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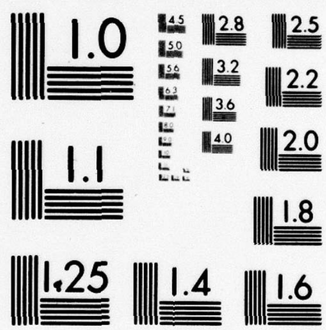

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FOREIGN TECHNOLOGY DIVISION

SCIENTIFIC CONFERENCE ON "COAL GASIFICATION"

By

J. Gawlik

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SCIENTIFIC CONFERENCE ON "COAL GASIFICATION"

J. Gawlik

A scientific conference dealing with problems of coal gasification was held on November 25 - 27 1976 within the framework of the activities of the Coordination Center of COMECON for New Methods in the Utilization of Coal. In spite of the fact that coal gasification was initiated already in the first half of the nineteenth century, full utilization of this very effective and profitable technology lies still in the future and the intensified research conducted in this field by many highly industrialized countries will hopefully soon be crowned with success. From this viewpoint the aim and importance of the conference seems quite clear. The meeting was organized by the Brennstoffinstitut (Fuel Institute) in Freiberg (GDR).

More than 50 experts from countries well advanced in research in the field of coal gasification took part in the conference. Within the framework of COMECON they represented the following countries: Czechoslovakia, the German Democratic Republic, the Polish People's Republic, the Romanian Soclialist Republic, the Hungarian People's Republic, and the Union of Soviet Socialist Republics. The complex problem of coal gasification was dealt with in dozens of papers and discussions encompassing many of its aspects. In addition to this program representatives of the individual countries participating in the conference exchanged information concerning the actual directions of their research, the progress made, and the trends of further developments in the gasification of coal in their own countries. The conference was headed by Dr Helmut Frast, the director of the Fuel Institute of Freiberg.

In his extensive introductory paper "The Situation, Trends, and Possibilities in the Development of New Methods of Gasification" P. Heler (GDR) discussed global trends in the field of gasification of solid fuels which he divided into three stages of development:

The first stage encompasses the period of about 100 years before 1940 when production was mainly concerned with the supply of gas for industrial furnaces, and gas generators , as well as with gas serving as raw material in the production of hydrogen.

The second stage encompasses a period of about twenty years when preference was given to generators producing hydrogen and synthetic gases in continuous processes on an industrial scale. Technologies adaptedfully for an industrial scale during this period include:

- gasification in fluid state in an atmosphere of oxygen or air under conditions of atmospheric pressure (Winkler generator),

- gasification in solid state under high pressure with introduction of blast oxygen (Lurgi process),

- production of water gas with a gaseous heat carrier (according to methods developed by Koppers and Pintz-Hildebrand),

- pressure-free oxygen gasification in suspended state (according to the Koppers Totzek method.

The third stage encompasses recent years of intensive research and development and can be characterized as follows:

- the economically profitable production of gas substitutes from coal (synthetic rock gas),

- the economically profitable production of synthetic gas and hydrogen from small-grained coal.

- combination of the gasification process with the production of electric power By desulfurizing coal with the aim of protecting the atmosphere and increasing the proportion of coal transformation into electric power,

-reduction of per-unit costs by introducing oxygen-free processes and increasing per-unit yields,

- reduction of coal consumption by introducing nuclear energy into the gasification process,

The author further described the technical characteristics and progresses in some experiments in the field of new gasification processes and discussed the following trends:

- autothermic gasification under pressure with insufflation of oxygen, continuous elimination of ashes, and realisation of these processes in fluid state or by gasification of coal dust,

- combined technologies for producing gases able to substitute for natural gas,

-studies concerning the introduction of allothermic gasification processes by utilizing heat from high-temperature nuclear reactors, including: gasification with water vapor, gasification by utilizing the water content of undried coal, and combinations with hydrogasification.

On the basis of a broadly conceived characteristic of new gasification processes and of their developmental trends the author gave an assessment of special experiments concerning their exploitation from the viewpoint of the economy of the GDR as well as an analysis of several variants of coal gasification in economic and technological comparison. For choosing appropriate systems of gasification the author recommended the following criteria: the existing mains of gas distribution in the GDR, actual difficulties encountered in the utilization of nuclear energy in the GDR, and the difficulties with gasifying one one of the most readily available materials, lignite. He recommended further research of the following variants:

1. Intensive improvements of lignite gasification processes under high pressure.

2. Gasification of lignite under pressure with elimination of gaseous slags.

3. Gasification of suspended coal dust under pressure.

4. Gasification of fine grained coal in fluid state under pressure.

All the above variants which the author recommended for further studies he then characterized in detail from the viewpoint of the possibilities they offered and of the necessity of introducing technical and structural innovations, improvements, and modernizations, in accordance with the most recent global trends in this field. On this basis the author compared typical variants from a technological and economic viewpoint with emphasis on the following limiting conditions:

- analysis in the entire technological range, that is from the composition of the raw coal to the purified gas, including all auxiliary processes,

- calculation based on raw coal of low caloric values (8230 kJ/kg or 1965 kcal/kg),

- by-production of technological steam with the parameters: 12.3 MPa (125 at) and 525 °C, with reduction of pressure to the lowest degree necessary for a profitable operation,

- utilization of electric power based on the assumption that it is being produced by suitable steam power plants,

- waste materials able to be utilized in the energetic balance (gases, dust, pitch) are consumed in the power station and incalculated on the basis of their caloric values, together with raw coal,

- calculations are based on a pressure of 3.5 MPa (36 at),

- gasification capacity is estimated at 84 TJ (20 Tcal) of purified gas per hour,

- the caliber of the generator is not larger than 4 m with regard to its transportation from producer to customer by truck of rail,

- calculations of operating costs and consumption of material and fuel in auxiliary processes are based on the indicators registered at the "Schwarze Pumpe " enterprises,

- methanization and transformation of gas into hydrogen are not included in the calculations.

In comparing the variants the author devoted special attention to: the utilization of input carriers of energy, material outlays, manpower requirements, prime costs, differences in fuels used in gasification, stability and elasticity of the respective processes, technological problems of exploitation, and the degree of utilization of the gases produced.

In summarizing the comparative assesements of the possibilities for developing new methods of coal gasification the author stressed that after selecting the respective method it would be necessary to conduct experiments on an industrial scale since only in this manner would it be possible to warrant appropriate progress. From this viewpoint the material and financial outlays could become very considerable. For this reason it would be necessary to introduce close cooperation of all interested countries of COMECON and coordination of the operations involved in order to reduce the anticipated outlays and to achieve a fair division of costs.

The paper "Mathematical Models of Gasification Processes in Solid State Under Pressure" E. Klos and W. Tojfar (GDR) presented a mathematic model showing the influence of heat transfer and mass on the gasification of coal. In view of the special difficulties encountered in such processes the model separates the individual stages of gasification (such as preheating, dehydration, degassing) into two parts:

1. a partial model including : preheating, dehydration, and degassing,

2. a partial model including: gasification reactions and heat exchange in a layer of ashes.

The first model is expressed by an algorithm representing the process of heat exchange. The authors presented mathematic formulas for calculating mass and energy balances. The most difficult problem in elaborating this model was to find an algorithm for calculating the dispersion of solid-state temperatures with changes in the size of the grain. The author based this algorithm on certain additional assumptions, such as: simplification of functions representing the interdependence between rate of dehydration and temperature, the connection between temperature and grain size of the fuel, the determination of final data in degassing, and so on.

The mathematical model of preheating , dehydration, and degassing was included in two programs. The first of them dealt with the surface temperature while the second defined the mean temperature in solid state based on the power balance and heat transfer.

The model was formulated for variants of the following parameters: fuel humidity, temperature of output gases, current intensity, and grain size of the fuel.

The second partial model which describes the reactions of gasification and heat exchange in the layer of ashes is based on five basic heterogenic reations:

$$C + O_2 \rightarrow CO_2; C + CO_2 \rightarrow 2CO; C + H_2O \rightarrow CO + H_2;$$
$$C + 2H_2 \rightarrow CH_4;\ CO + H_2O \rightleftharpoons CO_2 + H_2$$

These calculations use the interrelations between the speed of the reaction and the temperature according to the equation of Arrhenius expressing the intensity of the individual components such as the partial compression in the thermodynamic stage of equilibrium at an appropriate temperature. The respective calculations established the mutability of the following parameters: oxygen content, water vapor - oxygen ratio, current intensity, and mean gasification temperature. The computation results achieved by simplifying the model were presented by the authors in form of diagrams of the respective interdependences.

The paper "Possibilities Offered by the Introduction of Thermodynamic Diagrams of the Structure of a C - H - O Composition for Decomposition and Gasification Processes" delivered by E. Klos, G. Seifert, and Z. Maczek (GDR) presented the possibilities offered by the practical utilization of thermodynamic calculations for further research in heat technology.

The authors maintain that the timely determination of parameters defining the composition of the resulting gases is of paramount importance for the planning and calculation of engineering projects for gasification, for establishing correct operating conditions, and for the practical application of the results of research on an industrial scale. This was the reason for the elaboration of a number of computation methods for establishing thermodynamic equilibrium.

Since computations of this kind are extremely labor consuming and require the introduction of electronic technology, the authors propose graphical methods for initial estimates. This method, however, has a serious setback because the respective diagrams are only applicable to a certain kind of fuel at a time. It is therefore necessary to compare the various input materials. To simplify this matter even further the authors assume that only three components participate in the processes of decomposition and gasification, namely coal, hydrogen, and oxygen. On this basis it is then possible to illustrate the process on hand of a triangular (C - H - O) diagram.

In accordance with the conditions of the Gibbs Triangle the product of these reactions, that is the respective gas, will always depend on simple connective reagents, that is fuel and medium. In the second part of their paper the authors discuss the principles of constructing a thermodynamic C - H - O diagram for a gasification temperatur in the range of 600-1500°C.

The resulting diagrams make it possible to determine three basic fields, namely:

1. the range of stable thermodynamic components, such as H2O, CO^2, and O2.

2. the range of homogenic equilibria among such components as CO2, CO, CH4, H2, and H2O.

3. the range of a two-phase equilibrium in which the composition of the gas corresponds to the values established at the soot line.

The thermodynamic C - H - O diagram composed by the authors on the basis of the principles mentioned above can be used for establishing the composition of the gas during the process of gasification.

In the case of an isothermic realization of this process it is possible to read off the composition of the resulting gas for all kinds of fuels and media. In cases of an autothermal realization of the process, however, the reading of the composition of the gas from the diagram can be used for the immediate determination of thermal balances.

The computation methods described by the authors for determining the composition of the gas for isothermic processes were illustrated by examples.

In their paper "The Influence of Macrokinetic Coefficients on the Speed of Coal Gasification Processes" the authors, A. Mizera, W. Kapista, and A. Fronski (Poland), discuss the main reactions occuring in the gasification of coal by oxygen and water vapor or hydrogen and water vapor, the influence of the temperature on the respective endo- and exothermal reactions, and the influence of pressure on the course of reactions triggered by the increase in volume. The authors divide the basic heterogenic reactions occuring in the course of coal gasification into the following stages:

- diffusion of gaseous reagents by a gas film covering the surfaces of solid bodies,
- diffusion of the gaseous reagents inside of capillaries and pores,
- adsorption of reagents on the surface of solid bodies,
- chemical surface reaction,
- detachment of the productsfrom the surface of solid bodies.

In the second part of their paper the authors discuss the mechanism of heterogenetic reactions on the basis of two principal factors, namely the diffusive action of mass and kinetics. The speed of the entire process depends on those changes which take the longest time.

They discussed three stages in the process of gasification:

- coal degasification - the composition of the products of degasification is solely a function of the temperature, pressure, and composition of the gases accompanying the process of degasification,
- the stage of rapid methane formation,
- the stage of slow gasification reactions.

The rate of methane formation in gasification with hydrogen is a function of the pressure, the reactivity of the coal, and the temperature. If coal gasification takes place in an atmosphere containing water vapor, the rate of methane formation is a far more complicated function of pressure and temperature. Research proved the very favorable influence of water vapor on the rate of methane formation, particularly at temperatures over 1,000° centigrade and low pressures. The influence of water vapors diminishes with pressure increase and the degree of coal reaction. In the pressure range of 0.1 to 4.9 MPa (from 1 to 50 at) the rate of methane formation can be 2 to 100 times greater than in pure hydrogen at the same pressure.

The accelerating influence of water vapor on methane formation is not only based on the surface activity of the coal but also on the immediate reaction of water with coal according to the equation:

$$3C + 2H_2O \rightleftharpoons CH_4 + 2CO$$

The authors maintain in conclusion that the total rate of the gasification process is a function of pressure and certain parameters dependent on the temperature and the reactivity of the coal.

The paper "Practical Methods in the Research of Pyrolysis" delivered by L. Sekel (Hungary) discussed the present situation in the research of lignitic coal pyrolysis by instrumental methods in the respective Hungarian scientific institutions. Scientific research in this field aims at producing computer technologies for studying the mechanism and kinetics of the processes engaged in the thermic decomposition of coal at the following variable parameters:

- pyrolytic temperatures,
- preheating period,
- rate of preheating,
- decomposition temperature,
- species of coal.

From three experimental testing methods used for this purpose at a laboratory scale, namely:

- gas chromatography with pyrolysis of the sample,

- thermogravimetric tests in connection with mass spectrography,
- a method based on pyrolythic mass spectography,
- a thermogravimetric method linked with mass spectography.

In their research the authors used the first and third of these methods because the second method was still in a stage of preparation.

In the second part of their paper they discussed methodical processes in the research of lignite pyrolysis with the help of gas chromatography and in the study of slow pyrolysis of lignitic coals with the help of thermogravimetric and mass spectographic methods.

For both instances they defined the composition of the gases produced by pyrolysis and their depemdemce on the variable parameters of the process.

The paper "The Influence of Pressure on the Gasification of Solid Fuels", by J. Chernyenkov and G.S. Safir (USSR) discussed the results of several theoretical and experimental works conducted by the IGI in Moscow with the aim of elucidating the influence of pressure on the gasification process. It had been known that application of high pressure in the gasification of solid fuels improves the capacities of the respective equipment as well as the conditions of the process, thus making it possible to utilize small-grained raw materials of inferior quality. The results of these experiments and computations as shown by the authors proved that the application of increased pressure in the process of gasification leads to a directional change in several participating reactions. With increasing pressure those reactions become more prominent which result in FINAL products of H_2O, CO_2 and CH_4. The summary temperature balance will also be increased as a result of exothermic reactions connected with the creation of the final products mentioned above. They also studied the influence of pressure on the stage of semi-coking caused by the directional changes in secondary reactions and proved univocally that increased pressure (and thus increased concentration of reacting substrates) accelerates the gas producing reactions and intensifies the process of gasification. The authors maintain that it is even more advantageous to start gasification from a fluid state and to apply increased pressures.

Increased pressure changes the characteristics of the hydrodynamic processes and thus improves the structure of fluid media, reduces the extent of dust pollution and offers the possibility of greatly increasing the capacity of generators without increasing their dimensions. The authors also gave an account of a highly intensive method worked out by the IGI in Moscow for gasifying various kinds of coal by reducing their dust and sulphuric components content under high temperatures, which is based on the initial research of pressure application in solid and fluid state. They further discussed the work of a research center for the gasification of solid fuels with various sulphur contents under pressures of up to 3 MPa (30 at) which achieved a maximal gas yield of 1,000 um^3/h. The results of research conducted by this center make it possible to assume that it will be possible to apply them on an industrial scale. In the second part of their paper the authors discussed certain research tests conducted by the above center in the field of coal gasification in fluid state with the aim of elucidating the dependence of the intensity of the process from the applied pressure. On the basis of the results of this research the authors maintain that applied on an industrial scale with generators of 3.6 meters, a wider range of coal granulation, and a degree of expansion of 1.8 - 2.0 the intensity of gasification processes at p = 1 MPa (10 at) can be 5 - 6 times greater than its intensity in a Lurgi generator with the same diameter but at a pressure of p = 2MPA (20 at).

The next paper delivered by O. Barlai and D. Feni (Hungary) and entitled "Coal Gasification in a Soda Solution" discusses the advantages and disadvantages of coal gasification in salt solutions according to the method developed by Kellog. Their paper was based on theoretical solutions and the data available in literature. The main advantages of this method include:

- the catalytic influence of salts as evident in the degree of methane formation and in the reduction of oxygen consumption.
- full gasification of degased coal components without waste products such as pitch,
- the possibility of immediate gasification of coking coal (without preliminary degasification.

The main disadvantages of this process are:

- high corrosion liability of equipment parts,
- serious difficulties in the development of a salt regenerating process,
- equipment for the elimination of cinder from the generator.

In the second part of their paper the authors discussed their research at a laboratory for studying coal gasification in soda solutions with the main aim of eliminating the disadvantages mentioned above and enhancing its advantages as well as their recommendations for complementing or improving existing methods and for the possible construction of an installation working with high pressures. They also discussed in deatail the necessity of establishing research centers in this field and the requirements and methods of the research work required. These studies should be based on 6 already proven methods of gasification, on the data concerning the capacities of the reactors concerned, and on the characteristics of the behavior of the materials in questions. The results achieved so far are a promising starting point.

I her paper "Studies of the Process of Methanisation" K. Falecka (Poland) discussed the thermodynamics of methanization in a $CO-CO_2-CH_4-H_2-H_2O$ compound, the introduction of a methanization catalyst, and the kinetic problems of the process. She compared the results of her own studies with data from literature concerning the computation of thermodynamic conditions of equilibrium at various pressures, temperatures, and H_2/CO contents. These computations encompassed the following ranges: pressure 0.1 - 4.9 MPA (1 - 50 at), temperatures 400 - 1,400 K and molal concentrations of 0.2 - 30 H_2/CO. She further discussed the influence of changes in some of these parameters on the equilibrium degree of the transformation and on the threshold of coal deposition on the catalyst. The author further discussed the most modern findings concerning catalysts of the methanizatition of carbon monoxide and analysed the mechanism of methane forming reactions as described by several authors and their shortcomings.

In the second part of her paper she discussed the dependence of the catalysts's activity on the following factors:

- the crystallinity of the metal,
- the kind of carriers involved,
- the acidity of the carrier,
- the H_2/CO ratio,
- the content of water vapor, and
- the mean grain size of the contact.

She also discussed the possibility of catalyst pollution with coal depending on the size of the crystals and on the H_2/CO ratio.

On the basis of comparisons of the kinetic reaction of methanization drawn from literature, the author stressed the considerable differences in the conditions under which these comparisons were made.

In summarizing the author maintained that the collection of data concerning the projection of contact processes of methanization is based on the computation of the actual rate of the process in all pressure ranges with application of gradientless circulation reactors and on experiments on a quarter- and semi-technical scale.

In their paper "Hydrogen Production on the Basis of general Methods of Solid Fuel Gasification" the authors, H. Grunert and H. Knopel (GDR) presented the results of research concerning several variants of hydrogen production in the process of coal gasification based on economic processes in the Leuna Werk enterprises. Explaining the individual stages of this process and comparing the respective variants they computed the results of the various methods with regard to power consumption and to the equivalent outlays of elementary energy. On the basis of actual prices and costs they showed:

- the comparative prime costs of hydrogen production,
- the comparative investment costs,
- the comparative coefficients of profitability.

They gave these parameters for several variants of hydrogen production based on the following gasification technologies:

- Winkler's method,
- Koppers-Totzek's method,
- Lurgi's method, and
- their modernised versions.

As a basis for comparing the results achieved in computing the individual variants of hydrogen production the authors choose a capacity of 100,000 um^3 of hydrogen per hour (23.5 MPa that is 240 at).

With regard to the difficulty in including Winkler's method, which eliminates considerable quantities of coal together with the dust, the authors studied two subvariants with regard to their utilization of coal dust, namely:

- utilization of the dust in electric boilers,
- gasification of the dust according to the Koppers-Totzek method.

On the basis of their studies the authors maintain that production methods based on the usual Winkler or Koppers-Totzek technologies are comparable. A subvariant of Winkler's method based on dust gasification proved about 3.5 percent more effective (as far as prime production costs are concerned) than the Koppers-Totzek process.

The remaining variants which are based on the Lurgi process proved far more costly. In comparing the other coefficients they established that a variant based on Winkler's method was the most advantageous of all variants, which they ranged in the following order: Koper-Totzek, a modernized version of the Lurgi process, and the classical Lurgi process.

The authors established that the following processes show the greatest prime cost ratio respectively:

- oxygen production,
- gas production,
- gas compression.

Particular attention is given to the fact that the comparisons were made by people who were very well versed in all technological and economic aspects of all variants of gasification based on the Lurgi method,

In their paper "High Temperature Purification of Industrial Gases from Sulfuric Compounds by Solid Reagents" A. Gawrilov and U. Cherenkov (USSR) discussed the problem of applying various metallic reagents, metallic oxides and various salts in the high-temperature elimination of sulfuric compounds from industrial gases and the results of their own studies in this field.

The authors maintain that in studying the process of high-temperature elimination of sulfuric compounds from the gas with the help of solid reagents which together with the sulfur are bound into solid insolubl salts, it is above all necessary to consider the following factors:

- the temperature of disassociation of these reagents and of the ensuing sulfuric salts,
- the thermodynamic data concerning the course of reactions, such as: the magnitude of the thermodynamic potential and a stable equilibrium as a function of the temperature.

The paper further discussed plans for the construction of a research center for studying the kinetics of reactions in gas desulfurization under dynamic conditions as well as a program for such research and for the evaluation of its results.

On the basis of previously conducted studies the authors maintain that in the purification of moist power gas from sulfuretted hydrogen with the help of iron trioxide at temperatures of up to 100 centigrade, the purification process is slowed down by the water content of the gas. The height of the reagent layer increases the period of its contact with the sulfuretted hydrogen. An analysis of the chemical composition of the gas showed that during the process of purifying the gas from sulfuretted hydrogen on iron ore there is an additional reaction between CO_2 and H_2 leading to the formation of CO and H_2O in which the ore serves as a catalyst. The authors studied the effectiveness of this process at a temperature range of 600 - 900° centigrades and maintain that the optimal temperature of this process lies between 600- 700° centigrade.

On the basis of the positive results of laboratory research a pilot installation was put into operation. The authors also presented a schematic diagram of this pilot installation for the desulfurization of gas and the results of tests achieved in this installation.

In the following paper "The Present Level and Further Development of Gasification with Steam-Oxygen Blasts in Czechoslovakia" K. Prasek (CSSR) gave a survey of the development of lignite gasification according to Lurgi's method in three industrial enterprises: Most, Usti, and Vresov. Coal gasification is very important for the gas supply of Czechoslovakia. In 1974 63 percent of the total quantity of gas fuel was produced by gasification of lignite. From this viewpoint the modification and perfection of gasification processes is one of the most important tasks in fuel technology.

The author discussed the respective technology and the direction of its perfection on the basis of the experience of three industrial enterprises. The oldest gasification plant in Most has recently been completely modernized with inclusion of the old purifying installations of the "Rectisol" type. The plant at Usti is a combine designed for the production of gas fuel. The plant at Vresov, on the other hand, is a power generating combine which also produces electric power and lignite briquets.

The author anticipates a reduction of the proportion of gas fuel in the power balance of Czechoslovakia in coming years, in spite of an increase in coal gasification. He also anticipates that a solution to the problems encountered in the gasification of Czech lignites with high sulfur content will be found soon. One of the main changes expected in the technology of coal gasification is the modernization of generators including the improvement of fuel supply into the generator, the construction of a new type of heat exchanger for raw gases, new technologies in ash removal and changes in the construction of the grates and of the internal shell of the generator. After the conclusion of theoretical research these changes will be tested in an experimental generator at Vresov where the results will be evaluated by computer to ensure maximal utilization of new findings.

A further combination of new technologies in the production of gas fuel and in the production of other gases, for instance methanol is also anticipated which in future could lead to the production of a substitute for natural gas. The elaboration of a conclusive research report on a semi-industrial scale is expected in the next years.

The last paper "The Level of Development and Practical Results in the Construction of Gasification Plants for Solid Fuels with Oxygen in Solid State under Pressure in the GDR" by W. Roth, G. Hurbig, and G. Kunert (GDR) dealt with the history of the development of processes for the gasification of solid fuels in the GDR. The authors discussed problems in the exploitation of generators and auxiliary oxidising equipment, purification installations, and installations for the utilization of waste materials. They also dealt with the advantages and difficulties in the operation of installations for oxigenous gasification of coal in solid state under pressure.

The authors maintain that a 5 year exploitation of a modernized industrial installation met all planned capacity and quality standards in all stages of production. The initial difficulties in the removal of dust from the gas had also been successfully overcome. On the basis of their own experience and of intensive cooperation with the respective industrial enterprises in Czechoslovakia they prognosticated the further development of gasification technology as follows:

- increases in the capacity of generators, particularly in the sphere of gas production and purification,
- reduction of prime costs for fuel, auxiliary materials, and repairs, and
- full utilization of coproducts.

The authors added that on the basis of practical experience at the Schwarze Pumpe plant, the GDR constructed a similar plant for coal gasification in Kosovo, Yugoslavia. This plant with a capacity of 90,000 um^3 of raw gas per hour (6 generators) began construction in 1966/67 and was put into operation in 1970. It is planned to expand the capacity of the plant by installation of new equipment.

In conclusion the participants of the conference summarized the achievements and results of the meeting. It can be said that the Scientific Conference on the Gasification of Coal and Lignite, the first of its kind held within the framework of COMECON, has met all expectations and aims, and notably:

- disseminated among the participants of information about the main directions in gasification and about the progress achieved in the individual member countries of COMECON,
- encouraged and facilitated immediate contacts and exchange of experience between experts in the various stages of coal gasification.

The conference can be regarded as a first of a series of similar meetings held with the aim of disseminating introductary information. It confirmed the necessity of organizing similar conferences of this type with even more comprehensive programs in the framework of COMECON.

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