E-02	8.31E-02	8.01E-02	7.70E-02	6.75E-02	5.04E-02	3.50E-02
765	2.94E-01	2.90E-01	2.78E-01	2.68E-01	2.59E-01	2.51E-01	2.43E-01	2.34E-01	2.26E-01	1.99E-01	1.50E-01	1.04E-01
2032	4.45E-01	4.42E-01	4.30E-01	4.19E-01	4.08E-01	3.97E-01	3.86E-01	3.75E-01	3.62E-01	3.21E-01	2.44E-01	1.74E-01
16201	1.51E-01	1.50E-01	1.43E-01	1.37E-01	1.31E-01	1.25E-01	1.19E-01	1.13E-01	1.07E-01	9.28E-02	7.89E-02	6.42E-02
37914	5.88E-03	6.69E-03	1.00E-02	1.32E-02	1.53E-02	1.89E-02	2.12E-02	2.32E-02	2.47E-02	2.72E-02	2.94E-02	2.07E-02
100000	2.67E-04	3.84E-04	1.21E-03	2.73E-03	4.98E-03	7.92E-03	1.14E-02	1.52E-02	1.92E-02	3.07E-02	4.19E-02	4.24E-02
121730	1.44E-04	2.41E-04	9.68E-04	2.68E-03	5.93E-03	9.77E-03	1.54E-02	2.24E-02	3.01E-02	5.64E-02	8.50E-02	9.32E-02
141768	2.03E-05	3.43E-05	1.78E-04	5.74E-04	1.37E-03	2.68E-03	4.54E-03	6.79E-03	9.89E-03	2.03E-02	3.54E-02	4.19E-02
191537	1.56E-07	3.10E-07	3.00E-06	1.48E-05	4.68E-05	1.22E-04	2.54E-04	4.50E-04	7.42E-04	2.02E-03	4.83E-03	8.82E-03
160000	2.84E-06	5.13E-06	3.31E-05	1.25E-04	3.56E-04	7.20E-04	1.32E-03	2.14E-03	3.18E-03	7.27E-03	1.42E-02	1.74E-02
193356	1.17E-07	2.42E-07	2.39E-06	1.22E-05	4.11E-05	1.05E-04	2.21E-04	4.04E-04	6.62E-04	1.87E-03	4.52E-03	6.44E-03
270000	2.05E-09	5.63E-09	1.36E-07	1.31E-06	7.16E-06	2.66E-05	7.53E-05	1.74E-04	3.53E-04	1.56E-03	5.91E-03	1.10E-02
220000	3.62E-07	8.21E-07	1.09E-05	6.87E-05	2.71E-04	7.85E-04	1.82E-03	3.61E-03	6.32E-03	2.07E-02	5.81E-02	9.04E-02
298155	1.95E-10	5.94E-10	2.01E-08	2.47E-07	1.62E-06	6.91E-06	2.19E-05	5.60E-05	1.21E-04	6.36E-04	2.89E-03	5.89E-03
340000	2.46E-11	8.78E-11	4.91E-09	8.65E-08	7.39E-07	3.89E-06	1.44E-05	4.28E-05	1.04E-04	6.99E-04	4.03E-03	9.57E-03
400000	4.36E-13	1.95E-12	2.24E-10	6.60E-09	8.29E-08	5.90E-07	2.81E-06	1.00E-05	2.87E-05	2.76E-04	2.26E-03	6.89E-03
420000	1.34E-13	6.49E-13	9.47E-11	3.31E-09	4.72E-08	3.71E-07	1.92E-06	7.32E-06	2.21E-05	2.40E-04	2.23E-03	7.14E-03
300000	4.24E-09	1.30E-08	4.50E-07	5.63E-06	3.72E-05	1.40E-04	5.13E-04	1.32E-03	2.87E-03	1.52E-02	6.89E-02	1.43E-01
360000	1.80E-12	8.23E-12	7.44E-10	1.85E-08	2.04E-07	1.31E-06	5.77E-06	1.93E-05	5.23E-05	4.64E-04	3.21E-03	9.07E-03
430000	1.55E-13	6.77E-13	1.11E-10	4.24E-09	6.46E-08	5.33E-07	2.87E-06	1.13E-05	3.50E-05	4.04E-04	3.99E-03	1.32E-02
500000	1.12E-15	7.33E-15	2.79E-12	1.94E-10	4.62E-09	5.42E-08	3.89E-07	1.91E-06	7.14E-06	1.26E-04	1.89E-03	8.04E-03
520000	3.45E-16	2.44E-15	1.10E-12	9.70E-11	2.63E-09	3.41E-08	2.63E-07	1.39E-06	5.50E-06	1.09E-04	1.84E-03	8.47E-03

TABLE 66 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 4+

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	200000	400000	600000	1000000	2000000	4000000	6000000	10000000	10000000	0
0	8.30E-03	2.57E-03	1.65E-03	1.11E-03	8.49E-04	7.33E-04	6.98E-04	6.71E-04	0.	0.
765	2.48E-02	7.69E-03	4.93E-03	3.40E-03	2.55E-03	2.20E-03	2.09E-03	2.01E-03	0.	0.
7037	4.09E-02	1.28E-02	8.19E-03	5.65E-03	4.24E-03	3.66E-03	3.49E-03	3.35E-03	0.	0.
16301	3.69E-02	1.21E-02	7.91E-03	5.53E-03	4.20E-03	3.65E-03	3.48E-03	3.34E-03	0.	0.
37914	6.37E-03	2.24E-03	1.50E-03	1.07E-03	8.26E-04	7.23E-04	6.92E-04	6.67E-04	0.	0.
100000	2.02E-02	8.96E-03	6.47E-03	4.91E-03	3.95E-03	3.54E-03	3.41E-03	3.31E-03	0.	0.
121740	5.19E-02	2.49E-02	1.84E-02	1.43E-02	1.17E-02	1.05E-02	1.02E-02	9.89E-03	0.	0.
141748	2.69E-02	1.39E-02	1.05E-02	8.32E-03	6.90E-03	6.27E-03	6.07E-03	5.92E-03	0.	0.
191537	6.28E-03	3.87E-03	3.12E-03	2.58E-03	2.22E-03	2.05E-03	2.00E-03	1.94E-03	0.	0.
160000	1.31E-02	7.22E-03	5.61E-03	4.50E-03	3.78E-03	3.46E-03	3.36E-03	3.28E-03	0.	0.
195356	6.11E-03	3.87E-03	3.09E-03	2.57E-03	2.21E-03	2.03E-03	2.00E-03	1.94E-03	0.	0.
270000	1.78E-02	1.44E-02	1.29E-02	1.15E-02	1.05E-02	9.98E-03	9.81E-03	9.68E-03	0.	0.
220000	1.07E-01	6.98E-02	5.83E-02	4.95E-02	4.35E-02	4.07E-02	3.97E-02	3.90E-02	0.	0.
298155	1.17E-02	1.03E-02	9.68E-03	8.86E-03	8.22E-03	7.99E-03	7.80E-03	7.71E-03	0.	0.
340000	2.59E-02	2.72E-02	2.62E-02	2.50E-02	2.39E-02	2.34E-02	2.32E-02	2.30E-02	0.	0.
400000	2.80E-02	3.66E-02	3.78E-02	3.82E-02	3.82E-02	3.81E-02	3.81E-02	3.80E-02	0.	0.
420000	3.40E-02	4.76E-02	5.05E-02	5.20E-02	5.27E-02	5.30E-02	5.30E-02	5.31E-02	0.	0.
300000	2.88E-01	2.62E-01	2.40E-01	2.21E-01	2.05E-01	1.97E-01	1.95E-01	1.93E-01	0.	0.
380000	3.24E-02	3.93E-02	3.97E-02	3.94E-02	3.88E-02	3.84E-02	3.82E-02	3.81E-02	0.	0.
430000	6.77E-02	9.85E-02	1.06E-01	1.10E-01	1.12E-01	1.13E-01	1.13E-01	1.14E-01	0.	0.
500000	6.02E-02	1.28E-01	1.49E-01	1.64E-01	1.78E-01	1.84E-01	1.84E-01	1.87E-01	0.	0.
520000	6.27E-02	1.66E-01	1.99E-01	2.25E-01	2.45E-01	2.55E-01	2.59E-01	2.61E-01	0.	0.

TABLE 67. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C 5+

STATE	LEVEL		STAT.	TEMPERATURE (DEG K)											
	(CM-1)	(EVI)		1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400
1s	0	0.	2	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
2s	2963904	367.4678	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p	2964195	367.5039	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3s	3512929	435.5244	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3p	3513015	435.5471	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3d	3513090	435.5544	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4s	3705071	459.3584	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4p	3705107	459.3629	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4d	3705138	459.3667	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4f	3705151	459.3683	14	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL	TEMPERATURE (DEG K)											
	8000	9200	9600	10000	11000	12000	13000	14000	15000	16000	17000	18000
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
2963904	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2964195	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3512929	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3513015	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3513090	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3705071	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3705107	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3705138	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3705151	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
 NONSTARRED ENERGY LEVELS FROM GARCIA AND MACK (1965)

TABLE 57 (CONT.-1). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C 5+

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	10000	20000	24000	28000	32000	36000	40000	44000	48000	50000
0	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
2963904	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2964195	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3512929	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3513015	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3513090	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3705071	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3705107	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3705138	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3705151	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	10000	20000	24000	28000	32000	36000	40000	44000	48000	50000
0	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
2963904	5.49E-10	2.34E-05	8.13E-04	1.18E-02	3.59E-02	3.77E-02	7.45E-02	5.43E-02	0.	0.
2964195	1.64E-09	7.02E-05	2.44E-03	3.54E-02	1.08E-01	1.13E-01	1.10E-01	1.04E-01	0.	0.
3512929	1.06E-11	3.25E-06	2.18E-04	5.16E-03	2.42E-02	3.09E-02	3.21E-02	3.27E-02	0.	0.
3513015	3.17E-11	9.75E-06	6.54E-04	1.61E-02	7.25E-02	9.28E-02	9.63E-02	9.82E-02	0.	0.
3513090	5.29E-11	1.63E-05	1.09E-03	2.68E-02	1.21E-01	1.55E-01	1.60E-01	1.64E-01	0.	0.
3705071	2.64E-12	1.32E-06	1.37E-04	4.06E-03	2.10E-02	2.80E-02	3.26E-02	3.82E-02	0.	0.
3705107	7.97E-12	4.80E-06	4.12E-04	1.22E-02	6.31E-02	8.66E-02	9.19E-02	9.58E-02	0.	0.
3705138	1.33E-11	8.15E-06	6.87E-04	2.03E-02	1.05E-01	1.44E-01	1.53E-01	1.59E-01	0.	0.
3705151	1.86E-11	1.14E-05	9.62E-04	2.84E-02	1.57E-01	2.02E-01	2.15E-01	2.23E-01	0.	0.

TABLE 48. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF N 5+

STATE	LEVEL		STAT.	TEMPERATURE (DEC K)											
	(CM-1)	(EV)		WT.	5200	5600	6000	6400	6800	7200	7600	8000	8400		
1s	0	0.	1	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00		
1s 1s	3385890	419.7843	3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		
1s 2s	3448000	426.4946	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		
1s 2p	3447308	427.4007	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		
1s 3p	3990000	494.4842	4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		
1s 3p	4008000	496.9158	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		
1s 3d	4811000	497.5358	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		
1s 4s	4200000	520.7202	4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		
1s 4p	4202000	520.9482	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		
1s 4d	4203000	521.0921	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		
1s 4f	4203000	521.0921	28	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		

LEVEL	TEMPERATURE (DEC K)												
	(CM-1)	8000	9200	9600	10000	11000	12000	13000	14000	15000	16000	17000	18000
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
3385890	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3448000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3447308	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3990000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4008000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4811000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4200000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4202000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4203000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4203000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
MONITORING ENERGY LEVELS FROM MOORE (1949) AND EOLEN (1952)

TABLE 408 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF N 5+

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	19000	20000	24000	28000	32000	36000	40000	44000	48000	100000
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
3385870	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.00E 00
3440000	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.07E-26
3447308	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.35E-27
3990000	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.50E-36
4708200	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.42E-26
4708300	0.	0.	0.	0.	0.	0.	0.	0.	0.	3.45E-21
4708400	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.74E-31
4708500	0.	0.	0.	0.	0.	0.	0.	0.	0.	5.94E-31
4708600	0.	0.	0.	0.	0.	0.	0.	0.	0.	9.09E-31
4708700	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.68E-24
4708800	0.	0.	0.	0.	0.	0.	0.	0.	0.	6.27E-33
4708900	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.28E-26
4709000	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.81E-32
4709100	0.	0.	0.	0.	0.	0.	0.	0.	0.	6.65E-26
4709200	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.97E-32
4709300	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.09E-25
4709400	0.	0.	0.	0.	0.	0.	0.	0.	0.	4.16E-32
4709500	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.53E-25

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	200000	400000	600000	1000000	2000000	4000000	6000000	10000000	0	0
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	0.	0.
3385870	7.92E-11	1.54E-05	8.85E-04	1.67E-02	3.51E-02	3.14E-02	2.95E-02	2.80E-02	0.	0.
3440000	1.79E-11	4.23E-06	2.49E-04	5.14E-03	1.13E-02	1.03E-02	9.71E-03	9.24E-03	0.	0.
3447308	2.04E-10	4.94E-05	3.04E-03	6.11E-02	1.34E-01	1.23E-01	1.16E-01	1.11E-01	0.	0.
3990000	1.37E-12	2.34E-06	2.77E-04	9.12E-03	3.03E-02	3.37E-02	3.48E-02	3.42E-02	0.	0.
4008000	1.61E-12	6.58E-06	7.96E-04	2.73E-02	8.98E-02	1.00E-01	1.02E-01	1.02E-01	0.	0.
4013000	5.80E-12	1.98E-05	1.31E-03	4.51E-02	1.49E-01	1.07E-01	1.09E-01	1.70E-01	0.	0.
4200200	3.02E-13	1.10E-06	1.68E-04	6.89E-03	2.61E-02	3.12E-02	3.24E-02	3.31E-02	0.	0.
4202000	8.93E-13	3.27E-06	5.00E-04	2.06E-02	7.81E-02	9.36E-02	9.70E-02	9.94E-02	0.	0.
4203000	1.48E-12	5.44E-06	8.31E-04	3.43E-02	1.30E-01	1.56E-01	1.63E-01	1.64E-01	0.	0.
4203000	2.07E-12	7.61E-06	1.16E-03	4.80E-02	1.82E-01	2.18E-01	2.26E-01	2.32E-01	0.	0.

TABLE 69. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O 5+

STATE	LEVEL		STAT.	TEMPERATURE (DEG K)									
	(CM-1)	(EV)		WT.	5200	5600	6000	6400	6800	7200	7600	8000	8400
1s 2s	0	0.	2	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
2p 3s	96730	11.9927	6	7.14E-12	4.83E-11	2.53E-10	1.08E-09	3.88E-09	1.21E-08	3.34E-08	8.35E-08	1.91E-07	0.
3p 3s	640040	76.3528	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3p 3p	646218	82.5984	4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3d 3d	676656	83.6445	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4s	852694	105.7181	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4p 3p	863376	107.0422	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4d 3d	866893	107.4783	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4f 3p	867083	107.5018	14	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL		TEMPERATURE (DEG K)										
(CM-1)	8800	9200	9600	10000	11000	12000	13000	14000	15000	16000	17000	18000
0	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	9.99E-01	9.99E-01	9.99E-01
96730	4.06E-07	8.08E-07	1.52E-06	2.71E-06	9.60E-06	2.74E-05	6.72E-05	1.64E-04	2.80E-04	5.09E-04	8.34E-04	1.31E-03
640040	0.	0.	0.	0.	4.39E-17	4.70E-16	1.72E-15	2.71E-15	2.18E-15	1.01E-15	2.98E-16	8.04E-16
646218	0.	0.	0.	0.	4.29E-18	6.11E-17	2.85E-16	5.52E-16	5.30E-16	2.80E-16	9.75E-17	2.23E-17
676656	0.	0.	0.	0.	0.	3.70E-15	1.87E-14	3.93E-14	3.93E-14	2.24E-14	7.96E-15	1.90E-15
852694	0.	0.	0.	0.	0.	0.	0.	8.75E-19	3.01E-18	5.00E-18	4.55E-18	2.50E-18
863376	0.	0.	0.	0.	0.	0.	0.	0.	3.24E-18	5.74E-18	5.52E-18	3.20E-18
866893	0.	0.	0.	0.	0.	0.	0.	0.	3.84E-18	6.97E-18	6.09E-18	4.02E-18
867083	0.	0.	0.	0.	0.	0.	0.	0.	5.31E-18	9.40E-18	9.42E-18	5.55E-18

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTANDARD ENERGY LEVELS FROM MOORE (1949)

TABLE 69 (CONT.) 1. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O 5+

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	19000	20000	24000	28000	32000	36000	40000	44000	48000	50000
0	9.98E-01	9.97E-01	9.91E-01	9.80E-01	9.63E-01	9.41E-01	9.15E-01	8.87E-01	8.58E-01	8.28E-01
96730	1.97E-03	2.84E-03	9.01E-03	2.74E-02	3.73E-02	5.91E-02	8.47E-02	1.13E-01	1.42E-01	1.72E-01
640040	8.91E-22	1.00E-20	2.15E-17	5.10E-15	3.06E-13	7.32E-12	9.19E-11	7.22E-10	4.00E-09	1.67E-07
666218	3.68E-22	4.58E-21	1.34E-17	3.79E-15	2.83E-13	7.71E-12	1.07E-10	9.21E-10	5.47E-09	2.07E-07
674656	3.24E-22	4.16E-21	1.35E-17	4.31E-15	3.23E-13	9.17E-12	1.32E-10	1.16E-09	7.08E-09	3.64E-07
852496	9.04E-29	2.28E-27	6.24E-23	9.14E-20	2.15E-17	1.49E-15	4.30E-14	6.90E-13	1.02E-12	1.02E-09
863376	1.21E-28	3.17E-27	9.87E-23	1.59E-19	4.00E-17	2.92E-15	8.94E-14	1.46E-12	1.40E-11	2.36E-09
866893	1.54E-28	4.11E-27	1.35E-22	2.31E-19	5.69E-17	4.22E-15	1.31E-13	2.17E-12	2.23E-11	3.62E-09
867083	2.13E-28	5.67E-27	1.84E-22	3.74E-19	7.89E-17	5.87E-15	1.83E-13	3.02E-12	3.10E-11	5.04E-09

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	200000	400000	600000	800000	1000000	2000000	4000000	6000000	10000000	0
0	3.84E-01	2.15E-01	1.39E-01	8.58E-02	5.57E-02	4.41E-02	3.49E-02	2.81E-02	0.	0.
96730	5.75E-01	4.54E-01	3.30E-01	2.74E-01	1.56E-01	1.28E-01	1.19E-01	1.13E-01	0.	0.
640040	3.85E-03	2.15E-02	2.99E-02	3.42E-02	3.52E-02	3.50E-02	3.49E-02	3.47E-02	0.	0.
666218	9.58E-03	5.80E-02	8.43E-02	9.87E-02	1.03E-01	1.04E-01	1.04E-01	1.04E-01	0.	0.
674656	1.50E-02	9.51E-02	1.38E-01	1.62E-01	1.71E-01	1.73E-01	1.73E-01	1.73E-01	0.	0.
852496	8.33E-04	1.00E-02	1.60E-02	2.51E-02	3.02E-02	3.24E-02	3.31E-02	3.37E-02	0.	0.
863376	2.31E-03	2.89E-02	5.25E-02	7.43E-02	9.99E-02	9.69E-02	9.91E-02	1.01E-01	0.	0.
866893	3.74E-03	4.76E-02	8.68E-02	1.23E-01	1.49E-01	1.61E-01	1.65E-01	1.68E-01	0.	0.
867083	5.26E-03	6.66E-02	1.22E-01	1.72E-01	2.09E-01	2.26E-01	2.31E-01	2.35E-01	0.	0.

TABLE 70. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 5+

STATE	LEVEL	STAT.	WT.	TEMPERATURE (DEG K)									
				5200	5400	6000	6400	6800	7200	7600	8000	8400	
3s ² 3p ²	1470	6	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	
	218631	19	1.34E-26	9.79E-25	4.04E-23	1.03E-21	1.83E-20	2.37E-19	2.53E-18	1.82E-17	1.17E-16		
	101284	12	2.93E-12	1.46E-11	8.06E-11	3.60E-10	1.33E-09	4.33E-09	1.24E-08	3.20E-08	7.32E-08		
	132530	10	2.97E-18	3.98E-15	3.74E-14	2.87E-13	1.51E-12	7.94E-12	2.79E-11	9.44E-11	2.77E-10		
	183112	6	1.49E-22	5.40E-21	1.21E-19	1.84E-18	2.04E-17	1.72E-16	1.16E-15	6.49E-15	2.10E-14		
3s ² 3p ²	169801	2	1.97E-21	3.50E-20	9.83E-19	1.22E-17	1.13E-16	8.21E-16	4.82E-15	2.37E-14	1.00E-13		
	315000*	90	3.17E-37	1.56E-34	3.34E-32	3.67E-30	2.32E-28	9.24E-27	2.50E-25	.87E-24	7.13E-23		
	370000*	30	0.	0.	0.	5.22E-36	6.83E-34	5.20E-32	2.51E-30	8.21E-29	1.93E-27		
	270000*	20	1.80E-32	3.63E-30	3.61E-28	2.02E-26	7.04E-25	1.84E-23	2.78E-22	3.54E-21	3.53E-20		
	(all)	2	0.	3.12E-39	1.07E-34	1.77E-34	1.60E-32	8.81E-31	3.17E-29	7.99E-28	1.48E-26		
3s ² 3p ²	410300*	6	0.	0.	0.	0.	2.88E-38	3.51E-36	2.58E-34	1.23E-32	4.09E-31		
	454780	10	0.	0.	0.	0.	0.	8.93E-38	6.52E-36	4.52E-34	3.16E-34		
	460000*	14	0.	0.	0.	0.	0.	0.	4.66E-38	3.58E-36	1.82E-34		
	469000**	24	0.	0.	0.	0.	0.	0.	0.	1.21E-34	6.44E-33		
	4	4	540000*	72	0.	0.	0.	0.	0.	0.	0.	0.	
3s ² 3p ²	580000*	120	0.	0.	0.	0.	0.	0.	0.	0.	0.		
	600000*	168	0.	0.	0.	0.	0.	0.	0.	0.	0.		
	4	4	600000*	150	0.	0.	0.	0.	0.	0.	0.		
	4	4	420000*	30	0.	0.	0.	0.	1.19E-38	6.71E-36	5.10E-32	1.84E-30	
	4	4	600000*	74	0.	0.	0.	0.	0.	0.	0.	0.	
3s ² 3p ²	4	4	670000*	90	0.	0.	0.	0.	0.	0.	0.		
	4	4	710000*	150	0.	0.	0.	0.	0.	0.	0.		
	4	4	730000*	210	0.	0.	0.	0.	0.	0.	0.		
	4	4	730000*	210	0.	0.	0.	0.	0.	0.	0.		
	4	4	730000*	210	0.	0.	0.	0.	0.	0.	0.		

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTARRED ENERGY LEVELS FROM MOORE (1949) AND FANCIET ET AL. (1961)

TABLE 70 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 5+

LEVEL	TEMPERATURE (DEG K)												
	(CM-1)	8800	9200	9600	10000	11000	12000	13000	14000	15000	16000	17000	18000
1470	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	9.99E-01
210631	6.34E-16	2.97E-15	1.22E-14	4.49E-14	7.69E-13	8.20E-12	6.08E-11	3.38E-10	1.50E-09	5.51E-09	1.74E-08	4.02E-08	6.85E-08
101294	1.64E-07	3.32E-07	6.37E-07	1.16E-06	4.28E-06	1.27E-05	3.19E-05	7.01E-05	1.39E-04	2.53E-04	4.29E-04	6.85E-04	1.07E-03
137536	8.24E-10	2.09E-09	4.91E-09	1.08E-08	5.98E-08	2.50E-07	8.36E-07	2.36E-06	5.78E-06	1.27E-05	2.54E-05	4.70E-05	7.39E-05
183112	1.27E-13	4.60E-13	1.50E-12	4.47E-12	4.81E-11	3.48E-10	1.86E-09	7.81E-09	2.71E-08	8.04E-08	2.11E-07	4.94E-07	7.39E-07
169801	3.72E-13	1.23E-12	3.68E-12	1.01E-11	9.14E-11	5.72E-10	2.70E-09	1.02E-08	3.24E-08	8.89E-08	2.14E-07	4.78E-07	7.39E-07
315000	8.19E-21	7.61E-21	5.87E-20	3.35E-19	2.32E-17	7.08E-16	1.28E-14	1.32E-13	1.30E-12	8.54E-12	4.48E-11	1.94E-10	3.05E-09
170000	3.40E-26	6.64E-25	5.15E-24	4.89E-23	5.81E-21	3.23E-18	9.64E-16	1.76E-14	2.27E-13	2.02E-12	1.42E-11	8.04E-11	1.27E-10
270000	2.85E-18	1.93E-18	1.11E-17	5.54E-17	1.86E-15	3.67E-14	4.13E-13	3.65E-12	2.17E-11	1.09E-10	4.99E-10	1.59E-09	2.54E-09
342236	2.10E-23	2.37E-24	2.18E-23	1.69E-22	1.45E-20	5.97E-19	1.38E-17	2.05E-16	2.12E-15	1.63E-14	5.90E-14	4.91E-13	7.39E-13
410000	9.81E-30	1.79E-28	2.56E-27	2.97E-26	6.21E-24	5.34E-22	2.31E-20	5.84E-19	9.59E-18	1.11E-16	9.63E-16	6.57E-15	1.07E-14
454700	1.08E-32	2.71E-31	5.19E-30	7.47E-29	2.96E-26	4.14E-24	2.71E-22	9.75E-21	2.18E-19	3.30E-18	3.62E-17	3.05E-16	4.02E-15
460000	6.45E-33	1.68E-31	5.33E-30	5.20E-29	2.09E-26	3.10E-24	2.13E-22	7.99E-21	1.88E-19	2.89E-18	3.26E-17	2.82E-16	3.62E-15
469000	2.54E-33	7.04E-32	1.48E-30	2.44E-29	1.11E-26	1.81E-24	1.35E-22	5.43E-21	1.34E-19	2.20E-18	2.61E-17	2.35E-16	3.05E-15
540000	0.	5.18E-36	1.06E-34	2.68E-33	3.07E-30	1.09E-27	1.56E-25	1.10E-23	4.42E-22	1.12E-20	1.93E-19	2.42E-18	3.62E-17
590000	0.	0.	4.41E-37	1.42E-35	2.74E-32	1.50E-29	3.11E-27	3.02E-25	1.59E-23	5.10E-22	1.09E-20	1.65E-19	2.54E-18
600000	0.	0.	0.	1.12E-36	2.80E-33	1.91E-30	4.77E-28	5.41E-26	3.27E-24	1.18E-22	2.80E-21	4.67E-20	7.39E-19
420000	4.78E-29	9.37E-28	1.43E-26	4.20E-25	4.20E-23	4.02E-21	1.91E-19	5.22E-18	9.18E-17	1.13E-15	1.03E-14	7.39E-14	1.07E-13
600000	0.	0.	0.	1.99E-37	5.00E-34	3.41E-31	8.51E-29	9.64E-27	5.89E-25	2.11E-23	5.00E-22	8.34E-21	1.27E-20
670000	0.	0.	0.	0.	1.58E-37	2.32E-34	1.10E-31	2.18E-29	2.12E-27	1.17E-25	4.01E-24	9.29E-23	1.42E-21
710000	0.	0.	0.	0.	0.	3.19E-36	2.20E-33	5.95E-31	7.43E-29	5.34E-27	2.26E-26	6.33E-24	1.07E-23
730000	0.	0.	0.	0.	0.	4.06E-37	3.36E-34	1.07E-31	1.57E-29	1.24E-27	5.83E-26	1.79E-24	2.54E-23

TABLE 70 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 5+

LEVEL	TEMPERATURE (DEG K)									
	19000	20000	24000	28000	32000	36000	40000	44000	48000	50000
(CM-1)										
1470	9.99E-01	9.98E-01	9.94E-01	9.96E-01	9.73E-01	9.55E-01	9.32E-01	9.04E-01	8.74E-01	7.70E-01
218631	1.20E-07	2.73E-07	1.68E-06	2.14E-05	9.32E-05	2.71E-04	6.29E-04	1.24E-03	2.17E-03	7.03E-03
101244	1.04E-03	1.52E-03	5.01E-03	1.17E-02	2.15E-02	3.54E-02	5.14E-02	6.92E-02	8.77E-02	1.41E-01
132530	4.15E-05	1.34E-04	6.41E-04	1.35E-03	4.44E-03	8.44E-03	1.39E-02	2.07E-02	2.84E-02	5.34E-02
183112	1.06E-06	2.11E-06	1.85E-05	9.72E-05	2.76E-04	6.72E-04	1.39E-03	2.38E-03	3.77E-03	9.69E-03
169801	9.69E-07	1.84E-06	1.37E-05	5.76E-05	1.68E-04	3.81E-04	7.29E-04	1.23E-03	1.87E-03	4.13E-03
319000	7.32E-10	2.40E-09	1.02E-07	1.69E-06	1.10E-05	5.18E-05	1.77E-04	4.78E-04	1.04E-03	3.17E-02
319000	3.79E-12	1.53E-11	1.26E-09	2.34E-08	3.10E-07	1.32E-06	6.19E-06	2.64E-05	6.94E-05	5.94E-04
270000	4.91E-09	1.36E-08	3.38E-07	1.34E-06	1.85E-05	6.95E-05	1.98E-04	4.53E-04	9.30E-04	4.10E-03
347286	2.06E-12	7.48E-12	4.44E-10	8.15E-09	7.18E-08	3.87E-07	1.67E-06	4.34E-06	1.07E-05	7.25E-05
410000	3.66E-14	1.72E-13	2.30E-11	7.53E-10	1.03E-08	7.74E-08	1.87E-07	1.43E-06	4.20E-06	4.29E-05
444740	2.08E-15	1.14E-14	2.61E-12	1.26E-10	2.20E-09	2.15E-08	1.29E-07	5.50E-07	1.83E-06	2.44E-05
460000	1.94E-15	1.19E-14	2.67E-12	1.19E-10	2.53E-09	2.45E-08	1.49E-07	6.96E-07	2.19E-06	3.02E-05
460000	1.68E-15	9.87E-15	2.67E-12	1.45E-10	2.89E-09	2.93E-08	1.85E-07	5.29E-07	2.87E-06	4.17E-05
540000	2.33E-17	1.79E-16	1.14E-13	1.14E-11	3.56E-10	5.15E-09	4.32E-08	2.44E-07	1.02E-06	2.28E-05
540000	1.88E-18	1.68E-17	1.72E-14	2.42E-12	9.82E-11	1.73E-09	1.71E-08	1.10E-07	5.14E-07	1.15E-05
600000	5.79E-19	5.58E-18	7.27E-15	1.21E-12	5.60E-11	1.09E-09	1.17E-08	6.01E-08	3.95E-07	1.26E-05
420000	4.30E-13	2.09E-12	3.15E-10	1.15E-08	1.64E-07	1.30E-06	6.75E-06	2.57E-05	7.78E-05	8.43E-04
600000	1.03E-19	9.94E-19	1.30E-15	2.17E-13	9.99E-12	1.95E-10	2.08E-09	1.53E-08	7.04E-08	2.25E-06
670000	1.55E-21	1.94E-20	3.86E-17	1.78E-14	1.29E-12	3.57E-11	5.03E-10	4.35E-09	2.60E-08	1.26E-06
710000	1.25E-22	1.82E-21	8.88E-18	3.50E-15	3.55E-13	1.20E-11	1.94E-10	1.94E-09	1.31E-08	8.05E-07
730000	3.8E-23	6.05E-22	3.74E-18	1.90E-15	2.02E-13	7.56E-12	1.34E-10	1.43E-09	1.00E-08	6.98E-07

TABLE 70 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 5+

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	200000	400000	600000	1000000	2000000	4000000	6000000	10000000	0	0
1470	1.13E-01	2.97E-02	1.70E-02	1.04E-02	7.22E-03	5.94E-03	5.56E-03	5.27E-03	0.	0.
216331	3.94E-02	2.27E-02	1.69E-02	1.07E-02	7.03E-03	5.15E-03	4.80E-03	4.52E-03	0.	0.
101284	1.11E-01	4.19E-02	2.88E-02	1.93E-02	1.34E-02	1.13E-02	1.09E-02	1.04E-02	0.	0.
137930	7.36E-02	3.09E-02	2.07E-02	1.45E-02	1.09E-02	9.47E-03	8.98E-03	8.52E-03	0.	0.
163112	3.07E-02	1.55E-02	1.10E-02	8.11E-03	6.33E-03	5.56E-03	5.32E-03	5.14E-03	0.	0.
169801	1.13E-02	5.40E-03	3.79E-03	2.76E-03	2.13E-03	1.86E-03	1.78E-03	1.72E-03	0.	0.
315000	1.79E-01	1.44E-01	1.20E-01	1.01E-01	8.64E-02	7.96E-02	7.74E-02	7.56E-02	0.	0.
370000	4.00E-02	3.94E-02	3.52E-02	3.10E-02	2.77E-02	2.60E-02	2.55E-02	2.50E-02	0.	0.
270000	5.49E-02	3.77E-02	2.94E-02	2.39E-02	1.98E-02	1.80E-02	1.74E-02	1.69E-02	0.	0.
342286	3.26E-03	2.91E-03	2.51E-03	2.15E-03	1.88E-03	1.75E-03	1.71E-03	1.67E-03	0.	0.
410000	6.09E-03	6.83E-03	6.39E-03	5.84E-03	5.38E-03	5.13E-03	5.04E-03	4.97E-03	0.	0.
454790	7.25E-03	9.69E-03	9.57E-03	9.15E-03	8.68E-03	8.41E-03	8.31E-03	8.24E-03	0.	0.
460000	9.77E-03	1.33E-02	1.32E-02	1.21E-02	1.21E-02	1.17E-02	1.16E-02	1.15E-02	0.	0.
449000	1.57E-02	2.21E-02	2.22E-02	2.15E-02	2.06E-02	2.01E-02	1.99E-02	1.97E-02	0.	0.
540000	2.83E-02	5.14E-02	5.62E-02	5.81E-02	5.88E-02	5.87E-02	5.86E-02	5.86E-02	0.	0.
560000	3.53E-02	7.41E-02	8.51E-02	9.17E-02	9.52E-02	9.65E-02	9.68E-02	9.71E-02	0.	0.
600000	4.28E-02	9.64E-02	1.14E-01	1.29E-01	1.31E-01	1.34E-01	1.35E-01	1.35E-01	0.	0.
620000	1.40E-01	1.65E-01	1.56E-01	1.44E-01	1.33E-01	1.28E-01	1.26E-01	1.24E-01	0.	0.
600400	7.65E-03	1.73E-02	2.03E-02	2.23E-02	2.35E-02	2.39E-02	2.41E-02	2.42E-02	0.	0.
670000	1.39E-02	4.02E-02	5.14E-02	6.04E-02	6.69E-02	7.00E-02	7.11E-02	7.19E-02	0.	0.
710000	1.73E-02	5.31E-02	7.79E-02	9.51E-02	1.08E-01	1.15E-01	1.17E-01	1.19E-01	0.	0.
730000	2.10E-02	7.57E-02	1.04E-01	1.29E-01	1.50E-01	1.60E-01	1.63E-01	1.64E-01	0.	0.

TABLE 71. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF R 6+

STATE	LEVEL		STAT.	TEMPERATURE (DEG K)											
	(CM-1)	(EV)		5200	5600	6000	6400	6800	7200	7600	8000	8400	8800	9200	9600
1s	0	0.	2	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
2s	4034806	500.2393	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p	4035348	500.3065	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3s	4782276	592.9114	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3p	4782437	592.9313	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3d	4782575	592.9484	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4s	5043859	625.3427	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4p	5043926	625.3510	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4d	5043985	625.3583	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4f	5044010	625.3614	14	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL		TEMPERATURE (DEG K)											
(CM-1)	(EV)	8800	9200	9600	10000	11000	12000	13000	14000	15000	16000	17000	18000
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
4034806	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4035348	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4782276	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4782437	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4782575	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5043859	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5043926	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5043985	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5044010	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTANDARD ENERGY LEVELS FROM GARCIA AND MACK (1965)

TABLE 71 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF N 6+

LEVEL (CM-1)	TEMPERATURE (DEG K)										
	10000	20000	24000	28000	32000	36000	40000	44000	48000	60000	100000
0	1.00E 00	1.00E 00	1.00E 00	1.30E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
4034806	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4035348	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4782276	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4782437	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4782575	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5043859	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5043926	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5043985	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5044010	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL (CM-1)	TEMPERATURE (DEG K)										
	200000	400000	600000	1000000	2000000	4000000	6000000	10000000	0	0	0
0	1.00E 00	1.00E 00	1.00E 00	9.68E-01	5.17E-01	1.62E-01	9.85E-02	6.44E-02	0.	0	0
4034806	2.40E-13	4.90E-07	6.28E-05	2.92E-03	2.84E-02	3.81E-02	3.74E-02	3.61E-02	0.	0.	0.
4035348	7.40E-13	1.49E-06	1.88E-04	9.74E-03	8.52E-02	1.14E-01	1.12E-01	1.08E-01	0.	0.	0.
4782276	1.14E-15	3.30E-08	1.05E-05	9.95E-04	1.66E-02	2.91E-02	3.13E-02	3.24E-02	0.	0.	0.
4782437	3.43E-15	1.01E-07	3.14E-05	2.98E-03	4.97E-02	8.73E-02	9.39E-02	9.72E-02	0.	0.	0.
4782575	5.71E-15	1.69E-07	5.22E-05	4.97E-03	8.29E-02	1.45E-01	1.56E-01	1.62E-01	0.	0.	0.
5043859	1.74E-14	1.32E-08	5.58E-06	6.61E-04	1.31E-02	2.65E-02	2.94E-02	3.12E-02	0.	0.	0.
5043926	5.21E-16	3.90E-08	1.68E-15	2.05E-03	4.12E-02	7.94E-02	8.82E-02	9.36E-02	0.	0.	0.
5043985	8.71E-16	6.60E-08	2.79E-05	3.41E-03	6.87E-02	1.32E-01	1.47E-01	1.54E-01	0.	0.	0.
5044010	1.22E-15	9.24E-08	3.91E-05	4.78E-03	9.62E-02	1.85E-01	2.04E-01	2.19E-01	0.	0.	0.

TABLE 1. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O 6+

STATE	LEVEL (CM-1)	LEVEL (eV)	STAT. WT.	TEMPERATURE (DEG K)									
				5200	5400	6000	6400	6800	7200	7600	8000	8400	8800
1s 1S	0	0.	1	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
1s 2s	4525270	541.0475	3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1s 2p	4590000*	569.0728	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1s 3s	4597259	569.9728	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1s 3p	5340000*	662.0585	4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1s 3d	4359363	540.4782	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1s 4s	5365010	665.1593	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1s 4p	5620000*	696.7732	4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1s 4d	5623000*	697.1452	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1s 4f	5624000*	697.2691	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1s 4g	5624000*	697.2691	28	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	8800	9200	9600	10000	11000	12000	13000	14000	15000	16000
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
4525270	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4590000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4597259	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5340000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4359363	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5365010	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5620000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5623000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5624000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5624000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
UNSTARRED ENERGY LEVELS FROM MOORE (1949) AND EDLEN (1952)

TABLE 72 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O 6+

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	19000	20000	24000	28000	32000	36000	40000	44000	48000	100000
0	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
4525270	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.35E-35
4530000	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.41E-36
4597259	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.08E-29
5340000	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.40E-35
4359363	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.72E-33
5365010	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.07E-33
5620000	0.	0.	0.	0.	0.	0.	0.	0.	0.	5.99E-33
5623000	0.	0.	0.	0.	0.	0.	0.	0.	0.	3.05E-35
5624000	0.	0.	0.	0.	0.	0.	0.	0.	0.	8.78E-35
5624000	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.44E-34
5624000	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.02E-34

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	200000	400000	600000	1000000	2000000	4000000	6000000	10000000	0	0
0	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	0	0
4525270	2.18E-14	2.54E-07	5.81E-05	4.15E-03	3.09E-02	3.18E-02	3.00E-02	2.83E-02	0.	0.
4530000	4.57E-15	6.74E-08	1.64E-05	1.24E-03	9.84E-03	1.04E-02	9.84E-03	9.35E-03	0.	0.
4597259	5.20E-14	7.90E-07	1.95E-04	1.50E-02	1.17E-01	1.24E-01	1.18E-01	1.12E-01	0.	0.
5340000	8.29E-17	1.82E-08	1.10E-05	1.71E-03	2.25E-02	3.16E-02	3.25E-02	3.56E-02	0.	0.
4359363	2.84E-13	1.86E-06	3.46E-04	2.11E-02	1.39E-01	1.35E-01	1.25E-01	1.16E-01	0.	0.
5365010	3.46E-16	8.32E-08	5.17E-05	8.27E-03	1.13E-01	1.57E-01	1.63E-01	1.67E-01	0.	0.
5620000	1.11E-17	6.65E-09	5.61E-06	1.15E-03	1.08E-02	2.66E-02	3.07E-02	3.22E-02	0.	0.
5623000	3.25E-17	1.97E-08	1.67E-05	3.42E-03	5.62E-02	6.57E-02	9.22E-02	9.67E-02	0.	0.
5624000	5.37E-17	3.28E-08	2.78E-05	5.69E-03	9.35E-02	1.43E-01	1.54E-01	1.61E-01	0.	0.
5624000	7.52E-17	4.59E-08	3.80E-05	7.97E-03	1.31E-01	2.00E-01	2.15E-01	2.26E-01	0.	0.

TABLE 73. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF Ar 4+

STATE	LEVEL	STAT.	TEMPERATURE (DEG K)									
			(CM-1)	(EV)	WT.	5200	5600	6000	6400	6800	7200	7600
2s ² 3s ¹	0	1	114744	0.	1	1.70E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
2s ² 3p ¹	1	9	14.2261	1.47E-13	1	1.47E-13	1.42E-12	1.01E-11	5.66E-11	2.97E-10	9.91E-10	3.31E-09
2s ² 3d ¹	2	3	170120	21.1640	3	9.17E-21	2.64E-19	4.99E-18	6.64E-17	1.04E-16	4.50E-15	2.74E-14
3s ² 3p ¹	3	15	324151	40.1886	15	0.	1.02E-35	2.62E-33	3.37E-31	2.49E-29	1.11E-27	3.39E-26
3s ² 3d ¹	4	5	2660000	32.9789	5	5.43E-32	1.04E-29	9.93E-28	5.35E-26	1.80E-24	4.11E-23	8.74E-22
3s ² 4s ¹	5	15	2710000	33.5989	15	4.09E-32	8.64E-30	8.98E-28	5.21E-26	1.80E-24	4.54E-23	7.95E-22
3s ² 4p ¹	6	45	3100000	18.4361	45	3.34E-34	1.54E-33	5.12E-31	3.25E-29	1.94E-27	7.49E-26	1.95E-24
3s ² 4d ¹	7	3	3500000	41.3934	3	0.	0.	1.60E-35	3.03E-33	3.10E-31	1.90E-29	7.53E-28
3s ² 4f ¹	8	1	513383	63.7365	1	0.	0.	0.	0.	0.	0.	0.
3s ² 5s ¹	9	1	5260000	65.2140	1	0.	0.	0.	0.	0.	0.	0.
3s ² 5p ¹	10	9	5440000	70.1732	9	0.	0.	0.	0.	0.	0.	0.
3s ² 5d ¹	11	3	566362	70.2181	3	0.	0.	0.	0.	0.	0.	0.
3s ² 5f ¹	12	15	636490	78.9127	15	0.	0.	0.	0.	0.	0.	0.
3s ² 6s ¹	13	5	6360000	79.0999	5	0.	0.	0.	0.	0.	0.	0.
3s ² 6p ¹	14	21	660092	81.8389	21	0.	0.	0.	0.	0.	0.	0.
3s ² 6d ¹	15	60	4650000	97.6512	60	0.	0.	0.	0.	0.	0.	0.
3s ² 6f ¹	16	12	6400000	79.3478	12	0.	0.	0.	0.	0.	0.	0.

TEMPERATURE (DEG K)

LEVEL

(CM-1)	8800	9200	9600	10000	11000	12000	13000	14000	15000	16000	17000	18000
114744	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
14744	6.41E-08	1.49E-07	3.04E-07	6.09E-07	2.73E-06	9.34E-06	2.75E-05	6.81E-05	1.49E-04	2.97E-04	5.45E-04	9.99E-04
170120	2.26E-12	7.62E-12	2.32E-11	6.45E-11	6.02E-10	3.87E-09	1.87E-08	7.20E-08	2.32E-07	4.49E-07	1.59E-06	3.55E-06
324151	1.46E-22	1.49E-21	1.19E-20	8.34E-20	5.79E-18	1.90E-16	3.94E-15	5.11E-14	4.71E-13	3.29E-12	1.82E-11	8.30E-11
2660000	6.47E-19	4.29E-18	2.43E-17	1.20E-16	3.80E-15	7.05E-14	8.19E-13	6.71E-12	4.13E-11	2.04E-10	8.35E-10	2.91E-09
2710000	8.50E-19	5.89E-18	3.44E-17	1.75E-16	6.05E-15	1.14E-14	1.41E-13	1.20E-12	7.71E-11	3.91E-10	1.64E-09	5.84E-09
3100000	5.84E-21	5.29E-20	3.99E-19	2.56E-18	1.47E-16	4.32E-15	7.55E-14	8.79E-13	4.79E-12	4.49E-11	2.42E-10	1.04E-09
3500000	8.32E-24	7.61E-23	7.45E-22	6.07E-21	5.91E-19	2.68E-17	6.76E-16	1.08E-14	1.10E-13	9.65E-13	6.14E-12	3.18E-11
513383	9.41E-37	3.64E-35	1.04E-33	1.26E-32	1.88E-29	5.11E-27	5.05E-25	3.41E-23	1.13E-21	2.51E-20	3.15E-19	4.27E-18
5260000	6.47E-38	1.80E-36	5.79E-35	1.34E-33	1.32E-30	4.08E-28	5.21E-26	3.34E-24	1.23E-22	2.87E-21	4.63E-20	5.49E-19
5440000	0.	0.	1.30E-36	3.87E-35	6.34E-32	3.03E-29	5.11E-27	4.92E-25	2.30E-23	7.00E-22	1.61E-20	2.82E-19
566362	0.	0.	4.10E-37	1.22E-35	2.02E-32	9.46E-30	1.89E-27	1.58E-25	7.44E-23	2.28E-22	4.37E-21	6.54E-20
636490	0.	0.	0.	0.	1.05E-35	1.00E-32	3.82E-30	5.84E-28	7.59E-26	2.80E-24	4.04E-23	1.28E-21
6360000	0.	0.	0.	0.	2.87E-36	3.00E-33	1.08E-30	1.04E-28	1.32E-26	1.77E-24	1.77E-23	3.58E-22
660092	0.	0.	0.	0.	6.89E-37	8.92E-34	3.93E-31	7.25E-29	6.68E-27	3.49E-25	1.15E-23	2.58E-22
4650000	5.76E-32	1.57E-30	3.25E-29	5.28E-28	2.31E-25	3.67E-23	2.64E-21	1.04E-19	2.54E-18	4.15E-17	4.04E-16	4.32E-15
6400000	0.	0.	0.	0.	5.29E-36	5.67E-33	2.07E-30	3.27E-28	2.62E-26	1.22E-24	3.59E-23	7.27E-22

*ESTIMATED
NONSTARRED ENERGY LEVELS FROM MOORE (1949)

TABLE 73 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 4+

LEVEL	TEMPERATURE (DEG K)										
	10000	20000	24000	28000	32000	36000	40000	44000	48000	52000	100000
0	9.28E-01	7.98E-01	9.91E-01	8.75E-01	9.49E-01	9.13E-01	8.67E-01	8.14E-01	7.57E-01	5.81E-01	2.17E-01
116744	1.51E-03	2.33E-03	9.10E-03	2.51E-02	4.91E-02	6.31E-02	1.24E-01	1.72E-01	2.19E-01	3.34E-01	4.07E-01
170720	7.28E-06	1.39E-05	1.07E-04	4.51E-04	1.32E-03	2.98E-03	5.60E-03	9.19E-03	1.34E-02	4.94E-02	5.38E-02
324151	3.27E-10	1.12E-09	1.40E-08	8.54E-07	6.67E-06	3.24E-05	1.12E-04	3.04E-04	6.83E-04	3.70E-03	1.57E-02
268000	1.92E-09	2.44E-08	5.86E-07	5.65E-06	3.04E-05	1.10E-04	3.03E-04	1.30E-03	4.97E-03	1.49E-02	2.34E-02
271000	1.83E-08	5.11E-08	1.31E-06	1.31E-05	7.27E-05	2.71E-04	7.59E-04	1.73E-03	3.37E-03	1.32E-02	4.00E-02
310000	3.82E-09	1.24E-08	5.05E-07	7.07E-06	5.04E-05	2.20E-04	7.47E-04	1.93E-03	2.00E-03	8.10E-03	1.58E-02
350070	1.19E-10	5.21E-10	3.44E-08	6.79E-07	6.28E-06	3.44E-05	1.33E-04	3.92E-04	9.47E-04	5.94E-03	2.94E-02
514083	3.71E-17	2.60E-16	1.24E-14	9.25E-12	2.61E-10	1.27E-08	5.27E-07	4.61E-07	7.70E-06	1.03E-04	3.99E-04
526000	5.02E-18	3.67E-17	2.00E-14	1.74E-12	5.09E-11	6.77E-10	5.24E-09	2.74E-08	1.08E-07	1.95E-06	2.77E-05
544000	2.16E-18	1.84E-17	1.64E-14	2.05E-12	7.58E-11	1.23E-09	1.12E-08	6.71E-08	2.92E-07	4.72E-06	1.22E-04
566362	7.09E-19	6.04E-18	5.34E-15	6.72E-13	2.48E-11	4.05E-10	3.49E-09	2.71E-08	9.43E-08	4.03E-06	1.88E-04
634490	1.75E-20	1.95E-19	3.99E-16	9.14E-14	5.31E-12	1.23E-10	1.40E-09	1.12E-08	5.88E-08	2.04E-06	5.70E-05
638000	5.20E-21	5.82E-20	1.21E-16	2.82E-14	1.65E-12	3.81E-11	4.48E-10	3.54E-09	1.87E-08	6.64E-07	1.12E-04
660072	4.10E-21	4.98E-20	1.36E-16	3.91E-14	2.57E-12	6.69E-11	8.88E-10	7.22E-09	4.04E-08	1.64E-06	5.22E-05
663000	3.05E-14	1.77E-13	4.65E-11	2.44E-09	6.74E-08	4.63E-07	2.83E-06	1.22E-05	4.02E-05	3.09E-04	4.97E-03
640090	1.07E-20	1.21E-19	2.58E-16	6.11E-14	3.43E-12	8.53E-11	1.05E-09	7.96E-09	4.24E-08	1.52E-06	4.20E-05

LEVEL	TEMPERATURE (DEG K)										
	10000	20000	40000	60000	100000	200000	400000	600000	1000000	0	0
0	4.32E-02	1.39E-02	9.06E-03	4.31E-03	4.74E-03	3.92E-03	3.92E-03	3.74E-03	3.17E-03	0.	0.
116744	1.70E-01	8.20E-02	4.20E-02	4.82E-02	3.94E-02	3.54E-02	3.43E-02	3.13E-02	0.	0.	0.
170720	3.79E-72	2.24E-02	1.81E-02	1.48E-02	1.24E-02	1.14E-02	1.13E-02	1.10E-02	0.	0.	0.
324151	6.29E-02	6.50E-02	6.75E-02	5.94E-02	5.49E-02	5.49E-02	5.43E-02	5.37E-02	0.	0.	0.
268000	3.11E-02	2.67E-02	2.59E-02	2.15E-02	1.94E-02	1.87E-02	1.84E-02	1.81E-02	0.	0.	0.
271000	9.22E-02	7.87E-02	7.10E-02	6.41E-02	5.87E-02	5.60E-02	5.50E-02	5.43E-02	0.	0.	0.
310090	2.79E-01	2.74E-01	2.59E-01	2.42E-01	2.28E-01	2.21E-01	2.18E-01	2.14E-01	0.	0.	0.
350000	1.57E-01	1.70E-01	1.74E-01	1.72E-01	1.64E-01	1.63E-01	1.62E-01	1.61E-01	0.	0.	0.
514083	3.21E-03	6.54E-03	7.93E-03	9.04E-03	9.84E-03	1.03E-02	1.04E-02	1.05E-02	0.	0.	0.
526000	9.82E-04	2.10E-03	2.57E-03	2.94E-03	3.26E-03	3.40E-03	3.45E-03	3.49E-03	0.	0.	0.
566000	6.43E-03	1.63E-02	2.10E-02	2.52E-02	2.85E-02	3.02E-02	3.08E-02	3.12E-02	0.	0.	0.
566362	2.20E-03	5.44E-03	6.99E-03	8.38E-03	9.49E-03	1.01E-02	1.03E-02	1.04E-02	0.	0.	0.
634490	6.45E-03	2.11E-02	2.94E-02	3.79E-02	4.51E-02	4.91E-02	5.04E-02	5.13E-02	0.	0.	0.
638000	2.12E-03	7.01E-03	9.81E-03	1.24E-02	1.50E-02	1.63E-02	1.68E-02	1.72E-02	0.	0.	0.
660092	7.86E-03	2.72E-02	3.91E-02	5.13E-02	6.21E-02	6.81E-02	7.02E-02	7.19E-02	0.	0.	0.
663000	9.14E-02	1.57E-01	1.70E-01	1.94E-01	2.04E-01	2.09E-01	2.10E-01	2.11E-01	0.	0.	0.
640090	5.19E-03	1.67E-02	2.54E-02	3.02E-02	3.60E-02	3.92E-02	4.03E-02	4.12E-02	0.	0.	0.

TABLE 74. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O 7+

STATE	LEVEL (CM-1)	LEVEL (EV)	STAT. WT.	TEMPERATURE (DEG K)											
				5200	5600	6000	6400	6800	7200	7600	8000	8400	8800	9200	9600
1s	0	0.	2	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
2s	5270855	653.4859	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p	5271783	653.6009	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3s	6247421	774.5415	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3p	6247696	774.5956	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3d	6247933	774.6290	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4s	6589164	816.9311	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4p	6589279	816.9454	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4d	6589379	816.9578	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4f	6589422	816.9631	14	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL	LEVEL (CM-1)	TEMPERATURE (DEG K)											
		8000	9200	9600	10000	11000	12000	13000	14000	15000	16000	17000	18000
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
5270855	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5271783	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6247421	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6247696	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6247933	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6589164	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6589279	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6589379	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6589422	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
MONITORING ENERGY LEVELS FROM GAMMA AND X-RAY (1965)

TABLE T4 (CONT.-1). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O 7+

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	10000	20000	24000	28000	32000	36000	40000	44000	48000	50000
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
5270855	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5271783	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6247421	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6247696	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6247933	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6589164	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6589279	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6589379	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6589422	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	200000	400000	600000	1000000	2000000	4000000	6000000	10000000	0	0
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	0	0
5270855	1.41E-17	5.84E-09	3.24E-06	9.94E-01	7.52E-01	2.47E-01	1.34E-01	7.89E-02	0.	0.
5271783	1.02E-16	1.75E-08	9.70E-06	1.52E-03	5.08E-02	1.11E-01	1.14E-01	1.10E-01	0.	0.
6247421	3.03E-20	1.74E-10	3.12E-07	1.74E-04	8.40E-03	2.61E-02	3.01E-02	3.20E-02	0.	0.
6247696	9.07E-20	5.22E-10	9.34E-07	3.73E-04	2.52E-02	7.83E-02	9.82E-02	9.59E-02	0.	0.
6247933	1.51E-19	8.69E-10	1.56E-06	6.21E-04	4.20E-02	1.31E-01	1.50E-01	1.60E-01	0.	0.
6589164	2.59E-21	5.09E-11	1.37E-07	7.60E-05	6.57E-03	2.31E-02	2.77E-02	3.04E-02	0.	0.
6589279	7.77E-21	1.53E-10	4.12E-07	2.28E-04	1.97E-02	6.93E-02	8.31E-02	9.13E-02	0.	0.
6589379	1.29E-20	2.54E-10	6.84E-07	3.80E-04	3.28E-02	1.15E-01	1.34E-01	1.52E-01	0.	0.
6589422	1.81E-20	3.54E-10	9.61E-07	5.32E-04	4.60E-02	1.62E-01	1.94E-01	2.13E-01	0.	0.

TABLE 75. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF CR 7.

STATE	LEVEL	(CM-1)	(EV)	STAT.	WT.	TEMPERATURE (DEG A)									
						5200	5600	6000	6400	6800	7200	7600	8000	8400	8800
2p 3s	0	0	0.	2	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
	141870	17.5892	6	2.69E-17	4.44E-16	5.04E-15	6.22E-14	2.78E-13	1.44E-12	6.30E-12	2.23E-11	8.39E-11	3.04E-11	1.00E 00	1.00E 00
	332667	41.2444	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	575910	71.4019	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	628905	77.9723	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4d	697517	86.4789	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	716837	88.8742	14	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
LEVEL															
TEMPERATURE (DEG K)															
(CM-1)	8800	9200	9600	10000	11000	12000	13000	14000	15000	16000	17000	18000	19000	20000	21000
	0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
	141870	2.53E-10	6.94E-10	1.75E-09	4.09E-09	1.23E-07	4.55E-07	1.40E-06	3.69E-06	8.64E-06	1.83E-05	3.37E-05	6.03E-05	1.00E 00	1.00E 00
	332667	1.20E-23	1.27E-22	1.11E-21	8.17E-21	6.33E-19	5.12E-18	7.10E-16	6.93E-14	5.09E-13	2.74E-12	1.41E-11	6.79E-11	3.04E-11	1.00E 00
	575910	0.	0.	0.	0.	1.03E-35	2.00E-30	1.97E-28	1.97E-26	1.97E-24	1.97E-22	1.97E-20	1.97E-18	1.97E-16	1.97E-14
4f	697517	0.	0.	0.	0.	5.36E-33	1.77E-30	2.55E-28	1.90E-26	6.24E-25	2.87E-23	1.15E-21	3.04E-20	8.13E-19	2.00E-17
	716837	0.	0.	0.	0.	2.39E-36	1.49E-33	3.69E-31	4.39E-29	2.87E-27	1.15E-25	3.04E-24	8.13E-23	2.00E-21	5.00E-20

TABLE 75 (CONT.-). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 7+

LEVEL	19000	20000	24000	28000	32000	36000	40000	44000	48000	60000	80000	100000
(CM-1)	TEMPERATURE (DEG K)											
0	1.00E-00	1.00E-00	9.99E-01	9.78E-01	9.95E-01	9.90E-01	9.82E-01	9.72E-01	9.59E-01	9.08E-01	8.02E-01	6.98E-01
141070	6.48E-05	1.11E-04	6.07E-04	2.04E-03	5.07E-03	1.02E-02	1.79E-02	2.82E-02	4.09E-02	9.07E-02	1.88E-01	2.72E-01
332647	5.73E-11	2.02E-10	1.09E-09	1.88E-07	1.59E-06	8.32E-06	3.12E-05	9.17E-05	2.24E-04	1.58E-03	1.01E-02	2.91E-02
575910	1.15E-19	1.02E-18	1.01E-15	1.40E-13	5.65E-12	9.99E-11	9.90E-10	6.44E-09	3.05E-08	9.13E-07	2.55E-05	1.76E-04
628905	6.22E-21	6.73E-20	1.27E-16	2.76E-14	1.56E-12	3.60E-11	4.41E-10	3.41E-09	1.87E-08	7.68E-07	2.95E-05	2.46E-04
697517	5.75E-23	8.04E-22	3.45E-18	1.36E-15	1.19E-13	3.07E-12	6.24E-11	4.04E-10	3.99E-09	2.47E-07	1.43E-05	1.53E-04
716037	1.04E-23	2.61E-22	1.52E-18	7.03E-16	7.00E-14	2.50E-12	4.36E-11	4.49E-10	3.13E-09	2.18E-07	1.41E-05	1.62E-04
LEVEL	TEMPERATURE (DEG K)											
(CM-1)	TEMPERATURE (DEG K)											
0	3.76E-01	1.74E-01	1.18E-01	7.39E-02	5.74E-02	4.81E-02	4.53E-02	4.31E-02	0.	0.	0.	0.
141070	4.04E-01	3.17E-01	2.31E-01	1.45E-01	1.56E-01	1.37E-01	1.31E-01	1.27E-01	0.	0.	0.	0.
332647	1.77E-01	2.65E-01	2.47E-01	2.26E-01	2.13E-01	2.13E-01	2.09E-01	2.03E-01	0.	0.	0.	0.
575910	5.97E-03	2.21E-02	2.96E-02	3.49E-02	3.79E-02	3.91E-02	3.94E-02	3.97E-02	0.	0.	0.	0.
628905	1.22E-02	5.49E-02	7.82E-02	9.69E-02	1.10E-01	1.15E-01	1.17E-01	1.18E-01	0.	0.	0.	0.
697517	1.24E-02	7.13E-02	1.11E-01	1.46E-01	1.74E-01	1.87E-01	1.91E-01	1.95E-01	0.	0.	0.	0.
716037	1.52E-02	9.34E-02	1.48E-01	1.99E-01	2.40E-01	2.60E-01	2.67E-01	2.72E-01	0.	0.	0.	0.

TABLE 7A. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 0+

STATE	LEVEL (CM-1)	STAT. WT.	LEVEL (EV)	TEMPERATURE (DEG K.)										
				5200	5600	6000	6400	6800	7200	7600	8000	8400		
2s ² 2p ⁶	0	1	0.	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00		
2s ² 2p ⁵ 3s	2039000*	12	252.7973	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 3p	2220000*	36	275.2378	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 3d	2380000*	60	295.0748	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 4s	2710000*	12	335.9885	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 4p	2790000*	36	345.9075	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 4d	2840000*	60	352.1060	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 5s	2860000*	84	354.5857	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 5p	2600000*	4	322.3506	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 5d	2780000*	12	344.6672	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 6s	2840000*	20	364.5041	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 6p	3270000*	4	405.4179	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 6d	3350000*	12	415.3363	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 7s	3400000*	20	421.5354	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 7d	3470000*	28	424.0150	0.	0.	0.	0.	0.	0.	0.	0.	0.		

STATE	LEVEL (CM-1)	STAT. WT.	LEVEL (EV)	TEMPERATURE (DEG K.)										
				5200	5600	6000	6400	6800	7200	7600	8000	8400		
2s ² 2p ⁶	0	1	0.	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00		
2s ² 2p ⁵ 3s	2039000*	12	252.7973	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 3p	2220000*	36	275.2378	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 3d	2380000*	60	295.0748	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 4s	2710000*	12	335.9885	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 4p	2790000*	36	345.9075	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 4d	2840000*	60	352.1060	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 5s	2860000*	84	354.5857	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 5p	2600000*	4	322.3506	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 5d	2780000*	12	344.6672	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 6s	2840000*	20	364.5041	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 6p	3270000*	4	405.4179	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 6d	3350000*	12	415.3363	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 7s	3400000*	20	421.5354	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 7d	3470000*	28	424.0150	0.	0.	0.	0.	0.	0.	0.	0.	0.		

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTARRED ENERGY LEVELS FROM MOORE (1949)

TABLE 76 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF Ar 8+

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	19000	20000	24000	28000	32000	36000	40000	44000	48000	100000
0	1.00E-00	1.00E-00	1.00E-00	1.30E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
2039000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2220000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2280000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2710000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2790000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2840000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2860000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2880000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2940000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3270000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3350000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3400000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3420000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	200000	400000	600000	1000000	2000000	4000000	6000000	10000000	0	0
0	1.00E-00	5.41E-01	5.74E-01	1.04E-01	1.75E-02	6.48E-03	4.82E-03	3.71E-03	0.	0.
2039000	5.11E-06	7.53E-03	5.13E-02	6.77E-02	4.54E-02	3.85E-02	3.55E-02	3.32E-02	0.	0.
2220000	4.17E-06	1.10E-02	1.01E-01	1.54E-01	1.27E-01	1.08E-01	1.02E-01	9.70E-02	0.	0.
2380000	2.20E-06	1.10E-02	1.14E-01	2.07E-01	1.89E-01	1.70E-01	1.64E-01	1.58E-01	0.	0.
2710000	4.10E-08	6.74E-06	1.04E-02	2.58E-02	2.99E-02	3.03E-02	3.02E-02	3.01E-02	0.	0.
2790000	6.91E-08	1.52E-03	2.57E-02	6.89E-02	8.44E-02	8.82E-02	8.94E-02	8.94E-02	0.	0.
2840000	8.04E-08	2.11E-03	3.80E-02	1.07E-01	1.56E-01	1.44E-01	1.44E-01	1.44E-01	0.	0.
2860000	9.75E-08	2.75E-03	5.07E-02	1.45E-01	1.88E-01	2.01E-01	2.04E-01	2.04E-01	0.	0.
2880000	3.01E-08	3.34E-04	4.50E-03	1.01E-02	1.08E-02	1.09E-02	1.03E-02	1.02E-02	0.	0.
2940000	2.48E-08	5.24E-04	8.77E-03	2.13E-02	2.84E-02	2.92E-02	2.97E-02	2.94E-02	0.	0.
3270000	1.30E-08	4.91E-04	9.94E-03	3.08E-02	4.22E-02	4.64E-02	4.77E-02	4.84E-02	0.	0.
3350000	2.43E-10	3.08E-05	9.03E-04	3.84E-03	8.25E-03	8.81E-03	9.27E-03	9.27E-03	0.	0.
3400000	4.10E-10	6.74E-05	2.24E-03	1.03E-02	1.89E-02	2.40E-02	2.59E-02	2.75E-02	0.	0.
3420000	5.78E-10	9.38E-05	3.31E-03	1.59E-02	3.03E-02	3.93E-02	4.27E-02	4.55E-02	0.	0.
		1.22E-04	4.41E-03	2.16E-02	4.18E-02	5.47E-02	5.45E-02	6.35E-02	0.	0.

TABLE 77. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 4+

STATE	LEVEL (CM-1)	LEVEL (EV)	STAT.	TEMPERATURE (DEG K)									
				22000	24000	30000	34000	38000	42000	46000	50000	56000	76000
2s 2p ²	0	0.	4	8.67E-01	8.43E-01	8.26E-01	8.11E-01	7.96E-01	7.88E-01	7.79E-01	7.71E-01	7.63E-01	7.43E-01
2s 2p ²	18053	2.2382	2	1.33E-01	1.33E-01	1.33E-01	1.33E-01	1.33E-01	1.33E-01	1.33E-01	1.33E-01	1.33E-01	1.33E-01
2s 2p ²	604300	74.9217	2	2.97E-18	1.27E-15	1.07E-13	3.18E-12	4.62E-11	4.03E-10	2.41E-09	1.06E-08	1.59E-06	1.59E-06
2s 2p ²	2260000	280.1971	18	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s 2p ²	2440000	302.5136	54	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p 2p ²	2800000	322.3506	90	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p 2p ²	3000000	371.9430	288	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p 2p ²	2330000	288.8757	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p 2p ²	2510000	311.1923	30	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p 2p ²	2670000	331.0293	50	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p 2p ²	3100000	394.3411	160	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p 2p ²	2500000	309.9525	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p 2p ²	2700000	334.7487	60	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p 2p ²	2750000	340.9476	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p 2p ²	3200000	396.7592	18	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p 2p ²	3400000	371.9430	216	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p 2p ²	3400000	421.5354	384	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL (CM-1)	90000	150000	300000	500000	800000	1500000	3000000	5000000	8000000	0	0	0	0
0	7.27E-01	7.03E-01	6.73E-01	6.06E-01	2.92E-01	4.60E-02	1.19E-02	6.76E-03	4.90E-03	0.	0.	0.	0.
18053	2.73E-01	2.96E-01	3.08E-01	2.88E-01	1.42E-01	2.24E-02	5.89E-03	3.34E-03	2.44E-03	0.	0.	0.	0.
604300	2.32E-05	1.07E-03	1.85E-02	5.23E-02	4.93E-02	1.29E-02	4.44E-03	2.84E-03	2.20E-03	0.	0.	0.	0.
2260000	6.67E-16	1.22E-09	5.94E-05	4.09E-03	2.26E-02	2.37E-02	1.81E-02	1.56E-02	1.47E-02	0.	0.	0.	0.
2440000	1.13E-16	6.50E-10	7.52E-05	7.31E-03	4.90E-02	5.90E-02	4.97E-02	4.52E-02	4.27E-02	0.	0.	0.	0.
2600000	1.45E-17	2.34E-10	5.81E-05	7.68E-03	6.13E-02	8.55E-02	7.68E-02	7.18E-02	6.91E-02	0.	0.	0.	0.
3000000	7.77E-20	1.61E-11	2.73E-05	7.78E-03	9.55E-02	1.84E-01	2.03E-01	2.08E-01	2.04E-01	0.	0.	0.	0.
2330000	1.21E-16	3.46E-10	2.38E-05	1.86E-03	1.11E-02	1.23E-02	9.71E-03	8.64E-03	8.04E-03	0.	0.	0.	0.
2510000	2.04E-17	1.85E-10	2.98E-05	3.32E-03	2.40E-02	3.11E-02	2.67E-02	2.46E-02	2.34E-02	0.	0.	0.	0.
2670000	2.64E-18	6.63E-11	2.31E-05	3.49E-03	3.00E-02	4.44E-02	4.12E-02	3.92E-02	3.79E-02	0.	0.	0.	0.
3100000	8.73E-21	3.43E-12	9.40E-06	3.24E-03	4.43E-02	9.41E-02	1.07E-01	1.11E-01	1.12E-01	0.	0.	0.	0.
2500000	1.60E-18	1.35E-11	2.09E-06	2.28E-04	1.63E-03	2.09E-03	1.79E-03	1.65E-03	1.54E-03	0.	0.	0.	0.
2700000	1.96E-18	5.97E-11	2.40E-05	3.64E-03	3.41E-02	5.18E-02	4.88E-02	4.64E-02	4.53E-02	0.	0.	0.	0.
2750000	1.47E-19	6.16E-12	3.15E-06	5.54E-04	4.20E-03	4.23E-03	7.94E-03	7.46E-03	7.46E-03	0.	0.	0.	0.
3200000	1.99E-22	1.48E-13	6.54E-07	2.73E-04	4.17E-03	9.62E-03	1.15E-02	1.21E-02	1.24E-02	0.	0.	0.	0.
3000000	5.84E-20	1.21E-11	2.05E-05	5.83E-03	7.18E-02	1.40E-01	1.52E-01	1.54E-01	1.54E-01	0.	0.	0.	0.
3400000	1.73E-22	4.63E-13	5.35E-06	3.28E-03	6.20E-02	1.69E-01	2.23E-01	2.44E-01	2.55E-01	0.	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
 *NONSTARRED ENERGY LEVELS FROM PRYCE (1964).

TABLE 78. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 10*

STATE	LEVEL	STAT.	TEMPERATURE (DEG K)									
			10000	20000	30000	40000	50000	60000	70000	80000	90000	100000
2s 2p ² 3s	0	5	7.66E-01	7.33E-01	7.05E-01	6.80E-01	6.58E-01	6.39E-01	6.21E-01	6.04E-01	5.88E-01	5.74E-01
	14457	3	1.79E-01	1.79E-01	2.11E-01	2.21E-01	2.28E-01	2.34E-01	2.37E-01	2.40E-01	2.44E-01	2.48E-01
	18000	1	4.72E-02	5.91E-02	5.93E-02	6.35E-02	6.66E-02	6.89E-02	7.09E-02	7.22E-02	7.35E-02	7.51E-02
	70000	5	7.67E-03	1.52E-02	2.45E-02	3.52E-02	4.55E-02	5.81E-02	6.96E-02	8.08E-02	1.30E-01	1.30E-01
	150000	1	8.41E-06	3.64E-05	1.06E-04	2.38E-04	4.50E-04	7.49E-04	1.14E-03	1.62E-03	5.01E-03	5.01E-03
2s 2p ² 3p	531000	9	1.14E-15	2.28E-13	1.10E-11	2.13E-10	2.20E-09	1.45E-08	4.85E-08	2.52E-07	1.79E-05	1.79E-05
	700000	3	6.03E-21	6.81E-18	1.11E-15	5.57E-14	1.22E-12	1.40E-11	1.16E-10	6.49E-10	1.85E-07	1.85E-07
TEMPERATURE (DEG K)												
2s 2p ² 3d	0	300000	500000	800000	1500000	3000000	5000000	8000000	0	0	0	0
	14457	3.68E-01	3.14E-01	2.72E-01	2.33E-01	2.10E-01	2.00E-01	1.94E-01	0.	0.	0.	0.
	18000	2.31E-01	1.81E-01	1.59E-01	1.38E-01	1.25E-01	1.19E-01	1.16E-01	0.	0.	0.	0.
	70000	7.44E-02	6.75E-02	5.27E-02	4.59E-02	4.16E-02	3.98E-02	3.87E-02	0.	0.	0.	0.
	150000	2.66E-01	2.63E-01	2.57E-01	2.40E-01	2.03E-01	1.94E-01	1.92E-01	0.	0.	0.	0.
	531000	1.88E-04	4.09E-03	5.19E-02	1.23E-01	2.52E-01	3.09E-01	3.18E-01	0.	0.	0.	0.
	700000	4.20E-06	3.22E-04	7.69E-03	2.51E-02	4.64E-02	7.16E-02	8.99E-02	1.03E-01	0.	0.	0.
	14457	4.47E-01	4.47E-01	4.47E-01	4.47E-01	4.47E-01	4.47E-01	4.47E-01	4.47E-01	4.47E-01	4.47E-01	4.47E-01
	18000	2.42E-01	2.42E-01	2.42E-01	2.42E-01	2.42E-01	2.42E-01	2.42E-01	2.42E-01	2.42E-01	2.42E-01	2.42E-01
	70000	7.61E-02	7.61E-02	7.61E-02	7.61E-02	7.61E-02	7.61E-02	7.61E-02	7.61E-02	7.61E-02	7.61E-02	7.61E-02

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTARRED ENERGY LEVELS FROM PRYCE (1964).

TABLE 79. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR II*

STATE	LEVEL		STAT.	TEMPERATURE (DEG K)									
	(CM-1)	(EV)		WT.	22000	26000	30000	34000	38000	42000	46000	50000	70000
2s 2p ²	0	0.	4	9.91E-01	9.91E-01	9.91E-01	9.91E-01	9.91E-01	9.91E-01	9.91E-01	9.91E-01	9.91E-01	9.91E-01
	107000*	13.2660	10	2.21E-03	6.66E-03	1.45E-02	2.63E-02	4.8E-02	5.94E-02	6.83E-02	7.54E-02	8.04E-02	7.54E-02
	170000*	21.0768	6	2.22E-05	1.22E-04	4.25E-04	1.10E-03	2.50E-03	4.15E-03	6.72E-03	1.00E-02	1.00E-02	3.44E-02
*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS													
***STARTED ENERGY LEVELS FROM													
LEVEL	TEMPERATURE (DEG K)												
	(CM-1)	90000	150000	300000	700000	8000	1500000	3000000	5000000	8000000			
0	6.45E-01	4.57E-01	3.16E-01	2.10E-01	2.10E-01	2.43E-01	2.21E-01	2.10E-01	2.04E-01	2.04E-01	0.	0.	0.
	107000	2.91E-01	4.09E-01	4.74E-01	4.74E-01	4.74E-01	4.98E-01	4.98E-01	5.00E-01	5.00E-01	0.	0.	0.
	170000	6.37E-02	1.34E-01	2.10E-01	2.43E-01	2.65E-01	2.81E-01	2.91E-01	2.94E-01	2.94E-01	0.	0.	0.

TABLE 80. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 12+

STATE	LEVEL (CM-1)	LEVEL (EV)	STAT. WT.	TEMPERATURE (DEG K)							
				22000	26000	30000	34070	38000	42000	44000	50000 70000
2s 2p ³ P ₀ ³ P ₁ ³ P ₂ 1D 1S	0	0.	1	2.60E-01	2.30E-01	2.09E-01	1.93E-01	1.80E-01	1.70E-01	1.61E-01	1.54E-01 1.30E-01
	10000	1.2398	3	4.05E-01	3.97E-01	3.88E-01	3.78E-01	3.70E-01	3.61E-01	3.54E-01	3.46E-01 3.17E-01
	21000	2.6036	5	3.29E-01	3.60E-01	3.81E-01	3.96E-01	4.06E-01	4.13E-01	4.18E-01	4.21E-01 4.22E-01
	80000	9.9185	5	6.93E-03	1.37E-02	2.25E-02	3.26E-02	4.35E-02	5.48E-02	6.69E-02	7.70E-02 1.25E-01
	153000	18.9691	1	1.17E-05	4.84E-05	1.34E-04	2.97E-04	5.49E-04	8.98E-04	1.35E-03	1.89E-03 5.40E-03
TEMPERATURE (DEG K)											
LEVEL (CM-1)	90000	150000	300000	500000	800000	1500000	3000000	5000000	8000000	0	0
	0	1.14E-01	9.65E-02	8.15E-02	7.55E-02	7.22E-02	6.94E-02	6.81E-02	6.74E-02	6.72E-02	0.
	10000	2.97E-01	2.63E-01	2.33E-01	2.20E-01	2.13E-01	2.07E-01	2.03E-01	2.02E-01	2.01E-01	0.
	21000	4.15E-01	3.94E-01	3.69E-01	3.56E-01	3.48E-01	3.41E-01	3.37E-01	3.35E-01	3.33E-01	0.
	80000	1.62E-01	2.74E-01	2.78E-01	3.00E-01	3.13E-01	3.22E-01	3.26E-01	3.30E-01	3.31E-01	0.
	153000	1.01E-02	2.22E-02	3.91E-02	4.84E-02	5.48E-02	6.01E-02	6.33E-02	6.54E-02	6.54E-02	0.

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTARRED ENERGY LEVELS FROM

TABLE 81. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 13+

STATE	LEVEL (CM-1)	LEVEL (EV)	STAT. WT.	TEMPERATURE (DEG K)									
				22000	24000	30000	34000	39000	43000	46000	50000	70000	
1s	0	0.	2	6.88E-01	6.37E-01	5.97E-01	5.64E-01	5.41E-01	5.20E-01	5.07E-01	4.89E-01	4.74E-01	
2s	22443	2.8098	4	3.12E-01	3.63E-01	4.03E-01	4.34E-01	4.59E-01	4.79E-01	4.92E-01	5.09E-01	5.24E-01	
2p	239000	29.6315	12	6.72E-07	6.89E-06	3.77E-05	1.30E-04	3.81E-04	8.49E-04	1.71E-03	3.82E-03	1.92E-02	
3s	407000	50.4403	10	7.47E-12	5.27E-10	7.99E-09	9.37E-08	5.49E-07	2.49E-06	7.43E-06	2.00E-05	5.86E-04	
3p	510000	63.2303	2	2.25E-15	3.52E-13	1.42E-11	2.40E-10	2.22E-09	1.34E-08	5.94E-08	2.07E-07	1.22E-05	
3d	540000	66.9497	6	9.48E-16	2.01E-13	1.01E-11	2.02E-10	2.14E-09	1.44E-08	5.97E-08	2.61E-07	1.97E-05	
3f	709000	87.9025	4	1.00E-20	1.16E-17	2.04E-15	1.06E-13	2.37E-12	2.95E-11	3.72E-10	1.33E-09	4.00E-07	
4s	805000	99.8047	10	4.70E-23	1.43E-19	5.11E-17	4.54E-15	1.57E-13	2.75E-12	4.22E-11	2.11E-10	1.42E-07	
4p	897000	111.2110	6	6.88E-26	5.29E-22	3.71E-19	5.54E-17	2.89E-15	7.05E-14	1.22E-13	9.03E-12	1.28E-09	

LEVEL (CM-1)	LEVEL (EV)	STAT. WT.	TEMPERATURE (DEG K)									
			22000	24000	30000	34000	39000	43000	46000	50000	70000	
0	2.99E-01	1.68E-01	3.00000	500000	800000	1500000	3000000	5000000	8000000	0	0	0
22443	4.81E-01	3.02E-01	4	2.02E-01	1.47E-01	1.08E-01	8.01E-02	6.15E-02	4.75E-02	3.90E-02	0.	0.
239000	5.19E-02	1.81E-01	3.21E-01	2.98E-01	2.46E-01	2.40E-01	2.40E-01	2.44E-01	2.44E-01	0.	0.	0.
407000	2.95E-03	3.01E-02	1.20E-01	1.67E-01	1.84E-01	1.87E-01	1.84E-01	1.82E-01	1.81E-01	0.	0.	0.
510000	1.14E-04	2.24E-03	1.44E-02	2.44E-02	3.05E-02	3.39E-02	3.51E-02	3.54E-02	3.54E-02	0.	0.	0.
540000	2.11E-04	5.09E-03	3.79E-02	6.83E-02	8.47E-02	9.87E-02	1.04E-01	1.09E-01	1.04E-01	0.	0.	0.
709000	9.44E-04	6.65E-04	1.12E-02	2.00E-02	4.27E-02	5.60E-02	6.30E-02	6.60E-02	6.44E-02	0.	0.	0.
805000	5.09E-04	6.62E-04	1.77E-02	5.31E-02	9.98E-02	1.28E-01	1.52E-01	1.63E-01	1.69E-01	0.	0.	0.
897000	7.01E-02	1.64E-04	6.04E-03	2.45E-02	4.54E-02	7.01E-02	8.75E-02	9.51E-02	9.95E-02	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUMLEVELS
NONSTARRED ENERGY LEVELS FROM PRYCE (1964)

TABLE 82 ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 14+

STATE	LEVEL (CM-1)	LEVEL (EV)	STAT. WT.	TEMPERATURE (DEG K)									
				22000	26000	30000	34000	38000	42000	46000	50000	54000	70000
2s ¹ S	0	0.	1	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
2p ² P	234000*	29.2595	9	1.78E-06	1.92E-05	1.00E-04	4.14E-04	1.10E-03	2.77E-03	5.37E-03	1.00E-02	1.00E-02	9.34E-01
2p ² P	450000*	59.7915	3	4.97E-13	4.59E-11	1.27E-09	1.61E-08	1.19E-07	6.04E-07	2.30E-06	7.04E-06	2.49E-05	2.49E-05
2p ² P	620000*	76.8482	9	2.21E-17	1.13E-14	1.10E-12	3.63E-11	5.74E-10	5.34E-09	3.39E-08	1.59E-07	2.44E-05	2.44E-05
2p ² D	870000*	85.0673	5	4.67E-19	3.95E-16	5.54E-14	2.43E-12	4.80E-11	5.37E-10	3.94E-09	2.10E-08	4.80E-08	4.80E-08
3s ¹ S	876000*	102.9042	1	7.47E-24	1.13E-20	5.15E-18	5.57E-16	2.25E-14	4.47E-13	5.20E-12	4.20E-11	3.44E-08	3.44E-08

LEVEL: TEMPERATURE (DEG K)

LEVEL: (CM-1)	90000	150000	300000	500000	800000	1500000	3000000	5000000	8000000	0	0	0	0
0	8.27E-01	4.98E-01	2.03E-01	1.15E-01	7.75E-02	5.50E-02	4.44E-02	4.08E-02	3.89E-02	0.	0.	0.	0.
234000	1.71E-01	4.86E-01	5.89E-01	5.24E-01	4.54E-01	3.95E-01	3.38E-01	3.43E-01	3.35E-01	0.	0.	0.	0.
450000	1.86E-03	1.99E-02	7.03E-02	9.43E-02	1.04E-01	1.07E-01	1.08E-01	1.08E-01	1.08E-01	0.	0.	0.	0.
620000	3.69E-04	1.17E-02	9.34E-02	2.73E-01	2.09E-01	2.73E-01	2.98E-01	3.08E-01	3.13E-01	0.	0.	0.	0.
870000	4.22E-05	4.03E-03	4.08E-02	8.34E-02	1.18E-01	1.45E-01	1.62E-01	1.68E-01	1.72E-01	0.	0.	0.	0.
876000	1.43E-06	1.74E-04	3.79E-03	1.05E-02	1.74E-02	2.48E-02	2.99E-02	3.22E-02	3.39E-02	0.	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTARRED ENERGY LEVELS FROM

TABLE 84. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 16+

STATE	LEVEL (CM-1)	LEVEL (EV)	STAT. WT.	TEMPERATURE (DEG K)									
				27000	28000	30000	34000	38000	42000	46000	50000	54000	70000
1s ⁰	0	0.	1	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
1s 2s	24300000*	3012.7383	16	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1s 2p	24800000*	3570.6528	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1s 3s	30400000*	3769.0224	64	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL	TEMPERATURE (DEG K)									
(CM-1)	90000	150000	300000	500000	800000	1500000	3000000	5000000	8000000	0
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	0
24300000	0.	0.	0.	6.85E-30	1.68E-18	1.21E-09	1.39E-04	9.67E-01	5.97E-01	0.
28800000	0.	0.	0.	3.67E-35	1.15E-21	3.62E-11	3.61E-05	8.76E-03	1.21E-01	0.
30400000	0.	0.	0.	6.53E-37	1.15E-22	1.39E-11	2.98E-05	9.83E-03	1.61E-01	0.

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
MONOSTARRED ENERGY LEVELS FROM

TABLE 85. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 17*

STATE	LEVEL (CM-1)	LEVEL (EV)	STAT. WT.	TEMPERATURE (DEG K)									
				22000	26000	30000	34000	38000	42000	46000	50000	54000	58000
1s	0	0.	2	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
2s	26764214	3118.2540	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p	26788837	3221.3068	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3s	31732440	3934.2444	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3p	31739934	3935.1488	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3d	31744034	3935.9051	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4s	33470098	4149.6562	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4p	33473174	4150.0376	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4d	33475746	4150.3564	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4f	33476844	4150.4926	14	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL (CM-1)	150000	300000	500000	800000	1500000	3000000	5000000	8000000	15000000	30000000	50000000	80000000	150000000
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
26764214	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
26788837	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31732440	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31739934	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31744034	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
33470098	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
33473174	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
33475746	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
33476844	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
MINI-STARRED ENERGY LEVELS FROM GARCIA AND MACK (1965)

TABLE 86. DIATOMIC SPECTROSCOPIC CONSTANTS (UNITS: CM-1)

MOL. STATE	T_0	ω_e	$\omega_e x_e$	$\omega_e y_e$	ω_e^2	B_e	α_e	γ_e	δ_e
N_2									
$X^1\Sigma_g^+$	0.	2358.070	14.1880	-1.240E-02	-0.	1.99870	0.0178000	-0.	-0.
$A^3\Sigma_u^+$	49756.6	1460.600	13.8500	6.500E-03	1.800E-03	1.45450	0.0179400	-9.200E-05	-0.
$B^3\Delta_u$	58000.0	1490.900	13.0000	-0.	-0.	1.46000	0.0170090	-0.	-0.
$B^3\Pi_g$	59313.4	1723.880	14.3500	-1.100E-02	2.000E-04	1.63750	0.0179400	-7.400E-05	-0.
$B^3\Sigma_u^-$	65852.3	1516.883	12.1810	4.186E-02	7.323E-04	1.47359	0.0168610	3.619E-05	9.460E-07
$a^1\Sigma_u^-$	67739.3	1530.254	12.0747	4.129E-02	2.896E-04	1.47984	0.0165740	2.410E-05	-0.
$a^1\Pi_g$	68951.2	1696.200	13.9491	7.935E-03	-2.911E-04	1.61688	0.0179330	-2.930E-05	-0.
$w^1\Delta_u$	71698.3	1558.580	11.5300	-4.000E-02	-4.800E-03	1.49830	0.0166500	-0.	-0.
N_2^+									
$X^2\Sigma_g^+$	0.	2207.170	16.1460	-2.850E-02	9.200E-04	1.92580	0.0174300	-1.640E-04	-0.
$A^3\Pi_u$	8068.0	1903.420	15.0000	-0.	-0.	1.74800	0.0200000	-0.	-0.
$B^3\Sigma_u^-$	25586.0	2418.700	22.5300	-6.700E-01	4.000E-02	2.08300	0.0183000	-1.650E-03	-0.
$4\Sigma_u^+$	44328.0	1700.000	16.0000	-0.	-0.	1.60000	0.0200000	-0.	-0.
$4\Delta_u$	51328.0	1600.000	14.0000	-0.	-0.	1.60000	0.0200000	-0.	-0.
$D^3\Pi_g$	51203.0	914.780	13.1200	8.300E-02	-0.	1.11300	0.0200000	-0.	-0.
$4\Sigma_u^-$	60328.0	1500.000	14.0000	-0.	-0.	1.40000	0.0150000	-0.	-0.
$C^3\Sigma_u^+$	64542.0	2073.700	10.9700	-2.400E-01	-0.	1.51240	0.0017000	-7.500E-04	-0.

TABLE 86 (CONT.). DIATOMIC SPECTROSCOPIC CONSTANTS

MOLEC.	STATE	T_0	ω_0	ω_{x_0}	ω_{y_0}	ω_{z_0}	B_0	α_0	γ_0	δ_0
NO	X $^2\Pi$	62.2	1903.980	14.0150	1.000E-02	-5.800E-04	1.70420	0.0172500	-4.000E-05	-0.
	a $^4\Pi$	37965.0	1017.000	11.0000	-0.	-0.	1.17000	0.0170000	-0.	-0.
	A $^2\Sigma^+$	44199.2	2374.860	16.4600	-0.	-0.	1.99720	0.0192800	-0.	-0.
	B $^3\Pi$	45505.0	1037.640	7.5450	8.330E-02	-0.	1.12450	0.0132000	-0.	-0.
	b $^4\Sigma^-$	47092.0	1203.000	14.5000	-0.	-0.	1.36000	0.0240000	-0.	-0.
	C $^3\Pi$	52380.0	2395.000	15.0000	-0.	-0.	2.00200	0.0300000	-0.	-0.
	D $^2\Sigma^+$	53291.2	2323.900	22.8850	7.500E-01	2.200E-01	2.00260	0.0217500	-0.	-0.
HO ⁺	X $^1\Sigma^+$	0.	2377.100	16.3500	1.000E-02	-0.	2.00200	0.0202000	-0.	-0.
	a $^2\Sigma^+$	39934.0	1600.000	14.0000	-0.	-0.	1.65000	0.0200000	-0.	-0.
	B $^3\Sigma$	56804.0	2000.000	14.0000	-0.	-0.	1.50000	0.0200000	-0.	-0.
	B $^3\Pi$	63764.0	1700.000	14.0000	-0.	-0.	1.84000	0.0200000	-0.	-0.
	A $^1\Pi$	73084.0	1608.900	23.3000	-0.	-0.	1.58700	0.0240000	-0.	-0.
	B $^2\Sigma^-$	73334.0	1200.000	12.0000	-0.	-0.	1.22000	0.0150000	-0.	-0.

TABLE 87. IDEAL GAS FUNCTIONS FOR N₂ (MOLECULAR WEIGHT 28.0134, R = 1.98717 CAL./MOLE, 8 STATES INCLUDED)

TEMP. (°K)	PARTIT. FUNCT.	$\frac{H^0-E^0}{RT}$	$-\frac{F^0-E^0}{RT}$	ΔS^0	$\ln \frac{H^0-E^0}{RT} - \frac{F^0-E^0}{RT}$	$-\ln \frac{H^0-E^0}{RT} - \frac{F^0-E^0}{RT}$	$-\ln \frac{H^0-E^0}{RT} - \frac{F^0-E^0}{RT}$	$-\ln \frac{H^0-E^0}{RT} - \frac{F^0-E^0}{RT}$	$-\ln \frac{H^0-E^0}{RT} - \frac{F^0-E^0}{RT}$	$-\ln \frac{H^0-E^0}{RT} - \frac{F^0-E^0}{RT}$	TEMP. (°K)
1000	1-8159E 02	3.62519	23.8052	27.4294	7.20187	47.3049	54.5048	5.2147E 03	7.2018E 03	4.7305E 04	1000
1200	2-2413E 02	3.68633	24.4715	28.1578	7.32534	48.6289	55.9543	6.4058E 03	8.7904E 03	5.9355E 04	1200
1400	2-7033E 02	3.74630	25.0443	28.7906	7.44452	49.7672	57.2117	7.6403E 03	1.0422E 04	6.7674E 04	1400
1600	3-2046E 02	3.80178	25.5482	29.3500	7.55476	50.7485	58.3233	8.9082E 03	1.2088E 04	7.6123E 04	1600
1800	3-7467E 02	3.85210	25.9980	29.8511	7.65477	51.6442	59.3190	1.0202E 04	1.3779E 04	8.4994E 04	1800
2000	4-3307E 02	3.89741	26.4072	30.3046	7.74480	52.4795	60.2203	1.1515E 04	1.5490E 04	9.4095E 04	2000
2200	4-9572E 02	3.93781	26.7806	30.7187	7.82568	53.2515	61.0632	1.2845E 04	1.7217E 04	1.0370E 05	2200
2400	5-6270E 02	3.97474	27.1249	31.0986	7.89846	53.9916	61.8001	1.4187E 04	1.8954E 04	1.1270E 05	2400
2600	6-3404E 02	4.00778	27.4444	31.4521	7.96411	54.6948	62.5004	1.5540E 04	2.0707E 04	1.2119E 05	2600
2800	7-0979E 02	4.03768	27.7425	31.7802	8.02354	55.3689	63.1824	1.6902E 04	2.2486E 04	1.2930E 05	2800
3000	7-8997E 02	4.06488	28.0220	32.0869	8.07758	55.6433	63.7619	1.8271E 04	2.4233E 04	1.3705E 05	3000
3200	8-7463E 02	4.08971	28.2851	32.3748	8.12692	56.2072	64.3342	1.9647E 04	2.5980E 04	1.4447E 05	3200
3400	9-6378E 02	4.11247	28.5338	32.6462	8.17215	56.7013	64.8735	2.1029E 04	2.7785E 04	1.5170E 05	3400
3600	1-0575E 03	4.13342	28.7694	32.9028	8.21379	57.1636	65.3834	2.2416E 04	2.9570E 04	1.5841E 05	3600
3800	1-1587E 03	4.15278	28.9934	33.1462	8.25227	57.6147	65.8670	2.3807E 04	3.1359E 04	1.6464E 05	3800
4000	1-2585E 03	4.17075	29.2069	33.3776	8.28794	58.0389	66.3269	2.5203E 04	3.3152E 04	1.7046E 05	4000
4200	1-3660E 03	4.18747	29.4108	33.5983	8.32119	58.4441	66.7653	2.6603E 04	3.4949E 04	1.7587E 05	4200
4400	1-4781E 03	4.20309	29.6040	33.8091	8.35224	58.8320	67.1842	2.8004E 04	3.6750E 04	1.8088E 05	4400
4600	1-5948E 03	4.21774	29.7931	34.0109	8.38134	59.2039	67.5852	2.9401E 04	3.8554E 04	1.8549E 05	4600
4800	1-7163E 03	4.23152	29.9729	34.2045	8.40873	59.5612	67.9699	3.0824E 04	4.0362E 04	1.8980E 05	4800
5000	1-8425E 03	4.24453	30.1459	34.3905	8.43458	59.9050	68.3393	3.2237E 04	4.2172E 04	1.9382E 05	5000
5200	1-9735E 03	4.25684	30.3127	34.5695	8.45908	60.2363	68.6953	3.3654E 04	4.3987E 04	1.9757E 05	5200
5400	2-1092E 03	4.26859	30.4755	34.7421	8.48239	60.5559	69.0383	3.5074E 04	4.5802E 04	2.0108E 05	5400
5600	2-2498E 03	4.27978	30.6290	34.9088	8.50464	60.8648	69.3685	3.6498E 04	4.7624E 04	2.0434E 05	5600
5800	2-3952E 03	4.29051	30.7793	35.0699	8.52596	61.1636	69.6866	3.7925E 04	4.9451E 04	2.0735E 05	5800
6000	2-5456E 03	4.30085	30.9250	35.2258	8.54650	61.4530	69.9955	3.9354E 04	5.1279E 04	2.1012E 05	6000
6200	2-7009E 03	4.31087	31.0662	35.3770	8.56642	61.7336	70.2980	4.0791E 04	5.3112E 04	2.1275E 05	6200
6400	2-8611E 03	4.32064	31.2032	35.5236	8.58582	62.0059	70.5917	4.2231E 04	5.4949E 04	2.1528E 05	6400
6600	3-0265E 03	4.33021	31.3363	35.6665	8.60484	62.2704	70.8752	4.3677E 04	5.6792E 04	2.1770E 05	6600
6800	3-1969E 03	4.33967	31.4657	35.8054	8.62364	62.5275	71.1512	4.5126E 04	5.8641E 04	2.2003E 05	6800
7000	3-3724E 03	4.34907	31.5916	35.9407	8.64233	62.7778	71.4201	4.6584E 04	6.0494E 04	2.2228E 05	7000
7200	3-5532E 03	4.35850	31.7143	36.0728	8.66107	63.0215	71.6826	4.8052E 04	6.2346E 04	2.2445E 05	7200
7400	3-7393E 03	4.36802	31.8338	36.2018	8.67998	63.2591	71.9390	4.9527E 04	6.4232E 04	2.2654E 05	7400
7600	3-9308E 03	4.37771	31.9504	36.3282	8.69924	63.4908	72.1900	5.1012E 04	6.6114E 04	2.2856E 05	7600
7800	4-1378E 03	4.38765	32.0643	36.4519	8.71899	63.7170	72.4340	5.2506E 04	6.8006E 04	2.3052E 05	7800
8000	4-3505E 03	4.39791	32.1755	36.5734	8.73938	63.9380	72.6774	5.4018E 04	6.9915E 04	2.3245E 05	8000
8200	4-5688E 03	4.40854	32.2842	36.6928	8.76054	64.1541	72.9144	5.5542E 04	7.1834E 04	2.3436E 05	8200
8400	4-7931E 03	4.41967	32.3906	36.8103	8.78242	64.3654	73.1461	5.7082E 04	7.3774E 04	2.3624E 05	8400
8600	4-9734E 03	4.43133	32.4947	36.9260	8.80578	64.5724	73.3782	5.8640E 04	7.5730E 04	2.3810E 05	8600
8800	5-1999E 03	4.44358	32.5967	37.0403	8.83013	64.7751	73.6032	6.0218E 04	7.7705E 04	2.3994E 05	8800
9000	5-4320E 03	4.45631	32.6967	37.1532	8.85583	64.9738	73.8294	6.1810E 04	7.9702E 04	2.4176E 05	9000
9200	5-6724E 03	4.47018	32.7948	37.2650	8.88298	65.1688	74.0517	6.3422E 04	8.1723E 04	2.4356E 05	9200
9400	5-9180E 03	4.48463	32.8911	37.3758	8.91170	65.3601	74.2718	6.5051E 04	8.3770E 04	2.4534E 05	9400
9600	6-1723E 03	4.49953	32.9857	37.4856	8.94211	65.5480	74.4901	6.6707E 04	8.5844E 04	2.4710E 05	9600
9800	6-4333E 03	4.51612	33.0786	37.5946	8.97427	65.7327	74.7070	6.8374E 04	8.7948E 04	2.4884E 05	9800

TABLE N7 (CONT.). IDEAL GAS FUNCTIONS FOR N₂

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2-E_0}{RT}$	$-\frac{h^2-E_0}{RT}$	$5R$	$(h^2-E_0)_{CAL}$	$-\ln \frac{(h^2-E_0)_{CAL}}{h^2-E_0}$	S^0	E^0-E_0	h^2-E_0	$-\ln \frac{h^2-E_0}{CAL/RT^2}$	$-(h^2-E_0)$	TEMP. (°K)
10000	6.7019E 03	4.53323	33.1701	37.7033	9.00829	65.9144	76.9227	7.0211E 04	9.0003E 04	6.5014E 05	6.5014E 05	10000
10500	7.4090E 03	4.58026	33.3924	37.9728	9.10178	66.3561	77.4379	7.4703E 04	9.5349E 04	6.9674E 05	6.9674E 05	10500
11000	8.1718E 03	4.63360	33.6064	38.2402	9.20172	66.7819	77.9897	7.9428E 04	1.0128E 05	7.3460E 05	7.3460E 05	11000
11500	8.9933E 03	4.69315	33.8139	38.5070	9.32666	67.1934	78.5199	8.4272E 04	1.0723E 05	7.7273E 05	7.7273E 05	11500
12000	9.8900E 03	4.75857	34.0150	38.7734	9.45607	67.5934	79.0495	8.8927E 04	1.1347E 05	8.1112E 05	8.1112E 05	12000
12500	1.0841E 04	4.82920	34.2107	39.0399	9.59642	67.9823	79.5787	9.3116E 04	1.1994E 05	8.4978E 05	8.4978E 05	12500
13000	1.1917E 04	4.90413	34.4015	39.3057	9.74532	68.3615	80.1068	1.0083E 05	1.2649E 05	8.8870E 05	8.8870E 05	13000
13500	1.3047E 04	4.98223	34.5881	39.5703	9.90052	68.7322	80.6327	1.0683E 05	1.3344E 05	9.2786E 05	9.2786E 05	13500
14000	1.4323E 04	5.06227	34.7707	39.8330	10.05937	69.0951	81.1547	1.1301E 05	1.4083E 05	9.6733E 05	9.6733E 05	14000
14500	1.5692E 04	5.14293	34.9497	40.0927	10.21986	69.4509	81.6708	1.1937E 05	1.4811E 05	1.0079E 06	1.0079E 06	14500
15000	1.7184E 04	5.22294	35.1255	40.3484	10.37625	69.8001	82.1789	1.2589E 05	1.5548E 05	1.0476E 06	1.0476E 06	15000
15500	1.8814E 04	5.30107	35.2980	40.5991	10.53111	70.1430	82.6771	1.3248E 05	1.6280E 05	1.0872E 06	1.0872E 06	15500
16000	2.0590E 04	5.37625	35.4675	40.8437	10.68331	70.4798	83.1633	1.3914E 05	1.7014E 05	1.1277E 06	1.1277E 06	16000
16500	2.2520E 04	5.44735	35.6340	41.0814	10.83318	70.8107	83.6559	1.4583E 05	1.7744E 05	1.1684E 06	1.1684E 06	16500
17000	2.4616E 04	5.51420	35.7977	41.3115	10.97962	71.1359	84.1393	1.5256E 05	1.8478E 05	1.2093E 06	1.2093E 06	17000
17500	2.6888E 04	5.57563	35.9584	41.5340	11.07970	71.4553	84.6140	1.5912E 05	1.9230E 05	1.2506E 06	1.2506E 06	17500
18000	2.9345E 04	5.63145	36.1163	41.7477	11.19082	71.7690	85.0895	1.6566E 05	2.0143E 05	1.2918E 06	1.2918E 06	18000
18500	3.1994E 04	5.68142	36.2713	41.9527	11.28992	72.0770	85.5649	1.7210E 05	2.0886E 05	1.3334E 06	1.3334E 06	18500
19000	3.4850E 04	5.72544	36.4234	42.1488	11.37740	72.3793	86.0367	1.7841E 05	2.1617E 05	1.3752E 06	1.3752E 06	19000
19500	3.7915E 04	5.76355	36.5725	42.3361	11.45313	72.6758	86.5129	1.8459E 05	2.2334E 05	1.4172E 06	1.4172E 06	19500
20000	4.1190E 04	5.79588	36.7189	42.5148	11.51738	72.9664	86.9840	1.9060E 05	2.3033E 05	1.4593E 06	1.4593E 06	20000
20500	4.4641E 04	5.87230	37.2754	43.1479	11.64923	73.2519	87.4519	2.1301E 05	2.5672E 05	1.6296E 06	1.6296E 06	20500
21000	4.8313E 04	5.87963	37.7872	43.6449	11.83379	73.5379	87.9195	2.3272E 05	2.8041E 05	1.8021E 06	1.8021E 06	21000
21500	5.2299E 04	5.83899	38.2545	44.0955	11.60304	73.8220	88.3871	2.5001E 05	3.0166E 05	1.9764E 06	1.9764E 06	21500
22000	5.6785E 04	5.76785	38.6868	44.4544	11.44164	74.1070	88.8547	2.6529E 05	3.2093E 05	2.1524E 06	2.1524E 06	22000
22500	6.1878E 04	5.67885	39.0818	44.7606	11.28481	74.3919	89.3224	2.7893E 05	3.3854E 05	2.3299E 06	2.3299E 06	22500
23000	6.7434E 04	5.58058	39.4452	45.0257	11.08954	74.6761	89.7903	2.9128E 05	3.5487E 05	2.5083E 06	2.5083E 06	23000
23500	7.3533E 04	5.47885	39.7804	45.2591	10.86498	74.9593	90.2573	3.0259E 05	3.7014E 05	2.6877E 06	2.6877E 06	23500
24000	7.9991E 04	5.37638	40.0907	45.4673	10.64916	75.2416	90.7245	3.1309E 05	3.8443E 05	2.8680E 06	2.8680E 06	24000
24500	8.6808E 04	5.27655	40.3787	45.6552	10.45338	75.5231	91.1917	3.2293E 05	3.9844E 05	3.0491E 06	3.0491E 06	24500
25000	9.3999E 04	5.17983	40.6469	45.8267	10.29317	75.8040	91.6582	3.3224E 05	4.1173E 05	3.2307E 06	3.2307E 06	25000

TABLE 88. IDEAL GAS FUNCTIONS FOR N₂* (MOLECULAR WEIGHT 28.0129, R = 1.98717 CAL/MOLE, 8 STATES INCLUDED)

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2}{8\pi^2 I}$	$\frac{h^2}{8\pi^2 I} - \frac{h^2}{8\pi^2 I_0}$	$\frac{h^2}{8\pi^2 I}$	$\frac{h^2}{8\pi^2 I} - \frac{h^2}{8\pi^2 I_0}$	$\frac{h^2}{8\pi^2 I}$	$\frac{h^2}{8\pi^2 I} - \frac{h^2}{8\pi^2 I_0}$	$\frac{h^2}{8\pi^2 I}$	$\frac{h^2}{8\pi^2 I} - \frac{h^2}{8\pi^2 I_0}$	TEMP. (°K)
1000	3.8059E 02	3.64675	24.5451	28.1918	7.24669	48.7751	56.0218	5.2595E 03	7.2467E 03	1000
1200	4.7189E 02	3.71419	25.2159	28.9301	7.38071	50.1082	57.4899	6.4723E 03	7.2467E 03	1200
1400	5.7181E 02	3.78001	25.7934	29.5734	7.51151	51.2558	58.7873	7.6473E 03	7.2467E 03	1400
1600	6.8124E 02	3.84396	26.3024	30.1463	7.63859	52.2697	59.9957	8.7922E 03	7.2467E 03	1600
1800	8.0100E 02	3.90693	26.7588	30.6457	7.76372	53.1741	60.9378	9.8998E 03	7.2467E 03	1800
2000	9.3201E 02	3.96982	27.1736	31.1435	7.88868	53.9985	61.8872	1.1003E 04	7.2467E 03	2000
2200	1.0753E 03	4.03303	27.5550	31.6407	8.01430	54.7563	62.8406	1.2003E 04	7.2467E 03	2200
2400	1.2321E 03	4.09653	27.9086	32.0951	8.14048	55.4590	63.7995	1.3003E 04	7.2467E 03	2400
2600	1.4034E 03	4.15991	28.2390	32.5989	8.26662	56.1154	64.7620	1.4003E 04	7.2467E 03	2600
2800	1.5910E 03	4.22257	28.5496	32.7722	8.39094	56.7328	65.7287	1.5003E 04	7.2467E 03	2800
3000	1.7959E 03	4.28389	28.8430	33.1269	8.51200	57.3158	66.6998	1.6003E 04	7.2467E 03	3000
3200	2.0183E 03	4.34326	29.1214	33.4647	8.63077	57.8600	67.6756	1.7003E 04	7.2467E 03	3200
3400	2.2581E 03	4.40018	29.3864	33.7866	8.74788	58.3957	68.6563	1.8003E 04	7.2467E 03	3400
3600	2.5243E 03	4.45425	29.6395	34.0937	8.86353	58.9266	69.6419	1.9003E 04	7.2467E 03	3600
3800	2.8095E 03	4.50524	29.8817	34.3869	8.97825	59.3799	70.6325	2.0003E 04	7.2467E 03	3800
4000	3.1177E 03	4.55299	30.1140	34.6670	9.09254	59.8415	71.6281	2.1003E 04	7.2467E 03	4000
4200	3.4499E 03	4.59747	30.3372	34.9347	9.20582	60.2851	72.6287	2.2003E 04	7.2467E 03	4200
4400	3.8072E 03	4.63873	30.5521	35.1908	9.31859	60.7120	73.6341	2.3003E 04	7.2467E 03	4400
4600	4.1904E 03	4.67684	30.7591	35.4360	9.43036	61.1235	74.6441	2.4003E 04	7.2467E 03	4600
4800	4.6007E 03	4.71201	30.9589	35.6709	9.54128	61.5205	75.6587	2.5003E 04	7.2467E 03	4800
5000	5.0389E 03	4.74436	31.1519	35.8963	9.65183	61.9041	76.6779	2.6003E 04	7.2467E 03	5000
5200	5.5057E 03	4.77411	31.3386	36.1127	9.76205	62.2750	77.6917	2.7003E 04	7.2467E 03	5200
5400	6.0022E 03	4.80146	31.5193	36.3208	9.87192	62.6341	78.7002	2.8003E 04	7.2467E 03	5400
5600	6.5292E 03	4.82641	31.6944	36.5210	9.98128	62.9820	79.7033	2.9003E 04	7.2467E 03	5600
5800	7.0875E 03	4.84978	31.8642	36.7140	10.09012	63.3194	80.7017	3.0003E 04	7.2467E 03	5800
6000	7.6780E 03	4.87117	32.0289	36.9001	10.19852	63.6468	81.6956	3.1003E 04	7.2467E 03	6000
6200	8.3015E 03	4.89096	32.1890	37.0800	10.30642	63.9648	82.6849	3.2003E 04	7.2467E 03	6200
6400	8.9599E 03	4.90933	32.3446	37.2539	10.41382	64.2740	83.6697	3.3003E 04	7.2467E 03	6400
6600	9.6509E 03	4.92645	32.4959	37.4224	10.52072	64.5747	84.6499	3.4003E 04	7.2467E 03	6600
6800	1.0378E 04	4.94247	32.6432	37.5857	10.62712	64.8675	85.6256	3.5003E 04	7.2467E 03	6800
7000	1.1142E 04	4.95753	32.7867	37.7442	10.73302	65.1526	86.5971	3.6003E 04	7.2467E 03	7000
7200	1.1943E 04	4.97176	32.9264	37.8983	10.83842	65.4305	87.5644	3.7003E 04	7.2467E 03	7200
7400	1.2781E 04	4.98528	33.0630	38.0483	10.94332	65.7016	88.5276	3.8003E 04	7.2467E 03	7400
7600	1.3661E 04	4.99818	33.1961	38.1943	11.04772	65.9661	89.4867	3.9003E 04	7.2467E 03	7600
7800	1.4579E 04	5.01055	33.3261	38.3364	11.15162	66.2244	90.4417	4.0003E 04	7.2467E 03	7800
8000	1.5538E 04	5.02247	33.4531	38.4756	11.25502	66.4768	91.3927	4.1003E 04	7.2467E 03	8000
8200	1.6539E 04	5.03400	33.5773	38.6113	11.35792	66.7236	92.3397	4.2003E 04	7.2467E 03	8200
8400	1.7583E 04	5.04520	33.6987	38.7439	11.46032	66.9649	93.2827	4.3003E 04	7.2467E 03	8400
8600	1.8671E 04	5.05612	33.8175	38.8737	11.56222	67.2011	94.2217	4.4003E 04	7.2467E 03	8600
8800	1.9803E 04	5.06678	33.9339	39.0007	11.66362	67.4323	95.1567	4.5003E 04	7.2467E 03	8800
9000	2.0982E 04	5.07721	34.0479	39.1251	11.76452	67.6580	96.0877	4.6003E 04	7.2467E 03	9000
9200	2.2207E 04	5.08745	34.1596	39.2470	11.86492	67.8808	97.0147	4.7003E 04	7.2467E 03	9200
9400	2.3480E 04	5.09749	34.2691	39.3666	11.96482	68.0998	97.9377	4.8003E 04	7.2467E 03	9400
9600	2.4802E 04	5.10735	34.3765	39.4839	12.06422	68.3119	98.8567	4.9003E 04	7.2467E 03	9600
9800	2.6179E 04	5.11703	34.4819	39.5990	12.16312	68.5213	99.7717	5.0003E 04	7.2467E 03	9800

TABLE 88 (CONT.). IDEAL GAS FUNCTIONS FOR N₂

TEMP. (°F.)	PARTIAL PRESSURE (atm.)	$\frac{H^0 - H}{RT}$	$-\frac{P^0 - P}{P}$	$\frac{H^0 - H}{RT} - \frac{P^0 - P}{P}$	$\frac{H^0 - H}{RT} - \frac{P^0 - P}{P} - \frac{P^0}{P} \ln \frac{P}{P^0}$	$\frac{H^0 - H}{RT} - \frac{P^0 - P}{P} - \frac{P^0}{P} \ln \frac{P}{P^0} - \frac{P^0}{P} \ln \frac{P^0}{P}$	TEMP. (°F.)			
10000	2.7599E 04	5.12652	34.5854	39.7119	10.18724	94.7270	78.9142	1.0197E 05	6.8727E 05	10000
10500	3.1390E 04	5.14938	34.8361	39.9855	10.23268	66.2251	79.4578	1.0744E 05	7.2604E 05	10500
11000	3.5525E 04	5.17087	35.0762	40.2470	10.27516	66.7021	79.9775	1.1303E 05	7.6472E 05	11000
11500	4.0021E 04	5.19075	35.3065	40.4972	10.31488	70.1598	80.4747	1.1862E 05	8.0404E 05	11500
12000	4.4894E 04	5.20876	35.5278	40.7365	10.35059	70.5995	80.9502	1.2421E 05	8.4719E 05	12000
12500	5.0160E 04	5.22465	35.7407	40.9654	10.38225	71.0237	81.4050	1.2978E 05	8.9379E 05	12500
13000	5.5832E 04	5.23822	35.9459	41.1841	10.40922	71.4395	81.8397	1.3532E 05	9.4042E 05	13000
13500	6.1945E 04	5.25032	36.1438	41.3931	10.43127	71.8377	82.2580	1.4083E 05	9.8692E 05	13500
14000	6.8447E 04	5.25784	36.3349	41.5921	10.44819	72.20	82.6516	1.4627E 05	1.0404E 06	14000
14500	7.5410E 04	5.26373	36.5195	41.7832	10.45990	72.5763	83.0302	1.5167E 05	1.0923E 06	14500
15000	8.2823E 04	5.26700	36.6980	41.9650	10.46640	72.9250	83.3914	1.5700E 05	1.1439E 06	15000
15500	9.0690E 04	5.26769	36.8707	42.1384	10.46778	73.2662	83.7360	1.6229E 05	1.1957E 06	15500
16000	9.9017E 04	5.26589	37.0380	42.3038	10.46420	73.6005	84.0647	1.6754E 05	1.2478E 06	16000
16500	1.0781E 05	5.26172	37.1999	42.4617	10.45590	73.9224	84.3783	1.7272E 05	1.2997E 06	16500
17000	1.1706E 05	5.25530	37.3569	42.6122	10.44314	74.2344	84.6775	1.7783E 05	1.3512E 06	17000
17500	1.2678E 05	5.24674	37.5091	42.7559	10.42622	74.5369	84.9631	1.8244E 05	1.4044E 06	17500
18000	1.3696E 05	5.23633	37.6568	42.8931	10.40545	74.8303	85.2357	1.8730E 05	1.4594E 06	18000
18500	1.4760E 05	5.22410	37.8001	43.0242	10.38116	75.1151	85.4962	1.9205E 05	1.5094E 06	18500
19000	1.5869E 05	5.21027	37.9392	43.1495	10.35367	75.3916	85.7452	1.9672E 05	1.5544E 06	19000
19500	1.7023E 05	5.19498	38.0744	43.2684	10.32329	75.6601	85.9834	2.0130E 05	1.6044E 06	19500
20000	1.8222E 05	5.17841	38.2057	43.3841	10.29035	75.9211	86.2114	2.0581E 05	1.6504E 06	20000
20500	1.9469E 05	5.16058	38.3328	43.4978	10.25447	76.1849	86.4334	2.1024E 05	1.6974E 06	20500
21000	2.0767E 05	5.14158	38.4560	43.6095	10.21616	76.4508	86.6508	2.1460E 05	1.7444E 06	21000
21500	2.2115E 05	5.12152	38.5753	43.7194	10.17584	76.7188	86.8638	2.1889E 05	1.7914E 06	21500
22000	2.3513E 05	5.10052	38.6907	43.8276	10.13391	76.9888	87.0722	2.2312E 05	1.8384E 06	22000
22500	2.4961E 05	5.07867	38.8022	43.9342	10.09084	77.2608	87.2762	2.2729E 05	1.8864E 06	22500
23000	2.6459E 05	5.05597	38.9100	44.0392	10.04711	77.5348	87.4758	2.3141E 05	1.9344E 06	23000
23500	2.8007E 05	5.03242	39.0142	44.1416	9.95700	77.8108	87.6712	2.3548E 05	1.9824E 06	23500
24000	2.9605E 05	5.00802	39.1149	44.2416	9.91050	78.0888	87.8632	2.3951E 05	2.0304E 06	24000
24500	3.1253E 05	4.98282	39.2122	44.3392	9.86300	78.3688	88.0518	2.4349E 05	2.0784E 06	24500
25000	3.2951E 05	4.95687	39.3065	44.4342	9.81450	78.6508	88.2368	2.4744E 05	2.1264E 06	25000
25500	3.4699E 05	4.93015	39.3978	44.5265	9.76500	78.9348	88.4188	2.5135E 05	2.1744E 06	25500
26000	3.6497E 05	4.90267	39.4859	44.6162	9.71450	79.2208	88.5968	2.5521E 05	2.2224E 06	26000
26500	3.8345E 05	4.87442	39.5707	44.7034	9.66300	79.5088	88.7708	2.5902E 05	2.2704E 06	26500
27000	4.0243E 05	4.84542	39.6522	44.7881	9.61050	79.7988	88.9408	2.6278E 05	2.3184E 06	27000
27500	4.2191E 05	4.81567	39.7307	44.8704	9.55700	80.0908	89.1068	2.6649E 05	2.3664E 06	27500
28000	4.4189E 05	4.78517	39.8062	44.9504	9.50250	80.3848	89.2688	2.7015E 05	2.4144E 06	28000
28500	4.6237E 05	4.75382	39.8787	45.0281	9.44700	80.6808	89.4268	2.7376E 05	2.4624E 06	28500
29000	4.8335E 05	4.72162	39.9482	45.1034	9.39050	80.9788	89.5808	2.7732E 05	2.5104E 06	29000
29500	5.0483E 05	4.68867	39.9997	45.1762	9.33300	81.2788	89.7308	2.8083E 05	2.5584E 06	29500
30000	5.2681E 05	4.65507	40.0532	45.2465	9.27450	81.5808	89.8768	2.8429E 05	2.6064E 06	30000
30500	5.4929E 05	4.62072	40.1037	45.3142	9.21500	81.8848	89.9988	2.8770E 05	2.6544E 06	30500
31000	5.7227E 05	4.58572	40.1512	45.3794	9.15450	82.1908	90.1168	2.9106E 05	2.7024E 06	31000
31500	5.9575E 05	4.55007	40.1957	45.4421	9.09300	82.4988	90.2308	2.9437E 05	2.7504E 06	31500
32000	6.1973E 05	4.51377	40.2372	45.5024	9.03050	82.8088	90.3408	2.9763E 05	2.7984E 06	32000
32500	6.4421E 05	4.47682	40.2757	45.5592	8.96700	83.1208	90.4468	3.0084E 05	2.8464E 06	32500
33000	6.6919E 05	4.43922	40.3112	45.6135	8.90250	83.4348	90.5488	3.0400E 05	2.8944E 06	33000
33500	6.9467E 05	4.40097	40.3437	45.6652	8.83700	83.7508	90.6468	3.0711E 05	2.9424E 06	33500
34000	7.2065E 05	4.36207	40.3732	45.7145	8.77300	84.0688	90.7408	3.1017E 05	2.9904E 06	34000
34500	7.4713E 05	4.32252	40.4007	45.7612	8.70300	84.3968	90.8308	3.1318E 05	3.0384E 06	34500
35000	7.7411E 05	4.28232	40.4252	45.8055	8.63450	84.7308	90.9168	3.1614E 05	3.0864E 06	35000
35500	8.0159E 05	4.24157	40.4477	45.8472	8.56500	85.0688	91.0008	3.1905E 05	3.1344E 06	35500
36000	8.2957E 05	4.20027	40.4672	45.8865	8.49450	85.4108	91.0828	3.2191E 05	3.1824E 06	36000
36500	8.5805E 05	4.15842	40.4837	45.9234	8.42300	85.7568	91.1628	3.2472E 05	3.2304E 06	36500
37000	8.8703E 05	4.11602	40.5087	45.9578	8.35050	86.1068	91.2408	3.2749E 05	3.2784E 06	37000
37500	9.1651E 05	4.07307	40.5312	45.9897	8.27700	86.4608	91.3168	3.3021E 05	3.3264E 06	37500
38000	9.4649E 05	4.02957	40.5512	46.0192	8.20250	86.8188	91.3908	3.3288E 05	3.3744E 06	38000
38500	9.7697E 05	3.98607	40.5687	46.0462	8.12700	87.1808	91.4628	3.3550E 05	3.4224E 06	38500
39000	1.00795E 06	3.94257	40.5842	46.0707	8.05050	87.5468	91.5328	3.3807E 05	3.4704E 06	39000
39500	1.03813E 06	3.90007	40.5987	46.0927	7.97300	87.9168	91.6008	3.4059E 05	3.5184E 06	39500
40000	1.06831E 06	3.85807	40.6112	46.1122	7.89450	88.2908	91.6668	3.4306E 05	3.5664E 06	40000

TABLE B9 (CONT.). IDEAL GAS FUNCTIONS FOR NO

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2}{RT}$	$\ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT}$	TEMP. (°K)
10000	7.9451E 04	4.82983	35.7421	40.3719	9.20024	71.0255	80.2237	7.1823E 05
10500	8.7874E 04	4.85441	35.9487	40.4751	9.25346	71.5757	80.7287	7.1823E 05
11000	9.7205E 04	4.88088	36.1858	40.8647	9.30169	71.9973	81.2099	7.1823E 05
11500	1.0715E 05	4.70285	36.3944	41.0973	9.34355	72.3217	81.6671	7.1823E 05
12000	1.1773E 05	4.72207	36.5950	41.3170	9.38353	72.7203	82.1036	7.1823E 05
12500	1.2894E 05	4.73834	36.7881	41.5264	9.41937	73.1040	82.5199	7.1823E 05
13000	1.4083E 05	4.75159	36.9742	41.7258	9.45219	73.5736	82.9140	7.1823E 05
13500	1.5333E 05	4.76180	37.1537	41.9155	9.48247	74.0306	83.2931	7.1823E 05
14000	1.6652E 05	4.76902	37.3270	42.0960	9.51064	74.4750	83.6518	7.1823E 05
14500	1.8033E 05	4.77335	37.4945	42.2678	9.53696	74.9077	83.9931	7.1823E 05
15000	1.9479E 05	4.77695	37.6563	42.4313	9.56061	75.3293	84.3180	7.1823E 05
15500	2.0987E 05	4.77997	37.8129	42.5869	9.58267	75.7405	84.6271	7.1823E 05
16000	2.2557E 05	4.78261	37.9644	42.7360	9.60329	76.1415	84.9211	7.1823E 05
16500	2.4188E 05	4.78506	38.1111	42.8762	9.62266	76.5331	85.2021	7.1823E 05
17000	2.5877E 05	4.78751	38.2533	43.0108	9.64096	76.9156	85.4795	7.1823E 05
17500	2.7633E 05	4.78916	38.3910	43.1392	9.65838	77.2893	85.7447	7.1823E 05
18000	2.9455E 05	4.79070	38.5246	43.2619	9.67490	77.6544	86.0085	7.1823E 05
18500	3.1340E 05	4.79201	38.6543	43.3791	9.69059	78.0124	86.2614	7.1823E 05
19000	3.3284E 05	4.79315	38.7801	43.4913	9.70544	78.3625	86.5043	7.1823E 05
19500	3.5281E 05	4.79410	38.9023	43.5987	9.71952	78.7053	86.7378	7.1823E 05
20000	3.7335E 05	4.79488	39.0210	43.7017	9.73283	79.0412	86.9624	7.1823E 05
20500	3.9451E 05	4.79551	39.1369	43.8007	9.74538	79.3703	87.1784	7.1823E 05
21000	4.1627E 05	4.79599	39.2497	43.8954	9.75719	79.6927	87.3864	7.1823E 05
21500	4.3864E 05	4.79633	39.3599	43.9864	9.76826	79.9976	87.5772	7.1823E 05
22000	4.6157E 05	4.79655	39.4674	44.0734	9.77860	80.2953	87.7614	7.1823E 05
22500	4.8509E 05	4.79666	39.5721	44.1561	9.78821	80.5776	87.9390	7.1823E 05
23000	5.0924E 05	4.79666	39.6744	44.2344	9.79710	80.8534	88.1117	7.1823E 05
23500	5.3404E 05	4.79655	39.7744	44.3084	9.80528	81.1227	88.2793	7.1823E 05
24000	5.5949E 05	4.79633	39.8721	44.3784	9.81276	81.3874	88.4424	7.1823E 05
24500	5.8557E 05	4.79599	39.9674	44.4444	9.81952	81.6464	88.5999	7.1823E 05
25000	6.1230E 05	4.79551	40.0600	44.5064	9.82557	81.8999	88.7524	7.1823E 05
25500	6.3967E 05	4.79488	40.1509	44.5644	9.83090	82.1474	88.9004	7.1823E 05
26000	6.6770E 05	4.79410	40.2397	44.6184	9.83552	82.3899	89.0434	7.1823E 05
26500	6.9639E 05	4.79315	40.3264	44.6684	9.83943	82.6264	89.1814	7.1823E 05
27000	7.2574E 05	4.79201	40.4117	44.7144	9.84264	82.8574	89.3144	7.1823E 05
27500	7.5574E 05	4.79070	40.4954	44.7564	9.84516	83.0824	89.4424	7.1823E 05
28000	7.8639E 05	4.78916	40.5774	44.7944	9.84696	83.3134	89.5654	7.1823E 05
28500	8.1770E 05	4.78751	40.6574	44.8284	9.84806	83.5384	89.6834	7.1823E 05
29000	8.4967E 05	4.78506	40.7354	44.8584	9.84847	83.7584	89.7964	7.1823E 05
29500	8.8230E 05	4.78261	40.8114	44.8844	9.84818	83.9734	89.9044	7.1823E 05
30000	9.1557E 05	4.77997	40.8854	44.9064	9.84719	84.1834	90.0074	7.1823E 05
30500	9.4949E 05	4.77709	40.9574	44.9244	9.84540	84.3874	90.1054	7.1823E 05
31000	9.8404E 05	4.77397	41.0274	44.9384	9.84281	84.5854	90.1984	7.1823E 05
31500	1.01924E 06	4.77061	41.0954	44.9484	9.83942	84.7774	90.2864	7.1823E 05
32000	1.05839E 06	4.76701	41.1614	44.9544	9.83523	84.9624	90.3694	7.1823E 05
32500	1.09780E 06	4.76315	41.2254	44.9564	9.83034	85.1414	90.4474	7.1823E 05
33000	1.13747E 06	4.75906	41.2874	44.9544	9.82475	85.3134	90.5204	7.1823E 05
33500	1.17740E 06	4.75474	41.3474	44.9484	9.81846	85.4794	90.5884	7.1823E 05
34000	1.21759E 06	4.75019	41.4054	44.9384	9.81147	85.6394	90.6514	7.1823E 05
34500	1.25804E 06	4.74541	41.4614	44.9244	9.80378	85.7934	90.7094	7.1823E 05
35000	1.29875E 06	4.74039	41.5154	44.9064	9.79539	85.9414	90.7624	7.1823E 05
35500	1.33972E 06	4.73513	41.5674	44.8844	9.78630	86.0834	90.8104	7.1823E 05
36000	1.38095E 06	4.72964	41.6174	44.8584	9.77651	86.2194	90.8534	7.1823E 05
36500	1.42244E 06	4.72393	41.6654	44.8284	9.76602	86.3504	90.8914	7.1823E 05
37000	1.46419E 06	4.71799	41.7114	44.7944	9.75483	86.4754	90.9244	7.1823E 05
37500	1.50620E 06	4.71181	41.7554	44.7564	9.74294	86.5954	90.9524	7.1823E 05
38000	1.54847E 06	4.70539	41.7974	44.7144	9.73035	86.7104	90.9754	7.1823E 05
38500	1.59100E 06	4.69874	41.8374	44.6684	9.71706	86.8204	90.9934	7.1823E 05
39000	1.63379E 06	4.69186	41.8754	44.6184	9.70307	86.9254	91.0064	7.1823E 05
39500	1.67684E 06	4.68474	41.9114	44.5644	9.68838	87.0254	91.0144	7.1823E 05
40000	1.72015E 06	4.67739	41.9454	44.5064	9.67299	87.1204	91.0174	7.1823E 05

TABLE 90. IDEAL GAS FUNCTIONS FOR NO+ INMOLECULAR WEIGHT 30.0056, R = 1.98717 CAL/MOLE, 6 STATES INCLUDED

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2 E^2}{RT}$	$\frac{h^2 E^2}{RT} - \frac{h^2 E^2}{RT}$	$\frac{h^2 E^2}{RT}$	$\frac{h^2 E^2}{RT}$	$\frac{h^2 E^2}{RT}$	$\frac{h^2 E^2}{RT}$	$\frac{h^2 E^2}{RT}$	$\frac{h^2 E^2}{RT}$	$\frac{h^2 E^2}{RT}$	TEMP. (°K)
1000	3.6254E 02	3.62244	24.5996	28.2221	7.19039	48.8835	54.0819	5.2112E 03	7.1904E 03	1.9044E 03	1000
1200	4.4730E 02	3.68433	25.2656	28.9499	7.32137	50.2048	57.5282	6.4010E 03	8.7054E 03	2.8240E 03	1200
1400	5.3934E 02	3.74424	25.8300	29.5823	7.45443	51.3445	59.8961	7.5908E 03	1.0417E 04	3.7102E 03	1400
1600	6.3917E 02	3.79978	26.3417	30.1455	7.55080	52.3453	61.9911	8.7501E 03	1.2081E 04	4.6375E 03	1600
1800	7.4712E 02	3.85027	26.7922	30.6425	7.63111	53.2405	63.8917	9.8777E 03	1.3772E 04	5.5833E 03	1800
2000	8.6341E 02	3.89578	27.2003	31.0961	7.70156	54.0314	65.7040	1.0959E 04	1.5483E 04	6.5401E 03	2000
2200	9.8820E 02	3.93475	27.5735	31.5103	7.76223	54.7932	67.4361	1.2081E 04	1.7210E 04	7.5994E 03	2200
2400	1.1214E 03	3.96762	27.9177	31.8913	7.81423	55.5470	69.0962	1.3148E 04	1.8959E 04	8.7402E 03	2400
2600	1.2637E 03	4.00493	28.2371	32.2440	7.85843	56.2948	70.6901	1.4169E 04	2.0643E 04	9.9599E 03	2600
2800	1.4146E 03	4.03712	28.5351	32.5723	7.89523	57.0304	72.2242	1.5134E 04	2.2284E 04	1.1240E 04	2800
3000	1.5743E 03	4.06460	28.8146	32.8792	7.92674	57.7549	73.6945	1.6069E 04	2.3884E 04	1.2482E 04	3000
3200	1.7430E 03	4.08972	29.0778	33.1675	7.95347	58.4683	75.1078	1.6974E 04	2.5444E 04	1.3777E 04	3200
3400	1.9207E 03	4.11278	29.3244	33.4392	7.97601	59.1706	76.4634	1.7849E 04	2.6974E 04	1.5114E 04	3400
3600	2.1075E 03	4.13403	29.5621	33.6941	7.99501	59.8619	77.7622	1.8694E 04	2.8474E 04	1.6499E 04	3600
3800	2.3034E 03	4.15370	29.7861	33.9398	8.01101	60.5432	79.0059	1.9519E 04	2.9944E 04	1.7934E 04	3800
4000	2.5085E 03	4.17198	29.9997	34.1714	8.02451	61.2155	80.1945	2.0324E 04	3.1384E 04	1.9419E 04	4000
4200	2.7228E 03	4.18803	30.2036	34.3927	8.03601	61.8788	81.3388	2.1119E 04	3.2794E 04	2.0954E 04	4200
4400	2.9465E 03	4.20201	30.3989	34.6079	8.04601	62.5331	82.4391	2.1904E 04	3.4174E 04	2.2539E 04	4400
4600	3.1795E 03	4.21404	30.5861	34.8182	8.05461	63.1784	83.4954	2.2679E 04	3.5524E 04	2.4174E 04	4600
4800	3.4221E 03	4.22425	30.7660	35.0203	8.06201	63.8147	84.5088	2.3444E 04	3.6844E 04	2.5859E 04	4800
5000	3.6741E 03	4.23275	30.9392	35.1849	8.06831	64.4420	85.4791	2.4209E 04	3.8134E 04	2.7594E 04	5000
5200	3.9358E 03	4.24005	31.1060	35.3467	8.07361	65.0613	86.4064	2.4974E 04	3.9404E 04	2.9379E 04	5200
5400	4.2072E 03	4.24730	31.2671	35.5001	8.07801	65.6726	87.2917	2.5739E 04	4.0654E 04	3.1214E 04	5400
5600	4.4884E 03	4.25350	31.4227	35.6477	8.08161	66.2759	88.1350	2.6504E 04	4.1884E 04	3.3099E 04	5600
5800	4.7795E 03	4.25961	31.5732	35.7909	8.08441	66.8712	88.9373	2.7269E 04	4.3094E 04	3.4934E 04	5800
6000	5.0804E 03	4.26499	31.7191	35.9271	8.08641	67.4585	89.6986	2.8024E 04	4.4274E 04	3.6769E 04	6000
6200	5.3919E 03	4.27005	31.8605	36.0577	8.08761	68.0378	90.4199	2.8779E 04	4.5434E 04	3.8604E 04	6200
6400	5.7135E 03	4.27480	31.9978	36.1821	8.08801	68.6091	91.0912	2.9524E 04	4.6574E 04	4.0439E 04	6400
6600	6.0454E 03	4.27920	32.1313	36.3027	8.08761	69.1724	91.7125	3.0269E 04	4.7694E 04	4.2274E 04	6600
6800	6.3883E 03	4.28326	32.2610	36.4184	8.08641	69.7287	92.2838	3.1004E 04	4.8794E 04	4.4119E 04	6800
7000	6.7418E 03	4.28695	32.3874	36.5302	8.08441	70.2780	92.8051	3.1729E 04	4.9874E 04	4.6004E 04	7000
7200	7.1044E 03	4.29035	32.5105	36.6388	8.08161	70.8203	93.2764	3.2444E 04	5.0934E 04	4.7929E 04	7200
7400	7.4823E 03	4.29341	32.6305	36.7439	8.07801	71.3556	93.6977	3.3159E 04	5.1974E 04	4.9854E 04	7400
7600	7.8747E 03	4.29621	32.7477	36.8459	8.07361	71.8839	94.0690	3.3874E 04	5.2994E 04	5.1779E 04	7600
7800	8.2809E 03	4.29871	32.8621	36.9449	8.06831	72.4052	94.3903	3.4589E 04	5.3994E 04	5.3704E 04	7800
8000	8.6995E 03	4.29997	32.9739	37.0396	8.06201	72.9205	94.6616	3.5304E 04	5.4974E 04	5.5629E 04	8000
8200	9.1305E 03	4.29997	33.0834	37.1321	8.05461	73.4298	94.8829	3.6019E 04	5.5934E 04	5.7554E 04	8200
8400	9.5744E 03	4.29871	33.1905	37.2226	8.04601	73.9331	95.0542	3.6734E 04	5.6874E 04	5.9479E 04	8400
8600	1.0031E 04	4.29621	33.2954	37.3109	8.03601	74.4314	95.1755	3.7449E 04	5.7794E 04	6.1404E 04	8600
8800	1.0456E 04	4.29266	33.3983	37.3963	8.02451	74.9247	95.2468	3.8164E 04	5.8694E 04	6.3329E 04	8800
9000	1.0934E 04	4.28801	33.4992	37.4792	8.01101	75.4130	95.2679	3.8879E 04	5.9574E 04	6.5254E 04	9000
9200	1.1477E 04	4.28236	33.5982	37.5605	8.00001	75.8963	95.2382	3.9594E 04	6.0434E 04	6.7179E 04	9200
9400	1.2085E 04	4.27571	33.6955	37.6399	7.98801	76.3746	95.1595	4.0309E 04	6.1274E 04	6.9104E 04	9400
9600	1.2759E 04	4.26806	33.7911	37.7177	7.97451	76.8479	95.0208	4.1024E 04	6.2094E 04	7.1029E 04	9600
9800	1.3499E 04	4.25941	33.8851	37.7942	7.95901	77.3162	94.8321	4.1739E 04	6.2894E 04	7.2954E 04	9800
10000	1.4309E 04	4.24976	33.9776	37.8696	7.94151	77.7795	94.5934	4.2454E 04	6.3674E 04	7.4879E 04	10000

TABLE 90 (CONT.). IDEAL GAS FUNCTIONS FOR NO.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{H^\circ - G^\circ}{RT}$	$\frac{H^\circ - G^\circ}{RT}$	$\frac{H^\circ - G^\circ}{RT}$	$\frac{H^\circ - G^\circ}{RT}$	$\frac{H^\circ - G^\circ}{RT}$	$\frac{H^\circ - G^\circ}{RT}$	$\frac{H^\circ - G^\circ}{RT}$	$\frac{H^\circ - G^\circ}{RT}$	$\frac{H^\circ - G^\circ}{RT}$	$\frac{H^\circ - G^\circ}{RT}$	TEMP. (°K)
10000	1.3557E 04	4.50879	33.9776	38.5664	9.11668	67.5192	76.6378	7.1315E 04	9.1107E 04	1.1070E 04	6.7319E 05	10000
10500	1.5630E 04	4.64126	34.2028	38.8440	9.22294	77.1895	77.1895	7.5974E 04	9.6041E 04	1.0277E 05	7.5236E 05	10500
11000	1.6626E 04	4.69822	34.4207	39.1182	9.33413	68.3902	77.3343	8.0839E 04	1.0877E 05	1.1007E 05	7.9136E 05	11000
11500	1.8357E 04	4.75918	34.6302	39.3893	9.45728	68.8158	78.2721	8.5904E 04	1.1502E 05	1.1807E 05	8.3065E 05	11500
12000	2.0237E 04	4.82363	34.8340	39.6575	9.58496	69.2210	78.8060	9.1174E 04	1.2157E 05	1.2609E 05	8.7019E 05	12000
12500	2.2280E 04	4.89010	35.0323	39.9224	9.71744	69.6150	79.3324	9.6628E 04	1.2809E 05	1.3400E 05	9.1000E 05	12500
13000	2.4503E 04	4.95818	35.2234	40.1834	9.85272	69.9997	79.8514	1.0229E 05	1.3542E 05	1.4173E 05	9.5004E 05	13000
13500	2.6919E 04	5.02661	35.4138	40.4404	9.98871	70.3731	80.3618	1.0802E 05	1.4273E 05	1.4939E 05	9.9034E 05	13500
14000	2.9546E 04	5.09435	35.5979	40.6922	10.12331	70.7368	80.8621	1.1391E 05	1.4969E 05	1.5707E 05	1.0309E 06	14000
14500	3.2400E 04	5.16038	35.7778	40.9382	10.25453	71.0964	81.3509	1.1980E 05	1.5637E 05	1.6477E 05	1.0717E 06	14500
15000	3.5496E 04	5.22380	35.9538	41.1776	10.38056	71.4462	81.8267	1.2590E 05	1.6317E 05	1.7237E 05	1.1147E 06	15000
15500	3.8850E 04	5.28382	36.1261	41.4099	10.50083	71.7885	82.2883	1.3195E 05	1.6978E 05	1.7998E 05	1.1595E 06	15500
16000	4.2478E 04	5.33981	36.2967	41.6345	10.61610	72.1236	82.7367	1.3790E 05	1.7637E 05	1.8759E 05	1.2051E 06	16000
16500	4.6399E 04	5.39125	36.4598	41.8511	10.71331	72.4517	83.1651	1.4390E 05	1.8297E 05	1.9520E 05	1.2513E 06	16500
17000	5.0613E 04	5.43783	36.6215	42.0593	10.80586	72.7750	83.5786	1.4992E 05	1.8959E 05	2.0281E 05	1.2977E 06	17000
17500	5.5143E 04	5.47931	36.7797	42.2590	10.88829	73.0874	83.9757	1.5577E 05	1.9635E 05	2.1041E 05	1.3449E 06	17500
18000	6.0003E 04	5.51562	36.9346	42.4502	10.96044	73.3922	84.3556	1.6152E 05	2.0317E 05	2.1792E 05	1.3934E 06	18000
18500	6.5201E 04	5.54676	37.0862	42.6329	11.02233	73.6964	84.7187	1.6719E 05	2.0991E 05	2.2534E 05	1.4424E 06	18500
19000	7.0746E 04	5.57286	37.2345	42.8073	11.07619	73.9910	85.0652	1.7285E 05	2.1667E 05	2.3267E 05	1.4919E 06	19000
19500	7.6646E 04	5.59407	37.3795	42.9736	11.11634	74.2792	85.3956	1.7850E 05	2.2337E 05	2.3992E 05	1.5419E 06	19500
20000	8.2909E 04	5.61063	37.5213	43.1320	11.14925	74.5611	85.7104	1.8424E 05	2.2999E 05	2.4717E 05	1.5924E 06	20000
20500	1.1171E 05	5.63589	38.0578	43.6936	11.19944	75.4271	86.0265	2.0287E 05	2.4439E 05	2.5442E 05	1.6436E 06	20500
21000	1.4663E 05	5.66980	38.5473	44.1571	11.14759	76.5999	87.7475	2.1895E 05	2.6754E 05	2.6167E 05	1.6957E 06	21000
21500	1.8766E 05	5.69647	38.9942	44.5438	11.02810	77.4878	88.3159	2.3504E 05	2.8673E 05	2.6892E 05	1.7492E 06	21500
22000	2.3458E 05	5.74688	39.4026	44.8714	10.86757	78.2994	89.1670	2.4865E 05	3.0429E 05	2.7624E 05	1.8036E 06	22000
22500	2.8701E 05	5.77684	39.7768	45.1536	10.68468	79.0430	89.7277	2.6093E 05	3.2054E 05	2.8354E 05	1.8581E 06	22500
23000	3.4451E 05	5.79981	40.1207	45.4005	10.49186	79.7265	90.2184	2.7215E 05	3.3574E 05	2.9080E 05	1.9131E 06	23000
23500	4.0855E 05	5.81180	40.4379	45.6197	10.29709	80.3567	90.6538	2.8254E 05	3.5010E 05	2.9805E 05	1.9686E 06	23500
24000	4.7268E 05	5.82529	40.7313	45.8166	10.10531	80.8398	91.0451	2.9225E 05	3.6339E 05	3.0530E 05	2.0246E 06	24000
24500	5.4213E 05	5.839177	41.0037	45.9955	9.91947	81.4812	91.4007	3.0153E 05	3.7694E 05	3.1255E 05	2.0813E 06	24500
25000	6.1463E 05	5.85206	41.2575	46.1535	9.74117	81.9854	91.7266	3.1016E 05	3.8965E 05	3.2794E 05	2.1394E 06	25000

TABLE 91. IDEAL GAS FUNCTIONS FOR O₂ - MOLECULAR WEIGHT 31.9994, R = 1.98717 CAL/MOLE, 1 STATES INCLUDED

TEMP. (°K)	PARTIT. FUNCT.	$\frac{H^0 - E^0}{RT}$	$\frac{S^0}{R}$	$\ln \frac{P^0 - E^0}{P^0 - E^0_{VT}}$	$\frac{P^0 - E^0}{RT}$	$\frac{S^0}{R}$	$\ln \frac{P^0 - E^0}{P^0 - E^0_{VT}}$	$\frac{H^0 - E^0}{RT}$	$\frac{S^0}{R}$	$\ln \frac{P^0 - E^0}{P^0 - E^0_{VT}}$	TEMP. (°K)
1000	1.4789E 03	3.90526	30.0073	7.76040	51.8691	59.6295	5.7732E 03	7.7604E 03	5.1869E 04	5.1869E 04	1000
1200	1.9246E 03	3.98363	30.8249	7.91613	53.2983	61.2144	7.7148E 03	9.4994E 03	6.3950E 04	6.3950E 04	1200
1400	2.4312E 03	4.04760	31.4879	8.04326	54.9284	62.5717	8.4785E 03	1.1261E 04	7.6330E 04	7.6330E 04	1400
1600	2.9999E 03	4.10065	32.0880	8.14866	56.6096	63.7582	9.8584E 03	1.3032E 04	8.8975E 04	8.8975E 04	1600
1800	3.6320E 03	4.14553	32.6154	8.23755	58.2746	64.8122	1.1251E 04	1.4828E 04	1.0163E 05	1.0163E 05	1800
2000	4.3282E 03	4.18346	33.0924	8.31362	59.9445	65.7602	1.2453E 04	1.6627E 04	1.1449E 05	1.1449E 05	2000
2200	5.0897E 03	4.21679	33.5259	8.37945	61.6231	66.6215	1.4053E 04	1.8435E 04	1.2813E 05	1.2813E 05	2200
2400	5.9172E 03	4.24569	33.9230	8.43689	63.4737	67.4106	1.5479E 04	2.0249E 04	1.4154E 05	1.4154E 05	2400
2600	6.8116E 03	4.27102	34.2892	8.48721	65.3111	68.1383	1.6900E 04	2.2067E 04	1.5509E 05	1.5509E 05	2600
2800	7.7733E 03	4.29327	34.6268	8.53144	67.1444	68.8131	1.8324E 04	2.3888E 04	1.6879E 05	1.6879E 05	2800
3000	8.8031E 03	4.31281	34.9432	8.57027	68.9216	69.4419	1.9749E 04	2.5711E 04	1.8261E 05	1.8261E 05	3000
3200	9.9012E 03	4.32994	35.2412	8.60431	70.0302	70.0302	2.1175E 04	2.7534E 04	1.9650E 05	1.9650E 05	3200
3400	1.1048E 04	4.34493	35.5192	8.63409	71.1648	70.5825	2.2600E 04	2.9356E 04	2.1062E 05	2.1062E 05	3400
3600	1.2204E 04	4.35800	35.7810	8.66004	72.3247	71.1027	2.4022E 04	3.1176E 04	2.2479E 05	2.2479E 05	3600
3800	1.3468E 04	4.36934	36.0293	8.68261	73.5115	71.5941	2.5443E 04	3.2994E 04	2.3906E 05	2.3906E 05	3800
4000	1.4841E 04	4.37914	36.2424	8.70208	74.7259	72.0595	2.6860E 04	3.4808E 04	2.5343E 05	2.5343E 05	4000
4200	1.6323E 04	4.38754	36.4837	8.71877	75.9649	72.5012	2.8273E 04	3.6619E 04	2.6789E 05	2.6789E 05	4200
4400	1.7914E 04	4.39467	36.6561	8.73294	77.2244	72.9213	2.9681E 04	3.8425E 04	2.8243E 05	2.8243E 05	4400
4600	1.9512E 04	4.40063	36.8576	8.74479	78.5036	73.3216	3.1085E 04	4.0226E 04	2.9705E 05	2.9705E 05	4600
4800	2.1158E 04	4.40551	37.0890	8.75449	79.7982	73.7037	3.2483E 04	4.2022E 04	3.1176E 05	3.1176E 05	4800
5000	2.2872E 04	4.40936	37.2736	8.76217	81.1095	74.0689	3.3875E 04	4.3811E 04	3.2653E 05	3.2653E 05	5000
5200	2.4652E 04	4.41230	37.4496	8.76796	82.4385	74.3505	3.5260E 04	4.5593E 04	3.4138E 05	3.4138E 05	5200
5400	2.6498E 04	4.41431	37.6181	8.77133	83.7845	74.5534	3.6638E 04	4.7369E 04	3.5630E 05	3.5630E 05	5400
5600	2.8409E 04	4.41545	37.7798	8.77322	85.1451	74.7534	3.8008E 04	4.9136E 04	3.7128E 05	3.7128E 05	5600
5800	3.0384E 04	4.41576	37.9351	8.77381	86.5205	75.0000	3.9369E 04	5.0894E 04	3.8633E 05	3.8633E 05	5800
6000	3.2423E 04	4.41526	38.0853	8.77308	87.9059	75.2679	4.0720E 04	5.2643E 04	4.0144E 05	4.0144E 05	6000
6200	3.4524E 04	4.41399	38.2278	8.77133	89.3136	75.5649	4.2062E 04	5.4382E 04	4.1660E 05	4.1660E 05	6200
6400	3.6684E 04	4.41197	38.3659	8.76732	90.7420	75.8936	4.3393E 04	5.6111E 04	4.3182E 05	4.3182E 05	6400
6600	3.8907E 04	4.40923	38.4988	8.76187	92.1917	76.2536	4.4713E 04	5.7828E 04	4.4710E 05	4.4710E 05	6600
6800	4.1187E 04	4.40579	38.6270	8.75504	93.6632	76.5982	4.6022E 04	5.9534E 04	4.6242E 05	4.6242E 05	6800
7000	4.3524E 04	4.40168	38.7565	8.74687	95.1564	76.9033	4.7318E 04	6.1228E 04	4.7780E 05	4.7780E 05	7000
7200	4.5918E 04	4.39694	38.8857	8.73744	96.6724	77.2406	4.8602E 04	6.2915E 04	4.9322E 05	4.9322E 05	7200
7400	4.8362E 04	4.39158	38.9948	8.72679	98.2124	77.6092	4.9873E 04	6.4578E 04	5.0869E 05	5.0869E 05	7400
7600	5.0861E 04	4.38564	39.0934	8.71499	99.7450	77.9099	5.1131E 04	6.6234E 04	5.2421E 05	5.2421E 05	7600
7800	5.3410E 04	4.37915	39.2032	8.70210	101.2412	78.2406	5.2376E 04	6.7876E 04	5.3977E 05	5.3977E 05	7800
8000	5.6007E 04	4.37214	39.3070	8.68817	102.7044	78.5985	5.3603E 04	6.9505E 04	5.5537E 05	5.5537E 05	8000
8200	5.8651E 04	4.36465	39.4074	8.67328	104.1357	78.9389	5.4826E 04	7.1121E 04	5.7101E 05	5.7101E 05	8200
8400	6.1341E 04	4.35670	39.5045	8.65748	105.5345	79.2600	5.6031E 04	7.2723E 04	5.8669E 05	5.8669E 05	8400
8600	6.4074E 04	4.34832	39.5985	8.64084	106.9000	79.5640	5.7222E 04	7.4311E 04	6.0241E 05	6.0241E 05	8600
8800	6.6849E 04	4.33955	39.6896	8.62341	108.2444	79.8499	5.8399E 04	7.5886E 04	6.1817E 05	6.1817E 05	8800
9000	6.9663E 04	4.33042	39.7779	8.60526	109.5660	79.0453	5.9533E 04	7.7447E 04	6.3396E 05	6.3396E 05	9000
9200	7.2515E 04	4.32095	39.8635	8.58645	110.8645	79.2154	6.0713E 04	7.8995E 04	6.4979E 05	6.4979E 05	9200
9400	7.5404E 04	4.31118	39.9466	8.56703	112.1344	79.3804	6.1853E 04	8.0530E 04	6.6565E 05	6.6565E 05	9400
9600	7.8326E 04	4.30113	40.0272	8.54705	113.3796	79.5404	6.2951E 04	8.2052E 04	6.8156E 05	6.8156E 05	9600
9800	8.1281E 04	4.29083	40.1055	8.52658	114.6062	79.6942	6.4066E 04	8.3560E 04	6.9746E 05	6.9746E 05	9800

TABLE 91 (CONT.). IDEAL GAS FUNCTIONS FOR O₂

TEMP. (°K)	PARTIT. FUNCT.	$\frac{W}{RT}$	$-\frac{F^0 - F}{RT}$	$\ln$	$W^0 - F^0_{CAL}$	$-\ln \frac{F^0 - F}{W^0 - F^0_{CAL}}$	$F^0 - F$	$W^0 - F^0_{CAL}$	$-\ln \frac{F^0 - F}{W^0 - F^0_{CAL}}$	TEMP. (°K)
1000	8.4267E 04	4.20030	39.9012	40.1819	8.50566	71.3416	70.0473	9.5105E 04	8.5057E 04	7.1342E 05
1050	9.1853E 04	4.25314	36.1094	40.3625	8.45169	71.7553	69.2070	8.7870E 04	8.4517E 04	7.5343E 05
1100	9.9594E 04	4.28507	34.3664	40.5317	8.39591	72.1672	66.5431	7.9440E 04	8.3959E 04	7.9562E 05
1150	1.0744E 05	4.19438	34.4030	40.6902	8.33690	72.5192	64.0301	7.3045E 04	8.3369E 04	8.3397E 05
1200	1.1544E 05	4.16733	34.6718	40.8391	8.28117	72.8129	61.1540	7.3323E 04	8.2812E 04	8.7447E 05
1250	1.2350E 05	4.13013	34.9413	40.9794	8.22315	73.2097	61.4339	7.7950E 04	8.2232E 04	9.1512E 05
1300	1.3162E 05	4.10097	37.0030	41.1120	8.16319	73.5311	61.6943	8.2314E 04	8.1632E 04	9.5590E 05
1350	1.3970E 05	4.07990	37.1375	41.2375	8.10759	73.8362	61.9456	8.2620E 04	8.1076E 04	9.9482E 05
1400	1.4787E 05	4.05126	37.3054	41.3567	8.05037	74.1320	62.1826	8.4808E 04	8.0504E 04	1.0370E 06
1450	1.5617E 05	4.02298	37.4471	41.4701	7.99432	74.4135	62.4078	8.7104E 04	7.9943E 04	1.0790E 06
1500	1.6437E 05	3.99514	37.5630	41.5781	7.93899	74.6836	62.6236	8.9277E 04	7.9390E 04	1.1203E 06
1550	1.7259E 05	3.96781	37.7135	41.6813	7.88449	74.9436	62.8277	9.1412E 04	7.8845E 04	1.1614E 06
1600	1.8070E 05	3.94104	37.8391	41.7791	7.83150	75.1925	63.0240	9.3509E 04	7.8315E 04	1.2031E 06
1650	1.8882E 05	3.91406	37.9486	41.8748	7.77940	75.4327	63.2122	9.5573E 04	7.7794E 04	1.2444E 06
1700	1.9690E 05	3.88930	38.0764	41.9657	7.72868	75.6642	63.3929	9.7604E 04	7.7287E 04	1.2863E 06
1750	2.0491E 05	3.86435	38.1888	42.0532	7.67911	75.8875	63.5666	9.9609E 04	7.6791E 04	1.3280E 06
1800	2.1286E 05	3.84004	38.2973	42.1374	7.63070	76.1032	63.7359	1.0159E 05	7.6307E 04	1.3699E 06
1850	2.2075E 05	3.81635	38.4022	42.2186	7.58371	76.3116	63.8953	1.0354E 05	7.5837E 04	1.4110E 06
1900	2.2857E 05	3.79329	38.5037	42.2970	7.53769	76.5132	64.0511	1.0544E 05	7.5377E 04	1.4510E 06
1950	2.3631E 05	3.77064	38.6019	42.3728	7.49329	76.7084	64.2017	1.0737E 05	7.4933E 04	1.4958E 06
2000	2.4397E 05	3.74881	38.6971	42.4461	7.44991	76.8976	64.3475	1.0925E 05	7.4499E 04	1.5380E 06
2050	2.5157E 05	3.72754	38.7894	42.5181	7.40800	77.0899	64.4899	1.1104E 05	7.4080E 04	1.5804E 06
2100	2.5913E 05	3.70673	38.8786	42.5882	7.36732	77.2827	64.6277	1.1275E 05	7.3673E 04	1.6231E 06
2150	2.6665E 05	3.68635	38.9651	42.6569	7.32789	77.4743	64.7602	1.1436E 05	7.3279E 04	1.6661E 06
2200	2.7414E 05	3.66636	39.0491	42.7242	7.28979	77.6640	64.8876	1.1590E 05	7.2898E 04	1.7094E 06
2250	2.8160E 05	3.64674	39.1306	42.7901	7.25290	77.8519	65.0099	1.1738E 05	7.2529E 04	1.7531E 06
2300	2.8903E 05	3.62746	39.2096	42.8546	7.21721	78.0376	65.1266	1.1880E 05	7.2172E 04	1.7971E 06
2350	2.9644E 05	3.60850	39.2861	42.9178	7.18271	78.2214	65.2384	1.2016E 05	7.1827E 04	1.8414E 06
2400	3.0383E 05	3.58984	39.3601	42.9797	7.14939	78.4036	65.3456	1.2147E 05	7.1494E 04	1.8861E 06
2450	3.1120E 05	3.57146	39.4316	43.0402	7.11724	78.5843	65.4484	1.2273E 05	7.1172E 04	1.9312E 06
2500	3.1855E 05	3.55335	39.5006	43.0994	7.08624	78.7636	65.5466	1.2395E 05	7.0862E 04	1.9767E 06
2550	3.2588E 05	3.53548	39.5671	43.1572	7.05637	78.9414	65.6404	1.2512E 05	7.0564E 04	2.0226E 06
2600	3.3319E 05	3.51784	39.6311	43.2137	7.02761	79.1176	65.7299	1.2625E 05	7.0276E 04	2.0689E 06
2650	3.4048E 05	3.49941	39.6926	43.2689	7.00000	79.2921	65.8154	1.2734E 05	7.0000E 04	2.1156E 06
2700	3.4775E 05	3.48111	39.7516	43.3228	6.97354	79.4649	65.8969	1.2839E 05	6.9735E 04	2.1626E 06
2750	3.5499E 05	3.46294	39.8081	43.3753	6.94821	79.6359	65.9734	1.2940E 05	6.9482E 04	2.2099E 06
2800	3.6221E 05	3.44490	39.8621	43.4265	6.92394	79.8054	66.0459	1.3037E 05	6.9239E 04	2.2574E 06
2850	3.6941E 05	3.42699	39.9136	43.4764	6.89971	79.9734	66.1134	1.3130E 05	6.8997E 04	2.3051E 06
2900	3.7659E 05	3.40929	39.9626	43.5250	6.87651	80.1399	66.1759	1.3219E 05	6.8765E 04	2.3530E 06
2950	3.8375E 05	3.39170	39.9991	43.5723	6.85334	80.3049	66.2324	1.3304E 05	6.8533E 04	2.4011E 06
3000	3.9089E 05	3.37421	40.0331	43.6183	6.83021	80.4684	66.2839	1.3385E 05	6.8302E 04	2.4494E 06
3050	3.9801E 05	3.35682	40.0646	43.6630	6.80711	80.6304	66.3304	1.3462E 05	6.8071E 04	2.4979E 06
3100	4.0511E 05	3.33953	40.0936	43.7064	6.78404	80.7909	66.3719	1.3536E 05	6.7840E 04	2.5464E 06
3150	4.1219E 05	3.32234	40.1201	43.7485	6.76100	80.9499	66.4084	1.3607E 05	6.7610E 04	2.5950E 06
3200	4.1925E 05	3.30524	40.1451	43.7893	6.73800	81.1074	66.4404	1.3675E 05	6.7380E 04	2.6436E 06
3250	4.2629E 05	3.28824	40.1686	43.8288	6.71504	81.2634	66.4674	1.3740E 05	6.7150E 04	2.6922E 06
3300	4.3331E 05	3.27134	40.1906	43.8670	6.69211	81.4179	66.4899	1.3803E 05	6.6921E 04	2.7408E 06
3350	4.4032E 05	3.25454	40.2111	43.9039	6.66921	81.5709	66.5074	1.3864E 05	6.6692E 04	2.7894E 06
3400	4.4732E 05	3.23784	40.2301	43.9394	6.64634	81.7224	66.5199	1.3923E 05	6.6463E 04	2.8380E 06
3450	4.5431E 05	3.22124	40.2476	43.9736	6.62350	81.8724	66.5269	1.3980E 05	6.6235E 04	2.8866E 06
3500	4.6129E 05	3.20474	40.2636	44.0065	6.60069	82.0209	66.5294	1.4035E 05	6.6007E 04	2.9352E 06
3550	4.6825E 05	3.18834	40.2781	44.0381	6.57791	82.1679	66.5269	1.4088E 05	6.5779E 04	2.9838E 06
3600	4.7519E 05	3.17194	40.2911	44.0684	6.55516	82.3134	66.5194	1.4139E 05	6.5552E 04	3.0324E 06
3650	4.8211E 05	3.15564	40.3026	44.0974	6.53244	82.4574	66.5069	1.4188E 05	6.5324E 04	3.0810E 06
3700	4.8901E 05	3.13934	40.3126	44.1251	6.50974	82.6009	66.4894	1.4235E 05	6.5097E 04	3.1296E 06
3750	4.9589E 05	3.12304	40.3211	44.1516	6.48706	82.7429	66.4669	1.4280E 05	6.4871E 04	3.1782E 06
3800	5.0275E 05	3.10674	40.3281	44.1769	6.46441	82.8834	66.4394	1.4323E 05	6.4644E 04	3.2268E 06
3850	5.0959E 05	3.09044	40.3336	44.2011	6.44179	83.0224	66.4069	1.4364E 05	6.4418E 04	3.2754E 06
3900	5.1641E 05	3.07414	40.3376	44.2241	6.41921	83.1609	66.3694	1.4403E 05	6.4192E 04	3.3240E 06
3950	5.2321E 05	3.05784	40.3401	44.2459	6.39666	83.2979	66.3269	1.4440E 05	6.3967E 04	3.3726E 06
4000	5.3001E 05	3.04154	40.3411	44.2664	6.37414	83.4334	66.2794	1.4475E 05	6.3741E 04	3.4212E 06
4050	5.3679E 05	3.02524	40.3406	44.2857	6.35164	83.5674	66.2269	1.4508E 05	6.3516E 04	3.4698E 06
4100	5.4355E 05	3.00894	40.3386	44.3039	6.32916	83.7009	66.1694	1.4539E 05	6.3292E 04	3.5184E 06
4150	5.5031E 05	3.00000	40.3351	44.3211	6.30671	83.8329	66.1069	1.4568E 05	6.3067E 04	3.5670E 06
4200	5.5705E 05	2.98900	40.3301	44.3371	6.28429	83.9634	66.0394	1.4595E 05	6.2843E 04	3.6156E 06
4250	5.6379E 05	2.97794	40.3236	44.3519	6.26191	84.0924	65.9669	1.4620E 05	6.2619E 04	3.6642E 06
4300	5.7051E 05	2.96684	40.3156	44.3654	6.23956	84.2209	65.8894	1.4643E 05	6.2396E 04	3.7128E 06
4350	5.7721E 05	2.95569	40.3061	44.3776	6.21724	84.3479	65.8069	1.4664E 05	6.2172E 04	3.7614E 06
4400	5.8391E 05	2.94449	40.2951	44.3884	6.19494	84.4734	65.7194	1.4683E 05	6.1949E 04	3.8100E 06
4450	5.9059E 05	2.93324	40.2826	44.3979	6.17266	84.5974	65.6269	1.4700E 05	6.1727E 04	3.8586E 06
4500	5.9725E 05	2.92194	40.2686	44.4061	6.15039	84.7209	65.5294	1.4715E 05	6.1504E 04	3.9072E 06
4550	6.0391E 05	2.91059	40.2531	44.4129	6.12814	84.8429	65.4269	1.4728E 05	6.1281E 04	3.9558E 06
4600	6.1055E 05	2.89919	40.2361	44.4184	6.10591	84.9634	65.3194	1.4739E 05	6.1059E 04	4.0044E 06
4650	6.1719E 05	2.88774	40.2176	44.4226	6.08361	85.0824	65.2069	1.4748E 05	6.0836E 04	4.0530E 06
4700	6.2381E 05	2.87624	40.1986	44.4254	6.06134	85.2009	65.0894	1.4756E 05	6.0613E 04	4.1016E 06
4750	6.3041E 05	2.86469	40.1781	44.4269	6.03909	85.3179	64.9669	1.4763E 05	6.0391E 04	4.1502E 06
4800	6.3699E 05	2.85309	40.1561	44.4271	6.01684	85.4334	64.8394	1.4768E 05	6.0168E 04	4.1988E 06
4850	6.4355E 05	2.84144	40.1326	44.4259	6.00000	85.5474	64.7069	1.4771E 05	6.0000E 04	4.2474E 06
4900	6.5009E 05	2.82974	40.1076	44.4234	5.97721	85.6609	64.5694	1.4772E 05	5.9772E 04	4.2960E 06
4950	6.5661E 05	2.81799	40.0811	44.4196	5.95444	85.7729	64.4269	1.4772E 05	5.9544E 04	4.3446E 06
5000	6.6311E 05	2.80619	40.0531	44.4144	5.93169	85.8834	64.2794	1.4770E 05	5.9317E 04	4.3932E 06
5050	6.6959E 05	2.79434	40.0236	44.4079	5.90894	85.9924	64.1269	1.4766E 05	5.9089E 04	4.4418E 06
5100	6.7605E 05	2.78244	40.0001	44.4001	5.88619	86.1009	63.9694	1.4760E 05	5.8862E 04	4.4904E 06</

TABLE 92. IDEAL GAS FUNCTIONS FOR O₂ (MOLECULAR WEIGHT 31.9988, R = 1.98717 CAL/MOLE, 7 STATES INCLUDED)

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2-E_0}{RT}$	$-\frac{F^0-E^0}{RT}$	$\frac{S^0}{R}$	$(h^2-E_0)T - (F^0-E^0)T_0$ -- CAL/MOLE	S^0	$(h^2-E_0)T - (F^0-E^0)T_0$ -- CAL/MOLE	S^0	F^0-E^0	h^2-E_0	$-\frac{F^0-E^0}{RT}$	TEMP. (°K)
1000	5.1641E 02	3.77504	25.5079	29.2829	7.50164	50.4884	58.1900	5.5149E 03	7.5014E 03	5.0688E 04	5.0688E 04	1000
1200	1.0374E 03	3.65341	26.2033	30.0567	7.61537	52.0702	59.7276	6.8042E 03	9.1888E 03	4.2484E 04	4.2484E 04	1200
1400	1.2848E 03	3.52139	26.8025	30.7239	7.79246	53.2610	61.0515	8.1274E 03	1.0909E 04	7.4545E 04	7.4545E 04	1400
1600	1.5595E 03	3.39088	27.3301	31.3110	7.91067	54.3094	62.2201	9.4774E 03	1.2457E 04	8.6895E 04	8.6895E 04	1600
1800	1.8624E 03	3.26389	27.8021	31.8360	8.01601	55.2473	63.2634	1.0852E 04	1.4429E 04	9.9443E 04	9.9443E 04	1800
2000	2.1947E 03	3.14208	28.2296	32.3117	8.11177	56.0969	64.2087	1.2249E 04	1.6224E 04	1.1219E 05	1.1219E 05	2000
2200	2.5573E 03	3.02665	28.6208	32.7475	8.20034	56.8783	65.0746	1.3649E 04	1.8041E 04	1.2312E 05	1.2312E 05	2200
2400	2.9514E 03	2.91683	28.9817	33.1501	8.28336	57.5914	65.8748	1.5111E 04	1.9880E 04	1.3822E 05	1.3822E 05	2400
2600	3.3784E 03	2.80798	29.3046	33.5249	8.36195	58.2576	66.6193	1.6574E 04	2.1741E 04	1.5147E 05	1.5147E 05	2600
2800	3.8396E 03	2.69601	29.6301	33.8758	8.43678	58.8860	67.3168	1.8039E 04	2.3623E 04	1.6486E 05	1.6486E 05	2800
3000	4.3344E 03	2.58163	29.9243	34.2059	8.50831	59.4645	67.9728	1.9563E 04	2.5525E 04	1.7839E 05	1.7839E 05	3000
3200	4.8702E 03	2.46162	30.2017	34.5179	8.57685	60.0159	68.5927	2.1087E 04	2.7444E 04	1.9205E 05	1.9205E 05	3200
3400	5.4425E 03	2.34620	30.4644	34.8136	8.64259	60.5378	69.1804	2.2628E 04	2.9380E 04	2.0583E 05	2.0583E 05	3400
3600	6.0547E 03	2.23495	30.7139	35.0949	8.70567	61.0336	69.7393	2.4187E 04	3.1340E 04	2.1972E 05	2.1972E 05	3600
3800	6.7043E 03	2.11411	30.9516	35.3630	8.76621	61.5059	70.2721	2.5760E 04	3.3312E 04	2.3372E 05	2.3372E 05	3800
4000	7.4049E 03	1.98465	31.1786	35.6193	8.82430	61.9571	70.7814	2.7349E 04	3.5297E 04	2.4783E 05	2.4783E 05	4000
4200	8.1689E 03	1.84849	31.3960	35.8647	8.88003	62.3890	71.2690	2.8950E 04	3.7296E 04	2.6203E 05	2.6203E 05	4200
4400	8.9927E 03	1.70655	31.6045	36.1001	8.93346	62.8033	71.7348	3.0564E 04	3.9307E 04	2.7633E 05	2.7633E 05	4400
4600	9.7689E 03	1.55937	31.8049	36.3262	8.98470	63.2016	72.1863	3.2190E 04	4.1350E 04	2.9073E 05	2.9073E 05	4600
4800	1.0650E 04	1.40605	32.0137	36.5439	9.03374	63.5850	72.6187	3.3824E 04	4.3342E 04	3.0521E 05	3.0521E 05	4800
5000	1.1583E 04	1.24895	32.1839	36.7535	9.08065	63.9547	73.0354	3.5467E 04	4.5403E 04	3.1977E 05	3.1977E 05	5000
5200	1.2568E 04	1.08218	32.3636	36.9557	9.12543	64.3117	73.4372	3.7119E 04	4.7452E 04	3.3442E 05	3.3442E 05	5200
5400	1.3607E 04	9.61365	32.5373	37.1509	9.16808	64.6570	73.8250	3.8777E 04	4.9498E 04	3.4915E 05	3.4915E 05	5400
5600	1.4699E 04	8.34404	32.7034	37.3395	9.20861	64.9911	74.1997	4.0440E 04	5.1548E 04	3.6385E 05	3.6385E 05	5600
5800	1.5848E 04	6.95336	32.8684	37.5218	9.24699	65.3149	74.5619	4.2107E 04	5.3635E 04	3.7833E 05	3.7833E 05	5800
6000	1.7053E 04	5.47157	33.0265	37.6980	9.28318	65.6290	74.9122	4.3776E 04	5.5699E 04	3.9377E 05	3.9377E 05	6000
6200	1.8317E 04	4.68867	33.1799	37.8686	9.31716	65.9340	75.2512	4.5444E 04	5.7764E 04	4.0879E 05	4.0879E 05	6200
6400	1.9640E 04	4.70463	33.3290	38.0337	9.34888	66.2303	75.5792	4.7115E 04	5.9833E 04	4.2387E 05	4.2387E 05	6400
6600	2.1023E 04	4.71945	33.4740	38.1935	9.37833	66.5185	75.9068	4.8782E 04	6.1897E 04	4.3902E 05	4.3902E 05	6600
6800	2.2468E 04	4.73311	33.6131	38.3482	9.40547	66.7988	76.2293	5.0444E 04	6.3957E 04	4.5423E 05	4.5423E 05	6800
7000	2.3975E 04	4.74559	33.7525	38.4981	9.43028	67.0718	76.5021	5.2102E 04	6.6012E 04	4.6950E 05	4.6950E 05	7000
7200	2.5545E 04	4.75690	33.8864	38.6433	9.45274	67.3378	76.7904	5.3752E 04	6.8047E 04	4.8483E 05	4.8483E 05	7200
7400	2.7176E 04	4.76703	34.0188	38.7839	9.47287	67.5971	77.0700	5.5394E 04	7.0099E 04	5.0022E 05	5.0022E 05	7400
7600	2.8875E 04	4.77598	34.1441	38.9201	9.49066	67.8500	77.3406	5.7027E 04	7.2112E 04	5.1544E 05	5.1544E 05	7600
7800	3.0637E 04	4.78376	34.2683	39.0520	9.50613	68.0967	77.6028	5.8648E 04	7.4148E 04	5.3115E 05	5.3115E 05	7800
8000	3.2464E 04	4.79040	34.3895	39.1799	9.51932	68.3375	77.8549	6.0257E 04	7.6155E 04	5.4670E 05	5.4670E 05	8000
8200	3.4355E 04	4.79590	34.5078	39.3037	9.53025	68.5727	78.1030	6.1853E 04	7.8148E 04	5.6230E 05	5.6230E 05	8200
8400	3.6311E 04	4.80050	34.6234	39.4237	9.53899	68.8025	78.3415	6.3435E 04	8.0128E 04	5.7794E 05	5.7794E 05	8400
8600	3.8332E 04	4.80367	34.7364	39.5401	9.54598	69.0270	78.5726	6.5002E 04	8.2092E 04	5.9343E 05	5.9343E 05	8600
8800	4.0418E 04	4.80589	34.8449	39.6528	9.55009	69.2445	78.7965	6.6554E 04	8.4041E 04	6.0893E 05	6.0893E 05	8800
9000	4.2569E 04	4.80715	34.9549	39.7621	9.55259	69.4612	79.0138	6.8099E 04	8.5973E 04	6.2515E 05	6.2515E 05	9000
9200	4.4783E 04	4.80743	35.0606	39.8680	9.55318	69.6712	79.2243	6.9637E 04	8.7887E 04	6.4077E 05	6.4077E 05	9200
9400	4.7061E 04	4.80678	35.1640	39.9707	9.55186	69.8766	79.4285	7.1168E 04	8.9778E 04	6.5594E 05	6.5594E 05	9400
9600	4.9402E 04	4.80523	35.2651	40.0704	9.54979	70.0777	79.6265	7.2592E 04	9.1648E 04	6.7175E 05	6.7175E 05	9600
9800	5.1806E 04	4.80283	35.3642	40.1670	9.54602	70.2745	79.8185	7.4007E 04	9.3531E 04	6.8669E 05	6.8669E 05	9800

TABLE 92 (CONT.). IDEAL GAS FUNCTIONS FOR O₂

TEMP. (°K)	PARTIAL- FUNCT.	$\frac{h^0 - E^0}{RT}$	$\frac{h^0 - E^0}{RT} - \frac{F^0 - E^0}{RT}$	$\frac{h^0 - E^0}{RT}$	$\frac{h^0 - E^0}{RT}$	$\frac{h^0 - E^0}{RT}$	$\frac{h^0 - E^0}{RT}$	$\frac{h^0 - E^0}{RT}$	$\frac{h^0 - E^0}{RT}$	$\frac{h^0 - E^0}{RT}$	TEMP. (°K)
10000	5.4271E 04	4.79963	35.4612	40.2408	9.33765	70.4673	80.0049	1.9902E 04	9.5374E 04	7.0447E 05	10000
10500	6.0700E 04	4.77835	35.6551	40.4835	9.31523	70.3321	80.4473	7.9045E 04	9.4910E 04	7.0447E 05	10500
11000	6.7495E 04	4.76295	35.9175	40.6905	9.29444	71.3761	80.8387	6.2612E 04	1.0433E 05	7.0447E 05	11000
11500	7.4640E 04	4.75406	36.1293	40.8633	9.27410	71.7449	81.2620	6.3789E 04	1.0433E 05	8.2364E 05	11500
12000	8.2118E 04	4.75227	36.3312	41.0634	9.25380	72.1960	81.5946	6.5000E 04	1.1283E 05	8.2364E 05	12000
12500	8.9909E 04	4.70811	36.5239	41.2320	9.23579	72.5789	81.9347	9.2108E 04	1.1699E 05	9.0724E 05	12500
13000	9.7994E 04	4.68205	36.7080	41.3901	9.20401	72.9449	82.2489	9.5119E 04	1.2045E 05	9.4828E 05	13000
13500	1.0635E 05	4.65452	36.8842	41.5387	9.24930	73.2950	82.5443	9.8039E 04	1.2448E 05	9.8948E 05	13500
14000	1.1496E 05	4.62587	37.0530	41.6788	9.19237	73.5304	82.8227	1.0037E 05	1.2866E 05	1.0308E 06	14000
14500	1.2380E 05	4.59641	37.2146	41.8112	9.13383	73.9519	83.0857	1.0363E 05	1.3244E 05	1.0723E 06	14500
15000	1.3289E 05	4.56640	37.3701	41.9345	9.07420	74.2605	83.3347	1.0631E 05	1.3611E 05	1.1139E 06	15000
15500	1.4209E 05	4.53607	37.5193	42.0554	9.01392	74.5571	83.5710	1.0891E 05	1.3972E 05	1.1554E 06	15500
16000	1.5151E 05	4.50559	37.6629	42.1685	8.95354	74.8423	83.7957	1.1146E 05	1.4325E 05	1.1975E 06	16000
16500	1.6108E 05	4.47512	37.8010	42.2762	8.89281	75.1149	84.0097	1.1394E 05	1.4673E 05	1.2394E 06	16500
17000	1.7079E 05	4.44479	37.9342	42.3790	8.83254	75.3815	84.2140	1.1637E 05	1.5015E 05	1.2815E 06	17000
17500	1.8061E 05	4.41470	38.0626	42.4773	8.77276	75.6367	84.4094	1.1875E 05	1.5352E 05	1.3234E 06	17500
18000	1.9054E 05	4.38493	38.1865	42.5715	8.71359	75.8830	84.5945	1.2108E 05	1.5684E 05	1.3659E 06	18000
18500	2.0054E 05	4.35536	38.3063	42.6618	8.65521	76.1209	84.7761	1.2334E 05	1.6012E 05	1.4082E 06	18500
19000	2.1065E 05	4.32662	38.4220	42.7487	8.59771	76.3510	84.9487	1.2560E 05	1.6336E 05	1.4507E 06	19000
19500	2.2081E 05	4.29817	38.5341	42.8322	8.54117	76.5735	85.1147	1.2780E 05	1.6655E 05	1.4932E 06	19500
20000	2.3101E 05	4.27023	38.6425	42.9128	8.48505	76.7891	85.2747	1.2997E 05	1.6971E 05	1.5358E 06	20000
22000	2.7209E 05	4.16399	39.0445	43.2085	8.27454	77.5878	85.8624	1.3832E 05	1.8204E 05	1.7069E 06	22000
24000	3.1131E 05	4.06683	39.4026	43.4494	8.08156	78.2994	86.3808	1.4626E 05	1.9394E 05	1.8792E 06	24000
26000	3.5374E 05	3.97847	39.7245	43.7030	7.90587	78.9392	86.8451	1.5389E 05	2.0555E 05	2.0524E 06	26000
28000	3.9352E 05	3.89825	40.0164	43.9146	7.74646	79.5192	87.2654	1.6126E 05	2.1690E 05	2.2265E 06	28000
30000	4.3228E 05	3.82540	40.2828	44.1082	7.60171	80.0486	87.6503	1.6844E 05	2.2805E 05	2.4015E 06	30000
32000	4.6988E 05	3.75914	40.5276	44.2867	7.47004	80.5350	88.0050	1.7545E 05	2.3904E 05	2.5771E 06	32000
34000	5.0642E 05	3.69875	40.7536	44.4524	7.35002	80.9842	88.3342	1.8234E 05	2.4990E 05	2.7535E 06	34000
36000	5.4127E 05	3.64355	40.9634	44.6070	7.24034	81.4011	88.6415	1.8911E 05	2.6045E 05	2.9304E 06	36000
38000	5.7500E 05	3.59297	41.1591	44.7520	7.13982	81.7899	88.9297	1.9580E 05	2.7131E 05	3.1080E 06	38000
40000	6.0743E 05	3.54648	41.3422	44.8887	7.04744	82.1537	89.2012	2.0241E 05	2.8190E 05	3.2861E 06	40000

TABLE 93. IDEAL GAS FUNCTIONS FOR O₂. MOLECULAR WEIGHT 31.9983, R = 1.98717 CAL/MOLE, 4 STATES INCLUDED

TEMP. (°K)	PARTIT. FUNCT.	$\frac{H^0 - E_0^0}{RT}$	$\frac{S^0}{R}$	$\ln \frac{H^0 - E_0^0}{RT} - \frac{S^0}{R}$	$\frac{H^0 - E_0^0}{RT} - \frac{S^0}{R}$	$\frac{H^0 - E_0^0}{RT} - \frac{S^0}{R}$	$\frac{H^0 - E_0^0}{RT} - \frac{S^0}{R}$	TEMP. (°K)
1000	9.0389E 02	3.70707	25.6097	29.3167	7.36656	50.8906	58.2572	5.0891E 04
1200	1.1339E 03	3.78118	26.2922	30.0734	7.51382	52.2470	59.7608	6.2694E 04
1400	1.3866E 03	3.84745	26.8802	30.7276	7.64552	53.4153	61.0608	7.4781E 04
1600	1.6488E 03	3.90371	27.3978	31.3035	7.76129	54.4440	62.2053	8.7110E 04
1800	1.9752E 03	3.95677	27.8660	31.8176	7.86275	55.3641	63.2268	9.9455E 04
2000	2.3083E 03	4.00163	28.2801	32.2817	7.95190	56.1972	64.1491	1.1239E 05
2200	2.6385E 03	4.04127	28.6634	32.7047	8.03048	56.9586	64.9896	1.2531E 05
2400	3.0562E 03	4.07654	29.0166	33.0931	8.10767	57.6607	65.7615	1.3839E 05
2600	3.4717E 03	4.10813	29.3441	33.4523	8.16353	58.3116	66.4752	1.5161E 05
2800	3.9153E 03	4.13664	29.6496	33.7863	8.22018	58.9187	67.1369	1.6497E 05
3000	4.3872E 03	4.16255	29.9359	34.0985	8.27167	59.4877	67.7593	1.7844E 05
3200	4.8679E 03	4.18624	30.2053	34.3916	8.31874	60.0230	68.3418	1.9207E 05
3400	5.4176E 03	4.20807	30.4598	34.6539	8.36212	60.5287	68.8908	2.0580E 05
3600	5.9768E 03	4.22831	30.7009	34.9292	8.40236	61.0078	69.4101	2.1963E 05
3800	6.5654E 03	4.24724	30.9300	35.1773	8.43946	61.4631	69.9031	2.3334E 05
4000	7.1843E 03	4.26505	31.1483	35.4134	8.47537	61.8969	70.3723	2.4759E 05
4200	7.8336E 03	4.28198	31.3569	35.6388	8.50900	62.3112	70.8202	2.6171E 05
4400	8.5139E 03	4.29820	31.5564	35.8546	8.54123	62.7078	71.2491	2.7591E 05
4600	9.2256E 03	4.31388	31.7478	36.0617	8.57240	63.0882	71.6606	2.9021E 05
4800	9.9692E 03	4.32920	31.9318	36.2610	8.60284	63.4537	72.0565	3.0458E 05
5000	1.0745E 04	4.34430	32.1088	36.4531	8.63285	63.8055	72.4383	3.1903E 05
5200	1.1555E 04	4.35933	32.2795	36.6388	8.66271	64.1446	72.8074	3.3355E 05
5400	1.2398E 04	4.37442	32.4443	36.8187	8.69270	64.4721	73.1648	3.4815E 05
5600	1.3277E 04	4.38968	32.6036	36.9933	8.72303	64.7888	73.5118	3.6282E 05
5800	1.4191E 04	4.40522	32.7579	37.1632	8.75390	65.0955	73.8494	3.7755E 05
6000	1.5142E 04	4.42111	32.9076	37.3287	8.78547	65.3928	74.1782	3.9236E 05
6200	1.6130E 04	4.43741	33.0528	37.4902	8.81786	65.6814	74.4992	4.0722E 05
6400	1.7158E 04	4.45417	33.1919	37.6481	8.85118	65.9618	74.8130	4.2214E 05
6600	1.8224E 04	4.47142	33.3313	37.8037	8.88545	66.2347	75.1202	4.3715E 05
6800	1.9336E 04	4.48916	33.4650	37.9562	8.92070	66.5005	75.4212	4.5220E 05
7000	2.0490E 04	4.50737	33.5954	38.1028	8.95690	66.7596	75.7165	4.6732E 05
7200	2.1687E 04	4.52605	33.7226	38.2487	8.99401	67.0125	76.0065	4.8249E 05
7400	2.2931E 04	4.54513	33.8469	38.3920	9.03193	67.2594	76.2913	4.9772E 05
7600	2.4223E 04	4.56458	33.9684	38.5330	9.07077	67.5008	76.5714	5.1301E 05
7800	2.5564E 04	4.58451	34.0872	38.6713	9.10979	67.7369	76.8467	5.2835E 05
8000	2.6956E 04	4.60427	34.2035	38.8078	9.14944	67.9680	77.1175	5.4374E 05
8200	2.8401E 04	4.62436	34.3175	38.9418	9.18936	68.1945	77.3838	5.5919E 05
8400	2.9900E 04	4.64449	34.4291	39.0736	9.22938	68.4164	77.6458	5.7470E 05
8600	3.1454E 04	4.66459	34.5387	39.2032	9.26931	68.6340	77.9033	5.9025E 05
8800	3.3067E 04	4.68456	34.6461	39.3307	9.30899	68.8476	78.1566	6.0586E 05
9000	3.4739E 04	4.70431	34.7516	39.4559	9.34823	69.0572	78.4055	6.2151E 05
9200	3.6471E 04	4.72375	34.8552	39.5790	9.38687	69.2631	78.6500	6.3722E 05
9400	3.8265E 04	4.74280	34.9570	39.6998	9.42473	69.4654	78.8901	6.5297E 05
9600	4.0123E 04	4.76139	35.0571	39.8185	9.46167	69.6642	79.1259	6.6870E 05
9800	4.2046E 04	4.77944	35.1554	39.9349	9.49753	69.8597	79.3572	6.8442E 05

TABLE 93 (CONT.). IDEAL GAS FUNCTIONS FOR O₂

TEMP. (°K)	PARTIT. FUNC.	$\frac{h^2}{RT}$	$\ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT}$	TEMP. (°K)
10000	4.4034E 04	4.79688	35.2522	40.0490	9.53218	70.0519	79.5841	7.5450E 04	10000
10500	4.9307E 04	4.83744	35.4872	40.3247	9.61280	70.5190	80.1318	8.0049E 04	10500
11000	5.5017E 04	4.87312	35.7131	40.5862	9.68370	70.9678	90.6515	8.4662E 04	11000
11500	6.1180E 04	4.90344	35.9304	40.8338	9.74394	71.4097	1.1436	8.9203E 04	11500
12000	6.7806E 04	4.92817	36.1396	41.0678	9.79310	71.8454	81.6085	9.3671E 04	12000
12500	7.4902E 04	4.94732	36.3412	41.2885	9.83114	72.2160	82.0472	9.8050E 04	12500
13000	8.2472E 04	4.96103	36.5355	41.4766	9.85830	72.6022	82.4405	1.0233E 05	13000
13500	9.0515E 04	4.96957	36.7229	41.6925	9.87336	72.9746	82.8499	1.0449E 05	13500
14000	9.9028E 04	4.97332	36.9038	41.8771	9.88281	73.3339	83.2167	1.1054E 05	14000
14500	1.0801E 05	4.97267	37.0783	42.0510	9.88153	73.6807	83.5622	1.1447E 05	14500
15000	1.1744E 05	4.96807	37.2468	42.2149	9.87237	74.0155	83.8879	1.1828E 05	15000
15500	1.2733E 05	4.95994	37.4096	42.3695	9.85622	74.3390	84.1952	1.2197E 05	15500
16000	1.3765E 05	4.94870	37.5669	42.5156	9.83389	74.6516	84.4855	1.2555E 05	16000
16500	1.4839E 05	4.93476	37.7189	42.6537	9.80619	74.9538	84.7600	1.2901E 05	16500
17000	1.5954E 05	4.91849	37.8660	42.7845	9.77386	75.2460	85.0199	1.3237E 05	17000
17500	1.7108E 05	4.90024	38.0083	42.9086	9.73758	75.5289	85.2664	1.3563E 05	17500
18000	1.8300E 05	4.88031	38.1461	43.0264	9.69798	75.8026	85.5004	1.3879E 05	18000
18500	1.9527E 05	4.85898	38.2793	43.1385	9.65559	76.0678	85.7234	1.4187E 05	18500
19000	2.0789E 05	4.83650	38.4088	43.2453	9.61092	76.3257	85.9356	1.4485E 05	19000
19500	2.2083E 05	4.81309	38.5341	43.3472	9.56441	76.5757	86.1381	1.4776E 05	19500
20000	2.3408E 05	4.78895	38.6557	43.4446	9.51643	76.8153	86.3317	1.5059E 05	20000
22000	2.8978E 05	4.68811	39.1074	43.7956	9.31605	77.7130	87.0290	1.6124E 05	22000
24000	3.4902E 05	4.58566	39.5110	44.0966	9.11247	78.5148	87.6273	1.7101E 05	24000
26000	4.1079E 05	4.48591	39.8740	44.3600	8.91424	79.2363	88.1506	1.8010E 05	26000
28000	4.7424E 05	4.39099	40.2030	44.5940	8.72563	79.8900	88.6156	1.8868E 05	28000
30000	5.3869E 05	4.30186	40.5029	44.8047	8.54851	80.4859	89.0344	1.9684E 05	30000
32000	6.0351E 05	4.21876	40.7778	44.9966	8.38338	81.0322	89.4156	2.0468E 05	32000
34000	6.6822E 05	4.14158	41.0312	45.1728	8.23001	81.5358	89.7458	2.1226E 05	34000
36000	7.3249E 05	4.07002	41.2659	45.3359	8.08780	82.0022	90.0900	2.1962E 05	36000
38000	7.9590E 05	4.00369	41.4842	45.4878	7.95599	82.4359	90.3919	2.2682E 05	38000
40000	8.5836E 05	3.94217	41.6879	45.6301	7.83375	82.8408	90.6746	2.3386E 05	40000

TABLE 9A. IDEAL GAS FUNCTIONS FOR CO (MOLECULAR WEIGHT 28.0106, R = 1.98717 CAL/MOLE, 7 STATES INCLUDED)

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2-E_0}{RT}$	$\frac{h^2-E_0}{RT}$	$\frac{h^2-E_0}{RT}$	$\frac{h^2-E_0}{RT}$	$\frac{h^2-E_0}{RT}$	$\frac{h^2-E_0}{RT}$	$\frac{h^2-E_0}{RT}$	$\frac{h^2-E_0}{RT}$	$\frac{h^2-E_0}{RT}$	TEMP. (°K)
1000	3.8033E 02	3.6131	24.5443	28.1556	7.55576	48.7735	56.0293	5.2688E 03	7.2558E 03	4.8774E 04	1600
1200	4.7192E 02	3.71824	25.2159	28.9342	7.38876	50.1082	57.4970	6.4819E 03	8.8665E 03	6.0130E 04	1800
1400	5.7214E 02	3.74087	25.7939	29.5747	7.51321	51.2567	58.7699	7.7365E 03	1.0510E 04	7.1759E 04	2000
1600	6.8143E 02	3.83758	26.3025	30.1401	7.62590	52.2674	60.0933	9.0220E 03	1.2201E 04	8.3628E 04	2200
1800	8.0008E 02	3.84824	26.7575	30.6457	7.72661	53.1716	60.4982	1.0331E 04	1.3908E 04	9.5709E 04	2400
2000	9.2831E 02	3.93339	27.1695	31.1029	7.81629	53.9904	61.8067	1.1658E 04	1.5633E 04	1.0798E 05	2600
2200	1.0654E 03	3.97364	27.5464	31.5200	7.89621	54.7392	63.0534	1.3000E 04	1.7372E 04	1.2043E 05	2800
2400	1.2147E 03	4.03936	27.8937	31.9032	7.96766	55.4293	63.9370	1.4353E 04	1.9122E 04	1.3303E 05	3000
2600	1.3711E 03	4.08185	28.2159	32.2578	8.03182	56.0697	64.1015	1.5716E 04	2.0883E 04	1.4578E 05	3200
2800	1.5394E 03	4.07097	28.5165	32.5875	8.08969	56.6670	64.7567	1.7087E 04	2.2651E 04	1.5867E 05	3400
3000	1.7173E 03	4.09738	28.7983	32.8957	8.14218	57.2270	65.3492	1.8465E 04	2.4427E 04	1.7146E 05	3600
3200	1.9052E 03	4.12145	29.0635	33.1850	8.19000	57.7540	65.9440	1.9849E 04	2.6208E 04	1.8481E 05	3800
3400	2.1034E 03	4.14350	29.3141	33.4575	8.23381	58.2519	66.4957	2.1239E 04	2.7993E 04	1.9806E 05	4000
3600	2.3138E 03	4.16375	29.5515	33.7152	8.27406	58.7237	66.9977	2.2633E 04	2.9787E 04	2.1141E 05	4200
3800	2.5308E 03	4.18247	29.7771	33.9596	8.31126	59.1720	67.4833	2.4032E 04	3.1583E 04	2.2485E 05	4400
4000	2.7601E 03	4.19984	29.9921	34.1919	8.34577	59.5992	67.9450	2.5434E 04	3.3383E 04	2.3840E 05	4600
4200	3.0000E 03	4.21601	30.1974	34.4134	8.37791	60.0072	68.3851	2.6841E 04	3.5187E 04	2.5203E 05	4800
4400	3.2505E 03	4.23112	30.3939	34.6250	8.40793	60.3976	68.8056	2.8251E 04	3.6995E 04	2.6575E 05	5000
4600	3.5115E 03	4.24531	30.5823	34.8276	8.43613	60.7720	69.2081	2.9665E 04	3.8806E 04	2.7955E 05	5200
4800	3.7834E 03	4.25868	30.7632	35.0219	8.46270	61.1316	69.5943	3.1083E 04	4.0621E 04	2.9343E 05	5400
5000	4.0661E 03	4.27133	30.9373	35.2087	8.48783	61.4776	69.9654	3.2503E 04	4.2439E 04	3.0739E 05	5600
5200	4.3595E 03	4.28335	31.1051	35.3884	8.51173	61.8110	70.3227	3.3928E 04	4.4261E 04	3.2142E 05	5800
5400	4.6641E 03	4.29481	31.2670	35.5618	8.53450	62.1326	70.6671	3.5356E 04	4.6084E 04	3.3552E 05	6000
5600	4.9797E 03	4.30579	31.4234	35.7291	8.55631	62.4434	70.9997	3.6787E 04	4.7915E 04	3.4968E 05	6200
5800	5.3063E 03	4.31637	31.5746	35.8910	8.57735	62.7440	71.3214	3.8223E 04	4.9749E 04	3.6392E 05	6400
6000	5.6443E 03	4.32664	31.7211	36.0478	8.59774	63.0352	71.6329	3.9643E 04	5.1586E 04	3.7821E 05	6600
6200	5.9934E 03	4.33665	31.8632	36.1998	8.61764	63.3174	71.9350	4.1109E 04	5.3429E 04	3.9257E 05	6800
6400	6.3548E 03	4.34649	32.0010	36.3475	8.63720	63.5913	72.2285	4.2560E 04	5.5278E 04	4.0698E 05	7000
6600	6.7273E 03	4.35624	32.1349	36.4912	8.65637	63.8574	72.5140	4.4018E 04	5.7133E 04	4.2148E 05	7200
6800	7.1117E 03	4.36598	32.2651	36.6311	8.67592	64.1161	72.7920	4.5484E 04	5.8996E 04	4.3599E 05	7400
7000	7.5080E 03	4.37577	32.3928	36.7676	8.69539	64.3679	73.0633	4.6958E 04	6.0866E 04	4.5058E 05	7600
7200	7.9164E 03	4.38577	32.5152	36.9009	8.71516	64.6131	73.3283	4.8442E 04	6.2749E 04	4.6521E 05	7800
7400	8.3374E 03	4.39592	32.6355	37.0314	8.73543	64.8522	73.5876	4.9937E 04	6.4642E 04	4.7991E 05	8000
7600	8.7710E 03	4.40644	32.7529	37.1593	8.75633	65.0854	73.8417	5.1446E 04	6.6548E 04	4.9465E 05	8200
7800	9.2176E 03	4.41738	32.8675	37.2849	8.77806	65.3131	74.0912	5.2969E 04	6.8469E 04	5.0944E 05	8400
8000	9.6775E 03	4.42882	32.9795	37.4083	8.80079	65.5357	74.3364	5.4509E 04	7.0404E 04	5.2429E 05	8600
8200	1.0151E 04	4.44086	33.0890	37.5298	8.82469	65.7533	74.5779	5.6048E 04	7.2362E 04	5.3916E 05	8800
8400	1.0639E 04	4.45354	33.1961	37.6497	8.84922	65.9662	74.8161	5.7647E 04	7.4339E 04	5.5412E 05	9000
8600	1.1141E 04	4.46700	33.3011	37.7681	8.87446	66.1748	75.0514	5.9250E 04	7.6339E 04	5.6910E 05	9200
8800	1.1658E 04	4.48126	33.4039	37.8857	8.90005	66.3792	75.2842	6.0877E 04	7.8364E 04	5.8414E 05	9400
9000	1.2191E 04	4.49647	33.5048	38.0013	8.92522	66.5796	75.5148	6.2533E 04	8.0417E 04	5.9928E 05	9600
9200	1.2740E 04	4.51263	33.6038	38.1165	8.96734	66.7764	75.7437	6.4218E 04	8.2499E 04	6.1438E 05	9800
9400	1.3308E 04	4.52981	33.7011	38.2309	9.00169	66.9696	75.9711	6.5935E 04	8.4614E 04	6.2951E 05	9900
9600	1.3890E 04	4.54807	33.7966	38.3447	9.03777	67.1595	76.1972	6.7686E 04	8.6763E 04	6.4473E 05	
9800	1.4492E 04	4.56745	33.8906	38.4580	9.07627	67.3462	76.4225	6.9473E 04	8.8947E 04	6.5999E 05	

TABLE 94 (CONT.). IDEAL GAS FUNCTIONS FOR CO

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2-E^0}{RT}$	$\frac{h^2-E^0}{RT}$	$\frac{h^2-E^0}{RT}$	$\frac{h^2-E^0}{RT}$	$\frac{h^2-E^0}{RT}$	$\frac{h^2-E^0}{RT}$	$\frac{h^2-E^0}{RT}$	$\frac{h^2-E^0}{RT}$	$\frac{h^2-E^0}{RT}$	TEMP. (°K)
10000	1.5113E 04	4.58797	33.9831	38.5710	9.11705	67.5300	76.6470	7.1299E 04	9.1170E 04	4.7530E 05	10000
10500	1.6756E 04	3.64435	34.2083	38.8526	9.22910	67.9775	77.2066	7.1376E 04	9.6906E 04	7.1376E 05	10500
11000	1.8540E 04	4.70795	34.4257	39.1337	9.35548	68.4097	77.7651	7.1491E 04	1.0291E 05	7.5251E 05	11000
11500	2.0484E 04	4.77827	34.6366	39.4148	9.49322	68.8284	78.3238	7.1615E 04	1.0920E 05	7.9153E 05	11500
12000	2.2605E 04	4.85446	34.8415	39.6960	9.64661	69.2358	78.8824	7.1743E 04	1.1576E 05	8.3083E 05	12000
12500	2.4926E 04	4.93528	35.0413	39.9769	9.80722	69.6329	79.4401	7.1875E 04	1.2259E 05	8.7041E 05	12500
13000	2.7469E 04	5.01925	35.2365	40.2558	9.97408	70.0207	79.9948	7.2012E 04	1.2968E 05	9.1027E 05	13000
13500	3.0257E 04	5.10475	35.4275	40.5323	10.14399	70.4904	80.5443	7.2154E 04	1.3694E 05	9.5040E 05	13500
14000	3.3315E 04	5.19017	35.6147	40.8048	10.31363	70.9423	81.0860	7.2301E 04	1.4439E 05	9.9081E 05	14000
14500	3.6667E 04	5.27375	35.7983	41.0721	10.47981	71.3732	81.6170	7.2453E 04	1.5194E 05	1.0315E 06	14500
15000	4.0338E 04	5.35420	35.9785	41.3327	10.63367	71.7492	82.1348	7.2610E 04	1.5960E 05	1.0724E 06	15000
15500	4.4351E 04	5.43021	36.1553	41.5855	10.77907	72.1145	82.6373	7.2772E 04	1.6726E 05	1.1136E 06	15500
16000	4.8730E 04	5.50080	36.3288	41.8296	10.91099	72.4714	83.1224	7.2939E 04	1.7490E 05	1.1551E 06	16000
16500	5.3497E 04	5.56520	36.4991	42.0643	11.03897	72.8197	83.5887	7.3111E 04	1.8247E 05	1.1967E 06	16500
17000	5.8675E 04	5.62291	36.6661	42.2890	11.16366	73.1616	84.0353	7.3288E 04	1.8995E 05	1.2386E 06	17000
17500	6.4282E 04	5.67366	36.8298	42.5035	11.27451	73.4970	84.4615	7.3470E 04	1.9730E 05	1.2808E 06	17500
18000	7.0339E 04	5.71739	36.9903	42.7077	11.36137	73.8169	84.8672	7.3657E 04	2.0450E 05	1.3231E 06	18000
18500	7.6860E 04	5.75413	37.1475	42.9016	11.43442	74.1219	85.2526	7.3849E 04	2.1154E 05	1.3656E 06	18500
19000	8.3864E 04	5.78416	37.3013	43.0855	11.49407	74.4139	85.6180	7.4046E 04	2.1839E 05	1.4084E 06	19000
19500	9.1360E 04	5.80775	37.4519	43.2597	11.54097	74.6921	85.9641	7.4248E 04	2.2505E 05	1.4513E 06	19500
20000	9.9364E 04	5.82531	37.5992	43.4245	11.57586	74.9586	86.2916	7.4455E 04	2.3152E 05	1.4943E 06	20000
20500	1.0786E 05	5.83791	37.7435	43.5898	11.60822	75.2137	86.6048	7.4667E 04	2.3784E 05	1.5374E 06	20500
21000	1.1638E 05	5.84562	37.8842	43.7459	11.63839	75.4582	86.9049	7.4884E 04	2.4401E 05	1.5806E 06	21000
21500	1.2520E 05	5.84845	38.0212	43.8929	11.66639	75.6921	87.1921	7.5106E 04	2.5004E 05	1.6239E 06	21500
22000	1.3432E 05	5.84645	38.1542	44.0302	11.69232	75.9145	87.4662	7.5333E 04	2.5594E 05	1.6674E 06	22000
22500	1.4374E 05	5.83975	38.2829	44.1584	11.71634	76.1259	87.7276	7.5565E 04	2.6170E 05	1.7109E 06	22500
23000	1.5346E 05	5.82845	38.4072	44.2779	11.73860	76.3259	87.9762	7.5801E 04	2.6732E 05	1.7544E 06	23000
23500	1.6348E 05	5.81265	38.5279	44.3892	11.75922	76.5145	88.2121	7.6041E 04	2.7280E 05	1.7979E 06	23500
24000	1.7380E 05	5.79235	38.6442	44.4924	11.77832	76.6921	88.4356	7.6285E 04	2.7814E 05	1.8414E 06	24000
24500	1.8442E 05	5.76755	38.7572	44.5879	11.79592	76.8592	88.6476	7.6533E 04	2.8334E 05	1.8849E 06	24500
25000	1.9534E 05	5.73825	38.8669	44.6759	11.81212	77.0159	88.8481	7.6785E 04	2.8840E 05	1.9284E 06	25000
25500	2.0656E 05	5.70445	38.9732	44.7569	11.82692	77.1621	89.0376	7.7041E 04	2.9332E 05	1.9719E 06	25500
26000	2.1808E 05	5.66615	39.0762	44.8312	11.84032	77.2982	89.2161	7.7301E 04	2.9800E 05	2.0154E 06	26000
26500	2.2990E 05	5.62345	39.1759	44.8992	11.85232	77.4242	89.3836	7.7565E 04	3.0254E 05	2.0589E 06	26500
27000	2.4192E 05	5.57635	39.2722	44.9612	11.86292	77.5402	89.5401	7.7833E 04	3.0694E 05	2.1024E 06	27000
27500	2.5414E 05	5.52485	39.3652	45.0172	11.87212	77.6462	89.6856	7.8105E 04	3.1119E 05	2.1459E 06	27500
28000	2.6656E 05	5.46895	39.4552	45.0672	11.87992	77.7422	89.8201	7.8381E 04	3.1539E 05	2.1894E 06	28000
28500	2.7918E 05	5.40865	39.5422	45.1112	11.88632	77.8282	89.9446	7.8661E 04	3.1954E 05	2.2319E 06	28500
29000	2.9190E 05	5.34395	39.6262	45.1502	11.89132	77.9042	90.0691	7.8945E 04	3.2364E 05	2.2744E 06	29000
29500	3.0472E 05	5.27485	39.7072	45.1842	11.89502	77.9702	90.1836	7.9233E 04	3.2759E 05	2.3169E 06	29500
30000	3.1764E 05	5.20135	39.7852	45.2132	11.89742	78.0262	90.2881	7.9525E 04	3.3149E 05	2.3594E 06	30000
30500	3.3066E 05	5.12345	39.8602	45.2382	11.89852	78.0712	90.3826	7.9821E 04	3.3524E 05	2.4019E 06	30500
31000	3.4378E 05	5.04115	39.9322	45.2592	11.89832	78.1082	90.4671	8.0121E 04	3.3894E 05	2.4444E 06	31000
31500	3.5690E 05	4.95445	39.9992	45.2762	11.89682	78.1372	90.5416	8.0425E 04	3.4259E 05	2.4869E 06	31500
32000	3.6992E 05	4.86335	40.0632	45.2892	11.89402	78.1582	90.6061	8.0733E 04	3.4619E 05	2.5294E 06	32000
32500	3.8294E 05	4.76765	40.1242	45.2982	11.88992	78.1712	90.6616	8.1045E 04	3.4974E 05	2.5719E 06	32500
33000	3.9596E 05	4.66735	40.1812	45.3032	11.88452	78.1762	90.7081	8.1361E 04	3.5324E 05	2.6144E 06	33000
33500	4.0898E 05	4.56265	40.2342	45.3042	11.87782	78.1722	90.7456	8.1681E 04	3.5669E 05	2.6569E 06	33500
34000	4.2190E 05	4.45345	40.2832	45.3012	11.86992	78.1592	90.7741	8.2005E 04	3.5999E 05	2.6994E 06	34000
34500	4.3472E 05	4.33975	40.3282	45.2942	11.86082	78.1372	90.7936	8.2335E 04	3.6324E 05	2.7419E 06	34500
35000	4.4754E 05	4.22145	40.3692	45.2832	11.85042	78.1062	90.8041	8.2671E 04	3.6644E 05	2.7844E 06	35000
35500	4.6036E 05	4.09875	40.4062	45.2682	11.83872	78.0662	90.8066	8.3013E 04	3.6959E 05	2.8269E 06	35500
36000	4.7318E 05	3.97145	40.4392	45.2492	11.82582	78.0182	90.7991	8.3361E 04	3.7269E 05	2.8694E 06	36000
36500	4.8590E 05	3.83975	40.4682	45.2262	11.81172	77.9622	90.7816	8.3715E 04	3.7574E 05	2.9119E 06	36500
37000	4.9862E 05	3.70345	40.4932	45.1992	11.79642	77.8982	90.7541	8.4075E 04	3.7874E 05	2.9544E 06	37000
37500	5.1134E 05	3.56265	40.5142	45.1682	11.77982	77.8262	90.7176	8.4441E 04	3.8169E 05	2.9969E 06	37500
38000	5.2406E 05	3.41735	40.5312	45.1332	11.76192	77.7472	90.6721	8.4813E 04	3.8459E 05	3.0394E 06	38000
38500	5.3678E 05	3.26765	40.5442	45.0942	11.74282	77.6612	90.6186	8.5191E 04	3.8744E 05	3.0819E 06	38500
39000	5.4950E 05	3.11335	40.5532	45.0512	11.72252	77.5682	90.5561	8.5575E 04	3.9024E 05	3.1244E 06	39000
39500	5.6222E 05	2.95445	40.5582	45.0042	11.69992	77.4682	90.4856	8.5965E 04	3.9299E 05	3.1669E 06	39500
40000	5.7494E 05	2.79015	40.5592	44.9532	11.67502	77.3612	90.4071	8.6361E 04	3.9569E 05	3.2094E 06	40000

TABLE 95. FRACTIONAL ELECTRONIC POPULATIONS OF N2

TEMP. (°K)	$X^{1\Sigma^+}$	$A^{2\Sigma^+}$	STATE $2\Delta_u$	$B^3\Pi_g$	$B'^2\Sigma_u$	$a'^1\Sigma_u$	$a^1\Pi_g$	$w^1\Delta_u$
1200	1.03E-00	5.86E-26	5.90E-30	1.03E-30	2.36E-34	8.10E-34	3.31E-34	1.05E-37
1400	1.00E-00	1.87E-19	2.22E-22	5.85E-23	9.33E-26	5.95E-27	3.32E-27	3.14E-28
1600	1.00E-00	1.51E-15	7.87E-18	2.90E-18	1.38E-20	1.15E-21	8.33E-22	1.30E-22
1800	1.00E-00	6.10E-13	6.54E-15	3.14E-15	3.77E-17	4.01E-18	3.33E-18	7.28E-19
2000	1.00E-00	4.46E-11	1.24E-12	5.15E-13	1.09E-14	1.36E-15	1.25E-15	3.47E-16
3200	1.00E-00	1.12E-09	5.37E-11	2.36E-11	7.64E-13	1.00E-13	1.04E-13	3.54E-14
3400	1.00E-00	1.37E-08	9.93E-10	4.44E-10	2.99E-11	3.24E-12	3.39E-12	1.30E-12
4000	1.00E-00	1.07E-07	1.03E-08	5.03E-09	2.98E-10	4.94E-11	5.40E-11	2.31E-11
4400	1.00E-00	5.10E-07	6.95E-08	3.54E-08	2.59E-09	4.59E-10	5.21E-10	2.44E-10
4800	1.00E-00	2.09E-06	3.42E-07	1.80E-07	1.58E-08	2.95E-09	3.45E-09	1.75E-09
5200	1.00E-00	4.67E-06	1.32E-06	7.13E-07	7.30E-08	1.42E-08	1.71E-08	9.23E-09
5600	1.00E-00	1.81E-05	4.21E-06	2.12E-06	2.71E-07	5.48E-08	6.73E-08	3.85E-08
6000	1.00E-00	4.28E-05	1.15E-05	6.44E-06	8.45E-07	1.77E-07	2.21E-07	1.35E-07
6400	1.00E-00	9.10E-05	2.76E-05	1.58E-05	2.30E-06	4.32E-07	6.27E-07	3.93E-07
6800	1.00E-00	1.77E-04	6.00E-05	3.49E-05	5.55E-06	1.22E-06	1.57E-06	1.02E-06
7200	9.99E-01	3.19E-04	1.20E-04	7.05E-05	1.21E-05	2.72E-06	3.56E-06	2.40E-06
7600	9.99E-01	5.41E-04	2.22E-04	1.32E-04	2.44E-05	5.59E-06	7.41E-06	5.14E-06
8000	9.99E-01	8.67E-04	3.86E-04	2.33E-04	4.59E-05	1.07E-05	1.43E-05	1.02E-05
8400	9.99E-01	1.33E-03	6.37E-04	3.87E-04	8.12E-05	1.92E-05	2.60E-05	1.90E-05
8800	9.94E-01	1.95E-03	1.00E-03	6.16E-04	1.36E-04	3.27E-05	4.47E-05	3.34E-05
9200	9.94E-01	2.77E-03	1.52E-03	9.18E-04	2.19E-04	5.31E-05	7.33E-05	5.58E-05
9600	9.92E-01	3.80E-03	2.22E-03	1.38E-03	3.34E-04	8.28E-05	1.15E-04	8.94E-05
10000	9.89E-01	5.08E-03	3.13E-03	1.96E-03	5.00E-04	1.25E-04	1.75E-04	1.30E-04
11000	9.77E-01	9.45E-03	6.61E-03	4.19E-03	1.12E-03	3.02E-04	4.30E-04	3.51E-04
12000	9.60E-01	1.56E-02	1.22E-02	7.79E-03	2.37E-03	6.23E-04	9.01E-04	7.58E-04
13000	9.39E-01	2.33E-02	2.00E-02	1.29E-02	4.23E-03	1.14E-03	1.66E-03	1.43E-03
14000	9.04E-01	3.23E-02	3.02E-02	1.96E-02	6.83E-03	1.88E-03	2.37E-03	2.44E-03
15000	8.67E-01	4.17E-02	4.23E-02	2.77E-02	1.02E-02	2.85E-03	4.24E-03	3.80E-03
16000	8.26E-01	5.17E-02	5.59E-02	3.68E-02	1.42E-02	4.05E-03	6.09E-03	5.52E-03
17000	7.82E-01	6.12E-02	7.04E-02	4.65E-02	1.87E-02	5.65E-03	8.24E-03	7.59E-03
18000	7.37E-01	7.00E-02	8.52E-02	5.64E-02	2.36E-02	6.97E-03	1.04E-02	9.89E-03
19000	6.93E-01	7.79E-02	9.97E-02	6.62E-02	2.87E-02	8.61E-03	1.32E-02	1.23E-02
20000	6.51E-01	8.47E-02	1.14E-01	7.56E-02	3.39E-02	1.03E-02	1.59E-02	1.50E-02
24000	5.08E-01	1.02E-01	1.60E-01	1.07E-01	5.32E-02	1.70E-02	2.47E-02	2.57E-02
28000	4.07E-01	1.09E-01	1.91E-01	1.29E-01	6.88E-02	2.30E-02	3.44E-02	3.55E-02
32000	3.39E-01	1.10E-01	2.11E-01	1.42E-01	8.08E-02	2.78E-02	4.45E-02	4.39E-02
36000	2.92E-01	1.09E-01	2.24E-01	1.51E-01	8.99E-02	3.18E-02	5.12E-02	5.07E-02
40000	2.57E-01	1.07E-01	2.33E-01	1.57E-01	9.69E-02	3.51E-02	5.61E-02	5.65E-02

TABLE 96. FRACTIONAL ELECTRONIC POPULATIONS OF N2+

TEMP. (°K)	X ² _g ⁺	A	² E _g	B	² Σ _g ⁺	STATE	A _u	D	² Π _g	f _u	C ² _u ⁺
1200	1.00E-00	1.44E-04	4.43E-14	2.14E-23	9.91E-31	1.10E-26	1.10E-31	1.10E-12	1.10E-12	1.10E-12	1.10E-12
1400	9.98E-01	1.44E-03	9.32E-11	1.30E-17	4.95E-20	5.08E-20	5.08E-20	5.08E-12	5.08E-12	5.08E-12	5.08E-12
2000	9.93E-01	7.08E-03	9.13E-09	3.88E-14	3.19E-16	6.18E-16	6.18E-16	6.18E-12	6.18E-12	6.18E-12	6.18E-12
2400	9.81E-01	1.94E-02	1.92E-07	7.92E-12	2.48E-13	3.22E-13	3.22E-13	3.22E-12	3.22E-12	3.22E-12	3.22E-12
2800	9.63E-01	3.58E-02	1.84E-06	3.52E-10	2.01E-11	2.52E-11	2.52E-11	2.52E-12	2.52E-12	2.52E-12	2.52E-12
3200	9.39E-01	6.08E-02	8.43E-06	5.99E-09	5.39E-10	6.92E-10	6.92E-10	6.92E-12	6.92E-12	6.92E-12	6.92E-12
3400	9.11E-01	8.89E-02	2.93E-05	5.37E-08	6.89E-09	9.03E-09	9.03E-09	9.03E-12	9.03E-12	9.03E-12	9.03E-12
4000	8.81E-01	1.19E-01	7.85E-05	3.07E-07	5.24E-08	6.99E-08	6.99E-08	6.99E-11	6.99E-11	6.99E-11	6.99E-11
4400	8.49E-01	1.51E-01	1.75E-04	1.27E-06	2.73E-07	3.70E-07	3.70E-07	3.70E-10	3.70E-10	3.70E-10	3.70E-10
4800	8.18E-01	1.82E-01	3.38E-04	4.09E-06	1.08E-06	1.47E-06	1.47E-06	1.47E-09	1.47E-09	1.47E-09	1.47E-09
5200	7.88E-01	2.11E-01	5.47E-04	1.10E-05	3.41E-06	4.68E-06	4.68E-06	4.68E-07	4.68E-07	4.68E-07	4.68E-07
5400	7.59E-01	2.40E-01	9.40E-04	2.51E-05	9.11E-05	1.26E-05	1.26E-05	1.26E-08	1.26E-08	1.26E-08	1.26E-08
6000	7.32E-01	2.67E-01	1.41E-03	5.13E-05	2.13E-05	2.93E-05	2.93E-05	2.93E-07	2.93E-07	2.93E-07	2.93E-07
6400	7.06E-01	2.91E-01	2.00E-03	9.68E-05	4.45E-05	6.11E-05	6.11E-05	6.11E-07	6.11E-07	6.11E-07	6.11E-07
6800	6.83E-01	3.14E-01	2.72E-03	1.67E-04	8.50E-05	1.16E-04	1.16E-04	1.16E-06	1.16E-06	1.16E-06	1.16E-06
7200	6.61E-01	3.35E-01	3.58E-03	2.69E-04	1.51E-04	2.04E-04	2.04E-04	2.04E-06	2.04E-06	2.04E-06	2.04E-06
7600	6.40E-01	3.52E-01	4.56E-03	4.12E-04	2.51E-04	3.36E-04	3.36E-04	3.36E-06	3.36E-06	3.36E-06	3.36E-06
8000	6.21E-01	3.72E-01	5.67E-03	6.06E-04	3.98E-04	5.23E-04	5.23E-04	5.23E-06	5.23E-06	5.23E-06	5.23E-06
8400	6.03E-01	3.88E-01	6.89E-03	8.41E-04	5.94E-04	7.78E-04	7.78E-04	7.78E-06	7.78E-06	7.78E-06	7.78E-06
8800	5.86E-01	4.03E-01	8.22E-03	1.14E-03	8.62E-04	1.11E-03	1.11E-03	1.11E-06	1.11E-06	1.11E-06	1.11E-06
9200	5.70E-01	4.14E-01	9.64E-03	1.49E-03	1.21E-03	1.53E-03	1.53E-03	1.53E-06	1.53E-06	1.53E-06	1.53E-06
9400	5.55E-01	4.28E-01	1.12E-02	1.91E-03	1.63E-03	2.04E-03	2.04E-03	2.04E-06	2.04E-06	2.04E-06	2.04E-06
10000	5.41E-01	4.38E-01	1.28E-02	2.38E-03	2.14E-03	2.65E-03	2.65E-03	2.65E-06	2.65E-06	2.65E-06	2.65E-06
11000	5.09E-01	4.80E-01	1.70E-02	3.82E-03	3.91E-03	4.61E-03	4.61E-03	4.61E-06	4.61E-06	4.61E-06	4.61E-06
12000	4.82E-01	4.77E-01	2.14E-02	5.56E-03	6.33E-03	7.16E-03	7.16E-03	7.16E-06	7.16E-06	7.16E-06	7.16E-06
13000	4.57E-01	4.88E-01	2.58E-02	7.51E-03	9.40E-03	1.02E-02	1.02E-02	1.02E-06	1.02E-06	1.02E-06	1.02E-06
14000	4.35E-01	4.95E-01	3.01E-02	9.60E-03	1.31E-02	1.37E-02	1.37E-02	1.37E-06	1.37E-06	1.37E-06	1.37E-06
15000	4.15E-01	5.00E-01	3.42E-02	1.17E-02	1.72E-02	1.73E-02	1.73E-02	1.73E-06	1.73E-06	1.73E-06	1.73E-06
16000	3.98E-01	5.02E-01	3.80E-02	1.38E-02	2.17E-02	2.11E-02	2.11E-02	2.11E-06	2.11E-06	2.11E-06	2.11E-06
17000	3.82E-01	5.02E-01	4.19E-02	1.59E-02	2.64E-02	2.49E-02	2.49E-02	2.49E-06	2.49E-06	2.49E-06	2.49E-06
18000	3.68E-01	5.01E-01	4.44E-02	1.78E-02	3.12E-02	2.87E-02	2.87E-02	2.87E-06	2.87E-06	2.87E-06	2.87E-06
19000	3.55E-01	4.98E-01	4.74E-02	1.96E-02	3.62E-02	3.22E-02	3.22E-02	3.22E-06	3.22E-06	3.22E-06	3.22E-06
20000	3.44E-01	4.96E-01	4.99E-02	2.13E-02	4.11E-02	3.57E-02	3.57E-02	3.57E-06	3.57E-06	3.57E-06	3.57E-06
24000	3.08E-01	4.81E-01	5.76E-02	2.68E-02	5.98E-02	4.65E-02	4.65E-02	4.65E-06	4.65E-06	4.65E-06	4.65E-06
28000	2.83E-01	4.65E-01	6.24E-02	3.06E-02	7.60E-02	5.83E-02	5.83E-02	5.83E-06	5.83E-06	5.83E-06	5.83E-06
32000	2.65E-01	4.51E-01	6.54E-02	3.32E-02	8.97E-02	6.29E-02	6.29E-02	6.29E-06	6.29E-06	6.29E-06	6.29E-06
36000	2.52E-01	4.39E-01	6.74E-02	3.51E-02	1.01E-01	6.78E-02	6.78E-02	6.78E-06	6.78E-06	6.78E-06	6.78E-06
40000	2.41E-01	4.29E-01	6.88E-02	3.65E-02	1.11E-01	7.16E-02	7.16E-02	7.16E-06	7.16E-06	7.16E-06	7.16E-06

TABLE 97. FRACTIONAL ELECTRONIC POPULATIONS OF NO

TEMP. (°K)	STATE						
	X ² _Π	a ⁴ _Π	A ² _{Σ⁺}	B ² _Π	b ⁴ _{Σ⁻}	C ² _Π	D ² _{Σ⁺}
1200	1.00E 00	6.98E-20	4.22E-24	4.22E-24	4.69E-25	4.63E-28	7.80E-29
1600	1.00E 00	6.50E-15	2.26E-18	3.74E-18	6.89E-19	2.91E-21	6.47E-22
2000	1.00E 00	6.31E-12	6.28E-15	1.40E-14	3.40E-15	3.48E-17	9.07E-18
2400	1.00E 00	6.23E-10	1.22E-12	3.38E-12	9.93E-13	1.81E-14	5.21E-15
2800	1.00E 00	1.67E-08	5.22E-11	1.71E-10	5.76E-11	1.57E-12	4.81E-13
3200	1.00E 00	1.96E-07	8.67E-10	3.26E-09	1.21E-09	4.42E-11	1.41E-11
3600	1.00E 00	1.33E-06	7.64E-09	3.23E-08	1.30E-08	5.90E-10	1.93E-10
4000	1.00E 00	6.17E-06	4.32E-08	2.02E-07	8.74E-08	4.65E-09	1.54E-09
4400	1.00E 00	2.15E-05	1.76E-07	9.08E-07	4.14E-07	2.50E-08	8.35E-09
4800	1.00E 00	6.05E-05	5.65E-07	3.18E-06	1.52E-06	1.01E-07	3.37E-08
5200	1.00E 00	1.45E-04	1.50E-06	9.17E-06	4.54E-06	3.26E-07	1.09E-07
5600	1.00E 00	3.03E-04	3.44E-06	2.27E-05	1.16E-05	8.84E-07	2.94E-07
6000	9.99E-01	5.73E-04	7.00E-06	4.98E-05	2.61E-05	2.09E-06	6.89E-07
6400	9.97E-01	9.3E-04	1.29E-05	9.88E-05	5.29E-05	4.39E-06	1.44E-06
6800	9.96E-01	1.61E-03	2.21E-05	1.80E-04	9.84E-05	8.41E-06	2.75E-06
7200	9.97E-01	2.45E-03	3.54E-05	3.08E-04	1.70E-04	1.49E-05	4.84E-06
7600	9.86E-01	3.55E-03	7.38E-05	4.94E-04	2.77E-04	2.47E-05	7.98E-06
8000	9.94E-01	4.94E-03	7.75E-05	7.58E-04	4.28E-04	3.88E-05	1.24E-05
8400	9.91E-01	6.63E-03	1.08E-04	1.11E-03	6.32E-04	8.81E-05	1.85E-05
8800	9.89E-01	8.62E-03	1.44E-04	1.56E-03	8.98E-04	8.34E-05	2.64E-05
9200	9.85E-01	1.09E-02	1.87E-04	2.13E-03	1.23E-03	1.15E-04	3.63E-05
9600	9.82E-01	1.35E-02	2.58E-04	2.83E-03	1.64E-03	1.55E-04	4.85E-05
10000	9.77E-01	1.63E-02	2.94E-04	3.65E-03	2.13E-03	2.02E-04	6.29E-05
11000	9.65E-01	2.44E-02	4.62E-04	6.33E-03	3.73E-03	3.54E-04	1.09E-04
12000	9.49E-01	3.35E-02	6.59E-04	9.87E-03	5.83E-03	5.61E-04	1.70E-04
13000	9.32E-01	4.31E-02	8.77E-04	1.42E-02	8.40E-03	8.10E-04	2.44E-04
14000	9.14E-01	5.28E-02	1.11E-03	1.92E-02	1.13E-02	1.10E-03	3.28E-04
15000	8.95E-01	6.22E-02	1.34E-03	2.46E-02	1.46E-02	1.41E-03	4.16E-04
16000	8.76E-01	7.13E-02	1.56E-03	3.04E-02	1.80E-02	1.74E-03	5.09E-04
17000	8.58E-01	7.97E-02	1.78E-03	3.64E-02	2.16E-02	2.08E-03	6.05E-04
18000	8.40E-01	8.76E-02	1.99E-03	4.26E-02	2.51E-02	2.42E-03	7.00E-04
19000	8.22E-01	9.47E-02	2.18E-03	4.87E-02	2.87E-02	2.76E-03	7.93E-04
20000	8.05E-01	1.01E-01	2.34E-03	5.47E-02	3.22E-02	3.09E-03	8.84E-04
24000	7.47E-01	1.27E-01	2.94E-03	7.74E-02	4.53E-02	4.31E-03	1.21E-03
28000	7.11E-01	1.35E-01	3.38E-03	9.70E-02	5.64E-02	5.32E-03	1.48E-03
32000	6.65E-01	1.44E-01	3.69E-03	1.13E-01	6.54E-02	6.15E-03	1.69E-03
36000	6.36E-01	1.51E-01	3.91E-03	1.27E-01	7.32E-02	6.85E-03	1.87E-03
40000	6.13E-01	1.55E-01	4.08E-03	1.39E-01	7.95E-02	7.39E-03	2.01E-03

TABLE 98. FRACTIONAL ELECTRONIC POPULATIONS OF NO⁺

TEMP. (°K)	X ¹ Σ ⁺	a ³ Σ ⁺	STATE 3Δ	3Π	A ¹ Π	3Σ ⁻
1200	1.00E-00	6.51E-21	2.00E-30	4.44E-33	7.21E-39	0.
1600	1.00E-00	1.06E-15	9.22E-23	9.30E-25	8.54E-29	1.54E-28
2000	1.00E-00	1.48E-12	3.67E-18	9.19E-20	5.55E-23	8.79E-23
2400	1.00E-00	1.83E-10	4.29E-15	1.97E-16	3.01E-19	6.05E-19
2800	1.00E-00	5.74E-09	6.68E-13	4.74E-14	1.62E-16	3.32E-16
3200	1.00E-00	7.62E-08	2.95E-11	2.90E-12	1.82E-14	3.74E-14
3600	1.00E-00	5.71E-07	5.82E-10	7.14E-11	1.18E-13	1.46E-12
4000	1.00E-00	2.86E-06	5.94E-09	9.27E-10	1.34E-11	2.72E-11
4400	1.00E-00	1.07E-05	4.10E-08	7.58E-09	1.51E-10	2.94E-10
4800	1.00E-00	3.22E-05	2.06E-07	4.37E-08	1.13E-09	2.12E-09
5200	1.00E-00	8.14E-05	8.07E-07	1.93E-07	6.16E-09	1.12E-08
5600	1.00E-00	1.82E-04	2.61E-06	6.89E-07	2.64E-08	4.62E-08
6000	1.00E-00	3.63E-04	7.22E-06	2.08E-06	9.30E-08	1.57E-07
6400	9.99E-01	6.65E-04	1.76E-05	5.47E-06	2.79E-07	4.53E-07
6800	9.99E-01	1.14E-03	3.88E-05	1.28E-05	7.35E-07	1.15E-06
7200	9.98E-01	1.83E-03	7.83E-05	2.74E-05	1.73E-06	2.61E-06
7600	9.97E-01	2.80E-03	1.47E-04	5.40E-05	3.72E-06	5.40E-06
8000	9.96E-01	4.10E-03	2.58E-04	9.93E-05	7.39E-06	1.04E-05
8400	9.94E-01	5.78E-03	4.30E-04	1.72E-04	1.37E-05	1.85E-05
8800	9.91E-01	7.90E-03	6.84E-04	2.83E-04	2.39E-05	3.14E-05
9200	9.88E-01	1.05E-02	1.04E-03	4.45E-04	3.94E-05	5.04E-05
9600	9.84E-01	1.34E-02	1.53E-03	6.71E-04	6.26E-05	7.75E-05
10000	9.79E-01	1.72E-02	2.18E-03	9.78E-04	9.52E-05	1.15E-04
11000	9.64E-01	2.87E-02	4.66E-03	2.20E-03	2.34E-04	2.64E-04
12000	9.43E-01	4.33E-02	8.85E-03	4.25E-03	4.84E-04	5.16E-04
13000	9.16E-01	6.04E-02	1.44E-02	7.27E-03	8.77E-04	8.89E-04
14000	8.85E-01	7.93E-02	2.18E-02	1.13E-02	1.43E-03	1.38E-03
15000	8.50E-01	9.89E-02	3.08E-02	1.63E-02	2.14E-03	1.99E-03
16000	8.13E-01	1.18E-01	4.10E-02	2.21E-02	2.99E-03	2.68E-03
17000	7.75E-01	1.37E-01	5.21E-02	2.85E-02	3.95E-03	3.43E-03
18000	7.36E-01	1.54E-01	6.34E-02	3.52E-02	5.00E-03	4.22E-03
19000	7.02E-01	1.70E-01	7.52E-02	4.21E-02	6.10E-03	5.01E-03
20000	6.67E-01	1.84E-01	8.68E-02	4.90E-02	7.22E-03	5.78E-03
24000	5.53E-01	2.24E-01	1.28E-01	7.44E-02	1.16E-02	8.53E-03
28000	4.73E-01	2.46E-01	1.61E-01	9.48E-02	1.52E-02	1.06E-02
32000	4.18E-01	2.57E-01	1.85E-01	1.10E-01	1.82E-02	1.21E-02
36000	3.78E-01	2.63E-01	2.03E-01	1.22E-01	2.05E-02	1.31E-02
40000	3.49E-01	2.65E-01	2.17E-01	1.32E-01	2.24E-02	1.39E-02

TABLE 99. FRACTIONAL ELECTRONIC POPULATIONS OF O₂

TEMP. (°K)	X 3 Σ_g^-	a 1 Δ_g	b 1 Σ_g^+	C 2 Δ_u	A 3 Σ_u^+	c 1 Σ_u^-	B 3 Σ_u^-
1200	1.00E-00	5.51E-05	5.27E-06	5.70E-18	1.35E-14	1.44E-19	5.51E-26
1600	9.99E-01	5.73E-04	2.73E-06	1.84E-13	5.20E-14	8.18E-15	1.63E-19
2000	9.98E-01	2.39E-03	2.91E-05	9.23E-11	2.89E-11	5.68E-12	1.25E-15
2400	9.94E-01	6.16E-03	1.41E-04	5.73E-09	1.90E-09	4.29E-10	4.80E-13
2800	9.88E-01	1.21E-02	4.35E-04	1.08E-07	3.68E-08	9.11E-09	3.31E-11
3200	9.79E-01	1.99E-02	1.01E-03	9.54E-07	3.30E-07	8.73E-08	7.76E-10
3600	9.69E-01	2.91E-02	1.93E-03	5.04E-06	1.78E-06	4.92E-07	8.84E-09
4000	9.57E-01	3.88E-02	2.25E-03	1.88E-05	6.68E-06	1.92E-06	6.08E-08
4400	9.43E-01	5.09E-02	4.95E-03	5.44E-05	1.94E-05	5.72E-06	2.89E-07
4800	9.30E-01	6.23E-02	7.01E-03	1.28E-04	4.62E-05	1.39E-05	1.04E-06
5200	9.16E-01	7.38E-02	9.39E-03	2.62E-04	9.50E-05	2.92E-05	3.05E-06
5600	9.02E-01	8.51E-02	1.20E-02	4.78E-04	1.74E-04	5.43E-05	7.54E-06
6000	8.88E-01	9.60E-02	1.48E-02	7.94E-04	2.90E-04	9.17E-05	1.64E-05
6400	8.74E-01	1.07E-01	1.78E-02	1.23E-03	4.49E-04	1.44E-04	3.19E-05
6800	8.60E-01	1.16E-01	2.09E-02	1.79E-03	6.54E-04	2.11E-04	5.69E-05
7200	8.46E-01	1.26E-01	2.39E-02	2.47E-03	9.07E-04	2.95E-04	9.44E-05
7600	8.33E-01	1.35E-01	2.70E-02	3.28E-03	1.21E-03	3.95E-04	1.48E-04
8000	8.21E-01	1.43E-01	3.00E-02	4.20E-03	1.55E-03	5.10E-04	2.19E-04
8400	8.09E-01	1.50E-01	3.30E-02	5.23E-03	1.93E-03	6.39E-04	3.11E-04
8800	7.97E-01	1.57E-01	3.58E-02	6.35E-03	2.34E-03	7.81E-04	4.27E-04
9200	7.84E-01	1.64E-01	3.85E-02	7.54E-03	2.79E-03	9.33E-04	5.44E-04
9600	7.75E-01	1.70E-01	4.11E-02	8.80E-03	3.25E-03	1.09E-03	7.31E-04
10000	7.65E-01	1.75E-01	4.36E-02	1.01E-02	3.74E-03	1.26E-03	9.21E-04
11000	7.42E-01	1.87E-01	4.93E-02	1.34E-02	4.99E-03	1.70E-03	1.51E-03
12000	7.22E-01	1.96E-01	5.41E-02	1.69E-02	6.27E-03	2.15E-03	2.24E-03
13000	7.05E-01	2.04E-01	5.83E-02	2.03E-02	7.53E-03	2.59E-03	3.10E-03
14000	6.89E-01	2.10E-01	6.19E-02	2.35E-02	8.73E-03	3.02E-03	4.07E-03
15000	6.76E-01	2.14E-01	6.49E-02	2.65E-02	9.87E-03	3.43E-03	5.11E-03
16000	6.64E-01	2.18E-01	6.75E-02	2.94E-02	1.09E-02	3.81E-03	6.21E-03
17000	6.53E-01	2.22E-01	6.97E-02	3.20E-02	1.19E-02	4.17E-03	7.35E-03
18000	6.44E-01	2.24E-01	7.16E-02	3.45E-02	1.28E-02	4.50E-03	8.52E-03
19000	6.35E-01	2.26E-01	7.33E-02	3.67E-02	1.37E-02	4.81E-03	9.69E-03
20000	6.28E-01	2.28E-01	7.48E-02	3.88E-02	1.45E-02	5.09E-03	1.09E-02
2400	6.04E-01	2.33E-01	7.90E-02	4.57E-02	1.70E-02	6.04E-03	1.54E-02
28000	5.87E-01	2.35E-01	8.16E-02	5.08E-02	1.89E-02	6.75E-03	1.94E-02
32000	5.74E-01	2.37E-01	8.34E-02	5.44E-02	2.04E-02	7.29E-03	2.33E-02
36000	5.65E-01	2.37E-01	8.46E-02	5.78E-02	2.15E-02	7.72E-03	2.64E-02
40000	5.57E-01	2.38E-01	8.55E-02	6.00E-02	2.24E-02	8.04E-03	2.95E-02

TABLE 100. FRACTIONAL ELECTRONIC POPULATIONS OF G^+

TEMP. (°K)	$X \text{ } ^2\Pi_g$	$a \text{ } ^4\Pi_u$	$\lambda \text{ } ^2\Pi_u$	STATE $S \text{ } ^4\Sigma_g^-$
1200	1.00E-00	5.40E-17	2.04E-20	4.55E-26
1600	1.00E-00	9.53E-13	2.95E-15	1.17E-19
2000	1.00E-00	5.40E-10	3.06E-12	6.30E-16
2400	1.00E-00	1.72E-08	3.17E-10	3.08E-13
2800	1.00E-00	2.86E-07	6.76E-09	2.12E-11
3200	1.00E-00	2.34E-06	1.06E-07	5.10E-10
3600	1.00E-00	1.22E-05	7.36E-07	6.07E-09
4000	1.00E-00	4.55E-05	3.47E-06	4.41E-08
4400	1.00E-00	1.34E-04	1.23E-05	2.24E-07
4800	1.00E-00	3.29E-04	3.50E-05	8.64E-07
5200	9.99E-01	7.02E-04	6.44E-05	4.71E-06
5600	9.98E-01	1.34E-03	1.79E-04	7.20E-06
6000	9.97E-01	2.35E-03	3.41E-04	1.67E-05
6400	9.96E-01	3.81E-03	5.86E-04	3.45E-05
6800	9.95E-01	5.65E-03	9.70E-04	6.64E-05
7200	9.90E-01	8.46E-03	1.49E-03	1.17E-04
7600	9.86E-01	1.18E-02	2.16E-03	1.94E-04
8000	9.81E-01	1.57E-02	3.01E-03	3.04E-04
8400	9.75E-01	2.04E-02	4.05E-03	4.54E-04
8800	9.68E-01	2.57E-02	5.26E-03	6.52E-04
9200	9.61E-01	3.16E-02	6.65E-03	9.02E-04
9600	9.52E-01	3.81E-02	8.21E-03	1.21E-03
10000	9.44E-01	4.50E-02	9.91E-03	1.58E-03
11000	9.19E-01	6.37E-02	1.47E-02	2.77E-03
12000	8.92E-01	8.35E-02	2.00E-02	4.35E-03
13000	8.65E-01	1.03E-01	2.55E-02	6.26E-03
14000	8.38E-01	1.22E-01	3.09E-02	8.45E-03
15000	8.13E-01	1.40E-01	3.62E-02	1.08E-02
16000	7.89E-01	1.57E-01	4.11E-02	1.34E-02
17000	7.67E-01	1.72E-01	4.58E-02	1.60E-02
18000	7.46E-01	1.85E-01	5.00E-02	1.86E-02
19000	7.27E-01	1.98E-01	5.39E-02	2.13E-02
20000	7.10E-01	2.08E-01	5.74E-02	2.39E-02
24000	6.55E-01	2.42E-01	6.87E-02	3.38E-02
28000	6.17E-01	2.64E-01	7.66E-02	4.25E-02
32000	5.88E-01	2.80E-01	8.22E-02	4.99E-02
36000	5.67E-01	2.91E-01	8.64E-02	5.63E-02
40000	5.50E-01	2.99E-01	8.95E-02	6.17E-02

TABLE 101. FRACTIONAL ELECTRONIC POPULATIONS OF CO

TEMP. (°K)	STATE					
	$X^1\Sigma^+$	$a^3\Pi$	$a^3\Sigma^+$	$d^3\Delta$	$e^3\Sigma^-$	$I^1\Sigma^-$
1200	1.00E-00	4.18E-25	7.69E-29	2.92E-31	3.87E-33	5.10E-34
1600	1.00E-00	8.78E-19	1.36E-21	2.48E-23	8.28E-25	1.30E-26
2000	1.00E-00	5.49E-15	1.03E-17	1.44E-18	6.34E-20	1.73E-20
2400	1.00E-00	1.87E-12	2.41E-14	2.16E-15	1.82E-16	4.19E-17
2800	1.00E-00	1.20E-10	2.86E-12	4.04E-13	4.44E-14	1.10E-14
3200	1.00E-00	2.74E-09	1.03E-10	2.05E-10	2.75E-12	7.18E-13
3600	1.00E-00	3.12E-08	1.67E-09	4.16E-10	8.64E-11	1.14E-11
4000	1.00E-00	2.19E-07	1.56E-08	5.04E-09	8.95E-10	2.51E-10
4400	1.00E-00	1.08E-06	9.74E-08	1.64E-08	7.37E-09	1.61E-09
4800	1.00E-00	4.08E-06	4.48E-07	1.93E-07	4.21E-08	1.40E-08
5200	1.00E-00	1.25E-05	1.63E-06	9.20E-07	1.83E-07	5.62E-08
5600	1.00E-00	3.24E-05	4.95E-06	2.76E-06	6.78E-07	2.04E-07
6000	1.00E-00	7.58E-05	1.29E-05	7.31E-06	2.03E-06	6.21E-07
6400	1.00E-00	1.58E-04	3.90E-05	1.99E-05	5.37E-06	1.64E-06
6800	1.00E-00	3.01E-04	6.31E-05	4.47E-05	1.26E-05	3.87E-06
7200	9.93E-01	5.36E-04	1.22E-04	9.19E-05	2.68E-05	8.28E-06
7600	9.99E-01	8.96E-04	2.20E-04	1.75E-04	5.25E-05	1.63E-05
8000	9.93E-01	1.42E-03	3.74E-04	3.12E-04	9.60E-05	2.99E-05
8400	9.96E-01	2.16E-03	6.04E-04	5.24E-04	1.65E-04	5.17E-05
8800	9.95E-01	3.16E-03	9.32E-04	8.40E-04	2.70E-04	8.47E-05
9200	9.92E-01	4.46E-03	1.38E-03	1.79E-03	4.23E-04	1.33E-04
9600	9.83E-01	6.11E-03	1.96E-03	1.90E-03	6.34E-04	1.99E-04
10000	9.65E-01	8.15E-03	2.75E-03	2.71E-03	9.11E-04	2.89E-04
11000	9.79E-01	1.51E-02	5.56E-03	5.82E-03	2.03E-03	6.40E-04
12000	9.48E-01	2.50E-02	9.82E-03	1.08E-02	3.84E-03	1.22E-03
13000	9.13E-01	3.75E-02	1.56E-02	1.77E-02	6.43E-03	2.04E-03
14000	8.81E-01	5.21E-02	2.27E-02	2.66E-02	9.82E-03	3.11E-03
15000	8.43E-01	6.80E-02	3.07E-02	3.70E-02	1.38E-02	4.39E-03
16000	7.99E-01	8.49E-02	3.94E-02	4.84E-02	1.83E-02	5.81E-03
17000	7.55E-01	1.01E-01	4.82E-02	6.03E-02	2.31E-02	7.32E-03
18000	7.11E-01	1.16E-01	5.69E-02	7.23E-02	2.79E-02	8.84E-03
19000	6.69E-01	1.30E-01	6.52E-02	8.40E-02	3.26E-02	1.03E-02
20000	5.30E-01	1.43E-01	7.30E-02	9.51E-02	3.71E-02	1.18E-02
24000	5.05E-01	1.61E-01	9.78E-02	1.12E-01	5.27E-02	1.66E-02
28000	4.73E-01	2.06E-01	1.14E-01	1.58E-01	6.34E-02	2.01E-02
32000	3.63E-01	2.21E-01	1.25E-01	1.75E-01	7.10E-02	2.25E-02
36000	3.31E-01	2.30E-01	1.32E-01	1.86E-01	7.65E-02	2.42E-02
40000	3.05E-01	2.39E-01	1.37E-01	1.97E-01	8.06E-02	2.55E-02

TABLE 102. DIMENSIONLESS PRESSURE, PV/RT, OF EQUILIBRIUM AIR

TEMP. (DEG K)	-9.0	-8.5	-8.0	-7.5	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0
1000	3.982E 00	3.981E 00	3.979E 00	3.973E 00	3.956E 00	3.905E 00	3.773E 00	3.508E 00	3.135E 00	2.766E 00	2.477E 00
1050	3.982E 00	3.982E 00	3.981E 00	3.978E 00	3.970E 00	3.947E 00	3.808E 00	3.717E 00	3.417E 00	3.035E 00	2.682E 00
1100	3.985E 00	3.983E 00	3.982E 00	3.980E 00	3.974E 00	3.945E 00	3.932E 00	3.840E 00	3.634E 00	3.296E 00	2.913E 00
1150	3.994E 00	3.986E 00	3.983E 00	3.981E 00	3.979E 00	3.973E 00	3.956E 00	3.906E 00	3.777E 00	3.517E 00	3.149E 00
1200	4.025E 00	3.994E 00	3.986E 00	3.983E 00	3.981E 00	3.977E 00	3.947E 00	3.939E 00	3.862E 00	3.681E 00	3.365E 00
1250	4.109E 00	4.027E 00	3.997E 00	3.986E 00	3.982E 00	3.979E 00	3.973E 00	3.957E 00	3.911E 00	3.791E 00	3.544E 00
1300	4.287E 00	4.104E 00	4.025E 00	3.996E 00	3.986E 00	3.981E 00	3.977E 00	3.966E 00	3.938E 00	3.860E 00	3.686E 00
1350	4.572E 00	4.262E 00	4.092E 00	4.020E 00	3.994E 00	3.984E 00	3.979E 00	3.972E 00	3.933E 00	3.903E 00	3.775E 00
1400	4.904E 00	4.511E 00	4.224E 00	4.075E 00	4.013E 00	3.991E 00	3.982E 00	3.976E 00	3.963E 00	3.929E 00	3.840E 00
1450	5.205E 00	4.815E 00	4.435E 00	4.180E 00	4.055E 00	4.006E 00	3.988E 00	3.979E 00	3.949E 00	3.945E 00	3.883E 00
1500	5.438E 00	5.109E 00	4.705E 00	4.351E 00	4.135E 00	4.036E 00	3.998E 00	3.983E 00	3.973E 00	3.956E 00	3.911E 00
1550	5.618E 00	5.352E 00	4.987E 00	4.581E 00	4.266E 00	4.093E 00	4.019E 00	3.991E 00	3.978E 00	3.963E 00	3.930E 00
1600	5.755E 00	5.543E 00	5.237E 00	4.840E 00	4.452E 00	4.188E 00	4.058E 00	4.005E 00	3.984E 00	3.968E 00	3.942E 00
1650	5.851E 00	5.692E 00	5.442E 00	5.091E 00	4.678E 00	4.329E 00	4.123E 00	4.030E 00	3.993E 00	3.974E 00	3.952E 00
1700	5.908E 00	5.802E 00	5.606E 00	5.309E 00	4.916E 00	4.513E 00	4.223E 00	4.072E 00	4.008E 00	3.981E 00	3.959E 00
1750	5.940E 00	5.875E 00	5.733E 00	5.490E 00	5.141E 00	4.723E 00	4.360E 00	4.137E 00	4.034E 00	3.991E 00	3.966E 00
1800	5.958E 00	5.915E 00	5.824E 00	5.635E 00	5.337E 00	4.940E 00	4.531E 00	4.232E 00	4.074E 00	4.007E 00	3.974E 00
1850	5.969E 00	5.944E 00	5.894E 00	5.747E 00	5.502E 00	5.145E 00	4.722E 00	4.357E 00	4.135E 00	4.030E 00	3.984E 00
1900	5.980E 00	5.960E 00	5.921E 00	5.828E 00	5.636E 00	5.327E 00	4.919E 00	4.510E 00	4.218E 00	4.066E 00	3.999E 00
1950	5.994E 00	5.972E 00	5.944E 00	5.882E 00	5.740E 00	5.482E 00	5.108E 00	4.680E 00	4.326E 00	4.117E 00	4.019E 00
2000	6.016E 00	5.984E 00	5.960E 00	5.918E 00	5.817E 00	5.611E 00	5.280E 00	4.858E 00	4.457E 00	4.185E 00	4.048E 00
2200	6.371E 00	6.136E 00	6.031E 00	5.986E 00	5.951E 00	5.888E 00	5.745E 00	5.473E 00	5.076E 00	4.639E 00	4.293E 00
2400	7.181E 00	6.745E 00	6.356E 00	6.127E 00	6.023E 00	5.972E 00	5.917E 00	5.803E 00	5.568E 00	5.191E 00	4.744E 00
2600	7.719E 00	7.446E 00	7.050E 00	6.604E 00	6.261E 00	6.078E 00	5.994E 00	5.930E 00	5.822E 00	5.598E 00	5.225E 00
2800	7.919E 00	7.815E 00	7.607E 00	7.252E 00	6.802E 00	6.392E 00	6.138E 00	6.014E 00	5.934E 00	5.815E 00	5.579E 00
3000	7.997E 00	7.945E 00	7.863E 00	7.686E 00	7.365E 00	6.929E 00	6.486E 00	6.185E 00	6.028E 00	5.926E 00	5.784E 00
3200	8.190E 00	8.041E 00	7.966E 00	7.886E 00	7.728E 00	7.424E 00	6.988E 00	6.531E 00	6.205E 00	6.026E 00	5.901E 00
3400	8.705E 00	8.313E 00	8.093E 00	7.986E 00	7.896E 00	7.735E 00	7.431E 00	6.988E 00	6.526E 00	6.195E 00	6.005E 00
3600	9.316E 00	8.856E 00	8.418E 00	8.141E 00	8.002E 00	7.895E 00	7.718E 00	7.395E 00	6.937E 00	6.477E 00	6.154E 00
3800	9.712E 00	9.394E 00	8.944E 00	8.485E 00	8.174E 00	8.008E 00	7.880E 00	7.676E 00	7.318E 00	6.840E 00	6.393E 00
4000	9.927E 00	9.737E 00	9.424E 00	8.977E 00	8.509E 00	8.182E 00	7.899E 00	7.847E 00	7.401E 00	7.197E 00	6.704E 00
4200	1.013E 01	9.941E 00	9.739E 00	9.416E 00	8.960E 00	8.472E 00	8.166E 00	7.975E 00	7.788E 00	7.446E 00	7.031E 00
4400	1.048E 01	1.015E 01	9.940E 00	9.717E 00	9.372E 00	8.901E 00	8.439E 00	8.126E 00	7.925E 00	7.695E 00	7.323E 00
4600	1.094E 01	1.049E 01	1.015E 01	9.921E 00	9.671E 00	9.292E 00	8.802E 00	8.358E 00	8.065E 00	7.847E 00	7.553E 00
4800	1.133E 01	1.091E 01	1.046E 01	1.012E 01	9.880E 00	9.594E 00	9.172E 00	8.671E 00	8.257E 00	7.983E 00	7.728E 00
5000	1.166E 01	1.128E 01	1.085E 01	1.040E 01	1.007E 01	9.814E 00	9.481E 00	9.014E 00	8.517E 00	8.143E 00	7.871E 00
6000	1.204E 01	1.197E 01	1.189E 01	1.176E 01	1.149E 01	1.108E 01	1.058E 01	1.015E 01	9.802E 00	9.389E 00	8.863E 00
7000	1.236E 01	1.231E 01	1.220E 01	1.208E 01	1.197E 01	1.187E 01	1.167E 01	1.132E 01	1.082E 01	1.030E 01	9.856E 00
8000	1.239E 01	1.239E 01	1.238E 01	1.234E 01	1.227E 01	1.214E 01	1.201E 01	1.188E 01	1.166E 01	1.127E 01	1.079E 01

100000	1.239E 01	1.239E 01	1.239E 01	1.239E 01	1.238E 01	1.238E 01	1.237E 01	1.237E 01	1.237E 01
150000	1.239E 01	1.239E 01	1.239E 01	1.239E 01	1.239E 01	1.239E 01	1.239E 01	1.239E 01	1.239E 01
200000	1.247E 01	1.243E 01	1.240E 01	1.240E 01	1.239E 01	1.239E 01	1.239E 01	1.239E 01	1.239E 01
300000	1.502E 01	1.522E 01	1.471E 01	1.430E 01	1.405E 01	1.386E 01	1.357E 01	1.315E 01	1.246E 01
400000	1.640E 01	1.630E 01	1.626E 01	1.613E 01	1.602E 01	1.590E 01	1.568E 01	1.528E 01	1.473E 01
500000	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.642E 01	1.639E 01	1.633E 01	1.621E 01	1.606E 01
600000	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.642E 01	1.640E 01
800000	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.643E 01
1000000	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.643E 01
1500000	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.644E 01	1.644E 01	1.644E 01	1.643E 01
2000000	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01
3000000	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01
4000000	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01
5000000	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01
6000000	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01
8000000	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01
10000000	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01

TABLE 102(CONT) DIMENSIONLESS PRESSURE, PV/RT, OF EQUILIBRIUM AIR

TEMP. (DEG K)	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0
1000	2.282E 00	2.160E 00	2.087E 00	2.042E 00	2.008E 00	1.966E 00	1.886E 00	1.757E 00	1.597E 00	1.431E 00
1050	2.219E 00	2.245E 00	2.138E 00	2.073E 00	2.031E 00	1.992E 00	1.934E 00	1.827E 00	1.675E 00	1.517E 00
1100	2.287E 00	2.354E 00	2.205E 00	2.113E 00	2.057E 00	2.015E 00	1.967E 00	1.832E 00	1.746E 00	1.584E 00
1150	2.779E 00	2.487E 00	2.289E 00	2.165E 00	2.088E 00	2.038E 00	1.993E 00	1.924E 00	1.807E 00	1.650E 00
1200	2.983E 00	2.642E 00	2.392E 00	2.228E 00	2.127E 00	2.064E 00	2.015E 00	1.957E 00	1.850E 00	1.711E 00
1250	3.184E 00	2.811E 00	2.512E 00	2.305E 00	2.174E 00	2.093E 00	2.038E 00	1.983E 00	1.900E 00	1.767E 00
1300	3.366E 00	2.986E 00	2.646E 00	2.395E 00	2.231E 00	2.128E 00	2.062E 00	2.007E 00	1.933E 00	1.815E 00
1350	3.520E 00	3.157E 00	2.789E 00	2.497E 00	2.296E 00	2.169E 00	2.088E 00	2.025E 00	1.962E 00	1.857E 00
1400	3.642E 00	3.315E 00	2.937E 00	2.609E 00	2.371E 00	2.215E 00	2.110E 00	2.050E 00	1.986E 00	1.893E 00
1450	3.733E 00	3.453E 00	3.083E 00	2.727E 00	2.454E 00	2.269E 00	2.151E 00	2.073E 00	2.008E 00	1.923E 00
1500	3.799E 00	3.548E 00	3.221E 00	2.850E 00	2.543E 00	2.328E 00	2.188E 00	2.098E 00	2.029E 00	1.950E 00
1550	3.846E 00	3.600E 00	3.346E 00	2.972E 00	2.639E 00	2.393E 00	2.230E 00	2.125E 00	2.050E 00	1.973E 00
1600	3.879E 00	3.731E 00	3.456E 00	3.092E 00	2.738E 00	2.463E 00	2.275E 00	2.154E 00	2.071E 00	1.995E 00
1650	3.903E 00	3.785E 00	3.550E 00	3.204E 00	2.838E 00	2.537E 00	2.325E 00	2.186E 00	2.093E 00	2.015E 00
1700	3.919E 00	3.826E 00	3.627E 00	3.307E 00	2.938E 00	2.615E 00	2.378E 00	2.220E 00	2.116E 00	2.035E 00
1750	3.932E 00	3.856E 00	3.650E 00	3.400E 00	3.035E 00	2.694E 00	2.434E 00	2.257E 00	2.140E 00	2.054E 00
1800	3.942E 00	3.880E 00	3.746E 00	3.481E 00	3.128E 00	2.774E 00	2.492E 00	2.296E 00	2.166E 00	2.073E 00
1850	3.951E 00	3.898E 00	3.780E 00	3.551E 00	3.215E 00	2.854E 00	2.553E 00	2.337E 00	2.193E 00	2.092E 00
1900	3.960E 00	3.912E 00	3.812E 00	3.611E 00	3.295E 00	2.933E 00	2.615E 00	2.380E 00	2.221E 00	2.111E 00
1950	3.971E 00	3.924E 00	3.838E 00	3.662E 00	3.368E 00	3.009E 00	2.678E 00	2.425E 00	2.251E 00	2.131E 00
2000	3.983E 00	3.935E 00	3.859E 00	3.704E 00	3.433E 00	3.082E 00	2.740E 00	2.471E 00	2.282E 00	2.151E 00
2050	4.092E 00	3.990E 00	3.918E 00	3.815E 00	3.627E 00	3.331E 00	2.981E 00	2.660E 00	2.414E 00	2.238E 00
2100	4.360E 00	4.118E 00	3.985E 00	3.883E 00	3.742E 00	3.509E 00	3.186E 00	2.845E 00	2.552E 00	2.329E 00
2150	4.772E 00	4.374E 00	4.113E 00	3.957E 00	3.821E 00	3.630E 00	3.348E 00	3.011E 00	2.686E 00	2.422E 00
2200	5.193E 00	4.734E 00	4.338E 00	4.075E 00	3.898E 00	3.720E 00	3.475E 00	3.154E 00	2.810E 00	2.513E 00
2250	5.517E 00	5.104E 00	4.641E 00	4.261E 00	4.003E 00	3.802E 00	3.572E 00	3.274E 00	2.923E 00	2.600E 00
2300	5.724E 00	5.409E 00	4.963E 00	4.507E 00	4.151E 00	3.895E 00	3.659E 00	3.376E 00	3.023E 00	2.682E 00
2350	5.853E 00	5.624E 00	5.250E 00	4.779E 00	4.344E 00	4.014E 00	3.748E 00	3.467E 00	3.113E 00	2.758E 00
2400	5.959E 00	5.770E 00	5.474E 00	5.040E 00	4.584E 00	4.161E 00	3.847E 00	3.555E 00	3.196E 00	2.829E 00
2450	6.092E 00	5.883E 00	5.639E 00	5.265E 00	4.790E 00	4.333E 00	3.962E 00	3.643E 00	3.275E 00	2.897E 00
2500	6.284E 00	6.002E 00	5.766E 00	5.446E 00	5.002E 00	4.517E 00	4.093E 00	3.736E 00	3.353E 00	2.962E 00
2550	6.539E 00	6.155E 00	5.881E 00	5.591E 00	5.188E 00	4.701E 00	4.236E 00	3.837E 00	3.433E 00	3.025E 00
2600	6.827E 00	6.356E 00	6.008E 00	5.713E 00	5.345E 00	4.875E 00	4.385E 00	3.947E 00	3.516E 00	3.050E 00
2650	7.108E 00	6.595E 00	6.163E 00	5.830E 00	5.480E 00	5.033E 00	4.534E 00	4.063E 00	3.603E 00	3.157E 00
2700	7.353E 00	6.849E 00	6.351E 00	5.957E 00	5.601E 00	5.175E 00	4.678E 00	4.181E 00	3.695E 00	3.215E 00
2750	7.553E 00	7.092E 00	6.562E 00	6.101E 00	5.716E 00	5.302E 00	4.813E 00	4.301E 00	3.789E 00	3.256E 00
2800	7.845E 00	7.328E 00	6.759E 00	6.202E 00	5.782E 00	5.382E 00	4.877E 00	4.347E 00	3.826E 00	3.293E 00
2850	8.383E 00	7.810E 00	7.172E 00	6.551E 00	6.112E 00	5.712E 00	5.233E 00	4.712E 00	4.172E 00	3.637E 00
2900	1.017E 01	9.650E 00	9.067E 00	8.418E 00	7.789E 00	7.163E 00	6.491E 00	5.807E 00	5.133E 00	4.452E 00

15CC00	1.231E 01	1.222E 01	1.203E 01	1.192E 00	1.041E 00	0.274E 00	7.497E 00	6.721E 00	5.942E 00	5.119E 00
20CC00	1.236E 01	1.233E 01	1.227E 01	1.171E 01	1.121E 01	1.050E 01	9.623E 00	8.664E 00	7.674E 00	6.638E 00
30CC00	1.240E 01	1.237E 01	1.234E 01	1.215E 01	1.193E 01	1.152E 01	1.090E 01	1.004E 01	9.019E 00	7.884E 00
40CC00	1.259E 01	1.234E 01	1.233E 01	1.229E 01	1.220E 01	1.204E 01	1.175E 01	1.127E 01	1.054E 01	9.559E 00
5CC00	1.512E 01	1.454E 01	1.405E 01	1.362E 01	1.312E 01	1.244E 01	1.228E 01	1.194E 01	1.155E 01	1.094E 01
60CC00	1.603E 01	1.579E 01	1.538E 01	1.479E 01	1.419E 01	1.343E 01	1.305E 01	1.246E 01	1.192E 01	1.134E 01
80CC00	1.641E 01	1.638E 01	1.630E 01	1.614E 01	1.584E 01	1.542E 01	1.478E 01	1.401E 01	1.322E 01	1.239E 01
100CC00	1.642E 01	1.642E 01	1.640E 01	1.637E 01	1.629E 01	1.612E 01	1.580E 01	1.528E 01	1.452E 01	1.368E 01
150CC00	1.643E 01	1.642E 01	1.642E 01	1.641E 01	1.639E 01	1.635E 01	1.629E 01	1.615E 01	1.589E 01	1.541E 01
200CC00	1.643E 01	1.643E 01	1.642E 01	1.642E 01	1.641E 01	1.638E 01	1.635E 01	1.627E 01	1.614E 01	1.596E 01
300CC00	1.643E 01	1.644E 01	1.644E 01	1.643E 01	1.642E 01	1.641E 01	1.639E 01	1.635E 01	1.628E 01	1.616E 01
400CC00	1.643E 01	1.645E 01	1.645E 01	1.644E 01	1.644E 01	1.643E 01	1.641E 01	1.638E 01	1.634E 01	1.626E 01
500CC00	1.643E 01	1.645E 01	1.645E 01	1.645E 01	1.644E 01	1.644E 01	1.643E 01	1.641E 01	1.638E 01	1.632E 01
600CC00	1.643E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.644E 01	1.643E 01	1.642E 01	1.640E 01	1.635E 01
800CC00	1.643E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.644E 01	1.644E 01	1.643E 01	1.642E 01	1.639E 01
1000CC00	1.643E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.644E 01	1.644E 01	1.643E 01	1.641E 01

TABLE 103. PRESSURE (ATM) OF EQUILIBRIUM AIR

TEMP. (°C K)	-9.0	-8.5	-8.0	-7.5	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0
10500	1.450E-07	4.609E-07	1.457E-06	4.600E-06	1.446E-05	4.521E-05	1.381E-04	4.061E-04	1.148E-03	3.202E-03	9.048E-03
10500	1.531E-07	4.840E-07	1.530E-06	4.836E-06	1.528E-05	4.798E-05	1.492E-04	4.519E-04	1.314E-03	3.690E-03	1.031E-02
11000	1.605E-07	5.072E-07	1.603E-06	5.068E-06	1.601E-05	5.049E-05	1.583E-04	4.890E-04	1.463E-03	4.198E-03	1.173E-02
11500	1.682E-07	5.304E-07	1.677E-06	5.300E-06	1.675E-05	5.289E-05	1.645E-04	5.200E-04	1.590E-03	4.602E-03	1.326E-02
12000	1.768E-07	5.552E-07	1.751E-06	5.533E-06	1.749E-05	5.525E-05	1.743E-04	5.473E-04	1.697E-03	5.113E-03	1.478E-02
12500	1.860E-07	5.827E-07	1.829E-06	5.769E-06	1.822E-05	5.758E-05	1.818E-04	5.726E-04	1.790E-03	5.486E-03	1.622E-02
13000	2.040E-07	6.177E-07	1.916E-06	6.014E-06	1.897E-05	5.992E-05	1.893E-04	5.769E-04	1.874E-03	5.810E-03	1.751E-02
13500	2.259E-07	6.640E-07	2.022E-06	6.283E-06	1.974E-05	6.227E-05	1.967E-04	6.208E-04	1.954E-03	6.100E-03	1.866E-02
14000	2.514E-07	7.311E-07	2.165E-06	6.604E-06	2.057E-05	6.469E-05	2.041E-04	6.443E-04	2.031E-03	6.368E-03	1.968E-02
14500	2.763E-07	8.083E-07	2.354E-06	7.016E-06	2.153E-05	6.724E-05	2.117E-04	6.479E-04	2.107E-03	6.622E-03	2.061E-02
15000	2.986E-07	8.872E-07	2.584E-06	7.555E-06	2.270E-05	7.009E-05	2.196E-04	6.917E-04	2.182E-03	6.869E-03	2.148E-02
15500	3.188E-07	9.604E-07	2.830E-06	8.220E-06	2.421E-05	7.344E-05	2.281E-04	7.162E-04	2.257E-03	7.111E-03	2.230E-02
16000	3.371E-07	1.027E-06	3.068E-06	8.965E-06	2.602E-05	7.758E-05	2.377E-04	7.418E-04	2.333E-03	7.351E-03	2.309E-02
16500	3.534E-07	1.087E-06	3.287E-06	9.724E-06	2.826E-05	8.270E-05	2.490E-04	7.698E-04	2.412E-03	7.591E-03	2.387E-02
17000	3.677E-07	1.142E-06	3.489E-06	1.045E-05	3.060E-05	8.822E-05	2.628E-04	8.013E-04	2.493E-03	7.835E-03	2.464E-02
17500	3.805E-07	1.190E-06	3.673E-06	1.112E-05	3.293E-05	9.549E-05	2.793E-04	8.382E-04	2.584E-03	8.086E-03	2.541E-02
18000	3.928E-07	1.233E-06	3.838E-06	1.174E-05	3.517E-05	1.029E-04	2.986E-04	8.819E-04	2.685E-03	8.349E-03	2.619E-02
18500	4.043E-07	1.273E-06	3.985E-06	1.231E-05	3.726E-05	1.102E-04	3.190E-04	9.332E-04	2.800E-03	8.632E-03	2.698E-02
19000	4.160E-07	1.311E-06	4.119E-06	1.282E-05	3.920E-05	1.172E-04	3.421E-04	9.919E-04	2.934E-03	8.943E-03	2.781E-02
19500	4.279E-07	1.348E-06	4.244E-06	1.328E-05	4.098E-05	1.238E-04	3.646E-04	1.056E-03	3.088E-03	9.293E-03	2.863E-02
20000	4.403E-07	1.386E-06	4.364E-06	1.370E-05	4.259E-05	1.299E-04	3.866E-04	1.125E-03	3.263E-03	9.691E-03	2.964E-02
20500	4.532E-07	1.503E-06	4.857E-06	1.524E-05	4.793E-05	1.500E-04	4.627E-04	1.394E-03	4.088E-03	1.182E-02	3.458E-02
21000	4.630E-07	1.874E-06	5.585E-06	1.702E-05	5.292E-05	1.659E-04	5.199E-04	1.612E-03	4.892E-03	1.442E-02	4.168E-02
21500	4.734E-07	2.241E-06	6.711E-06	1.988E-05	5.959E-05	1.830E-04	5.705E-04	1.785E-03	5.541E-03	1.685E-02	4.974E-02
22000	4.819E-07	2.532E-06	7.792E-06	2.351E-05	6.973E-05	2.072E-04	6.292E-04	1.950E-03	6.082E-03	1.885E-02	5.719E-02
22500	4.883E-07	2.759E-06	8.635E-06	2.669E-05	8.093E-05	2.404E-04	7.124E-04	2.148E-03	6.620E-03	2.058E-02	6.353E-02
23000	4.959E-07	2.979E-06	9.332E-06	2.921E-05	9.050E-05	2.750E-04	8.186E-04	2.420E-03	7.269E-03	2.232E-02	6.913E-02
23500	5.048E-06	3.272E-06	1.007E-05	3.143E-05	9.828E-05	3.044E-04	9.250E-04	2.751E-03	8.123E-03	2.438E-02	7.474E-02
24000	5.122E-06	3.691E-06	1.109E-05	3.393E-05	1.055E-04	3.290E-04	1.017E-03	3.082E-03	9.142E-03	2.700E-02	8.113E-02
24500	5.200E-06	4.132E-06	1.244E-05	3.733E-05	1.137E-04	3.523E-04	1.096E-03	3.377E-03	1.010E-02	3.009E-02	8.894E-02
25000	5.283E-06	4.509E-06	1.380E-05	4.157E-05	1.246E-04	3.789E-04	1.171E-03	3.634E-03	1.113E-02	3.333E-02	9.816E-02
25500	5.370E-06	4.834E-06	1.597E-05	4.579E-05	1.378E-04	4.129E-04	1.256E-03	3.877E-03	1.198E-02	3.640E-02	1.081E-01
26000	5.460E-06	5.171E-06	1.601E-05	4.950E-05	1.510E-04	4.534E-04	1.359E-03	4.139E-03	1.274E-02	3.919E-02	1.193E-01
26500	5.555E-06	5.585E-06	1.709E-05	5.283E-05	1.629E-04	4.948E-04	1.482E-03	4.451E-03	1.358E-02	4.179E-02	1.272E-01
27000	5.653E-06	6.063E-06	1.838E-05	5.624E-05	1.736E-04	5.331E-04	1.612E-03	4.819E-03	1.451E-02	4.436E-02	1.359E-01
27500	5.755E-06	6.532E-06	1.986E-05	6.016E-05	1.844E-04	5.681E-04	1.735E-03	5.217E-03	1.559E-02	4.713E-02	1.441E-01
28000	5.860E-06	7.000E-06	2.133E-05	6.416E-05	1.952E-04	6.044E-04	1.852E-03	5.622E-03	1.672E-02	5.000E-02	1.526E-01
28500	5.968E-06	7.477E-06	2.277E-05	6.827E-05	2.060E-04	6.417E-04	1.967E-03	6.000E-03	1.790E-02	5.290E-02	1.614E-01
29000	6.078E-06	7.962E-06	2.420E-05	7.248E-05	2.168E-04	6.800E-04	2.080E-03	6.383E-03	1.914E-02	5.583E-02	1.708E-01
29500	6.190E-06	8.454E-06	2.562E-05	7.679E-05	2.276E-04	7.191E-04	2.192E-03	6.761E-03	2.041E-02	5.880E-02	1.802E-01
30000	6.304E-06	8.952E-06	2.703E-05	8.119E-05	2.384E-04	7.590E-04	2.303E-03	7.142E-03	2.171E-02	6.182E-02	1.900E-01
30500	6.420E-06	9.456E-06	2.843E-05	8.568E-05	2.492E-04	8.000E-04	2.413E-03	7.533E-03	2.304E-02	6.486E-02	2.000E-01
31000	6.538E-06	9.966E-06	2.983E-05	9.026E-05	2.600E-04	8.417E-04	2.523E-03	7.924E-03	2.438E-02	6.794E-02	2.100E-01
31500	6.658E-06	1.048E-05	3.123E-05	9.493E-05	2.708E-04	8.840E-04	2.633E-03	8.315E-03	2.574E-02	7.106E-02	2.200E-01
32000	6.779E-06	1.100E-05	3.263E-05	9.968E-05	2.816E-04	9.269E-04	2.743E-03	8.706E-03	2.711E-02	7.421E-02	2.300E-01
32500	6.901E-06	1.153E-05	3.403E-05	1.045E-04	2.924E-04	9.702E-04	2.853E-03	9.097E-03	2.848E-02	7.736E-02	2.400E-01
33000	7.024E-06	1.206E-05	3.543E-05	1.094E-04	3.030E-04	1.014E-03	2.963E-03	9.488E-03	2.984E-02	8.051E-02	2.500E-01
33500	7.148E-06	1.260E-05	3.683E-05	1.143E-04	3.138E-04	1.057E-03	3.073E-03	9.879E-03	3.119E-02	8.366E-02	2.600E-01
34000	7.273E-06	1.314E-05	3.823E-05	1.192E-04	3.246E-04	1.100E-03	3.183E-03	1.026E-02	3.254E-02	8.681E-02	2.700E-01
34500	7.400E-06	1.368E-05	3.963E-05	1.241E-04	3.354E-04	1.143E-03	3.293E-03	1.065E-02	3.389E-02	8.996E-02	2.800E-01
35000	7.528E-06	1.422E-05	4.103E-05	1.290E-04	3.462E-04	1.186E-03	3.403E-03	1.104E-02	3.524E-02	9.311E-02	2.900E-01
35500	7.657E-06	1.476E-05	4.243E-05	1.339E-04	3.570E-04	1.229E-03	3.513E-03	1.143E-02	3.659E-02	9.626E-02	3.000E-01
36000	7.787E-06	1.530E-05	4.383E-05	1.388E-04	3.678E-04	1.272E-03	3.623E-03	1.182E-02	3.794E-02	9.941E-02	3.100E-01
36500	7.918E-06	1.584E-05	4.523E-05	1.437E-04	3.786E-04	1.315E-03	3.733E-03	1.221E-02	3.929E-02	1.025E-01	3.200E-01
37000	8.050E-06	1.638E-05	4.663E-05	1.486E-04	3.894E-04	1.358E-03	3.843E-03	1.260E-02	4.064E-02	1.056E-01	3.300E-01
37500	8.183E-06	1.692E-05	4.803E-05	1.535E-04	4.002E-04	1.401E-03	3.953E-03	1.299E-02	4.199E-02	1.087E-01	3.400E-01
38000	8.317E-06	1.746E-05	4.943E-05	1.584E-04	4.110E-04	1.444E-03	4.063E-03	1.338E-02	4.334E-02	1.118E-01	3.500E-01
38500	8.452E-06	1.800E-05	5.083E-05	1.633E-04	4.218E-04	1.487E-03	4.173E-03	1.377E-02	4.469E-02	1.149E-01	3.600E-01
39000	8.588E-06	1.854E-05	5.223E-05	1.682E-04	4.326E-04	1.530E-03	4.283E-03	1.416E-02	4.604E-02	1.180E-01	3.700E-01
39500	8.724E-06	1.908E-05	5.363E-05	1.731E-04	4.434E-04	1.573E-03	4.393E-03	1.455E-02	4.739E-02	1.211E-01	3.800E-01
40000	8.861E-06	1.962E-05	5.503E-05	1.780E-04	4.542E-04	1.616E-03	4.503E-03	1.494E-02	4.874E-02	1.242E-01	3.900E-01

[illegible]

TABLE 103(CONT) PRESSURE (ATM) OF EQUILIBRIUM AIR

TEMP. (DEG K)	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0
10500	2.642E-02	7.909E-02	2.416E-01	7.475E-01	2.324E 00	7.196E 00	2.186E 01	6.433E 01	1.848E 02	5.314E 02
10500	2.940E-02	8.630E-02	2.599E-01	7.948E-01	2.448E 00	7.458E 00	2.350E 01	7.024E 01	2.035E 02	5.822E 02
11000	3.294E-02	9.480E-02	2.808E-01	8.510E-01	2.619E 00	8.115E 00	2.504E 01	7.580E 01	2.225E 02	6.300E 02
11500	3.700E-02	1.047E-01	3.048E-01	9.113E-01	2.780E 00	8.581E 00	2.653E 01	8.102E 01	2.406E 02	6.944E 02
12000	4.144E-02	1.161E-01	3.323E-01	9.790E-01	2.955E 00	9.066E 00	2.800E 01	8.597E 01	2.581E 02	7.517E 02
12500	4.607E-02	1.284E-01	3.635E-01	1.055E 00	3.147E 00	9.579E 00	2.949E 01	9.077E 01	2.749E 02	8.044E 02
13000	5.066E-02	1.421E-01	3.982E-01	1.140E 00	3.357E 00	1.013E 01	3.103E 01	9.550E 01	2.910E 02	8.639E 02
13500	5.502E-02	1.560E-01	4.359E-01	1.234E 00	3.589E 00	1.072E 01	3.263E 01	1.003E 02	3.066E 02	9.178E 02
14000	5.902E-02	1.699E-01	4.761E-01	1.337E 00	3.842E 00	1.135E 01	3.432E 01	1.051E 02	3.219E 02	9.701E 02
14500	6.266E-02	1.833E-01	5.175E-01	1.448E 00	4.119E 00	1.204E 01	3.611E 01	1.101E 02	3.371E 02	1.021E 03
15000	6.597E-02	1.959E-01	5.593E-01	1.565E 00	4.417E 00	1.278E 01	3.800E 01	1.152E 02	3.524E 02	1.071E 03
15500	6.901E-02	2.077E-01	6.005E-01	1.687E 00	4.735E 00	1.358E 01	4.001E 01	1.206E 02	3.679E 02	1.120E 03
16000	7.185E-02	2.185E-01	6.402E-01	1.811E 00	5.071E 00	1.445E 01	4.215E 01	1.262E 02	3.836E 02	1.169E 03
16500	7.455E-02	2.286E-01	6.781E-01	1.935E 00	5.421E 00	1.533E 01	4.441E 01	1.320E 02	3.998E 02	1.217E 03
17000	7.714E-02	2.381E-01	7.139E-01	2.058E 00	5.792E 00	1.627E 01	4.680E 01	1.382E 02	4.165E 02	1.264E 03
17500	7.964E-02	2.471E-01	7.476E-01	2.178E 00	6.149E 00	1.726E 01	4.931E 01	1.446E 02	4.334E 02	1.316E 03
18000	8.215E-02	2.557E-01	7.794E-01	2.294E 00	6.516E 00	1.828E 01	5.194E 01	1.513E 02	4.514E 02	1.364E 03
18500	8.463E-02	2.640E-01	8.096E-01	2.405E 00	6.885E 00	1.933E 01	5.468E 01	1.583E 02	4.697E 02	1.417E 03
19000	8.711E-02	2.721E-01	8.385E-01	2.512E 00	7.248E 00	2.040E 01	5.752E 01	1.654E 02	4.884E 02	1.469E 03
19500	8.963E-02	2.801E-01	8.664E-01	2.614E 00	7.603E 00	2.148E 01	6.045E 01	1.731E 02	5.081E 02	1.521E 03
20000	9.223E-02	2.881E-01	8.934E-01	2.712E 00	7.950E 00	2.257E 01	6.345E 01	1.809E 02	5.283E 02	1.575E 03
20500	9.482E-02	2.961E-01	9.197E-01	2.809E 00	8.298E 00	2.368E 01	6.653E 01	1.891E 02	5.496E 02	1.632E 03
21000	9.741E-02	3.041E-01	9.459E-01	2.905E 00	8.648E 00	2.483E 01	6.971E 01	1.974E 02	5.719E 02	1.692E 03
21500	1.000E-01	3.121E-01	9.721E-01	3.001E 00	8.999E 00	2.603E 01	7.301E 01	2.061E 02	5.952E 02	1.757E 03
22000	1.026E-01	3.201E-01	9.983E-01	3.097E 00	9.352E 00	2.728E 01	7.641E 01	2.152E 02	6.194E 02	1.826E 03
22500	1.052E-01	3.281E-01	1.024E-01	3.193E 00	9.707E 00	2.861E 01	8.000E 01	2.247E 02	6.446E 02	1.899E 03
23000	1.078E-01	3.361E-01	1.050E-01	3.289E 00	1.006E 01	3.000E 01	8.368E 01	2.346E 02	6.708E 02	1.976E 03
23500	1.104E-01	3.441E-01	1.076E-01	3.385E 00	1.041E 01	3.148E 01	8.746E 01	2.449E 02	6.979E 02	2.059E 03
24000	1.130E-01	3.521E-01	1.102E-01	3.481E 00	1.076E 01	3.296E 01	9.134E 01	2.556E 02	7.259E 02	2.146E 03
24500	1.156E-01	3.601E-01	1.128E-01	3.577E 00	1.111E 01	3.444E 01	9.531E 01	2.668E 02	7.569E 02	2.238E 03
25000	1.182E-01	3.681E-01	1.154E-01	3.673E 00	1.146E 01	3.592E 01	9.938E 01	2.784E 02	7.889E 02	2.336E 03
25500	1.208E-01	3.761E-01	1.180E-01	3.769E 00	1.181E 01	3.740E 01	1.035E 02	2.904E 02	8.219E 02	2.439E 03
26000	1.234E-01	3.841E-01	1.206E-01	3.865E 00	1.216E 01	3.888E 01	1.077E 02	3.029E 02	8.559E 02	2.546E 03
26500	1.260E-01	3.921E-01	1.232E-01	3.961E 00	1.251E 01	4.036E 01	1.120E 02	3.159E 02	8.909E 02	2.658E 03
27000	1.286E-01	4.001E-01	1.258E-01	4.057E 00	1.286E 01	4.184E 01	1.163E 02	3.294E 02	9.269E 02	2.776E 03
27500	1.312E-01	4.081E-01	1.284E-01	4.153E 00	1.321E 01	4.332E 01	1.207E 02	3.434E 02	9.639E 02	2.899E 03
28000	1.338E-01	4.161E-01	1.310E-01	4.249E 00	1.356E 01	4.480E 01	1.251E 02	3.579E 02	1.001E 03	3.026E 03
28500	1.364E-01	4.241E-01	1.336E-01	4.345E 00	1.391E 01	4.628E 01	1.296E 02	3.729E 02	1.041E 03	3.158E 03
29000	1.390E-01	4.321E-01	1.362E-01	4.441E 00	1.426E 01	4.776E 01	1.341E 02	3.884E 02	1.086E 03	3.296E 03
29500	1.416E-01	4.401E-01	1.388E-01	4.537E 00	1.461E 01	4.924E 01	1.386E 02	4.044E 02	1.136E 03	3.440E 03
30000	1.442E-01	4.481E-01	1.414E-01	4.633E 00	1.496E 01	5.072E 01	1.431E 02	4.209E 02	1.191E 03	3.590E 03
30500	1.468E-01	4.561E-01	1.440E-01	4.729E 00	1.531E 01	5.220E 01	1.476E 02	4.379E 02	1.251E 03	3.746E 03
31000	1.494E-01	4.641E-01	1.466E-01	4.825E 00	1.566E 01	5.368E 01	1.521E 02	4.554E 02	1.316E 03	3.908E 03
31500	1.520E-01	4.721E-01	1.492E-01	4.921E 00	1.601E 01	5.516E 01	1.566E 02	4.734E 02	1.386E 03	4.078E 03
32000	1.546E-01	4.801E-01	1.518E-01	5.017E 00	1.636E 01	5.664E 01	1.611E 02	4.919E 02	1.461E 03	4.254E 03
32500	1.572E-01	4.881E-01	1.544E-01	5.113E 00	1.671E 01	5.812E 01	1.656E 02	5.109E 02	1.541E 03	4.436E 03
33000	1.598E-01	4.961E-01	1.570E-01	5.209E 00	1.706E 01	5.960E 01	1.701E 02	5.304E 02	1.626E 03	4.624E 03
33500	1.624E-01	5.041E-01	1.596E-01	5.305E 00	1.741E 01	6.108E 01	1.746E 02	5.504E 02	1.716E 03	4.818E 03
34000	1.650E-01	5.121E-01	1.622E-01	5.401E 00	1.776E 01	6.256E 01	1.791E 02	5.709E 02	1.811E 03	5.018E 03
34500	1.676E-01	5.201E-01	1.648E-01	5.497E 00	1.811E 01	6.404E 01	1.836E 02	5.919E 02	1.911E 03	5.224E 03
35000	1.702E-01	5.281E-01	1.674E-01	5.593E 00	1.846E 01	6.552E 01	1.881E 02	6.134E 02	2.016E 03	5.436E 03
35500	1.728E-01	5.361E-01	1.700E-01	5.689E 00	1.881E 01	6.700E 01	1.926E 02	6.354E 02	2.126E 03	5.654E 03
36000	1.754E-01	5.441E-01	1.726E-01	5.785E 00	1.916E 01	6.848E 01	1.971E 02	6.579E 02	2.241E 03	5.878E 03
36500	1.780E-01	5.521E-01	1.752E-01	5.881E 00	1.951E 01	6.996E 01	2.016E 02	6.809E 02	2.361E 03	6.108E 03
37000	1.806E-01	5.601E-01	1.778E-01	5.977E 00	1.986E 01	7.144E 01	2.061E 02	7.044E 02	2.486E 03	6.344E 03
37500	1.832E-01	5.681E-01	1.804E-01	6.073E 00	2.021E 01	7.292E 01	2.106E 02	7.284E 02	2.616E 03	6.586E 03
38000	1.858E-01	5.761E-01	1.830E-01	6.169E 00	2.056E 01	7.440E 01	2.151E 02	7.529E 02	2.751E 03	6.834E 03
38500	1.884E-01	5.841E-01	1.856E-01	6.265E 00	2.091E 01	7.588E 01	2.196E 02	7.779E 02	2.891E 03	7.088E 03
39000	1.910E-01	5.921E-01	1.882E-01	6.361E 00	2.126E 01	7.736E 01	2.241E 02	8.034E 02	3.036E 03	7.348E 03
39500	1.936E-01	6.001E-01	1.908E-01	6.457E 00	2.161E 01	7.884E 01	2.286E 02	8.294E 02	3.186E 03	7.618E 03
40000	1.962E-01	6.081E-01	1.934E-01	6.553E 00	2.196E 01	8.032E 01	2.331E 02	8.559E 02	3.341E 03	7.894E 03
40500	1.988E-01	6.161E-01	1.960E-01	6.649E 00	2.231E 01	8.180E 01	2.376E 02	8.829E 02	3.501E 03	8.176E 03
41000	2.014E-01	6.241E-01	1.986E-01	6.745E 00	2.266E 01	8.328E 01	2.421E 02	9.104E 02	3.666E 03	8.464E 03
41500	2.040E-01	6.321E-01	2.012E-01	6.841E 00	2.301E 01	8.476E 01	2.466E 02	9.384E 02	3.836E 03	8.758E 03
42000	2.066E-01	6.401E-01	2.038E-01	6.937E 00	2.336E 01	8.624E 01	2.511E 02	9.669E 02	4.011E 03	9.058E 03
42500	2.092E-01	6.481E-01	2.064E-01	7.033E 00	2.371E 01	8.772E 01	2.556E 02	9.959E 02	4.191E 03	9.364E 03
43000	2.118E-01	6.561E-01	2.090E-01	7.129E 00	2.406E 01	8.920E 01	2.601E 02	1.024E 03	4.376E 03	9.676E 03
43500	2.144E-01	6.641E-01	2.116E-01	7.225E 00	2.441E 01	9.068E 01	2.646E 02	1.054E 03	4.566E 03	9.994E 03
44000	2.170E-01	6.721E-01	2.142E-01	7.321E 00	2.476E 01	9.216E 01	2.691E 02	1.084E 03	4.761E 03	1.032E 04
44500	2.196E-01	6.801E-01	2.168E-01	7.417E 00	2.511E 01	9.364E 01	2.736E 02	1.114E 03	4.961E 03	1.070E 04
45000	2.222E-01	6.881E-01	2.194E-01	7.513E 00	2.546E 01	9.512E 01	2.781E 02	1.144E 03	5.166E 03	1.110E 04
45500	2.248E-01	6.961E-01	2.220E-01	7.609E 00	2.581E 01	9.660E 01	2.826E 02	1.174E 03	5.376E 03	1.152E 04
46000	2.274E-01	7.041E-01	2.246E-01	7.705E 00	2.616E 01	9.808E 01	2.871E 02	1.204E 03	5.591E 03	1.196E 04
46500	2.300E-01	7.121E-01	2.272E-01	7.801E 00	2.651E 01	9.956E 01	2.916E 02	1.234E 03	5.811E 03	1.242E 04
47000	2.326E-01	7.201E-01	2.298E-01	7.897E 00	2.686E 01	1.010E 02	2.961E 02	1.264E 03	6.036E 03	1.290E 04
47500	2.352E-01	7.281E-01	2.324E-01	7.993E 00	2.721E 01	1.024E 02	3.006E 02	1.294E 03	6.266E 03	1.340E 04
48000	2.378E-01	7.361E-01	2.350E-01	8.089E 00	2.756E 01	1.038E 02	3.051E 02	1.324E 03	6.501E 03	1.392E 04
48500	2.404E-01	7.441E-01	2.376E-01	8.185E 00	2.791E 01	1.052E 02	3.096E 02	1.354E 03	6.741E 03	1.446E 04
49000	2.430E-01	7.521E-								

200000	2.861E 00	5.026E 00	2.840E 01	8.897E 01	2.761E 02	8.437E 02	2.523E 03	7.354E 03	2.088E 04	5.773E 04
300000	4.306E 00	1.359E 01	4.285E 01	1.349E 02	4.236E 02	1.322E 03	4.081E 03	1.238E 04	3.661E 04	1.050E 05
400000	6.293E 00	1.925E 01	5.896E 01	1.827E 02	5.708E 02	1.785E 03	5.558E 03	1.713E 04	5.185E 04	1.330E 05
500000	8.752E 00	2.662E 01	8.135E 01	2.493E 02	7.595E 02	2.314E 03	7.104E 03	2.189E 04	6.687E 04	2.004E 05
600000	1.114E 01	3.468E 01	1.069E 02	3.250E 02	9.853E 02	2.995E 03	9.065E 03	2.737E 04	8.279E 04	2.492E 05
800000	1.520E 01	4.797E 01	1.510E 02	4.726E 02	1.469E 03	4.517E 03	1.369E 04	4.104E 04	1.225E 05	3.629E 05
1000000	1.901E 01	6.010E 01	1.899E 02	5.992E 02	1.886E 03	5.903E 03	1.830E 04	5.594E 04	1.681E 05	4.977E 05
1500000	2.853E 01	9.019E 01	2.851E 02	9.011E 02	2.846E 03	8.981E 03	2.828E 04	8.870E 04	2.760E 05	8.465E 05
2000000	3.804E 01	1.203E 02	3.803E 02	1.202E 03	3.798E 03	1.200E 04	3.785E 04	1.192E 05	3.732E 05	1.164E 06
3000000	5.712E 01	1.804E 02	5.709E 02	1.804E 03	5.703E 03	1.802E 04	5.691E 04	1.796E 05	5.655E 05	1.775E 06
4000000	7.617E 01	2.409E 02	7.616E 02	2.408E 03	7.613E 03	2.404E 04	7.600E 04	2.399E 05	7.566E 05	2.381E 06
5000000	9.522E 01	3.011E 02	9.521E 02	3.010E 03	9.518E 03	3.009E 04	9.509E 04	3.004E 05	9.479E 05	2.987E 06
6000000	1.143E 02	3.613E 02	1.143E 03	3.613E 03	1.142E 04	3.611E 04	1.142E 05	3.607E 05	1.139E 06	3.592E 06
8000000	1.524E 02	4.818E 02	1.523E 03	4.817E 03	1.523E 04	4.816E 04	1.523E 05	4.812E 05	1.520E 06	4.800E 06
10000000	1.904E 02	6.022E 02	1.904E 03	6.022E 03	1.904E 04	6.021E 04	1.904E 05	6.017E 05	1.902E 06	6.006E 06

TABLE 104. LOG OF PRESSURE (ATM) OF EQUILIBRIUM AIR

TEMP. (DEG K)	-9.0	-8.5	-8.0	-7.5	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0
10000	-6.836E 00	-6.336E 00	-5.837E 00	-5.337E 00	-4.839E 00	-4.345E 00	-3.860E 00	-3.391E 00	-2.940E 00	-2.495E 00	-2.042E 00
10500	-6.815E 00	-6.315E 00	-5.815E 00	-5.316E 00	-4.816E 00	-4.319E 00	-3.822E 00	-3.345E 00	-2.882E 00	-2.433E 00	-1.987E 00
11000	-6.795E 00	-6.295E 00	-5.795E 00	-5.295E 00	-4.796E 00	-4.297E 00	-3.800E 00	-3.311E 00	-2.835E 00	-2.377E 00	-1.931E 00
11500	-6.774E 00	-6.275E 00	-5.776E 00	-5.276E 00	-4.776E 00	-4.277E 00	-3.779E 00	-3.284E 00	-2.799E 00	-2.330E 00	-1.878E 00
12000	-6.752E 00	-6.256E 00	-5.757E 00	-5.257E 00	-4.757E 00	-4.258E 00	-3.759E 00	-3.262E 00	-2.770E 00	-2.291E 00	-1.830E 00
12500	-6.726E 00	-6.235E 00	-5.730E 00	-5.239E 00	-4.739E 00	-4.240E 00	-3.740E 00	-3.242E 00	-2.747E 00	-2.261E 00	-1.790E 00
13000	-6.699E 00	-6.209E 00	-5.718E 00	-5.221E 00	-4.722E 00	-4.222E 00	-3.723E 00	-3.224E 00	-2.727E 00	-2.236E 00	-1.757E 00
13500	-6.666E 00	-6.176E 00	-5.694E 00	-5.202E 00	-4.705E 00	-4.206E 00	-3.706E 00	-3.207E 00	-2.709E 00	-2.215E 00	-1.729E 00
14000	-6.600E 00	-6.136E 00	-5.665E 00	-5.180E 00	-4.682E 00	-4.189E 00	-3.690E 00	-3.191E 00	-2.692E 00	-2.196E 00	-1.704E 00
14500	-6.559E 00	-6.092E 00	-5.628E 00	-5.154E 00	-4.667E 00	-4.172E 00	-3.674E 00	-3.175E 00	-2.676E 00	-2.179E 00	-1.686E 00
15000	-6.525E 00	-6.052E 00	-5.588E 00	-5.122E 00	-4.646E 00	-4.154E 00	-3.658E 00	-3.140E 00	-2.641E 00	-2.163E 00	-1.668E 00
15500	-6.497E 00	-6.018E 00	-5.548E 00	-5.085E 00	-4.616E 00	-4.134E 00	-3.642E 00	-3.145E 00	-2.646E 00	-2.148E 00	-1.652E 00
16000	-6.472E 00	-5.989E 00	-5.513E 00	-5.047E 00	-4.584E 00	-4.110E 00	-3.624E 00	-3.130E 00	-2.632E 00	-2.134E 00	-1.637E 00
16500	-6.452E 00	-5.964E 00	-5.483E 00	-5.012E 00	-4.549E 00	-4.082E 00	-3.604E 00	-3.114E 00	-2.618E 00	-2.120E 00	-1.622E 00
17000	-6.435E 00	-5.942E 00	-5.457E 00	-4.981E 00	-4.514E 00	-4.052E 00	-3.580E 00	-3.096E 00	-2.603E 00	-2.104E 00	-1.608E 00
17500	-6.420E 00	-5.924E 00	-5.435E 00	-4.954E 00	-4.482E 00	-4.019E 00	-3.554E 00	-3.077E 00	-2.588E 00	-2.092E 00	-1.595E 00
18000	-6.406E 00	-5.909E 00	-5.416E 00	-4.930E 00	-4.454E 00	-3.987E 00	-3.525E 00	-3.055E 00	-2.571E 00	-2.078E 00	-1.582E 00
18500	-6.393E 00	-5.895E 00	-5.400E 00	-4.910E 00	-4.429E 00	-3.958E 00	-3.495E 00	-3.030E 00	-2.553E 00	-2.064E 00	-1.569E 00
19000	-6.381E 00	-5.882E 00	-5.385E 00	-4.892E 00	-4.407E 00	-3.931E 00	-3.468E 00	-3.004E 00	-2.533E 00	-2.048E 00	-1.556E 00
19500	-6.369E 00	-5.870E 00	-5.372E 00	-4.877E 00	-4.387E 00	-3.907E 00	-3.438E 00	-2.974E 00	-2.510E 00	-2.032E 00	-1.542E 00
20000	-6.356E 00	-5.856E 00	-5.360E 00	-4.863E 00	-4.371E 00	-3.886E 00	-3.413E 00	-2.949E 00	-2.486E 00	-2.014E 00	-1.528E 00
22000	-6.290E 00	-5.806E 00	-5.314E 00	-4.817E 00	-4.319E 00	-3.824E 00	-3.335E 00	-2.856E 00	-2.388E 00	-1.928E 00	-1.461E 00
24000	-6.200E 00	-5.727E 00	-5.253E 00	-4.769E 00	-4.270E 00	-3.780E 00	-3.284E 00	-2.793E 00	-2.311E 00	-1.841E 00	-1.380E 00
26000	-6.134E 00	-5.650E 00	-5.173E 00	-4.702E 00	-4.223E 00	-3.738E 00	-3.244E 00	-2.746E 00	-2.256E 00	-1.773E 00	-1.303E 00
28000	-6.091E 00	-5.596E 00	-5.108E 00	-4.629E 00	-4.157E 00	-3.684E 00	-3.201E 00	-2.712E 00	-2.216E 00	-1.725E 00	-1.243E 00
30000	-6.056E 00	-5.559E 00	-5.064E 00	-4.574E 00	-4.092E 00	-3.619E 00	-3.147E 00	-2.668E 00	-2.179E 00	-1.687E 00	-1.197E 00
32000	-6.018E 00	-5.524E 00	-5.030E 00	-4.534E 00	-4.043E 00	-3.561E 00	-3.087E 00	-2.612E 00	-2.122E 00	-1.631E 00	-1.140E 00
34000	-5.985E 00	-5.485E 00	-4.997E 00	-4.503E 00	-4.008E 00	-3.516E 00	-3.034E 00	-2.561E 00	-2.090E 00	-1.613E 00	-1.126E 00
36000	-5.911E 00	-5.433E 00	-4.935E 00	-4.469E 00	-3.977E 00	-3.483E 00	-2.993E 00	-2.511E 00	-2.035E 00	-1.569E 00	-1.091E 00
38000	-5.869E 00	-5.384E 00	-4.905E 00	-4.428E 00	-3.944E 00	-3.453E 00	-2.960E 00	-2.472E 00	-1.992E 00	-1.522E 00	-1.051E 00
40000	-5.838E 00	-5.344E 00	-4.860E 00	-4.391E 00	-3.904E 00	-3.421E 00	-2.931E 00	-2.440E 00	-1.953E 00	-1.477E 00	-1.008E 00
42000	-5.807E 00	-5.314E 00	-4.825E 00	-4.353E 00	-3.861E 00	-3.384E 00	-2.901E 00	-2.412E 00	-1.922E 00	-1.439E 00	-0.961E-01
44000	-5.772E 00	-5.286E 00	-4.796E 00	-4.303E 00	-3.821E 00	-3.344E 00	-2.867E 00	-2.383E 00	-1.894E 00	-1.407E 00	-0.928E-01
46000	-5.735E 00	-5.253E 00	-4.767E 00	-4.277E 00	-3.788E 00	-3.306E 00	-2.829E 00	-2.352E 00	-1.867E 00	-1.379E 00	-0.895E-01
48000	-5.701E 00	-5.217E 00	-4.736E 00	-4.250E 00	-3.760E 00	-3.273E 00	-2.793E 00	-2.317E 00	-1.838E 00	-1.353E 00	-0.871E-01
50000	-5.673E 00	-5.189E 00	-4.702E 00	-4.220E 00	-3.734E 00	-3.246E 00	-2.761E 00	-2.283E 00	-1.807E 00	-1.327E 00	-0.844E-01
60000	-5.578E 00	-5.080E 00	-4.583E 00	-4.088E 00	-3.598E 00	-3.114E 00	-2.634E 00	-2.153E 00	-1.667E 00	-1.186E 00	-0.710E-01
70000	-5.499E 00	-5.001E 00	-4.505E 00	-4.009E 00	-3.513E 00	-3.017E 00	-2.524E 00	-2.037E 00	-1.557E 00	-1.078E 00	-0.5976E-01
80000	-5.440E 00	-4.940E 00	-4.441E 00	-3.942E 00	-3.445E 00	-2.949E 00	-2.454E 00	-1.959E 00	-1.467E 00	-0.9813E-01	-5.027E-01

90000	-5.309E 00	-4.809E 00	-4.309E 00	-3.809E 00	-3.309E 00	-2.809E 00	-2.309E 00	-1.809E 00	-1.404E 00	-9.105E-01	-4.221E-01
100000	-5.343E 00	-4.843E 00	-4.343E 00	-3.843E 00	-3.343E 00	-2.844E 00	-2.344E 00	-1.844E 00	-1.350E 00	-8.555E-01	-3.627E-01
110000	-5.167E 00	-4.667E 00	-4.167E 00	-3.667E 00	-3.167E 00	-2.667E 00	-2.167E 00	-1.667E 00	-1.167E 00	-6.478E-01	-1.605E-01
120000	-5.040E 00	-4.540E 00	-4.042E 00	-3.542E 00	-3.042E 00	-2.542E 00	-2.042E 00	-1.542E 00	-1.042E 00	-5.426E-01	-4.288E-02
130000	-4.703E 00	-4.277E 00	-3.792E 00	-3.304E 00	-2.812E 00	-2.318E 00	-1.827E 00	-1.340E 00	-8.533E-01	-3.411E-01	1.356E-01
140000	-4.619E 00	-4.121E 00	-3.623E 00	-3.127E 00	-2.630E 00	-2.133E 00	-1.639E 00	-1.15CE 00	-6.641E-01	-1.801E-01	3.098E-01
150000	-4.522E 00	-4.022E 00	-3.522E 00	-3.022E 00	-2.522E 00	-2.023E 00	-1.524E 00	-1.028E 00	-5.317E-01	-3.641E-02	4.558E-01
160000	-4.443E 00	-3.943E 00	-3.443E 00	-2.943E 00	-2.443E 00	-1.943E 00	-1.443E 00	-9.429E-01	-4.435E-01	5.486E-02	5.516E-01
170000	-4.318E 00	-3.818E 00	-3.318E 00	-2.818E 00	-2.318E 00	-1.818E 00	-1.318E 00	-8.177E-01	-3.177E-01	1.822E-01	6.821E-01
180000	-4.221E 00	-3.721E 00	-3.221E 00	-2.721E 00	-2.221E 00	-1.721E 00	-1.221E 00	-7.208E-01	-2.208E-01	2.792E-01	7.792E-01
190000	-4.049E 00	-3.549E 00	-3.049E 00	-2.549E 00	-2.049E 00	-1.549E 00	-1.049E 00	-5.444E-01	-4.444E-02	4.533E-01	9.533E-01
200000	-3.919E 00	-3.419E 00	-2.919E 00	-2.419E 00	-1.919E 00	-1.419E 00	-9.195E-01	-4.196E-01	8.035E-02	5.803E-01	1.88CE 00
210000	-3.749E 00	-3.249E 00	-2.749E 00	-2.249E 00	-1.749E 00	-1.249E 00	-7.431E-01	-2.431E-01	2.549E-01	7.549E-01	1.257E 00
220000	-3.618E 00	-3.118E 00	-2.618E 00	-2.118E 00	-1.618E 00	-1.118E 00	-6.182E-01	-1.182E-01	3.818E-01	8.818E-01	1.362E 00
230000	-3.521E 00	-3.021E 00	-2.521E 00	-2.021E 00	-1.521E 00	-1.021E 00	-5.213E-01	-2.127E-02	4.787E-01	9.787E-01	1.479E 00
240000	-3.442E 00	-2.942E 00	-2.442E 00	-1.942E 00	-1.442E 00	-9.421E-01	-4.421E-01	5.791E-02	5.379E-01	1.058E 00	1.958E 00
250000	-3.317E 00	-2.817E 00	-2.317E 00	-1.817E 00	-1.317E 00	-8.171E-01	-3.171E-01	1.829E-01	4.829E-01	1.181E 00	1.683E 00
260000	-3.220E 00	-2.720E 00	-2.220E 00	-1.720E 00	-1.220E 00	-7.202E-01	-2.202E-01	2.798E-01	7.798E-01	1.280E 00	1.780E 00

TABLE 104(CONT): LOG OF PRESSURE (ATM) OF EQUILIBRIUM AIR

TEMP. (DEG K)	-3.5	-3.0	-2.5	LOG DENSITY RATIO	-1.5	-1.0	-0.5	0.0	0.5	1.0
1000	-1.570E 00	-1.102E 00	-6.169E-01	-1.264E-01	3.663E-01	0.571E-01	1.340E 00	1.808E 00	2.267E 00	2.725E 00
1050	-1.532E 00	-1.064E 00	-5.952E-01	-9.843E-02	3.924E-01	0.841E-01	1.371E 00	1.847E 00	2.309E 00	2.766E 00
1100	-1.492E 00	-1.025E 00	-5.517E-01	-7.007E-02	4.181E-01	9.093E-01	1.399E 00	1.880E 00	2.347E 00	2.805E 00
1150	-1.432E 00	-9.800E-01	-5.140E-01	-4.033E-02	4.441E-01	9.335E-01	1.424E 00	1.909E 00	2.381E 00	2.842E 00
1200	-1.363E 00	-9.333E-01	-4.785E-01	-9.232E-03	4.706E-01	9.574E-01	1.447E 00	1.934E 00	2.412E 00	2.876E 00
1250	-1.337E 00	-8.906E-01	-4.395E-01	2.323E-02	4.978E-01	9.813E-01	1.470E 00	1.958E 00	2.439E 00	2.908E 00
1300	-1.295E 00	-8.473E-01	-3.999E-01	5.687E-02	5.260E-01	1.006E-01	1.492E 00	1.980E 00	2.464E 00	2.936E 00
1350	-1.240E 00	-8.048E-01	-3.604E-01	9.132E-02	5.549E-01	1.030E 00	1.514E 00	2.001E 00	2.487E 00	2.963E 00
1400	-1.229E 00	-7.698E-01	-3.223E-01	1.261E-01	5.846E-01	1.055E 00	1.536E 00	2.022E 00	2.508E 00	2.987E 00
1450	-1.203E 00	-7.368E-01	-2.861E-01	1.607E-01	6.147E-01	1.081E 00	1.558E 00	2.042E 00	2.528E 00	3.009E 00
1500	-1.161E 00	-7.079E-01	-2.523E-01	1.945E-01	6.451E-01	1.107E 00	1.580E 00	2.062E 00	2.547E 00	3.030E 00
1550	-1.116E 00	-6.826E-01	-2.215E-01	2.279E-01	6.753E-01	1.133E 00	1.602E 00	2.081E 00	2.566E 00	3.049E 00
1600	-1.144E 00	-6.605E-01	-1.937E-01	2.578E-01	7.051E-01	1.159E 00	1.625E 00	2.101E 00	2.584E 00	3.068E 00
1650	-1.128E 00	-6.408E-01	-1.687E-01	2.868E-01	7.341E-01	1.185E 00	1.647E 00	2.121E 00	2.602E 00	3.085E 00
1700	-1.113E 00	-6.232E-01	-1.444E-01	3.135E-01	7.621E-01	1.211E 00	1.670E 00	2.140E 00	2.620E 00	3.103E 00
1750	-1.095E 00	-6.072E-01	-1.263E-01	3.381E-01	7.888E-01	1.237E 00	1.693E 00	2.160E 00	2.637E 00	3.119E 00
1800	-1.085E 00	-5.923E-01	-1.082E-01	3.604E-01	8.141E-01	1.262E 00	1.715E 00	2.180E 00	2.655E 00	3.135E 00
1850	-1.072E 00	-5.784E-01	-9.170E-02	3.812E-01	8.379E-01	1.286E 00	1.738E 00	2.199E 00	2.672E 00	3.151E 00
1900	-1.060E 00	-5.653E-01	-7.648E-02	4.000E-01	8.602E-01	1.310E 00	1.760E 00	2.219E 00	2.689E 00	3.167E 00
1950	-1.048E 00	-5.524E-01	-6.229E-02	4.173E-01	8.810E-01	1.332E 00	1.781E 00	2.238E 00	2.706E 00	3.182E 00
2000	-1.035E 00	-5.404E-01	-4.895E-02	4.335E-01	9.003E-01	1.353E 00	1.802E 00	2.257E 00	2.723E 00	3.197E 00
2200	-9.821E-01	-4.930E-01	-9.161E-04	4.875E-01	9.656E-01	1.429E 00	1.880E 00	2.331E 00	2.789E 00	3.254E 00
2400	-9.167E-01	-4.415E-01	4.418E-02	5.330E-01	1.017E 00	1.469E 00	1.947E 00	2.398E 00	2.851E 00	3.311E 00
2600	-8.427E-01	-3.805E-01	9.273E-02	5.759E-01	1.061E 00	1.538E 00	2.003E 00	2.457E 00	2.908E 00	3.363E 00
2800	-7.738E-01	-3.141E-01	1.480E-01	6.208E-01	1.102E 00	1.581E 00	2.051E 00	2.510E 00	2.960E 00	3.411E 00
3000	-7.176E-01	-2.515E-01	2.073E-01	6.702E-01	1.143E 00	1.621E 00	2.094E 00	2.556E 00	3.004E 00	3.454E 00
3200	-6.736E-01	-1.982E-01	2.645E-01	7.228E-01	1.187E 00	1.659E 00	2.132E 00	2.597E 00	3.049E 00	3.497E 00
3400	-6.376E-01	-1.549E-01	3.152E-01	7.744E-01	1.233E 00	1.699E 00	2.169E 00	2.635E 00	3.088E 00	3.536E 00
3600	-6.049E-01	-1.190E-01	3.582E-01	8.224E-01	1.279E 00	1.739E 00	2.205E 00	2.671E 00	3.124E 00	3.572E 00
3800	-5.719E-01	-8.701E-02	3.946E-01	8.648E-01	1.324E 00	1.780E 00	2.241E 00	2.705E 00	3.159E 00	3.605E 00
4000	-5.361E-01	-5.605E-02	4.265E-01	9.019E-01	1.365E 00	1.820E 00	2.278E 00	2.738E 00	3.191E 00	3.637E 00
4200	-4.977E-01	-2.391E-02	4.563E-01	9.343E-01	1.402E 00	1.859E 00	2.314E 00	2.771E 00	3.222E 00	3.668E 00
4400	-4.587E-01	1.022E-02	4.858E-01	9.639E-01	1.435E 00	1.895E 00	2.349E 00	2.803E 00	3.253E 00	3.697E 00
4600	-4.219E-01	4.555E-02	5.162E-01	9.920E-01	1.465E 00	1.928E 00	2.383E 00	2.835E 00	3.283E 00	3.726E 00
4800	-3.887E-01	8.044E-02	5.476E-01	1.020E 00	1.493E 00	1.958E 00	2.415E 00	2.864E 00	3.312E 00	3.753E 00
5000	-3.593E-01	1.133E-01	5.796E-01	1.049E 00	1.520E 00	1.987E 00	2.445E 00	2.896E 00	3.341E 00	3.780E 00
6000	-2.369E-01	4.409E-01	7.179E-01	1.187E 00	1.649E 00	2.111E 00	2.572E 00	3.027E 00	3.472E 00	3.907E 00
7000	-1.190E-01	3.537E-01	8.243E-01	1.296E 00	1.764E 00	2.225E 00	2.681E 00	3.135E 00	3.582E 00	4.017E 00
8000	-2.594E-02	4.512E-01	9.241E-01	1.392E 00	1.858E 00	2.322E 00	2.779E 00	3.231E 00	3.677E 00	4.113E 00

96CC00	9.842E-02	9.335E-01	1.008E 00	1.478E 00	1.944E 00	2.405E 00	2.843E 00	3.314E 00	3.762E 00	4.197E 00
10CC00	1.262E-01	6.073E-01	1.081E 00	1.552E 00	2.020E 00	2.481E 00	2.938E 00	3.391E 00	3.838E 00	4.273E 00
150C00	3.300E-01	8.267E-01	1.320E 00	1.808E 00	2.289E 00	2.761E 00	3.223E 00	3.677E 00	4.125E 00	4.562E 00
250C00	4.546E-01	9.555E-01	1.453E 00	1.949E 00	2.441E 00	2.926E 00	3.402E 00	3.867E 00	4.320E 00	4.761E 00
36CC00	6.341E-01	1.133E 00	1.632E 00	2.130E 00	2.627E 00	3.121E 00	3.611E 00	4.093E 00	4.564E 00	5.021E 00
480C00	7.989E-01	1.284E 00	1.771E 00	2.262E 00	2.756E 00	3.252E 00	3.745E 00	4.234E 00	4.715E 00	5.185E 00
50CC00	9.421E-01	1.425E 00	1.910E 00	2.397E 00	2.881E 00	3.364E 00	3.842E 00	4.314E 00	4.779E 00	5.242E 00
60CC00	1.047E 00	1.540E 00	2.024E 00	2.512E 00	2.994E 00	3.476E 00	3.957E 00	4.437E 00	4.918E 00	5.398E 00
80CC00	1.102E 00	1.681E 00	2.179E 00	2.675E 00	3.167E 00	3.655E 00	4.136E 00	4.613E 00	5.088E 00	5.568E 00
100CC00	1.279E 00	1.779E 00	2.370E 00	2.770E 00	3.276E 00	3.771E 00	4.262E 00	4.748E 00	5.226E 00	5.697E 00
130CC00	1.455E 00	1.955E 00	2.455E 00	2.955E 00	3.454E 00	3.953E 00	4.451E 00	4.948E 00	5.441E 00	5.928E 00
260CC00	1.580E 00	2.080E 00	2.580E 00	3.080E 00	3.580E 00	4.079E 00	4.578E 00	5.076E 00	5.573E 00	6.068E 00
300CC00	1.757E 00	2.257E 00	2.757E 00	3.256E 00	3.754E 00	4.254E 00	4.753E 00	5.254E 00	5.752E 00	6.249E 00
400CC00	1.882E 00	2.382E 00	2.882E 00	3.382E 00	3.882E 00	4.381E 00	4.881E 00	5.380E 00	5.879E 00	6.377E 00
500CC00	1.979E 00	2.479E 00	2.979E 00	3.479E 00	3.979E 00	4.478E 00	4.978E 00	5.478E 00	5.977E 00	6.475E 00
6000000	2.058E 00	2.558E 00	3.058E 00	3.558E 00	4.058E 00	4.558E 00	5.057E 00	5.557E 00	6.056E 00	6.555E 00
8000000	2.183E 00	2.683E 00	3.183E 00	3.683E 00	4.183E 00	4.683E 00	5.183E 00	5.682E 00	6.182E 00	6.681E 00
10000000	2.280E 00	2.780E 00	3.280E 00	3.780E 00	4.280E 00	4.780E 00	5.280E 00	5.779E 00	6.279E 00	6.779E 00

TABLE 105. DIMENSIONLESS INTERNAL ENERGY, E/RT, OF EQUILIBRIUM AIR

TEMP. (DEG K)	-9.0	-8.5	-8.0	-7.5	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0
10000	4.954E 01	4.952E 01	4.949E 01	4.939E 01	4.908E 01	4.818E 01	4.583E 01	4.109E 01	3.444E 01	2.781E 01	2.262E 01
10500	4.752E 01	4.750E 01	4.749E 01	4.744E 01	4.731E 01	4.692E 01	4.580E 01	4.303E 01	3.792E 01	3.139E 01	2.534E 01
11000	4.574E 01	4.569E 01	4.566E 01	4.543E 01	4.557E 01	4.539E 01	4.486E 01	4.209E 01	4.003E 01	3.453E 01	2.827E 01
11500	4.436E 01	4.409E 01	4.401E 01	4.397E 01	4.393E 01	4.385E 01	4.358E 01	4.282E 01	4.083E 01	3.678E 01	3.102E 01
12000	4.372E 01	4.286E 01	4.256E 01	4.247E 01	4.242E 01	4.237E 01	4.223E 01	4.183E 01	4.069E 01	3.799E 01	3.327E 01
12500	4.466E 01	4.230E 01	4.144E 01	4.114E 01	4.104E 01	4.099E 01	4.091E 01	4.069E 01	4.004E 01	3.834E 01	3.481E 01
13000	4.818E 01	4.308E 01	4.090E 01	4.010E 01	3.982E 01	3.972E 01	3.945E 01	3.952E 01	3.914E 01	3.810E 01	3.562E 01
13500	5.431E 01	4.599E 01	4.143E 01	3.952E 01	3.882E 01	3.859E 01	3.844E 01	3.839E 01	3.816E 01	3.752E 01	3.585E 01
14000	6.131E 01	5.108E 01	4.363E 01	3.977E 01	3.819E 01	3.743E 01	3.743E 01	3.732E 01	3.717E 01	3.676E 01	3.566E 01
14500	6.711E 01	5.724E 01	4.769E 01	4.128E 01	3.816E 01	3.696E 01	3.651E 01	3.634E 01	3.621E 01	3.594E 01	3.520E 01
15000	7.103E 01	6.283E 01	5.293E 01	4.431E 01	3.904E 01	3.648E 01	3.578E 01	3.546E 01	3.530E 01	3.510E 01	3.460E 01
15500	7.356E 01	6.595E 01	5.818E 01	4.356E 01	4.113E 01	3.708E 01	3.534E 01	3.471E 01	3.447E 01	3.428E 01	3.393E 01
16000	7.502E 01	6.974E 01	6.246E 01	5.326E 01	4.435E 01	3.831E 01	3.533E 01	3.416E 01	3.373E 01	3.351E 01	3.324E 01
16500	7.539E 01	7.151E 01	6.557E 01	5.755E 01	4.828E 01	4.052E 01	3.593E 01	3.389E 01	3.311E 01	3.280E 01	3.255E 01
17000	7.484E 01	7.231E 01	6.768E 01	6.096E 01	5.230E 01	4.353E 01	3.725E 01	3.400E 01	3.268E 01	3.217E 01	3.190E 01
17500	7.374E 01	7.222E 01	6.892E 01	6.345E 01	5.586E 01	4.697E 01	3.930E 01	3.462E 01	3.248E 01	3.165E 01	3.129E 01
18000	7.239E 01	7.148E 01	6.934E 01	6.513E 01	5.871E 01	5.040E 01	4.194E 01	3.591E 01	3.260E 01	3.127E 01	3.074E 01
18500	7.099E 01	7.039E 01	6.906E 01	6.606E 01	6.083E 01	5.344E 01	4.488E 01	3.758E 01	3.312E 01	3.109E 01	3.028E 01
19000	6.967E 01	6.917E 01	6.831E 01	6.631E 01	6.227E 01	5.594E 01	4.781E 01	3.977E 01	3.408E 01	3.115E 01	2.993E 01
19500	6.852E 01	6.793E 01	6.731E 01	6.608E 01	6.304E 01	5.784E 01	5.048E 01	4.223E 01	3.547E 01	3.150E 01	2.973E 01
20000	6.769E 01	6.680E 01	6.623E 01	6.533E 01	6.329E 01	5.917E 01	5.275E 01	4.474E 01	3.722E 01	3.219E 01	2.970E 01
22000	7.199E 01	6.968E 01	6.788E 01	6.173E 01	6.099E 01	5.980E 01	5.719E 01	5.230E 01	4.533E 01	3.778E 01	3.187E 01
24000	8.721E 01	7.625E 01	6.658E 01	6.089E 01	5.837E 01	5.723E 01	5.622E 01	5.429E 01	5.040E 01	4.427E 01	3.712E 01
26000	9.450E 01	8.789E 01	7.852E 01	6.811E 01	6.016E 01	5.598E 01	5.414E 01	5.259E 01	5.127E 01	4.784E 01	4.223E 01
28000	9.354E 01	9.110E 01	8.620E 01	7.835E 01	6.848E 01	5.955E 01	5.409E 01	5.133E 01	5.011E 01	4.835E 01	4.501E 01
30000	9.035E 01	8.899E 01	8.712E 01	8.330E 01	7.658E 01	6.743E 01	5.835E 01	5.223E 01	4.917E 01	4.748E 01	4.533E 01
32000	9.117E 01	8.693E 01	8.497E 01	8.310E 01	7.988E 01	7.384E 01	6.525E 01	5.633E 01	5.015E 01	4.689E 01	4.499E 01
34000	1.008E 02	9.010E 01	8.617E 01	8.143E 01	7.944E 01	7.430E 01	7.053E 01	6.227E 01	5.378E 01	4.781E 01	4.461E 01
36000	1.119E 02	9.998E 01	8.870E 01	8.163E 01	7.820E 01	7.595E 01	7.266E 01	6.684E 01	5.873E 01	5.073E 01	4.529E 01
38000	1.168E 02	1.086E 02	9.775E 01	8.653E 01	7.898E 01	7.513E 01	7.257E 01	6.895E 01	6.284E 01	5.481E 01	4.746E 01
40000	1.172E 02	1.124E 02	1.050E 02	9.440E 01	8.358E 01	7.608E 01	7.207E 01	6.921E 01	6.310E 01	5.854E 01	5.089E 01
42000	1.179E 02	1.126E 02	1.080E 02	1.008E 02	9.039E 01	8.006E 01	7.289E 01	6.897E 01	6.099E 01	5.099E 01	4.546E 01
44000	1.227E 02	1.139E 02	1.085E 02	1.034E 02	9.588E 01	8.579E 01	7.601E 01	6.954E 01	6.579E 01	6.211E 01	5.454E 01
46000	1.299E 02	1.181E 02	1.096E 02	1.042E 02	9.871E 01	9.080E 01	8.079E 01	7.183E 01	6.817E 01	6.244E 01	5.812E 01
48000	1.350E 02	1.246E 02	1.134E 02	1.052E 02	9.972E 01	9.379E 01	8.338E 01	7.559E 01	6.746E 01	6.276E 01	5.887E 01
50000	1.371E 02	1.293E 02	1.188E 02	1.081E 02	1.006E 02	9.512E 01	8.556E 01	7.967E 01	7.040E 01	6.365E 01	5.927E 01
60000	1.274E 02	1.259E 02	1.238E 02	1.208E 02	1.067E 02	1.067E 02	1.067E 02	1.067E 02	1.067E 02	1.067E 02	1.067E 02
70000	1.194E 02	1.181E 02	1.134E 02	1.127E 02	1.104E 02	1.083E 02	1.047E 02	9.844E 01	8.912E 01	8.105E 01	7.409E 01
80000	1.074E 02	1.074E 02	1.071E 02	1.065E 02	1.049E 02	1.023E 02	9.973E 01	9.736E 01	9.392E 01	8.794E 01	7.976E 01

100000	8.9708 01	8.9702 01	8.9696 01	8.9690 01	8.9684 01	8.9678 01	8.9672 01	8.9666 01	8.9660 01	8.9654 01	8.9648 01	8.9642 01	8.9636 01	8.9630 01	8.9624 01	8.9618 01	8.9612 01	8.9606 01	8.9600 01	8.9594 01	8.9588 01	8.9582 01	8.9576 01	8.9570 01	8.9564 01	8.9558 01	8.9552 01	8.9546 01	8.9540 01	8.9534 01	8.9528 01	8.9522 01	8.9516 01	8.9510 01	8.9504 01	8.9498 01	8.9492 01	8.9486 01	8.9480 01	8.9474 01	8.9468 01	8.9462 01	8.9456 01	8.9450 01	8.9444 01	8.9438 01	8.9432 01	8.9426 01	8.9420 01	8.9414 01	8.9408 01	8.9402 01	8.9396 01	8.9390 01	8.9384 01	8.9378 01	8.9372 01	8.9366 01	8.9360 01	8.9354 01	8.9348 01	8.9342 01	8.9336 01	8.9330 01	8.9324 01	8.9318 01	8.9312 01	8.9306 01	8.9300 01	8.9294 01	8.9288 01	8.9282 01	8.9276 01	8.9270 01	8.9264 01	8.9258 01	8.9252 01	8.9246 01	8.9240 01	8.9234 01	8.9228 01	8.9222 01	8.9216 01	8.9210 01	8.9204 01	8.9198 01	8.9192 01	8.9186 01	8.9180 01	8.9174 01	8.9168 01	8.9162 01	8.9156 01	8.9150 01	8.9144 01	8.9138 01	8.9132 01	8.9126 01	8.9120 01	8.9114 01	8.9108 01	8.9102 01	8.9096 01	8.9090 01	8.9084 01	8.9078 01	8.9072 01	8.9066 01	8.9060 01	8.9054 01	8.9048 01	8.9042 01	8.9036 01	8.9030 01	8.9024 01	8.9018 01	8.9012 01	8.9006 01	8.9000 01	8.8994 01	8.8988 01	8.8982 01	8.8976 01	8.8970 01	8.8964 01	8.8958 01	8.8952 01	8.8946 01	8.8940 01	8.8934 01	8.8928 01	8.8922 01	8.8916 01	8.8910 01	8.8904 01	8.8898 01	8.8892 01	8.8886 01	8.8880 01	8.8874 01	8.8868 01	8.8862 01	8.8856 01	8.8850 01	8.8844 01	8.8838 01	8.8832 01	8.8826 01	8.8820 01	8.8814 01	8.8808 01	8.8802 01	8.8796 01	8.8790 01	8.8784 01	8.8778 01	8.8772 01	8.8766 01	8.8760 01	8.8754 01	8.8748 01	8.8742 01	8.8736 01	8.8730 01	8.8724 01	8.8718 01	8.8712 01	8.8706 01	8.8700 01	8.8694 01	8.8688 01	8.8682 01	8.8676 01	8.8670 01	8.8664 01	8.8658 01	8.8652 01	8.8646 01	8.8640 01	8.8634 01	8.8628 01	8.8622 01	8.8616 01	8.8610 01	8.8604 01	8.8598 01	8.8592 01	8.8586 01	8.8580 01	8.8574 01	8.8568 01	8.8562 01	8.8556 01	8.8550 01	8.8544 01	8.8538 01	8.8532 01	8.8526 01	8.8520 01	8.8514 01	8.8508 01	8.8502 01	8.8496 01	8.8490 01	8.8484 01	8.8478 01	8.8472 01	8.8466 01	8.8460 01	8.8454 01	8.8448 01	8.8442 01	8.8436 01	8.8430 01	8.8424 01	8.8418 01	8.8412 01	8.8406 01	8.8400 01	8.8394 01	8.8388 01	8.8382 01	8.8376 01	8.8370 01	8.8364 01	8.8358 01	8.8352 01	8.8346 01	8.8340 01	8.8334 01	8.8328 01	8.8322 01	8.8316 01	8.8310 01	8.8304 01	8.8298 01	8.8292 01	8.8286 01	8.8280 01	8.8274 01	8.8268 01	8.8262 01	8.8256 01	8.8250 01	8.8244 01	8.8238 01	8.8232 01	8.8226 01	8.8220 01	8.8214 01	8.8208 01	8.8202 01	8.8196 01	8.8190 01	8.8184 01	8.8178 01	8.8172 01	8.8166 01	8.8160 01	8.8154 01	8.8148 01	8.8142 01	8.8136 01	8.8130 01	8.8124 01	8.8118 01	8.8112 01	8.8106 01	8.8100 01	8.8094 01	8.8088 01	8.8082 01	8.8076 01	8.8070 01	8.8064 01	8.8058 01	8.8052 01	8.8046 01	8.8040 01	8.8034 01	8.8028 01	8.8022 01	8.8016 01	8.8010 01	8.8004 01	8.7998 01	8.7992 01	8.7986 01	8.7980 01	8.7974 01	8.7968 01	

TABLE 105 (CONT.) DIMENSIONLESS INTERNAL ENERGY, E/RT, OF EQUILIBRIUM AIR

TEMP. (DEG K)	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0
1000	1.911E 01	1.692E 01	1.561E 01	1.481E 01	1.426E 01	1.368E 01	1.273E 01	1.119E 01	9.333E 00	7.653E 00
1050	2.082E 01	1.783E 01	1.599E 01	1.488E 01	1.418E 01	1.362E 01	1.290E 01	1.168E 01	9.978E 00	8.345E 00
1100	2.290E 01	1.908E 01	1.681E 01	1.510E 01	1.418E 01	1.356E 01	1.294E 01	1.198E 01	1.051E 01	8.787E 00
1150	2.521E 01	2.061E 01	1.747E 01	1.550E 01	1.430E 01	1.353E 01	1.292E 01	1.215E 01	1.091E 01	9.289E 00
1200	2.752E 01	2.235E 01	1.856E 01	1.607E 01	1.452E 01	1.357E 01	1.290E 01	1.222E 01	1.119E 01	9.721E 00
1250	2.960E 01	2.419E 01	1.982E 01	1.679E 01	1.487E 01	1.368E 01	1.290E 01	1.224E 01	1.137E 01	1.007E 01
1300	3.128E 01	2.598E 01	2.120E 01	1.763E 01	1.532E 01	1.386E 01	1.294E 01	1.235E 01	1.148E 01	1.035E 01
1350	3.266E 01	2.760E 01	2.262E 01	1.864E 01	1.589E 01	1.413E 01	1.303E 01	1.227E 01	1.155E 01	1.055E 01
1400	3.314E 01	2.893E 01	2.401E 01	1.969E 01	1.653E 01	1.447E 01	1.317E 01	1.231E 01	1.159E 01	1.070E 01
1450	3.339E 01	2.992E 01	2.529E 01	2.078E 01	1.720E 01	1.489E 01	1.336E 01	1.238E 01	1.163E 01	1.062E 01
1500	3.331E 01	3.057E 01	2.638E 01	2.185E 01	1.808E 01	1.536E 01	1.360E 01	1.248E 01	1.168E 01	1.090E 01
1550	3.301E 01	3.090E 01	2.726E 01	2.285E 01	1.887E 01	1.589E 01	1.389E 01	1.261E 01	1.174E 01	1.097E 01
1600	3.257E 01	3.097E 01	2.791E 01	2.376E 01	1.968E 01	1.645E 01	1.423E 01	1.278E 01	1.181E 01	1.104E 01
1650	3.206E 01	3.085E 01	2.833E 01	2.454E 01	2.046E 01	1.704E 01	1.459E 01	1.297E 01	1.191E 01	1.110E 01
1700	3.151E 01	3.058E 01	2.855E 01	2.517E 01	2.119E 01	1.764E 01	1.499E 01	1.320E 01	1.202E 01	1.110E 01
1750	3.095E 01	3.023E 01	2.860E 01	2.565E 01	2.185E 01	1.823E 01	1.540E 01	1.345E 01	1.216E 01	1.126E 01
1800	3.040E 01	2.982E 01	2.852E 01	2.599E 01	2.244E 01	1.879E 01	1.583E 01	1.372E 01	1.231E 01	1.135E 01
1850	2.988E 01	2.939E 01	2.833E 01	2.615E 01	2.293E 01	1.931E 01	1.626E 01	1.401E 01	1.248E 01	1.145E 01
1900	2.940E 01	2.895E 01	2.808E 01	2.628E 01	2.332E 01	1.983E 01	1.668E 01	1.430E 01	1.267E 01	1.157E 01
1950	2.899E 01	2.852E 01	2.779E 01	2.626E 01	2.362E 01	2.027E 01	1.709E 01	1.460E 01	1.286E 01	1.171E 01
2000	2.865E 01	2.811E 01	2.746E 01	2.610E 01	2.383E 01	2.066E 01	1.749E 01	1.491E 01	1.307E 01	1.185E 01
2050	2.831E 01	2.788E 01	2.720E 01	2.599E 01	2.398E 01	2.105E 01	1.808E 01	1.604E 01	1.392E 01	1.250E 01
2100	2.806E 01	2.763E 01	2.695E 01	2.585E 01	2.415E 01	2.147E 01	1.854E 01	1.697E 01	1.474E 01	1.315E 01
2150	2.789E 01	2.746E 01	2.678E 01	2.568E 01	2.445E 01	2.185E 01	1.902E 01	1.757E 01	1.539E 01	1.372E 01
2200	2.771E 01	2.728E 01	2.660E 01	2.548E 01	2.425E 01	2.222E 01	1.981E 01	1.808E 01	1.584E 01	1.415E 01
2250	2.753E 01	2.710E 01	2.642E 01	2.530E 01	2.407E 01	2.244E 01	2.000E 01	1.801E 01	1.612E 01	1.445E 01
2300	2.735E 01	2.692E 01	2.624E 01	2.512E 01	2.389E 01	2.266E 01	2.040E 01	1.805E 01	1.620E 01	1.465E 01
2350	2.717E 01	2.674E 01	2.606E 01	2.494E 01	2.371E 01	2.288E 01	2.070E 01	1.810E 01	1.630E 01	1.485E 01
2400	2.700E 01	2.657E 01	2.589E 01	2.476E 01	2.353E 01	2.315E 01	2.092E 01	1.823E 01	1.647E 01	1.487E 01
2450	2.682E 01	2.640E 01	2.571E 01	2.458E 01	2.335E 01	2.336E 01	2.075E 01	1.849E 01	1.660E 01	1.497E 01
2500	2.665E 01	2.623E 01	2.554E 01	2.441E 01	2.318E 01	2.358E 01	2.156E 01	1.885E 01	1.680E 01	1.508E 01
2550	2.647E 01	2.605E 01	2.536E 01	2.423E 01	2.299E 01	2.389E 01	2.248E 01	1.942E 01	1.708E 01	1.523E 01
2600	2.630E 01	2.588E 01	2.519E 01	2.406E 01	2.281E 01	2.419E 01	2.342E 01	2.005E 01	1.743E 01	1.543E 01
2650	2.612E 01	2.570E 01	2.501E 01	2.388E 01	2.263E 01	2.449E 01	2.430E 01	2.072E 01	1.785E 01	1.567E 01
2700	2.595E 01	2.553E 01	2.484E 01	2.375E 01	2.245E 01	2.479E 01	2.507E 01	2.139E 01	1.831E 01	1.595E 01
2750	2.577E 01	2.535E 01	2.466E 01	2.357E 01	2.227E 01	2.509E 01	2.573E 01	2.204E 01	1.880E 01	1.626E 01
2800	2.560E 01	2.518E 01	2.448E 01	2.339E 01	2.209E 01	2.539E 01	2.797E 01	2.445E 01	2.104E 01	1.797E 01
2850	2.542E 01	2.500E 01	2.430E 01	2.321E 01	2.191E 01	2.569E 01	3.065E 01	2.641E 01	2.281E 01	1.956E 01
2900	2.525E 01	2.483E 01	2.411E 01	2.303E 01	2.173E 01	2.599E 01	3.354E 01	2.870E 01	2.460E 01	2.109E 01
2950	2.507E 01	2.465E 01	2.393E 01	2.285E 01	2.155E 01	2.629E 01				
3000	2.490E 01	2.447E 01	2.376E 01	2.267E 01	2.137E 01	2.659E 01				
3050	2.472E 01	2.429E 01	2.358E 01	2.249E 01	2.119E 01	2.689E 01				
3100	2.455E 01	2.411E 01	2.340E 01	2.231E 01	2.101E 01	2.719E 01				
3150	2.437E 01	2.393E 01	2.322E 01	2.213E 01	2.083E 01	2.749E 01				
3200	2.420E 01	2.375E 01	2.304E 01	2.195E 01	2.065E 01	2.779E 01				
3250	2.402E 01	2.357E 01	2.286E 01	2.177E 01	2.047E 01	2.809E 01				
3300	2.385E 01	2.339E 01	2.268E 01	2.159E 01	2.029E 01	2.839E 01				
3350	2.367E 01	2.321E 01	2.250E 01	2.141E 01	2.011E 01	2.869E 01				
3400	2.350E 01	2.303E 01	2.232E 01	2.123E 01	1.993E 01	2.899E 01				
3450	2.332E 01	2.285E 01	2.214E 01	2.105E 01	1.975E 01	2.929E 01				
3500	2.315E 01	2.267E 01	2.196E 01	2.087E 01	1.957E 01	2.959E 01				
3550	2.297E 01	2.249E 01	2.178E 01	2.069E 01	1.939E 01	2.989E 01				
3600	2.280E 01	2.231E 01	2.160E 01	2.051E 01	1.921E 01	3.019E 01				
3650	2.262E 01	2.213E 01	2.142E 01	2.033E 01	1.903E 01	3.049E 01				
3700	2.245E 01	2.195E 01	2.124E 01	2.015E 01	1.885E 01	3.079E 01				
3750	2.227E 01	2.177E 01	2.106E 01	1.997E 01	1.867E 01	3.109E 01				
3800	2.210E 01	2.159E 01	2.088E 01	1.979E 01	1.849E 01	3.139E 01				
3850	2.192E 01	2.141E 01	2.070E 01	1.961E 01	1.831E 01	3.169E 01				
3900	2.175E 01	2.123E 01	2.052E 01	1.943E 01	1.813E 01	3.199E 01				
3950	2.157E 01	2.105E 01	2.034E 01	1.925E 01	1.795E 01	3.229E 01				
4000	2.140E 01	2.087E 01	2.016E 01	1.907E 01	1.777E 01	3.259E 01				
4050	2.122E 01	2.069E 01	1.998E 01	1.889E 01	1.759E 01	3.289E 01				
4100	2.105E 01	2.051E 01	1.980E 01	1.871E 01	1.741E 01	3.319E 01				
4150	2.087E 01	2.033E 01	1.962E 01	1.853E 01	1.723E 01	3.349E 01				
4200	2.070E 01	2.015E 01	1.944E 01	1.835E 01	1.705E 01	3.379E 01				
4250	2.052E 01	1.997E 01	1.926E 01	1.817E 01	1.687E 01	3.409E 01				
4300	2.035E 01	1.979E 01	1.908E 01	1.799E 01	1.669E 01	3.439E 01				
4350	2.017E 01	1.961E 01	1.890E 01	1.781E 01	1.651E 01	3.469E 01				
4400	2.000E 01	1.943E 01	1.872E 01	1.763E 01	1.633E 01	3.499E 01				
4450	1.982E 01	1.925E 01	1.854E 01	1.745E 01	1.615E 01	3.529E 01				
4500	1.965E 01	1.907E 01	1.836E 01	1.727E 01	1.597E 01	3.559E 01				
4550	1.947E 01	1.889E 01	1.818E 01	1.709E 01	1.579E 01	3.589E 01				
4600	1.930E 01	1.871E 01	1.800E 01	1.691E 01	1.561E 01	3.619E 01				
4650	1.912E 01	1.853E 01	1.782E 01	1.673E 01	1.543E 01	3.649E 01				
4700	1.895E 01	1.835E 01	1.764E 01	1.655E 01	1.525E 01	3.679E 01				
4750	1.877E 01	1.817E 01	1.746E 01	1.637E 01	1.507E 01	3.709E 01				
4800	1.860E 01	1.799E 01	1.728E 01	1.619E 01	1.489E 01	3.739E 01				
4850	1.842E 01	1.781E 01	1.710E 01	1.601E 01	1.471E 01	3.769E 01				
4900	1.825E 01	1.763E 01	1.692E 01	1.583E 01	1.453E 01	3.799E 01				
4950	1.807E 01	1.745E 01	1.674E 01	1.565E 01	1.435E 01	3.829E 01				
5000	1.790E 01	1.727E 01	1.656E 01	1.547E 01	1.417E 01	3.859E 01				
5050	1.772E 01	1.709E 01	1.638E 01	1.529E 01	1.399E 01	3.889E 01				
5100	1.755E 01	1.691E 01	1.620E 01	1.511E 01	1.381E 01	3.919E 01				
5150	1.737E 01	1.673E 01	1.602E 01	1.493E 01	1.363E 01	3.949E 01				
5200	1.720E 01	1.655E 01	1.584E 01	1.475E 01	1.345E 01	3.979E 01				
5250	1.702E 01	1.637E 01	1.566E 01	1.457E 01	1.327E 01	4.009E 01				
5300	1.685E 01	1.619E 01	1.548E 01	1.439E 01	1.309E 01	4.039E 01				
5350	1.667E 01	1.601E 01	1.530E 01	1.421E 01	1.291E 01	4.069E 01				
5400	1.650E 01	1.583E 01	1.512E 01	1.403E 01	1.273E 01	4.099E 01				
5450	1.632E 01	1.565E 01	1.494E 01	1.385E 01	1.255E 01	4.129E 01				
5500	1.615E 01	1.547E 01	1.476E 01	1.367E 01	1.237E 01	4.159E 01				
5550	1.597E 01	1.529E 01	1.458E 01	1.349E 01	1.219E 01	4.189E 01				
5600	1.580E 01	1.511E 01	1.440E 01	1.33						

15CCCO	7.779E 01	7.779E 01	9.971E 01	9.754E 01	9.083E 01	4.416E 01	3.801E 01	3.204E 01	2.062E 01	2.394E 01
20CCCO	6.552E 01	6.481E 01	6.328E 01	6.071E 01	5.701E 01	5.192E 01	4.584E 01	3.972E 01	3.407E 01	2.912E 01
30CCCO	5.403E 01	5.391E 01	5.367E 01	5.314E 01	5.20CE 01	4.986E 01	4.649E 01	4.26CE 01	3.844E 01	3.172E 01
40CCCO	4.275E 01	4.241E 01	4.220E 01	4.199E 01	4.169E 01	4.115E 01	4.015E 01	3.839E 01	3.562E 01	3.113E 01
50CCCO	5.763E 01	4.988E 01	4.288E 01	3.882E 01	3.699E 01	3.607E 01	3.529E 01	3.429E 01	3.261E 01	3.016E 01
60CCCO	7.545E 01	6.541E 01	5.774E 01	5.130E 01	4.447E 01	3.833E 01	3.447E 01	3.279E 01	3.060E 01	2.862E 01
70CCCO	8.053E 01	7.675E 01	7.091E 01	6.254E 01	5.424E 01	4.742E 01	4.099E 01	3.521E 01	3.112E 01	2.827E 01
80CCCO	7.149E 01	7.114E 01	7.023E 01	6.83CE 01	6.513E 01	6.048E 01	5.388E 01	4.69CE 01	3.978E 01	3.374E 01
90CCCO	6.224E 01	6.221E 01	6.212E 01	6.189E 01	6.131E 01	5.992E 01	5.726E 01	5.304E 01	4.719E 01	4.052E 01
10CCCO	4.972E 01	4.971E 01	4.969E 01	4.966E 01	4.960E 01	4.947E 01	4.922E 01	4.866E 01	4.748E 01	4.517E 01
20CCCO	4.346E 01	4.345E 01	4.344E 01	4.342E 01	4.318E 01	4.332E 01	4.320E 01	4.297E 01	4.294E 01	4.17CE 01
30CCCO	3.749E 01	3.743E 01	3.736E 01	3.728E 01	3.721E 01	3.714E 01	3.706E 01	3.695E 01	3.675E 01	3.639E 01
40CCCO	3.431E 01	3.431E 01	3.430E 01	3.429E 01	3.426E 01	3.420E 01	3.411E 01	3.398E 01	3.381E 01	3.357E 01
50CCCO	3.239E 01	3.238E 01	3.238E 01	3.238E 01	3.237E 01	3.235E 01	3.231E 01	3.224E 01	3.211E 01	3.191E 01
60CCCO	3.110E 01	3.110E 01	3.110E 01	3.109E 01	3.109E 01	3.107E 01	3.105E 01	3.101E 01	3.093E 01	3.079E 01
70CCCO	2.949E 01	2.949E 01	2.949E 01	2.949E 01	2.949E 01	2.948E 01	2.946E 01	2.944E 01	2.940E 01	2.932E 01
80CCCO	2.853E 01	2.853E 01	2.853E 01	2.853E 01	2.852E 01	2.852E 01	2.851E 01	2.849E 01	2.846E 01	2.841E 01

TABLE 106. INTERNAL ENERGY (ERG/GM) OF EQUILIBRIUM AIR

TEMP. (DEG K)	-9.0	-8.5	-8.0	-7.5	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0
10000	1.422E 12	1.421E 12	1.421E 12	1.418E 12	1.439E 12	1.383E 12	1.315E 12	1.18CE 12	9.885F 11	7.981E 11	6.493E 11
10500	1.432E 12	1.432E 12	1.431E 12	1.430E 12	1.426E 12	1.414E 12	1.380E 12	1.297E 12	1.143E 12	9.441E 11	7.638E 11
11000	1.445E 12	1.442E 12	1.442E 12	1.441E 12	1.439E 12	1.433E 12	1.416E 12	1.370E 12	1.264E 12	1.090E 12	8.924E 11
11500	1.464E 12	1.455E 12	1.453E 12	1.451E 12	1.450E 12	1.447E 12	1.439E 12	1.413E 12	1.340E 12	1.214E 12	1.024E 12
12000	1.504E 12	1.476E 12	1.466E 12	1.463E 12	1.461E 12	1.459E 12	1.455E 12	1.441E 12	1.402E 12	1.309E 12	1.146E 12
12500	1.502E 12	1.518E 12	1.487E 12	1.476E 12	1.473E 12	1.471E 12	1.468E 12	1.460E 12	1.437E 12	1.376E 12	1.249E 12
13000	1.798E 12	1.608E 12	1.526E 12	1.496E 12	1.486E 12	1.482E 12	1.480E 12	1.475E 12	1.461E 12	1.422E 12	1.329E 12
13500	2.104E 12	1.782E 12	1.604E 12	1.531E 12	1.504E 12	1.495E 12	1.491E 12	1.488E 12	1.479E 12	1.454E 12	1.389E 12
14000	2.444E 12	2.053E 12	1.753E 12	1.598E 12	1.535E 12	1.512E 12	1.504E 12	1.500E 12	1.494E 12	1.477E 12	1.433E 12
14500	2.793E 12	2.382E 12	1.985E 12	1.718E 12	1.588E 12	1.537E 12	1.519E 12	1.512E 12	1.507E 12	1.496E 12	1.465E 12
15000	3.058E 12	2.705E 12	2.279E 12	1.908E 12	1.681E 12	1.579E 12	1.540E 12	1.527E 12	1.520E 12	1.511E 12	1.490E 12
15500	3.272E 12	2.979E 12	2.508E 12	2.161E 12	1.850E 12	1.649E 12	1.572E 12	1.544E 12	1.533E 12	1.525E 12	1.510E 12
16000	3.445E 12	3.203E 12	2.869E 12	2.446E 12	2.037E 12	1.759E 12	1.623E 12	1.569E 12	1.549E 12	1.539E 12	1.526E 12
16500	3.570E 12	3.387E 12	3.105E 12	2.725E 12	2.287E 12	1.919E 12	1.702E 12	1.605E 12	1.568E 12	1.553E 12	1.542E 12
17000	3.652E 12	3.528E 12	3.303E 12	2.974E 12	2.552E 12	2.124E 12	1.817E 12	1.659E 12	1.594E 12	1.570E 12	1.556E 12
17500	3.704E 12	3.627E 12	3.422E 12	3.187E 12	2.806E 12	2.359E 12	1.974E 12	1.739E 12	1.631E 12	1.590E 12	1.572E 12
18000	3.740E 12	3.693E 12	3.502E 12	3.365E 12	3.033E 12	2.604E 12	2.167E 12	1.950E 12	1.804E 12	1.746E 12	1.588E 12
18500	3.770E 12	3.738E 12	3.607E 12	3.508E 12	3.230E 12	2.838E 12	2.383E 12	1.995E 12	1.759E 12	1.651E 12	1.608E 12
19000	3.799E 12	3.772E 12	3.725E 12	3.616E 12	3.396E 12	3.051E 12	2.608E 12	2.169E 12	1.858E 12	1.699E 12	1.632E 12
19500	3.835E 12	3.802E 12	3.748E 12	3.694E 12	3.530E 12	3.237E 12	2.828E 12	2.364E 12	1.985E 12	1.763E 12	1.644E 12
20000	3.866E 12	3.835E 12	3.802E 12	3.750E 12	3.633E 12	3.397E 12	3.028E 12	2.588E 12	2.137E 12	1.848E 12	1.705E 12
20500	3.896E 12	3.866E 12	3.835E 12	3.788E 12	3.851E 12	3.776E 12	3.611E 12	3.303E 12	2.862E 12	2.384E 12	2.013E 12
21000	3.927E 12	3.897E 12	3.877E 12	3.840E 12	4.021E 12	3.943E 12	3.873E 12	3.740E 12	3.472E 12	3.050E 12	2.557E 12
21500	3.957E 12	3.927E 12	3.907E 12	3.877E 12	4.050E 12	3.978E 12	3.908E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
22000	3.987E 12	3.957E 12	3.937E 12	3.907E 12	4.080E 12	4.008E 12	3.938E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
22500	4.017E 12	3.987E 12	3.967E 12	3.937E 12	4.110E 12	4.038E 12	3.968E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
23000	4.047E 12	4.017E 12	4.000E 12	3.970E 12	4.140E 12	4.068E 12	3.998E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
23500	4.077E 12	4.047E 12	4.030E 12	4.000E 12	4.170E 12	4.098E 12	4.028E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
24000	4.107E 12	4.077E 12	4.060E 12	4.030E 12	4.200E 12	4.128E 12	4.058E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
24500	4.137E 12	4.107E 12	4.090E 12	4.060E 12	4.230E 12	4.158E 12	4.088E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
25000	4.167E 12	4.137E 12	4.120E 12	4.090E 12	4.260E 12	4.188E 12	4.118E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
25500	4.197E 12	4.167E 12	4.150E 12	4.120E 12	4.290E 12	4.218E 12	4.148E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
26000	4.227E 12	4.197E 12	4.180E 12	4.150E 12	4.320E 12	4.248E 12	4.178E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
26500	4.257E 12	4.227E 12	4.210E 12	4.180E 12	4.350E 12	4.278E 12	4.208E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
27000	4.287E 12	4.257E 12	4.240E 12	4.210E 12	4.380E 12	4.308E 12	4.238E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
27500	4.317E 12	4.287E 12	4.270E 12	4.240E 12	4.410E 12	4.338E 12	4.268E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
28000	4.347E 12	4.317E 12	4.300E 12	4.270E 12	4.440E 12	4.368E 12	4.298E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
28500	4.377E 12	4.347E 12	4.330E 12	4.300E 12	4.470E 12	4.398E 12	4.328E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
29000	4.407E 12	4.377E 12	4.360E 12	4.330E 12	4.500E 12	4.428E 12	4.358E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
29500	4.437E 12	4.407E 12	4.390E 12	4.360E 12	4.530E 12	4.458E 12	4.388E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
30000	4.467E 12	4.437E 12	4.420E 12	4.390E 12	4.560E 12	4.488E 12	4.418E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
30500	4.497E 12	4.467E 12	4.450E 12	4.420E 12	4.590E 12	4.518E 12	4.448E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
31000	4.527E 12	4.497E 12	4.480E 12	4.450E 12	4.620E 12	4.548E 12	4.478E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
31500	4.557E 12	4.527E 12	4.510E 12	4.480E 12	4.650E 12	4.578E 12	4.508E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
32000	4.587E 12	4.557E 12	4.540E 12	4.510E 12	4.680E 12	4.608E 12	4.538E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
32500	4.617E 12	4.587E 12	4.570E 12	4.540E 12	4.710E 12	4.638E 12	4.568E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
33000	4.647E 12	4.617E 12	4.600E 12	4.570E 12	4.740E 12	4.668E 12	4.598E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
33500	4.677E 12	4.647E 12	4.630E 12	4.600E 12	4.770E 12	4.698E 12	4.628E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
34000	4.707E 12	4.677E 12	4.660E 12	4.630E 12	4.800E 12	4.728E 12	4.658E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
34500	4.737E 12	4.707E 12	4.690E 12	4.660E 12	4.830E 12	4.758E 12	4.688E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
35000	4.767E 12	4.737E 12	4.720E 12	4.690E 12	4.860E 12	4.788E 12	4.718E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
35500	4.797E 12	4.767E 12	4.750E 12	4.720E 12	4.890E 12	4.818E 12	4.748E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
36000	4.827E 12	4.797E 12	4.780E 12	4.750E 12	4.920E 12	4.848E 12	4.778E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
36500	4.857E 12	4.827E 12	4.810E 12	4.780E 12	4.950E 12	4.878E 12	4.808E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
37000	4.887E 12	4.857E 12	4.840E 12	4.810E 12	4.980E 12	4.908E 12	4.838E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
37500	4.917E 12	4.887E 12	4.870E 12	4.840E 12	5.010E 12	4.938E 12	4.868E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
38000	4.947E 12	4.917E 12	4.900E 12	4.870E 12	5.040E 12	4.968E 12	4.898E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
38500	4.977E 12	4.947E 12	4.930E 12	4.900E 12	5.070E 12	4.998E 12	4.928E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
39000	5.007E 12	4.977E 12	4.960E 12	4.930E 12	5.100E 12	5.028E 12	4.958E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
39500	5.037E 12	5.007E 12	5.000E 12	4.970E 12	5.130E 12	5.058E 12	4.988E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
40000	5.067E 12	5.037E 12	5.020E 12	4.990E 12	5.160E 12	5.088E 12	5.018E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
40500	5.097E 12	5.067E 12	5.050E 12	5.020E 12	5.190E 12	5.118E 12	5.048E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
41000	5.127E 12	5.097E 12	5.080E 12	5.050E 12	5.220E 12	5.148E 12	5.078E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
41500	5.157E 12	5.127E 12	5.110E 12	5.080E 12	5.250E 12	5.178E 12	5.108E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
42000	5.187E 12	5.157E 12	5.140E 12	5.110E 12	5.280E 12	5.208E 12	5.138E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
42500	5.217E 12	5.187E 12	5.170E 12	5.140E 12	5.310E 12	5.238E 12	5.168E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
43000	5.247E 12	5.217E 12	5.200E 12	5.170E 12	5.340E 12	5.268E 12	5.198E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
43500	5.277E 12	5.247E 12	5.230E 12	5.200E 12	5.370E 12	5.298E 12	5.228E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
44000	5.307E 12	5.277E 12	5.260E 12	5.230E 12	5.400E 12	5.328E 12	5.258E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
44500	5.337E 12	5.307E 12	5.290E 12	5.260E 12	5.430E 12	5.358E 12	5.288E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
45000	5.367E 12	5.337E 12	5.320E 12	5.290E 12	5.460E 12	5.388E 12	5.318E 12	3.754E 12	3.472E 12	3.050E 12	2.557E 12
45500	5.397E 12	5.367E 12	5.350E 12	5.320E 12	5.490E 12	5.418E 12	5.348E 12	3.754E 12	3		

100000	2.575E 13	2.575E 13	2.574E 13	2.574E 13	2.573E 13	2.570E 13	2.562E 13	2.548E 13	2.527E 13	2.500E 13	2.466E 13	2.426E 13	2.381E 13
150000	2.842E 13	2.842E 13	2.841E 13	2.841E 13	2.841E 13	2.841E 13	2.841E 13	2.841E 13	2.840E 13	2.840E 13	2.838E 13	2.836E 13	2.834E 13
200000	3.244E 13	3.244E 13	3.243E 13	3.243E 13	3.243E 13	3.243E 13	3.243E 13	3.243E 13	3.242E 13	3.242E 13	3.240E 13	3.238E 13	3.236E 13
300000	1.069E 14	9.703E 13	8.486E 13	7.506E 13	6.941E 13	6.532E 13	5.961E 13	5.134E 13	4.369E 13	3.932E 13	3.106E 13	3.105E 13	3.105E 13
400000	1.354E 14	1.340E 14	1.311E 14	1.272E 14	1.238E 14	1.206E 14	1.152E 14	1.092E 14	9.192E 13	8.082E 13	7.334E 13	7.334E 13	7.334E 13
500000	1.634E 14	1.434E 14	1.433E 14	1.432E 14	1.430E 14	1.422E 14	1.402E 14	1.366E 14	1.321E 14	1.274E 14	1.263E 14	1.263E 14	1.263E 14
600000	1.504E 14	1.504E 14	1.504E 14	1.504E 14	1.504E 14	1.504E 14	1.503E 14	1.501E 14	1.494E 14	1.476E 14	1.439E 14	1.439E 14	1.439E 14
700000	1.646E 14	1.646E 14	1.646E 14	1.646E 14	1.646E 14	1.646E 14	1.646E 14	1.646E 14	1.646E 14	1.646E 14	1.646E 14	1.646E 14	1.646E 14
800000	1.787E 14	1.787E 14	1.787E 14	1.787E 14	1.787E 14	1.787E 14	1.787E 14	1.787E 14	1.787E 14	1.787E 14	1.787E 14	1.787E 14	1.787E 14
900000	2.147E 14	2.147E 14	2.147E 14	2.147E 14	2.147E 14	2.147E 14	2.147E 14	2.147E 14	2.147E 14	2.147E 14	2.147E 14	2.147E 14	2.147E 14
1000000	2.523E 14	2.523E 14	2.523E 14	2.523E 14	2.523E 14	2.523E 14	2.523E 14	2.523E 14	2.523E 14	2.523E 14	2.523E 14	2.523E 14	2.523E 14
1500000	3.231E 14	3.231E 14	3.231E 14	3.231E 14	3.231E 14	3.231E 14	3.231E 14	3.231E 14	3.231E 14	3.231E 14	3.231E 14	3.231E 14	3.231E 14
2000000	3.940E 14	3.940E 14	3.940E 14	3.940E 14	3.940E 14	3.940E 14	3.940E 14	3.940E 14	3.940E 14	3.940E 14	3.940E 14	3.940E 14	3.940E 14
3000000	4.648E 14	4.648E 14	4.648E 14	4.648E 14	4.648E 14	4.648E 14	4.648E 14	4.648E 14	4.648E 14	4.648E 14	4.648E 14	4.648E 14	4.648E 14
4000000	5.356E 14	5.356E 14	5.356E 14	5.356E 14	5.356E 14	5.356E 14	5.356E 14	5.356E 14	5.356E 14	5.356E 14	5.356E 14	5.356E 14	5.356E 14
5000000	6.064E 14	6.064E 14	6.064E 14	6.064E 14	6.064E 14	6.064E 14	6.064E 14	6.064E 14	6.064E 14	6.064E 14	6.064E 14	6.064E 14	6.064E 14
6000000	6.772E 14	6.772E 14	6.772E 14	6.772E 14	6.772E 14	6.772E 14	6.772E 14	6.772E 14	6.772E 14	6.772E 14	6.772E 14	6.772E 14	6.772E 14
7000000	7.480E 14	7.480E 14	7.480E 14	7.480E 14	7.480E 14	7.480E 14	7.480E 14	7.480E 14	7.480E 14	7.480E 14	7.480E 14	7.480E 14	7.480E 14
8000000	8.188E 14	8.188E 14	8.188E 14	8.188E 14	8.188E 14	8.188E 14	8.188E 14	8.188E 14	8.188E 14	8.188E 14	8.188E 14	8.188E 14	8.188E 14
9000000	8.896E 14	8.896E 14	8.896E 14	8.896E 14	8.896E 14	8.896E 14	8.896E 14	8.896E 14	8.896E 14	8.896E 14	8.896E 14	8.896E 14	8.896E 14
10000000	9.604E 14	9.604E 14	9.604E 14	9.604E 14	9.604E 14	9.604E 14	9.604E 14	9.604E 14	9.604E 14	9.604E 14	9.604E 14	9.604E 14	9.604E 14

TABLE 1C6(Cont): INTERNAL ENERGY (ERG/CM) OF EQUILIBRIUM AIR

TEMP. (°C K)	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0
10000	3.404E 11	4.857E 11	4.479E 11	4.250E 11	4.092E 11	3.925E 11	3.653E 11	3.212E 11	2.679E 11	2.140E 11
10500	6.273E 11	5.374E 11	4.810E 11	4.483E 11	4.273E 11	4.105E 11	3.807E 11	3.525E 11	3.007E 11	2.481E 11
11000	7.231E 11	6.023E 11	5.245E 11	4.769E 11	4.479E 11	4.281E 11	4.009E 11	3.784E 11	3.318E 11	2.773E 11
11500	8.320E 11	6.803E 11	5.748E 11	5.116E 11	4.719E 11	4.467E 11	4.264E 11	4.009E 11	3.461E 11	3.044E 11
12000	9.477E 11	7.700E 11	6.392E 11	5.534E 11	5.002E 11	4.673E 11	4.444E 11	4.208E 11	3.654E 11	3.240E 11
12500	1.042E 12	8.679E 11	7.111E 11	6.025E 11	5.334E 11	4.907E 11	4.623E 11	4.393E 11	4.000E 11	3.614E 11
13000	1.147E 12	9.695E 11	7.916E 11	6.590E 11	5.710E 11	5.173E 11	4.829E 11	4.572E 11	4.204E 11	3.841E 11
13500	1.250E 12	1.069E 12	8.766E 11	7.223E 11	6.157E 11	5.476E 11	5.049E 11	4.759E 11	4.475E 11	4.089E 11
14000	1.332E 12	1.163E 12	9.649E 11	7.914E 11	6.649E 11	5.817E 11	5.292E 11	4.947E 11	4.659E 11	4.302E 11
14500	1.389E 12	1.245E 12	1.052E 12	8.648E 11	7.190E 11	6.197E 11	5.561E 11	5.152E 11	4.842E 11	4.501E 11
15000	1.434E 12	1.316E 12	1.136E 12	9.406E 11	7.775E 11	6.615E 11	5.857E 11	5.372E 11	5.029E 11	4.693E 11
15500	1.469E 12	1.375E 12	1.213E 12	1.017E 12	8.394E 11	7.049E 11	6.182E 11	5.611E 11	5.222E 11	4.881E 11
16000	1.496E 12	1.422E 12	1.282E 12	1.091E 12	9.036E 11	7.556E 11	6.533E 11	5.868E 11	5.425E 11	5.040E 11
16500	1.518E 12	1.461E 12	1.342E 12	1.162E 12	9.680E 11	8.070E 11	6.911E 11	6.195E 11	5.640E 11	5.259E 11
17000	1.537E 12	1.492E 12	1.393E 12	1.228E 12	1.034E 12	8.605E 11	7.313E 11	6.451E 11	5.847E 11	5.453E 11
17500	1.554E 12	1.518E 12	1.437E 12	1.289E 12	1.090E 12	9.154E 11	7.735E 11	6.756E 11	6.100E 11	5.654E 11
18000	1.570E 12	1.541E 12	1.473E 12	1.343E 12	1.159E 12	9.710E 11	8.177E 11	7.086E 11	6.361E 11	5.843E 11
18500	1.587E 12	1.561E 12	1.505E 12	1.391E 12	1.217E 12	1.027E 12	8.632E 11	7.437E 11	6.628E 11	6.080E 11
19000	1.603E 12	1.579E 12	1.532E 12	1.433E 12	1.272E 12	1.081E 12	9.097E 11	7.800E 11	6.908E 11	6.311E 11
19500	1.622E 12	1.596E 12	1.555E 12	1.470E 12	1.322E 12	1.134E 12	9.567E 11	8.174E 11	7.199E 11	6.553E 11
20000	1.645E 12	1.614E 12	1.577E 12	1.503E 12	1.368E 12	1.186E 12	1.004E 12	8.588E 11	7.501E 11	6.804E 11
20500	1.661E 12	1.704E 12	1.654E 12	1.604E 12	1.514E 12	1.267E 12	1.186E 12	1.014E 12	8.788E 11	7.891E 11
21000	2.139E 12	1.882E 12	1.757E 12	1.688E 12	1.610E 12	1.506E 12	1.344E 12	1.169E 12	1.015E 12	9.059E 11
26000	2.649E 12	2.213E 12	1.938E 12	1.796E 12	1.710E 12	1.615E 12	1.479E 12	1.311E 12	1.148E 12	1.024E 12
28000	3.183E 12	2.671E 12	2.239E 12	1.967E 12	1.819E 12	1.714E 12	1.592E 12	1.437E 12	1.273E 12	1.137E 12
30000	3.618E 12	3.153E 12	2.638E 12	2.228E 12	1.972E 12	1.822E 12	1.696E 12	1.551E 12	1.388E 12	1.245E 12
32000	3.924E 12	3.569E 12	3.070E 12	2.565E 12	2.189E 12	1.958E 12	1.804E 12	1.658E 12	1.495E 12	1.340E 12
34000	4.150E 12	3.687E 12	3.468E 12	2.843E 12	2.469E 12	2.138E 12	1.929E 12	1.764E 12	1.558E 12	1.462E 12
36000	4.370E 12	4.132E 12	3.750E 12	3.314E 12	2.789E 12	2.364E 12	2.080E 12	1.894E 12	1.702E 12	1.537E 12
38000	4.659E 12	4.354E 12	4.044E 12	3.648E 12	3.122E 12	2.627E 12	2.263E 12	2.017E 12	1.811E 12	1.632E 12
40000	5.071E 12	4.610E 12	4.296E 12	3.933E 12	3.442E 12	2.912E 12	2.475E 12	2.169E 12	1.929E 12	1.732E 12
42000	5.612E 12	4.946E 12	4.532E 12	4.181E 12	3.734E 12	3.201E 12	2.710E 12	2.341E 12	2.059E 12	1.837E 12
44000	6.228E 12	5.303E 12	4.810E 12	4.414E 12	3.998E 12	3.481E 12	2.958E 12	2.532E 12	2.201E 12	1.944E 12
46000	6.841E 12	5.704E 12	5.155E 12	4.658E 12	4.236E 12	3.744E 12	3.208E 12	2.735E 12	2.357E 12	2.069E 12
48000	7.394E 12	6.463E 12	5.744E 12	4.937E 12	4.470E 12	3.990E 12	3.454E 12	2.947E 12	2.523E 12	2.198E 12
50000	7.874E 12	7.012E 12	6.049E 12	5.265E 12	4.713E 12	4.223E 12	3.692E 12	3.162E 12	2.698E 12	2.334E 12
60000	1.019E 13	9.193E 12	8.354E 12	7.392E 12	6.365E 12	5.497E 12	4.816E 12	4.210E 12	3.623E 12	3.095E 12
70000	1.353E 13	1.199E 13	1.052E 13	9.355E 12	8.295E 12	7.188E 12	6.158E 12	5.307E 12	4.583E 12	3.931E 12
80000	1.647E 13	1.490E 13	1.330E 13	1.163E 13	1.016E 13	8.904E 12	7.700E 12	6.550E 12	5.649E 12	4.842E 12

190000	2.821E 13	2.790E 13	2.725E 13	2.614E 13	2.432E 13	2.222E 13	2.000E 13	1.777E 13	1.555E 13	1.333E 13	1.111E 13	9.89E 12	8.67E 12	7.45E 12	6.23E 12	5.01E 12	3.79E 12	2.57E 12	1.35E 12	1.13E 12
200000	3.101E 13	3.095E 13	3.081E 13	3.051E 13	2.985E 13	2.862E 13	2.740E 13	2.618E 13	2.496E 13	2.374E 13	2.252E 13	2.130E 13	2.008E 13	1.886E 13	1.764E 13	1.642E 13	1.520E 13	1.398E 13	1.276E 13	1.154E 13
300000	3.601E 13	3.652E 13	3.634E 13	3.616E 13	3.590E 13	3.543E 13	3.496E 13	3.449E 13	3.402E 13	3.355E 13	3.308E 13	3.261E 13	3.214E 13	3.167E 13	3.120E 13	3.073E 13	3.026E 13	2.979E 13	2.932E 13	2.885E 13
400000	6.616E 13	5.727E 13	4.923E 13	4.457E 13	4.247E 13	4.141E 13	4.032E 13	3.932E 13	3.832E 13	3.744E 13	3.656E 13	3.568E 13	3.480E 13	3.392E 13	3.304E 13	3.216E 13	3.128E 13	3.040E 13	2.952E 13	2.864E 13

500000	1.083E 14	9.419E 13	8.287E 13	7.343E 13	6.383E 13	5.501E 13	4.947E 13	4.635E 13	4.392E 13	4.158E 13	3.924E 13	3.690E 13	3.456E 13	3.222E 13	2.988E 13	2.754E 13	2.520E 13	2.286E 13	2.052E 13	1.818E 13
600000	1.387E 14	1.322E 14	1.221E 14	1.077E 14	9.340E 13	8.167E 13	7.060E 13	6.044E 13	5.360E 13	4.809E 13	4.362E 13	3.915E 13	3.468E 13	3.021E 13	2.574E 13	2.127E 13	1.680E 13	1.233E 13	8.86E 12	5.39E 12
800000	1.642E 14	1.634E 14	1.613E 14	1.568E 14	1.496E 14	1.389E 14	1.237E 14	1.080E 14	9.134E 13	7.822E 13	6.744E 13	5.882E 13	5.120E 13	4.458E 13	3.796E 13	3.134E 13	2.472E 13	1.810E 13	1.148E 13	4.86E 12
1000000	1.787E 14	1.786E 14	1.783E 14	1.777E 14	1.760E 14	1.720E 14	1.643E 14	1.522E 14	1.354E 14	1.139E 14	9.44E 13	7.74E 13	6.34E 13	5.24E 13	4.34E 13	3.54E 13	2.84E 13	2.14E 13	1.44E 13	7.4E 12
1500000	2.141E 14	2.140E 14	2.139E 14	2.138E 14	2.135E 14	2.130E 14	2.119E 14	2.095E 14	2.044E 14	1.944E 14	1.804E 14	1.644E 14	1.464E 14	1.264E 14	1.044E 14	8.24E 13	6.04E 13	3.84E 13	1.64E 13	4.4E 12
2000000	2.495E 14	2.494E 14	2.494E 14	2.492E 14	2.490E 14	2.487E 14	2.480E 14	2.467E 14	2.442E 14	2.394E 14	2.304E 14	2.184E 14	2.044E 14	1.884E 14	1.704E 14	1.504E 14	1.284E 14	1.044E 14	8.04E 13	5.64E 13
3000000	3.228E 14	3.223E 14	3.217E 14	3.210E 14	3.204E 14	3.198E 14	3.191E 14	3.181E 14	3.164E 14	3.134E 14	3.084E 14	3.014E 14	2.924E 14	2.814E 14	2.684E 14	2.544E 14	2.384E 14	2.204E 14	2.004E 14	1.784E 14
4000000	3.939E 14	3.934E 14	3.930E 14	3.927E 14	3.923E 14	3.927E 14	3.918E 14	3.902E 14	3.882E 14	3.844E 14	3.784E 14	3.704E 14	3.604E 14	3.484E 14	3.344E 14	3.184E 14	3.004E 14	2.804E 14	2.584E 14	2.344E 14
5000000	4.648E 14	4.648E 14	4.647E 14	4.646E 14	4.645E 14	4.642E 14	4.637E 14	4.627E 14	4.609E 14	4.579E 14	4.534E 14	4.474E 14	4.394E 14	4.294E 14	4.174E 14	4.034E 14	3.874E 14	3.694E 14	3.494E 14	3.274E 14
6000000	5.356E 14	5.356E 14	5.355E 14	5.355E 14	5.354E 14	5.352E 14	5.348E 14	5.341E 14	5.327E 14	5.303E 14	5.268E 14	5.218E 14	5.154E 14	5.074E 14	4.974E 14	4.854E 14	4.714E 14	4.554E 14	4.374E 14	4.174E 14
8000000	6.773E 14	6.772E 14	6.772E 14	6.772E 14	6.771E 14	6.769E 14	6.765E 14	6.760E 14	6.750E 14	6.732E 14	6.704E 14	6.664E 14	6.614E 14	6.554E 14	6.474E 14	6.374E 14	6.254E 14	6.114E 14	5.954E 14	5.774E 14
10000000	8.189E 14	8.189E 14	8.189E 14	8.189E 14	8.187E 14	8.186E 14	8.184E 14	8.180E 14	8.169E 14	8.153E 14	8.124E 14	8.084E 14	8.034E 14	7.974E 14	7.894E 14	7.794E 14	7.674E 14	7.534E 14	7.374E 14	7.194E 14

TABLE 107. INTERNAL ENERGY DENSITY (ERG/CM³) OF EQUILIBRIUM AIR

TEMP. (DEG K)	-9.0	-8.5	-8.0	-7.5	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0
1000	1.837E 00	5.809E 00	1.836E 01	5.793E 01	1.821E 02	5.651E 02	1.700E 03	4.820E 03	1.277E 04	3.262E 04	8.391E 04
1050	1.851E 00	5.851E 00	1.849E 01	5.843E 01	1.843E 02	5.779E 02	1.784E 03	5.300E 03	1.477E 04	3.866E 04	9.871E 04
1100	1.867E 00	5.895E 00	1.863E 01	5.888E 01	1.859E 02	5.857E 02	1.830E 03	5.598E 03	1.634E 04	4.456E 04	1.153E 05
1150	1.892E 00	5.948E 00	1.877E 01	5.931E 01	1.874E 02	5.915E 02	1.859E 03	5.776E 03	1.742E 04	4.961E 04	1.323E 05
1200	1.946E 00	6.032E 00	1.895E 01	5.977E 01	1.883E 02	5.964E 02	1.880E 03	5.887E 03	1.811E 04	5.368E 04	1.481E 05
1250	2.071E 00	6.203E 00	1.921E 01	6.033E 01	1.903E 02	6.010E 02	1.897E 03	5.965E 03	1.856E 04	5.622E 04	1.614E 05
1300	2.323E 00	6.571E 00	1.972E 01	6.114E 01	1.920E 02	6.057E 02	1.912E 03	6.026E 03	1.882E 04	5.810E 04	1.718E 05
1350	2.720E 00	7.282E 00	2.075E 01	6.258E 01	1.944E 02	6.110E 02	1.927E 03	6.079E 03	1.911E 04	5.941E 04	1.795E 05
1400	3.184E 00	8.389E 00	2.266E 01	6.530E 01	1.983E 02	6.179E 02	1.944E 03	6.129E 03	1.930E 04	6.037E 04	1.852E 05
1450	3.610E 00	9.736E 00	2.365E 01	7.021E 01	2.032E 02	6.283E 02	1.963E 03	6.181E 03	1.947E 04	6.112E 04	1.893E 05
1500	4.052E 00	1.105E 01	2.445E 01	7.796E 01	2.173E 02	6.453E 02	1.991E 03	6.238E 03	1.964E 04	6.176E 04	1.925E 05
1550	4.229E 00	1.217E 01	3.345E 01	8.829E 01	2.365E 02	6.738E 02	2.032E 03	6.311E 03	1.982E 04	6.233E 04	1.951E 05
1600	4.452E 00	1.309E 01	3.707E 01	9.995E 01	2.632E 02	7.190E 02	2.097E 03	6.411E 03	2.002E 04	6.289E 04	1.973E 05
1650	4.614E 00	1.384E 01	4.013E 01	1.114E 02	2.935E 02	7.642E 02	2.199E 03	6.558E 03	2.027E 04	6.348E 04	1.992E 05
1700	4.719E 00	1.442E 01	4.268E 01	1.216E 02	3.298E 02	8.680E 02	2.349E 03	6.780E 03	2.060E 04	6.415E 04	2.011E 05
1750	4.787E 00	1.482E 01	4.474E 01	1.302E 02	3.626E 02	9.642E 02	2.551E 03	7.106E 03	2.108E 04	6.497E 04	2.031E 05
1800	4.833E 00	1.509E 01	4.629E 01	1.375E 02	3.920E 02	1.064E 03	2.800E 03	7.561E 03	2.177E 04	6.603E 04	2.053E 05
1850	4.871E 00	1.528E 01	4.739E 01	1.434E 02	4.174E 02	1.160E 03	3.080E 03	8.151E 03	2.273E 04	6.746E 04	2.078E 05
1900	4.910E 00	1.541E 01	4.814E 01	1.478E 02	4.388E 02	1.247E 03	3.370E 03	8.863E 03	2.402E 04	6.942E 04	2.110E 05
1950	4.956E 00	1.554E 01	4.865E 01	1.510E 02	4.562E 02	1.323E 03	3.652E 03	9.659E 03	2.565E 04	7.206E 04	2.150E 05
2000	5.022E 00	1.567E 01	4.913E 01	1.533E 02	4.695E 02	1.388E 03	3.913E 03	1.050E 04	2.762E 04	7.551E 04	2.203E 05
2200	5.875E 00	1.695E 01	5.131E 01	1.593E 02	4.977E 02	1.543E 03	4.666E 03	1.350E 04	3.699E 04	9.750E 04	2.601E 05
2400	7.763E 00	2.147E 01	5.928E 01	1.710E 02	5.197E 02	1.611E 03	5.005E 03	1.528E 04	4.487E 04	1.246E 05	3.304E 05
2600	9.114E 00	2.680E 01	7.573E 01	2.077E 02	5.802E 02	1.707E 03	5.222E 03	1.616E 04	4.945E 04	1.459E 05	4.073E 05
2800	9.715E 00	2.992E 01	8.952E 01	2.574E 02	7.113E 02	1.956E 03	5.618E 03	1.692E 04	5.204E 04	1.588E 05	4.675E 05
3000	1.005E 01	3.132E 01	9.695E 01	2.931E 02	8.522E 02	2.373E 03	6.493E 03	1.838E 04	5.472E 04	1.671E 05	5.066E 05
3200	1.082E 01	3.263E 01	1.009E 02	3.122E 02	9.482E 02	2.772E 03	7.745E 03	2.117E 04	5.952E 04	1.760E 05	5.341E 05
3400	1.271E 01	3.593E 01	1.061E 02	3.247E 02	1.002E 03	3.043E 03	8.895E 03	2.484E 04	6.783E 04	1.907E 05	5.626E 05
3600	1.494E 01	4.222E 01	1.184E 02	3.447E 02	1.044E 03	3.207E 03	9.703E 03	2.823E 04	7.643E 04	2.142E 05	6.048E 05
3800	1.646E 01	4.851E 01	1.378E 02	3.857E 02	1.113E 03	3.349E 03	1.023E 04	3.073E 04	8.850E 04	2.443E 05	6.690E 05
4000	1.739E 01	5.276E 01	1.558E 02	4.432E 02	1.246E 03	3.569E 03	1.069E 04	3.247E 04	9.658E 04	2.747E 05	7.521E 05
4200	1.837E 01	5.559E 01	1.802E 02	4.957E 02	1.408E 03	3.941E 03	1.136E 04	3.398E 04	1.025E 05	3.005E 05	8.412E 05
4400	2.002E 01	5.878E 01	1.771E 02	5.337E 02	1.565E 03	4.427E 03	1.241E 04	3.590E 04	1.074E 05	3.206E 05	9.231E 05
4600	2.216E 01	6.382E 01	1.871E 02	5.621E 02	1.684E 03	4.899E 03	1.378E 04	3.876E 04	1.129E 05	3.370E 05	9.916E 05
4800	2.403E 01	7.013E 01	2.018E 02	5.923E 02	1.776E 03	5.281E 03	1.520E 04	4.256E 04	1.205E 05	3.533E 05	1.048E 06
5000	2.543E 01	7.584E 01	2.203E 02	6.343E 02	1.866E 03	5.579E 03	1.643E 04	4.673E 04	1.306E 05	3.733E 05	1.099E 06
6000	2.835E 01	8.832E 01	2.755E 02	8.499E 02	2.563E 03	7.509E 03	2.154E 04	6.228E 04	1.829E 05	5.306E 05	1.493E 06
7000	3.101E 01	9.699E 01	3.003E 02	9.255E 02	2.867E 03	8.892E 03	2.720E 04	8.083E 04	2.330E 05	6.855E 05	1.924E 06
8000	3.188E 01	1.007E 02	3.179E 02	9.990E 02	3.112E 03	9.603E 03	2.959E 04	9.136E 04	2.787E 05	8.252E 05	2.367E 06

90C00	3-250E 01	1-030E 02	3-257E 02	1-029E 03	3-248E 03	1-021E 04	3-101E 04	9-812E 04	3-817E 05	9-249E 05	2-782E 06
100C00	3-327E 01	1-052E 02	3-327E 02	1-052E 03	3-325E 03	1-050E 04	3-311E 04	1-030E 05	3-221E 05	9-897E 05	3-029E 06
150C00	3-673E 01	1-161E 02	3-672E 02	1-161E 03	3-672E 03	1-161E 04	3-671E 04	1-161E 05	3-670E 05	1-160E 06	3-661E 06
200C00	4-192E 01	1-294E 02	4-054E 02	1-277E 03	4-031E 03	1-273E 04	4-020E 04	1-270E 05	4-016E 05	1-269E 06	4-012E 06
300C00	1-381E 02	3-965E 02	1-097E 03	3-068E 03	8-970E 03	2-669E 04	7-703E 04	2-698E 05	5-644E 05	1-607E 06	4-845E 06
400C00	1-750E 02	5-476E 02	1-694E 03	5-197E 03	1-600E 04	4-930E 04	1-409E 05	4-298E 05	1-188E 06	3-303E 06	9-478E 06
500C00	1-953E 02	5-859E 02	1-852E 03	5-854E 03	1-847E 04	5-810E 04	1-812E 05	5-802E 05	1-787E 06	5-208E 06	1-554E 07
600C00	1-944E 02	6-148E 02	1-944E 03	6-148E 03	1-944E 04	6-147E 04	1-943E 05	6-133E 05	1-930E 06	6-031E 06	1-860E 07
800C00	2-127E 02	6-720E 02	2-127E 03	6-726E 03	2-127E 04	6-724E 04	2-127E 05	6-724E 05	2-127E 06	6-724E 06	2-125E 07
1000C00	2-310E 02	7-305E 02	2-310E 03	7-305E 03	2-310E 04	7-305E 04	2-310E 05	7-304E 05	2-310E 06	7-304E 06	2-309E 07
1500C00	2-774E 02	8-760E 02	2-768E 03	8-751E 03	2-767E 04	8-750E 04	2-767E 05	8-750E 05	2-767E 06	8-750E 06	2-767E 07
2000C00	3-261E 02	1-031E 03	3-259E 03	1-030E 04	3-252E 04	1-026E 05	3-239E 05	1-022E 06	3-228E 06	1-020E 07	3-224E 07
3000C00	4-176E 02	1-321E 03	4-176E 03	1-321E 04	4-176E 04	1-321E 05	4-176E 05	1-321E 06	4-176E 06	1-320E 07	4-174E 07
4000C00	5-091E 02	1-610E 03	5-091E 03	1-610E 04	5-091E 04	1-610E 05	5-091E 05	1-610E 06	5-091E 06	1-610E 07	5-091E 07
5000C00	6-007E 02	1-899E 03	6-007E 03	1-899E 04	6-007E 04	1-899E 05	6-007E 05	1-899E 06	6-007E 06	1-899E 07	6-007E 07
6000C00	6-922E 02	2-189E 03	6-922E 03	2-189E 04	6-922E 04	2-189E 05	6-922E 05	2-189E 06	6-922E 06	2-189E 07	6-922E 07
8000C00	8-753E 02	2-768E 03	8-753E 03	2-768E 04	8-753E 04	2-768E 05	8-753E 05	2-768E 06	8-753E 06	2-768E 07	8-753E 07
10000C00	1-058E 03	3-347E 03	1-058E 04	3-347E 04	1-058E 05	3-347E 05	1-058E 06	3-347E 06	1-058E 07	3-347E 07	1-058E 08

TABLE 107(CUNT) INTERNAL ENERGY DENSITY (ERG/CM3) OF EQUILIBRIUM AIR

TEPP. (DEC K)	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0
10000	2.242E 05	6.277E 05	1.832E 06	5.493E 06	1.672E 07	5.073E 07	1.493E 08	4.15CF 08	1.095E 09	2.840E 09
10500	2.564E 05	6.945E 05	1.969E 06	5.794E 06	1.746E 07	5.305E 07	1.588E 08	4.549E 08	1.229E 09	3.207E 09
11000	2.955E 05	7.783E 05	2.143E 06	6.163E 06	1.830E 07	5.532E 07	1.699E 08	4.890E 08	1.356E 09	3.585E 09
11500	3.400E 05	8.792E 05	2.357E 06	6.612E 06	1.928E 07	5.773E 07	1.743E 08	5.181E 08	1.472E 09	3.963E 09
12000	3.873E 05	9.950E 05	2.612E 06	7.131E 06	2.044E 07	6.040E 07	1.816E 08	5.438E 08	1.575E 09	4.327E 09
12500	4.341E 05	1.122E 06	2.906E 06	7.786E 06	2.180E 07	6.342E 07	1.892E 08	5.677E 08	1.667E 09	4.671E 09
13000	4.771E 05	1.253E 06	3.233E 06	8.516E 06	2.337E 07	6.686E 07	1.974E 08	5.909E 08	1.751E 09	4.990E 09
13500	5.141E 05	1.382E 06	3.583E 06	9.334E 06	2.516E 07	7.076E 07	2.063E 08	6.146E 08	1.829E 09	5.285E 09
14000	5.442E 05	1.502E 06	3.943E 06	1.023E 07	2.717E 07	7.517E 07	2.163E 08	6.393E 08	1.904E 09	5.559E 09
14500	5.678E 05	1.610E 06	4.301E 06	1.118E 07	2.939E 07	8.008E 07	2.273E 08	6.658E 08	1.979E 09	5.817E 09
15000	5.861E 05	1.701E 06	4.642E 06	1.216E 07	3.177E 07	8.549E 07	2.394E 08	6.943E 08	2.055E 09	6.065E 09
15500	6.002E 05	1.777E 06	4.957E 06	1.314E 07	3.430E 07	9.136E 07	2.526E 08	7.251E 08	2.134E 09	6.308E 09
16000	6.114E 05	1.838E 06	5.238E 06	1.410E 07	3.693E 07	9.765E 07	2.670E 08	7.583E 08	2.217E 09	6.550E 09
16500	6.205E 05	1.888E 06	5.483E 06	1.502E 07	3.959E 07	1.043E 08	2.824E 08	7.941E 08	2.303E 09	6.795E 09
17000	6.283E 05	1.929E 06	5.693E 06	1.587E 07	4.226E 07	1.112E 08	2.989E 08	8.324E 08	2.398E 09	7.047E 09
17500	6.352E 05	1.962E 06	5.871E 06	1.665E 07	4.486E 07	1.183E 08	3.162E 08	8.731E 08	2.496E 09	7.307E 09
18000	6.418E 05	1.991E 06	6.021E 06	1.735E 07	4.737E 07	1.255E 08	3.342E 08	9.160E 08	2.600E 09	7.577E 09
18500	6.484E 05	2.017E 06	6.149E 06	1.797E 07	4.975E 07	1.327E 08	3.528E 08	9.611E 08	2.709E 09	7.858E 09
19000	6.553E 05	2.040E 06	6.259E 06	1.852E 07	5.197E 07	1.397E 08	3.718E 08	1.008E 09	2.823E 09	8.156E 09
19500	6.630E 05	2.063E 06	6.356E 06	1.900E 07	5.403E 07	1.466E 08	3.910E 08	1.056E 09	2.942E 09	8.468E 09
20000	6.721E 05	2.085E 06	6.443E 06	1.942E 07	5.591E 07	1.533E 08	4.102E 08	1.106E 09	3.065E 09	8.793E 09
22000	7.358E 05	2.202E 06	6.761E 06	2.072E 07	6.187E 07	1.767E 08	4.846E 08	1.311E 09	3.591E 09	1.020E 10
24000	8.743E 05	2.433E 06	7.179E 06	2.182E 07	6.613E 07	1.947E 08	5.500E 08	1.511E 09	4.149E 09	1.171E 10
26000	1.082E 06	2.861E 06	7.421E 06	2.321E 07	6.988E 07	2.088E 08	6.046E 08	1.694E 09	4.693E 09	1.323E 10
28000	1.301E 06	3.452E 06	9.148E 06	2.541E 07	7.432E 07	2.215E 08	6.507E 08	1.857E 09	5.203E 09	1.470E 10
30000	1.478E 06	4.075E 06	1.078E 07	2.876E 07	8.058E 07	2.354E 08	6.932E 08	2.004E 09	5.672E 09	1.608E 10
32000	1.604E 06	4.812E 06	1.255E 07	3.314E 07	8.944E 07	2.531E 08	7.373E 08	2.142E 09	6.110E 09	1.739E 10
34000	1.696E 06	5.024E 06	1.417E 07	3.803E 07	1.008E 08	2.763E 08	7.883E 08	2.283E 09	6.531E 09	1.864E 10
36000	1.788E 06	5.340E 06	1.552E 07	4.283E 07	1.14CE 08	3.054E 08	8.501E 08	2.435E 09	6.955E 09	1.986E 10
38000	1.904E 06	5.627E 06	1.661E 07	4.714E 07	1.276E 08	3.395E 08	9.248E 08	2.607E 09	7.400E 09	2.110E 10
40000	2.072E 06	5.957E 06	1.756E 07	5.082E 07	1.406E 08	3.763E 08	1.012E 09	2.803E 09	7.882E 09	2.238E 10
42000	2.293E 06	6.391E 06	1.852E 07	5.403E 07	1.526E 08	4.137E 08	1.108E 09	3.026E 09	8.413E 09	2.373E 10
44000	2.545E 06	6.956E 06	1.966E 07	5.704E 07	1.633E 08	4.498E 08	1.209E 09	3.272E 09	8.996E 09	2.518E 10
46000	2.796E 06	7.630E 06	2.107E 07	6.020E 07	1.731E 08	4.838E 08	1.311E 09	3.535E 09	9.632E 09	2.674E 10
48000	3.023E 06	8.353E 06	2.278E 07	6.380E 07	1.827E 08	5.156E 08	1.412E 09	3.809E 09	1.031E 10	2.840E 10
50000	3.218E 06	9.062E 06	2.472E 07	6.805E 07	1.926E 08	5.458E 08	1.509E 09	4.087E 09	1.103E 10	3.016E 10
60000	4.165E 06	1.188E 07	3.414E 07	9.533E 07	2.6C1E 08	7.103E 08	1.968E 09	5.441E 09	1.481E 10	4.000E 10
70000	5.531E 06	1.550E 07	4.300E 07	1.200E 08	3.390E 08	9.290E 08	2.516E 09	6.858E 09	1.873E 10	5.580E 10
80000	6.731E 06	1.925E 07	5.435E 07	1.503E 08	4.153E 08	1.151E 09	3.147E 09	8.517E 09	2.308E 10	6.258E 10

YUNUW	0.007E 00	2.672E 07	7.941E 07	2.134E 08	5.963E 08	1.638E 09	4.459E 09	1.211E 10	1.287E 10	0.880E 10
100000	0.143E 04	2.675E 07	7.941E 07	2.134E 08	5.963E 08	1.638E 09	4.459E 09	1.211E 10	1.287E 10	0.880E 10
150000	1.133E 07	3.604E 07	1.113E 08	3.370E 08	1.003E 09	2.889E 09	8.044E 09	2.210E 10	5.993E 10	1.420E 11
200000	1.207E 07	4.000E 07	1.259E 08	3.942E 08	1.220E 09	3.699E 09	1.091E 10	3.114E 10	8.442E 10	2.354E 11
300000	1.504E 07	4.719E 07	1.485E 08	4.673E 08	1.467E 09	4.579E 09	1.413E 10	4.272E 10	1.234E 11	3.554E 11
400000	2.704E 07	7.401E 07	2.012E 08	5.760E 08	1.734E 09	5.352E 09	1.656E 10	5.001E 10	1.330E 11	4.475E 11
500000	4.423E 07	1.217E 08	3.307E 08	9.515E 08	2.608E 09	7.110E 09	2.022E 10	5.909E 10	1.793E 11	5.349E 11
600000	5.648E 07	1.708E 08	4.990E 08	1.392E 09	3.817E 09	1.055E 10	2.805E 10	7.830E 10	2.190E 11	6.292E 11
800000	6.708E 07	2.111E 08	6.591E 08	2.027E 09	6.112E 09	1.795E 10	5.054E 10	1.380E 11	3.733E 11	1.091E 12
1000000	7.301E 07	2.308E 08	7.287E 08	2.290E 09	7.191E 09	2.223E 10	6.716E 10	1.967E 11	5.335E 11	1.503E 12
1500000	8.748E 07	2.766E 08	8.743E 08	2.763E 09	8.727E 09	2.753E 10	8.608E 10	2.788E 11	8.354E 11	2.313E 12
2000000	1.019E 08	3.223E 08	1.019E 09	3.221E 09	1.010E 10	3.214E 10	1.013E 11	3.180E 11	9.979E 11	3.093E 12
3000000	1.319E 08	4.164E 08	1.315E 09	4.160E 09	1.309E 10	4.133E 10	1.304E 11	4.111E 11	1.293E 12	4.050E 12
4000000	1.610E 08	5.091E 08	1.609E 09	5.088E 09	1.607E 10	5.075E 10	1.600E 11	5.042E 11	1.586E 12	4.901E 12
5000000	1.899E 08	6.004E 08	1.899E 09	6.003E 09	1.890E 10	5.999E 10	1.893E 11	5.979E 11	1.883E 12	5.910E 12
6000000	2.189E 08	6.921E 08	2.189E 09	6.920E 09	2.180E 10	6.916E 10	2.185E 11	6.902E 11	2.177E 12	6.853E 12
8000000	2.765E 08	8.752E 08	2.768E 09	8.751E 09	2.767E 10	8.748E 10	2.762E 11	8.734E 11	2.758E 12	8.698E 12
10000000	3.347E 08	1.059E 09	3.340E 09	1.058E 10	3.340E 10	1.058E 11	3.344E 11	1.057E 12	3.338E 12	1.054E 13

TABLE 108. ENTHALPY (ERG/GM) OF EQUILIBRIUM AIR

TEMP. (DEG K)	-9.0	-8.5	-8.0	-7.5	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0
10500	1.536E 12	1.536E 12	1.535E 12	1.532E 12	1.522E 12	1.495E 12	1.424E 12	1.280E 12	1.070E 12	8.775E 11	7.204E 11
10500	1.552E 12	1.552E 12	1.550E 12	1.546E 12	1.546E 12	1.533E 12	1.497E 12	1.409E 12	1.246E 12	1.030E 12	8.447E 11
11000	1.570E 12	1.568E 12	1.567E 12	1.566E 12	1.564E 12	1.550E 12	1.515E 12	1.491E 12	1.379E 12	1.194E 12	9.844E 11
11500	1.596E 12	1.587E 12	1.584E 12	1.583E 12	1.582E 12	1.570E 12	1.549E 12	1.542E 12	1.472E 12	1.330E 12	1.120E 12
12000	1.644E 12	1.614E 12	1.603E 12	1.600E 12	1.598E 12	1.596E 12	1.591E 12	1.574E 12	1.535E 12	1.435E 12	1.262E 12
12500	1.750E 12	1.662E 12	1.670E 12	1.619E 12	1.615E 12	1.613E 12	1.610E 12	1.602E 12	1.577E 12	1.512E 12	1.376E 12
13000	1.958E 12	1.761E 12	1.676E 12	1.645E 12	1.635E 12	1.631E 12	1.628E 12	1.623E 12	1.608E 12	1.564E 12	1.447E 12
13500	2.282E 12	1.947E 12	1.764E 12	1.687E 12	1.659E 12	1.650E 12	1.644E 12	1.641E 12	1.632E 12	1.605E 12	1.535E 12
14000	2.681E 12	2.234E 12	1.923E 12	1.762E 12	1.656E 12	1.672E 12	1.664E 12	1.660E 12	1.653E 12	1.635E 12	1.587E 12
14500	3.010E 12	2.583E 12	2.149E 12	1.892E 12	1.757E 12	1.704E 12	1.685E 12	1.678E 12	1.672E 12	1.660E 12	1.627E 12
15000	3.292E 12	2.925E 12	2.482E 12	2.095E 12	1.859E 12	1.753E 12	1.713E 12	1.698E 12	1.691E 12	1.681E 12	1.658E 12
15500	3.522E 12	3.217E 12	2.810E 12	2.364E 12	2.020E 12	1.831E 12	1.751E 12	1.722E 12	1.710E 12	1.702E 12	1.684E 12
16000	3.709E 12	3.457E 12	3.109E 12	2.668E 12	2.251E 12	1.952E 12	1.809E 12	1.753E 12	1.732E 12	1.721E 12	1.707E 12
16500	3.847E 12	3.656E 12	3.363E 12	2.966E 12	2.508E 12	2.124E 12	1.897E 12	1.796E 12	1.757E 12	1.742E 12	1.729E 12
17000	3.940E 12	3.811E 12	3.576E 12	3.233E 12	2.792E 12	2.344E 12	2.023E 12	1.858E 12	1.790E 12	1.764E 12	1.750E 12
17500	4.002E 12	3.923E 12	3.750E 12	3.463E 12	3.044E 12	2.597E 12	2.193E 12	1.947E 12	1.834E 12	1.790E 12	1.771E 12
18000	4.048E 12	3.999E 12	3.883E 12	3.656E 12	3.309E 12	2.859E 12	2.401E 12	2.069E 12	1.895E 12	1.823E 12	1.794E 12
18500	4.086E 12	4.054E 12	3.979E 12	3.813E 12	3.522E 12	3.111E 12	2.634E 12	2.226E 12	1.978E 12	1.865E 12	1.820E 12
19000	4.125E 12	4.097E 12	4.048E 12	3.934E 12	3.703E 12	3.341E 12	2.876E 12	2.415E 12	2.088E 12	1.920E 12	1.850E 12
19500	4.171E 12	4.137E 12	4.100E 12	4.023E 12	3.851E 12	3.544E 12	3.112E 12	2.626E 12	2.237E 12	1.994E 12	1.869E 12
20000	4.231E 12	4.178E 12	4.144E 12	4.090E 12	3.967E 12	3.719E 12	3.331E 12	2.847E 12	2.392E 12	2.088E 12	1.937E 12
22000	4.948E 12	4.534E 12	4.351E 12	4.276E 12	4.227E 12	4.148E 12	3.973E 12	3.648E 12	3.183E 12	2.679E 12	2.284E 12
24000	6.502E 12	5.717E 12	5.025E 12	4.616E 12	4.434E 12	4.354E 12	4.280E 12	4.145E 12	3.855E 12	3.407E 12	2.884E 12
26000	7.628E 12	7.114E 12	6.386E 12	5.576E 12	4.937E 12	4.631E 12	4.488E 12	4.397E 12	4.261E 12	3.988E 12	3.541E 12
28000	8.154E 12	7.950E 12	7.338E 12	6.880E 12	6.050E 12	5.300E 12	4.650E 12	4.425E 12	4.504E 12	4.353E 12	4.064E 12
30000	8.469E 12	8.347E 12	8.179E 12	7.834E 12	7.229E 12	6.403E 12	5.583E 12	5.030E 12	4.753E 12	4.599E 12	4.418E 12
32000	9.126E 12	8.723E 12	8.536E 12	8.364E 12	8.047E 12	7.464E 12	6.635E 12	5.779E 12	5.176E 12	4.861E 12	4.675E 12
34000	1.069E 13	9.604E 12	9.004E 12	8.726E 12	8.525E 12	8.201E 12	7.609E 12	6.759E 12	5.805E 12	5.270E 12	4.940E 12
36000	1.253E 13	1.125E 13	1.003E 13	9.276E 12	8.908E 12	8.664E 12	8.366E 12	7.671E 12	6.766E 12	5.911E 12	5.315E 12
38000	1.390E 13	1.290E 13	1.144E 13	1.036E 13	9.505E 12	9.047E 12	8.775E 12	8.358E 12	7.452E 12	6.725E 12	5.874E 12
40000	1.459E 13	1.403E 13	1.313E 13	1.188E 13	1.037E 13	9.672E 12	9.193E 12	8.847E 12	8.366E 12	7.548E 12	6.584E 12
42000	1.544E 13	1.480E 13	1.419E 13	1.326E 13	1.198E 13	1.067E 13	9.771E 12	9.275E 12	8.808E 12	8.255E 12	7.357E 12
44000	1.622E 13	1.567E 13	1.496E 13	1.429E 13	1.339E 13	1.196E 13	1.067E 13	9.811E 12	9.309E 12	8.816E 12	8.068E 12
46000	1.860E 13	1.700E 13	1.582E 13	1.506E 13	1.431E 13	1.321E 13	1.183E 13	1.059E 13	9.801E 12	9.282E 12	8.631E 12
48000	2.014E 13	1.866E 13	1.704E 13	1.589E 13	1.510E 13	1.424E 13	1.303E 13	1.161E 13	1.046E 13	9.744E 12	9.175E 12
50000	2.134E 13	2.018E 13	1.860E 13	1.701E 13	1.588E 13	1.506E 13	1.407E 13	1.273E 13	1.133E 13	1.030E 13	9.636E 12
60000	2.401E 13	2.367E 13	2.208E 13	2.101E 13	2.020E 13	1.949E 13	1.849E 13	1.699E 13	1.504E 13	1.460E 13	1.308E 13
70000	2.648E 13	2.621E 13	2.549E 13	2.507E 13	2.459E 13	2.414E 13	2.339E 13	2.205E 13	2.020E 13	1.835E 13	1.687E 13
80000	2.732E 13	2.750E 13	2.744E 13	2.728E 13	2.690E 13	2.629E 13	2.566E 13	2.502E 13	2.424E 13	2.278E 13	2.078E 13

98000	2.8418	13	6.8748	13	2.9308	13	2.9298	13	2.9268	13	2.9178	13	2.8978	13	6.8748	13	3.3712	13	3.3458	13
100000	2.9308	13	2.9308	13	2.9308	13	2.9308	13	2.9308	13	2.9308	13	2.9308	13	2.9308	13	2.9308	13	2.9308	13
150000	3.3768	13	3.3758	13	3.3758	13	3.3758	13	3.3758	13	3.3758	13	3.3758	13	3.3758	13	3.3758	13	3.3758	13
200000	3.9408	13	3.8798	13	3.8498	13	3.8318	13	3.8208	13	3.8228	13	3.8208	13	3.8198	13	3.8178	13	3.8158	13
300000	1.7038	14	1.1018	14	0.7538	13	0.1918	13	7.7258	13	7.1298	13	0.2678	13	9.4408	13	9.0128	13	8.0218	13
400000	1.5438	14	1.3288	14	1.4978	14	1.4228	14	1.3098	14	1.3328	14	1.2278	14	1.0008	14	9.7208	13	8.9348	13
500000	1.6498	14	1.6498	14	1.6498	14	1.6498	14	1.6498	14	1.6498	14	1.6498	14	1.6498	14	1.6498	14	1.6498	14
600000	1.7878	14	1.7878	14	1.7878	14	1.7878	14	1.7878	14	1.7878	14	1.7878	14	1.7878	14	1.7878	14	1.7878	14
800000	2.0238	14	2.0238	14	2.0238	14	2.0238	14	2.0238	14	2.0238	14	2.0238	14	2.0238	14	2.0238	14	2.0238	14
1000000	2.2598	14	2.2598	14	2.2598	14	2.2598	14	2.2598	14	2.2598	14	2.2598	14	2.2598	14	2.2598	14	2.2598	14
1200000	2.8548	14	2.8518	14	2.8508	14	2.8498	14	2.8498	14	2.8498	14	2.8498	14	2.8498	14	2.8498	14	2.8498	14
1400000	3.4478	14	3.4478	14	3.4408	14	3.4408	14	3.4408	14	3.4408	14	3.4408	14	3.4408	14	3.4408	14	3.4408	14
1600000	4.0408	14	4.0408	14	4.0408	14	4.0408	14	4.0408	14	4.0408	14	4.0408	14	4.0408	14	4.0408	14	4.0408	14
1800000	5.6288	14	5.6288	14	5.6288	14	5.6288	14	5.6288	14	5.6288	14	5.6288	14	5.6288	14	5.6288	14	5.6288	14
2000000	7.0098	14	7.0098	14	7.0098	14	7.0098	14	7.0098	14	7.0098	14	7.0098	14	7.0098	14	7.0098	14	7.0098	14
2200000	8.1898	14	8.1898	14	8.1898	14	8.1898	14	8.1898	14	8.1898	14	8.1898	14	8.1898	14	8.1898	14	8.1898	14
2400000	1.0558	15	1.0558	15	1.0558	15	1.0558	15	1.0558	15	1.0558	15	1.0558	15	1.0558	15	1.0558	15	1.0558	15
2600000	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15
2800000	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15
3000000	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15

TABLE 10B(CONT) ENTHALPY (ERG/CM) OF EQUILIBRIUM AIR

TEMP. (DEG K)	LOG DENSITY RATIO									
	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0
10500	4.141E 11	5.477E 11	5.078E 11	4.936E 11	4.668E 11	4.409E 11	4.195E 11	3.710E 11	3.137E 11	2.615E 11
10800	7.004E 11	6.031E 11	5.462E 11	5.108E 11	4.885E 11	4.704E 11	4.449E 11	4.071E 11	3.512E 11	2.939E 11
11000	8.040E 11	6.766E 11	5.941E 11	5.366E 11	5.128E 11	4.917E 11	4.704E 11	4.378E 11	3.809E 11	3.275E 11
11500	9.237E 11	7.624E 11	6.524E 11	5.931E 11	5.408E 11	5.140E 11	4.924E 11	4.644E 11	4.190E 11	3.611E 11
12000	1.050E 12	8.610E 11	7.216E 11	6.301E 11	5.735E 11	5.384E 11	5.130E 11	4.802E 11	4.454E 11	3.930E 11
12500	1.176E 12	9.688E 11	8.012E 11	6.922E 11	6.114E 11	5.658E 11	5.360E 11	5.104E 11	4.762E 11	4.240E 11
13000	1.293E 12	1.081E 12	8.897E 11	7.604E 11	6.551E 11	5.967E 11	5.599E 11	5.321E 11	5.004E 11	4.539E 11
13500	1.394E 12	1.192E 12	9.847E 11	8.391E 11	7.047E 11	6.316E 11	5.850E 11	5.542E 11	5.235E 11	4.809E 11
14000	1.478E 12	1.296E 12	1.083E 12	9.062E 11	7.602E 11	6.707E 11	6.143E 11	5.771E 11	5.457E 11	5.042E 11
14500	1.545E 12	1.399E 12	1.181E 12	9.783E 11	8.212E 11	7.141E 11	6.454E 11	6.015E 11	5.676E 11	5.302E 11
15000	1.598E 12	1.470E 12	1.275E 12	1.063E 12	8.870E 11	7.617E 11	6.800E 11	6.276E 11	5.902E 11	5.535E 11
15500	1.640E 12	1.538E 12	1.342E 12	1.149E 12	9.568E 11	8.134E 11	7.174E 11	6.554E 11	6.134E 11	5.759E 11
16000	1.674E 12	1.594E 12	1.440E 12	1.233E 12	1.029E 12	8.687E 11	7.578E 11	6.857E 11	6.376E 11	5.965E 11
16500	1.703E 12	1.640E 12	1.510E 12	1.314E 12	1.103E 12	9.272E 11	8.012E 11	7.160E 11	6.631E 11	6.213E 11
17000	1.729E 12	1.679E 12	1.570E 12	1.390E 12	1.177E 12	9.881E 11	8.473E 11	7.524E 11	6.900E 11	6.444E 11
17500	1.752E 12	1.712E 12	1.622E 12	1.459E 12	1.250E 12	1.051E 12	8.959E 11	7.699E 11	7.195E 11	6.686E 11
18000	1.774E 12	1.741E 12	1.667E 12	1.523E 12	1.321E 12	1.114E 12	9.445E 11	8.275E 11	7.400E 11	6.934E 11
18500	1.794E 12	1.767E 12	1.705E 12	1.579E 12	1.388E 12	1.178E 12	9.908E 11	8.678E 11	7.793E 11	7.191E 11
19000	1.819E 12	1.792E 12	1.739E 12	1.630E 12	1.451E 12	1.241E 12	1.052E 12	9.090E 11	8.119E 11	7.442E 11
19500	1.845E 12	1.816E 12	1.770E 12	1.675E 12	1.511E 12	1.303E 12	1.107E 12	9.531E 11	8.459E 11	7.742E 11
20000	1.873E 12	1.840E 12	1.798E 12	1.715E 12	1.565E 12	1.363E 12	1.161E 12	9.977E 11	8.811E 11	8.039E 11
20500	2.059E 12	1.936E 12	1.902E 12	1.844E 12	1.743E 12	1.578E 12	1.374E 12	1.182E 12	1.031E 12	9.304E 11
21000	2.440E 12	2.166E 12	2.031E 12	1.956E 12	1.876E 12	1.748E 12	1.565E 12	1.365E 12	1.191E 12	1.066E 12
21500	3.005E 12	2.540E 12	2.245E 12	2.091E 12	1.995E 12	1.866E 12	1.729E 12	1.536E 12	1.349E 12	1.204E 12
22000	3.600E 12	3.052E 12	2.587E 12	2.294E 12	2.132E 12	2.013E 12	1.871E 12	1.691E 12	1.499E 12	1.339E 12
22500	4.093E 12	3.593E 12	3.038E 12	2.593E 12	2.316E 12	2.149E 12	2.004E 12	1.833E 12	1.640E 12	1.448E 12
23000	4.450E 12	4.066E 12	3.526E 12	2.979E 12	2.570E 12	2.316E 12	2.140E 12	1.968E 12	1.773E 12	1.592E 12
23500	4.722E 12	4.434E 12	3.980E 12	3.409E 12	2.892E 12	2.530E 12	2.295E 12	2.105E 12	1.902E 12	1.711E 12
24000	4.986E 12	4.728E 12	4.363E 12	3.835E 12	3.260E 12	2.794E 12	2.478E 12	2.251E 12	2.032E 12	1.829E 12
24500	5.323E 12	4.994E 12	4.679E 12	4.222E 12	3.644E 12	3.100E 12	2.695E 12	2.414E 12	2.148E 12	1.948E 12
25000	5.793E 12	5.299E 12	4.951E 12	4.558E 12	4.016E 12	3.431E 12	2.945E 12	2.598E 12	2.314E 12	2.072E 12
25500	6.400E 12	5.688E 12	5.241E 12	4.855E 12	4.359E 12	3.768E 12	3.221E 12	2.804E 12	2.472E 12	2.201E 12
26000	7.090E 12	6.185E 12	5.568E 12	5.135E 12	4.671E 12	4.094E 12	3.512E 12	3.030E 12	2.645E 12	2.339E 12
26500	7.780E 12	6.775E 12	5.969E 12	5.428E 12	4.940E 12	4.400E 12	3.807E 12	3.272E 12	2.833E 12	2.486E 12
27000	8.409E 12	7.407E 12	6.449E 12	5.798E 12	5.241E 12	4.703E 12	4.099E 12	3.523E 12	3.032E 12	2.642E 12
27500	8.950E 12	8.030E 12	6.991E 12	6.141E 12	5.533E 12	4.984E 12	4.383E 12	3.762E 12	3.262E 12	2.807E 12
28000	1.163E 13	1.036E 13	9.649E 12	8.598E 12	7.471E 12	6.510E 12	5.742E 12	5.045E 12	4.350E 12	3.720E 12
28500	1.542E 13	1.376E 13	1.210E 13	1.091E 13	9.736E 12	8.505E 12	7.348E 12	6.376E 12	5.530E 12	4.746E 12
29000	1.881E 13	1.711E 13	1.538E 13	1.356E 13	1.195E 13	1.055E 13	9.191E 12	7.924E 12	6.827E 12	5.850E 12

150000	3.351E 13	3.316E 13	3.243E 13	3.110E 13	2.937E 13	2.808E 13	2.688E 13	2.588E 13	2.501E 13	1.797E 13	1.540E 13
200000	3.811E 13	3.803E 13	3.709E 13	3.740E 13	3.670E 13	3.524E 13	3.395E 13	3.279E 13	2.988E 13	2.632E 13	2.274E 13
300000	4.749E 13	4.717E 13	4.690E 13	4.674E 13	4.640E 13	4.560E 13	4.499E 13	4.409E 13	4.274E 13	3.975E 13	3.579E 13
400000	5.177E 13	7.234E 13	6.389E 13	5.800E 13	5.662E 13	5.541E 13	5.430E 13	5.275E 13	5.030E 13	4.662E 13	
500000	1.300E 14	1.151E 14	1.030E 14	9.317E 13	8.264E 13	7.316E 13	6.709E 13	6.351E 13	6.050E 13	5.681E 13	
600000	1.663E 14	1.594E 14	1.484E 14	1.332E 14	1.178E 14	1.032E 14	9.307E 13	8.269E 13	7.413E 13	6.822E 13	
800000	2.018E 14	2.010E 14	1.907E 14	1.939E 14	1.840E 14	1.743E 14	1.577E 14	1.389E 14	1.217E 14	1.059E 14	
1000000	2.250E 14	2.257E 14	2.254E 14	2.264E 14	2.227E 14	2.183E 14	2.097E 14	1.961E 14	1.771E 14	1.553E 14	
1500000	2.848E 14	2.847E 14	2.846E 14	2.845E 14	2.841E 14	2.834E 14	2.820E 14	2.791E 14	2.729E 14	2.608E 14	
2000000	3.430E 14	3.437E 14	3.434E 14	3.435E 14	3.432E 14	3.427E 14	3.418E 14	3.401E 14	3.369E 14	3.264E 14	
3000000	4.644E 14	4.639E 14	4.633E 14	4.635E 14	4.610E 14	4.611E 14	4.602E 14	4.589E 14	4.566E 14	4.526E 14	
4000000	5.820E 14	5.820E 14	5.827E 14	5.829E 14	5.821E 14	5.813E 14	5.800E 14	5.783E 14	5.758E 14	5.721E 14	
5000000	7.009E 14	7.000E 14	7.000E 14	7.007E 14	7.005E 14	7.001E 14	6.995E 14	6.982E 14	6.959E 14	6.921E 14	
6000000	8.189E 14	8.189E 14	8.188E 14	8.187E 14	8.186E 14	8.183E 14	8.178E 14	8.169E 14	8.151E 14	8.119E 14	
8000000	1.055E 15	1.055E 15	1.055E 15	1.055E 15	1.055E 15	1.054E 15	1.054E 15	1.053E 15	1.052E 15	1.049E 15	
10000000	1.291E 15	1.291E 15	1.291E 15	1.291E 15	1.291E 15	1.291E 15	1.290E 15	1.290E 15	1.288E 15	1.286E 15	

TABLE 109. EFFECTIVE GAMMA-1 - P/V/E OF EQUILIBRIUM AIR

TEMP. (DEG K)	-9.0	-8.5	-8.0	-7.5	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0
1000	0.030E-02	0.039E-02	0.040E-02	0.043E-02	0.040E-02	0.105E-02	0.232E-02	0.535E-02	9.105E-02	9.946E-02	1.051E-01
1050	0.300E-02	0.302E-02	0.303E-02	0.305E-02	0.301E-02	0.411E-02	0.472E-02	0.630E-02	9.012E-02	9.649E-02	1.051E-01
1100	0.709E-02	0.710E-02	0.721E-02	0.722E-02	0.725E-02	0.734E-02	0.764E-02	0.831E-02	9.076E-02	9.542E-02	1.031E-01
1150	0.005E-02	0.039E-02	0.050E-02	0.054E-02	0.057E-02	0.061E-02	0.074E-02	0.121E-02	9.251E-02	9.502E-02	1.015E-01
1200	0.207E-02	0.325E-02	0.365E-02	0.379E-02	0.383E-02	0.387E-02	0.394E-02	0.410E-02	9.491E-02	9.608E-02	1.012E-01
1250	0.201E-02	0.519E-02	0.645E-02	0.679E-02	0.703E-02	0.708E-02	0.713E-02	0.726E-02	9.767E-02	9.877E-02	1.011E-01
1300	0.898E-02	0.524E-02	0.042E-02	0.044E-02	1.001E-01	1.002E-01	1.003E-01	1.004E-01	1.004E-01	1.004E-01	1.003E-01
1350	0.418E-02	0.267E-02	0.076E-02	1.027E-01	1.039E-01	1.033E-01	1.034E-01	1.035E-01	1.034E-01	1.040E-01	1.051E-01
1400	7.999E-02	0.031E-02	0.081E-02	1.025E-01	1.031E-01	1.061E-01	1.064E-01	1.065E-01	1.064E-01	1.069E-01	1.077E-01
1450	7.755E-02	0.412E-02	0.301E-02	1.013E-01	1.063E-01	1.084E-01	1.092E-01	1.095E-01	1.094E-01	1.098E-01	1.103E-01
1500	7.656E-02	0.132E-02	0.089E-02	0.820E-02	1.039E-01	1.100E-01	1.110E-01	1.123E-01	1.126E-01	1.127E-01	1.130E-01
1550	7.637E-02	7.944E-02	0.572E-02	0.433E-02	1.037E-01	1.104E-01	1.137E-01	1.150E-01	1.154E-01	1.156E-01	1.158E-01
1600	7.672E-02	7.940E-02	0.384E-02	0.080E-02	1.004E-01	1.093E-01	1.140E-01	1.172E-01	1.181E-01	1.184E-01	1.184E-01
1650	7.760E-02	7.940E-02	0.299E-02	0.047E-02	0.609E-02	1.069E-01	1.140E-01	1.189E-01	1.204E-01	1.212E-01	1.214E-01
1700	7.894E-02	0.024E-02	0.262E-02	0.710E-02	0.400E-02	1.037E-01	1.134E-01	1.190E-01	1.227E-01	1.237E-01	1.241E-01
1750	0.055E-02	0.135E-02	0.317E-02	0.652E-02	0.203E-02	1.006E-01	1.109E-01	1.195E-01	1.242E-01	1.261E-01	1.268E-01
1800	0.230E-02	0.280E-02	0.400E-02	0.652E-02	0.911E-02	0.802E-02	1.006E-01	1.182E-01	1.250E-01	1.281E-01	1.291E-01
1850	0.409E-02	0.444E-02	0.521E-02	0.695E-02	0.045E-02	0.627E-02	1.052E-01	1.140E-01	1.240E-01	1.296E-01	1.314E-01
1900	0.584E-02	0.617E-02	0.660E-02	0.709E-02	0.051E-02	0.523E-02	1.029E-01	1.134E-01	1.230E-01	1.305E-01	1.330E-01
1950	0.748E-02	0.791E-02	0.031E-02	0.912E-02	0.102E-02	0.478E-02	1.012E-01	1.100E-01	1.220E-01	1.307E-01	1.352E-01
2000	0.888E-02	0.950E-02	0.000E-02	0.059E-02	0.191E-02	0.462E-02	1.001E-01	1.084E-01	1.197E-01	1.300E-01	1.343E-01
2050	0.850E-02	0.344E-02	0.591E-02	0.642E-02	0.751E-02	0.847E-02	1.005E-01	1.047E-01	1.120E-01	1.228E-01	1.347E-01
2100	0.235E-02	0.845E-02	0.547E-02	1.006E-01	1.032E-01	1.043E-01	1.053E-01	1.069E-01	1.105E-01	1.173E-01	1.270E-01
2150	0.168E-02	0.472E-02	0.979E-02	0.694E-02	1.041E-01	1.086E-01	1.107E-01	1.119E-01	1.134E-01	1.170E-01	1.237E-01
2200	0.466E-02	0.579E-02	0.019E-02	0.254E-02	0.933E-02	1.073E-01	1.135E-01	1.167E-01	1.184E-01	1.203E-01	1.240E-01
2250	0.351E-02	0.290E-02	0.025E-02	0.227E-02	0.623E-02	1.028E-01	1.112E-01	1.144E-01	1.224E-01	1.248E-01	1.270E-01
2300	0.982E-02	0.250E-02	0.376E-02	0.401E-02	0.671E-02	1.005E-01	1.071E-01	1.150E-01	1.237E-01	1.285E-01	1.312E-01
2350	0.637E-02	0.220E-02	0.015E-02	0.809E-02	0.937E-02	1.014E-01	1.054E-01	1.122E-01	1.213E-01	1.296E-01	1.346E-01
2400	0.324E-02	0.857E-02	0.491E-02	0.973E-02	1.023E-01	1.039E-01	1.062E-01	1.106E-01	1.181E-01	1.277E-01	1.359E-01
2450	0.316E-02	0.631E-02	0.150E-02	0.808E-02	1.035E-01	1.066E-01	1.086E-01	1.113E-01	1.164E-01	1.248E-01	1.347E-01
2500	0.471E-02	0.659E-02	0.978E-02	0.504E-02	1.018E-01	1.076E-01	1.110E-01	1.134E-01	1.164E-01	1.229E-01	1.323E-01
2550	0.594E-02	0.810E-02	0.019E-02	0.359E-02	0.913E-02	1.061E-01	1.120E-01	1.154E-01	1.184E-01	1.227E-01	1.302E-01
2600	0.545E-02	0.914E-02	0.154E-02	0.397E-02	0.775E-02	1.030E-01	1.110E-01	1.168E-01	1.205E-01	1.239E-01	1.295E-01
2650	0.422E-02	0.068E-02	0.256E-02	0.523E-02	0.777E-02	1.023E-01	1.090E-01	1.164E-01	1.219E-01	1.256E-01	1.300E-01
2700	0.391E-02	0.760E-02	0.226E-02	0.622E-02	0.908E-02	1.023E-01	1.074E-01	1.147E-01	1.220E-01	1.272E-01	1.313E-01
2750	0.459E-02	0.727E-02	0.132E-02	0.615E-02	1.001E-01	1.032E-01	1.071E-01	1.131E-01	1.210E-01	1.279E-01	1.320E-01
2800	0.451E-02	0.537E-02	0.610E-02	0.735E-02	0.977E-02	1.030E-01	1.093E-01	1.147E-01	1.193E-01	1.245E-01	1.321E-01
2850	1.035E-01	1.042E-01	1.055E-01	1.071E-01	1.084E-01	1.094E-01	1.114E-01	1.150E-01	1.204E-01	1.271E-01	1.330E-01
2900	1.153E-01	1.154E-01	1.155E-01	1.159E-01	1.170E-01	1.187E-01	1.204E-01	1.220E-01	1.242E-01	1.262E-01	1.349E-01

TABLE 109(CONT) EFFECTIVE GAMMA-1 - P/V/E OF EQUILIBRIUM AIR

TEMP. (DEG K)	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0
10000	1.194E-01	1.277E-01	1.337E-01	1.379E-01	1.408E-01	1.437E-01	1.464E-01	1.570E-01	1.711E-01	1.895E-01
10500	1.162E-01	1.259E-01	1.337E-01	1.394E-01	1.432E-01	1.463E-01	1.499E-01	1.564E-01	1.678E-01	1.843E-01
11000	1.129E-01	1.234E-01	1.327E-01	1.399E-01	1.450E-01	1.484E-01	1.520E-01	1.571E-01	1.681E-01	1.803E-01
11500	1.102E-01	1.207E-01	1.310E-01	1.377E-01	1.441E-01	1.504E-01	1.542E-01	1.584E-01	1.694E-01	1.776E-01
12000	1.084E-01	1.182E-01	1.289E-01	1.387E-01	1.465E-01	1.521E-01	1.562E-01	1.632E-01	1.640E-01	1.740E-01
12500	1.075E-01	1.162E-01	1.267E-01	1.373E-01	1.463E-01	1.530E-01	1.579E-01	1.620E-01	1.670E-01	1.754E-01
13000	1.074E-01	1.149E-01	1.248E-01	1.356E-01	1.456E-01	1.533E-01	1.593E-01	1.638E-01	1.684E-01	1.754E-01
13500	1.084E-01	1.144E-01	1.233E-01	1.339E-01	1.445E-01	1.532E-01	1.602E-01	1.653E-01	1.699E-01	1.740E-01
14000	1.099E-01	1.146E-01	1.223E-01	1.324E-01	1.433E-01	1.531E-01	1.608E-01	1.645E-01	1.713E-01	1.768E-01
14500	1.110E-01	1.154E-01	1.219E-01	1.313E-01	1.420E-01	1.524E-01	1.610E-01	1.675E-01	1.726E-01	1.778E-01
15000	1.141E-01	1.167E-01	1.221E-01	1.304E-01	1.408E-01	1.515E-01	1.608E-01	1.691E-01	1.737E-01	1.789E-01
15500	1.165E-01	1.184E-01	1.227E-01	1.301E-01	1.399E-01	1.506E-01	1.605E-01	1.685E-01	1.746E-01	1.799E-01
16000	1.191E-01	1.205E-01	1.238E-01	1.301E-01	1.391E-01	1.497E-01	1.599E-01	1.686E-01	1.753E-01	1.808E-01
16500	1.217E-01	1.227E-01	1.253E-01	1.306E-01	1.387E-01	1.489E-01	1.593E-01	1.685E-01	1.758E-01	1.815E-01
17000	1.244E-01	1.251E-01	1.271E-01	1.314E-01	1.386E-01	1.483E-01	1.587E-01	1.682E-01	1.760E-01	1.821E-01
17500	1.271E-01	1.274E-01	1.290E-01	1.325E-01	1.389E-01	1.478E-01	1.580E-01	1.678E-01	1.760E-01	1.824E-01
18000	1.297E-01	1.301E-01	1.312E-01	1.339E-01	1.394E-01	1.476E-01	1.575E-01	1.674E-01	1.759E-01	1.824E-01
18500	1.322E-01	1.326E-01	1.334E-01	1.354E-01	1.402E-01	1.476E-01	1.570E-01	1.669E-01	1.757E-01	1.827E-01
19000	1.347E-01	1.351E-01	1.357E-01	1.374E-01	1.413E-01	1.479E-01	1.568E-01	1.664E-01	1.754E-01	1.824E-01
19500	1.370E-01	1.376E-01	1.381E-01	1.394E-01	1.426E-01	1.484E-01	1.564E-01	1.662E-01	1.750E-01	1.820E-01
20000	1.390E-01	1.400E-01	1.405E-01	1.415E-01	1.441E-01	1.491E-01	1.567E-01	1.657E-01	1.746E-01	1.815E-01
20500	1.404E-01	1.409E-01	1.415E-01	1.425E-01	1.451E-01	1.501E-01	1.587E-01	1.676E-01	1.764E-01	1.830E-01
21000	1.424E-01	1.429E-01	1.435E-01	1.445E-01	1.471E-01	1.521E-01	1.607E-01	1.696E-01	1.784E-01	1.850E-01
21500	1.443E-01	1.448E-01	1.454E-01	1.464E-01	1.490E-01	1.540E-01	1.626E-01	1.715E-01	1.803E-01	1.869E-01
22000	1.463E-01	1.468E-01	1.474E-01	1.484E-01	1.510E-01	1.560E-01	1.646E-01	1.735E-01	1.823E-01	1.889E-01
22500	1.482E-01	1.487E-01	1.493E-01	1.503E-01	1.529E-01	1.579E-01	1.665E-01	1.754E-01	1.842E-01	1.908E-01
23000	1.502E-01	1.507E-01	1.513E-01	1.523E-01	1.549E-01	1.599E-01	1.685E-01	1.774E-01	1.862E-01	1.928E-01
23500	1.521E-01	1.526E-01	1.532E-01	1.542E-01	1.568E-01	1.618E-01	1.704E-01	1.793E-01	1.881E-01	1.947E-01
24000	1.541E-01	1.546E-01	1.552E-01	1.562E-01	1.588E-01	1.638E-01	1.724E-01	1.813E-01	1.901E-01	1.967E-01
24500	1.560E-01	1.565E-01	1.571E-01	1.581E-01	1.607E-01	1.657E-01	1.743E-01	1.832E-01	1.920E-01	1.986E-01
25000	1.580E-01	1.585E-01	1.591E-01	1.601E-01	1.627E-01	1.677E-01	1.763E-01	1.852E-01	1.940E-01	2.006E-01
25500	1.600E-01	1.605E-01	1.611E-01	1.621E-01	1.647E-01	1.697E-01	1.783E-01	1.872E-01	1.960E-01	2.026E-01
26000	1.620E-01	1.625E-01	1.631E-01	1.641E-01	1.667E-01	1.717E-01	1.803E-01	1.892E-01	1.980E-01	2.046E-01
26500	1.640E-01	1.645E-01	1.651E-01	1.661E-01	1.687E-01	1.737E-01	1.823E-01	1.912E-01	2.000E-01	2.066E-01
27000	1.660E-01	1.665E-01	1.671E-01	1.681E-01	1.707E-01	1.757E-01	1.843E-01	1.932E-01	2.020E-01	2.086E-01
27500	1.680E-01	1.685E-01	1.691E-01	1.701E-01	1.727E-01	1.777E-01	1.863E-01	1.952E-01	2.040E-01	2.106E-01
28000	1.700E-01	1.705E-01	1.711E-01	1.721E-01	1.747E-01	1.797E-01	1.883E-01	1.972E-01	2.060E-01	2.126E-01
28500	1.720E-01	1.725E-01	1.731E-01	1.741E-01	1.767E-01	1.817E-01	1.903E-01	1.992E-01	2.080E-01	2.146E-01
29000	1.740E-01	1.745E-01	1.751E-01	1.761E-01	1.787E-01	1.837E-01	1.923E-01	2.012E-01	2.100E-01	2.166E-01
29500	1.760E-01	1.765E-01	1.771E-01	1.781E-01	1.807E-01	1.857E-01	1.943E-01	2.032E-01	2.120E-01	2.186E-01
30000	1.780E-01	1.785E-01	1.791E-01	1.801E-01	1.827E-01	1.877E-01	1.963E-01	2.052E-01	2.140E-01	2.206E-01
30500	1.800E-01	1.805E-01	1.811E-01	1.821E-01	1.847E-01	1.897E-01	1.983E-01	2.072E-01	2.160E-01	2.226E-01
31000	1.820E-01	1.825E-01	1.831E-01	1.841E-01	1.867E-01	1.917E-01	2.003E-01	2.092E-01	2.180E-01	2.246E-01
31500	1.840E-01	1.845E-01	1.851E-01	1.861E-01	1.887E-01	1.937E-01	2.023E-01	2.112E-01	2.200E-01	2.266E-01
32000	1.860E-01	1.865E-01	1.871E-01	1.881E-01	1.907E-01	1.957E-01	2.043E-01	2.132E-01	2.220E-01	2.286E-01
32500	1.880E-01	1.885E-01	1.891E-01	1.901E-01	1.927E-01	1.977E-01	2.063E-01	2.152E-01	2.240E-01	2.306E-01
33000	1.900E-01	1.905E-01	1.911E-01	1.921E-01	1.947E-01	1.997E-01	2.083E-01	2.172E-01	2.260E-01	2.326E-01
33500	1.920E-01	1.925E-01	1.931E-01	1.941E-01	1.967E-01	2.017E-01	2.103E-01	2.192E-01	2.280E-01	2.346E-01
34000	1.940E-01	1.945E-01	1.951E-01	1.961E-01	1.987E-01	2.037E-01	2.123E-01	2.212E-01	2.300E-01	2.366E-01
34500	1.960E-01	1.965E-01	1.971E-01	1.981E-01	2.007E-01	2.057E-01	2.143E-01	2.232E-01	2.320E-01	2.386E-01
35000	1.980E-01	1.985E-01	1.991E-01	2.001E-01	2.027E-01	2.077E-01	2.163E-01	2.252E-01	2.340E-01	2.406E-01
35500	2.000E-01	2.005E-01	2.011E-01	2.021E-01	2.047E-01	2.097E-01	2.183E-01	2.272E-01	2.360E-01	2.426E-01
36000	2.020E-01	2.025E-01	2.031E-01	2.041E-01	2.067E-01	2.117E-01	2.203E-01	2.292E-01	2.380E-01	2.446E-01
36500	2.040E-01	2.045E-01	2.051E-01	2.061E-01	2.087E-01	2.137E-01	2.223E-01	2.312E-01	2.400E-01	2.466E-01
37000	2.060E-01	2.065E-01	2.071E-01	2.081E-01	2.107E-01	2.157E-01	2.243E-01	2.332E-01	2.420E-01	2.486E-01
37500	2.080E-01	2.085E-01	2.091E-01	2.101E-01	2.127E-01	2.177E-01	2.263E-01	2.352E-01	2.440E-01	2.506E-01
38000	2.100E-01	2.105E-01	2.111E-01	2.121E-01	2.147E-01	2.197E-01	2.283E-01	2.372E-01	2.460E-01	2.526E-01
38500	2.120E-01	2.125E-01	2.131E-01	2.141E-01	2.167E-01	2.217E-01	2.303E-01	2.392E-01	2.480E-01	2.546E-01
39000	2.140E-01	2.145E-01	2.151E-01	2.161E-01	2.187E-01	2.237E-01	2.323E-01	2.412E-01	2.500E-01	2.566E-01
39500	2.160E-01	2.165E-01	2.171E-01	2.181E-01	2.207E-01	2.257E-01	2.343E-01	2.432E-01	2.520E-01	2.586E-01
40000	2.180E-01	2.185E-01	2.191E-01	2.201E-01	2.227E-01	2.277E-01	2.363E-01	2.452E-01	2.540E-01	2.606E-01
40500	2.200E-01	2.205E-01	2.211E-01	2.221E-01	2.247E-01	2.297E-01	2.383E-01	2.472E-01	2.560E-01	2.626E-01
41000	2.220E-01	2.225E-01	2.231E-01	2.241E-01	2.267E-01	2.317E-01	2.403E-01	2.492E-01	2.580E-01	2.646E-01
41500	2.240E-01	2.245E-01	2.251E-01	2.261E-01	2.287E-01	2.337E-01	2.423E-01	2.512E-01	2.600E-01	2.666E-01
42000	2.260E-01	2.265E-01	2.271E-01	2.281E-01	2.307E-01	2.357E-01	2.443E-01	2.532E-01	2.620E-01	2.686E-01
42500	2.280E-01	2.285E-01	2.291E-01	2.301E-01	2.327E-01	2.377E-01	2.463E-01	2.552E-01	2.640E-01	2.706E-01
43000	2.300E-01	2.305E-01	2.311E-01	2.321E-01	2.347E-01	2.397E-01	2.483E-01	2.572E-01	2.660E-01	2.726E-01
43500	2.320E-01	2.325E-01	2.331E-01	2.341E-01	2.367E-01	2.417E-01	2.503E-01	2.592E-01	2.680E-01	2.746E-01
44000	2.340E-01	2.345E-01	2.351E-01	2.361E-01	2.387E-01	2.437E-01	2.523E-01	2.612E-01	2.700E-01	2.766E-01
44500	2.360E-01	2.365E-01	2.371E-01	2.381E-01	2.407E-01	2.457E-01	2.543E-01	2.632E-01	2.720E-01	2.786E-01
45000	2.380E-01	2.385E-01	2.391E-01	2.401E-01	2.427E-01	2.477E-01	2.563E-01	2.652E-01	2.740E-01	2.806E-01
45500	2.400E-01	2.405E-01	2.411E-01	2.421E-01	2.447E-01	2.497E-01	2.583E-01	2.672E-01	2.760E-01	2.826E-01
46000	2.420E-01	2.425E-01	2.431E-01	2.441E-01	2.467E-01	2.517E-01	2.603E-01	2.692E-01	2.780E-01	2.846E-01
46500	2.440E-01	2.445E-01	2.451E-01	2.461E-01	2.487E-01	2.537E-01	2.623E-01	2.712E-01	2.800E-01	2.866E-01
47000	2.460E-01	2.465E-01	2.471E-01	2.481E-01	2.507E-01	2.557E-01	2.643E-01	2.732E-01	2.820E-01	2.886E-01
47500	2.480E-01	2.485E-01	2.491E-01	2.501E-01	2.527E-01	2.577E-01	2.663E-01	2.752E-01	2.840E-01	2.906E-01
48000	2.500E-01	2.505E-01	2.511E-01	2.521E-01	2.547E-01	2.597E-01	2.683E-01	2.772E-01	2.860E-01	2.926E-01
48500	2.520E-01	2.525E-01	2.531E-01	2.541E-01	2.567E-01	2.617E-01	2.703E-01	2.792E-01	2.880E-01	2.946E-01
49000	2.540E-01	2.545E-01	2.551E-01	2.561E-01	2.587E-01	2.637E-01	2.723E-01			

90000	1.434E-01	1.509E-01	1.588E-01	1.649E-01	1.764E-01	1.864E-01	1.955E-01	2.037E-01	2.101E-01	2.114E-01
100000	1.482E-01	1.534E-01	1.610E-01	1.693E-01	1.779E-01	1.874E-01	1.972E-01	2.058E-01	2.121E-01	2.136E-01
150000	1.679E-01	1.805E-01	1.901E-01	1.928E-01	1.947E-01	2.023E-01	2.099E-01	2.182E-01	2.252E-01	2.279E-01
200000	2.247E-01	2.284E-01	2.284E-01	2.287E-01	2.293E-01	2.311E-01	2.344E-01	2.391E-01	2.440E-01	2.485E-01
300000	2.901E-01	2.917E-01	2.924E-01	2.926E-01	2.924E-01	2.925E-01	2.927E-01	2.934E-01	2.959E-01	2.993E-01
400000	2.358E-01	2.635E-01	2.969E-01	3.214E-01	3.332E-01	3.380E-01	3.401E-01	3.415E-01	3.433E-01	3.465E-01
500000	2.004E-01	2.214E-01	2.434E-01	2.635E-01	2.950E-01	3.298E-01	3.562E-01	3.783E-01	3.775E-01	3.429E-01
600000	1.991E-01	2.057E-01	2.170E-01	2.346E-01	2.615E-01	2.875E-01	3.184E-01	3.539E-01	3.830E-01	4.012E-01
800000	2.295E-01	2.302E-01	2.321E-01	2.343E-01	2.435E-01	2.550E-01	2.743E-01	3.014E-01	3.325E-01	3.673E-01
1000000	2.639E-01	2.639E-01	2.640E-01	2.644E-01	2.657E-01	2.691E-01	2.760E-01	2.881E-01	3.076E-01	3.352E-01
1500000	3.304E-01	3.304E-01	3.304E-01	3.304E-01	3.305E-01	3.304E-01	3.309E-01	3.319E-01	3.347E-01	3.413E-01
2000000	3.761E-01	3.761E-01	3.761E-01	3.761E-01	3.762E-01	3.762E-01	3.764E-01	3.787E-01	3.795E-01	3.813E-01
3000000	4.388E-01	4.393E-01	4.400E-01	4.407E-01	4.414E-01	4.418E-01	4.421E-01	4.425E-01	4.431E-01	4.441E-01
4000000	4.794E-01	4.794E-01	4.795E-01	4.796E-01	4.798E-01	4.804E-01	4.812E-01	4.822E-01	4.832E-01	4.844E-01
5000000	5.079E-01	5.079E-01	5.080E-01	5.080E-01	5.081E-01	5.082E-01	5.084E-01	5.090E-01	5.100E-01	5.114E-01
6000000	5.289E-01	5.289E-01	5.290E-01	5.290E-01	5.290E-01	5.291E-01	5.292E-01	5.295E-01	5.301E-01	5.311E-01
8000000	5.577E-01	5.577E-01	5.578E-01	5.578E-01	5.578E-01	5.579E-01	5.580E-01	5.581E-01	5.585E-01	5.590E-01
10000000	5.766E-01	5.766E-01	5.766E-01	5.766E-01	5.766E-01	5.767E-01	5.768E-01	5.769E-01	5.772E-01	5.776E-01

TABLE 110. DIMENSIONLESS ENTROPY, S/R, OF EQUILIBRIUM AIR

TEMP. (DEG K)	-9.0	-8.5	-8.0	-7.5	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0
10500	1.453E 02	1.397E 02	1.351E 02	1.304E 02	1.258E 02	1.201E 02	1.134E 02	1.045E 02	9.417E 01	8.427E 01	7.410E 01
10500	1.446E 02	1.400E 02	1.354E 02	1.306E 02	1.251E 02	1.212E 02	1.156E 02	1.085E 02	9.932E 01	8.921E 01	8.000E 01
11000	1.450E 02	1.404E 02	1.358E 02	1.312E 02	1.258E 02	1.210E 02	1.157E 02	1.108E 02	1.032E 02	9.300E 01	8.409E 01
11500	1.456E 02	1.408E 02	1.361E 02	1.315E 02	1.269E 02	1.222E 02	1.174E 02	1.121E 02	1.037E 02	9.755E 01	8.808E 01
12000	1.459E 02	1.414E 02	1.365E 02	1.318E 02	1.272E 02	1.226E 02	1.179E 02	1.129E 02	1.039E 02	1.003E 02	9.162E 01
12500	1.456E 02	1.426E 02	1.371E 02	1.322E 02	1.275E 02	1.229E 02	1.182E 02	1.134E 02	1.039E 02	1.022E 02	9.449E 01
13000	1.548E 02	1.450E 02	1.382E 02	1.327E 02	1.279E 02	1.232E 02	1.185E 02	1.138E 02	1.039E 02	1.034E 02	9.644E 01
13500	1.628E 02	1.495E 02	1.402E 02	1.337E 02	1.284E 02	1.235E 02	1.189E 02	1.142E 02	1.042E 02	1.042E 02	9.819E 01
14000	1.718E 02	1.563E 02	1.439E 02	1.353E 02	1.291E 02	1.240E 02	1.192E 02	1.145E 02	1.039E 02	1.040E 02	9.927E 01
14500	1.797E 02	1.642E 02	1.495E 02	1.382E 02	1.304E 02	1.246E 02	1.196E 02	1.148E 02	1.101E 02	1.053E 02	1.000E 02
15000	1.859E 02	1.718E 02	1.563E 02	1.426E 02	1.328E 02	1.256E 02	1.200E 02	1.151E 02	1.104E 02	1.056E 02	1.006E 02
15500	1.908E 02	1.779E 02	1.633E 02	1.483E 02	1.359E 02	1.271E 02	1.208E 02	1.155E 02	1.107E 02	1.060E 02	1.011E 02
16000	1.945E 02	1.828E 02	1.684E 02	1.546E 02	1.404E 02	1.295E 02	1.219E 02	1.161E 02	1.110E 02	1.063E 02	1.014E 02
16500	1.972E 02	1.867E 02	1.744E 02	1.605E 02	1.457E 02	1.329E 02	1.235E 02	1.168E 02	1.115E 02	1.066E 02	1.018E 02
17000	1.989E 02	1.894E 02	1.765E 02	1.656E 02	1.512E 02	1.371E 02	1.259E 02	1.179E 02	1.120E 02	1.069E 02	1.021E 02
17500	1.999E 02	1.916E 02	1.817E 02	1.690E 02	1.562E 02	1.416E 02	1.290E 02	1.195E 02	1.127E 02	1.073E 02	1.024E 02
18000	2.006E 02	1.929E 02	1.840E 02	1.733E 02	1.606E 02	1.465E 02	1.327E 02	1.217E 02	1.138E 02	1.078E 02	1.027E 02
18500	2.012E 02	1.937E 02	1.856E 02	1.759E 02	1.643E 02	1.509E 02	1.368E 02	1.244E 02	1.152E 02	1.085E 02	1.031E 02
19000	2.017E 02	1.944E 02	1.867E 02	1.779E 02	1.673E 02	1.540E 02	1.409E 02	1.276E 02	1.170E 02	1.093E 02	1.035E 02
19500	2.024E 02	1.949E 02	1.874E 02	1.793E 02	1.697E 02	1.561E 02	1.448E 02	1.310E 02	1.192E 02	1.105E 02	1.041E 02
20000	2.032E 02	1.955E 02	1.880E 02	1.803E 02	1.715E 02	1.609E 02	1.493E 02	1.346E 02	1.219E 02	1.120E 02	1.048E 02
20500	2.040E 02	1.962E 02	1.888E 02	1.827E 02	1.731E 02	1.671E 02	1.579E 02	1.466E 02	1.337E 02	1.207E 02	1.098E 02
21000	2.048E 02	1.970E 02	1.896E 02	1.871E 02	1.777E 02	1.694E 02	1.618E 02	1.532E 02	1.428E 02	1.304E 02	1.179E 02
21500	2.053E 02	1.975E 02	1.903E 02	1.893E 02	1.841E 02	1.729E 02	1.641E 02	1.561E 02	1.477E 02	1.377E 02	1.260E 02
22000	2.062E 02	1.980E 02	1.910E 02	1.903E 02	1.897E 02	1.806E 02	1.680E 02	1.585E 02	1.502E 02	1.417E 02	1.319E 02
22500	2.069E 02	1.988E 02	1.917E 02	1.925E 02	1.933E 02	1.826E 02	1.700E 02	1.627E 02	1.527E 02	1.441E 02	1.355E 02
23000	2.076E 02	1.995E 02	1.924E 02	1.936E 02	1.944E 02	1.837E 02	1.711E 02	1.702E 02	1.588E 02	1.465E 02	1.378E 02
23500	2.081E 02	1.999E 02	1.928E 02	1.940E 02	1.948E 02	1.841E 02	1.715E 02	1.795E 02	1.634E 02	1.503E 02	1.401E 02
24000	2.086E 02	2.003E 02	1.932E 02	1.944E 02	1.952E 02	1.844E 02	1.719E 02	1.877E 02	1.715E 02	1.559E 02	1.433E 02
24500	2.091E 02	2.007E 02	1.936E 02	1.948E 02	1.956E 02	1.848E 02	1.723E 02	1.934E 02	1.787E 02	1.627E 02	1.479E 02
25000	2.096E 02	2.011E 02	1.940E 02	1.952E 02	1.960E 02	1.852E 02	1.727E 02	1.971E 02	1.842E 02	1.692E 02	1.535E 02
25500	2.101E 02	2.015E 02	1.944E 02	1.956E 02	1.964E 02	1.856E 02	1.731E 02	1.975E 02	1.880E 02	1.745E 02	1.593E 02
26000	2.106E 02	2.019E 02	1.948E 02	1.960E 02	1.968E 02	1.860E 02	1.735E 02	1.979E 02	1.910E 02	1.784E 02	1.643E 02
26500	2.111E 02	2.023E 02	1.952E 02	1.964E 02	1.972E 02	1.864E 02	1.739E 02	1.983E 02	1.943E 02	1.815E 02	1.684E 02
27000	2.116E 02	2.027E 02	1.956E 02	1.968E 02	1.976E 02	1.868E 02	1.743E 02	1.987E 02	1.985E 02	1.844E 02	1.715E 02
27500	2.121E 02	2.031E 02	1.960E 02	1.972E 02	1.980E 02	1.872E 02	1.747E 02	1.991E 02	1.990E 02	1.878E 02	1.743E 02
28000	2.126E 02	2.035E 02	1.964E 02	1.976E 02	1.984E 02	1.876E 02	1.751E 02	1.995E 02	1.994E 02	1.887E 02	1.747E 02
28500	2.131E 02	2.039E 02	1.968E 02	1.980E 02	1.988E 02	1.880E 02	1.755E 02	1.999E 02	1.998E 02	1.891E 02	1.751E 02
29000	2.136E 02	2.043E 02	1.972E 02	1.984E 02	1.992E 02	1.884E 02	1.759E 02	2.003E 02	2.002E 02	1.895E 02	1.755E 02
29500	2.141E 02	2.047E 02	1.976E 02	1.988E 02	1.996E 02	1.888E 02	1.763E 02	2.007E 02	2.006E 02	1.899E 02	1.759E 02
30000	2.146E 02	2.051E 02	1.980E 02	1.992E 02	1.999E 02	1.892E 02	1.767E 02	2.011E 02	2.010E 02	1.903E 02	1.763E 02
30500	2.151E 02	2.055E 02	1.984E 02	1.996E 02	2.003E 02	1.896E 02	1.771E 02	2.015E 02	2.014E 02	1.907E 02	1.767E 02
31000	2.156E 02	2.059E 02	1.988E 02	1.999E 02	2.007E 02	1.899E 02	1.775E 02	2.019E 02	2.018E 02	1.911E 02	1.771E 02
31500	2.161E 02	2.063E 02	1.992E 02	2.003E 02	2.011E 02	1.903E 02	1.779E 02	2.023E 02	2.022E 02	1.915E 02	1.775E 02
32000	2.166E 02	2.067E 02	1.996E 02	2.007E 02	2.015E 02	1.907E 02	1.783E 02	2.027E 02	2.026E 02	1.919E 02	1.779E 02
32500	2.171E 02	2.071E 02	1.999E 02	2.011E 02	2.019E 02	1.911E 02	1.787E 02	2.031E 02	2.030E 02	1.923E 02	1.783E 02
33000	2.176E 02	2.075E 02	2.003E 02	2.015E 02	2.023E 02	1.915E 02	1.791E 02	2.035E 02	2.034E 02	1.927E 02	1.787E 02
33500	2.181E 02	2.079E 02	2.007E 02	2.019E 02	2.027E 02	1.919E 02	1.795E 02	2.039E 02	2.038E 02	1.931E 02	1.791E 02
34000	2.186E 02	2.083E 02	2.011E 02	2.023E 02	2.031E 02	1.923E 02	1.799E 02	2.043E 02	2.042E 02	1.935E 02	1.795E 02
34500	2.191E 02	2.087E 02	2.015E 02	2.027E 02	2.035E 02	1.927E 02	1.803E 02	2.047E 02	2.046E 02	1.939E 02	1.799E 02
35000	2.196E 02	2.091E 02	2.019E 02	2.031E 02	2.039E 02	1.931E 02	1.807E 02	2.051E 02	2.050E 02	1.943E 02	1.803E 02
35500	2.201E 02	2.095E 02	2.023E 02	2.035E 02	2.043E 02	1.935E 02	1.811E 02	2.055E 02	2.054E 02	1.947E 02	1.807E 02
36000	2.206E 02	2.099E 02	2.027E 02	2.039E 02	2.047E 02	1.939E 02	1.815E 02	2.059E 02	2.058E 02	1.951E 02	1.811E 02
36500	2.211E 02	2.103E 02	2.031E 02	2.043E 02	2.051E 02	1.943E 02	1.819E 02	2.063E 02	2.062E 02	1.955E 02	1.815E 02
37000	2.216E 02	2.107E 02	2.035E 02	2.047E 02	2.055E 02	1.947E 02	1.823E 02	2.067E 02	2.066E 02	1.959E 02	1.819E 02
37500	2.221E 02	2.111E 02	2.039E 02	2.051E 02	2.059E 02	1.951E 02	1.827E 02	2.071E 02	2.070E 02	1.963E 02	1.823E 02
38000	2.226E 02	2.115E 02	2.043E 02	2.055E 02	2.063E 02	1.955E 02	1.831E 02	2.075E 02	2.074E 02	1.967E 02	1.827E 02
38500	2.231E 02	2.119E 02	2.047E 02	2.059E 02	2.067E 02	1.959E 02	1.835E 02	2.079E 02	2.078E 02	1.971E 02	1.831E 02
39000	2.236E 02	2.123E 02	2.051E 02	2.063E 02	2.071E 02	1.963E 02	1.839E 02	2.083E 02	2.082E 02	1.975E 02	1.835E 02
39500	2.241E 02	2.127E 02	2.055E 02	2.067E 02	2.075E 02	1.967E 02	1.843E 02	2.087E 02	2.086E 02	1.979E 02	1.839E 02
40000	2.246E 02	2.131E 02	2.059E 02	2.071E 02	2.079E 02	1.971E 02	1.847E 02	2.091E 02	2.090E 02	1.983E 02	1.843E 02
40500	2.251E 02	2.135E 02	2.063E 02	2.075E 02	2.083E 02	1.975E 02	1.851E 02	2.095E 02	2.094E 02	1.987E 02	1.847E 02
41000	2.256E 02	2.139E 02	2.067E 02	2.079E 02	2.087E 02	1.979E 02	1.855E 02	2.099E 02	2.098E 02	1.991E 02	1.851E 02
41500	2.261E 02	2.143E 02	2.071E 02	2.083E 02	2.091E 02	1.983E 02	1.859E 02	2.103E 02	2.102E 02	1.995E 02	1.855E 02
42000	2.266E 02	2.147E 02	2.075E 02	2.087E 02	2.095E 02	1.987E 02	1.863E 02	2.107E 02	2.106E 02	1.999E 02	1.859E 02
42500	2.271E 02	2.151E 02	2.079E 02	2.091E 02	2.099E 02	1.991E 02	1.867E 02	2.111E 02	2.110E 02	2.003E 02	1.863E 02
43000	2.276E 02	2.155E 02	2.083E 02	2.095E 02	2.103E 02	1.995E 02	1.871E 02	2.115E 02	2.114E 02	2.007E 02	1.867E 02
43500	2.281E 02	2.159E 02	2.087E 02	2.099E 02	2.107E 02	1.999E 02	1.875E 02	2.119E 02	2.118E 02	2.011E 02	1.871E 02
44000	2.286E 02	2.163E 02	2.091E 02	2.103E 02	2.111E 02	2.003E 02	1.879E 02	2.123E 02	2.122E 02	2.015E 02	1.875E 02
44500	2.291E 02	2.167E 02	2.095E 02	2.107E 02	2.115E 02	2.007E 02	1.883E 02	2.127E 02	2.126E 02	2.019E 02	1.879E 02
45000	2.296E 02	2.171E 02	2.099E 02	2.111E 02	2.119E 02	2.011E 02	1.887E 02	2.131E 02	2.130E 02	2.023E 02	1.883E 02
45500	2.301E 02	2.175E 02	2.103E 02	2.115E 02	2.123E 02	2.015E 02	1.891E 02	2.13			

9CC00	3.930E 02	3.795E 02	3.612E 02	3.509E 02	3.344E 02	3.214E 02	3.041E 02	2.897E 02	2.739E 02	2.569E 02	2.393E 02
100000	3.957E 02	3.815E 02	3.672E 02	3.529E 02	3.364E 02	3.243E 02	3.097E 02	2.940E 02	2.790E 02	2.627E 02	2.462E 02
150000	4.033E 02	3.890E 02	3.747E 02	3.605E 02	3.427E 02	3.319E 02	3.177E 02	3.034E 02	2.891E 02	2.740E 02	2.605E 02
200000	4.111E 02	3.954E 02	3.806E 02	3.661E 02	3.510E 02	3.394E 02	3.231E 02	3.088E 02	2.945E 02	2.802E 02	2.659E 02
300000	5.133E 02	4.843E 02	4.531E 02	4.232E 02	4.024E 02	3.817E 02	3.592E 02	3.345E 02	3.100E 02	2.913E 02	2.740E 02
400000	5.423E 02	5.222E 02	5.009E 02	4.789E 02	4.579E 02	4.364E 02	4.134E 02	3.871E 02	3.595E 02	3.323E 02	3.097E 02

500000	5.485E 02	5.290E 02	5.104E 02	4.917E 02	4.726E 02	4.531E 02	4.330E 02	4.117E 02	3.901E 02	3.685E 02	3.454E 02
600000	5.530E 02	5.341E 02	5.152E 02	4.963E 02	4.773E 02	4.584E 02	4.394E 02	4.204E 02	4.011E 02	3.812E 02	3.604E 02
800000	5.601E 02	5.412E 02	5.223E 02	5.033E 02	4.844E 02	4.655E 02	4.466E 02	4.277E 02	4.087E 02	3.898E 02	3.709E 02
1000000	5.656E 02	5.467E 02	5.278E 02	5.088E 02	4.899E 02	4.710E 02	4.521E 02	4.332E 02	4.143E 02	3.953E 02	3.764E 02
1500000	5.757E 02	5.567E 02	5.378E 02	5.188E 02	4.999E 02	4.810E 02	4.621E 02	4.432E 02	4.242E 02	4.053E 02	3.864E 02
2000000	5.833E 02	5.643E 02	5.454E 02	5.264E 02	5.074E 02	4.884E 02	4.694E 02	4.504E 02	4.314E 02	4.124E 02	3.934E 02
3000000	5.933E 02	5.744E 02	5.554E 02	5.365E 02	5.175E 02	4.986E 02	4.797E 02	4.607E 02	4.418E 02	4.228E 02	4.039E 02
4000000	6.004E 02	5.815E 02	5.625E 02	5.436E 02	5.246E 02	5.057E 02	4.868E 02	4.679E 02	4.490E 02	4.299E 02	4.110E 02
5000000	6.099E 02	5.909E 02	5.719E 02	5.529E 02	5.339E 02	5.149E 02	4.959E 02	4.769E 02	4.579E 02	4.389E 02	4.199E 02
6000000	6.164E 02	5.915E 02	5.725E 02	5.534E 02	5.344E 02	5.154E 02	4.964E 02	4.774E 02	4.584E 02	4.394E 02	4.210E 02
8000000	6.175E 02	5.904E 02	5.704E 02	5.507E 02	5.317E 02	5.127E 02	4.937E 02	4.747E 02	4.557E 02	4.367E 02	4.181E 02
10000000	6.230E 02	6.041E 02	5.851E 02	5.662E 02	5.472E 02	5.283E 02	5.094E 02	4.904E 02	4.715E 02	4.525E 02	4.336E 02

TABLE 110(CONT) DIMENSIONLESS ENTROPY, S/R, OF EQUILIBRIUM AIR

TEMP. (DEG K)	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0
1000	7.001E 01	6.531E 01	6.157E 01	5.842E 01	5.554E 01	5.288E 01	4.951E 01	4.587E 01	4.208E 01	3.844E 01
1050	7.264E 01	6.703E 01	6.271E 01	5.920E 01	5.615E 01	5.328E 01	5.030E 01	4.692E 01	4.320E 01	3.942E 01
1100	7.563E 01	6.910E 01	6.407E 01	6.011E 01	5.681E 01	5.305E 01	5.004E 01	4.777E 01	4.420E 01	4.037E 01
1150	7.898E 01	7.147E 01	6.566E 01	6.117E 01	5.754E 01	5.442E 01	5.150E 01	4.847E 01	4.508E 01	4.147E 01
1200	8.234E 01	7.407E 01	6.747E 01	6.238E 01	5.837E 01	5.502E 01	5.202E 01	4.905E 01	4.583E 01	4.231E 01
1250	8.553E 01	7.680E 01	6.947E 01	6.375E 01	5.929E 01	5.568E 01	5.254E 01	4.957E 01	4.647E 01	4.304E 01
1300	8.834E 01	7.951E 01	7.161E 01	6.524E 01	6.033E 01	5.639E 01	5.308E 01	5.004E 01	4.703E 01	4.373E 01
1350	9.067E 01	8.208E 01	7.381E 01	6.689E 01	6.144E 01	5.717E 01	5.365E 01	5.034E 01	4.752E 01	4.433E 01
1400	9.250E 01	8.439E 01	7.599E 01	6.860E 01	6.268E 01	5.802E 01	5.426E 01	5.102E 01	4.799E 01	4.487E 01
1450	9.388E 01	8.637E 01	7.808E 01	7.036E 01	6.397E 01	5.893E 01	5.490E 01	5.131E 01	4.843E 01	4.535E 01
1500	9.492E 01	8.800E 01	8.001E 01	7.210E 01	6.532E 01	5.990E 01	5.559E 01	5.202E 01	4.880E 01	4.580E 01
1550	9.569E 01	8.930E 01	8.173E 01	7.360E 01	6.670E 01	6.091E 01	5.631E 01	5.254E 01	4.930E 01	4.622E 01
1600	9.628E 01	9.033E 01	8.321E 01	7.541E 01	6.808E 01	6.196E 01	5.707E 01	5.312E 01	4.974E 01	4.663E 01
1650	9.676E 01	9.114E 01	8.447E 01	7.689E 01	6.945E 01	6.304E 01	5.787E 01	5.370E 01	5.019E 01	4.703E 01
1700	9.715E 01	9.178E 01	8.551E 01	7.823E 01	7.077E 01	6.412E 01	5.868E 01	5.430E 01	5.066E 01	4.743E 01
1750	9.749E 01	9.230E 01	8.636E 01	7.942E 01	7.202E 01	6.520E 01	5.951E 01	5.492E 01	5.113E 01	4.783E 01
1800	9.780E 01	9.273E 01	8.707E 01	8.045E 01	7.319E 01	6.627E 01	6.036E 01	5.555E 01	5.142E 01	4.823E 01
1850	9.810E 01	9.310E 01	8.765E 01	8.134E 01	7.428E 01	6.730E 01	6.120E 01	5.620E 01	5.211E 01	4.883E 01
1900	9.842E 01	9.344E 01	8.814E 01	8.211E 01	7.524E 01	6.829E 01	6.204E 01	5.686E 01	5.262E 01	4.905E 01
1950	9.875E 01	9.375E 01	8.857E 01	8.276E 01	7.614E 01	6.923E 01	6.287E 01	5.752E 01	5.313E 01	4.948E 01
2000	9.914E 01	9.405E 01	8.894E 01	8.332E 01	7.693E 01	7.011E 01	6.368E 01	5.817E 01	5.365E 01	4.991E 01
2200	1.017E 02	9.553E 01	9.021E 01	8.487E 01	7.930E 01	7.303E 01	6.641E 01	6.072E 01	5.571E 01	5.167E 01
2400	1.067E 02	9.818E 01	9.173E 01	8.634E 01	8.085E 01	7.508E 01	6.896E 01	6.298E 01	5.771E 01	5.339E 01
2600	1.136E 02	1.027E 02	9.421E 01	8.771E 01	8.210E 01	7.657E 01	7.077E 01	6.499E 01	5.951E 01	5.498E 01
2800	1.204E 02	1.085E 02	9.801E 01	8.987E 01	8.348E 01	7.781E 01	7.218E 01	6.646E 01	6.107E 01	5.640E 01
3000	1.255E 02	1.141E 02	1.027E 02	9.292E 01	8.529E 01	7.909E 01	7.340E 01	6.778E 01	6.237E 01	5.765E 01
3200	1.289E 02	1.187E 02	1.074E 02	9.664E 01	8.767E 01	8.059E 01	7.459E 01	6.894E 01	6.357E 01	5.875E 01
3400	1.313E 02	1.220E 02	1.116E 02	1.005E 02	9.055E 01	8.245E 01	7.588E 01	7.003E 01	6.462E 01	5.974E 01
3600	1.334E 02	1.244E 02	1.148E 02	1.042E 02	9.367E 01	8.465E 01	7.735E 01	7.119E 01	6.563E 01	6.066E 01
3800	1.361E 02	1.265E 02	1.172E 02	1.072E 02	9.674E 01	8.707E 01	7.903E 01	7.241E 01	6.662E 01	6.153E 01
4000	1.397E 02	1.287E 02	1.193E 02	1.097E 02	9.953E 01	8.956E 01	8.089E 01	7.374E 01	6.765E 01	6.239E 01
4200	1.442E 02	1.315E 02	1.212E 02	1.118E 02	1.019E 02	9.196E 01	8.284E 01	7.517E 01	6.873E 01	6.326E 01
4400	1.491E 02	1.350E 02	1.234E 02	1.136E 02	1.040E 02	9.417E 01	8.479E 01	7.688E 01	6.985E 01	6.414E 01
4600	1.537E 02	1.389E 02	1.261E 02	1.155E 02	1.058E 02	9.616E 01	8.668E 01	7.822E 01	7.102E 01	6.504E 01
4800	1.578E 02	1.430E 02	1.291E 02	1.175E 02	1.075E 02	9.794E 01	8.846E 01	7.975E 01	7.222E 01	6.594E 01
5000	1.611E 02	1.468E 02	1.324E 02	1.198E 02	1.092E 02	9.956E 01	9.011E 01	8.124E 01	7.343E 01	6.690E 01
6000	1.755E 02	1.604E 02	1.468E 02	1.330E 02	1.174E 02	9.710E 01	8.774E 01	7.912E 01	7.153E 01	6.912E 01
7000	1.931E 02	1.751E 02	1.582E 02	1.433E 02	1.296E 02	1.163E 02	1.041E 02	9.348E 01	8.412E 01	7.581E 01
8000	2.065E 02	1.884E 02	1.708E 02	1.536E 02	1.381E 02	1.241E 02	1.112E 02	9.932E 01	8.893E 01	7.989E 01

100000	2.291E 02	2.104E 02	1.908E 02	1.697E 02	1.488E 02	1.313E 02	1.174E 02	1.048E 02	9.341E 01	8.388E 01
120000	2.389E 02	2.225E 02	2.054E 02	1.872E 02	1.685E 02	1.508E 02	1.344E 02	1.193E 02	1.039E 02	9.422E 01
150000	2.468E 02	2.312E 02	2.157E 02	1.995E 02	1.827E 02	1.652E 02	1.477E 02	1.312E 02	1.142E 02	1.029E 02
200000	2.516E 02	2.373E 02	2.229E 02	2.083E 02	1.933E 02	1.777E 02	1.615E 02	1.450E 02	1.289E 02	1.140E 02
250000	2.559E 02	2.415E 02	2.272E 02	2.128E 02	1.983E 02	1.834E 02	1.685E 02	1.528E 02	1.370E 02	1.216E 02
300000	2.597E 02	2.451E 02	2.307E 02	2.163E 02	2.019E 02	1.874E 02	1.727E 02	1.577E 02	1.423E 02	1.268E 02
350000	2.630E 02	2.504E 02	2.345E 02	2.196E 02	2.050E 02	1.905E 02	1.759E 02	1.611E 02	1.461E 02	1.309E 02
400000	2.677E 02	2.647E 02	2.429E 02	2.245E 02	2.084E 02	1.934E 02	1.787E 02	1.639E 02	1.491E 02	1.341E 02
450000	2.820E 02	2.793E 02	2.571E 02	2.348E 02	2.145E 02	1.971E 02	1.815E 02	1.665E 02	1.517E 02	1.367E 02
500000	3.194E 02	2.929E 02	2.687E 02	2.465E 02	2.244E 02	2.034E 02	1.854E 02	1.673E 02	1.541E 02	1.391E 02
600000	3.389E 02	3.168E 02	2.931E 02	2.676E 02	2.428E 02	2.201E 02	1.995E 02	1.782E 02	1.641E 02	1.439E 02
700000	3.477E 02	3.273E 02	3.059E 02	2.839E 02	2.604E 02	2.356E 02	2.110E 02	1.898E 02	1.691E 02	1.501E 02
800000	3.510E 02	3.326E 02	3.129E 02	2.924E 02	2.708E 02	2.483E 02	2.245E 02	2.007E 02	1.785E 02	1.578E 02
900000	3.549E 02	3.359E 02	3.168E 02	2.973E 02	2.772E 02	2.560E 02	2.339E 02	2.106E 02	1.873E 02	1.634E 02
1000000	3.575E 02	3.385E 02	3.194E 02	3.005E 02	2.811E 02	2.611E 02	2.401E 02	2.181E 02	1.928E 02	1.725E 02
1200000	3.620E 02	3.431E 02	3.241E 02	3.052E 02	2.862E 02	2.670E 02	2.475E 02	2.273E 02	2.041E 02	1.841E 02
1500000	3.675E 02	3.486E 02	3.294E 02	3.107E 02	2.918E 02	2.728E 02	2.537E 02	2.343E 02	2.149E 02	1.944E 02
2000000	3.748E 02	3.557E 02	3.367E 02	3.178E 02	2.989E 02	2.799E 02	2.610E 02	2.420E 02	2.229E 02	2.034E 02
2500000	3.802E 02	3.612E 02	3.423E 02	3.233E 02	3.044E 02	2.855E 02	2.665E 02	2.475E 02	2.285E 02	2.094E 02
3000000	3.849E 02	3.659E 02	3.469E 02	3.279E 02	3.090E 02	2.900E 02	2.710E 02	2.521E 02	2.331E 02	2.140E 02
3500000	3.888E 02	3.698E 02	3.509E 02	3.319E 02	3.129E 02	2.939E 02	2.749E 02	2.559E 02	2.369E 02	2.179E 02
4000000	3.921E 02	3.731E 02	3.542E 02	3.352E 02	3.163E 02	2.973E 02	2.783E 02	2.593E 02	2.403E 02	2.212E 02
4500000	3.950E 02	3.760E 02	3.571E 02	3.381E 02	3.192E 02	3.002E 02	2.813E 02	2.623E 02	2.433E 02	2.242E 02
5000000	3.976E 02	3.786E 02	3.597E 02	3.407E 02	3.218E 02	3.028E 02	2.839E 02	2.649E 02	2.459E 02	2.269E 02
6000000	4.021E 02	3.831E 02	3.642E 02	3.452E 02	3.263E 02	3.074E 02	2.884E 02	2.694E 02	2.504E 02	2.315E 02
7000000	4.059E 02	3.869E 02	3.680E 02	3.490E 02	3.301E 02	3.112E 02	2.922E 02	2.732E 02	2.542E 02	2.353E 02
8000000	4.092E 02	3.902E 02	3.713E 02	3.523E 02	3.334E 02	3.145E 02	2.955E 02	2.765E 02	2.575E 02	2.384E 02
9000000	4.121E 02	3.931E 02	3.747E 02	3.552E 02	3.363E 02	3.174E 02	2.984E 02	2.794E 02	2.604E 02	2.414E 02
10000000	4.147E 02	3.951E 02	3.768E 02	3.578E 02	3.389E 02	3.200E 02	3.010E 02	2.821E 02	2.631E 02	2.447E 02

TABLE 111. ENTROPY (ERG/CM-DEG K) OF EQUILIBRIUM AIR

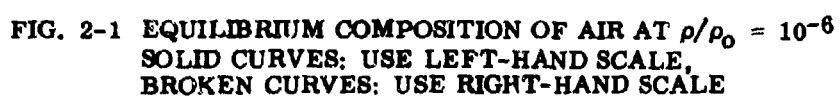
TEMP. (DEG K)	-9.0	-8.5	-8.0	-7.5	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0
1000	4.141E 08	4.009E 08	3.877E 08	3.743E 08	3.603E 08	3.448E 08	3.284E 08	3.000E 08	2.703E 08	2.419E 08	2.187E 08
1050	4.152E 08	4.019E 08	3.887E 08	3.753E 08	3.612E 08	3.478E 08	3.317E 08	3.113E 08	2.851E 08	2.561E 08	2.294E 08
1100	4.163E 08	4.029E 08	3.897E 08	3.763E 08	3.632E 08	3.495E 08	3.350E 08	3.100E 08	2.928E 08	2.692E 08	2.414E 08
1150	4.180E 08	4.041E 08	3.907E 08	3.774E 08	3.642E 08	3.508E 08	3.369E 08	3.210E 08	3.035E 08	2.800E 08	2.528E 08
1200	4.215E 08	4.086E 08	3.910E 08	3.784E 08	3.651E 08	3.518E 08	3.383E 08	3.241E 08	3.000E 08	2.879E 08	2.630E 08
1250	4.293E 08	4.092E 08	3.935E 08	3.795E 08	3.660E 08	3.527E 08	3.392E 08	3.256E 08	3.108E 08	2.933E 08	2.712E 08
1300	4.444E 08	4.162E 08	3.965E 08	3.810E 08	3.671E 08	3.536E 08	3.403E 08	3.268E 08	3.120E 08	2.968E 08	2.774E 08
1350	4.673E 08	4.291E 08	4.025E 08	3.834E 08	3.684E 08	3.548E 08	3.412E 08	3.277E 08	3.140E 08	2.992E 08	2.818E 08
1400	4.931E 08	4.480E 08	4.131E 08	3.888E 08	3.706E 08	3.558E 08	3.421E 08	3.286E 08	3.151E 08	3.009E 08	2.849E 08
1450	5.159E 08	4.714E 08	4.291E 08	3.967E 08	3.743E 08	3.574E 08	3.431E 08	3.295E 08	3.160E 08	3.022E 08	2.872E 08
1500	5.336E 08	4.930E 08	4.488E 08	4.094E 08	3.806E 08	3.604E 08	3.444E 08	3.305E 08	3.169E 08	3.032E 08	2.880E 08
1550	5.475E 08	5.107E 08	4.687E 08	4.258E 08	3.902E 08	3.649E 08	3.466E 08	3.316E 08	3.178E 08	3.041E 08	2.901E 08
1600	5.584E 08	5.247E 08	4.843E 08	4.434E 08	4.031E 08	3.718E 08	3.498E 08	3.332E 08	3.187E 08	3.050E 08	2.911E 08
1650	5.660E 08	5.359E 08	5.007E 08	4.608E 08	4.183E 08	3.815E 08	3.544E 08	3.353E 08	3.199E 08	3.059E 08	2.921E 08
1700	5.708E 08	5.443E 08	5.123E 08	4.732E 08	4.339E 08	3.935E 08	3.614E 08	3.385E 08	3.219E 08	3.040E 08	2.930E 08
1750	5.738E 08	5.499E 08	5.214E 08	4.874E 08	4.504E 08	4.070E 08	3.703E 08	3.431E 08	3.256E 08	3.080E 08	2.930E 08
1800	5.774E 08	5.530E 08	5.227E 08	4.905E 08	4.516E 08	4.205E 08	3.810E 08	3.493E 08	3.285E 08	3.094E 08	2.940E 08
1850	5.774E 08	5.530E 08	5.227E 08	4.905E 08	4.516E 08	4.205E 08	3.810E 08	3.493E 08	3.285E 08	3.094E 08	2.940E 08
1900	5.790E 08	5.548E 08	5.350E 08	5.107E 08	4.803E 08	4.443E 08	4.044E 08	3.662E 08	3.358E 08	3.139E 08	2.971E 08
1950	5.808E 08	5.564E 08	5.380E 08	5.147E 08	4.872E 08	4.539E 08	4.154E 08	3.761E 08	3.422E 08	3.172E 08	2.987E 08
2000	5.834E 08	5.610E 08	5.397E 08	5.173E 08	4.923E 08	4.618E 08	4.237E 08	3.863E 08	3.498E 08	3.214E 08	3.008E 08
2200	6.141E 08	5.716E 08	5.476E 08	5.245E 08	5.027E 08	4.797E 08	4.531E 08	4.208E 08	3.837E 08	3.465E 08	3.151E 08
2400	6.768E 08	6.220E 08	5.738E 08	5.371E 08	5.100E 08	4.849E 08	4.644E 08	4.394E 08	4.098E 08	3.748E 08	3.363E 08
2600	7.183E 08	6.745E 08	6.240E 08	5.720E 08	5.283E 08	4.962E 08	4.710E 08	4.481E 08	4.238E 08	3.953E 08	3.616E 08
2800	7.334E 08	7.025E 08	6.631E 08	6.164E 08	5.653E 08	5.183E 08	4.822E 08	4.549E 08	4.312E 08	4.040E 08	3.766E 08
3000	7.444E 08	7.142E 08	6.828E 08	6.463E 08	6.025E 08	5.529E 08	5.051E 08	4.670E 08	4.382E 08	4.137E 08	3.880E 08
3200	7.633E 08	7.344E 08	7.025E 08	6.675E 08	6.261E 08	5.839E 08	5.439E 08	5.000E 08	4.500E 08	4.206E 08	3.954E 08
3400	8.049E 08	7.486E 08	7.047E 08	6.704E 08	6.384E 08	6.038E 08	5.625E 08	5.153E 08	4.691E 08	4.313E 08	4.022E 08
3600	8.557E 08	7.919E 08	7.315E 08	6.841E 08	6.478E 08	6.152E 08	5.801E 08	5.387E 08	4.921E 08	4.475E 08	4.113E 08
3800	8.872E 08	8.331E 08	7.714E 08	7.103E 08	6.620E 08	6.244E 08	5.909E 08	5.550E 08	5.130E 08	4.670E 08	4.245E 08
4000	9.054E 08	8.594E 08	8.066E 08	7.464E 08	6.938E 08	6.380E 08	6.000E 08	5.658E 08	5.286E 08	4.857E 08	4.407E 08
4200	9.237E 08	8.761E 08	8.299E 08	7.774E 08	7.181E 08	6.599E 08	6.123E 08	5.746E 08	5.396E 08	5.008E 08	4.572E 08
4400	9.530E 08	8.941E 08	8.457E 08	7.987E 08	7.459E 08	6.871E 08	6.309E 08	5.854E 08	5.483E 08	5.121E 08	4.716E 08
4600	9.894E 08	9.211E 08	8.626E 08	8.140E 08	7.661E 08	7.174E 08	6.543E 08	6.007E 08	5.576E 08	5.209E 08	4.832E 08
4800	1.020E 09	9.535E 08	8.865E 08	8.295E 08	7.810E 08	7.320E 08	6.772E 08	6.201E 08	5.699E 08	5.292E 08	4.924E 08
5000	1.042E 09	9.817E 08	9.153E 08	8.501E 08	7.951E 08	7.467E 08	6.963E 08	6.406E 08	5.886E 08	5.390E 08	5.003E 08
6000	1.083E 09	1.038E 09	9.938E 08	9.288E 08	8.919E 08	8.307E 08	7.693E 08	7.093E 08	6.506E 08	6.077E 08	5.542E 08
7000	1.115E 09	1.070E 09	1.023E 09	9.745E 08	9.283E 08	8.828E 08	8.339E 08	7.781E 08	7.170E 08	6.577E 08	6.049E 08
8000	1.124E 09	1.083E 09	1.041E 09	9.884E 08	9.533E 08	9.057E 08	8.585E 08	8.123E 08	7.637E 08	7.090E 08	6.496E 08

100000	1.1295	07	1.0722	07	1.0722	07	1.0135	07	9.7195	08	9.3075	08	8.8905	08	8.4615	08	8.0095	08	7.5395	08	7.0675	08
120000	1.1455	09	1.1035	09	1.0645	09	1.0235	09	9.8105	08	9.4085	08	8.9985	08	8.5875	08	8.1745	08	7.7535	08	7.3145	08
150000	1.1585	09	1.1175	09	1.0745	09	1.0355	09	9.9375	08	9.5275	08	9.1185	08	8.7085	08	8.2985	08	7.8885	08	7.4745	08
200000	1.1805	09	1.1355	09	1.0925	09	1.0515	09	1.0105	09	9.6845	08	9.2735	08	8.8625	08	8.4525	08	8.0425	08	7.6325	08
250000	1.3245	09	1.2645	09	1.2015	09	1.1255	09	1.0525	09	9.9265	08	9.4395	08	8.9015	08	8.5815	08	8.1665	08	7.7545	08
300000	1.4735	09	1.3905	09	1.3015	09	1.2205	09	1.1555	09	1.0955	09	1.0315	09	9.6005	08	9.2215	08	8.7405	08	8.2605	08
350000	1.5235	09	1.4625	09	1.4035	09	1.3395	09	1.2655	09	1.1815	09	1.0995	09	1.0295	09	9.6745	08	9.0335	08	8.3495	08
400000	1.5575	09	1.4995	09	1.4385	09	1.3755	09	1.3135	09	1.2535	09	1.1875	09	1.1115	09	1.0295	09	9.5385	08	8.8885	08
450000	1.5675	09	1.5125	09	1.4575	09	1.4015	09	1.3435	09	1.2815	09	1.2195	09	1.1585	09	1.0935	09	1.0205	09	9.4035	08
500000	1.5745	09	1.5205	09	1.4645	09	1.4115	09	1.3545	09	1.3015	09	1.2435	09	1.1825	09	1.1205	09	1.0585	09	9.9135	08
600000	1.5875	09	1.5335	09	1.4795	09	1.4245	09	1.3705	09	1.3165	09	1.2615	09	1.2075	09	1.1515	09	1.0945	09	1.0345	09
700000	1.5985	09	1.5445	09	1.4905	09	1.4355	09	1.3815	09	1.3275	09	1.2725	09	1.2185	09	1.1645	09	1.1095	09	1.0545	09
800000	1.6085	09	1.5535	09	1.4995	09	1.4455	09	1.3905	09	1.3345	09	1.2825	09	1.2285	09	1.1735	09	1.1195	09	1.0645	09
900000	1.6165	09	1.5625	09	1.5075	09	1.4535	09	1.3995	09	1.3445	09	1.2905	09	1.2365	09	1.1825	09	1.1275	09	1.0735	09
1000000	1.6235	09	1.5695	09	1.5155	09	1.4615	09	1.4065	09	1.3525	09	1.2985	09	1.2435	09	1.1895	09	1.1355	09	1.0805	09
1200000	1.6365	09	1.5825	09	1.5285	09	1.4735	09	1.4195	09	1.3655	09	1.3115	09	1.2565	09	1.2025	09	1.1485	09	1.0935	09
1500000	1.6525	09	1.5985	09	1.5445	09	1.4895	09	1.4355	09	1.3815	09	1.3265	09	1.2725	09	1.2185	09	1.1635	09	1.1095	09
2000000	1.6745	09	1.6205	09	1.5655	09	1.5115	09	1.4565	09	1.4025	09	1.3475	09	1.2935	09	1.2385	09	1.1845	09	1.1295	09
2500000	1.6905	09	1.6365	09	1.5815	09	1.5275	09	1.4735	09	1.4185	09	1.3645	09	1.3095	09	1.2555	09	1.2005	09	1.1465	09
3000000	1.7035	09	1.6495	09	1.5945	09	1.5405	09	1.4855	09	1.4315	09	1.3775	09	1.3225	09	1.2685	09	1.2145	09	1.1595	09
3500000	1.7145	09	1.6595	09	1.6055	09	1.5515	09	1.4965	09	1.4425	09	1.3885	09	1.3335	09	1.2795	09	1.2255	09	1.1705	09
4000000	1.7235	09	1.6695	09	1.6155	09	1.5605	09	1.5045	09	1.4515	09	1.3975	09	1.3435	09	1.2895	09	1.2345	09	1.1805	09
4500000	1.7325	09	1.6775	09	1.6235	09	1.5695	09	1.5145	09	1.4605	09	1.4055	09	1.3515	09	1.2975	09	1.2425	09	1.1885	09
5000000	1.7395	09	1.6855	09	1.6305	09	1.5765	09	1.5225	09	1.4675	09	1.4135	09	1.3595	09	1.3045	09	1.2505	09	1.1955	09
6000000	1.7525	09	1.6985	09	1.6435	09	1.5895	09	1.5355	09	1.4805	09	1.4265	09	1.3715	09	1.3175	09	1.2635	09	1.2085	09
7000000	1.7635	09	1.7095	09	1.6545	09	1.6005	09	1.5455	09	1.4915	09	1.4375	09	1.3825	09	1.3285	09	1.2745	09	1.2195	09
8000000	1.7725	09	1.7185	09	1.6645	09	1.6095	09	1.5555	09	1.5015	09	1.4465	09	1.3925	09	1.3375	09	1.2835	09	1.2295	09
9000000	1.7815	09	1.7265	09	1.6725	09	1.6185	09	1.5635	09	1.5095	09	1.4555	09	1.4005	09	1.3465	09	1.2915	09	1.2375	09
10000000	1.7885	09	1.7345	09	1.6795	09	1.6255	09	1.5715	09	1.5165	09	1.4625	09	1.4085	09	1.3535	09	1.2995	09	1.2455	09

TABLE 111(CONT) ENTROPY (ERG/CM-DEG K) OF EQUILIBRIUM AIR

TEMP. (DEG K)	-3.3	-3.0	-2.5	-2.0	-1.0	-0.5	0.0	0.5	1.0
10000	2.009E 08	1.674E 08	1.767E 08	1.61E 08	1.512E 08	1.421E 08	1.317E 08	1.208E 08	1.110E 08
10500	2.035E 08	1.924E 08	1.800E 08	1.651E 08	1.529E 08	1.444E 08	1.347E 08	1.240E 08	1.137E 08
11000	2.172E 08	1.983E 08	1.839E 08	1.691E 08	1.563E 08	1.462E 08	1.371E 08	1.269E 08	1.164E 08
11500	2.267E 08	2.051E 08	1.885E 08	1.756E 08	1.652E 08	1.578E 08	1.391E 08	1.294E 08	1.190E 08
12000	2.363E 08	2.120E 08	1.917E 08	1.790E 08	1.675E 08	1.593E 08	1.408E 08	1.315E 08	1.214E 08
12500	2.459E 08	2.204E 08	1.994E 08	1.830E 08	1.702E 08	1.598E 08	1.423E 08	1.334E 08	1.236E 08
13000	2.554E 08	2.282E 08	2.059E 08	1.873E 08	1.731E 08	1.596E 08	1.437E 08	1.350E 08	1.255E 08
13500	2.603E 08	2.356E 08	2.119E 08	1.920E 08	1.764E 08	1.540E 08	1.451E 08	1.364E 08	1.272E 08
14000	2.659E 08	2.422E 08	2.181E 08	1.969E 08	1.799E 08	1.557E 08	1.464E 08	1.377E 08	1.288E 08
14500	2.695E 08	2.479E 08	2.241E 08	2.019E 08	1.834E 08	1.576E 08	1.479E 08	1.390E 08	1.302E 08
15000	2.724E 08	2.526E 08	2.294E 08	2.070E 08	1.875E 08	1.596E 08	1.493E 08	1.403E 08	1.315E 08
15500	2.747E 08	2.563E 08	2.344E 08	2.118E 08	1.914E 08	1.616E 08	1.509E 08	1.415E 08	1.327E 08
16000	2.764E 08	2.593E 08	2.388E 08	2.164E 08	1.954E 08	1.638E 08	1.525E 08	1.428E 08	1.339E 08
16500	2.777E 08	2.616E 08	2.424E 08	2.207E 08	1.993E 08	1.661E 08	1.541E 08	1.441E 08	1.350E 08
17000	2.788E 08	2.634E 08	2.454E 08	2.245E 08	2.031E 08	1.684E 08	1.558E 08	1.454E 08	1.361E 08
17500	2.798E 08	2.649E 08	2.479E 08	2.279E 08	2.067E 08	1.708E 08	1.574E 08	1.468E 08	1.373E 08
18000	2.807E 08	2.662E 08	2.499E 08	2.309E 08	2.101E 08	1.732E 08	1.595E 08	1.482E 08	1.384E 08
18500	2.814E 08	2.672E 08	2.516E 08	2.335E 08	2.132E 08	1.757E 08	1.613E 08	1.494E 08	1.396E 08
19000	2.825E 08	2.682E 08	2.530E 08	2.357E 08	2.160E 08	1.781E 08	1.632E 08	1.518E 08	1.408E 08
19500	2.835E 08	2.691E 08	2.542E 08	2.375E 08	2.184E 08	1.805E 08	1.651E 08	1.525E 08	1.420E 08
20000	2.844E 08	2.700E 08	2.553E 08	2.392E 08	2.208E 08	1.828E 08	1.670E 08	1.540E 08	1.433E 08
20500	2.851E 08	2.742E 08	2.589E 08	2.439E 08	2.274E 08	1.912E 08	1.743E 08	1.599E 08	1.483E 08
21000	2.862E 08	2.818E 08	2.633E 08	2.475E 08	2.320E 08	1.979E 08	1.809E 08	1.654E 08	1.532E 08
21500	2.872E 08	2.894E 08	2.704E 08	2.518E 08	2.357E 08	2.031E 08	1.863E 08	1.708E 08	1.578E 08
22000	2.884E 08	2.976E 08	2.813E 08	2.579E 08	2.394E 08	2.072E 08	1.908E 08	1.753E 08	1.619E 08
22500	2.895E 08	3.064E 08	2.948E 08	2.647E 08	2.440E 08	2.107E 08	1.945E 08	1.791E 08	1.655E 08
23000	2.906E 08	3.147E 08	3.084E 08	2.714E 08	2.514E 08	2.141E 08	1.979E 08	1.825E 08	1.684E 08
23500	2.917E 08	3.202E 08	3.202E 08	2.804E 08	2.593E 08	2.178E 08	2.011E 08	1.855E 08	1.715E 08
24000	2.928E 08	3.257E 08	3.294E 08	2.889E 08	2.680E 08	2.220E 08	2.043E 08	1.884E 08	1.741E 08
24500	2.939E 08	3.311E 08	3.369E 08	2.977E 08	2.769E 08	2.268E 08	2.072E 08	1.912E 08	1.764E 08
25000	2.950E 08	3.360E 08	3.423E 08	3.077E 08	2.859E 08	2.322E 08	2.117E 08	1.942E 08	1.791E 08
25500	2.961E 08	3.409E 08	3.479E 08	3.169E 08	2.951E 08	2.378E 08	2.159E 08	1.973E 08	1.816E 08
26000	2.972E 08	3.457E 08	3.543E 08	3.261E 08	3.044E 08	2.434E 08	2.201E 08	2.005E 08	1.841E 08
26500	2.983E 08	3.507E 08	3.618E 08	3.315E 08	3.138E 08	2.488E 08	2.245E 08	2.039E 08	1.867E 08
27000	2.994E 08	3.556E 08	3.694E 08	3.373E 08	3.233E 08	2.539E 08	2.289E 08	2.073E 08	1.893E 08
27500	2.995E 08	3.604E 08	3.769E 08	3.438E 08	3.328E 08	2.584E 08	2.332E 08	2.106E 08	1.920E 08
28000	3.006E 08	3.653E 08	3.844E 08	3.508E 08	3.423E 08	2.638E 08	2.376E 08	2.139E 08	1.947E 08
28500	3.017E 08	3.702E 08	3.919E 08	3.573E 08	3.518E 08	2.692E 08	2.419E 08	2.172E 08	1.974E 08
29000	3.028E 08	3.751E 08	3.994E 08	3.643E 08	3.613E 08	2.746E 08	2.463E 08	2.205E 08	1.999E 08
29500	3.039E 08	3.800E 08	4.069E 08	3.713E 08	3.708E 08	2.799E 08	2.507E 08	2.238E 08	2.026E 08
30000	3.050E 08	3.849E 08	4.144E 08	3.783E 08	3.803E 08	2.852E 08	2.551E 08	2.271E 08	2.053E 08
30500	3.061E 08	3.898E 08	4.219E 08	3.853E 08	3.898E 08	2.905E 08	2.595E 08	2.304E 08	2.080E 08
31000	3.072E 08	3.947E 08	4.294E 08	3.923E 08	3.993E 08	2.958E 08	2.639E 08	2.337E 08	2.107E 08
31500	3.083E 08	4.000E 08	4.369E 08	4.000E 08	4.088E 08	3.011E 08	2.683E 08	2.370E 08	2.134E 08
32000	3.094E 08	4.053E 08	4.444E 08	4.070E 08	4.183E 08	3.064E 08	2.727E 08	2.403E 08	2.161E 08
32500	3.105E 08	4.106E 08	4.519E 08	4.140E 08	4.278E 08	3.117E 08	2.771E 08	2.436E 08	2.188E 08
33000	3.116E 08	4.159E 08	4.594E 08	4.210E 08	4.373E 08	3.170E 08	2.815E 08	2.469E 08	2.215E 08
33500	3.127E 08	4.212E 08	4.669E 08	4.280E 08	4.468E 08	3.223E 08	2.859E 08	2.502E 08	2.242E 08
34000	3.138E 08	4.265E 08	4.744E 08	4.350E 08	4.563E 08	3.276E 08	2.903E 08	2.535E 08	2.269E 08
34500	3.149E 08	4.318E 08	4.819E 08	4.420E 08	4.658E 08	3.329E 08	2.947E 08	2.568E 08	2.296E 08
35000	3.160E 08	4.371E 08	4.894E 08	4.490E 08	4.753E 08	3.382E 08	2.991E 08	2.601E 08	2.323E 08
35500	3.171E 08	4.424E 08	4.969E 08	4.560E 08	4.848E 08	3.435E 08	3.035E 08	2.634E 08	2.350E 08
36000	3.182E 08	4.477E 08	5.044E 08	4.630E 08	4.943E 08	3.488E 08	3.079E 08	2.667E 08	2.377E 08
36500	3.193E 08	4.530E 08	5.119E 08	4.700E 08	5.038E 08	3.541E 08	3.123E 08	2.700E 08	2.404E 08
37000	3.204E 08	4.583E 08	5.194E 08	4.770E 08	5.133E 08	3.594E 08	3.167E 08	2.733E 08	2.431E 08
37500	3.215E 08	4.636E 08	5.269E 08	4.840E 08	5.228E 08	3.647E 08	3.211E 08	2.766E 08	2.458E 08
38000	3.226E 08	4.689E 08	5.344E 08	4.910E 08	5.323E 08	3.700E 08	3.255E 08	2.799E 08	2.485E 08
38500	3.237E 08	4.742E 08	5.419E 08	4.980E 08	5.418E 08	3.753E 08	3.299E 08	2.832E 08	2.512E 08
39000	3.248E 08	4.795E 08	5.494E 08	5.050E 08	5.513E 08	3.806E 08	3.343E 08	2.865E 08	2.539E 08
39500	3.259E 08	4.848E 08	5.569E 08	5.120E 08	5.608E 08	3.859E 08	3.387E 08	2.898E 08	2.566E 08
40000	3.270E 08	4.901E 08	5.644E 08	5.190E 08	5.703E 08	3.912E 08	3.431E 08	2.931E 08	2.593E 08
40500	3.281E 08	4.954E 08	5.719E 08	5.260E 08	5.798E 08	3.965E 08	3.475E 08	2.964E 08	2.620E 08
41000	3.292E 08	5.007E 08	5.794E 08	5.330E 08	5.893E 08	4.018E 08	3.519E 08	2.997E 08	2.647E 08
41500	3.303E 08	5.060E 08	5.869E 08	5.400E 08	5.988E 08	4.071E 08	3.563E 08	3.030E 08	2.674E 08
42000	3.314E 08	5.113E 08	5.944E 08	5.470E 08	6.083E 08	4.124E 08	3.607E 08	3.063E 08	2.701E 08
42500	3.325E 08	5.166E 08	6.019E 08	5.540E 08	6.178E 08	4.177E 08	3.651E 08	3.096E 08	2.728E 08
43000	3.336E 08	5.219E 08	6.094E 08	5.610E 08	6.273E 08	4.230E 08	3.695E 08	3.129E 08	2.755E 08
43500	3.347E 08	5.272E 08	6.169E 08	5.680E 08	6.368E 08	4.283E 08	3.739E 08	3.162E 08	2.782E 08
44000	3.358E 08	5.325E 08	6.244E 08	5.750E 08	6.463E 08	4.336E 08	3.783E 08	3.195E 08	2.809E 08
44500	3.369E 08	5.378E 08	6.319E 08	5.820E 08	6.558E 08	4.389E 08	3.827E 08	3.228E 08	2.836E 08
45000	3.380E 08	5.431E 08	6.394E 08	5.890E 08	6.653E 08	4.442E 08	3.871E 08	3.261E 08	2.863E 08
45500	3.391E 08	5.484E 08	6.469E 08	5.960E 08	6.748E 08	4.495E 08	3.915E 08	3.294E 08	2.890E 08
46000	3.402E 08	5.537E 08	6.544E 08	6.030E 08	6.843E 08	4.548E 08	3.959E 08	3.327E 08	2.917E 08
46500	3.413E 08	5.590E 08	6.619E 08	6.100E 08	6.938E 08	4.601E 08	3.999E 08	3.360E 08	2.944E 08
47000	3.424E 08	5.643E 08	6.694E 08	6.170E 08	7.033E 08	4.654E 08	4.043E 08	3.393E 08	2.971E 08
47500	3.435E 08	5.696E 08	6.769E 08	6.240E 08	7.128E 08	4.707E 08	4.087E 08	3.426E 08	3.000E 08
48000	3.446E 08	5.749E 08	6.844E 08	6.310E 08	7.223E 08	4.760E 08	4.131E 08	3.459E 08	3.027E 08
48500	3.457E 08	5.802E 08	6.919E 08	6.380E 08	7.318E 08	4.813E 08	4.175E 08	3.492E 08	3.054E 08
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49500	3.479E 08	5.908E 08	7.069E 08	6.520E 08	7.508E 08	4.919E 08	4.263E 08	3.558E 08	3.108E 08
50000	3.490E 08	5.961E 08	7.144E 08	6.590E 08	7.603E 08	4.972E 08	4.307E 08	3.591E 08	3.135E 08

120000	6.837E 08	6.383E 08	5.894E 08	5.373E 08	4.837E 08	4.329E 08	3.857E 08	3.424E 08	3.042E 08	2.711E 08
150000	7.060E 08	6.635E 08	6.191E 08	5.727E 08	5.244E 08	4.743E 08	4.242E 08	3.764E 08	3.335E 08	2.704E 08
200000	7.222E 08	6.811E 08	6.398E 08	5.977E 08	5.549E 08	5.101E 08	4.635E 08	4.162E 08	3.700E 08	3.272E 08
250000	7.343E 08	6.932E 08	6.521E 08	6.109E 08	5.695E 08	5.270E 08	4.834E 08	4.387E 08	3.933E 08	3.491E 08
300000	7.459E 08	7.056E 08	6.642E 08	6.229E 08	5.815E 08	5.390E 08	4.957E 08	4.520E 08	4.085E 08	3.644E 08
350000	7.574E 08	7.188E 08	6.770E 08	6.352E 08	5.936E 08	5.509E 08	5.076E 08	4.638E 08	4.194E 08	3.750E 08
400000	8.237E 08	7.597E 08	6.973E 08	6.443E 08	5.981E 08	5.550E 08	5.128E 08	4.704E 08	4.279E 08	3.849E 08
450000	8.647E 08	8.016E 08	7.380E 08	6.739E 08	6.157E 08	5.658E 08	5.210E 08	4.780E 08	4.353E 08	3.924E 08
500000	9.173E 08	8.406E 08	7.712E 08	7.074E 08	6.441E 08	5.843E 08	5.323E 08	4.841E 08	4.423E 08	3.992E 08
600000	9.724E 08	9.044E 08	8.414E 08	7.681E 08	6.949E 08	6.319E 08	5.690E 08	5.114E 08	4.594E 08	4.129E 08
700000	9.979E 08	9.333E 08	8.781E 08	8.140E 08	7.473E 08	6.763E 08	6.080E 08	5.447E 08	4.852E 08	4.309E 08
800000	1.010E 09	9.547E 08	8.982E 08	8.391E 08	7.774E 08	7.120E 08	6.443E 08	5.761E 08	5.123E 08	4.529E 08
900000	1.019E 09	9.641E 08	9.092E 08	8.534E 08	7.959E 08	7.340E 08	6.712E 08	6.044E 08	5.377E 08	4.747E 08
1000000	1.024E 09	9.717E 08	9.172E 08	8.624E 08	8.048E 08	7.494E 08	6.911E 08	6.299E 08	5.603E 08	4.952E 08
1200000	1.039E 09	9.847E 08	9.303E 08	8.759E 08	8.214E 08	7.644E 08	7.104E 08	6.524E 08	5.914E 08	5.285E 08
1500000	1.053E 09	1.000E 09	9.462E 08	8.918E 08	8.374E 08	7.830E 08	7.283E 08	6.731E 08	6.168E 08	5.585E 08
2000000	1.073E 09	1.021E 09	9.663E 08	9.122E 08	8.579E 08	8.035E 08	7.491E 08	6.945E 08	6.397E 08	5.843E 08
2500000	1.091E 09	1.037E 09	9.824E 08	9.280E 08	8.737E 08	8.193E 08	7.650E 08	7.105E 08	6.559E 08	6.011E 08
3000000	1.105E 09	1.050E 09	9.958E 08	9.413E 08	8.868E 08	8.323E 08	7.779E 08	7.235E 08	6.690E 08	6.143E 08
3500000	1.114E 09	1.061E 09	1.007E 09	9.528E 08	8.981E 08	8.435E 08	7.890E 08	7.345E 08	6.800E 08	6.254E 08
4000000	1.123E 09	1.071E 09	1.017E 09	9.622E 08	9.078E 08	8.533E 08	7.989E 08	7.442E 08	6.894E 08	6.350E 08
4500000	1.134E 09	1.079E 09	1.025E 09	9.705E 08	9.162E 08	8.618E 08	8.073E 08	7.528E 08	6.982E 08	6.434E 08
5000000	1.141E 09	1.087E 09	1.032E 09	9.780E 08	9.236E 08	8.693E 08	8.148E 08	7.604E 08	7.058E 08	6.512E 08
6000000	1.154E 09	1.100E 09	1.045E 09	9.909E 08	9.366E 08	8.822E 08	8.278E 08	7.734E 08	7.189E 08	6.644E 08
7000000	1.165E 09	1.111E 09	1.056E 09	1.002E 09	9.475E 08	8.931E 08	8.387E 08	7.843E 08	7.299E 08	6.755E 08
8000000	1.174E 09	1.120E 09	1.064E 09	1.011E 09	9.569E 08	9.026E 08	8.482E 08	7.938E 08	7.394E 08	6.850E 08
9000000	1.183E 09	1.128E 09	1.074E 09	1.020E 09	9.653E 08	9.109E 08	8.565E 08	8.022E 08	7.478E 08	6.938E 08
10000000	1.190E 09	1.134E 09	1.081E 09	1.027E 09	9.728E 08	9.184E 08	8.640E 08	8.094E 08	7.552E 08	7.008E 08



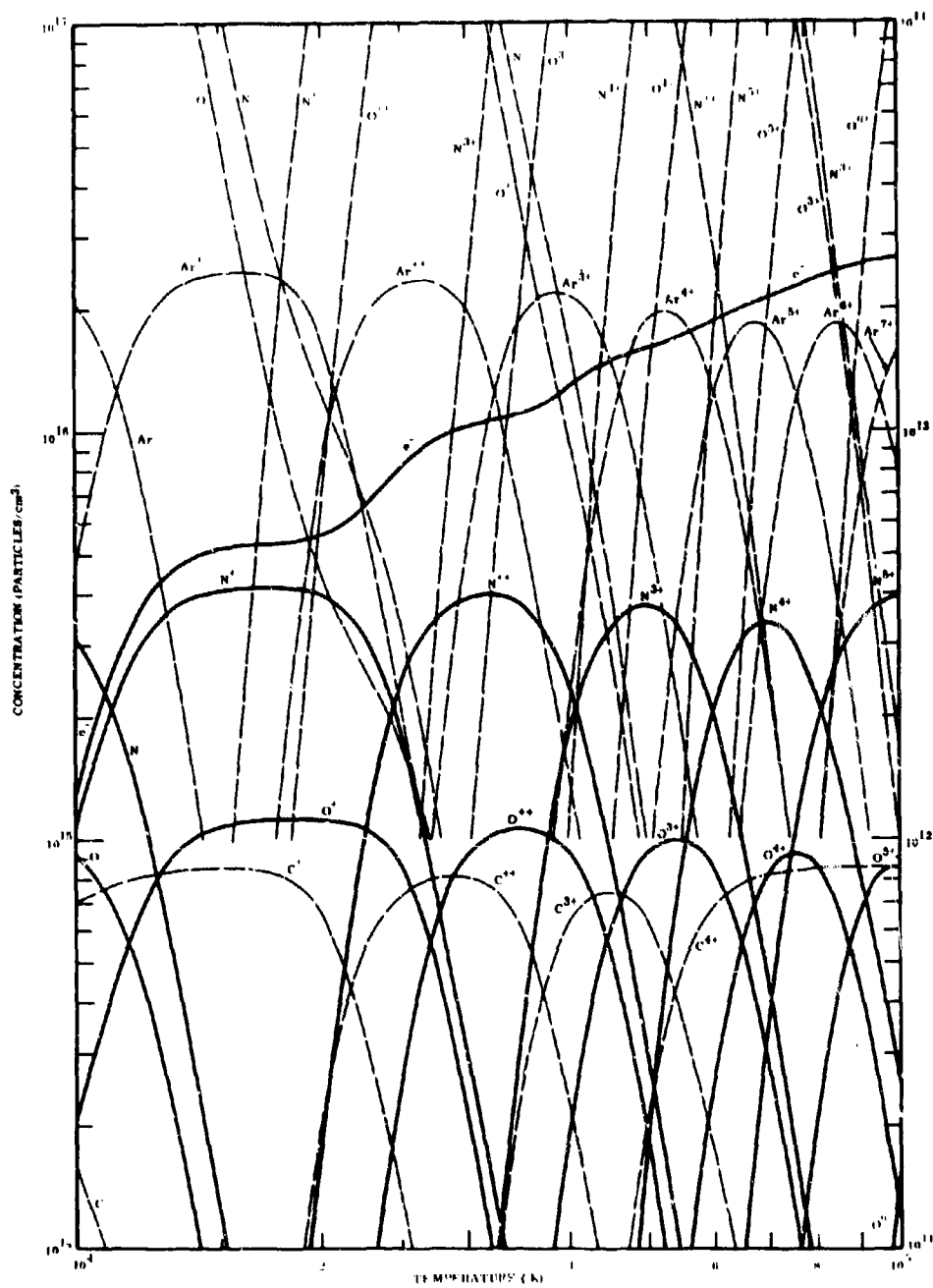


FIG. 2-2 EQUILIBRIUM COMPOSITION OF AIR AT $\rho/\rho_0 = 10^{-4}$
 SOLID CURVES: USE LEFT-HAND SCALE,
 BROKEN CURVES: USE RIGHT-HAND SCALE

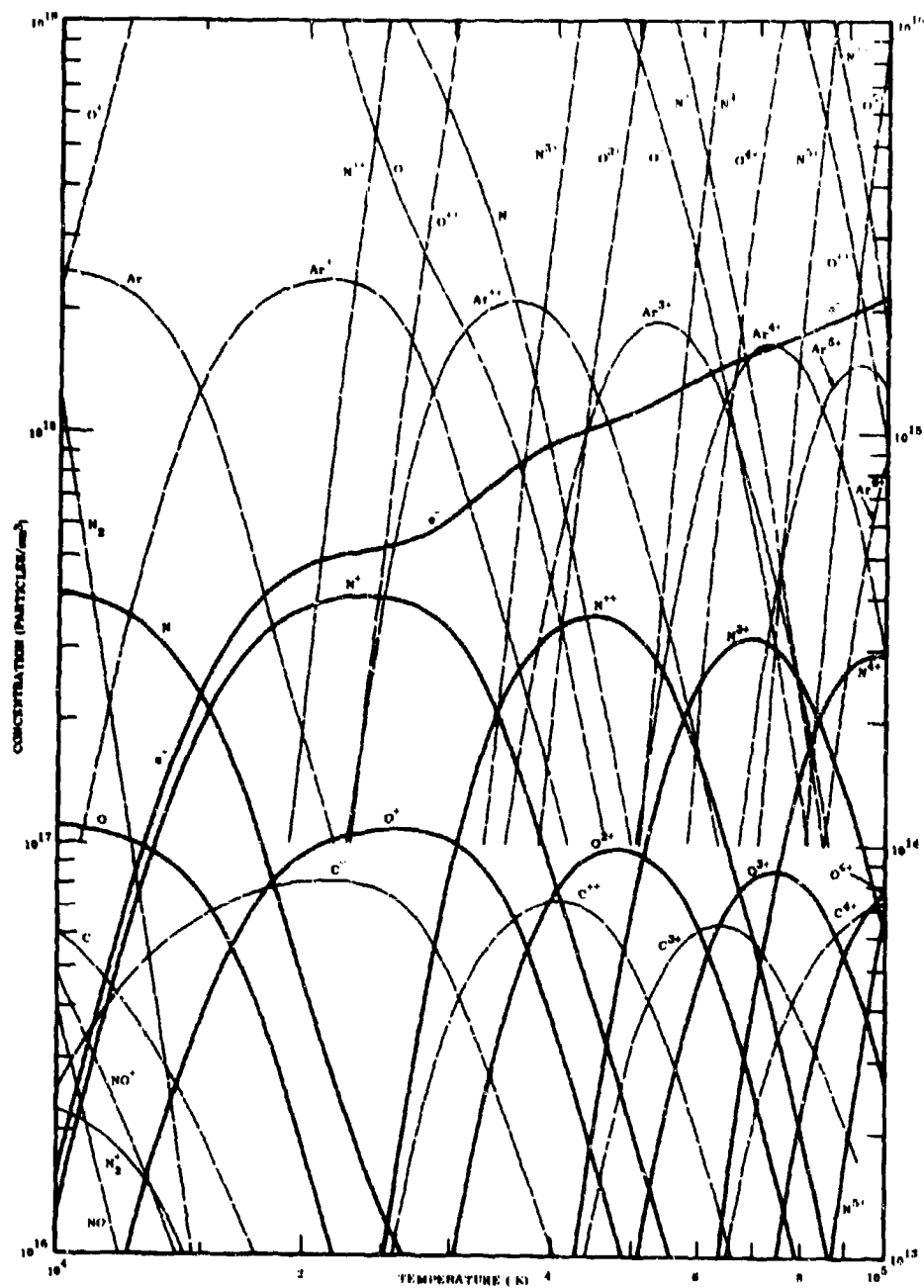


FIG. 2-3 EQUILIBRIUM COMPOSITION OF AIR AT $\rho/\rho_0 = 10^{-2}$
 SOLID CURVES: USE LEFT-HAND SCALE,
 BROKEN CURVES: USE RIGHT-HAND SCALE

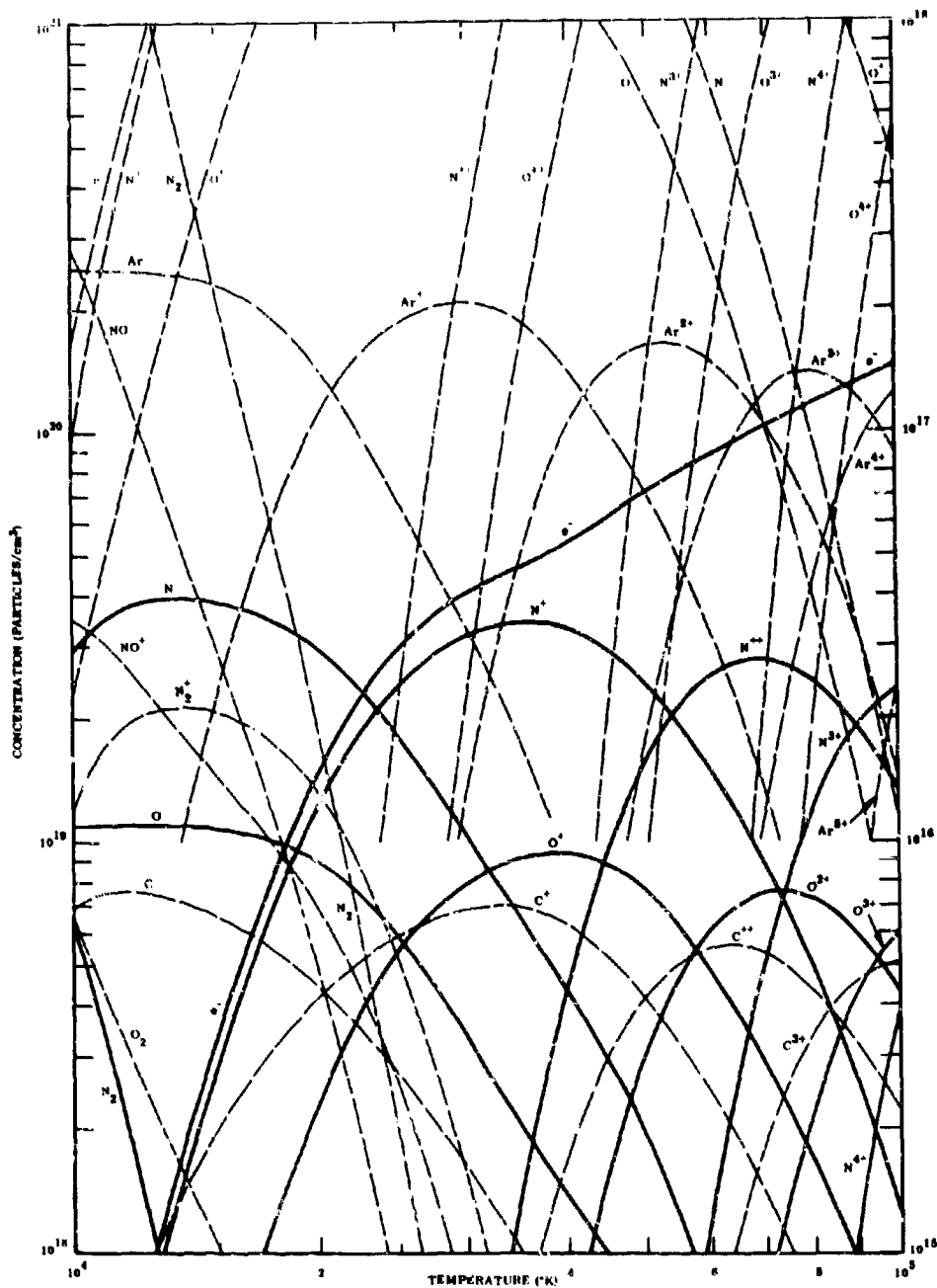


FIG. 2-4 EQUILIBRIUM COMPOSITION OF AIR AT $p/p_0 = 1$
 SOLID CURVES: USE LEFT-HAND SCALE,
 BROKEN CURVES: USE RIGHT-HAND SCALE

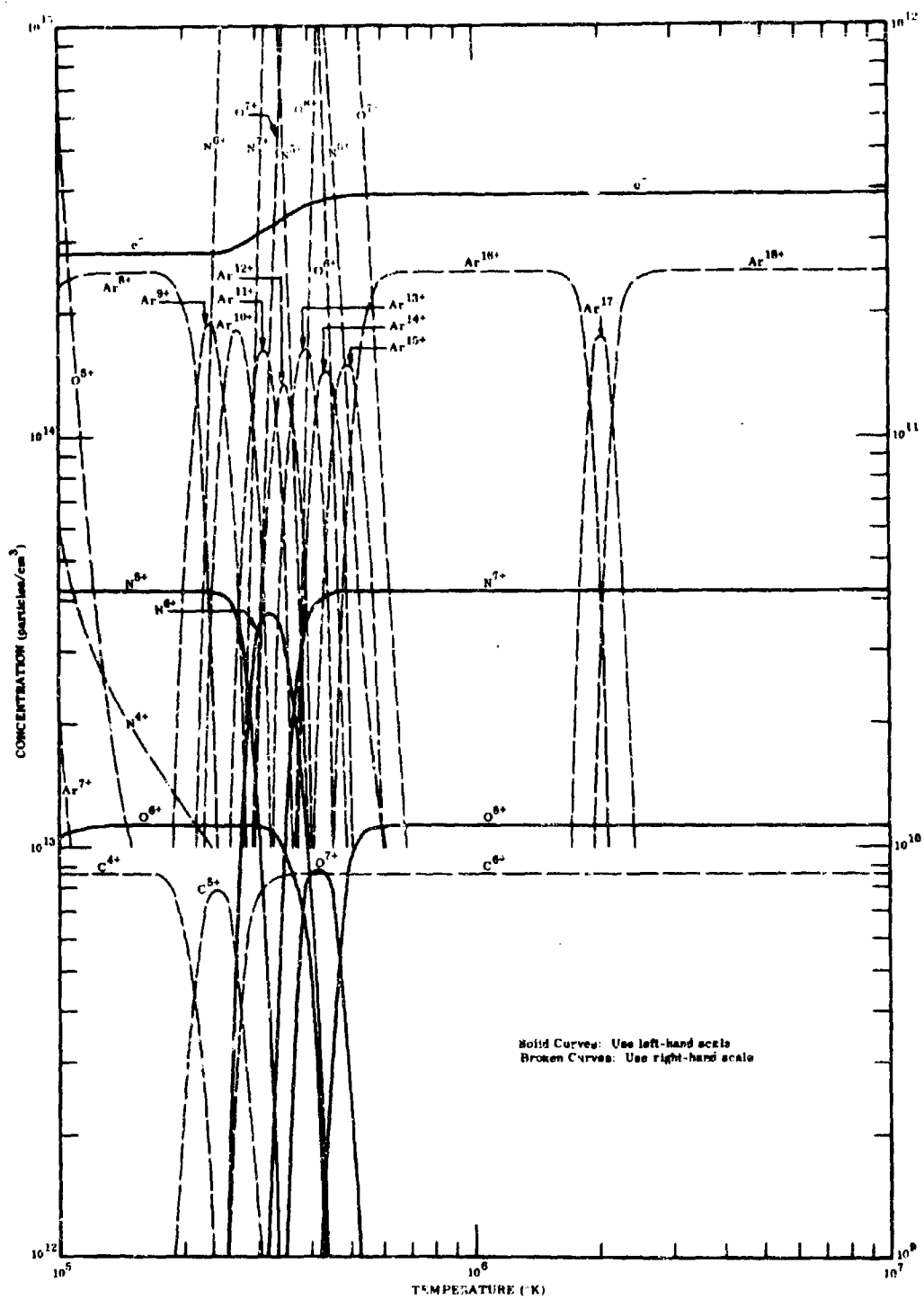


FIG. 2-5 EQUILIBRIUM COMPOSITION OF AIR AT $\rho/\rho_0 = 10^{-6}$

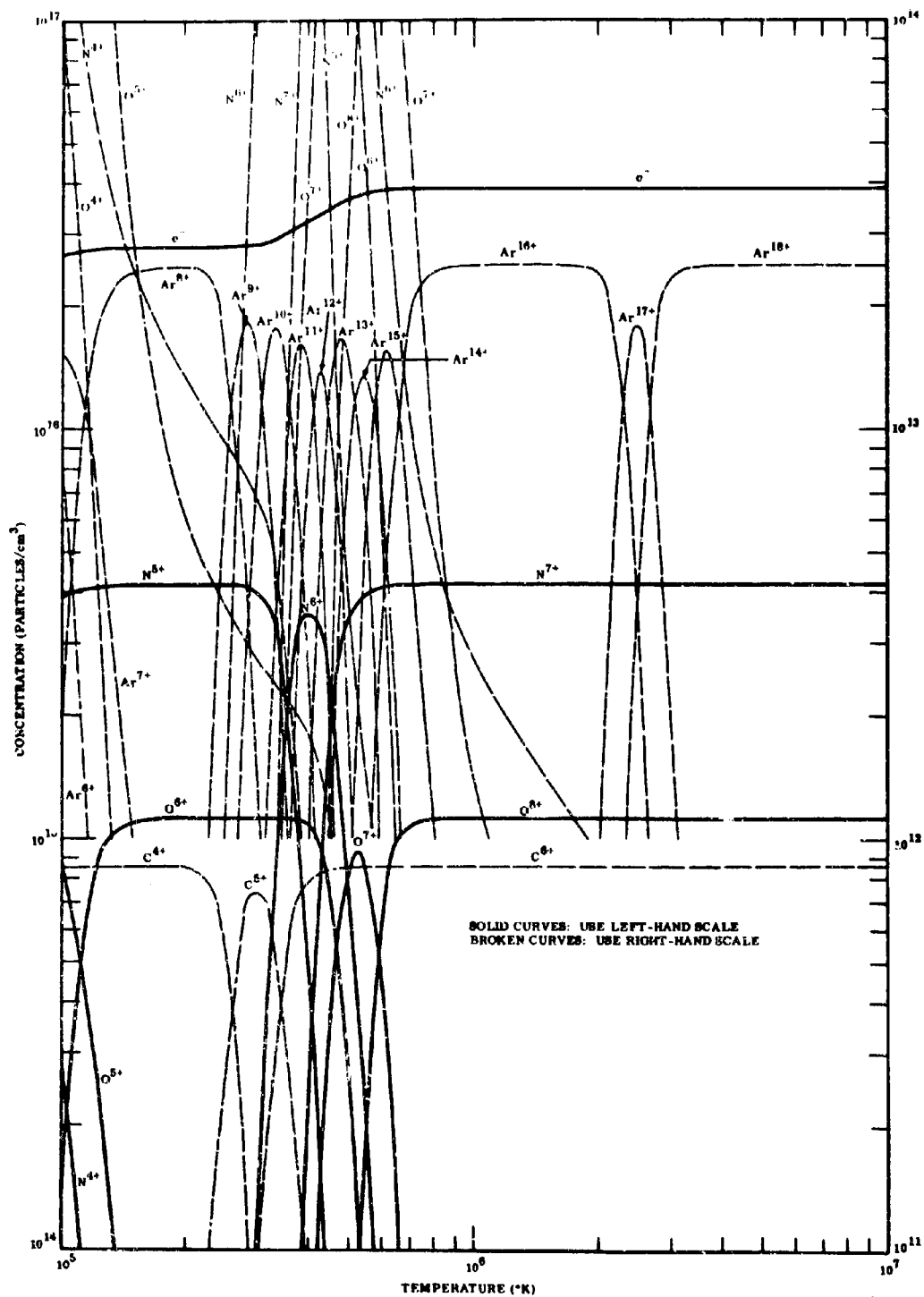


FIG. 2-6 EQUILIBRIUM COMPOSITION OF AIR AT $\rho/\rho_0 = 10^{-4}$

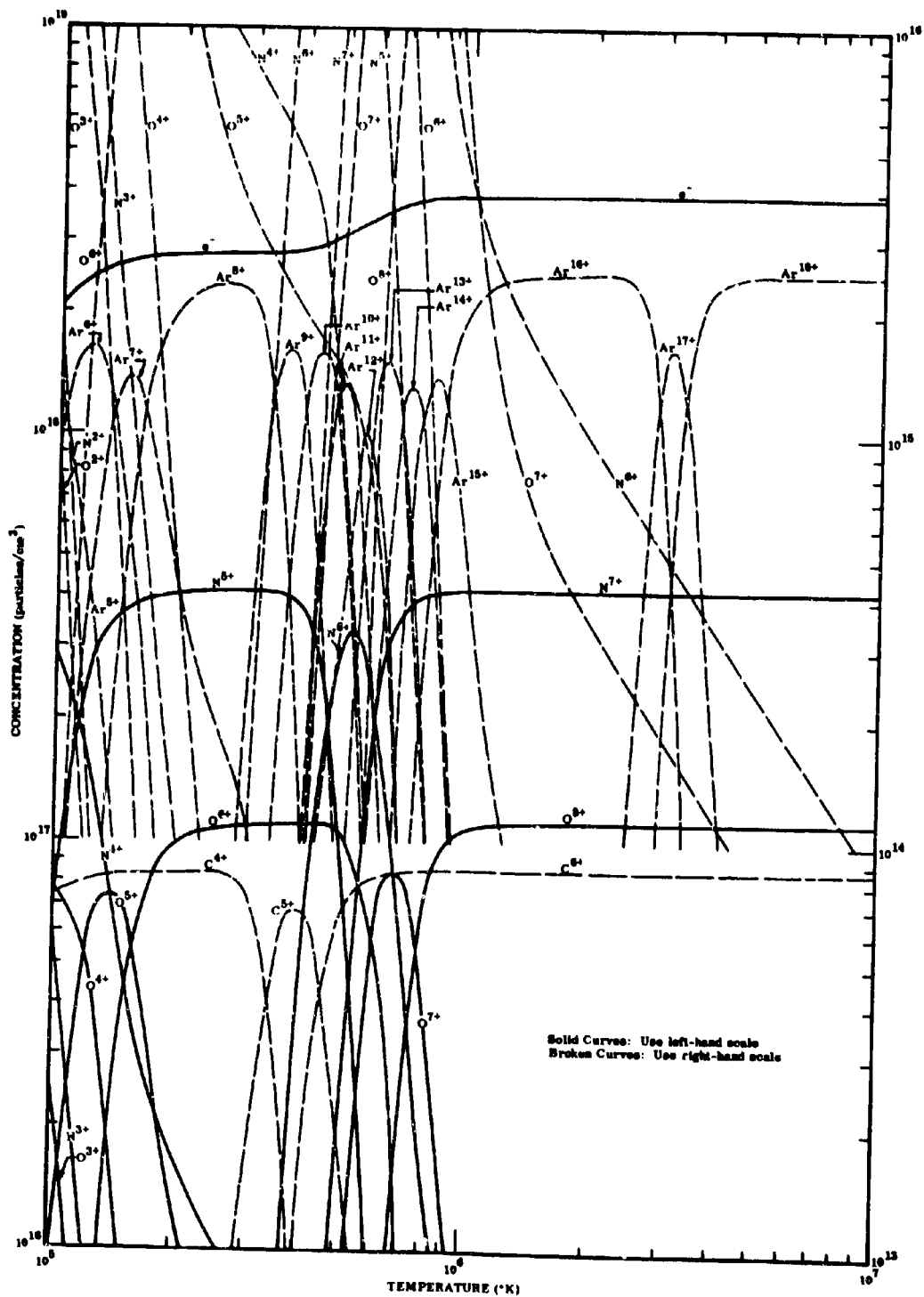


FIG. 2-7 EQUILIBRIUM COMPOSITION OF AIR AT $\rho/\rho_0 = 10^{-2}$

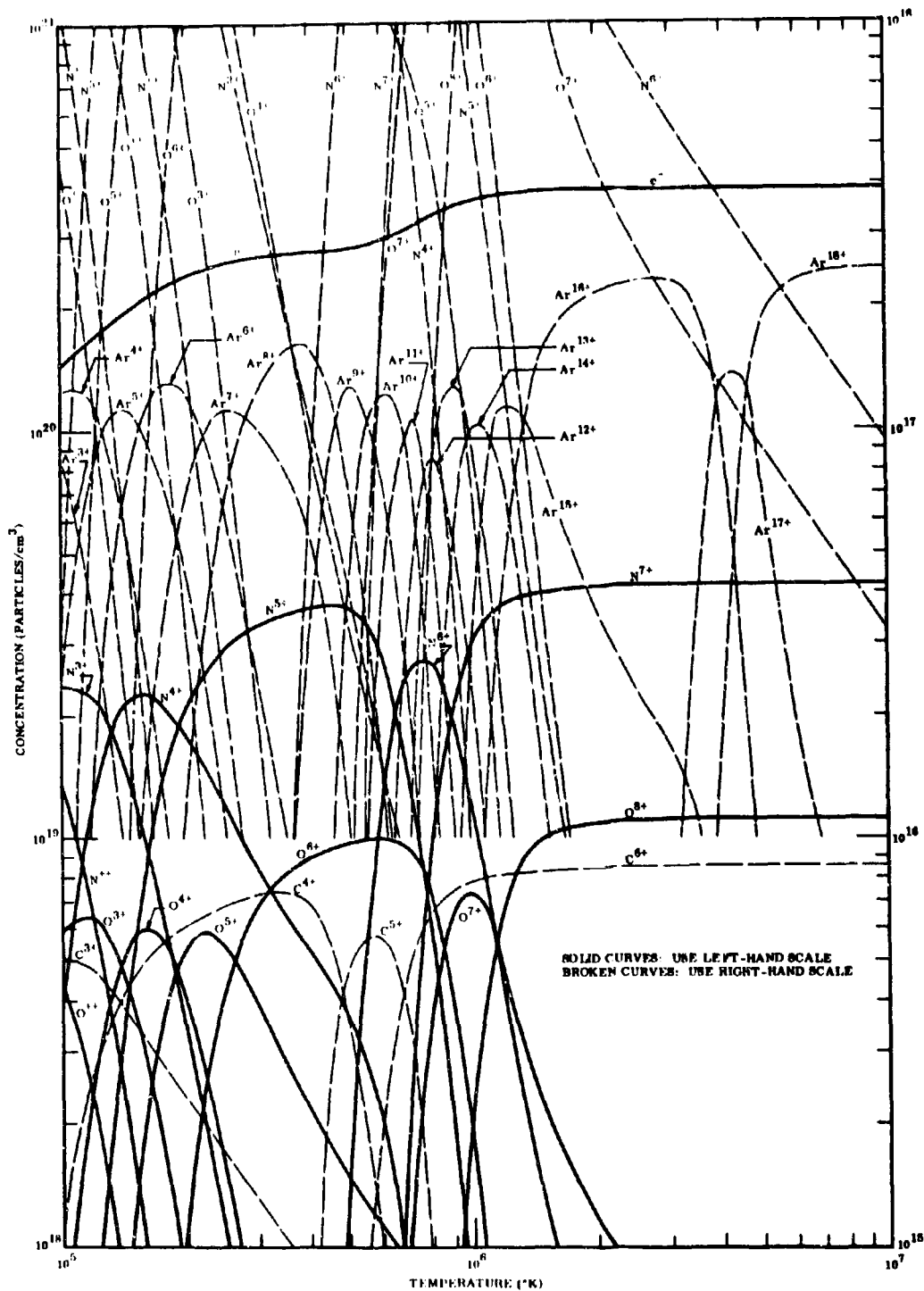


FIG. 2-8 EQUILIBRIUM COMPOSITION OF AIR AT $\rho/\rho_0 = 1$

Appendix A. Composition and Properties of the Atmosphere*
(written by A.D. Anderson)

In this Appendix the main characteristics of the atmosphere are reviewed. The principal regions of the earth's atmosphere are given in Table A-1. Inasmuch as the dominant process in the atmosphere is mixing up to at least 90 km, the proportions of the major constituents are constant up to this altitude. Hence, the mean molecular weight (mass) remains the same from 0 to 90 km and the region is called the "homosphere". Above 90 km, the molecular weight decreases as the composition changes with altitude, because of molecular dissociation and diffusion. This region is called the "heterosphere".

Aside from the compositions of the homosphere and heterosphere, we have also summarized the physics of the upper atmosphere with particular attention to variation of properties and composition with the solar cycle, a subject which has received much recent study.

Composition of the homosphere (lower atmosphere). The composition of dry air near sea level is presented in Table A-2 (U.S. Standard Atmosphere, 1962). Table A-3 gives property values for the homosphere as taken from the U.S. Standard Atmosphere, 1962 (1962). The molecular weight from 0 to 90 km is 28.964. The U.S. Standard Atmosphere, 1962, is a middle-latitude (approximately 45°) year-round mean over the range of solar activity between sunspot minima and sunspot maxima. Seasonal and latitudinal variations of the lower atmosphere properties can be taken into account, if desired, by using values from supplemental atmospheres derived by Cole and Kantor (1963).

* Some of this material has appeared in Space Materials Handbook, Ch. 4, published by Addison-Wesley Pub. Co., 1965, edited by C.G. Goetzl, J.B. Rittenhouse and J.B. Singletary.

TABLE A-1. Principal regions of the earth's atmosphere

Atmospheric region	Sub-region	Approximate altitude range (km)	Characteristic features
Homosphere	Troposphere	0-12	Mean molecular weight constant; heat transfer by convection
	Stratosphere	12-50	Constant molecular weight; increasing temperature, region strongly heated by both earth infrared and solar ultraviolet radiation
	Mesosphere	50-90	Constant molecular weight; decreasing temperature. Mixing processes dominant throughout homosphere
Heterosphere	Thermosphere	90-550	Frequent particle collisions; diffusion process dominant
	Exosphere	550-60,000	Collisions rare; temperature constant with altitude to about 8500 km; diffusion process dominant; heat transfer by conduction.

TABLE A-2. Normal composition of clean, dry atmospheric air
near sea level from U. S. Standard Atmosphere, 1962.

Constituent gas	Content (per cent by volume)	Molecular weight (C ¹² = 12.0000)
Molecular nitrogen	78.084	28.0134
Molecular oxygen	20.9476	31.9988
Argon	0.934	39.948
Carbon dioxide	0.0314	44.00995
Neon	0.001818	20.183
Helium	0.000524	4.026
Krypton	0.000114	83.80
Xenon	0.0000087	131.30
Molecular hydrogen	0.00005	2.01594
Methane	0.0002	16.04303
Nitrous oxide	0.00005	44.0128
Sulfur dioxide	0 to 0.0001	64.0628
Ozone	Summer: 0 to 0.000007 Winter: 0 to 0.000002	47.9982
Nitrogen dioxide	0 to 0.000002	46.0055
Ammonia	0 to trace	17.03061
Carbon monoxide	0 to trace	28.01055
Iodine	0 to 0.000001	253.8088

TABLE A-3. Lower atmosphere neutral properties versus altitude (U.S. Standard Atmosphere, 1962).

Altitude h (km)	Temperature T (°K)	Scale Height (km)	Concentration n (cm ⁻³)	Pressure (dynes cm ⁻²)	Density (gm cm ⁻³)
0	288	8.4	2.54(19)*	1.01(6)	1.22(-3)
5	256	7.5	1.53(19)	5.46(5)	7.36(-4)
10	223	6.6	8.60(16)	2.65(5)	4.24(-4)
15	217	6.4	4.05(16)	1.21(5)	1.95(-4)
20	217	6.4	1.85(16)	5.53(4)	8.89(-5)
25	222	6.5	8.33(17)	2.55(4)	4.00(-5)
30	226	6.7	3.82(17)	1.20(4)	1.84(-5)
35	236	7.0	1.76(17)	5.75(3)	8.46(-6)
40	250	7.4	8.31(16)	2.87(3)	4.00(-6)
45	264	7.8	4.09(16)	1.49(3)	1.97(-6)
50	271	8.0	2.14(16)	7.98(2)	1.09(-6)
60	256	7.6	6.36(15)	2.25(2)	3.06(-7)
70	220	6.6	1.82(15)	5.52(1)	8.75(-8)
80	181	5.4	4.16(14)	1.04(1)	2.00(-8)
90	181	5.4	6.60(13)	1.64	3.17(-9)

*Denotes $n = 2.54 \times 10^{19}$ particles cm⁻³

Minor constituents in the homosphere. Despite the general constancy of the proportions of the major constituents in the homosphere, photochemical and collision mechanisms result in major changes with altitude in the concentrations of the minor constituents. In spite of their small concentrations, some of these minor constituents can be very important. For example, although water vapor usually comprises less than 3 per cent of the gases even with moist conditions at sea level, it absorbs nearly six times as much solar radiant energy as do all the other gases combined. Furthermore, it accounts for nearly all the gaseous absorption of the terrestrial infrared radiation.

Atomic oxygen is present as a minor constituent of the mesosphere, as a result of photodissociation. Detection of the sodium D lines in the night airglow and twilight flash demonstrates the presence of sodium in the mesosphere. Carbon dioxide and the oxides of nitrogen have also been detected in the mesosphere by mass spectrometers of rocket flights. The presence of water vapor in the stratosphere and mesosphere is inferred from the detection of the hydroxyl radical in the night airglow.

Carbon dioxide is also an important absorber of infrared radiation. Many measurements have been made to determine the CO_2 content of the atmosphere. Bray (1959) has weighted the various measurements and gives a median value of 320 ppm. Most of the carbon dioxide measurements have been taken at sea level. Glueckauf (1944) reports values that vary from 250 ppm to 300 ppm for a series of balloon flights over England. He indicates that samples taken in the stratosphere were not different from those taken at ground level. Measurements indicate that the minimum concentrations of CO_2 are approximately 150 ppm and are found in polar air; however, the polar air values vary widely. The maximum concentrations have been measured off the west coast of Africa and may rise to 700 ppm locally. The CO_2 concentration is greater in urban than in rural areas, continental air masses show higher concentrations than air masses over the oceans, and night air usually contains more CO_2 than daytime air.

Water vapor is the most variable constituent in the atmosphere and is perhaps the most difficult to measure at small concentrations and at low temperatures. Measurements indicate that the mixing ratio of water vapor in the atmosphere decreases rapidly from ground level to the tropopause. In the stratosphere, the vapor content changes more slowly and usually decreases with altitude. Since the maximum concentration of water vapor is temperature dependent, its normal altitude profile is in accord with the temperature profile in the atmosphere. Gutnick (1962) has derived a water vapor profile for temperate latitudes, based on the best water vapor measurements to date. The general features of this model are that the mixing ratio decreases from about 6,150 ppm (mg/kg) at the surface to 9 ppm at 16 km, then increases slightly with altitude. However, the water vapor increase above 16 km is now considered dubious. Bandeen et al. (1969) infer the relative planetary distribution of atmospheric moisture from measurement within the 6.3 micron band of water vapor made from Tiros meteorological satellites.

Ozone, produced by the action of solar ultraviolet radiation on molecular oxygen, is found between 15 and 40 km, with peak values between 22 and 35 km. The total amount of ozone in temperate latitudes is about 2.7 mm on the average for the whole year; that is, if the total amount of ozone in the atmosphere could be concentrated at the surface it would make a layer of this height at STP. There are considerable changes in the amount of ozone from day to day which are correlated with weather changes. In particular the relation to pressure changes is well indicated. Ozone also appears to have a slight seasonal and latitudinal variation. Figure A-1 shows the measurements for various latitudes reported by Miller (1960). The ozone distributions shown in the figure can be considered as representative of the atmosphere over the Tropical, Temperate, and Arctic regions of the earth. Atmospheric absorption by ozone is most important in the ultraviolet region of the spectrum and near 9.6 microns in the infrared; a minor absorption band also occurs near 4.8 microns. A good review article on ozone has been presented by Götz (1951).

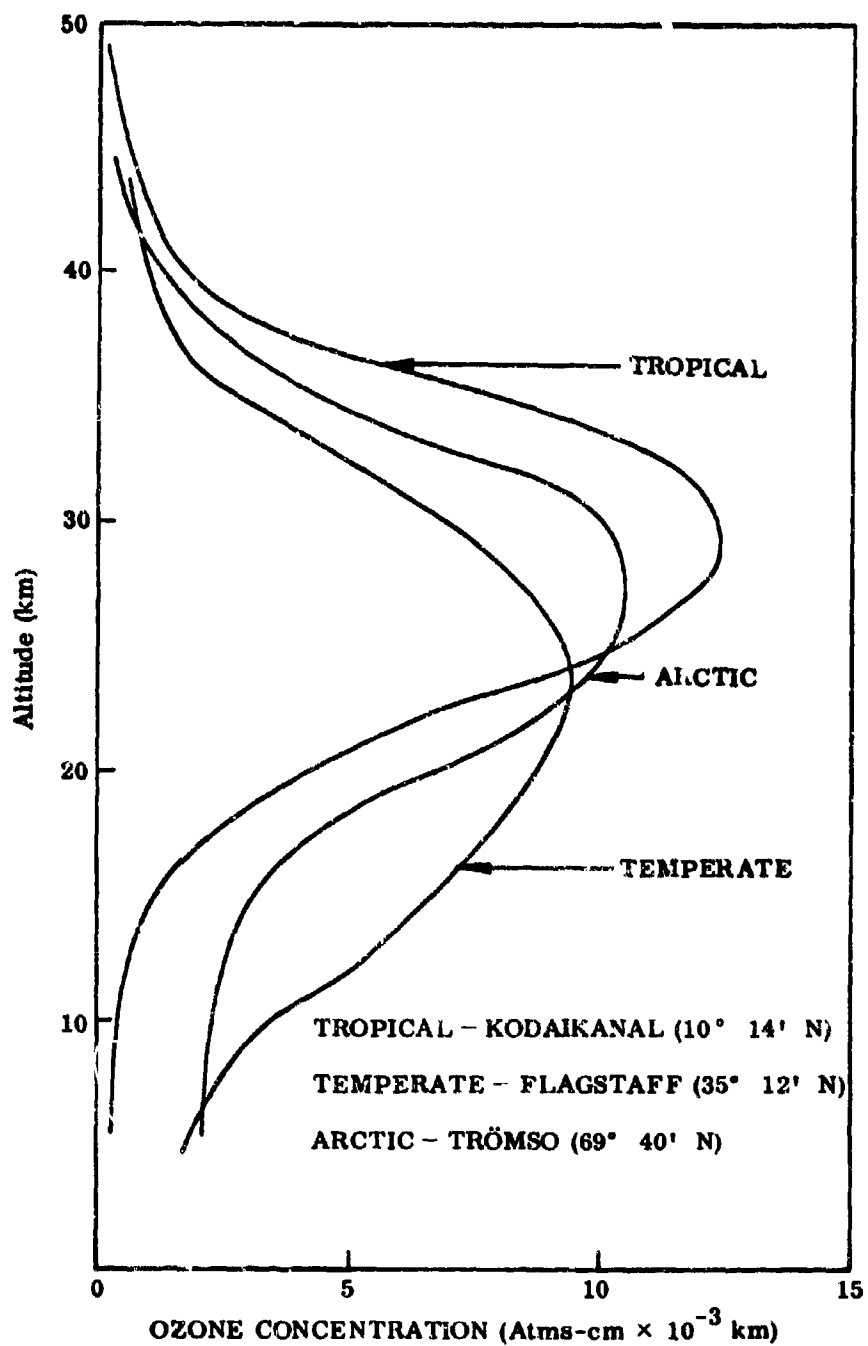


FIG. A-1 OZONE DISTRIBUTION

Composition of the heterosphere (upper atmosphere). The neutral atmosphere above 100 km is composed almost wholly of molecular nitrogen and oxygen and atomic nitrogen, oxygen, helium, and hydrogen; the relative concentrations of these constituents depend strongly on altitude and temperature. The composition of the upper atmosphere can be explained, at least in a qualitative sense, by noting the types of photochemical reactions that can occur and how the reaction products are affected by mixing and diffusion. In the following paragraphs, the reactions leading to the neutral constituents will be discussed first, followed by the ion reactions.

At about 100 km, the absorption of solar radiation with wavelengths shorter than 1850Å down to about 1300Å leads to the dissociation of oxygen molecules into oxygen atoms. For wavelengths shorter than 1026Å, the oxygen molecule can be ionized; this ionization is normally followed by a dissociative recombination producing atomic oxygen. Although the oxygen atoms can recombine into molecules, photochemical equilibrium, where the rates of dissociation and recombination are equal at each altitude, does not prevail. Instead, vertical transport due to both diffusion and mixing plays an important role in determining the atomic and molecular concentrations at various levels near 100 km. More oxygen dissociates than recombines above 100 km, due to the rapid fall-off with altitude of the recombination processes. Below 100 km, collisions occur frequently enough for recombination to prevail, hence more oxygen recombines than dissociates. Consequently, there is a steady flux of molecular oxygen upward and atomic oxygen downward through the 100 km level, due to the effects of diffusion and mixing. Atomic oxygen is the most important constituent in the upper thermosphere.

The most active process leading to the dissociation of molecular nitrogen is ionization followed by dissociative recombination, producing

atomic nitrogen. Atomic nitrogen can react with molecular oxygen to form nitric oxide and atomic oxygen. The nitric oxide in turn reacts with atomic nitrogen to form molecular nitrogen and atomic oxygen. The effectiveness of these reactions, together with the slowness with which molecular nitrogen dissociates, causes atmospheric nitrogen to remain predominantly in molecular form.

Photodissociation of water vapor and methane near 80 km constitute the principal sources of atomic hydrogen. Owing to the small mass of the hydrogen atom compared to other atmospheric constituents, the hydrogen concentration does not decrease with altitude as rapidly as do the other atmospheric constituents in the altitude region where diffusion proceeds rapidly; hence atomic hydrogen becomes an increasingly important atmospheric constituent with increasing altitude. However, atomic hydrogen is such a minor constituent in the thermosphere that it does not become the dominant constituent until 2000 to 5000 km altitude, remaining so until about 20,000 km where the hydrogen ion becomes dominant. The source of atomic hydrogen near 80 km can be expected to remain essentially constant through the sunspot cycle, but the rate of escape, depending on the temperature at the base of the exosphere, varies with the sunspot cycle. The escape will be relatively rapid when the temperature is high, and the concentration of hydrogen will be correspondingly low in the exosphere near sunspot maximum. The escape is relatively slow when the temperature is low, so that the concentration must be comparatively high near sunspot minimum.

Nicolet (1961) showed that helium atoms are an important constituent in the lower exosphere. He explains the high densities derived from the rate of change of the period of the Echo satellite by the presence of helium. Evidently, atomic oxygen, nitrogen or hydrogen cannot explain the slow density decrease between 750 and 1500 km. Atomic oxygen is the most important constituent in the upper thermosphere, but atomic helium

dominates over atomic oxygen somewhere above 800 to 1000 km. Atomic hydrogen dominates over helium somewhere above 2000 to 5000 km. Although the total concentration of the neutral particles is at least an order of magnitude greater than that of the ions up to about 2000 km altitude, the ion concentrations finally become significant at the higher altitudes.

The primary ions formed in the E region (85 to 140 km) of the ionosphere are N_2^+ , O_2^+ , and O^+ . The N_2^+ ions dissociatively recombine very rapidly, and they may also react with oxygen, so that the concentration of N_2^+ is small. Ion-atom exchange reactions of the type



proceed very rapidly, so that the reactions of O^+ with O_2 and N_2 quickly remove the O^+ ions and produce either NO^+ or O_2^+ . The dominant ions in the F_1 region (140 to 200 km) are NO^+ and O_2^+ near the lower altitude boundary, with a gradual transition to O^+ as the principal ion at the upper boundary. O^+ becomes the dominant ion because of the rapid decrease with altitude of the neutral molecular constituents that otherwise would tend to eliminate O^+ by reaction (A1.). In the F_2 region (200 to 800 km), the ions present are O^+ and N^+ , with O^+ greatly predominant. The helium ion starts to become dominant between 800 and 1400 km (Bourdeau and Bauer, 1963), depending on atmospheric temperature. Likewise, protons become the dominant ion between about 1400 to 4000 km. Thus, there are two transition regions (from oxygen to helium ions and from helium to hydrogen ions) in the upper ionosphere rather than a single transition from oxygen to hydrogen as previously believed. The outer portion of the earth's atmosphere (extending from about 20,000 km to at least 60,000 km above the earth's surface) consists

mainly of protons. The protons predominate in the earth's outer atmosphere over the hydrogen atoms because the confining effect of the earth's magnetic field makes their rate of escape to space much less than for the neutral hydrogen atoms. According to Johnson (1960), the solar wind cannot penetrate the geomagnetic field; therefore, the upper boundary of the earth's atmosphere and magnetic field (magnetosphere) are the same.

Even under normal solar wind conditions, the magnetosphere does not present a simple boundary to the earth's atmosphere. On the day side of the earth, a cavity, which is filled with the earth's magnetic field and atmosphere, is formed in the solar wind. At the same time, the geomagnetic field is deformed by the solar wind. A schematic representation of the cavity and deformed geomagnetic field during a moderately strong solar wind is shown in Fig. A-2 (Johnson, 1960). The boundary of the magnetic field in the direction facing the sun is about 10 earth radii from the center of the earth. The widest portion of the magnetic field downwind from the earth is more than 12 earth radii in width and may be over 18. The length of this tail is presently unknown and undoubtedly depends on the intensity and temperature of the particles in the solar wind.

Physics of the atmosphere. Assuming that the earth's atmosphere is a continuous medium consisting of a gas in static equilibrium, the equation connecting the pressure P and density ρ at any altitude h is

$$dP = -g\rho dh, \quad (A2.)$$

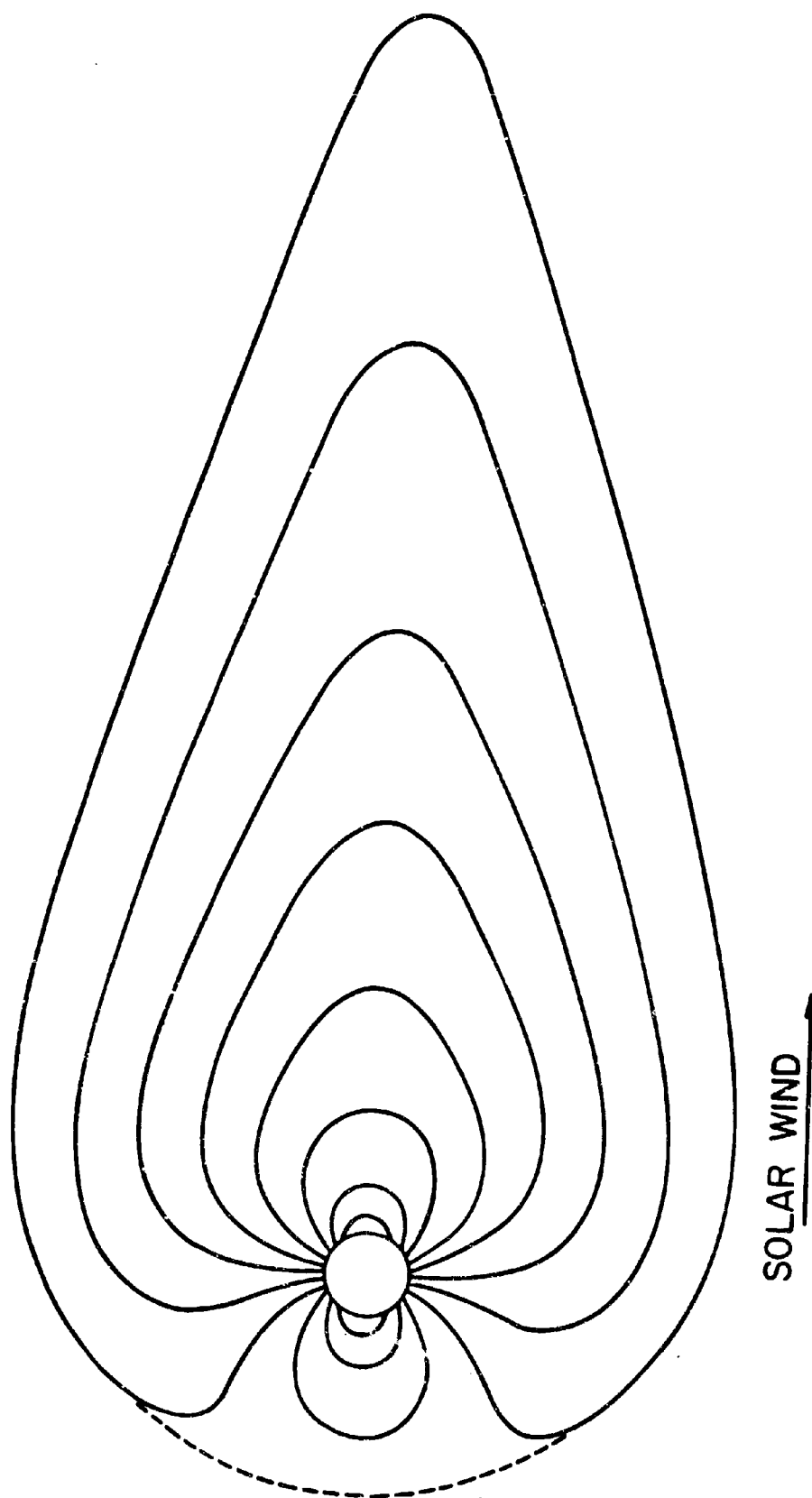


FIG. A-2 THE GEOMAGNETIC FIELD AS DEFORMED BY A MODERATELY STRONG SOLAR WIND BLOWING PERPENDICULARLY TO THE MAGNETIC AXIS, ACCORDING TO JOHNSON (1960)

where g is the gravitational acceleration. The variation in g with altitude can be taken into account by using the relationship

$$g = g_0 R_0^2 / (R_0 + h)^2 , \quad (A3.)$$

where g_0 is the acceleration of gravity at the earth's surface and R_0 is the earth's radius. Eq. (A2.) is the hydrostatic equation in differential form. Further, let m be the mean molecular mass of the gas and n denote the number density or concentration; the density ρ is then

$$\rho = n m . \quad (A4.)$$

Since the terrestrial atmosphere can be approximated by a perfect gas, the pressure is given by the equation of state

$$P = n k T , \quad (A5.)$$

where T is the temperature and k the Boltzmann constant (1.38×10^{-16} erg deg⁻¹).

Multiplying both sides of Eq. (A4.) by g and dividing the result into Eq. (A5.) gives

$$P/\rho \cdot g = k T/m g = H , \quad (A6.)$$

where $H = k T/m g$ is known as the pressure scale height, a parameter convenient for atmospheric calculations.

From Eqs. (A2.) to (A4.) one can obtain

$$\frac{dP}{P} = - \frac{m g}{k T} dh . \quad (A7.)$$

Then, integrating Eq.(A7.) gives the barometric law

$$\frac{P}{P_0} = \exp \left[- \int_0^h \frac{m g}{k T} dh \right] . \quad (A8)$$

From Eqs.(A5.) and (A8.) we have

$$\frac{n}{n_0} = \frac{T_0}{T} \exp \left[- \int_0^h \frac{m g}{k T} dh \right] , \quad (A9)$$

and Eqs.(A4.) and (A9.) yield

$$\frac{\rho}{\rho_0} = \frac{m T_0}{m_0 T} \exp \left[- \int_0^h \frac{m g}{k T} dh \right] . \quad (A10)$$

In Eqs.(A8.) to (A10.), P , n , and ρ are the pressure, particle concentration, and density, respectively, at altitude h , and P_0 , n_0 , and ρ_0 are the corresponding values at an arbitrary reference level at which h is assigned the value zero.

Eqs.(A2.) to (A10.) are applicable in the atmosphere where the escape into space of a constituent is not important. The hydrostatic Eq.(A2.) is based on the concept of LTE, i.e., collisions between particles are frequent enough so that there is a complete statistical exchange of particle energy and momentum in the volume under consideration. In the thermosphere the particles collide often enough to insure a Maxwellian velocity distribution and the existence of a meaningful kinetic temperature.

In the exosphere, above about 550 km, collisions are sufficiently reduced so that the existence of a Maxwellian distribution, and consequently, the validity of applying the hydrostatic relationship, must be examined anew. Liouville's theorem can be used to show that the Maxwellian velocity distribution present below the base of the exosphere applies equally well in the exosphere, provided that the escape of particles to space is negligible. The atmosphere is so rarefied in the exosphere that there is little solar radiation absorbed. Also, there are no energy loss mechanisms to disturb the Maxwellian velocity distribution. At the temperatures present, the distribution is disturbed only by the escape of neutral hydrogen from well above the base of the exosphere. It follows that the maximum altitude in the atmosphere where the hydrostatic equation is applicable can be determined by calculating the altitude in the exosphere where the density of the neutral hydrogen starts to be significantly affected by the escape of hydrogen atoms. Consequently, the greatest error involved in using the hydrostatic assumption will occur during the day near sunspot maximum conditions, inasmuch as temperatures are highest then. Calculations (Anderson and Francis, 1964) indicate that the error will start to become significant above about 5000 km altitude. For average sunspot conditions, the altitude is about 8500 km. For sunspot minimum conditions, the error will not be significant below 10,000 km.

Inasmuch as the atmosphere consists of a mixture of gases subject to a force field, the equilibrium distribution of its constituents can be expected to show some degree of diffusive separation. Although turbulent mixing below 100 km does not allow the development of diffusive equilibrium distributions, above this altitude there is experimental evidence that

diffusive equilibrium does exist. In the geopotential field, diffusive equilibrium gives concentration distributions for neutral particles that vary exponentially with the geopotential, with a more rapid decrease in concentration with increasing geopotential for the heavier constituents in the atmosphere than for the lighter. The result is a static distribution of gas constituents under the action of the external force field, which may be expressed by the barometric law Eq. (A8.) that applies for each atmospheric constituent independently of the others.

The concept that the atmosphere extending above 400 km over a given location on the earth's surface is isothermal in the sense that the temperature does not vary with altitude is now well established. In the tenuous gas of the upper thermosphere the thermal conductivity is independent of the pressure while the heat capacity varies linearly with density. Consequently, the conductivity is very large compared to the heat capacity. Above 400 km, the absorption of energy is negligible and the relatively high heat conductivity eliminates temperature differences; hence the kinetic temperature is nearly constant with altitude for many thousands of kilometers. The kinetic temperature can only be determined for a gas with a Maxwellian velocity distribution. As pointed out under the discussion of the accuracy of the hydrostatic assumption, the Maxwellian velocity distribution applies in the exosphere provided that the escape of particles to space is negligible. For hydrogen, the escape of atoms is comparatively rapid so that the velocity distribution in the upper exosphere beyond 10,000 km is not Maxwellian. Therefore, the hydrogen atoms in the upper exosphere have a non-Maxwellian distribution that becomes more pronounced with altitude.

Under these circumstances the concept of kinetic temperature is not entirely applicable, although an effective temperature can be defined by considering the average energy of the hydrogen atoms (Sharp, 1962).

Variation of upper-atmosphere properties and composition with the solar cycle. A principal problem connected with atmospheric structure is to calculate accurate values for all the primary properties in the heterosphere (above 90 km) as a function of time, location, and date by taking into account the relevant processes. The primary atmospheric properties are temperature, pressure, density, and mean molecular mass (or composition). To account for their variations, the following factors must be considered: (a) time (hour, day, sun-rotation period, season, year, sunspot cycle); (b) location (altitude, latitude, longitude); (c) solar characteristics (ultraviolet radiation, solar plasma and associated magnetic storms); and (d) particle processes (conduction, diffusion, mass transport, photoionization, dissociation, recombination, particle escape into space). The problem of describing upper atmospheric behavior is difficult because many of the above elements are interrelated.

The magnitudes of the atmospheric properties in the upper atmosphere are derived from measurements made from satellites, rockets, meteor observations, sky emissions, and the propagation of sound and radio waves. The data are sparse and contain much uncertainty above 200 km. The density (drag) data resulting from tracking satellites are the most precise, and by far, the most numerous. Study of the orbital decay data has clearly established that two major systematic density variations occur: (1) a solar activity effect in which variations in atmospheric heating and density take place above 90 km due to variations in solar

ultraviolet radiation; and (2) a diurnal (time-of-day) effect, in which the solar heating results in the atmosphere bulging toward the sun, producing relatively large density increases at altitudes above 300 km in the sunlit region of the earth. At 800 km, due to effect (1), the density can be 40 times as high during solar maximum conditions than during solar minimum, and due to effect (2), 15 times as high during the day than during the night. The combination of both (1) and (2) can result in densities 500 times as high at 800 km during solar maximum (day) than during solar minimum (night). This extreme variability in density also applies to pressure. Upper atmosphere density variations with latitude and season are much smaller than the two primary effects above. In addition, there is a conspicuous drag effect on satellites associated with major magnetic storms and the resulting heating is such that the relative effect on density increases with altitude. At present, it is not possible to make more than a rough estimate of the effect of magnetic heating on the density; fortunately, major magnetic storms are fairly rare and the associated heating is transient.

Upper-atmosphere measurements are not made on a regular enough basis, either in kind, time or space, to allow them to be used alone, without the aid of a model, to represent atmospheric conditions. The approach followed by most models used to derive atmospheric properties is to assume altitude profiles for some of them in order to calculate the remainder. Almost all the models deal with data referring only to density, pressure and/or temperature. The altitude variation of the mean molecular mass is introduced somewhat arbitrarily and, therefore, a physically

consistent vertical distribution of the composition cannot be obtained. A new method has been devised for computing atmospheric properties (Anderson and Francis, 1964). In this model, no major assumptions are made regarding the property profiles. Instead, the primary properties are calculated by starting with an empirical density profile from a density model as the chief input, assuming diffusive equilibrium conditions above 110 km and isothermal conditions with altitude above 400 km. The density profile, used as starting input for this new property model, is represented in a previous empirical model (Anderson, 1964) as a function of local time and solar activity from 200 to 800 km. This density model can be used to calculate the marked variations in density that occur from day to day by taking corrected values of the 10.7-cm solar flux (called S') as an index of the sun's extreme ultraviolet radiation. The remaining properties are derived by using the hydrostatic equation and equation of state, that relate density, pressure, temperature, and mean molecular mass as a function of altitude (Eqs. (A8.) to (A10.)), together with boundary values based on measurements.

The equations embodying the model are programmed for an IBM-7090 computer. The results of the computations made from the model are given in two tables that present the neutral atmospheric properties and composition vs. altitude from 100 to 10,000 km. Tables A-4 and A-5 exhibit the properties and number densities of the various constituents vs. altitude near sunspot maximum and near sunspot minimum, respectively. The S' value used for Table A-4 ($S' = 250$) is an average value for September, 1959, the month immediately following the Argus high-altitude

nuclear detonation. The S' value used for Table A-5 ($S' = 44$) is an average value for July and August, 1962 ($S' = 42$ for July; $S' = 46$ for August), the two months following the Starfish high-altitude shot. Both tables are for $t = 21$ hr.; the density for this time has been found to closely approximate the diurnally averaged density or the sum of the densities for every hour of the day divided by 24. Calculations of density from the model are based on neutral particles only. The ions do not contribute significantly to the total (ambient) density below 2000 km. Above this altitude, the contribution of H^+ should be taken into account in any calculation of the ambient density. The neutral density is corrected for the departure from a Maxwellian velocity distribution caused by the escape of atomic hydrogen from the earth's exosphere. The temperature used to calculate the total pressure in the exosphere from A-5 is the kinetic temperature that is assumed to be locally isothermal vertically to 10,000 km. Hence, the computed pressure will be somewhat higher than the ambient pressure (a function of the effective temperature) of the neutral constituents above about 5000 km.

TABLE A-4. Upper atmosphere neutral properties versus altitude near sunspot maximum

Altitude h (km)	Temp. T (°K)	Scale height h _s (km)	Mass rel. wt.	Concent. n (cm ⁻³)	Pressure (dynes cm ⁻²)	Density (gm cm ⁻³)	n(H) (cm ⁻³)	n(H ₂) (cm ⁻³)	n(O) (cm ⁻³)	n(N ₂) (cm ⁻³)	n(O ₂) (cm ⁻³)	n(A) (cm ⁻³)
100	230	7	28.43	1.07(13)*	3.40(-1)	5.05(-10)	4.17(5)	3.78(8)	6.81(11)	7.03(12)	2.88(12)	1.05(11)
120	330	12	27.15	7.28(11)	3.82(-2)	3.28(-11)	3.22(4)	7.05(7)	1.27(11)	3.81(11)	2.14(11)	4.73(9)
140	583	20	25.48	1.34(11)	1.08(-2)	5.66(-12)	2.07(4)	3.80(7)	3.85(10)	6.48(10)	3.00(10)	4.51(8)
160	796	29	24.11	4.33(10)	4.76(-3)	1.73(-12)	1.46(4)	2.44(7)	1.66(10)	1.89(10)	7.45(9)	8.87(7)
180	969	38	22.98	1.86(10)	2.62(-3)	7.48(-13)	1.17(4)	1.81(7)	9.13(9)	7.64(9)	2.81(9)	2.65(7)
200	1080	44	22.02	1.08(10)	1.61(-3)	3.96(-13)	1.03(4)	1.49(7)	5.80(9)	3.75(9)	1.26(9)	1.08(7)
240	1165	52	20.38	4.40(9)	7.07(-4)	1.49(-13)	9.18(3)	1.18(7)	2.83(9)	1.17(9)	3.36(8)	1.96(6)
300	1182	59	18.51	1.48(9)	2.42(-4)	4.56(-14)	8.56(3)	9.33(6)	1.17(9)	2.44(8)	5.65(7)	2.11(5)
340	1183	63	17.62	7.72(8)	1.26(-4)	2.26(-14)	8.25(3)	8.07(6)	6.57(8)	8.87(7)	1.78(7)	4.95(4)
400	1183	68	16.69	3.05(8)	5.05(-5)	8.56(-15)	7.82(3)	6.52(6)	2.80(8)	1.99(7)	3.21(6)	5.86(3)
500	1183	75	15.59	7.61(7)	1.24(-5)	1.97(-15)	7.17(3)	4.60(5)	6.96(7)	1.74(6)	1.95(5)	1.81(2)
600	1183	84	14.26	2.15(7)	3.51(-6)	5.08(-16)	6.53(3)	3.28(6)	1.80(7)	1.64(5)	1.33(4)	6.17
700	1183	102	12.09	7.23(6)	1.81(-6)	1.45(-16)	6.01(3)	2.36(6)	4.04(6)	1.65(4)	9.64(2)	
800	1183	137	9.28	3.08(6)	5.02(-7)	4.74(-17)	5.55(3)	1.72(6)	1.35(6)	1.76(3)	7.51(1)	
900	1183	192	6.82	1.66(6)	2.70(-7)	1.62(-17)	5.13(3)	1.26(6)	3.90(5)	2.01(2)	6.27	
1000	1183	253	5.32	1.05(6)	1.72(-7)	9.30(-18)	4.75(3)	9.32(5)	1.17(5)	2.43(1)		
1400	1183	372	4.01	3.06(5)	4.99(-8)	2.04(-18)	3.57(3)	3.01(5)	1.27(3)			
2000	1183	444	3.90	7.01(4)	1.14(-8)	4.53(-19)	2.44(3)	6.76(4)	3.24			
4000	1183	915	2.91	2.56(3)	4.18(-10)	1.23(-20)	9.33(2)	1.62(3)				
6000	1183	2301	1.64	6.07(2)	9.91(-11)	1.66(-21)	4.77(2)	1.30(2)				
10,000	1183	6128	1.08	1.97(2)	3.25(-11)	3.57(-22)	1.94(2)	5.31				

*Denotes $n = 1.07 \times 10^{13}$ particles cm⁻³

TABLE A-5. Upper atmosphere neutral properties versus altitude near sunspot minimum

Altitude h (km)	Temp. T (°K)	Sonic ht. (km)	Mean mol. wt.	Conc. n (cm ⁻³)	Pressure (dynes cm ⁻²)	Density (gm cm ⁻³)	n (H) (cm ⁻³)	n (He) (cm ⁻³)	Constituent concentrations n (O) (cm ⁻³)	n (N ₂) (cm ⁻³)	n (O ₂) (cm ⁻³)	n (A) (cm ⁻³)
100	206	6	28.22	1.04 (13)	2.94 (-1)	4.86 (-10)	7.46 (5)	1.55 (6)	4.83 (11)	8.00 (12)	1.82 (12)	6.64 (10)
120	287	9	27.22	5.31 (11)	2.11 (-2)	2.40 (-11)	1.12 (5)	1.21 (7)	5.85 (10)	4.04 (11)	6.78 (10)	1.39 (9)
140	418	14	25.72	6.37 (10)	3.67 (-3)	2.72 (-12)	7.21 (4)	6.40 (6)	1.40 (10)	4.40 (10)	5.68 (9)	6.96 (7)
160	595	22	24.28	1.46 (10)	1.18 (-3)	5.88 (-13)	4.92 (4)	3.81 (6)	4.84 (9)	8.79 (9)	9.47 (8)	7.97 (6)
180	740	29	23.03	5.19 (9)	5.30 (-4)	1.96 (-13)	3.76 (4)	2.63 (6)	2.23 (9)	2.70 (9)	2.54 (6)	1.63 (6)
200	876	35	21.95	2.40 (9)	2.84 (-4)	8.75 (-14)	3.16 (4)	2.04 (6)	1.24 (9)	1.07 (9)	9.03 (7)	4.64 (5)
240	969	44	20.18	7.76 (8)	1.04 (-4)	2.60 (-14)	2.66 (4)	1.48 (6)	5.08 (8)	2.48 (8)	1.73 (7)	6.06 (4)
300	1004	51	18.24	2.13 (8)	2.96 (-5)	6.46 (-15)	2.40 (4)	1.10 (6)	1.72 (8)	3.82 (7)	2.04 (6)	4.24 (3)
340	1007	55	17.36	9.99 (7)	1.39 (-5)	2.88 (-15)	2.30 (4)	9.28 (5)	8.68 (7)	1.16 (7)	5.24 (5)	7.74 (2)
400	1008	59	16.47	3.46 (7)	4.82 (-6)	9.45 (-16)	2.16 (4)	7.21 (5)	3.18 (7)	2.00 (6)	7.04 (4)	6.30 (1)
500	1008	65	15.32	6.94 (6)	9.51 (-7)	1.74 (-16)	1.95 (4)	4.80 (5)	6.32 (6)	1.15 (5)	2.69 (3)	1.06
600	1008	76	13.50	1.62 (6)	2.25 (-7)	3.63 (-17)	1.76 (4)	3.23 (5)	1.27 (6)	7.17 (3)	1.13 (2)	
700	1008	102	10.36	5.03 (5)	7.08 (-8)	8.75 (-18)	1.60 (4)	2.29 (5)	2.73 (5)	4.83 (2)	5.16	
800	1008	154	7.04	2.26 (5)	3.15 (-8)	2.66 (-18)	1.45 (4)	1.51 (5)	6.10 (4)	3.51 (1)		
900	1008	223	4.99	1.32 (5)	1.84 (-8)	1.10 (-19)	1.33 (4)	1.05 (5)	1.42 (4)	2.74		
1000	1008	282	4.05	8.91 (4)	1.24 (-8)	6.00 (-19)	1.21 (4)	7.36 (4)	3.44 (3)			
1400	1008	412	3.08	2.82 (4)	3.93 (-9)	1.44 (-19)	8.69 (3)	1.95 (4)	1.71 (1)			
2000	1008	692	2.13	8.98 (3)	1.25 (-9)	3.18 (-20)	5.99 (3)	3.39 (3)				
4000	1008	2120	1.07	1.88 (3)	2.62 (-10)	3.34 (-21)	1.84 (3)	4.26 (1)				
6000	1008	3186	1.01	8.56 (2)	1.19 (-10)	1.43 (-21)	8.54 (2)	2.29				
10,000	1008	5637	1.00	3.10 (2)	4.31 (-11)	5.15 (-22)	3.10 (2)					

* Denotes $n = 1.04 \times 10^{13}$ particles cm⁻³

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