

# Mineral Industries

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Number 6

## FIFTH PENNSYLVANIA MINERAL INDUSTRIES CONFERENCE

APRIL 26th and 27th

PETROLEUM AND NATURAL GAS SECTION Will Hold Symposium on  
Solvent Extraction Process

The producer, as well as the refiner, of Pennsylvania grade crude oil is vitally interested in the changes now taking place in the methods of manufacturing superior lubricating oils, for it is essential that the present premium on Pennsylvania crude oil be maintained. The opening session of the conference, Friday afternoon, April 26, from 1:30 P.M. until 4:30 P.M., will be devoted largely to the consideration of the solvent extraction processes applicable to the refining of Pennsylvania crude oil. There will be one or more papers dealing with this topic as well as some formal and informal discussion.

During the past year, three refineries in Pennsylvania have adopted the Chlorex process; therefore, the paper by Mr. D. B. Williams, entitled "Application of the Chlorex Process to the Treatment of Lubricating Oils from Pennsylvania Crude," would be of especial interest.

Mr. Williams was graduated from Cornell University in 1924 with the degree of mechanical engineer and has been employed by the Carbide and Carbon Chemicals Corporation since then. Chlorex (beta beta' chloroethyl ether) is manufactured by processes developed by the Carbide and Carbon Chemicals Corporation, which company has received an exclusive license under an agreement with the Mid-Continent Petroleum Corporation and the Standard Oil Company (Indiana) who brought the Chlorex process to the commercial stage.

The first part of the paper will include brief descriptions of the plants installed in Pennsylvania. The second section of the paper will thoroughly cover typical results secured by Chlorex, treating Pennsylvania neutrals, bright stock and cylinder rock. The last section will be devoted to a consideration of the costs of installing and operating Chlorex plants for the treatment of Pennsylvania oils, including the advantages of solvent extraction, such as (a) improvement in filter yields, (b) breaking cylinder stock viscosity, and (c) disposal of extracts.

For some time past, Dr. Earl S. Hill of the petroleum research laboratory of the School of Mineral Industries has been studying the problem of the accurate determination of oil saturation of oil sand reserves. He will present a paper giving the indications of the various methods now in use and describing new methods for saturation determinations.

Dr. Hill received the M. S. degree in 1931 and the Ph. D. degree in 1934 from the California Institute of Technology. While at this institution, under project No. 37 of the American Petroleum Institute, he car-

ried on research for four years studying the fundamentals of the retention of oil and gas in sands.

A particularly appropriate paper at this time is the one to be presented by Mr. Allen D. MacLean, Chief Engineer of the Pittsburgh Equitable Meter Company, on the "Measurements of Fluids in the Petroleum Industry." The new fluids' measurement laboratory of the School of Mineral Industries has just been completed.



ARTHUR SIMMONS

This paper will include the following: (a) Development of the use of orifice and venturi type meters for the measurement of flows showing the derivation of the common flow formula and giving a resumé of the work which has been done to establish accurately the coefficients used for the measurement of oil, with curves showing these coefficients; (b) Description of other type meters which are commonly used in measuring petroleum products from the well to final retailing. These include the nutating disc meter, the velocity meter, the confined impeller type meter and the piston type meter. The application of the orifice meter formula to natural gas is also made with a short resumé on the derivation of the new coefficients for natural gas measurement.

Mr. MacLean was graduated from Harvard University in 1917 with the degree of Bachelor of Science. From 1917 to 1919 he was with the American Air Service and in 1919 was Engineer for the Ashton Valve Company, Boston, Mass. From 1920 to 1926 he was Assistant Chief Engineer, New Departure Division of the General Motors Corporation, and since 1926 he has held the position of Chief Engineer of the Pittsburgh Equitable Meter Company.

The oil and gas possibilities of the deeper sands in northwestern Pennsylvania is another subject of general interest to the natural gas and petroleum industries of the State. Mr. S. H. Cathcart, senior geologist of the Pennsylvania Topographic and Geologic Survey, and Dr. Charles R. Fettke, head of the Department of Geology at the Carnegie Institute of Technology, will present a joint paper on this topic. The paper will consist of a resumé of the regional geology including subsurface deductions based upon deep well data determined by the study of well cuttings; reference to the surface structure of the region, in so far as known and its probable relation to the subsurface; and a discussion of the oil and gas possibilities of the Oriskany sandstone, the Newburg sand of the Lockport (Niagara) dolomite and the Medina sand.

Mr. Cathcart received his B. S. degree in metallurgy in 1912 from The Pennsylvania State College and his M. S. degree in mining geology from the same institution in 1916. During the years 1917-1918 and 1919-1920 he was engaged in graduate work in geology at Yale University. During 1916-1917 he was employed by the Empire Gas and Fuel Company. Since then Mr. Cathcart has had a varied field and office experience, being connected with the U. S. Geological Survey from 1918 to 1925, and with the Standard Oil Companies of Argentina and Venezuela from 1925 to 1930. In 1930 he joined the staff of the Pennsylvania Topographic and Geologic Survey in charge of the oil and gas work of the State.

Dr. Charles R. Fettke, Professor of Geology and Mineralogy at the Carnegie Institute of Technology obtained his undergraduate training in mining engineering at the University of Washington. This was followed by three years of graduate work in geology and physical chemistry at Columbia University from which institution he received the degrees of Master of Science and Doctor of Philosophy. At Columbia University he was assistant to Professor James F. Kemp, noted authority on ore

(Continued on page two)

## Mineral Industries

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THE PENNSYLVANIA STATE COLLEGE  
Division of Mineral Industries Extension  
H. B. NORTHRUP, Director

### Pennsylvania's School of Mineral Industries and Experiment Station

*Dedicated to the exploration, development, and conservation of Pennsylvania's natural mineral resources, and their preparation, processing, and efficient utilization.*

#### FIELD OF WORK

Geology, Mineralogy, Geography  
Petroleum and Natural Gas  
Mining and Geophysics  
Mineral Economics  
Fuel Technology  
Metallurgy  
Ceramics

#### DIVISIONS OF SERVICE

Resident Instruction  
Extension Instruction  
Correspondence Instruction  
Mineral Industries Research

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APRIL, 1935

## PETROLEUM CONFERENCE

(Continued from page one)

deposits, for two years. From this position he went to the Carnegie Institute of Technology to take charge of the courses in geology and mineralogy. Dr. Fettke has been making a detailed study of the Bradford oil field and the subsurface stratigraphy of the northern Appalachian oil and gas fields during the past ten years for the Pennsylvania Topographic and Geologic Survey. He has made, also, extensive investigations on the recovery of oil by water flooding and air and gas drives.

Water for flooding purposes has represented an acute quantitative problem for several years in Pennsylvania but not until rather recently has it become generally realized that quality is an equally important factor. Mr. Arthur Simmons of Torrey, Fralich and Simmons will discuss this question in a paper entitled "Problems of Flood Water Supply." In this paper Mr. Simmons points out that corrosion of pipe lines and the growth of organic material are, in many cases, nullifying the effects of filtration since the flood water cannot be introduced directly into the sand after filtration. He will discuss, also, the various chemical and mechanical means by which it is possible to insure clean water at the sand face and will show that the cost of such treatment is small compared with the possibilities of increased recovery.

Mr. Simmons is an alumnus of the School of Mineral Industries, having been graduated in mining engineering in 1925. Following this he was connected with the Ingersoll-Rand Company, first being employed in the general engineering department of this company and later as sales engineer in the Pennsylvania grade crude oil fields. Later he was employed as an engineer by the Sloan and Zook Company of Bradford, Pennsylvania. Since 1929, he has been associated with Messrs. Torrey and Fralich in the conduct of a general consulting geological and engineering business.

State College is ideally situated for a meeting of this kind; it is nearly in the exact center of Pennsylvania and is easily reached by auto via State Highway Routes 322 or 45, and by bus and train from Tyrone, Lewistown or Bellefonte.

Anyone interested in any aspect of the problems of the petroleum and natural gas industries of the State is cordially invited to attend. It is requested that those planning to attend communicate with Professor C. A. Bonine, Room 112, Mineral Industries Building. If at all possible, information should be furnished as to the number coming and the number wishing to attend the Friday evening dinner.

#### ENTERTAINMENT

No stated program has been arranged for Saturday afternoon. Guests may arrange to play golf on the College Course of 18 holes which adjoins the Campus, directly opposite the Nittany Lion Inn or on the course of the Centre Hills Country Club near State College.

There will be one intercollegiate athletic contest on the Penn State Campus Saturday afternoon, as follows: Baseball at 2:00 P. M., Penn State vs. Juniata.

#### LADIES' ENTERTAINMENT

Ladies will be welcome at the informal dinner and dance on Friday evening at 6:30 P. M.

On Friday afternoon at 4:00, an informal tea will be given in their honor at the Nittany Lion Inn.

The laboratories and research rooms of the Mineral Industries Building will be open for inspection on Thursday evening previous and throughout the meeting.

Persons interested in visiting other College buildings will be provided with guides.

## PROGRAM

April 26, 1935

FRIDAY, A. M.

Registration. Lobby of the Mineral Industries Building.

Inspection of Laboratories.

#### FIRST SESSION

FRIDAY, 1:30 P. M.

Room 315, Mineral Industries Building  
Presiding Officer—Mr. E. E. Bown, Refinery Manager, The Kendall Refining Company, Bradford, Penna.

"Application of the Chlorex Process to the Treatment of Lubricating Oils from Pennsylvania Crude," by Mr. D. B. Williams of the Carbide and Carbon Chemicals Corporation, New York, N. Y.

Discussion—by Mr. P. M. Robinson, Research and Development Engineer, The Pennzoil Company, Oil City, Penna., and Mr. W. B. McCluer of the Kendall Refining Company Bradford, Penna.

"The Solvent Treating of Petroleum Fractions," by Mr. John Dickinson of the M. W. Kellogg Company, New York, N. Y.

Discussion.

"Methods of Determining the Saturation of Oil Sand Samples" by Dr. Earl S. Hill, Research Assistant, the Mineral Industries Experiment Station, State College, Penna.

Discussion.

FRIDAY, 6:30 P. M.

Dinner Dance (informal). The Nittany Lion Inn. Price \$1.50. Secure tickets upon registration.

April 27, 1935

#### SECOND SESSION

SATURDAY, 9:30 A. M.

Presiding Officer—Mr. George E. Welker, President, The United Natural Gas Company, Oil City, Penna.

"Measurement of Fluids in the Petroleum Industry" by Mr. Allen D. MacLean, Chief Engineer, the Pittsburgh Equitable Meter Company, Pittsburgh, Penna.

Discussion.

"Oil and Gas Possibilities of the Deep Sands in Northwestern Pennsylvania" by Mr. S. H. Cathcart, Senior Geologist of the Pennsylvania Topographic and Geologic Survey, Harrisburg, Penna., and Dr. Charles R. Fettke, Head of the Department of Geology, Carnegie Institute of Technology, Pittsburgh, Penna.

Discussion—by Mr. James D. Sisler, Carnegie Natural Gas Company, Pittsburgh, Penna.

"Problems of Flood Water Supply" by Mr. Arthur Simmons of Torrey, Fralich and Simmons, Bradford, Penna.

Discussion.

SATURDAY, 12:30 P. M.

Luncheon Meeting of the Petroleum and Natural Gas Advisory Boards. The John Gilpin Room of the Nittany Lion Inn.

Baseball Game—Juniata College vs. The Pennsylvania State College.

#### LADIES' ENTERTAINMENT

Friday afternoon, Informal Tea in the Lounge, Nittany Lion Inn, 4:00 P. M.

Friday evening, Dinner (informal) followed by dancing, Nittany Lion Inn, 6:30 P. M.

Notice—Smoker for those arriving Thursday evening in the production research laboratories of the School.

## Guest Accommodations

**HOTELS:** The Nittany Lion Inn (hotel headquarters). Located on the campus. Rates: American Plan, single \$6.00 each; double \$5.00 each.

The State College Hotel, Allen Street and College Avenue. Rates: European Plan, single \$1.50 to \$3.00; double \$3.00 to \$5.00.

Penn State Hotel, 310 East College Avenue. Ten rooms with running water and twin beds. Rates: European Plan, \$1.25; \$1.50 single; \$2.50 double.

Hotel reservations should be made direct with the management.

**RESTAURANTS:** The Sandwich Shop, basement Main Building, campus. Meals, \$0.35 to \$0.75.

The Corner Room, Allen Street and College Avenue, a la carte service.

The Green Room, Pugh Street and East College Avenue, a la carte service.

The Allencrest, West Beaver Avenue. Meals, \$0.35 to \$0.50.

**ROOMS:** Private home accommodation for 150 to 400 persons at \$1.00 to \$1.50 per night. Most of these rooms are within a radius of three blocks of the campus. Rooms will be engaged in advance upon request to Professor C. A. Bonine, 112 Mineral Industries Building, State College, Pa.

**Petroleum and Natural Gas Laboratory Completed**

During the past two years additional laboratory space and equipment have been provided by the Department of Petroleum and Natural Gas Engineering due to the rapid increase in enrollment in the curriculum and need for more adequate facilities for student laboratory work. As a result, a large laboratory room in the Mining Industries Building was allocated to the department last year. The new laboratory has been furnished with benches, seats, instruments, and modern test equipment for student work in petroleum and natural gas.

The laboratory work is divided into three divisions: petroleum production, petroleum refining, and natural gas, each division operating its own laboratory course. The work in parts of the courses is performed in the Petroleum and Natural Gas Research Laboratory where special equipment has been developed and is available for student use.

The laboratory courses have been developed in accordance with both general and specific practice—Eastern, Mid-Continent, and California—and the specialized problems of the Pennsylvania industry. Each course requires the completion of a definite number of experiments, and an instruction sheet is issued to the student for each experiment. The titles of typical experiments for the three laboratory courses are indicative of the scope of the work. Typical experiments are:

**PETROLEUM PRODUCTION ENGINEERING**

- Production. Inspection of Petroleum and Natural Gas Laboratories.
- Construction of Well Logs and Oil Field Maps
- Design of the Standard Cable Tool Rig
- Design of Standard Drilling and Fishing Tools
- Design of the Rotary Tool Drilling Rig
- Methods for the Determination of Porosity
- Determination of Permeability
- Methods for the Determination of Oil Saturation
- Characteristics of Crude Oils
- Study of Oil Field Waters
- Study of Crude Oil Emulsions
- Design of Production Equipment
- Design of Modern Re-pressuring Operations
- Design of Modern Water-Flooding Operations

**PETROLEUM REFINING ENGINEERING**

- Studies of Standard Petroleum Tests
- Studies of Low Temperature Gas and Gasoline Analyses
- True Boiling Point Analyses
- Unit Processes
- Commercial Products

**NATURAL GAS ENGINEERING**

- Calibration of Pressure Gages
- Density and Specific Gravity of Gases
- Proving and Adjustment of Displacement Meters
- Fundamental Orifice and Venturi Meters
- Orifice Discharge Coefficients as a Function of Ratio of Orifice to Pipe Diameter (Meriam orifice)
- Effect of Location of Pressure Taps on Orifice Coefficient
- Calibration of Westcott Recording Orifice Meter
- Calibration of EMCO Recording Orifice Meter
- Calibration of Venturi Indicator-Register-Recorder
- Calibration of Orifice and Meters for

- Studies of Flow Control of Gases
- Studies of Proportional Flow Control
- Studies of Flow Control of Liquids
- Design of Modern Gas Lift Systems

Each experiment performed by the student is submitted by him in the form of a professional report, including summary, procedure, data, calculations, drawings, curves, discussion, etc.

To give some detail concerning a few of the experiments, the series in the natural gas laboratory course devoted to flow control are of interest. A schematic diagram of the flow control test equipment is shown in Figure 1. Large volumes of high pressure air or as much as 3,000 gallons per hour of absorption oil or water may be passed through the test system. Calculations of the accuracy of the flow control of the fluid, orifice calibration, pressure regulation, and of other variables may be made. The system is designed to permit the one assembly to be used in five different test operations. The instruction sheet also requires the student to design installations for various purposes in refinery processes, in natural gasoline plants, in natural and manufactured gas mixing, and in control operations for re-pressuring, gas-lift, and flowing oil well installations. In the group of experiments concerned with the determination of orifice coefficients, a four-inch brass flow tube, highly machined inside to assure smoothness of the walls, is available for test purposes. The tube has a long straight run to the orifice, and the upstream end also is fitted with straightening vanes. The orifice assembly is fitted with twelve pressure taps located at various distances upstream and downstream to the upstream surface of the orifice plate. This arrangement permits the calibration of sharp-edge and hourly orifice coefficients for pressure connections at the pipe, throat, and at several places at the flanges. This apparatus was built in duplicate units by a manufacturer for work in checking coefficients. After the completion of the research, one unit was given to this laboratory, and the other unit is to be used in the Bureau of Standards.

Much of the equipment in the new laboratory has been donated or permanently loaned the department for test and instructional purposes by various manufacturers and operating companies. Much credit is due to the interest and cooperation of the following companies:

Pittsburgh Equitable Meter Co., Equitable Gas Co., United Natural Gas Co., The Meriam Co., National Transit Pump and Machine Co., Mason-Neilan Regulator Co., Builders Iron Foundry, American Meter Co., The Foxboro Co., Moser Mfg. Co., Jones and Laughlin Steel Corp., Axelson Mfg. Co., Oil Well Supply Co., Bovaird and Co., Bradford Motor Works, American Glycerin Co., S. R. Dresser Mfg. Co., Spang and Co., American Cable Co., Inc., Baker Oil Tools, Inc., Guiberson Corp., Charles N. Hough Mfg. Co., Halliburton Oil Well Cementing Co., Reed Roller Bit Co., Patterson-Ballagh Corp., Union Wire Rope Corp., Larkin and Co., Victualic Co. of America, Lee C. Moore and Co., Inc., Torrey, Fralich and Simmons, Ltd., American Cast Iron Pipe Co., United States Pipe and Foundry Co., Kendall Refining Co., Crew-Levick Co., and Universal Engineering Co., Ltd., and Mr. L. G. Dana, Derrick City, Pa.

**Bus Schedules**

**Tyrone-State College**

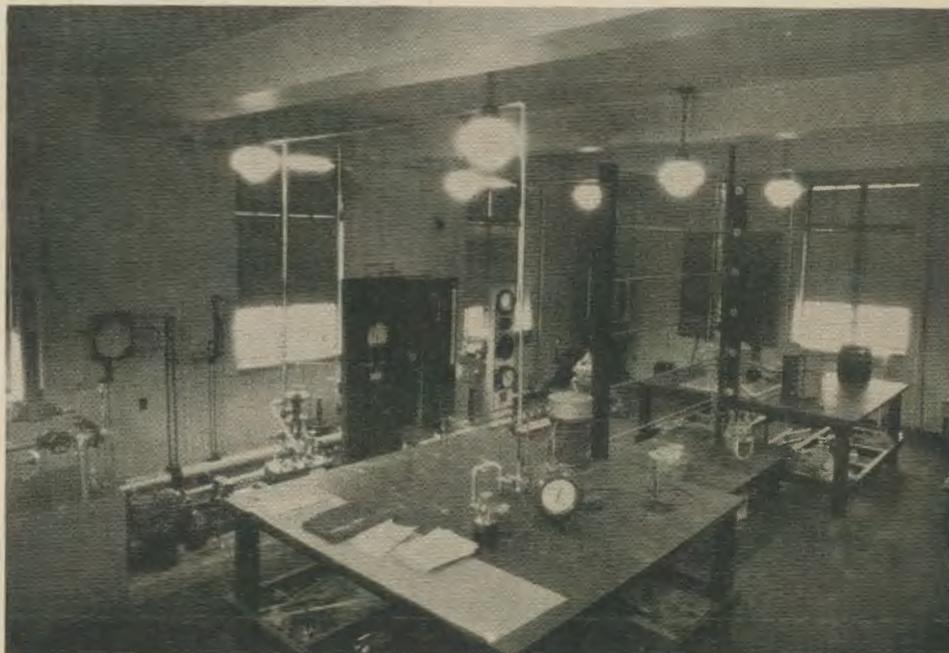
- Lv. Tyrone 11:10 a.m.; 2:10, 4:10, 7:45 p.m.
  - Lv. State College 8:30, 11:30 a.m.; 1:35, 5:20 p.m.
- (Running Time approximately 1 hr. 5 min.)

**Bellefonte-State College**

- Lv. Bellefonte 7:15, 10:40 a.m.; 1:10, 2:40, 5:00, 9:10 p.m.
- Ar. State College 7:45, 11:10 a.m.; 1:40, 3:20, 5:30, 9:40 p.m.
- Lv. State College 8:00 a.m., 12:10, 2:00, 5:10, 6:30, 9:40 p.m.
- Ar. Bellefonte 8:30 a.m.; 12:40, 2:30, 5:40, 7:00, 10:10 p.m.

**Pittsburgh-Tyrone (Greyhound Lines)**

- Lv. Pittsburgh 7:15 a.m.; Ar. Tyrone 12:38 p.m.
  - Lv. Pittsburgh 10:30 a.m.; Ar. Tyrone 3:36 p.m.
  - Lv. Tyrone 12:58 p.m., via Johnstown; Ar. Pittsburgh 6:35 p.m.
  - Lv. Tyrone 1:38 p.m., via Blairsville; Ar. Pittsburgh, 6:25 p.m.
  - Lv. Tyrone 7:08 p.m., via Blairsville; Ar. Pittsburgh 11:55 p.m.
- (These are subject to change at any time)



LABORATORY FOR PETROLEUM AND NATURAL GAS ENGINEERING

## EXPERIMENT STATION TECHNICAL PAPERS

(Continued from February issue)

9. *Silurian Sections Near Mount Union, Central Pennsylvania*, by Frank McKim Swartz, Associate Professor of Paleontology (reprint of a Study made for The Pennsylvania Topographic and Geologic Survey), 1934, 53 pages, 5 illustrations. Price, 25 cents.

Six sections of Silurian rocks, seen near Mount Union and Lewistown, are described in detail. These sections display almost all of the 3000 feet of Silurian strata of south Central Pennsylvania, including the Tuscarora sandstone, Castanea sandstone, Rose Hill shale, Keefe sandstone, Rochester shale, McKenzie shale and limestone, Bloomsburg red shale, Wills Creek shale, and Tonoloway limestone. Some of these formations exhibit interesting faunal sequences, and diagnostic zones of ostracodes and other fossils. Relations to the Silurian deposits of western Maryland, eastern Pennsylvania, and western New York, are discussed.

10. *Observing Formation of Martensite in Certain Alloy Steels at Low Temperatures*, by O. A. Knight, Associate Professor of Metallurgy, and Helmut Muller-Stock, Graduate Student, 1934, 7 pages, 4 illustrations. Price, 10 cents.

Steel containing 0.16% C., 25% Ni. and 4% Si. was rendered austenitic. It was then polished and mounted on a micro-metallograph in a special apparatus which enabled the observer to watch the polished surface while the specimen was cooled with either solid carbon dioxide and ether or with liquid air. The specimen mounting and objective were connected with a rubber "tubing" and the space desiccated so that ice would not condense and freeze on specimen or objective. The actual appearance of martensite needles was observed a number of times. The needles, for the most part, seemed to form instantaneously. In later work moving pictures of this change have been obtained.

11. *Correlation Studies of the Central and South Central Pennsylvania Bentonite Occurrences* by R. R. Rosenkrans, 1934, 22 pages, 6 illustrations. Price, 10 cents.

The discovery of altered volcanic ash in the Ordovician rocks of Tennessee, Kentucky, and Alabama, by W. A. Nelson, suggested to geologists the possibility of its wide spread occurrence in the middle Ordovician formations of eastern United States. A search for this material in the central part of Pennsylvania met with success, and a preliminary paper published in 1929 by Bonine and Honess definitely established the occurrence of Ordovician bentonite in that state. The present paper is an extension of that work and comprises a petrographic study and correlation of the bentonite beds throughout the entire middle Ordovician province of central Pennsylvania. This discussion establishes the identity of six well defined beds of bentonite occurring in the basal portion of the Salona formation, several of which have been traced throughout an area over 100 miles in length and 25 miles in width. In addition several horizons marked by bentonitic material of Pre-Salona age have been recognized and tentative correlations made over portions of the area. The detailed mapping of many occurrences and the correlation of the bentonite beds of this province form a basis for future study of similar beds in neighboring provinces.

12. *Reactions Between Solids in the Absence of a Liquid Phase*, by Nelson W. Taylor, Professor of Ceramics, 1934, 9 pages. Price, 10 cents.

The factors governing reactions between dry, finely divided solids in intimate contact are discussed in some detail and examples from this and other laboratories are cited. The direction and driving force of reactions are determined by the free energy change which may be expressed in terms of the lattice or crystal energies of the solid phases concerned. The mechanism of reaction is primarily a diffusion process, whose speed is largely determined by the firmness of binding of the ionic constituents of the reaction product. For every reaction there is a characteristic heat of activation. Gases or liquids may sometimes act as catalysts.

Reactions between solids play an important role in the firing of whitewares and refractories, in the early stages of glass melting, and in the high temperature service of refractories. Many of the reactions of geological contact metamorphism are of this type.

13. *Mineral Matter in Coal—A Preliminary Report*, by A. W. Gauger, Director of Mineral Industries Research, E. P. Barrett, Research Associate, and F. J. Williams, Research Assistant. 1934. 10 pages. Price, 10 cents.

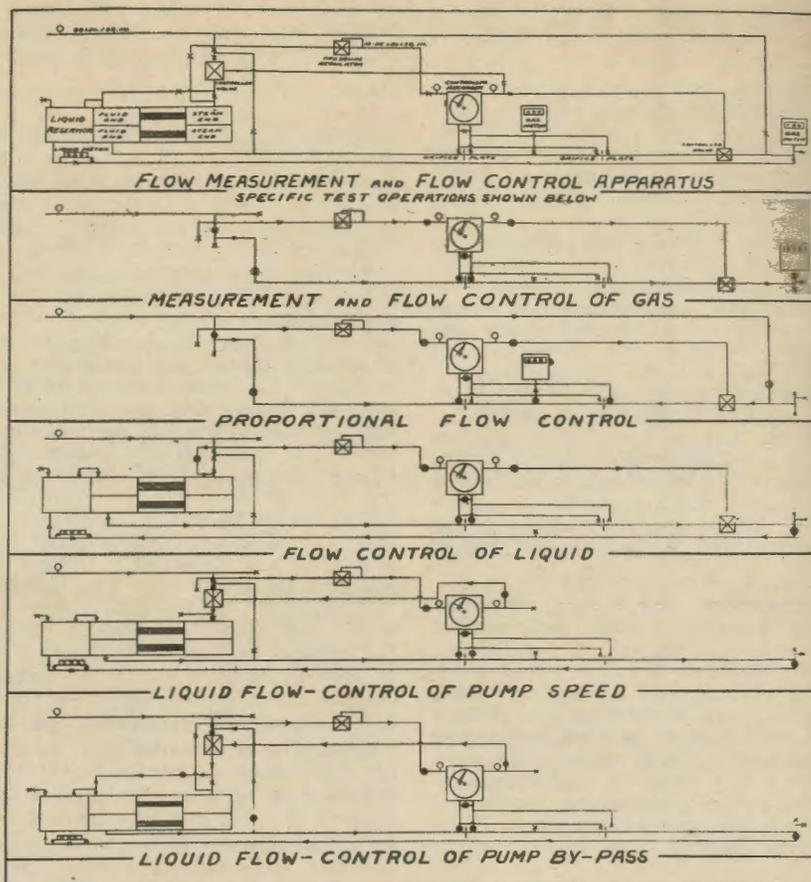


FIG. 1. SCHEMATIC DIAGRAM OF FLOW CONTROL TEST EQUIPMENT

The numerous empirical corrections for the losses from the mineral matter during ignition of coal to ash are all subject to error due to variations in the nature of the mineral matter present. Seven samples of coal and three of washery refuse were examined for the purpose of obtaining an approximate knowledge of the minerals present. Ash analyses were available for a number of these samples. These analyses were rationalized with the aid of the information provided by the mineralogical data and the results tabulated. The procedure used in rationalizing the analyses is described in detail. The difference in calorific equivalents for the original, the float, and the sink fractions of five coals are calculated by the Parr formula, on the ash-free basis, and on the mineral-matter-free basis. The calculations to mineral-matter-free basis yield B.t.u. values for original, float and sink fractions in closer agreement than either the Parr formula or the ash-free basis.

### Penn State Professor Given Fellowship

DR. HONESS IS AWARDED GRANT OF \$1,000  
TO PURSUE FURTHER HIS  
RESEARCH WORK

Dr. Arthur P. Honess, professor of mineralogy at The Pennsylvania State College, has been elected a Fellow of the Geological Society of America and awarded \$1,000 to pursue investigations of crystal structure by means of etch methods. Information concerning his election to this society and of the monetary award was forwarded to Dr. Honess by Dr. Charles P. Berkley, professor of geology at Columbia University and secretary of the society. The award was made from the Penrose Fund which the society administers to encourage scientific research.

Although the research to be undertaken by Dr. Honess is purely scientific in that it is primarily a search for added information about crystal structures, it may have important practical applications. Crystals are present in nearly everything that man manufactures or uses. Metals and minerals are crystalline; silk is crystalline; cellulose of all vegetation is crystalline.

processes, for all of the hormones and enzymes thus far isolated are pure crystals.

The new problem upon which Dr. Honess is embarking is that of studying the structure of crystals by means of etching their surfaces with optically active solvents. Due to the orderly arrangement of atoms within a crystal, the patterns formed by etch figures on the surface reveals the interior structure.

Recently, however, he observed that the symmetry indicated by optically active solvents on calcite was of a different grade than that revealed by optically inactive solvents. An optically active solvent is one which rotates a beam of polarized light, the scientist explains. He reported this anomalous condition to the Geological Society and received a grant of \$1,000 to investigate the condition.

The grant will enable Dr. Honess to continue investigations in a field in which he is already known internationally. He is one of the few Americans to hold membership in the Royal British Mineralogical Society. His publication, "Etch Figures on Crystals," is the standard American work on the subject.

He will be assisted by Robert Jones, a recent Penn State graduate who later obtained his master's degree under Dr. Honess' supervision.

Dr. Gerald L. Hassler, assistant professor of Petroleum Engineering, gave a paper on "The Theory of Secondary Structure in Crystals" before the Advanced Physics Colloquium of the University of Pittsburgh on March 8th. This colloquium is composed of scientists from the University of Pittsburgh, Mellon Institute, U. S. Bureau of Mines, the Gulf Companies Re-