PLAINTIFF'S
EXHIBIT
USG-516

CERAMIC ABSTRACTS

Compiled by

The American Ceramic Society

Volume 24, 1945

Editorial Office: 2525 North High Street, Columbus 2, Ohio
Publication Office: 20th and Northampton Streets, Easton, Pa.

General

Ceramics today. ANON. *Chem. Age* [London], 50 [1302] 556 (1944).—Ceramics are being used by manufacturers in place of plastics, steel, nickel, copper, aluminum, zinc, and rubber. Present-day industrial whiteware has characteristics that make it highly suitable for many industrial uses. Its resistance to abrasion is high. Almost the only materials that outwear whiteware are rubber-tire-tread stock and manganese steel; for some exacting uses, such as nozzles for sandblast equipment, the best ceramic nozzles will outlast manganese steel, and for lining coke chutes, hard vitreous tile is still in good condition when both steel and rubber linings are worn out. The compressive strength of ceramics ranges from 25,000 to 80,000 lb./sq. in. This compares with 9000 to 47,000 for aluminum alloys, 16,500 to 45,000 for thermosetting plastics, 7000 to 20,000 for zinc alloys, and 55,000 to 400,000 for ferrous alloys. Ceramics are low in tensile strength (1500 to 10,000 lb./sq. in.). This deficiency can often be made up by increasing the thickness or other dimensions of the ceramic unit. Resistance to chemicals is high. Ceramic ware will withstand almost any compound except hydrofluoric acid. In hardness, it exceeds most plastics and nonferrous metals; it is equal to glass and softer than alloy steels and chilled cast iron. Obstacles to the use of ceramic parts as substitutes for metal in complicated assemblies are the shrinkage and occasional warping that take place during firing, but dimensional tolerances sufficiently fine have been obtained by several newer molding methods. One method molds a part in the traditional manner but somewhat oversize. A preliminary firing shrinks the part to a certain extent but leaves it still oversize. The first firing is stopped while the material is still soft enough to machine with standard tools. The machining is done to allow an exact margin for the additional shrinkage that occurs during the second and final firing. In another method, exact parts are obtained by machining rods of fused mica and glass up to 1 in. thick. Mica and glass are not fired during the forming process because, unlike true ceramics, they soften at high temperatures, but the mica-glass material can be used like porcelain; it has the advantage of machinability and can be pressure molded like plastics. In a third method, carefully blended and moistened clays are molded under such heavy pressure that warpage is practically absent, and the result is a dense high-strength product. The fired product can be held to an accuracy of $^1/_{64}$ in. per inch of dimension, and further exactness can be obtained by grinding the finished article accurately to size. A.B.S.

Classification of natural organic binders. EDWARD P. MCNAMARA AND JAY E. COMEFORO. *Jour. Amer. Ceram. Soc.*, 28 [1] 25–31 (1945).—14 references, 7 figures.

Congress displays industry's war effort. ANON. *Amer. Foundryman*, 6 [6] 2–3 (1944).—The 48th annual convention of the American Foundrymen's Assn. is discussed. M.A.S.

Findings from Foundation surveys of war plants. F. R. HOLDEN AND W. C. L. HEMEON. Presented at meeting of Industrial Hygiene Foundation, Pittsburgh, Pa., Nov., 1944; abstracted in *Safety Eng.*, 88 [6] 63–66 (1944).—The report discusses among other things the conversion of forms of quartz into tridymite and cristobalite, which are more destructive of animal tissue than quartz. Where the clay-pot process is used in glassmaking, the reclaiming of the discarded pots produces a serious health hazard. Likewise, in the glass industry, furnace and tuille stones contain about 15% cristobalite, and the principal silicosis hazard arises in departments where the clays and furnace and tuille-stones are manufactured and handled. A survey of industrial hygiene in a portion of the ceramic industry is under way, and a report is expected in 1945 in which conclusions will differ somewhat from prevalent ideas. The report gives some consideration to dust control for masons in glass and similar plants and in particular to a portable exhaust unit for a brick-cutting saw in common use. Minimizing dust around clay and flint storage bins, etc., is touched upon. Investigations have also been made in a sand-washing plant to determine what additional measures for dust control might be necessary. M.R.

Have you any idea what prospects want to know about your product? E. L. SPARKS. *Ind. Marketing*, 29 [12] 51–52, 55 (1944).—S. discusses results of a survey made among engineering and industrial readers as to possible points to be emphasized in advertising construction equipment and building materials. One of those submitting answers condemns the use of hammered or frosted glass in factory windows. He asks, "Why don't glass manufacturers advise owners or engineers to install a line of clear glass at eye level where the bulk of the windows are hammered or frost glass?" Another wanted physical data pertaining to glass block. S. found the men interviewed to be practical, common-sense folk and felt that their suggestions to manufacturers and advertisers should be heeded. M.R.

Mist and dust collection. C. E. LAPPLE. *Heating, Piping and Air Conditioning*, 16 [7] 410–14; [8] 464–66; [10] 578–81 (1944).—L. reviews the purposes of mist and dust collecting and summarizes the characteristics of dust. The main reasons for industrial dust collection are (1) nuisance elimination, (2) improvement of product quality, (3) reduction of equipment maintenance, (4) elimination of safety and health hazards, and (5) recovery or collection of powdered products. To properly design industrial control equipment it is necessary to recognize and understand the fundamental properties and characteristics of gas dispersoids. These include particle size (cement dust is one of the largest of common dusts), particle classification, explosion hazards, and health hazards. L. then discusses the methods of measurement and the character of atmospheric pollution. Dust fall, use of Ringelmann charts, impingers, precipitators, filters, and atmospheric pollution data are included. Finally, he covers the sampling of process and ventilation gases to determine the performance of dust-collecting equipment, to evaluate the need for installing a system, or to obtain information for design. 43 references, 4 illustrations. M.R.

Noted engineer stresses research at meeting. H. F. UTLEY. *Pit and Quarry*, 37 [6] 76, 78 (1944).—At a meeting held in Los Angeles, Nov. 9, 1944, Stanton Walker discussed the research activities of the National Sand and Gravel Assn. and the National Ready Mixed Concrete Assn. He devoted much time to the simplification of sizes for coarse aggregates as well as to the research developments in fine aggregates. It was decided to form committees of producers from the northern and southern parts of California to work jointly with committees of Government engineers to facilitate reducing the large number of sizes of aggregates now being produced. 1 photograph. M.R.

Organization of research. A. PARKER. *Jour. Inst. Fuel*, 17 [96] 154–58 (June, 1944); abstracted in *Bull. Brit. Non-Ferrous Metals Research Assn.*, No. 182, p. 220 (Aug., 1944).—P. characterizes organization of research in universities and colleges, special research institutes, individual industrial undertakings, cooperative industrial undertakings, and cooperative industrial research. The Department of Scientific and Industrial Research and the Fuel Research Station are described, and the selection of a research staff is discussed.

Prevention of pneumoconiosis. ANON. *Chem. Age* [London], 51 [1312] 180–81 (1944).—Pneumoconiosis is a group name for all lung diseases caused by dust particles; two forms of it are silicosis and asbestosis. The best methods of prevention are (1) replacement of the substance producing the obnoxious dust by a harmless one, e.g., alumina in place of flint for "dusting" and bedding in pottery manufacture and artificial abrasive materials for sandstone in grinding; (2) prevention of the escape of dust into the workshop atmosphere, usually by means of hoods and air suction; (3) the use of respirators by all workers likely to be affected; and (4) copious general ventilation. In the British Isles, the Factories' Act, 1937, requires that provision shall be made for rendering harmless as far as prac-

ticable all dust, etc., that may be injurious to health; that means shall be taken for preventing the inhalation of dust; and that persons shall be excluded from workrooms in which siliceous dust is produced during the intervals allowed for meals or rest. In addition, various regulations have been made for the control of special industries or processes; sandblasting may be done only in an enclosed chamber in which no other work is ordinarily performed and in which efficient means are provided to prevent the escape of dust outside the chamber. Another set of regulations applies to processes carried out in quarries in which the stone contains at least 80% silica. Machines used for the crushing and grinding of stone must be entirely enclosed or provided with efficient arrangements to prevent the escape of dust. In deciding the harmfulness of dust, it is necessary to know its chemical and mineralogical nature, its concentration, and other physical characteristics, including the mass concentration, i.e., the weight of dust in unit volume of the dust cloud, the number of particles per unit volume, and the size distribution of the particles. Information about the size of the dust particles is necessary because it is unlikely that many particles larger than about 10 microns reach the deeper part of the lungs. The smaller dust particles are regarded as the more dangerous. Various instruments have been devised for sampling air-borne dusts. They entrap the dust particles from a known volume of air on a glass surface or in liquid. The particles are then counted under the microscope; in some cases the particle diameters are also measured, and the particle-size distribution is thus ascertained. The available instruments differ considerably in their sampling efficiencies, so that for the same dust cloud different instruments may give substantially different results. The thermal precipitator sampling instrument is highly efficient. The dust is deposited on two microscope cover slips which are subsequently mounted on slides. The dust particles are counted and measured under a high-power microscope. A.B.S.

Enos A. Stewart, founder and owner of the Stark Brick Company. ANON. *Bull. Amer. Ceram. Soc.*, 24 [1] 1-2 (1945).—1 photo.

Symposium on the Organization, Direction, and Support of Research: Advancement of learning in the United States in the postwar world. J. B. CONANT. *Proc. Amer. Phil. Soc.*, 87 [4] 291–98 (Jan. 29, 1944). **Organization, direction, and support of research in the physical sciences.** H. S. TAYLOR. *Ibid.*, pp. 299–306. **Discovery and interpretation of biological phenomena.** D. W. BRONK. *Ibid.*, pp. 307–12. **Critique of medical research.** A. GREGG. *Ibid.*, pp. 313–20. **Political economy in the modern state.** H. A. INNIS. *Ibid.*, pp. 323–41. **War and research in social science.** R. F. NICHOLLS. *Ibid.*, pp. 361–64; abstracted in *Bull. Brit. Non-Ferrous Metals Research Assn.*, No. 185, p. 307 (Nov., 1944).

SEPARATE PUBLICATIONS

Industry and Research. ANON. *Federation of British Industries Brochure*, 24 pp. (Oct., 1943); abstracted in *Bull. Brit. Non-Ferrous Metals Research Assn.*, No. 174, p. 370 (Dec., 1943).—The importance and achievements of industrial research, its present position and organization, and suggestions for development are presented. Considerable reference is made to research associations and to the need for their increased support.

Scientific Research and the Universities in Postwar Britain. ANON. *Parliamentary and Scientific Committee Brochure*, 18 pp. (Oct., 1943); abstracted in *Bull. Brit. Non-Ferrous Metals Research Assn.*, No. 174, p. 370 (Dec., 1943).—After a concise demonstration of the case for a great increase in industrial and all other types of scientific research in this country, the supply and training of research personnel are considered. A two- or three-fold expansion of university and other facilities for the training of scientists, with correspondingly increased Government financial support, is demanded. Fifteen "proposals" are formally stated.

TECHNICAL BOOKS REPUBLISHED

The following technical volumes have been republished in the United States under licenses issued by the Alien Property Custodian and are available to the industry at the prices indicated from publisher, Edwards Brothers, Inc., Ann Arbor, Mich.

Eitel, Wilhelm (editor)

Glastechnische Tabellen: Physikalische und chemische Konstanten der Gläser. Unter Mitwirkung von H. Altenthum ...u. a.... herausgegeben von Wilhelm Eitel, Marcello Pirani, und Karl Scheel. Berlin, Springer, 1932. xi + 714 pp. Price $24.00.

Eitel, Wilhelm

Physikalische Chemie der Silikate. 2, völlig neubearb. Aufl. Leipzig, Barth, 1941. vii + 826 pp. illus. Price $21.00

Koeppel, Claus

Feuerfeste Baustoffe silikatischer und silikathaltiger Massen. Leipzig, Hirzel, 1938. xvi + 296 pp. illus. (Chemie und Technik der Gegenwart. 18). Price $6.00.

Selmang, Hermann

Die physikalischen und chemischen Grundlagen der Keramik. Berlin, Springer, 1933. viii + 229 pp. Price $5.75.

Schmid, Erich

Kristallplastizität. Berlin, Springer, 1935. 373 pp. Price $9.65.

Smits, Andreas

Die Theorie der Komplexität und der Allotropie. Berlin, Verlag Chemie, 1938. xii + 372 pp. Price $8.50.

Strunz, Hugo (editor)

Mineralogische Tabellen, im Auftrage der Deutschen mineralogischen Gesellschaft herausgegeben. Leipzig, Akademische Verlagsgesellschaft, 1941. 257 pp. Price $7.35.

Stuckert, Ludwig

Die Emailfabrikation, ein Lehr- und Handbuch für die Emailindustrie. Berlin, Springer, 1941. vi + 300, (2) pp. Price $9.00.

Volmer, Max

Kinetik der Phasenbildung. Dresden, Steinkopff, 1939. xii + 220 pp. Price $4.75.

The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

BOUVERIE HOUSE, 154 FLEET STREET, LONDON, E.C.4

Telegrams: ALLANGAS FLEET LONDON Telephone: CENTRAL 3212 (10 lines)
GLASGOW: 116 Hope Street (Central 3970) BIRMINGHAM: Daimler House, Paradise Street (Midland 0784 5)

THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five day week by Benn Brothers Limited.

VOL. LI No. 1311. August 19, 1944 Annual Subscription 31s. Overseas 36s.

Export Research

MANY things are important in operating a business successfully. In technical arts, such as that of chemical manufacture, the technical men are prone to consider that theirs is the most essential part of the undertaking. It is true, of course, that unless production is efficient, the undertaking cannot prosper. Technical skill is the first essential, without which no undertaking can even hope to start in the chemical field and in many other fields—it is almost accurate to state that as a universal truth in to-day's conditions. But there is another partner whose work is complementary and equally important—that of the salesman. The modern scientific salesman must not be confused with the old-time carpet-bagger. Sales technique is specialised and employs many weapons. One of these is advertising; another is market research; a third is that somewhat indefinable asset of personal contact between buyer and seller on which is built up an edifice of mutual respect and reliance. These tools, as we may term them, are of importance in the home trade and are essential in the export market. Unfortunately, distance has too often prevented sufficiently intimate personal contact and likewise has made market research difficult and uncertain. British trade has thereby lost heavily.

A move is announced which will bring about a change if it operates as its sponsors intend. After several months of negotiation a project is taking shape for setting up a self-supporting, non-profit-making Export Research Association. The project is still in the embryo stage, but it has been developed far enough for the sponsors to feel able to ask business firms whether or not they are prepared to act as godparents to such an association. The project in question has been fathered by the Advertising Association; and it is linked with a plan for the creation at the same time of a National Overseas Advertising Service. This is the first real intimation that there is beginning to be an appreciation of the vital connection between market research and commercial efficiency. In 1941 the Government set up Export Groups in most industries, which were intended to be the spearhead of a great drive to obtain more exports in order to provide currency for the purchase of munitions. The Lease-Lend arrangement removed the necessity for this drive and permitted us to put our whole indus-

On Other Pages

essential before making any connection with equipment where the gas is to be used. Moreover, develop the habit of opening and closing all valves slowly.

Bear in mind the particular properties of the gases which are in use. Among inflammable gases are ammonia, acetylene, butane, ethylene, ethyl chloride, hydrogen, methyl chloride, and propane; those which are non-inflammable include carbon dioxide, chlorine, nitrogen, nitrous oxide, oxygen, and sulphur dioxide. Anæsthetic effects are produced on breathing acetylene, butane, ethylene, ethyl chloride, methyl chloride, nitrous oxide, and propane; irritant gases include ammonia, chlorine, and sulphur dioxide. The inflammable range, in admixture with air, varies considerably; it lies between 2.5 and 80 per cent. in the case of acetylene, is from 4.1 to 75 per cent. in the case of hydrogen, and from 16 to 26 per cent. with ammonia.

Industrial Dusts

The Prevention of Pneumoconiosis

A RECENT issue of the Bulletin of the National Association for the Prevention of Tuberculosis (December, 1943) was largely devoted to articles on the various aspects of pneumoconiosis, or lung disease caused by dust particles. The prevention of pneumoconiosis was dealt with by Dr. Thomas Bedford, of the Industrial Health Research Board, Medical Research Council. "Pneumoconiosis" is a group name covering such diseases as silicosis and asbestosis.

Silicosis is caused by the inhalation of siliceous dusts such as those of sandstone and quartz. It occurs, writes Dr. Bedford, in workers following a variety of occupations, principal among which are sandblasting, metal grinding, sandstone quarrying and working, slate quarrying, pottery manufacture, the manufacture of abrasive soap powders, metalliferous mining, and the driving of hard headings in coal mines.

The breathing of asbestos dust, usually over a long period, causes the disease known as asbestosis. Many coalminers engaged in hewing coal contract a disease somewhat similar.

Clearly, any measures designed to reduce or abolish the incidence of pneumoconiosis must aim at preventing the worker from breathing air laden with harmful dust. The methods by which protection from noxious or contaminants, including pneumoconiosis-inducing dusts, may be achieved are, in order of preference: (i) substitution of the noxious substance by a harmless one; (ii) prevention of the escape of dangerous dust into the general atmosphere; (iii) copious general ventilation; and (iv) personal protection of the worker.

An example of substitution can be taken from the pottery industry. Powdered flint has long been used for the firing of china ware, and the workers who removed the ware after firing were exposed to flint dust which is a potent cause of silicosis. Manufacturers experimented to find a safe substitute and it appeared that alumina could be used satisfactorily in place of flint. In an investigation carried out by the Medical Research Council among men who had been exposed to alumina dust for many years no evidence of pneumoconiosis was found. Thus by using alumina in place of flint in this pottery process the risk of pneumoconiosis can at any rate be greatly reduced. Another instance of substitution is the extensive change-over from grindstones made of sandstone to artificial abrasive wheels in the grinding of metals.

Where the harmful substance must necessarily be used the escape of dust into the general atmosphere should be prevented if at all possible. As near as possible to the point of origin of the dust a suitably designed hood is placed, and from the hood a metal dust leads to a pressure fan which is made to pull air into the hood. The shape and location of the hood, the size of the duct, and the power of the fan are so arranged that the air-flow over the point at which the dust is generated is such as will ensure that the dust is drawn straight into the duct and transported to a suitable collecting device. Local exhaust hoods are commonly used with many types of rotary machinery, such as grindstones; they are also used in a variety of other processes such as, for example, stone dressing, rock crushing, and some operations in the pottery industry.

Sometimes it is practicable for the process to be completely enclosed. Often, as in rock-drilling and some metal grinding processes, the formation or dispersion of dust can be much reduced by the use of water.

In spite of precautions such as those described, it often happens that enough dust to constitute a hazard to health escapes into the air. In such cases generous ventilation must be provided, so that the suspended dust is dispersed in a large enough volume of air to ensure that its concentration does not reach a harmful level. There are other processes in which none of the methods will suffice to maintain a safe atmosphere, and then respirators or other breathing apparatus must be worn by the operatives, and the process must be segregated in special compartments. Sandblasting is such a process.

Statutory Requirements

There are statutory requirements concerning dust control in industry. The Factories Act, 1937, requires that provision shall be made for rendering harmless so far as practicable all dust, etc., that may be injurious to health; another section requires that means shall be taken for preventing the inhalation of dust, and a further section requires the exclusion of persons from workrooms in which siliceous dust is produced during the intervals allowed for meals or rest. In addition, various regulations have been made for the control of special industries or processes. Thus, briefly, sandblasting may only be done in an enclosed chamber to which no other work is ordinarily performed, and in which efficient means are provided to prevent the escape of dust outside the chamber; the sandblaster working in the chamber must wear overalls and a suitable protective helmet and gauntlets; the helmet must be provided with a supply of pure air and a way of escape for exhaust air, and must bear the mark of the person using it. Another set of regulations applies to processes carried out in quarries in which the stone contains at least 80 per cent. of silica. Machines used for the crushing and grinding of stone must be entirely enclosed, or be provided with efficient arrangements to prevent the escape of dust.

These examples of official regulations are enough to indicate the care that is required to protect industrial workers.

Dust Sampling

If one is to assess the risk of pneumoconiosis, or to decide on the efficacy of dust control measures, one must know something about the nature and quantity of the dust present in the air. In order to define an air-borne dust completely it is necessary to know the chemical and mineralogical nature of the dust, its concentration, and other physical characteristics. These physical characteristics include: the mass concentration *i.e.*, the weight of dust in unit volume of the dust cloud; the number of particles per unit volume; and the size distribution of the particles. Information about the size of the dust particles is very necessary because it is unlikely that many particles larger than about 10 microns (1 micron equals one-thousandth of a millimetre, or about 1/25,000th of an inch) reach the deeper parts of the lungs. The smaller dust particles are regarded as the more dangerous. Generally, in industrial dust clouds practically all the particles are much smaller than 10 microns. Thus, for example, the average size distribution for a large group of samples taken in one anthracite mine showed that 94 per cent. of the dust particles were below 5 microns in size, 75 per cent. were less than 2 microns and roughly 55 per cent. were smaller than 1 micron.

Various instruments have been devised for sampling air-borne dusts. Generally, those used for sampling pneumoconiosis-producing dusts are designed to entrap the dust particles from a known volume of air on a glass surface or in a liquid. The particles are then counted under the microscope, and in some cases the particle diameters are also measured and the particle size distribution thus ascertained.

Sampling Instruments

Dr. Bedford considers it unfortunate that the various available dust-sampling instruments differ considerably in their sampling efficiencies, so that for the same dust cloud different instruments may give substantially different results. (A discussion of the relative merits of such instruments was presented by Dr. E. C. Blacktin in THE CHEMICAL AGE, 1943, *48*, p. 575.) Therefore, in considering a stated dust concentration one should have regard to the methods of sampling employed. One of the sampling instruments designed in Great Britain, the thermal precipitator, is highly efficient. The dust is deposited on two microscope cover slips which are subsequently mounted on slides. Counting and measurement of the dust particles are done later under a high-power microscope. While, as has been indicated, some of the dust-sampling instruments now in use do not give extremely accurate information concerning dust concentrations, they have nevertheless been of inestimable value in controlling the dust hazard in many industries.

RECOVERY OF TIN

As a result of special research work on tin recovery, induced by the loss of Malayan tin supplies, the Australian Council for Scientific and Industrial Research has developed a new process for extracting tin from lode ores. It is reported that the new process promises to make possible the separation, from "tailings," of a large proportion of the tin not previously recoverable. Flotation replaces the gravitation methods now customarily employed. Laboratory tests have achieved the recovery of a high proportion of metallic tin from ores which were difficult to treat. It is now planned to establish an experimental plant, and Mr. W. H. Williams, director of the Tasmanian Mines Department, has offered his department's aid in the commercial development of the process. (*Industrial Australian and Mining Standard.*)

The American Ceramic Society

February 15, 1993

I hereby certify that the attached copies of **Ceramic Abstracts, Volume 24, 1945**, are true and accurate copies, which are maintained in the normal course of business at the American Ceramic Society, 735 Ceramic Place, Westerville, Ohio 43081.

I cannot verify the accuracy of copies from **Chemical Age, Volume 51, 1944.**

Christine Schnitzer

Christine Schnitzer
Product Manager
Ceramic Information Center

735 Ceramic Place
Westerville, Ohio 43081-8720
614 • 890 • 4700
TWX: 7101109409