Published During the College Year

Mineral Industries

THE PENNSYLVANIA STATE COLLEGE

School of Mineral Industries

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Offer Extension Course For Workers in Ceramics

School Completes Preparation of New Three-Year Program for Advancement in Industry

Responding again to the demands of a great mineral industry, the Division of Mineral Industries Extension of The Pennsylvania State College is now prepared to offer a program of adult education to workers in ceramics.

Three-Year Course Aids Worker

The division has completed preparation of a three-year course of study designed to help the worker advance himself in the industry. The course has been shaped so that workers who accept the training will be ready for more responsible positions, able to handle better the new processes developed by research, and will know how to link their practical understanding to technical problems.

Great strides in technical advancement are being made in the ceramics industry, specialists in the School point out. Employees must be trained to accept the positions of greater responsibility that follow research and new techniques.

Course Has 120 Class Hours

The new course will be an organized curriculum three years in length. One textbook is being prepared for each year of the work, all of them by the extension division with the assistance of members of the teaching and research staffs of the resident department. Each year of the course will comprise 120 hours of class instruction and upon completion of each year's work the student will be awarded a certificate valued at eight industrial points. When he has completed the entire course, he will receive an extension diploma in ceramics.

The first year of the course, which is preparatory, deals with such subjects as elementary mathematics, chemistry, physics, electricity, pyrometry, fuels and combustion, water and lubricants, furnace design and construction, and kilns.

In the second year geography, general geology, mineralogy, the geology of ceramic materials, mining and preparation, beneficiation, handling and storage, melting and crystallization of silicates and the heat treatment of ceramic materials are studied.

Specialize in Third Year

During the third year the student will be permitted to specialize in any one of the following: refractories, heavy clay products and whiteware, glass and enamels, Portland cement, or limes and plasters.

After he has finished his third-year option, the student may, in order to broaden his horizon, elect any of the other third-year operations. He will thus have available seven continuous years of study in the

New Members of the Faculty of the School of Mineral Industries

DR. K. H. ANDRESEN
Research assistant in petroleum and natural gas

H. BEECHER CHARMBURY
Research assistant in petroleum and natural gas

DR. THOMAS G. COOKE
Research assistant in petroleum and natural gas

DR. TOBIAS H. DUNKELBERGER
Research assistant in petroleum and natural gas

DR. MAURICE C. FETZER
Instructor in metallurgy

DR. PAUL D. KRYNINE
Research assistant in petroleum research

DONALD W. MCGLASHAN
Research assistant in ceramics

DR. WILLIAM M. MYERS
Associate professor of mineral economics and technology

DR. HANS NEUBERGER
Instructor in geophysics

KEITH D. PFOOR
Assistant supervisor of coal mining extension

DR. CARL H. SAMANS
Assistant professor of metallurgy

ROBERT W. STOHR
Laboratory assistant in mining

DR. WOLDEMAR WEYL
Professor of glass technology

Graduate Assistants

EUGENE P. BOWLER
Graduate assistant in petroleum and natural gas

ROBERT DORAN
Graduate assistant in ceramics

OTTO C. KLINE
Graduate assistant in ceramics

CHO-YUAN LIN
Orton fellow in ceramics

J. TUCKER MACKENZIE JR.
Graduate assistant in metallurgy

KUO PING
Graduate assistant in fuel technology

AUGUST C. SIEFERT
Graduate assistant in ceramics

Prehistoric Fossil Tracks Added to School Exhibit

Exhibits in the School of Mineral Industries' growing collection now include a specimen of rock containing the footprints of a giant amphibian believed to have lived 250 million years ago.

The exhibit, which is on display in the west first floor corridor of the Mineral Industries building together with some fossil plants from the same mine, is part of a larger slab which is still intact in the roof of the Jerome mine of the Hillman Coal and Coke Company, 18 miles south of Johnstown,

Enlarge Staff on Water-Flooding Research Work

Growth of Project Requires Three Additional Specialists; Staff Now Numbers Eight

ANDRESEN, CHARMBURY, COOKE NEW APPOINTEES

Growth of the School of Mineral Industries' research project in the secondary recovery of petroleum by the water-flooding process has necessitated three additions to the staff working on this project, this year. The research staff engaged on this problem now numbers six full-time and two part-time workers.

Academic, Practical Experience

Dr. Kurt H. Andresen, Dr. Thomas S. Cooke, and H. B. Charmbury are the three new research men. Dr. Andresen came to the School of Mineral Industries from the laboratory of Dr. J. W. McBain at Stanford University. He received his training at the Technische Hochschule and Kaiser Wilhelm Institut fur Physikalische Chemie, and received his doctor's degree in technological chemistry with specialization in petroleum. Dr. Andresen has had wide experience in surface chemistry, of particular importance to water-flooding.

Dr. Cooke trained under Professors Rodebush and Phipps of the University of Illinois, who are recognized leaders in physical chemistry. In 1936 Dr. Cooke taught physical chemistry at the University of Michigan. His experience includes industrial work in materials and process control.

Mr. Charmbury is a graduate in chemistry of Gettysburg College. He received a master of science degree from the University of Pennsylvania in 1936.

Process Developed in This State

Water-flooding as a process for the secondary recovery of petroleum is a unique method which has evolved in Pennsylvania. It has become one of the most important methods and consists of forcing water under pressure into the oil-bearing formation through predetermined wells so that the oil is swept out through other wells.

Rule of thumb methods for the work have prevailed for some time but four years ago the importance of standardizing the procedure scientifically was recognized by a group of oil men. These men organized as the Bradford District Research Group and are now sponsoring the investigation at State College into the how and why of water-flooding. As a result, many old speculations have been replaced by facts and some old practices have given way to new production methods.

Operators in other fields have adapted the Pennsylvania methods to their properties, and it is known that these practices have

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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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Library Acquires New Sets of Publications

Recent accessions to the Mineral Industries library include several sets of periodicals which have long been needed by the research and teaching staffs. These include *Gluckauf* from 1903 through 1935, which is a German mining publication for significant articles on mining and constitution of coal, and *Braunkohle*, another German periodical which publishes particularly on the constitution of low-rank coals.

Geophysicists of the School will be greatly aided in having available a complete file of Gerland's *Beitrage zur Geophysik*. In mineralogy, the *Bulletin de la Societe Francaise de Mineralogie* has been purchased complete. A ceramics publication, *Glastenische Berichte*, has been acquired from 1927-28 to date. The *Berichte der Deutschen Keramischen Gesellschaft* also has been made more accessible through binding this nearly complete file, which was a gift two years ago. Gradually, the library is becoming more able to meet the demands made upon it.

R. B. Hewes Will Teach First Semester

Robert B. Hewes, '32, will assist in the teaching program of the Department of Mining Engineering during the first semes-

Department of Mining and Geophysics

The Geophysical laboratory has recently acquired a torsion balance which will be used for laboratory experiments and field surveys in courses in geophysical prospecting. Instruments of this type are used to measure the gravitational field of the earth and in the past have been used primarily for the location of oil domes and for determining general geological subsurface structure. The instrument is a valuable addition to the laboratory equipment of this department, which is hapidly proving its worth through its research studies on mine subsidence and mine air contamination.

Dr. Hans Neuberger, formerly of Hamburg, Germany, joined the staff of the department with the beginning of the winter semester. Having completed his undergraduate work in physics and mathematics at the University of Heidelberg, in 1936 he received the doctor of science degree in geophysics from the University of Hamburg. He will be engaged in research work on mine subsidence and other geophysical subjects.

Department of Geology, Mineralogy and Geography

Professor C. A. Bonine spent June and July in the field with senior students in geology, mapping geological formations in Penn's and Stone valleys.

More courses in geography and geology were given during the 1937 summer session due to the expansion of the summer school staff. There were three instructors in geography and one in geology. Visiting staff members were Dr. Ralph Brown, University of Minnesota, and Dr. Wallace Buckley, Indiana University.

Dr. and Mrs. Raymond Murphy spent their vacation in the Ozarks. On the way back they visited Mammoth Cave and then went to Cumberland Gap in the southeastern part of Kentucky. From there, being particularly interested in the geography of the Appalachian plateau, they followed the eastern part of the plateau northward. This took them through Harlan and other coal mining centers in eastern Kentucky and southern West Virginia, and north by way of the Greenbrier valley of eastern West Virginia.

Dr. John R. Randall spent much of the summer doing field work on the geography of Nittany valley.

Dr. Frank M. Swartz, associate professor of geology, recently conducted Dr. Marius Lecompte, of Belgium, on a four-day trip to study lower Devonian rocks of Pennsylvania and the Virginias, which were described by Dr. Swartz in 1929. Dr. Lecompte is a member of the staff of the National Museum of Belgium, and is spending four months in this country to study Devonian sediments and corals and other fossils in New York, the middle Appalachians, and the midwest, as well as living corals of the coasts of Florida and Bermuda. The data obtained will be used to provide more critical correlations of the Devonian rocks of North America and Europe.

Complete Subsurface Exploration for New Wing

Subsurface exploration has been comple-

Institutional Engineers Hold Annual Meeting on Penn State Campus

Institutional engineers of the State Department of Welfare and their assistants held their fourth annual conference September 1 and 2 in the Mineral Industries building at The Pennsylvania State College.

The Department of Fuel Technology cooperated as in the past by sponsoring the conference and arranging the program. Charles S. Hill Jr., engineer with the Division of Institutional Management, and Dr. H. W. Nelson, Department of Fuel Technology, of The Pennsylvania State College, were in charge of arrangements.

Examine Tests for Coal

R. E. Joslin, chief chemist, Rochester and Pittsburgh Coal Company, read the first paper of the session, on "The Significance of Standard Tests for Coal." Following discussion of his talk, J. F. Barkley, supervising engineer, Fuel Economy Service, U. S. Bureau of Mines, presented a paper on "The Relation of Type of Equipment to the Selection of Coals."

"Generators and Related Auxiliaries" was read as the first paper of the afternoon session by J. R. McDermit, chief engineer of the Elliott Company. The second paper, "Some Practical Aspects of the Corrosion Problem as Related to Pipe Systems," was given by V. V. Kendall, Department of Metallurgy and Research, National Tube Company.

Three papers by institutional engineers followed which dealt with problems in operating institutional utility plants. J. W. Considine, chief engineer, Morganza State Institution, spoke on "The Ideal Underground Steam Line." B. R. Abbott, chief engineer, Norristown State Hospital, spoke on "The Most Economical Steam Pressure for Institutional Operators." J. N. Hayes, chief engineer, Polk State School, discussed the problems involved in institutional wiring.

An informal dinner at the Nittany Lion Inn followed the afternoon session of the first day.

Round Table Ends Meeting

The final morning session was opened by R. Y. Sigworth, supervisor of utilities, The Pennsylvania State College, who spoke on "The Necessity for Metering Devices in Power Plants." Round table discussion of specific problems concerned with power plant operation concluded the two-day program.

Professor Chedsey Resigns as Mining Department Head

Professor William R. Chedsey, head of the Department of Mining of the College, resigned following the close of the second semester to accept a position as Director of the School of Mines and Metallurgy at Rolla, Mo. Professor Chedsey had been head of the Department of Mining at Penn State since 1916 and was well known, especially throughout Pennsylvania, as a capable mining engineer and educator.

Professor Chedsey is president of the Coal Mining Institute of America. Previous to coming to The Pennsylvania State College, he had taught at the Colorado School of

lass Technologists, Mill Executives Hold Two-Day Conference at College

ivision of American Ceramic Society Discusses Problems of Glass Constitution

By Samuel Zerfoss

Problems in the constitution of glass iefly occupied members of the glass divi- on of the American Ceramic Society dur- g their two-day conference in State Col- ge, September 10 and 11.

The School of Mineral Industries and in articular the Department of Ceramics was ost to 129 glass technologists and execu- ves who gathered to discuss practical and cademic questions of glass manufacture. echnical sessions, under the direction of .. N. Finn, U. S. Bureau of Standards, ere held both mornings. Inspection of the ollege laboratories, recreation and a din- er contributed to the social side of the con- erence Friday afternoon and evening.

Explain Tools for Research

Professor N. W. Taylor of the Depart- nent of Ceramics, The Pennsylvania State ollege, and Professor B. E. Warren, De- artment of Physics, Massachusetts Insti- ute of Technology, Cambridge, contributed he two major discussions on the constitu- ion of glass. Their papers, which were read during the Friday morning session, were expositions of tools by which study of the composition of glass is possible.

Foremost among these tools are the ther- mal variation of viscosity, electrical con- ductivity, gas permeabilty and X-ray dif- fraction.

Constitution of glass refers to the ulti- mate nature of the atomic or ionic forces and configurations of the material in the glassy state. That the glassy state is a separate and unique condition of matter has been known for some time. Constitu- tion studies are investigations of the rela- tionships between the observable physical properties, chemical analysis and the man- ner in which the constituent atoms and com- binations in the substance contribute to these properties at various temperatures or states of activity.

Thermal Variations

Dr. Taylor's paper was an explanation of the data on glass composition which is made available by the first tool, changes in vis- cosity due to variations in temperature. His tentative definition of glass was that it is a supercooled lquid whose viscosity is so high that its properties are a function of its preparation or previous mechanical and thermal history. An important atomic op- eration which occurs during viscous flow is known as the activation energy of the glass. A measure of activation energy is the slope of the line obtained by plotting the logarithm of the viscosity versus the recip- rocal of the absolute temperature.

Present knowledge of the glassy state in- dicates that the chemical or electronic forces holding the atoms together are not widely different from those in the crystalline state. In a soda-silica glass there are two impor- tant atomic bonds to consider, Na-O and Si-O. Because of the intrinsic properties of the atoms, the Si-O bond is the stronger. Dr. Taylor presented a picture of viscous flow which involved the successive breaking of the weak Na-O bonds. The energy barrier involved in this process was associated with the calculated [illegible] of activation.

The characteristic structural unit of all silicate compounds was demonstrated by Dr. Taylor by means of models. The unit was shown to be the SiO_4 tetrahedron, a sili- con atom surrounded by four oxygen atoms.

Explains X-Ray as Tool

Dr. Warren's paper summarized the data which derive from use of X-ray to obtain the diffraction pattern of glass. X-rays pro- vide information on the ultimate arrange- ments of the constituent atoms of glass.

The diffraction pattern obtained from glass differs somewhat from crystalline pat- tern. The latter is a series of sharp lines resulting from the regular diffraction of the X-ray by the characteristic planes of the crystal. The diffraction pattern of a glass is a series of diffuse bands of varying intensity. Positions of maximum intensity are characteristic distances in the atomic structure.

In 1931 Randall and others reported on the relation between the diffraction pattern of a glass and its devitrification product. In 1932 Zachariasen presented the first simple picture of a glass. Inasmuch as the bond- ing forces and interatomic distances are approximately the same in a glass and the crystal derived from it, the essential differ- ence is arrangements of the elementary unit.

In a crystal the essential unit is the unit cell, and translation of this unit in regular directions allows assembly of the crystal. In glass the arrangement is an aperiodic, three-dimensional network of the units. No single unit occurs regularly placed through- out the structure. Dr. Warren pointed out that the answer to the question, "Will a ma- terial have pronounced glassy properties?" is found in the ease of bonding and effecting a variety of combinations in the lattice.

Whereas Dr. Taylor's models showed that the SiO_4 tetrahedron is the characteristic structural unit of all silicate compounds, Dr. Warren's conclusion was that no unit similar to the parent substance, SiO_2 or silica, exists in them. Absence of com- pounds in glass is the essential part of Dr. Warren's theory. His experiments with the system of glasses, soda-silica, show con- tinuous change in X-ray quantities with varying soda content.

By means of a model Dr. Warren illus- trated his picture of simple glass. Addition of soda merely introduced Na-O bonds into the random network of SiO_4 tetrahedra.

Theories of Glassy State

In the discussion that followed Dr. War- ren's paper, mention was made of another theory of the glassy state. This theory holds that glass is composed of crystallites or minute crystals. Dr. Warren discussed the data offered in support of this theory and raised numerous objections, most of which dealt with the questionable technique employed in obtaining and using the data.

Dr. Warren's discussion also included de- scription of the equipment used at the Mas- sachusetts Institute of Technology for his studies on glass. He described the special technique employed in the taking of diffrac- tion patterns of glass and treatment of data.

The third paper on the Friday morning session was "New Developments and Ideas in Analytical Chemistry of Interest to the Glass Industry," by G. E. F. Lundell, prin- cipal chemist, Bureau of Standards, Wash- ington, D. C.

Continued on page 4, Col. 2

Organize Comprehensive M. I. Extension Program

Expect Enrollment to be 25 Per Cent Greater in Extramural Classes; Add Extra Personnel

Classes are now in process of organiza- tion throughout Pennsylvania in the vari- ous types of instruction provided by the Ex- tension Division of the School of Mineral Industries. Indications point to a total en- rollment this year which will exceed that of 1936 by at least 25 per cent.

Last year the Extension Division of the School conducted 118 classes in 69 class cen- ters in 28 counties throughout the state, employing 97 part-time teachers. Requests for many additional classes had to be de- ferred because of inadequate personnel to organize and supervise the work.

Pfoor New Staff Member

To aid in the supervision of the work in coal mining, Keith D. Pfoor has been added to the staff of the division as assistant su- pervisor of coal mining extension. Mr. Pfoor, who is a graduate of The Pennsyl- vania State College in mining engineering, class of 1933, has been certified as a fire boss in bituminous mines by the State De- partment of Mines. He has had four years of practical experience in many departments of coal mining, including engineering, fuel preparation at the face, fuel testing in the laboratory, and executive work. He will pursue special studies in fuel technology at the College and is working on a three-year extension course in that field.

New Class Centers Chosen

New centers in coal mining are being or- ganized at Coalport, Coral, LaBelle, Muse, Punxsutawney, South Fork and Woodland. In addition, several centers where the courses were formerly taught are resuming. These include Curtisville, Ellsworth, Heil- wood, Marianna, Winburne and Wayno.

Extension work in ceramics, as explained on page 1 of this issue, is being started. This work is in charge of E. P. McNamara and consists of a three-year course covering all phases of the ceramic industry. Class centers are located at Beaver Falls, Clarion, Derry, Kittanning, Mt. Union, New Castle, Summerville and Washington.

New Curricula Organized

The curriculum in petroleum and natural gas engineering has been completely re- vised. Three-year extension courses are now available in petroleum production, petroleum refining, and natural gas engineering. This work is in charge of Dr. M. M. Stephens, supervisor of petroleum and natural gas ex- tension. New centers in this work are be- ing organized this year at Beaver Falls, Kittanning and Washington and at several centers in the Philadelphia area.

Ferrous metallurgy extension classes un- der E. J. Teichert, supervisor of metallurgy extension, will soon complete their organi- zation. New class centers are being or- ganized at Homestead and Vandergrift. Re- quests for additional classes have been re- ceived from Harrisburg and Philadelphia.

H. I. Smith, '07, has presented the School with a fine collection of Joplin, Mo., miner- als.

Fossil Tracks of Prehistoric Salamander in M. I. Exhibit

Continued from page 1

The tracks were discovered in the roof rock about a foot above the upper Kittanning or C prime coal bed several years ago. J. J. Alexander, assistant mine foreman and instructor of the coal mining extension class at Jerome, brought the tracks to the attention of the Extension Division of the School. The exhibit now in the Mineral Industries building was obtained through the courtesy of W. L. Affelder, vice president of the Hillman company, and M. E. Kent, superintendent of the mine. The School hopes to obtain additional and still larger slabs later in the year.

Casts of the tracks can be seen in position in the mine for a distance of 15 feet crossing the roof of a main entry. They are about 200 feet below the present ground surface. Proceeding for some distance in a straight course, the tracks bear left, then disappear into the roof of a side entry.

On their discovery some of the miners suggested that the tracks had likely been formed by a bear which was disturbed by the approach of a cave man. One man said that he had always wanted to drive a tunnel in the path of the tracks to see where they would eventually go. Somewhat smaller tracks parallel the larger ones at a distance of about 50 feet.

Salamander Made Tracks

According to geologists in the School of Mineral Industries, however, the miners who harked back to the cave man were wrong by many millions of years. Judging from skeletons discovered in the Carboniferous or coal age rocks of various parts of the world, it is certain, they contend, that these tracks were formed, not by a bear or other present-day animal, but by one of the early large salamanders.

These prehistoric creatures were fat bodied and had heavily armored heads but the skin of the remainder of their bodies was soft and poorly protected, so that they could not stand the direct rays of the sun, but had to creep beneath the tangle of giant club mosses, scale trees and ferns of the great peat bogs which later were buried and became the Carboniferous coal beds.

Furthermore, the School's geologists say, some of these salamanders grew to lengths of eight or even 10 feet, although the Jerome specimen was not this large. The fossil skulls usually possess a socket for a third median eye, as well as sockets for the more familiar lateral eyes. A vestige of this third eye is found in all the higher vertebrates.

Distinguish Fore, Hind Prints

Prints of both front and hind feet can be readily distinguished on the exhibits. Prints of the front feet are about three inches long and toe distinctly inwards. Those of the hind feet are about four inches long, are directed forward, and the centers of the right and left prints are about nine rather than seven inches apart. Impressions of the five toes can be distinguished in several of the prints elongated slightly by drag of the toe tips. The stride measures 12 to 13 inches.

Disintegration Measures Age

The great antiquity of the coal age rocks, and thus of the animals which are represented by the fossils found in them, is not generally appreciated. One of the interest- [illegible] of the study of radium and has undergone greater disintegration in older than in younger rocks.

The amount of disintegration, when accurately determined, provides a reliable measurement of the age of the ore rocks. On this basis the tracks found on the slab in the Mineral Industries exhibit and on the roof of the Jerome mine are believed to have been impressed into soft muds about 250 millions of years ago. Buried under later sediments, the muds gradually hardened and have preserved for us these interesting footprints and other fossils.

Glass Technologists Hold Two-Day Meeting at School

Continued from page 3

The increasing complexity of glass analysis, observable from Dr. Lundell's experience with preparation of standard samples as well as analysis, was the burden of this paper.

The determination of many elements in the composition of glass today, whereas formerly it was necessary to determine only a few, accounts for the increasing complexity of glass analysis, Dr. Lundell reported.

Techniques of Glass Analysis

Evaluation by Dr. Lundell of the techniques employed in glass analysis included description of their precision and advantages. On the basis of precision, he felt that macro-methods serve better for general work. Dr. Lundell was not ready to recommend general use of micro-methods for all elements. Specific reagents, such as dimethylglyoxime for nickel, will be increasingly used in future, he predicted. For analytical work the polarographic method shows promise, he believed. Colorometric methods is an additional tool which received passing reference.

The technical paper of the session was presented Saturday morning by Dr. Louis Navias, of the General Electric Company, Schenectady. His topic was "The Mechanical Properties of Glass: Their Significance and Determination."

Recent developments indicating glass as a possible building material have raised the question among engineers concerning its mechanical strength. The literature shows widely varying data and no technique of measurement having moderate precision is available. The brittleness of glass as compared with steel and plastics complicates determination of its mechanical properties.

Test Strengths of Glass

Under auspices of the A.S.T.M. a committee (D9, sub. 5) has been organized, composed of leading glass physicists, to study methods for determination of the mechanical properties of glass. The two properties selected for study were transverse strength and compressive strength. After the committee had agreed on a method of measuring the properties, various assignments were made. Six industrial laboratories cooperated in making the tests of transverse strength, and compressive strength measurements were made principally at the General Electric laboratories.

Specifications for the transverse strength tests were: (1) sample quarter-inch cane 6 inches long (2) supported on two knife edges, radius one thirty-secondth of an inch, placed 1 inch from each end of cane, or a span of 4 inches, with (3) the load centrally applied in any arbitrary manner, using any design of apparatus, the initial

Data collected for these tests were presented by Dr. Navias. As soon as data were available to the committee it became evident that two factors affecting the condition of the sample were influencing the results. They were annealing and surface condition or history.

Annealing can well be controlled by defining the birefringence tolerated. Surface condition is more difficult to control. Numerous kinds of abuses were practiced on the surface in order to arrive at a condition permitting reproducibility. These abuses were tried because an untouched sample showed greater strength than one having ordinary handling. The surface treatments consisted of various types of abrasions with emery, boiling in water and NaOH solution, and polishing of the sample.

No Satisfactory Test Found

General conclusions from these treatments included: (1) The surface condition and handling of the sample is quite an important factor in the measure of transverse strength. (2) The value of the transverse strength obtained could be materially altered by abrasion or boiling in water or NaOH solution for some as yet unexplainable reason. (3) At present there is no entirely satisfactory method for the determination of this property of glass.

Many hundreds of tests were made on samples by the six cooperating laboratories. Although data from the various sources were in substantial agreement concerning major trends, the lack of precision within a set of measurements for a given laboratory indicates that further refinement of the test method is needed. This work is still in progress.

Invitation to Berlin Congress

Dr. R. Schultze, a German scientist, attended the glass division meeting. Following Dr. Navias' presentation, Dr. Schultze mentioned the German method of testing, which measures the tensile strength of glass with fair reproducibility. Discussion of the American and German methods provoked no agreement as to their respective values.

Dr. Schultze, associated with the Deutsche Glass Gesellschaft, attended the meeting to renew the invitation which the German society extended the Second International Glass Congress, held last year in London, to attend a third congress in Berlin in 1939.

The technical program of the proposed congress was outlined by Dr. Schultze, and with colored lantern slides he illustrated the points of interest along the tentative route of travel for the congress through Germany. Each auditor was provided with excellent guide books. Geographical distribution of glass plants and sources of raw materials throughout Germany were described in Dr. Schultze's oral invitation, which he closed by expressing his wish for continuation of the international goodwill that marked the London congress.

Conference Closes Socially

First prize in the impromptu golf tournament Friday afternoon was won by V. V. Kelsey, Consolidated Feldspar Company, Trenton, N. J., and second prize was captured by Dr. J. T. Littleton, Corning Glass Works, Corning, N. Y.

A. N. Finn was toastmaster at the dinner held Friday evening at Centre Hills country club. Dean Edward Steidle of the School of Mineral Industries welcomed the members of the conference. The president of the society, Dr. R. B. Sosman, and the secretary, R. C. Purdy, were presented to the group. After the dinner the evening's entertainment was provided through the cour-