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RF Project 691
Report No. 31

QUARTERLY

R E P O R T

by

THE OHIO STATE UNIVERSITY
RESEARCH FOUNDATION

1314 Kinnear Road
Columbus 12, Ohio

To:

DEPARTMENT OF THE NAVY
Office of Naval Research
Contract No. Nonr 495(12)
ARPA Order No. 23-61; Task 1, Item 4

On:

STRUCTURAL AND THERMODYNAMIC PROPERTIES OF
POLYATOMIC MOLECULES AT ELEVATED TEMPERATURES

For the period:

1 January 1964 - 31 March 1964

Submitted by:

David White
Department of Chemistry

Date: 30 September 1964



STRUCTURAL AND THERMODYNAMIC PROPERTIES OF
POLYATOMIC MOLECULES AT ELEVATED TEMPERATURES

During this report period a quantitative mass spectrometric investigation of the effect of oxygen pressure on the concentration of gaseous sodium and potassium oxides in equilibrium with solid Na_2O and K_2O was completed. These data confirm the results of the earlier preliminary studies on the composition of the vapor state. It is still not possible to report new values for the heats of formation of gaseous Na_2O , NaO , K_2O , and KO because of the uncertainty in estimating cross sections. An attempt is currently being made to determine these values experimentally.

The mass spectrometric studies also revealed the existence of both Na_2O_2 and K_2O_2 on the vapor phase. These species are considerably more abundant, relative to the monoxides, than the corresponding species observed in the lithium oxide system. Preliminary matrix isolation studies in the infrared region suggest however that these are peroxides rather than the rhombic form assigned to Li_2O_2 .

Infrared studies of matrix-isolated $\text{MgF}_2(\text{g})$ were initiated during the report period. The present data are not sufficiently complete to warrant a discussion of the molecule structure.

The manuscript describing the investigation of the infrared spectrum of matrix-isolated Al_2O has been submitted for publication.

Investigator Harold White Date 10/12/64

Supervisor James I. H. T. Date 11/12/64

For The Ohio State University Research Foundation

Executive Director Robert C. Stephenson Date 10/12/64

A

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