CERAMIC ABSTRACTS

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Process for applying tungsten carbide particles to a workpiece surface. Warren M. Shwayder. U. S. 3,049,435, Aug. 14, 1962.—The process comprises crushing tungsten carbide to 0.25 in. to 325 mesh, coating the particles with a thin film of metallic nickel, and then applying them to the ferrous metal surface with sufficient heat to fuse the nickel coating to the ferrous metal, thereby binding the particles to the surface and imparting to them hard wearing and cutting properties. D.J.B.

Sectional coated abrasive belt and process of making it. Edward W. Bratton (Carborundum Co.). U. S. 3,053,020, Sept. 11, 1962.—The product comprises a layer of abrasive grain bonded to a cloth backing, the backing being prestretched both in the cross direction and in the warp direction and having equal residual stretch in the directions of its cross and warp threads. D.J.B.

Segment for rotary abrasive devices. Aleck Block. U. S. 3,053,021, Sept. 11, 1962.—An abrasive pack comprises abrasive leaves with at least one spacer of compressible material between them, the spacer being secured to the root portions and compressed at a distance from the root end of the pack to provide a thinned waist and a thicker butt of elongated form extending full width of the pack for keying reception in an axially extending peripheral mounting socket of a rotary holder. D.J.B.

See also Sect. V: (*patent*) Dressing device for grinding spectacle glasses.

II—Art, Design, and Archeology

Chemical basis of ancient Greek vase painting. U. Hofmann. *Angew. Chem. Intern. Ed. Engl.*, 1 [7] 341–50 (1962).—H. covers historical and economic data on the Greek nation as well as scientific and artistic information. Vases were a major Athenian export countering the unfavorable balance of trade for grain imports. The exact method of production is discussed in detail. The red pigment was Fe_2O_3, and the black Fe_3O_4. The potter's clay itself generally afforded the red color on firing. Blacks and the less usual "intentional" or painted-on red were applied as finely elutriated clay. A first firing under oxidizing conditions gave a completely red vessel; rosiny wood was then added to give a brief reducing firing, during which the entire body became black. Vents were then reopened, and the porous body of the vase reoxidized and became red, while the less porous "painted" areas stayed black. "Intentional reds" were porous and became red at this stage. Related techniques in Roman times are also described. 15 figs. (4 in color), 3 tables, 11 refs. M.J.A.

Design and the production man. Richard M. Bauer. *Am. Ceram. Soc. Bull.*, 41 [11] 774–75 (1962). 1 fig.

Facets of design from the view of the designer. Sid Bersudsky. *Am. Ceram. Soc. Bull.*, 41 [12] 819 (1962).

Mystery and charm of Parian. Anon. *Pottery Gaz.*, 87 [1018] 528–31 (1962).—Historical. An attempt is made to work out the type of body and firing conditions required to produce Parian ware and to re-assess its merits and charm. 7 photos. C.E.L.F.

Strontium crackle glaze. Yu. G. Shteinberg and E. L. Gaukhman. *Steklo i Keram.*, 19 [5] 24–26 (1962).—The ware is covered with one glaze only (earthenware type) without a bisque firing. The frit contains 27.1 quartz, 37.1 feldspar, 20.8 $SrCO_3$, 7.7 $MgCO_3$, and 7.3% Na_2CO_3 and is melted at 1300°C. The glaze contains 94% frit and 5% kaolin. Glaze density should be 1.34 to 1.36 for dipping. The glost ware removed from the kiln is shock treated by immersion in a tank containing a solution of colorant, such as cobalt or iron salt in 50% concentration, after being heated at 220° for 30 min. This covers the glaze with a fine network of cracks into which the solution of colorant penetrates. 3 figs., 1 ref. K.S.

III—Cements, Limes, and Plasters

Behavior of hydrated cement minerals toward aggressive waters with reference to concrete corrosion. A. Kjennerue. *Nord. Betong*, 6 [3] 223–34 (1962).—K. studied the effect of synthetic CO_2-containing aqueous solutions on hydrated cement minerals prepared from pure clinker minerals. After 30 days the minerals formed were studied with X rays and microscope. The aluminates were more resistant than the silicates at moderate CO_2 concentration and low sulfate concentration. 4 figs., 2 tables, 5 refs. S.A.L.

Composition and structure of the hydration products of calcium silicates of cements. Michel Venuat. *Rev. Mater. Construct. Trav. Publ.*, 1961, No. 555, pp. 481–90.—A review of the mineral constituents of clinker. The composition and structure of calcium silicates resulting from hydration are discussed. 5 tables, 3 figs., 38 refs. P.L.M.

Concrete containing fly ash as a replacement for portland blast-furnace slag cement. W. E. Grieb and D. O. Woolf. *Am. Soc. Testing Materials Proc.*, 61, 1143–54 (1961).—Tests show that fly ash can be used satisfactorily as a replacement for portland cement or portland blast-furnace slag cement, but the propetries of the concrete are affected by the carbon content of the fly ash. It is indicated that the amount of fly ash used should be correlated with the amount of lime released by the cement. The adjusted mix, containing a low-carbon fly ash, will give strengths at 28 days equal to those of similar concrete without fly ash. 5 tables, 3 figs., 8 refs.

Dust control in the cement industry. N. Pilpel. *Brit. Chem. Eng.*, 7 [4] 258–63 (1962).—Portland cement manufacturing is described with emphasis on the reduction of dust emission at the various stages. Bag filtration, electrostatic precipitation, and cyclone collection equipment are discussed. Brief mention is made of other methods of reducing or controlling dust. 7 figs., 2 tables, 13 refs. W.W.P.

Effects of crystal state on the dehydration of calcium sulfate dihydrate. Michio Sekiya and Yasuo Sugiyama. *Sekko To Sekkai*, 1961, No. 60, pp. 223–34.—Samples of $CaSO_4 \cdot 2H_2O$ were prepared by using various manufacturing methods of representative by-product gypsum in Japan. Microscopic study, DTA, and TGA were made. In the dehydration of $CaSO_4 \cdot 2H_2O$ to $CaSO_4 \cdot {}^1/_2H_2O$ through $CaSO_4 \cdot {}^3/_2H_2O$, the higher the apparent crystallinity of the dihydrate, the higher is the dehydration temperature and the slower is the rate of dehydration. 9 figs., 1 table, 13 refs. Y.S.

Influence of surface-active agent on hardness of concrete. M. Yu. Leshchinskii. *Dokl. Akad. Nauk SSSR*, 121 [5] 889–91 (1958).—The coefficient of variability of a concrete surface wetted with a surface-active agent increases, and the hardness decreases. 2 tables, 11 refs. B.Z.K.

Investigation of properties of calcium hydrosilicates. T. M. Berkovich, D. M. Kheiker, O. I. Gracheva, L. S. Zevin, and N. I. Kupreeva. *Dokl. Akad. Nauk SSSR*, 120 [4] 853–56 (1958).—The hydrosilicates $C_2SH(A)$, $C_2SH(C)$, CSH(B), $C_4S_3H_4$, and CSH(A) were prepared. Roentgenograms were obtained as were curves of differential thermal analysis and weight loss on heating with a temperature rise of 20°/min. The compressive strength of $C_4S_3H_4$ was 1.5 times as great as that of CSH(B); bending strength was the same. The compressive strength of $C_4S_3H_4$ was approx 20 times as great as that of $C_2SH(A)$, but the bending strength was only 30% more. 4 figs., 11 refs. B.Z.K.

New approach to portland cement kiln refractory problems. H. Parnham. *Brit. Clayworker*, 72 [841] 159–64 (1962).—The relative merits of high alumina, dolomite, and magnesia-based bricks in cement kilns are considered. Heat loss is 28% less for dolomite than for magnesia brick. Methods for installing dolomite brick kiln linings are described in detail, and heating-up procedure is recommended. 7 figs., 2 tables. C.E.L.F.

Physicochemical interaction of the medium with hardened cement block, structural mortars, and concretes. Z. N. Tsilosani. *Dokl. Akad. Nauk SSSR*, 122 [4] 674–77 (1958).—The liquid, while saturating the cement block, can at the same time (1) reduce the strength as a result of the effect of the adsorption layers and (2) increase resistance to destruction as a result of the development of closely compressive forces from capillary pressure. 1 table, 1 fig., 6 refs. B.Z.K.

Plasticity figure of slaked lime for use as plaster. Tsugio Miyakawa, Yoshihisa Takakusa, and Manjiro Nakahara. *Sekko To Sekkai*, 1962, No. 60, pp. 235–39.—The effects of the

impervious to water, a block of rigid moisture-absorbent material in the container, a porous pot having capillary properties supported on the block, an annular open-topped vessel received in the container having a moisture-permeable floor in intimate contact with, and supported from, the block, the top of the vessel being below the top of the container, an annular shell supported from the vessel and circumscribing the pot in radially spaced relation thereto, and a collar supported from the upper end of the shell, the collar having a flaring flange at least the inner periphery of which is located above the upper end of the pot. D.J.B.

III—Cements, Limes, and Plasters

Aggregates for masonry grout. *ASTM Std.*, 1961, Part IV, pp. 475–77. ASTM Designation C 404–61.—Adopted in 1961. 1 table, 1 ref. 50 cents. W.W.P.

Air-entraining additions for use in the manufacture of air-entraining portland cement. *ASTM Std.*, 1961, Part IV, pp. 38–44. ASTM Designation C 226–61 T.—Revised in 1961. 2 tables, 3 refs. 50 cents. W.W.P.

Air-entraining portland cement. *ASTM Std.*, 1961, Part IV, pp. 6–9. ASTM Designation C 175–61.—Revised in 1961. 2 tables, 2 refs. 50 cents. W.W.P.

Applications of the vacuum X-ray spectrometer to cement plant operations. Kenneth E. Palmer. *Pit Quarry*, 55 [1] 102–107, 179 (1962).—P. discusses the theory and instruments and develops a sample operating technique for a combination of minerals selected as presenting special difficulties. Particle size distribution of the raw mix can be narrowed by a special grinding technique to produce accurate results and eliminate a mathematical correction for interelement effects. The possible analysis of a continuous slurry stream is also considered. 12 figs. D.J.B. *c*

Asbestos thermal insulating and finishing cement. *ASTM Std.*, 1961, Part V, pp. 784–85. ASTM Designation C 194–61 T.—Issued in 1961. 1 ref. 50 cents. W.W.P.

Automatic vertical cement kiln—50 years later. Ralph Ironman. *Rock Prod.*, 65 [8] 80–83 (1962).—For low outputs where only solid fuel is available, the vertical type kiln is still used. The most modern equipment for this type of operation at a new plant in Peggau, Austria, with peak output of 200 tons/day, is described. 7 figs. D.J.B. *e*

Binding of lime in calcium hydrosilicates under normal conditions. V. F. Abrosenkova, G. I. Logginov, and P. A. Rebinder. *Dokl. Akad. Nauk SSSR*, 115 [3] 509–11 (1957).—A study was made of the kinetics of prolonged binding of Ca by sand with high specific surface (up to 2.9 m²/g) from a saturated solution. The amount of bound Ca was determined from the difference between the activity of the starting solution of $Ca(OH)_2$ and that of the same solution after reaction with the sand for a given time. The process consists of two stages: irreversible binding in the surface layer of sand grains during the first days and a further diffusion process which proceeds at constant rate. Data on X-ray structural analysis indicate that carbonation of $Ca(OH)_2$ proceeds much more slowly than its silicification. 2 figs., 2 tables, 8 refs. B.Z.K. *f*

Bond strength of mortar to masonry units. *ASTM Std.*, 1961, Part V, pp. 1071–80. ASTM Designation E 149–59 T.—Issued in 1959. 8 figs., 2 refs. 50 cents. W.W.P. *g*

Chemical analysis of portland cement (standard methods). *ASTM Std.*, 1961, Part IV, pp. 70–121. ASTM Designation C 114–61.—Revised in 1961. 1 fig., 2 tables, 12 refs. 75 cents. W.W.P.

Chemical analysis of portland cement (tentative methods). *ASTM Std.*, 1961, Part IV, pp. 122–27. ASTM Designation C 114–61 T.—Revised in 1961. 1 fig., 7 refs. 50 cents. W.W.P. *h*

Chemically setting silicate-type chemical resistant mortars. *ASTM Std.*, 1961, Part IV, pp. 421–22. ASTM Designation C 466–61 T.—Issued in 1961. 1 table, 2 refs. 50 cents. W.W.P.

Chemicals quell dust. Anon. *Rock Prod.*, 65 [8] 92 + 2 pp. (1962).—National Gypsum Co. uses a surface-active agent blended with water by a proportioning system and sprayed at dust in locations from the quarry throughout the whole processing system. 4 figs. D.J.B. *i*

Compressive strength of molded concrete cylinders. *ASTM Std.*, 1961, Part IV, pp. 721–23. ASTM Designation C 39–61.—Revised in 1961. 1 ref. 50 cents. W.W.P.

Concrete aggregates. *ASTM Std.*, 1961, Part IV, pp. 504–509. ASTM Designation C 33–61 T.—Issued in 1961. 3 tables, 4 refs. 50 cents. W.W.P. *j*

Corrugated asbestos-cement sheets. *ASTM Std.*, 1961, Part V, pp. 4–8. ASTM Designation C 221–61.—Adopted in 1961. 50 cents. W.W.P.

Covering capacity and volume change upon drying of thermal insulating cement. *ASTM Std.*, 1961, Part V, pp. 894–96. ASTM Designation C 166–61.—Revised in 1961. 1 fig., 1 ref. 50 cents. W.W.P. *b*

Diatomaceous silica thermal insulating cement. *ASTM Std.*, 1961, Part V, pp. 795–97. ASTM Designation C 197–61.—Adopted in 1961. 1 ref. 50 cents. W.W.P.

Don't throw away dust. George C. Lindsay. *Rock Prod.*, 65 [7] 86–89, 125 (1962).—L. describes the automatic closed-loop dust-leaching system at the St. Louis plant of the Missouri Portland Cement Co. The dust return system reduces the alkaline content of the kiln product from 0.7 to 0.3–0.5%, reduces the number of mud rings in the chain system of the kiln, eliminates buildup of alkali sulfates as scale on the precipitator electrodes, and simplifies the control of SO_3 with the gypsum addition. 6 figs. D.J.B.

Drying shrinkage of concrete block. *ASTM Std.*, 1961, Part V, pp. 129–33. ASTM Designation C 426–61 T.—Revised in 1961. 1 fig., 2 refs. 50 cents. W.W.P. *d*

Effect of cement kiln dust on soil and plants. F. Scheffer, E. Przemeck, and W. Wilms. *Staub*, 21 [6] 251–54 (1961); *APCA Abstr.*, 7 [6] 2 (1961).—A two-year field experiment showed no damage to plants from the deposition of cement kiln dust in the case of four agricultural crops. The possibility exists, however, of an indirect influence on the plant yield and the substances contained in the plants from the soil, changes in the soil reaction, and nutrient. Under certain circumstances this may lead to impairment of plant production. This can be counteracted by agricultural countermeasures such as constant supervision of the soil properties and soil examination.

Effects of some inorganic salts on the dehydration of calcium sulfate dihydrate. Michio Sekiya, Yasuo Sugiyama, and Shoichi Okamoto. *Sekko To Sekkai*, 1962, No. 61, pp. 263–72.—To 10 g of natural gypsum found in Ras Mallap (−200 mesh sieve), 10 ml of 0.01 to 1% solutions of 4 chlorides, 4 nitrates, 3 sulfates, 2 carbonates, and 2 fluorides was added, and the mixture was dried at 50°C. DTA showed the following results: (1) The chlorides lower the 1st and 2nd dehydration temperatures but have no effect on the 3rd dehydration temperature; an exothermic peak at approx 230°C corresponding to the formation of α-$CaSO_4 \cdot {}^1/_2H_2O$ is observed when $CaCl_2$ (1%) or $MgCl_2$ (0.1 to 1%) was added. (2) The effect of the nitrates on the dehydration is less than that of the chlorides. (3) The other salts have no effect on the dehydration. 6 figs., 1 table, 12 refs. Cf. *Ceram. Abstr.*, 1963, Jan., p. 2*f*. Y.S.

Expanded or exfoliated vermiculite thermal insulating cement. *ASTM Std.*, 1961, Part V, pp. 792–94. ASTM Designation C 196–61.—Adopted in 1961. 1 ref. 50 cents. W.W.P.

Factors affecting strength of field-fabricated concrete test beams. J. F. Crary and H. C. Fryer. *Mater. Res. Std.*, 2 [5] 385–87 (1962).—The results of a statistical study of data from 444 beams made in the field having the same proportions throughout indicate that about half of the variation in flexural strength should be attributed to the 13 variables considered; the other half is unexplained. 4 tables, 5 refs. M.P.H.

False set of portland cement (mortar method). *ASTM Std.*, 1961, Part IV, pp. 139–41. ASTM Designation C 359–61 T.—Revised in 1961. 1 fig., 2 refs. 50 cents. W.W.P.

Flat asbestos-cement sheets. *ASTM Std.*, 1961, Part V, pp. 1–3. ASTM Designation C 220–61.—Revised in 1961. 4 tables. 50 cents. W.W.P.

Flexural strength of hydraulic cement mortars. *ASTM Std.*, 1961, Part IV, pp. 165–72. ASTM Designation C 348–61 T.—Revised in 1961. 5 figs., 2 refs. 50 cents. W.W.P.

Flow table for use in tests of hydraulic cement. *ASTM Std.*, 1961, Part IV, pp. 209–13. ASTM Designation C 230–61 T.—Revised in 1961. 1 fig. 50 cents. W.W.P.

Hydraulic hydrated lime for structural purposes. *ASTM Std.*, 1961, Part IV, pp. 225–30. ASTM Designation C 141–61.—Revised in 1961. 1 table, 2 refs. 50 cents. W.W.P.

Infrared absorption spectra of calcium sulfate dihydrate, hemi-

Crystal growing process. Allan I. Bennet (Westinghouse Electric Corp.). U.S. 3,058,915, Oct. 16, 1962. D.J.B.

Device for X-ray spectrochemical analysis by means of fluorescent radiation. Sjoerd Wytzes (North American Philips Co., Inc.). U.S. 3,060,314, Oct. 23, 1962. D.J.B.

Electrochemical determination of fluorides. George H. Farrah (Aluminum Co. of America). U.S. 3,058,901, Oct. 16, 1962. D.J.B.

Growing single crystals from a molten mass with a linear isotherm. Juraj Eckstein and Zdenek Wachtl. Czech. 94,-996, April 15, 1960; *Chem. Abstr.*, 55 [3] 2217*g* (1961).

Method and apparatus for the continuous colorimetric determination of the individual components of a [liquid] mixture. Wolfgang Grassmann and Kurt Hannig. U.S. 3,059,524, Oct. 23, 1962. D.J.B.

Method and apparatus for operating an analytical mass spectrometer with a getter-ion pump. Ernest W. Boyer (Continental Oil Co.) U.S. 3,057,996, Oct. 9, 1962. D.J.B.

Method for the growth of preferentially oriented single crystals of metals. Theodore H. Orem (United States of America as represented by the Secretary of Commerce). U.S. 3,060,065, Oct. 23, 1962. D.J.B.

Process for separating rare earths and yttrium by ion exchange [resin]. Pawel Krumholz and Kasimierz J. Bril. U.S. 3,-054,655, Sept. 18, 1962. D.J.B.

Treatment of zeolitic molecular sieves to inhibit polymerization of olefins. N. V. de Bataafsche Petroleum Maatschappij. Brit. 842,431, July 27, 1960; *Chem. Abstr.*, 55 [2] 1968*i* (1961).

See also Sect. V: Elastic stresses produced by indentation of plane surface of a semi-infinite elastic solid by an elastic spherical punch.

XV—General

Glass dust—a study of its biologic effects. P. Gross, Marian L. Westrick, and J. M. McNerney. *A.M.A. Arch. Ind. Health*, 21, 10–23 (Jan. 1960); *APCA Abstr.*, 5 [10] 7 (1960).—A study on animals showed no effect of glass dust and glass flakes on the conjunctiva. No toxic or traumatic effect was demonstrable on the gastrointestinal tract. There was no bronchial disease attributable to the dust. Compared with kaolin, fine glass dust was even more benign in pulmonary effects because the stored dust remained alveolar instead of occupying interstitial positions and therefore was more readily mobilized and cleared from the lung.

Histology of iron deposits in silicosis among porcelain workers. H. Otto and R. Maron. *Arch. Gewerbepathol. Gewerbehyg.*, 17 [2] 117–26 (1959); *APCA Abstr.*, 5 [8] 9 (1960).—Earlier work indicated that normal lungs had an iron content, measured as Fe_2O_3, as high as 3.4 g with an average of 0.3 g. Similarly measured, the content of the lungs of persons who had worked in dusty industries ranged from 0.4 to 10.0 g. The authors made a histological and histochemical study of 40 cases of porcelain silicosis. The iron reaction was typical only of severe siderosis; in a low-grade silicosis with predominantly tubercular damage, the iron reaction was correspondingly slight, indicating a possibility of the use of this reaction in a differential diagnosis.

Hygiene characteristics of mica dust. I. K. Pushkina. *Gigiena i Sanit.*, 25 [8] 18–23 (1960); *APCA Abstr.*, 6 [11] 2 (1961).—X-ray examinations of workers at industrial plants using mica indicate the possible occurrence of chronic lung diseases of pneumoconiotic etiology.

Impact of materials science and materials engineering on ceramic engineering. Joseph A. Pask. *Am. Ceram. Soc. Bull.*, 42 [1] 23–24 (1963).

Methods of preparation of silica-containing dusts for use in biological research. E. Occella and G. Maddalon. *Med. Lavoro*, 52 [5] 382–90 (1961); *APCA Abstr.*, 7 [12] 5 (1962).—The mineralogy laboratory of the Clinica del Lavoro of Milan Univ. has prepared a series of samples of fine silica-containing or inert dusts, classified and defined granulometrically, for the study of the etiology of silicosis. The origin and synthesis of the prime materials (quartz, opal, diatomaceous earth, chalcedony, tridymite, cristobalite, silica glass) are reviewed, together with grinding techniques and methods of classification used to obtain dusts mostly $<3\mu$ in diameter.

Pathogenicity of glass reinforced plastics—experimental inquiries by injection or external application techniques. G. W. H. Schepers. *Arch. Environ. Health*, 2 [6] 20–34 (1961); *APCA Abstr.*, 7 [4] 7–8 (1961).—The tissue damaging effects of flake glass and of two varieties of Fiberglas plastic with a calcium carbonate filler were explored. Although all these substances are comparatively inert, the Fiberglas plastic with a calcium carbonate filler produced slightly more local reaction than that with a calcium sulfate filler. Flake glass had the least effect. None of the substances caused fibrosis except Fiberglas implanted subcutaneously.

Plant organization for quality control. G. F. Finzer. *J. Can. Ceram. Soc.*, 31, 104–105 (1962). J.J.D.

Production of antibodies by quartz and beryllium oxide. A. Collet, G. A. Voisin, and F. Toullet. *Arch. Environ. Health*, 2 [4] 409–17 (1961); *APCA Abstr.*, 7 [1] 6 (1961).—Three groups of guinea pigs were used: a control group, a group given injections of quartz + homologous cells + homologous serum, and a group given injections of beryllium oxide + homologous cells + homologous serum, according to the usual method for maximal immunization. The results showed that no antibodies were formed against the substances tested. None of the treated animals showed hypersensitivity to quartz, BeO, or homologous serum. A moderate hypersensitivity was produced in the animals of the two treated groups for homologous polynuclear leukocytes.

Some oxidative and hydroxylative actions of quartz—their possible relation to the development of silicosis. L. W. Marasas and J. S. Harrington. *Nature*, 188, 1173–74 (Dec. 31, 1960); *APCA Abstr.*, 7 [1] 7 (1961).—The existence of a special surface activity possessed by siliceous dusts and silicates has been reported. A correlation appears to exist between the oxidative activity of the dusts and the known fibrogenetic potential of the materials examined. A connection between particle size and activity also seems apparent in coarse quartz and other quartz dusts of a smaller size.

Sudan's ceramic industries. A. Lee Bennett. *Ceram. News*, 11 [8] 14–15 (1962).—B. describes the manufacture of brick and sewer pipe in open-air plants near Khartoum. D.J.B.

Types of asbestos, their study by optical methods, and their pathogenic action. K. G. Schmidt. *Staub*, 20 [6] 173–80 (1960); *APCA Abstr.*, 7 [1] 4 (1961).—With the polarization and phase contrast microscopes it is comparatively simple to distinguish eleven types of asbestos. Chrysotile, amosite, and crocidolite asbestos are dangerous, and tremolite or anthophyllite may cause illness. Too little is known about the other types. All asbestos dusts should be treated as being injurious to the lungs.

PATENT

Light-scattering coatings for the inside of light bulbs. Pieter W. Haaijman, Gerardus H. Janssen, and Petrus C. van der Linden (N. V. Philips' Gloeilampenfabrieken). Dutch 90,572, April 15, 1959; *Chem. Abstr.*, 55 [5] 4914*g* (1961).

XVI—Books

Advances in X-Ray Analysis: Vol. 5, Proceedings of the Tenth Annual Conference on Applications of X-Ray Analysis, August 1961. Edited by William M. Mueller. 1962. Plenum Press, New York 11. xi + 564 pp., illus. $17.50.—This volume contains 48 of the 56 papers presented at the conference. A particular merit of this series of volumes is their rapid publication after the actual conferences. Many of the papers obviously deal with work in progress rather than with completed investigations, and in the discussions which are recorded, some authors agree that their work is nowhere near completion. The discussions make very interesting reading, in some cases bringing out the inadequacies of the methods used and in other cases providing

L. Shelton, Jr. (International Business Machines Corp.). U.S. 3,064,519, Nov. 20, 1962. D.J.B.

Spectroscopic apparatus. Jason L. Saunderson and Eliot Du Bois (Baird-Atomic, Inc.). U.S. 3,064,520, Nov. 20, 1962. D.J.B.

Stable aqueous suspensions based on fused alumina. Georg Buehler and Hans Feulner. Ger. (East) 17,722, Oct. 21, 1959; *Chem. Abstr.*, 55 [2] 2052*c* (1961).

Temperature regulator for chromatographs. Walter Donner and Don W. Carle (Beckman Instruments, Inc.). U.S. 3,062,037, Nov. 6, 1962. D.J.B.

See also Sect. VIII: Quantitative studies of high-temperature reactions of quartz-kaolinite-feldspar mixtures. Sect. IX: Electrical conductivity and thermodynamic equilibrium in nickel oxide.

XV—General

Austrian regulations governing the solubility of lead from on-glaze decorated porcelain. H. Haeffner. *Ber. Deut. Keram. Ges.*, 39 [9] 460–61 (1962).—The regulation (January 1961) limits the amount of Pb extracted by 4% acetic acid solution during 24 hr at room temperature to 2 mg/liter of contents. Cf. *Ceram. Abstr.*, 1962, May, p. 120*d*. J.A.S.

Chemistry of the surface of silica and silicosis. U. Hofmann. *Ber. Deut. Keram. Ges.*, 39 [5] 272–79 (1962).—A review. 8 figs., 3 tables, 35 refs. J.A.S.

Chronic shortness of breath and its treatment by aerosol therapy. Wolfgang Graupner. *Keram. Z.*, 14 [7] 392–93 (1962).—A review with special reference to the inhalation apparatus made by Pari-Werk Paul Ritzau, Starberg am See, Bavaria, Germany. 2 photos. J.A.S.

Clean air in ceramic factories. H. Schuetz. *Keram. Z.*, 14 [7] 399–406 (1962).—A detailed description is given of the sources of dangerous dust and the design of the filter system including bench hoods, ductwork, fans, and filter apparatus. 18 figs. J.A.S.

Comparative concentration of silica in parent material and in airborne particulate matter. M. Sheinbaum. *Am. Ind. Hyg. Assoc. J.*, 22, 313–17 (Aug. 1961); *APCA Abstr.*, 7 [6] 5 (1961).—A progress report is presented on the relation between the silica concentration of airborne particulate matter and the parent material from which it has been generated. Thirty airborne samples were collected by impingers or membrane filters, and parent materials were collected as grab or ledge samples. The Talvitie method for free silica determination was used for analysis of parent materials. Phase microscopy was used to analyze airborne particulate matter. Of the 30 sampling sites, 19 were located within 6 ft of operations producing dust and 11 were located at greater distances. Data indicate that the concentration of free silica in the breathing zone of the operator is about the same as that in the parent material in cases where operators were within 6 ft of the operation.

Control of beryllium hazards. C. L. Lindeken and O. L. Meadors. *Am. Ind. Hyg. Assoc. J.*, 21, 245–51 (June 1960); *APCA Abstr.*, 6 [4] 1 (1960).—With the exception of certain radioisotopes, the toxicity of beryllium probably exceeds that of any material previously used in industry. A continuing air monitoring program is required to evaluate the performance of enclosures and to assure that hazardous concentrations of beryllium are not released to the room atmosphere. As a working rule, a beryllium concentration of about 0.2 $\mu g/m^3$ is considered as an alert, and immediate attempts are made to remedy the situation. The enclosures described have been applied to operations ranging from chemical processing of finely divided beryllium oxide powder to machining of elemental beryllium castings.

Dust measurements in the ceramic industry. H. A. Blasum and D. Claus. *Keram. Z.*, 14 [7] 394–99 (1962).—Measurements with the Konimeter (microscopic examination of a deposit on a slide), the thermal precipitator, and the microfilter are described. Typical data for various departments in a factory are given. 7 photos, 1 table, 17 refs. J.A.S.

Dust technology. W. Gruender. *VDI* (Ver. Deut. Ingr.) *Z.*, 103, 683–86 (May 1961); *APCA Abstr.*, 7 [6] 11 (1961).—This annual survey of the various aspects of dust technology is accompanied by a bibliography of 55 references, all but a few items of which were published in 1959 and 1960. The information reviewed includes dust counting techniques, dust hygiene, combustible industrial dusts, dust technology, dust emission, and dust depositing.

Dust-feed mechanism suitable for fibrous dust. P. F. Holt and D. K. Young. *Ann. Occupational Hyg.* (London), 2, 249–56 (Nov. 1960); *APCA Abstr.*, 8 [3] 4 (1962).—Apparatus previously used for maintaining a dusty atmosphere for inhalation experiments often failed when applied to fibrous dusts. An apparatus is described which will automatically maintain a dust-laden atmosphere for long periods at a reasonably steady level. A simple method of varying the dust level is provided, and there are adequate safeguards against failure.

Fine glass fiber paper for air sampling. D. C. Stevens and R. F. Hounam. *Ann. Occupational Hyg.* (London), 3, 58–63 (Jan. 1961); *APCA Abstr.*, 7 [7] 7 (1961).—The paper combines a low resistance to airflow with high collection efficiency for aerosols. The excellence of performance of fiber glass compared with that of other filter papers previously used for air sampling for particulate contamination, at air velocities of 12.5 to 250 cm/sec, is outlined in a table. The fine glass fibers, however, are susceptible to deterioration when the dusts so collected are treated chemically, and an analysis of the paper indicated that certain chemical elements might interfere with a spectrographic analysis of dusts collected on it. It has the advantage of having a surface texture which lends itself to direct microscopic examination of the collected dust.

Significance of surface finish on friction, wear, and lubrication. A. Sonntag. *Ind. Diamond Rev.*, 20 [234] 86–90, 92–99 (1960).—A general review of surface finish is given with respect to its definition and measurement. Test data are presented for surface geometry related to boundary friction, wear, and lubrication. 26 figs., 4 tables, 21 refs. W.B.C.

Who selects materials. E. J. Tangerman. *Prod. Eng.*, 33 [26] 58–61 (1962).—Engineering departments usually specify materials according to company standards, but there is increasing emphasis on process economics, which involves the manufacturing departments. 8 figs. W.W.P.

XVI—Books

Analyses of Ancient Glasses 1790–1957—A Comprehensive and Critical Survey. Earle R. Caley. 1962. Corning Museum of Glass Monographs, Vol. 1. Corning Glass Center, Corning, New York. 115 pp., 133 tables. $7.50.—The Corning Museum of Glass and Professor Caley have done good service to those interested in glass by bringing together in a well-produced volume all the known analytical data for glass up to 1957. The analyzed samples date from the earliest times through the 5th century A.D. The analyses, made between 1790 and 1957, are reinterpreted and evaluated in the light of modern knowledge. The first two chapters gather together the existing data in chronological order. The next three chapters deal with Egyptian, Near and Far Eastern, and Roman glass. In these chapters special attention is given to any distinguishing characteristics of the chemical composition of glass for a particular civilization at certain periods and to any chronological differences in composition. The last chapter deals with the physical and chemical alteration of glass long buried in the soil. This book is Volume I in a planned series of publications by the Corning Museum of Glass dealing with the history of glass in all of its aspects: scientific, economic, aesthetic, and literary. Later volumes can be awaited with interest. Marie Farnsworth

Building Research. 1961. Department of Scientific and Industrial Research. 1962. v + 89 pp., illus. Price 8s. 6d. Available from H. M. Stationery Office, London. Cf. *Ceram. Abstr.*, 1961, Nov., p. 275*i*.

Clays and Clay Minerals—Proceedings of the Eighth National Conference, Norman, Oklahoma, October, 1959. Edited by Ada Swineford and Paul C. Franks. 1960. Pergamon Press, Inc., New York 22. ix + 292 pp., illus. $9.50.—This volume

tension cell and a compression cell are described. 12 figs., 11 refs. H.T.H.

Tensile strength checked by hydrostatic tester. Anon. *Prod. Eng.*, 34 [2] 84 (1963).—The tensile strength of brittle materials can be determined with a hydrostatic tester designed at Stanford Research Institute. 2 figs. W.W.P.

Thermocouple performance in gas streams. J. C. Faul. *Instr. Control Systems*, 35 [12] 104–106 (1962).—Error sources in measuring the temperature of gas streams by five types of thermocouple are discussed, and correction data are given. 4 figs. W.W.P.

Ultrafine dust—its effective removal by suspension filters. E. Giovannini. *Wasser Luft Betrieb*, 6, 305–309 (Sept., 1961); *APCA Abstr.*, 8 [8] 1–2 (1963).—The technique of ultrafiltration has been developing rapidly in the field of chemical and physical research, but only recently has it been approved in dust filtration. The filtering material can be cellulose, asbestos, glass wool, etc., but it always has a characteristic massing of many fibers unequally or randomly spaced. The process is especially effective in filtering submicroscopic particles.

PATENTS

Apparatus for testing heat responsive devices. Raymond D. Brunson (Howell Instruments, Inc.). U. S. 3,067,604, Dec. 11, 1962. D.J.B.

Catalyst coated thermocouple elements. Joseph H. Tracht (Gulf Research & Development Co.). U. S. 3,070,645, Dec. 25, 1962.—The thermocouple has a coating on its hot junction of catalytic material capable of promoting an exothermic reaction of fuel reactants contacted therewith, the leads of the thermocouple being noncatalytic with respect to the reaction. D.J.B.

Device for the measurement of the density of pulverulent or liquid materials. Mario Ballestra. U. S. 3,067,622, Dec. 11, 1962.—The device continuously and simultaneously determines the density and the humidity of a pulverulent material. D.J.B.

Machine for testing hardness and wear characteristics of abrasive materials. Paul R. Gjertsen. U. S. 3,069,892, Dec. 25, 1962. D.J.B.

Measuring and comparing device of the [optical] pyrometer type. Donald D. Vawter (North American Aviation, Inc.). U. S. 3,068,746, Dec. 18, 1962. D.J.B.

Method of making a high temperature thermocouple. Oluf D. Sherning (George H. Roach). U. S. 3,069,752, Dec. 25, 1962.—The method comprises fitting a pair of thermocouple wires in a tubular housing having an open upper end and a closed lower end, filling the housing with an inert, high temperature resistant powder, and compacting the powder with a tamping tool. D.J.B.

Pressure and temperature sensing device for high pressure apparatus. Armando A. Giardini and John E. Tydings (United States of America as represented by the Secretary of the Army). U. S. 3,067,465, Dec. 11, 1962. D.J.B.

Temperature indicating device. Roland W. Roberts and William T. Conry (Westinghouse Electric Corp.). U. S. 3,068,698, Dec. 18, 1962.—An apparatus for indicating the highest temperature of a plurality of temperatures to be sensed comprises a like plurality of saturable reactor circuits. D.J.B.

Temperature reference block. Douglas P. Hines (General Electric Co.). U. S. 3,069,909, Dec. 25, 1962.—The block comprises a body of metallic material with an anodic oxide film thermally coupling a current conducting element to the metallic material. D.J.B.

Thermal emissivity device. Donald R. Kerstetter (Sylvania Electric Products, Inc.). U. S. 3,069,893, Dec. 25, 1962.—The process comprises blackening both surfaces of a calibrating sample equal in surface area to a preselected test sample, heating the calibrating sample to the temperature T_1 and the atmosphere adjacent it to T_0, blackening one surface of the test sample, applying to it the prescribed amount of heat to raise the atmosphere adjacent the test sample to T_0, and registering the T_2 of the test sample, the thermal emissivity being in accordance with the equation $e = (2(T_1^4 - T_0^4) - (T_2^4 - T_0^4))/(T_1^4 - T_0^4)$. D.J.B.

Thermocouple. Robert B. Clark (General Electric Co.). U. S. 3,071,636, Jan. 1, 1963.—The thermocouple comprises a closed end tubular sheath, a pair of thermocouple leads, a core of insulating material in the housing separating the leads from the sheath, the thermocouple junction extending beyond the insulating material, and two diametrically opposed apertures in the sheath shaped and positioned relative to the junction to introduce turbulence flow into the moving fluid flowing past the junction. D.J.B.

XII—Kilns, Furnaces, Fuels, and Combustion

Industrial applications of beta-ray excited X rays: VIII, Determination of sulfur in heavy oil by tritium bremsstrahlung absorption method. Shigemasa Enomoto, Tomihiko Furuta, Chizuo Mori, and Yutaka Ishihara. *Nagoya Kogyo Gijutsu Shikensho Hokoku*, 10 [10] 636–41 (1961). 6 figs., 2 tables, 11 refs. IX, Rapid determination of the ash content of coal with the absorption method using tritium bremsstrahlung. Shigemasa Enomoto, Chizuo Mori, and Tomihiko Furuta. *Ibid.*, [11] 721–27.—A tritium source containing 6 curies in the form of the gas absorbed on a thin layer of titanium vacuum evaporated upon a copper disk and a vessel with a beryllium bottom 0.5 mm thick were used. The effective energy of X rays passing through coal samples in the vessel was measured by means of an energy spectrometer with a proportional counter. The ash content was determined by measuring the intensity of X rays passing through samples with a Geiger-Müller counter. The results obtained were as follows: (1) The intensity or effective energy of the transmitted X rays corresponds to the thickness or description of the coal samples, and the calibration curve for the estimation of ash content was obtained for the respective description. (2) Using the mass absorption coefficients of the ash and combustion elements of samples of each description, the calibration curves obtained agreed well with those based on the theory of monochromatic X-ray absorption analysis. (3) The experimental error for the estimation of ash content with 5 minutes' counting was about 0.5 to 1.0% ash for samples of 16 to 23% ash. The calorific value of coal was also estimated with similar accuracy. 7 figs., 1 table, 11 refs. For part VII see *Ceram. Abstr.*, 1962, Jan., p. 18*f*. K.F.

Possibility of drying ceramic materials with electrical current. Karel Maurer. *Sklar Keram.*, 10 [1] 10–13 (1960).—The possibility of negative and dielectric drying of a ceramic body is discussed. Principles of the experimental procedures, the results, and their evaluation are described. 9 figs., 15 refs. A.D.

PATENTS

Electrical device for induction furnaces. John T. Vaughan (National Research Corp.). U.S. 3,055,959, Sept. 25, 1962.—The device regulates the voltage and power factor of an alternator. D.J.B.

Furnace roller. Gloyd H. Young and Carrol Cone (Midland-Ross Corp.). U.S. 3,070,362, Dec. 25, 1962. D.J.B.

Heat exchangers in furnaces for the sintering of magnesite, dolomite, or cement. Herbert Kitzrow (Rheinische Kalksteinwerke, G.m.b.H.). Ger. 1,071,571, Dec. 17, 1959; *Chem. Abstr.*, 55 [12] 11786*a* (1961).

Method and apparatus for generating electrical power from solar energy. Harry A. Toulmin, Jr. (Commonwealth Engineering Co. of Ohio). U. S. 3,070,643, Dec. 25, 1962.—The unit comprises thermoelectric elements arranged to form a hollow body having an inner wall with a metallic mass in heat-conducting relation to it, a lens system to concentrate rays of the sun onto the metallic mass to energize the thermoelectric elements by radiation from the metallic mass, and means within the hollow body to reflect heat rays radiated from the metallic mass against the inner wall of the hollow body to further energize the thermoelectric elements. D.J.B.

Sampling device and method for analysis of [condensed] furnace gases. Stanley Krinov (Pittsburgh Plate Glass Co.). U.S. 3,070,990, Jan. 1, 1963. D.J.B.

Seal for rotating cylinders such as kilns, etc. Alexander J. Roubal (Allis-Chalmers Mfg. Co.). U.S. 3,068,015, Dec. 11, 1962.—The seal comprises a cylinder with a flange, a jaw arranged radially outward from it, the jaw and cylinder being adapted to grasp a cable arranged parallel to the flange, and a clamp for engaging both the jaw and the cylinder operative to move the jaw radially inward toward the cylinder. D.J.B.

XV—General

Acidity and alkalinity of industrial water. *ASTM Std.*, 1961, Part 10, pp. 1528–33. ASTM Designation D 1884–61 T.—Issued in 1961. 50 cents. W.W.P.

Analysis of industrial water and industrial waste water. *ASTM Std.*, 1961, Part 10, pp. 1379–84. ASTM Designation D 1256–61.—Adopted in 1961. 50 cents. W.W.P.

Chloride in high-purity industrial water. *ASTM Std.*, 1961, Part 10, pp. 1534–36. ASTM Designation D 1885–61 T.—Issued in 1961. 50 cents. W.W.P.

Collection and analysis of dustfall. *ASTM Std.*, 1961, Part 10, pp. 1585–88. ASTM Designation D 1739–60 T.—Issued in 1960. 50 cents. W.W.P.

Consistent quality control as an effective means of reducing production costs in the ceramic industry. H. Klepsch. *Silikat J.*, 1962, No. 5, pp. 176–77. N.W.S.

Continuous analysis and automatic recording of the sulfur dioxide content of the atmosphere. *ASTM Std.*, 1961, Part 10, pp. 1635–49. ASTM Designation D 1355–60.—Adopted in 1960. 50 cents. W.W.P.

Development in building materials—prospect for the future. F. M. Lea. *Chem. Ind.* (London), 1962, No. 43, pp. 1840–46.—A survey covers research and development in the building industry with particular reference to future trends in the use of materials such as cement, fired clay, and plastics. 3 tables, 1 ref. V.S.R.

Dissolved and gaseous hydrogen in industrial water. *ASTM Std.*, 1961, Part 10, pp. 1470–75. ASTM Designation D 1588–60.—Adopted in 1960. 50 cents. W.W.P.

Dissolved oxygen in industrial waste water. *ASTM Std.*, 1961, Part 10, pp. 1476–83. ASTM Designation D 1589–60.—Adopted in 1960. 50 cents. W.W.P.

Fluoride ion in industrial water and industrial waste water. *ASTM Std.*, 1961, Part 10, pp. 1328–38. ASTM Designation D 1179–61.—Revised in 1961. 50 cents. W.W.P.

Hardness in industrial water. *ASTM Std.*, 1961, Part 10, pp. 1298–1302. ASTM Designation D 1126–60.—Revised in 1960. 50 cents. W.W.P.

Iron in industrial water and industrial waste water. *ASTM Std.*, 1961, Part 10, pp. 1282–89. ASTM Designation D 1068–61 T.—Revised in 1961. 50 cents. W.W.P.

Mass concentration of particulate matter in the atmosphere. *ASTM Std.*, 1961, Part 10, pp. 1619–26. ASTM Designation D 1899–61 T.—Issued in 1961. 50 cents. W.W.P.

Measurement of beta particle radioactivity of industrial water and industrial waste water. *ASTM Std.*, 1961, Part 10, pp. 1569–77. ASTM Designation D 1890–61 T.—Issued in 1961. 50 cents. W.W.P.

Measurement of gamma radioactivity of industrial water and industrial waste water. *ASTM Std.*, 1961, Part 10, pp. 1505–1509. ASTM Designation D 1690–61.—Adopted in 1961. 50 cents. W.W.P.

Nickel in industrial water. *ASTM Std.*, 1961, Part 10, pp. 1537–42. ASTM Designation D 1886–61 T.—Issued in 1961. 50 cents. W.W.P.

Nitrite ion in industrial water. *ASTM Std.*, 1961, Part 10, pp. 1370–74. ASTM Designation D 1254–60.—Adopted in 1960. 50 cents. W.W.P.

a Operating performance of cation-exchange materials-sodium cycle. *ASTM Std.*, 1961, Part 10, pp. 1514–20. ASTM Designation D 1782–60 T.—Issued in 1960. 50 cents. W.W.P.

— Particulate matter in the atmosphere. *ASTM Std.*, 1961, Part 10, pp. 1627–34. ASTM Designation D 1704–61.—Adopted in 1961. 50 cents. W.W.P.

b Present tendencies in the ceramic industry: I. A. Baudran. *Ind. Ceram.*, 1962, No. 542, pp. 239–44.—New markets in such fields as electronics, nuclear power, and astronautics are discussed. The trend of new products is away from the complex aluminosilicates toward simple single phase crystalline materials of high purity. Manufacture is often based on modifications of traditional methods. 6 figs. II. *Ibid.*, No. 543, pp. 281–88.—Production has developed without sudden change. It has been marked particularly by an increase in output and quality.

c Research is being carried out in three main fields: improvement of production, methods of testing and control, and standardization. By way of illustration, a comparison is made of the articles published in *J. Am. Ceram. Soc.* in 1940 and in 1960. Mention is made of the competition from other materials, such as heat resisting metals and plastics. Energetic publicity based on the excellent properties of ceramic materials is necessary to combat the ignorance of the general public, who seem to attach less and less importance to ceramic products. 19 figs. L.J.M.

d Silica in high-purity water. *ASTM Std.*, 1961, Part 10, pp. 1501–1504. ASTM Designation D 1689–61 T.—Revised in 1961. 50 cents. W.W.P.

— Specific gravity of industrial water and industrial waste water. *ASTM Std.*, 1961, Part 10, pp. 1452–55. ASTM Designation D 1429–60.—Adopted in 1960. 50 cents. W.W.P.

e Statistical quality control—some case histories in ceramics. Harry Kleinkauf. *Am. Ceram. Soc. Bull.*, **42** [3] 101–103 (1963).—The use of statistical procedures in controlling the moisture added to a dry body, in evaluating shrinkage variations and setting tolerances, and in finding the causes of variation is described. 3 figs., 1 table, 3 refs.

— Sticking of dust to walls (during blowing). E. Muschelknautz and P. Fischer. *Naturwissenschaften*, 49 [2] 33 (1962).—The sticking of dust to plates was investigated experimentally at

f different speeds and with different nozzle diameters. The results are discussed briefly. 1 fig. G.B.

Suspended and dissolved solids in industrial water. *ASTM Std.*, 1961, Part 10, pp. 1548–60. ASTM Designation D 1888–61 T.—Issued in 1961. 50 cents. W.W.P.

— Terms relating to industrial water and industrial waste water. *ASTM Std.*, 1961, Part 10, pp. 1316–22. ASTM Designation D 1129–61.—Revised in 1961. 50 cents. W.W.P.

g Total chromium in industrial water and industrial waste water. *ASTM Std.*, 1961, Part 10, pp. 1490–95. ASTM Designation D 1687–61.—Adopted in 1961. 50 cents. W.W.P.

— Turbidity of industrial water. *ASTM Std.*, 1961, Part 10, pp. 1561–68. ASTM Designation D 1889–61 T.—Issued in 1961. 50 cents. W.W.P.

XVI—Books

Consolidated Index of Selected Property Values—Physical Chemistry and Thermodynamics. Prepared by the Office of Critical Tables. 1962. *Natl. Acad. Sci.—Natl. Res. Council Publ.*, No. 976, xxiii + 275 pp. $6.—The Consolidated Index is a key to the contents of publications that present critically evaluated numerical property values. This initial volume contains in codified form the contents of the following six compilations of physicochemical and thermodynamic data: Selected Values of Properties of Hydrocarbons and Related Compounds, American Petroleum Institute Research Project 44; Selected Values of Properties of Chemical Compounds, Manufacturing Chemists Association Research Project; Selected Values of Chemical Thermodynamic Properties, *Natl. Bur. Standards* (U. S.) *Circ.*, No. 500; Thermodynamic Properties of the Elements, D. R. Stull and G. C. Sinke; Contributions to the Data on Theoretical Metallurgy, *U. S. Bur. Mines Bull.*, Nos. 383, 384, 393, 406, 407, 477, 542, 584; Selected Values for the Thermodynamic Properties of Metals and Alloys, Minerals Research Laboratory, University of California, Berkeley, Calif.

— Dana's System of Mineralogy: Vol. III, Silica Minerals. Clifford Frondel. 1962. John Wiley & Sons, Inc., New York 16. 334 pp., illus. $7.95.—The properties of silica (SiO_2), one of the most abundant materials of the earth's crust and an important component in many ceramic systems, have been the

i subject of a voluminous literature. The importance of silica as a material in widespread use and occurrence is ample justification for the compilation and critical review of published literature. Although intended as a professional reference work for

— earth scientists, this volume will be of interest and use to scientists working in many fields, including ceramics. An introductory section describes the phase relations of silica, structurally related materials, and poorly defined polymorphs. Ceramists will

j find this section concise and comprehensive. Structural analogs and structurally related materials are tabulated for each polymorph.

The text presents the properties of the silica polymorphs from the viewpoint of the mineralogist. Physical, chemical, and crystallographic properties of silica minerals are given in detail

with increase in the power dissipated, and the power dissipation required to attain a given efficiency increases with decrease in particle size of the dust or mist. The efficiency is nearly independent of the size, design, and geometry of the scrubber and of the method by which the power is applied to the contacting process. 3 figs., 33 refs. III, Electrostatic filter. Waldemar Koglin. *AM + R* (in *Sprechsaal*, 95 [21]), 2 [21] a199–207 (1962).—The design, performance, and application of the electrostatic filter are presented. Its main advantages are high separation yields with the finest particles (dry or wet, hot (over 450°C) or cold), continuous operation, few and slowly rotating parts, low pressure and temperature losses, low energy consumption, and easy maintenance. 10 figs., 12 refs. Cf. *Ceram. Abstr.*, 1960, Nov., p. 264*h*. L.M.

Earthenware centrifugal pump. Vaclav Aubrecht. *Sklar Keram.*, 10 [5] 144 (1960). 1 fig., 1 ref. A.D.

Preparation of clays for electron microscope examination. G. Serwatzky. *Sprechsaal*, 95 [21] 559–65 (1962).—S. studied the suitability of existing methods of preparing clay minerals for examination. Reproducible results are obtained only if great care is taken to disintegrate the clay with a dispersion agent and an effective shaking process. NH_4OH and Na_2P_4O, were inferior to certain organic reagents; best results were obtained with tertiary-butylamine diluted with distilled water (1:700). Ultrasonic vibration destroys illite and montmorillonite and should not be used. 15 figs., 4 refs. L.M.

Radioactive isotopes in bin and level indication of granular materials and liquids. C. Mueller. *AM + R* (in *Sprechsaal*, 95 [3]), 2 [3] a17–19 (1962).—Measurement of bin loads by means of radiation indicators is discussed. 4 figs., 6 refs. L.M.

Vacuum equipment and dust removal in the ceramic industry. Friedmund Rueb. *Sprechsaal*, 94 [23] 597–604 (1961).—Problems are discussed, and the equipment required for individual or central dust removal and precipitation is described. The recycling of the purified air is discussed in regard to silicosis protection. 19 figs. L.M.

PATENTS

Abrasive drilling apparatus. Allen E. Dilliard and Edward L. Mifflin, Jr. (United States of America as represented by the Secretary of the Army). U. S. 3,075,318, Jan. 29, 1963.—An abrasive gun comprises a telescoping divergent discharge nozzle to be advanced within a hole being drilled in a workpiece. D.J.B.

Acoustically vibrated material cutting and removing devices. Claus Kleesattel, Lewis Balamuth, and Arthur Kuris (Cavitron Corp.). U. S. 3,076,904, Feb. 5, 1963. D.J.B.

Apparatus for handling particulate material. Louis M. Arcement (Flintkote Co.). U. S. 3,076,582, Feb. 5, 1963.—The apparatus comprises a vertically elongated container with a material inlet at the top and a discharge outlet in the center of the downwardly and inwardly inclined bottom and a flow control member comprising a stationary elongated tube extending throughout the container in axial alignment with the outlet and having a diameter slightly greater than that of the outlet, the wall of the tube having an opening extending in a helical path therearound from the top to the bottom. D.J.B.

Crusher jaws [design]. Harry P. Kautz (Mine and Smelter Supply Co.). U. S. 3,075,713, Jan. 29, 1963. D.J.B.

Dust separator. Karl L. Westlin (American Air Filter Co., Inc.). U. S. 3,071,916, Jan. 8, 1963. D.J.B.

Gun for atomization and electrostatic spraying of materials. Marcel À. R. Point (Soc. Anon. de Machines Electrostatiques). U. S. 3,075,706, Jan. 29, 1963. D.J.B.

a Hydraulic horizontal press with two series of multiple chambers for pressing with filter plates for very high production. Antonio Vitali (Societa per Azioni Macchine per l'Industria Dolciaria Carle & Montanari). U. S. 3,073,238, Jan. 15, 1963. D.J.B.

— Manufacture of articles from powdered materials. James P. Glenn (Westinghouse Electric Corp.). U. S. 3,075,244, Jan. 29, 1963.—The method comprises pressing loose powdered material to form a barrel-shaped compact, elastically deforming the compact along the longitudinal axis thereof by extrusion, and sintering to produce a cylindrical body. D.J.B.

b Method and apparatus for drilling minute holes in small ceramic wafers, etc. George F. Fisher (Midland Mfg. Co., Inc.). U. S. 3,074,392, Jan. 22, 1963. D.J.B.

— Method for removing complex sodium aluminum silicate scale. Grover L. Dobbins (Kaiser Aluminum & Chemical Corp.). U. S. 3,074,823, Jan. 22, 1963.—A method for removing scale from apparatus used in an alkaline process for alumina refining comprises dissolving the scale in a solution of 10 to 12.5% (vol) sulfuric acid, a small amount of a surface active agent, and the balance water. D.J.B.

c Multiple unitizer. Richmond L. Davis, William C. Williams, and James L. Hanner (United Carbon Co., Inc.). U. S. 3,073,431, Jan. 15, 1963.—The turntable unitizing device provides for simultaneously erecting on pallets units which comprise superimposed layers, each of which, in turn, comprises subunits. D.J.B.

d Particle separation method. Norman G. Anderson (United States of America as represented by the U. S. Atomic Energy Commission). U. S. 3,075,694, Jan. 29, 1963.—A process for increasing the rate of sedimentation of particles of molecular size in a suspension comprises positioning insoluble powdered material in a centrifuge cell, introducing the suspension into the cell, centrifuging the cell to pack the powdered material, adding additional powdered material, and again centrifuging to cause the particles to impinge upon the surfaces of the powdered material and induce preferential flow of fluid richer in the particles in the direction of the centrifugal force. D.J.B.

e Plural reaction chamber press for high pressures. Francis P. Bundy (General Electric Co.). U. S. 3,075,245, Jan. 29, 1963. D.J.B.

— Process for wet grinding solids to extreme fineness. Ignatz L. Feld and Ballard H. Clemmons (United States of America as represented by the Secretary of the Interior). U. S. 3,075,710, Jan. 29, 1963.—A method for grinding solids to $<37\mu$ comprises agitating at high speed a slurry comprised of the solids to be ground, a liquid, and a deflocculating reagent, adding a granular medium harder than the solids and including particles having a diameter 705 to 75 times as large as that desired for the upper limiting size of the particles in the final product, and agitating the slurry for a second and longer time. D.J.B.

f Slurry diffusing machine. Ewald Kothe (Coors Porcelain Co.). U. S. 3,073,531, Jan. 15, 1963.—The machine comprises (1) a slurry diffusing member fixed on the lower end of a vertical rotated shaft, (2) a rotatable housing surrounding and spaced from the shaft, (3) an annular slurry passageway concentric with the shaft and a water passageway between them for lubricating the shaft and cooling the slurry, (4) a slurry feed valve on the lower end of the tubular housing and a plug between the shaft and the valve, (5) means for moving the valve and plug relative to each other, (6) an inlet in the housing communicating with the slurry passageway, and (7) means for uniformly dispersing the slurry through the valve to the diffusing member. D.J.B

XI—Instruments and Test Methods

Detection limits in radiation and optical pyrometry. D. R. Lovejoy. *J. Opt. Soc. Am.*, 52 [12] 1387–98 (1962).—Temperature discrimination with photoelectric detectors was analyzed. It should be possible to realize the International Practical Temperature Scale with an accuracy of about 0.01° near 1063°C and 0.1° near 1769°C by using a special trialkali photosurface photomultiplier or a silicon photodiode at a 1.0μ wavelength. 5 figs., 2 tables, 18 refs. J.J.D.

Determination of the Blaine specific surface area of gypsum. L. Chassevent. *Zement-Kalk-Gips*, 15 [12] 509–12 (1962).—Because of the porosity of calcined gypsum particles, measurements of the Blaine surface area give varying results. This difficulty is eliminated by using the apparent density instead of the specific density (true density). Further investigation is recommended to establish the use of this correction with other porous materials. 3 figs., 3 tables. S.A.L.

— Determination of some impurities in titanium dioxide. Frantisek Plesnivy. *Sklar Keram.*, 10 [3] 77–80 (1960).—Impurities and the determination of iron and alkalis as well as ignition loss, lead oxide, barium carbonate, and calcium carbonate in titanium dioxide are discussed. 8 figs. A.D.

j Direct reading beryllium spectrograph. W. A. Van Sandt, V. C. Santomassino, R. P. Rumble, and O. M. Barlow. *Am. Ind. Hyg. Assoc. J.*, 23, 203–13 (May–June 1962); *APCA Abstr.*, 8 [5] 6 (1962).—Operation of the spectrograph is automatic, and the amount of beryllium on the filter paper is read directly from a

SiC polytype, 111 R, was discovered, and its structure is discussed. 3 figs., 31 refs. G.B.

X-ray study of autunite. Yukio Takano. *Am. Mineralogist*, 46 [7–8] 812–22 (1961). 3 figs., 4 tables, 15 refs.

PATENTS

Apparatus for presenting source particles to a mass spectrometer. Donald C. Damoth and John M. Saari (Bendix Corp.). U. S. 3,076,893, Feb. 5, 1963. D.J.B.

Growth of single crystals of corundum and gallium oxide. Joseph P. Remeika (Bell Telephone Laboratories, Inc.). U. S. 3,075,831, Jan. 29, 1963. D.J.B.

a **X-ray spectral analysis.** Joshua Ladell and Nathan Spielberg (North American Philips Co., Inc.). U. S. 3,072,789, Jan. 8, 1963. D.J.B.

— See also Sect. IX: (*patent*) Mullite synthesis.

XV—General

Abbreviations in Russian abstract journals covering chemistry and related fields. Joseph J. Gwirtsman. *J. Chem. Doc.*, 3 [1] 44–59 (1963).—About 700 abbreviations are listed with the complete Russian versions and the English equivalents. 5 refs.

Etruscan heritage: Ceramics industry growth spurts. Anon. *Italy Presents*, 5 [June] 15–18 (1962).—A brief review. 11 figs.

c **New ideas and remuneration for them.** Anon. *Sklar Keram.*, 10 [6] 176 (1960).—Profitable ideas for improving Czech manufacturing methods or environment, the amounts saved by them, and the remuneration paid are given. 2 tables. A.D.

— **Principal methods used in dust concentration and the danger of dust in working places.** Jose M. Caceres Hernandez. *Bol. Soc. Espan. Ceram.* (Madrid), 1 [6] 361–69 (1962).—Dust as an industrial hazard can be classified as (1) fibrosis producing dusts, (2) toxic and irritant dusts, (3) inert dusts, and (4) explosive dusts. Details are given on the determination of the harmfulness of a dust. Silicosis and the Silikose-Forschungs Institut formula are briefly discussed. 4 figs. V.R.P.

— **Produce larger profits by stretching working capital.** LeRoy L. Kohn. *Brick Clay Record*, 141 [2] 41, 49–51 (1962).—Accounts receivable financing is described. W.K.S.

Scientific research in the present and the future of the ceramic industry. Antonio Garcia Verduch. *Bol. Soc. Espan. Ceram.* (Madrid), 1 [6] 377–88 (1962).—The need for research, the instrumentation used, and recent advances in ceramic technology and science are outlined. V.R.P.

— **Spanish building materials.** Anon. *Spanish-American Trade*, 1962, No. 90, 17 + 9 pp.—A brief review. 22 photos.

XVI—Books

Advanced Materials—Refractory Fibers, Fibrous Metals, and Composites. C. Z. Carroll-Porczynski. 1962. Chemical Publishing Co., Inc., New York 10. 286 pp., 124 illus. $11.75.—The title of this book suggests rather more than the author delivers. The book might better be known by its subtitle, "Refractory Fibers, Fibrous Metals, and Composites." Within the specialized field of high-temperature structural and insulating materials based on fibers, this book should be very useful to those concerned with engineering design and development.

The book is primarily a compilation of detailed information on the constitution, production, properties, and performance of a large number of proprietary fibers and composites. Long stretches of the text read as if lifted bodily from the manufacturers' technical brochures, but this does not detract from its utility. The information is well organized; materials related chemically or functionally are treated together under an appropriate chapter heading. Particularly noteworthy is the plentiful supply of up-to-date references to materials literature through 1961. Most chapters also have a long list of references to publications in the general area treated by the chapter, recommended for further reading. There is also a special addendum listing and abstracting twenty recent unclassified U. S. Government research reports in the field of refractory materials. The book is plentifully illustrated with graphs, diagrams, and photographs of successful applications.

The author should be gently chided for a certain inconsistency in his terminology. In the introductory paragraphs of the chapter, "Fused Silica Fibers," he quite properly disapproves of the use of the term "quartz" in connection with products made by the fusion of quartz, yet somehow he falls into the same error repeatedly in the remainder of the chapter! This is a useful book, and it should help the practical designer to make an intelligent choice from the new high-temperature fibrous materials that are becoming available. F. M. Ernsberger

Chemistry of Cement: Vols. I, II—Proceedings of the Fourth International Symposium, Washington, October 1960. 1962. *Natl. Bur. Std.* (U.S.) *Monograph*, 1962, No. 43, Vol. I, pp. 1–573, $5.75; Vol. II, pp. 574–1123, $5.50. Supt. of Documents, U. S. Govt. Printing Office, Washington 25, D. C.—The lapse of nearly two years between the meeting and the publication of the proceedings reflects the monumental task required in editing and assembling the reports. These volumes should interest all disciplines concerned with the chemistry of inorganic solids. Important advances in the solid state chemistry of clinker and applications of new instrumentation in the study of the hydrated phases are recorded. The comprehensive reviews of all phases of cement chemistry and reports on special cements should prove indispensable references to cement scientists and technologists. The editing, printing, and physical makeup of the volumes meet the highest standards.

The following papers are included in **Vol. I:** "Some problems *e* associated with the growth of science," by Wallace R. Brode. "Cement research—retrospect and prospect," by F. M. Lea. "Phase equilibria and constitution of portland cement clinker," by R. W. Nurse.—This general report is followed by extensive *—* discussions and supplemental reports. In the discussions, Roy describes the effects of pressure (due to grinding) on the polymorphism of $2CaO \cdot SiO_2$ (abbr. C_2S), and Kraemer and zur Strassen report that 4% MgO increases the alite ($3CaO \cdot SiO_2$ *f* containing lattice substituents) content by 14% in cement clinker and describe the effects of Na_2O, K_2O, Na_2SO_4, and K_2SO_4 on C_3S; Katharine Mather directs attention to the 2.720 X-ray diffraction line probably not being that of $3CaO \cdot Al_2O_3$ in clinkers. *—* "Crystal structures of clinker constituents," by Fred Ordway.—Advanced fundamentals are discussed. "Effect of minor components on the hydraulicity of the calcium silicates," by J. H. Welch and W. Gutt.—The effects of F and P_2O_5 are shown; *g* 0.5 to 2.0% F reduces the strength markedly. "X-ray diffraction examination of portland cement clinker," by H. G. Midgley, D. Rosaman, and K. E. Fletcher.—The authors describe the application of X-ray diffraction for analysis of *—* clinkers for phase contents and compare the measured and computed amounts of phases. In the discussions, Kantro *et al.* call attention to systematic errors in Midgley's method resulting in overestimation of amounts of C_3A. "Influence of reducing *h* atmosphere on the constitution of clinker," by Y. Suzukawa and T. Sasaki.—The authors substituted Fe^{2+} for Ca^{2+} in C_2S; quenched samples contained up to 2.8% FeO before dusting occurred, but slowly cooled samples exhibited dusting with *—* much lower contents of FeO. "Reactions of coal ash with portland cement clinker during the burning process," by T. Heilmann.—Zoning within the clinker and absorption into pores of the molten ash are clearly shown. "Solid solution of alumina *i* and magnesia in tricalcium silicate," by F. W. Locher.—L. reports 0.8% Al_2O_3 and 2.5% MgO as maximum amounts substituting in alite; the amount of MgO is temperature dependent. "Reaction velocity in portland cement clinker formation," by *—* Renichi Kondo.—K. discusses the reaction velocity of cement clinker formation of kiln feeds containing clay and blast-furnace slag. "Solid solutions of the minerals of portland cement clinkers," by N. A. Toropov.—T. discusses solid solutions of *j* clinker phases and constituents and of Cr_2O_3, BaO, and SiO_2 in C_3S and C_2S. "Decomposition of alite in technical portland cement clinker," by E. Woermann.—Alite in clinkers burned in a reducing atmosphere underwent decomposition due to exsolution of FeO at annealing temperatures as low as 1180°C.

V—Glass

Care, cleaning, and maintenance of glass molds. Padma Pani and K. D. Sharma. *Central Glass Ceram. Res. Inst. Bull.* (India), 9 [4] 148–54 (1962).—Methods used for the pretreatment and maintenance of glass molds are reviewed. 30 refs. Cf. *Ceram. Abstr.*, 1962, April, p. 85*i*. R.L.T.

Coloring of photosensitive glasses by X-radiation. V. A. Borgman and V. G. Chistoserdov. *Opt. Spectry.* (USSR) (English Transl.), 13 [3] 233–35 (1962).—Absorption bands created in photosensitive glasses at various temperatures by X-radiation and the changes of these bands under heat treatment were studied. The effect of temperature on the sensitivity to irradiation and the role of impurity color centers in the formation of a latent image were established. 3 figs., 4 refs. J.J.D.

Comparison between theory and flight ablation data. Henry Hidalgo and Leo P. Kadanoff. *AIAA* (Am. Inst. Aeron. Astronautics) *J.*, 1963, No. 1, pp. 41–45.—The ablation of opaque quartz on an AICBM nose cone recovered after a 5000 nautical mile flight agreed favorably with the predicted results. Variations between the theoretical and actual ablation were attributed mainly to the effect of impurities on the viscosity of the quartz. 7 figs., 3 tables, 24 refs. J.B.W.

Cutting crystal glass with diamond. Norman Stuckey. *Ind. Diamond Rev.*, 22 [261] 221–23 (1962). Cf. *Ceram. Abstr.*, 1962, Oct., p. 247*d*. W.B.C.

Decolorizing of manganese glass. M. A. Bezborodov, E. E. Mazo, and M. T. Mel'nik. *Zh. Prikl. Khim.*, 35 [8] 1666–70 (1962).—Boron-free, nonalkaline manganese glasses, prepared for the manufacture of glass yarn or medical containers, were found to have a dark color, caused by the presence of Mn_2O_3. Attempts to decolorize the glass by adding reducing agents, such as carbon or coke, to the raw materials failed to give satisfactory results; the addition of 2%(wt) Sb_2O_3 resulted in a slight increase in transparency, but the best results were obtained with either 2% metallic Al or 0.5 to 0.9% Fe_2O_3, which yielded an almost colorless glass. The transparency of the glasses containing Fe_2O_3 was somewhat lower than that of the glasses containing Al. The addition of Fe_2O_3 increased the resistance of the glass to water and inorganic acids. 3 figs., 1 table, 9 refs. A.A.

Determination of the quantitative relationship between the ordered and disordered phases in a glass with a composition of 33.3% Na_2O and 66.6% SiO_2. A. G. Vlasov and T. E. Chebotareva. *Opt. Spertry.* (USSR)(English Transl.), 13 [4] 351 (1962).—From the infrared reflectivities of the subsurface parts of the initial glass and of the crystallized glass, it was calculated that the ordered portion of the glass is about 25%. 1 fig., 6 refs. J.J.D.

Effect of glass fiber geometry on composite material strength. James E. Bell. *ARS* (Am. Rocket Soc.) *J.*, 31 [9] 1260–65 (1961).—An analysis of five different glass fiber geometries in an epoxy resin showed that filament-wound structures gave the highest composite efficiency. Discontinuous, randomly oriented fibers gave the lowest efficiency. Ceramic fibers, whisker materials, and metal filaments are briefly discussed. 5 figs., 3 tables, 17 refs. J.B.W.

Effects of fluxing ingredients on the properties of magnesium-calcium-aluminosilicate glasses. Sachchidananda Kumar and Benoy B. Nag. *Trans. Indian Ceram. Soc.*, 21 [4] 107–14 (1962).—The effect of Li_2O, Na_2O, F, MnO, Fe_2O_3, B_2O_3, ZnO, BaO, and TiO_2 on the melting, thermal expansion, direct current resistivity, and dielectric properties of two glass compositions in the systems $CaO–MgO–Al_2O_3–SiO_2$ and $MgO–Al_2O_3–SiO_2$ were studied. Approx 3% F and approx 6% MnO improved meltability without affecting the thermal and electrical properties of the glasses. Even less than 1% alkali increased the dielectric loss at high temperatures. 5 figs., 4 tables, 18 refs. R.L.T.

Engineering breakthrough by Kimble Glass in cathode ray tubes. Anon. *Ceram. News*, 11 [10] 53 (1962).—The new Kimcode system tube uses two steel bands to eliminate an implosion plate, which decreases the cost, weight, and size of the finished tube. 2 photos. D.J.B.

Glass story. Anon. *Ceram. News*, 11 [11] 10–11 (1962).—Operations in the manufacture of stained glass and handblown decorative glass at Blenko Glass Co., Milton, W. Va., are described. A metal-mesh belt has been in continuous use on the lehr for 18 years. 3 photos. D.J.B.

Glasses in the systems $PbO–B_2O_3–SO_3$ and $ZnO–B_2O_3–SO_3$. Pranab K. Gupta and Sachchidananda Kumar. *Trans. Indian Ceram. Soc.*, 21 [3] 91–94 (1962).—Clear and stable glasses were obtained with about 20%(mole) SO_3 in the systems. The sulfate-containing glasses show selective infrared transmission at about 12μ. Replacement of B_2O_3 by SO_3 had no effect on direct current resistivity, dielectric constant, or softening temperature. The addition of SO_3 to lead glasses improved the chemical durability, but in zinc oxide containing glasses the effect was reversed. 3 figs., 2 tables, 3 refs. R.L.T.

Grinding of glass [with diamond]. M. Narboni and M. Hornstein. *Ind. Diamond Rev.*, 22 [263] 281–83 (1962).—The advantages of diamond grinding in the glass industry and its rapid adoption by European manufacturers are described. W.B.C.

Investigation of the structure of glassy phosphates using Raman spectra. Ya. S. Bobovich. *Opt. Spectry.* (USSR) (English Transl.), 13 [4] 274 (1962).—The glasses studied were two-component phosphate glasses containing Na_2O, BeO, MgO, CaO, SrO, BaO, ZnO, CdO, Al_2O_3, Ga_2O_3, PbO, and Bi_2O_3, three-component glasses in the $Na_2O–TiO_2–P_2O_5$ system, and glassy P_2O_5 itself. The effect of the cations on the state of the bonds in the phosphate skeleton of the glass was determined and interpreted. The spectra of some glasses and crystals of the same composition were compared. 5 figs., 23 refs. J.J.D.

Method of preparing glass samples for microhardness measurements. M. B. Epel'baum and Yu. E. Gorbatyi. *Zavodsk. Lab.*, 28 [12] 1492–94 (1962).—It is proposed that the microhardness of glass be measured on the fracture surface of grains 2 to 3 mm in diameter, shortly after breakage; a flat surface must be selected. The use of small grains has the advantage that the stresses associated with larger samples are practically eliminated and a true microhardness value is obtained. A measurement of the microhardness of glasses containing 10% CaO, 65 to 78% SiO_2, and the remainder Na_2O gave the following values (SiO_2 content in parentheses): 566 (65), 720 (68), 615 (70), 1010 (74), and 670 kg/mm² (78% SiO_2). Photomicrographs (in color) show the indentation marks and the lack of stress lines in the glass grains. 3 figs., 2 tables, 6 refs. A.A.

Northwestern Glass Co. produces glass containers for Pacific Northwest needs. Anon. *Ceram. News*, 11 [9] 14–16 (1962).—Four melting furnaces at the Seattle, Wash., plant produce 225 tons of soda-lime glass per day for 750,000 jars and bottles. Operations and equipment are discussed briefly. 6 photos. D.J.B.

Owens-Illinois Glass Co.—New Orleans plant. George L. Vincent. *Ceram. Ind.*, 80 [2] 53–57, 76 (1963).—The plant is described. 7 figs., 1 table. W.K.S.

Radial distribution study of vitreous barium borosilicate. G. J. Piermarini and S. Block. *J. Res. Natl. Bur. Std.*, 67A [1] 37–41 (1963).—An X-ray diffraction study of a barium borosilicate glass was made. The observed average barium separations are in partial agreement with those predicted by Levin and Block on the basis of a structural interpretation of immiscibility data. A proposed coordination change by Levin and Block for the barium atoms in the system has been confirmed, but the details of the coordination change mechanism have not. A mechanism which permits the calculation of the composition of the modifier-rich liquids in the ternary system is presented. The calculated composition agrees well with the experimental value. 6 figs., 10 refs. M.J.K.

Thermal expansion behavior of silica glass as a function of thermal history. R. Brueckner. *Naturwissenschaften*, 49 [7] 150–52 (1962).—The thermal expansion of various heat-treated silica glass samples was measured. The thermal expansion curves showed different effects depending on the height of the temperature of previous thermal treatment. The results are discussed. 5 figs., 5 refs. G.B.

Thirsty glass. T. H. Elmer and M. E. Nordberg. *Mater. Design Eng.*, 56 [7] 118–19 (1962).—Physical and chemical properties are presented for this $Na_2O–B_2O_3–SiO_2$ glass that is adapted for desiccating purposes, such as electronic getters. An intermediate form of 96% SiO_2 glass, it will adsorb up to 200 mg of moisture per gram of glass and can be reactivated in 1 hr. 5 figs., 1 table, 2 refs. D.J.B.

PATENTS

Acoustical panel. Lowell B. Johnston (Owens-Corning Fiberglas Corp.). U. S. 3,077,426, Feb. 12, 1963.—A compressed resin bonded fibrous glass panel has a facing layer formed of closely grouped flattened clumps or balls of fibrous glass with occasional surface cracks or openings between them. D.J.B.

Exact viscosity measurement of ceramic suspensions by means of capillary viscosimeters. Zdenek Pospisil. *Silikaty*, 2 [1] 40–49 (1958).—P. discusses the accuracy of capillary viscosimeters, starting with the Hagen-Poiseuille equation, and points out their fundamental deficiency, i.e., the impossibility of viscosity measurement during constant shearing stress in the measured liquid. The validity of the Hagen-Poiseuille equation for two different types of viscosimeters is verified. A suction viscosimeter developed in this study meets the requirements of the equation much better than the flow viscosimeters commonly used in ceramics. The probable causes of the deviations are discussed. 4 figs., 5 tables, 4 refs. A.D.

Measuring moisture in solids. D. J. Fraade. *Instr. Control Systems*, 36 [2] 99–101 (1963).—Various techniques, such as thermogravimetry, Karl Fischer titration, electrolysis, and the use of capacitance, conductivity, radioactive emission, and nuclear magnetic resonance, are discussed with respect to the determination of small amounts of water in solid materials. 6 figs. W.W.P.

Microspectrochemical analysis of minerals: II. Claude L. Waring. *Am. Mineralogist*, 47 [5–6] 741–43 (1962).—Modifications are made in the previously described microspectrochemical method for the analysis of minerals. By altering the type of lower electrode to allow the arc to strike the sample more directly and consume less carbon, a significant reduction in the background is observed. The period of exposure of the red portion of the spectrum is also changed. The combined effect is to lower the limits of detection for 16 elements, 4 by a factor of 100. The improvements also widen the application of the method to the analysis of other types of samples. 1 table, 1 ref. For part I see *Ceram. Abstr.*, 1963, April, p. 107*c*.

New heating stage for the X-ray diffractometer. Brian J. Skinner, David B. Stewart, and Joseph C. Morgenstern. *Am. Mineralogist*, 47 [7–8] 962–67 (1962). 4 figs., 7 refs.

New slow running personal dust sampler. R. Hunt and M. Ellison. *Lab. Pract.*, 12 [2] 148–51 (1963).—The instrument, developed by the Asbestosis Research Council, takes in small quantities of air steadily over a working shift and leaves a deposit that can be examined and counted under a microscope. A 6-volt 1810-rpm governed motor drives a pump consisting of a rubber tube fitted against a circular track against which it is p ogressively squeezed by rollers. Reduction gear drives the pump at approx 15 rpm. The collecting area of the filter membrane is 1 cm². 6 figs., 2 refs. W.A.

Preparation of small powder samples from thin and polished sections. K. L. Williams. *Am. Mineralogist*, 47 [7–8] 974–76 (1962). 1 fig.

Provisional method of eliminating the effects of film shrinkage and improper camera diameter in Debye patterns. Dorita A. Norton and Jean M. Ohrt. *Am. Mineralogist*, 47 [5–6] 792–94 (1962). 1 table, 4 refs.

Quantitative determination of kaolinite by X-ray diffraction. H. W. van der Marel. *Am. Mineralogist*, 47 [9–10] 1209–13 (1962).—A reply to G. W. Brindley and S. S. Kurtossy (*Ceram. Abstr.*, 1963, April, p. 107*d*). 1 table, 11 refs. **Reply.** G. W. Brindley and Sari S. Kurtossy. *Ibid.*, pp. 1213–15. 2 refs.

Quartz Bourdon gage. J. B. Damrel. *Instr. Control Systems*, 36 [2] 87–89 (1963).—The ideal properties of fused quartz as a spring material led to its use as a Bourdon tube. Its accuracy is comparable to that of a precision mercury manometer or dead weight tester, and it is less trouble and faster to operate. 4 figs. W.W.P.

Rapid determination of permeability in porous rock. Jerry B. F. Champlin. *U. S. Bur. Mines Rept. Invest.*, 1962, No. 6098, 9 pp. Free.—C. describes a method and an apparatus that use the principle of specific-volume permeametry to determine permeabilities of porous solids rapidly and accurately. 3 figs. M.J.K.

Rotational viscosimeter—concentric cylinder method. A. Macenauer. *Silikaty*, 2 [1] 69–78 (1958).—The Glass Research Institute constructed a rotational viscosimeter with a revolving inner cylinder which is rotated by a falling weight suspended from the rim of a wheel attached to the axle of the inner cylinder. 5 figs. A.D.

Semiquantitative analysis of chlorites by X-ray diffraction. Robert Schoen. *Am. Mineralogist*, 47 [11–12] 1384–92 (1962). —The determination of the chemical composition of chlorites, using the ratio of structure factors for the 002 and 004 reflections, is unreliable because of the small change in the ratio with composition. By using the rapidly changing ratio F_{002}/F_{001}, a factor may be computed which relates theoretical structure factors to the structure factors calculated from a diffractogram. By determining the theoretical value of F_{002}, the composition of the chlorite is determined. Sample thickness, detector error, time constant, and sample size must all be controlled for the successful application of this technique. In particular, the relation between sample size and divergence slit size has a most important effect on X-ray intensities. The method is accurate to within 13% of the composition of the chlorite octahedral sheets. 2 tables, 7 refs.

a

Single beam two-frequency pyrometer for measuring flame temperatures. E. N. Maleev and D. S. Ermakov. *Opt. Spectry.* (USSR) (English Transl.), 13 [4] 339 (1962).—The light from a source modulated at one frequency is passed through the flame, and the combination is modulated at a second frequency before being detected, amplified, and displayed on a two-channel oscilloscope. By measuring two sets of intensities, one with and one without the flame in the path, it is possible to obtain the emissivity of the flame and its "mean true" temperature. 2 figs., 1 table, 4 refs. J.J.D.

b

Spindle stage—a modification utilizing a hypodermic syringe. M. J. Oppenheim. *Am. Mineralogist*, 47 [7–8] 903–906 (1962).—A new spindle stage built around a hypodermic syringe is described. Advantages of the simple design include rigidity coupled with smoothness of rotation. 3 figs., 2 refs.

c

Temperature control spindle stage. D. Jerome Fisher. *Am. Mineralogist*, 47 [5–6] 649–64 (1962).—F. describes a simple temperature control spindle stage together with the recommended operation procedure. For accurate double variation work, a stereogram with extinction curves would normally be required. It is recommended that, for the sake of simplicity and easy visualization, the plane of the stereogram be normal to the spindle axis. This technique is illustrated by the study of a Black Hills morinite crystal, and new values for its indices of refraction are given. The double variation spindle technique is much simpler, quicker, and definitely more accurate than the U-stage double variation method of index determination. 7 figs., 2 tables, 15 refs.

d

Tests for the uniformity of 45° 0° reflectometers. Richard S. Hunter. *J. Opt. Soc. Am.*, 53 [3] 390–93 (1963).—Tristimulus 45° 0° reflectometers, widely used for color-control measurements of ceramic products, often give different results because of spectral, geometric, or photometer-scale disparities. Seven test panels were designed to evaluate the most frequent sources of disparity. 9 figs., 1 table, 7 refs. J.J.D.

e

Vacuum techniques. S. L. Rutherford. *Instr. Control Systems*, 36 [2] 78–81 (1963).—Conventional vacuum systems are described with recent developments. Getter-ion pumps can develop pressures below 10^{-10} mm Hg. 1 table, 9 figs. W.W.P.

f

X-ray spectrographic method for measuring base exchange capacity. David N. Hinckley. *Am. Mineralogist*, 47 [7–8] 993–96 (1962). 1 table, 1 fig., 4 refs.

g

PATENTS

Apparatus and method for measurement of moisture content. Charles W. E. Walker (Beloit Iron Works). U. S. 3,079,551, Feb. 26, 1963.—Apparatus for sensing a constituent of solid dielectric material. Cf. "Instrument . . .," this section. D.J.B.

High-pressure optical cell. Charles E. Weir, Alvin Van Valkenburg, and Ellis R. Lippincott (United States of America as represented by the Secretary of Commerce). U. S. 3,079,505, Feb. 26, 1963.—A device for performing spectrum analysis of solid materials. D.J.B.

h

High-temperature [graphite-Rh] thermocouple. Allen M. Eshaya (United States of America as represented by the U. S. Atomic Energy Commission). U. S. 3,077,505, Feb. 12, 1963. D.J.B.

i

Instrument for the measurement of moisture, etc. Charles W. E. Walker (Beloit Iron Works). U. S. 3,079,552, Feb. 26, 1963.—The method of sensing a constituent of granular material comprises bringing the material into an annular space surrounding a single conductor surface wave transmission path, transmitting microwave energy of frequency differentially sensitive to the constituent along the transmission path as a surface wave, and detecting the microwave energy transmitted along the path as an indication of the presence of the constituent. D.J.B.

j

Optical pyrometers. Henri J. C. George (Quartz & Silice Soc. Anon.). U. S. 3,079,507, Feb. 26, 1963. D.J.B.

containing equimolar proportions of arsenic and Eu, Gd, Tb, Dy, Ho, Er, Tm, or Yb to approx 350°C to initiate an exothermic reaction, cooling, recompacting, and firing in an inert atmosphere. D.J.B.

Resistor compositions and spark plugs having integral resistors. Frederick E. Heischman (Ford Motor Co.). U. S. 3,088,921, May 7, 1963.—A resistor consists of borosilicate glass, titanium dioxide and the products of its reduction, and boron carbide and the products of its oxidation and is produced by heating at 1600° to 1800°F. D.J.B.

Storage target. Norman H. Lehrer and Raymond A. Solivan (Hughes Aircraft Co.). U. S. 3,089,050, May 7, 1963.—In a storage target for a storage tube, the improvement comprises a layer of material which is nonreactive chemically with cubic zinc sulfide disposed between the sulfide and its support member. D.J.B.

Thermoelectricity. Courtland M. Henderson and Darrel M. Harris (Monsanto Chemical Co.). U. S. 3,087,002, April 23, 1963.—The device comprises <3 thermoelectric bodies in series and in contact, the first, subjected to the highest temperature, comprising boron containing about 5%(at.) carbon dispersed in it, the second being indium arsenic phosphide, and the third being bismuth telluride or lead telluride. D.J.B.

Treatment of gallium arsenide. Calvin S. Fuller (Bell Telephone Laboratories, Inc.). U. S. 3,085,032, April 9, 1963.—The method of increasing the donor concentration of a surface portion of a gallium arsenide body comprises heating the body to about 820°C for 24 hr while exposing the surface portion to an atmosphere rich in silicon tetrachloride vapor. D.J.B.

See also Sect. IV: Inorganic binders for C cores. (*patents*) Method of making ceramic-to-metal composite stock. Method of making glass to metal seal. Sect. V: (*patent*) Process and apparatus for obtaining electrically conductive coatings on the surface of objects consisting of glass or ceramic materials.

X—Production Equipment and Unit Operations

Applications of ultrasonic energy—ultrasonic casting of ceramic and cermet slips. C. Dana McKinney, Jr., William B. Tarpley, and Frederick H. Gaskins. *NYO* 9586, 47 pp.; *U. S. Govt. Res. Repts.*, 37 [11] S-16 (1962). 12 refs.

Application of ultrasonic vibration to cold pressing of ceramic pellets. William B. Tarpley and Herbert Kartluke. *NYO* 10005, 17 pp.; *U. S. Govt. Res. Repts.*, 37 [10] S-30 (1962). 9 refs.

Electrostatic separation of granular materials. F. Fraas. *U. S. Bur. Mines Bull.*, 1963, No. 603, 155 pp. 75 cents.—F. describes the development of the electrostatic method of particle separation. Design of equipment; probability and selectivity; effects of dielectric constant, humidity, temperature, and impurities; and size limits, classification, and separation of fine powders are covered. 76 figs. M.J.K.

Fluidization of fine particles packed in layer condition: I. Yasunobu Yuasa. *Japan. J. Appl. Phys.*, 1 [3] 181–86 (1962).—In the design of an orifice for fine particles or of a hopper, study of the fluidization of fine particles is important. The movement of fine particles in a vessel in flowing out from a slit was analyzed in a two-dimensional case. In the most open-packed state, the fluidizing area determined by the boundary curves of fluidization increases with increase in roughness of the fine particles and with decrease in the slit width. After the initial acceleration, the vertical displacement of particles on the central line from initial position during fluidization is linear with time. The effect of the bottom width of the vessel on boundary curves of fluidization was studied under various degrees of packing. The drain angle increases with increase in grain size, irrespective of the slit width. 15 figs., 5 refs. K.F.

Guide to insulation costs for vessels. T. N. Dinning. *Chem. Eng.*, 70 [8] 186, 188 (1963).—Tables of materials (including both refractories and foamed plastics) make it possible to estimate quickly the cost of insulating a process vessel. 3 tables. W.A.

Treatment of discontinuous operations in automation of processes and mechanical manufacture. H. Weissmann. *A.M + R in Sprechsaal*, 95 [16]), 2 [16] a141–44 (1962).—Problems in the automation of chemical and ceramic processes and in the mechanical processing of the products are examined, and suitable equipment is described. 10 figs., 14 refs. L.M.

Ultrasonic extrusion—reduction in vehicle and plasticizer requirements for nonclay ceramics. William B. Tarpley, Kenneth B. Yocom, and Richard Pheasant. *NYO* 10006, 66 pp.; *U. S. Govt. Res. Repts.*, 37 [10] S-30 (1962). 31 refs.

Vacuum-assisted slip casting. A. Adami and L. S. Williams. *Am. Ceram. Soc. Bull.*, 42 [7] 391–93 (1963).—To overcome some of the disadvantages and limitations of gypsum plaster as a mold material, a generally applicable slip casting procedure was developed, based on the use of a perforated metal mold contained in a vacuum vessel and lined with fine macerated paper pulp. The experimental equipment and procedure described combine the inherent advantages of versatility, flexible control of casting rate, and easy extraction of the cast shortly after completion of the casting operation. The paper lining adhering to the cast after release from the mold facilitates the safe handling of fragile ware. 3 figs., 8 refs.

PATENTS

Apparatus for handling and wetting dust. Earl W. Sieger (United States Steel Corp.). U. S. 3,086,537, April 23, 1963.—The apparatus comprises an elongated vertical pipe, horizontal water inlets connected to the midportion around the circumference, upwardly directed steam inlets connected above the water inlets, and a wafer-type slide valve in the upper portion for controlling admission of dust to the pipe, the steam producing turbulence in the dust. D.J.B.

Apparatus for the oxidation of metal powders. Joseph C. Long and Charles B. Milton (Union Carbide Corp.). U. S. 3,085,865, April 16, 1963. D.J.B.

Apparatus for supporting and cutting semiplastic bodies. Joseph L. Mennitt (Owens-Illinois Glass Co.). U. S. 3,088,186, May 7, 1963.—A gang of cutting wires is used to sever a molded body into individual slabs. D.J.B.

Breaker plate structure for impact crusher and retaining means therefor. Thomas E. Bridgewater. U. S. 3,088,685, May 7, 1963. D.J.B.

Compaction process. James P. Swed (E. I. du Pont de Nemours and Co.). U. S. 3,084,398, April 9, 1963.—A method for simultaneously compacting powder into two separate slabs comprises loading powder into two containers having at least one pair of parallel sides, positioning a layer of explosive on one side of each container, positioning the containers in parallel spaced alignment with the explosive layers on the parallel sides most distant from each other, filling the space between the containers with a shock absorbing material irreversibly compressible to a size one-half to one-tenth its original volume and having a sonic impedance > ±50% of that of the powder, and initiating the explosion. D.J.B.

Conveyer. Charles W. Husum (Owens-Illinois Glass Co.). U. S. 3,088,579, May 7, 1963.—The conveyer comprises a device for conveying sheets having at least one coated surface through a heated oven. D.J.B.

Device [vibratory screen] for separating fine from coarse materials. Albert Musschoot and Leonard B. Wilson (Chain Belt Co.). U. S. 3,087,618, April 30, 1963. D.J.B.

Electrostatic spray heads. Howard V. Schweitzer and Richard J. Verba (Schweitzer Electrostatic Co.). U. S. 3,085,749, April 16, 1963.—The primary features included are designs for spray heads to increase atomization, reduce overspray, and minimize downtime in cleaning or changing colors when applying enamels, lacquers, and ceramic coatings. D.J.B.

High pressure, high temperature apparatus. Robert H. Wentorf, Jr. (General Electric Co.). U. S. 3,088,169, May 7, 1963.—The apparatus comprises a pair of opposed anvil members axially movable toward each other and, positioned between them, a lateral pressure resisting member having a central tapered conical opening to contain a specimen material to be subjected to high pressures and high temperatures, the two members laterally and axially compressing the specimen. D.J.B.

Light reflecting films and process for their production. Charles M. Browne (Libbey-Owens-Ford Glass Co.). U. S. 3,087,831, April 30, 1963.—The process includes spraying, upon a heated oxidation resistant surface, a liquid containing a metal compound thermally decomposable to loosely adhering particles of

X—Production Equipment and Unit Operations

Dish granulation in the chemical industry. J. D. Corney. *Brit. Chem. Eng.*, 8 [6] 405–407 (1963).—The design features of dish-type granulators are described, along with the granulation process. Desirable characteristics of granules are listed plus test methods for determining mechanical strength, thermal shock resistance, porosity, size uniformity, and resistance to abrasion. Cement manufacturing processes using wet slurry feed and granulated spherical feed are contrasted. 6 figs., 1 ref. W.W.P.

Particle size reduction 1961–62. J. Nijman. *Brit. Chem. Eng.* 8 [6] 408–11 (1963).—The literature of the last two years is surveyed with emphasis on machinery, influence of surface properties, and commercial practice including the cement and ceramic fields. 121 refs. W.W.P.

What's your recipe for screen cloth? Albert E. Reed. *Rock Prod.*, 66 [4] 92 + 2 pp. (1963).—R. describes the procedure for specifying screen for particular requirements and the available types. 3 figs., 1 table. D.J.B.

PATENTS

Apparatus for handling stacks of bricks. Rudolf N. Gunzelmann. U. S. 3,090,502, May 21, 1963.—The device comprises a vertically movable frame, pairs of grippers extending downwardly from it which grasp objects between them as the frame is raised, and feelers below the grippers which cause the frame to move at a reduced speed as the object is grasped. D.J.B.

Apparatus for making precast cored building blocks. Leonard D. Long. U. S. 3,090,093, May 21, 1963. D.J.B.

Apparatus for measuring and controlling moisture content of materials. Harry W. Dietert (Harry W. Dietert Co.). U. S. 3,092,882, June 11, 1963. D.J.B.

Apparatus and method for conveying slurry. Paul L. Schoonover (Monolith Portland Cement Co.). U. S. 3,093,364, June 11, 1963.—The method comprises forcing a slurry into one end of an elongated flexible conduit while agitating the slurry by rotating an end of an elongated flexible member within the conduit. D.J.B.

Apparatus and process for forming high density compacts. Milton H. Feldman and Harold E. Hosticka (Westinghouse Electric Corp.). U. S. 3,089,189, May 14, 1963.—The method comprises (1) charging solid particles into a die cavity comprised of a perforation within a resilient, flowable elastomeric member, (2) positioning the member between two hard platens, and (3) applying a pressure of 1×10^6 psi to the material by compressing it between the platens without confining the periphery of the elastomeric member. D.J.B.

Blow molding apparatus. John N. Scott, Jr., Doyle L. Alexander, and Don L. Peters (Phillips Petroleum Co.). U. S. 3,091,803, June 4, 1963. D.J.B.

Continuous dry blender. Louis A. Benton (Johns-Manville Corp.). U. S. 3,090,602, May 21, 1963.—The blender comprises a mixing cylinder rotating about a horizontal axis, longitudinal flights on the inner wall for lifting and dispersing material, and spaced disks along the longitudinal axis of the cylinder, successive disks being out of parallel to give the material a back-and-forth motion. D.J.B.

Flow apparatus for separating granular particles. Fritz Kaiser (Alpine Akt.-Ges. Maschinenfabrik und Eisengiesserei). U. S. 3,089,595, May 14, 1963. D.J.B.

Gravity actuated apparatus for weighing granular material, etc. Hansel S. Sanderson (C. E. Anthony). U. S. 3,093,202, June 11, 1963. D.J.B.

Hydrostatic press for an elongated object. George Gerard and Jacob Brayman (Barogenics, Inc.). U. S. 3,091,804, June 4, 1963. D.J.B.

Impregnation [of cellular material] by implosion. George F. Russell. U. S. 3,092,536, June 4, 1963. D.J.B.

Method and apparatus for moistening dust. Harold T. Stirling and Harry F. Hartzell, Jr. (Koppers Co., Inc.). U. S. 3,089,791, May 14, 1963.—A method for improving the flow properties of dust comprises feeding the dust to a surge bin, automatically conveying it to a dust wetting drum, moistening it by fogging water into the drum, tumbling it, and discharging free-flowing dust containing 5 to 14% water from the drum. D.J.B.

Method and apparatus for sizing solid particles [centrifugally]. William T. Doyle (Sturtevant Mill Co.). U. S. 3,090,487, May 21, 1963. D.J.B.

Oven for treating articles. John R. Johnson, Elmer B. Voss, and Francis S. Wright (Owens-Illinois Glass Co.). U. S. 3,089,254, May 14, 1963.—A continuous pin-type conveyer carries articles through the oven, and heated air is blown down from the top across the articles. D.J.B.

Process for making laminated material. William J. Knapp and Francis R. Shanley (Rand Corp.). U. S. 3,089,196, May 14, 1963. D.J.B.

Pulverizer. James L. Harvey and Alden Q. Beaty (Babcock & Wilcox Co.). U. S. 3,093,327, June 11, 1963. D.J.B.

XI—Instruments and Test Methods

Absorptiometric determination of silicon in water: I, Formation, stability, and reduction of α- and β-molybdosilicic acids. I. R. Morrison and A. L. Wilson. *Analyst*, 88 [1043] 88–99 (1963).—The effect of experimental conditions on the formation, stability (in the presence of reagents used for destroying molybdophosphoric acid), and reduction of α- and β-molybdosilicic acids was determined. The effectiveness of several reagents for preventing interference from phosphate was also investigated. Both α-molybdosilicic acid reduced by stannous tin and β-molybdosilicic acid reduced by 1-amino-2-naphthol-4-sulfonic acid should be suitable for precise methods of determining "reactive" silicon in water. 9 figs., 8 refs. **II, Method for determining "reactive" silicon in power-station waters.** *Ibid.*, pp. 100–104.—The method, based on the absorptiometric measurement of reduced β-molybdosilicic acid, can be modified for high sensitivity. The within-batch coefficient of variation of the optical-density difference, optical density of sample less optical density of reagent blank solution, varied from 7 to 0.2% for concentrations of 0.01 and 0.5 ppm of SiO_2, respectively. The limit of detection was 0.001 ppm of SiO_2, and analysis time was abour 1.5 hr for 10 samples in duplicate. 3 refs. W.A.

Adhesion measurements involving small particles. G. Boehme, H. Krupp, H. Rabenhorst, and G. Sandstede. *Trans. Inst. Chem. Engrs.* (London), 40, 252–59 (Oct. 1962); *APCA Abstr.*, 8 [10] 3 (1963).—After stressing the technical importance of adhesion phenomena, the authors critically review experimental methods for measuring the adhesion between small particles (10^{-1} to $10^4\mu$) and between particles and a solid substrate. The weighing, pendulum, aerodynamic, friction, and centrifuge methods are discussed. With the centrifuge method the adhesion of up to 1000 particles to a substratum may be measured in one experiment. The aerodynamic and the friction methods are not considered to provide direct data on adhesion. Both the weighing and the pendulum methods are difficult to use, in particular with small particles. 35 refs.

Air separator for sizing refractory materials. A. E. Williams. *Brit. Clayworker*, 71 [845] 305–306 (1962).—Dry classification of ground particles by centrifugal air separation increases mill capacity through recirculation of oversize particles. The operation of the Sturtevant air separator at the Womelsdorf plant of North American Refractories Corp. is described. 3 figs. C.E.L.F.

Bonded-wire temperature sensors. A. B. Kaufman. *Instr. Control Systems*, 36 [5] 103–104 (1963).—This type of sensor, resembling wire or foil strain gages, has been in use, but factors such as strain sensitivity and apparent strain due to temperature change have been overlooked. A procedure for correcting for system errors is given. 3 figs., 2 tables, 4 refs. W.W.P.

Carbon-arc radiation standard. M. R. Null and W. W. Lozier. *Instr. Control Systems*, 36 [5] 93–95 (1963).—An arc-lamp mechanism and a power supply are available for use in calibrating pyrometers or as a standard radiation source. The center of the lamp's positive graphite electrode has a brightness temperature close to 3800°K, with a deviation of probably less than ±20°K. Spectral data are given. 3 figs. W.W.P.

Cryogenic hose. F. J. Ryan. *Prod. Eng.*, 34 [11] 32–35 (1963).—Loss of low-temperature fluids is minimized through special constructions and the use of insulation. Heat loss data are given for insulation including fiber glass. 5 figs., 3 tables.

XV—General

Bond Teflon with epoxies. J. E. Schmidt, A. L. Mathews, and W. J. Hornblower. *Prod. Eng.*, 34 [11] 43–46 (1963).—A bonding method permits Teflon to be bonded to metal, glass, ceramic, etc. The Teflon is etched, and this surface and that of the substrate are completely coated with an epoxy adhesive. Details are given for the etching process, the preparation of the substrate, and the handling of the adhesive. 4 photos. W.W.P.

Ceramic materials. Wayne E. Brownell. *Machine Design*, 35 [15] 200 + 4 pp. (1963).—B. discusses the expanded range of applications and gives the strength, thermal properties, electrical resistivity, and dielectric constants of a number of materials in tabular form. Other properties are also covered briefly together with some of the production processes. Included are glasses, porcelains, Al_2O_3, B_4C, SiC, and titanates. D.J.B.

Chemistry at high temperatures. John L. Margrave. *Science*, 135 [3501] 345–50 (1962).—High-temperature chemistry includes those chemical phenomena which occur at 1000°K and higher. High temperatures can be attained by combustion, by electrical heating, or by chemical explosions and nuclear reactions. Techniques based on radiation phenomena, i.e., the various spectroscopic techniques, and electrical resistance thermometers are important measuring means. High-temperature chemistry plays an important role in inorganic syntheses, structure determinations, determination of transport properties and kinetics, and measurement of classical physical properties. Important goals for the future should include the establishment of highly reliable standards for temperature measurement, new techniques for attaining high temperatures, development of apparatus for attaining high temperatures in highly oxidizing atmospheres, better means for deducing the structures of high-temperature gaseous molecules, and the determination of high-precision thermodynamic data for high-temperature systems, especially heats of formation and heat capacities of high-temperature materials over wider ranges of pressure and temperature. As high-temperature chemistry becomes of age new molecules will be discovered, new techniques will be developed, and new theories will be required to explain chemical and physical phenomena over the range 1000° to 1,000,000°K. 2 figs., 1 table, 6 refs. H.T.H.

Computer controlled systems. Anon. *Instr. Control Systems*, 36 [5] 85–90 (1963).—Computer experience from the chemical process, public utilities, and cement fields is reported. 6 photos. W.W.P.

Industrial hygiene design in raw materials handling systems. W. V. Andresen. *Am. Ind. Hyg. Assoc. J.*, 23, 509–13 (Nov.–Dec. 1962); *APCA Abstr.*, 8 [12] 2 (1963).—The raw materials used in industry may be gases, liquids, or solids. The general considerations which affect dust conditions are the quantity of material utilized and the raw material physical form. Operations leading to problems of dust exposure during materials handling are discussed. The problems and methods of control are presented with emphasis on closed systems and ventilation.

Manufacturers association formed. Anon. *Ceramics*, 14 [171] 17–18 (1963).—An association of firms engaged in the design, manufacture, and installation of all forms of ceramic production equipment has been formed to raise the standards of productivity in the ceramic industry by improving the design and manufacture of all forms of production and handling machinery. 1 photo. W.W.P.

Market and ceramic industry in Brazil and the Argentine Republic. M. Roger. *Ind. Ceram.*, 1962, No. 546, pp. 445–55.—The remarkable economic development of certain South American countries has led to the study, in the ceramic industry, of the possibilities of investment offered to foreign capital. By analyzing the market for ceramic products and the evolution of the national industry, it is possible to forecast for Brazil the value of new investments in the refractories and the structural materials industries. In Argentina, the refractories industry will benefit from a plan for economic reorganization aimed toward the heavy metallurgical industry. The possibilities and risks of such investments will depend not only on the economic evolution of these countries, but also on the solution of social and political problems. 8 figs. L.J.M.

Methyl Cellosolve intoxication. M. R. Zavon. *Am. Ind. Hyg. Assoc. J.*, 24, 36–41 (Jan.–Feb. 1963); *APCA Abstr.*, 8 [12] 8 (1963).—Case histories are presented of five persons who suffered from methyl Cellosolve intoxication after an industrial exposure. Signs and symptoms related to previous reports are described. These cases arose out of increased exposure to methyl Cellosolve without awareness or knowledge of the toxic potential and need for control measures.

New laboratories opened at Nova Scotia Technical College. Anon. *Chem. Can.*, 15 [5] 57 (1963).—Among the facilities is a high-temperature laboratory for work with ceramics. 3 photos. W.W.P.

Report of the Committee on Patents. Fulton B. Flick, chairman. *Am. Ceram. Soc. Bull.*, 42 [8] 453 (1963).

Science and technology in the glass and electrical industries. J. E. Stanworth. *Glass Technol.*, 4 [1] 10–12 (1963).—The past 25 years has seen the growth of new branches of electrical technology, such as semiconductors, discharge lamps, and nuclear power. In many of these fields, the deployment of large scientific resources has resulted in rapid technical development and industrial growth. Some have made novel demands on the glass and ceramic industries, and these sciences may be destined to make important contributions to the development of new communication systems and improved power stations. F.W.G.

Single crystals as engineering materials. R. D. Olt and R. G. Rudness. *Mater. Design Eng.*, 57 [3] 86–91 (1963).—Single crystals of sapphire, ruby, rutile, Si, W, Mo, Ta, Ni, V, ferrites, oxides, carbides, borides, silicides, quartz, beryl, and garnets are discussed with their applications and improved properties over the polycrystalline form. Electrical and mechanical properties of sapphire are tabulated and compared with those of 85 and 99.5% Al_2O_3. Various crystal growing methods are shown schematically. 11 figs., 3 tables. D.J.B.

Standards and labels for quality of ceramic products. A. Baudran. *Ind. Ceram.*, 1963, No. 549, pp. 62–68.—Standards have been established to guarantee quality and uniformity and to simplify the number of models. Building products and most consumer products have been standardized in the last few years. Standards organizations and their work are discussed. Standards and labels lead the manufacturer to a simpler technique and the commercial angle, and give the consumer a better knowledge of the product and an assurance of its qualities and properties. The present state of the work in the ceramic industries is reviewed, and a list of French specifications is appended. L.J.M.

United States ceramics—education, training, and research. W. L. German. *Ceramics*, 14 [171] 11–12, 14 (1963).—G. surveys U. S. educational practices as seen through British eyes, with particular emphasis on ceramic aspects. Comparisons and contrasts are drawn with the British system. W.W.P.

Works control in the ceramic industry and its value. K. Litzow. *Ind. Ceram.*, 1963, No. 549, pp. 55–61.—The efficiency of works control depends to a large extent on the general organization of the factory. Only when the experience acquired is wisely applied and the faults which arise are rapidly detected does works control fulfill its function. Great differences are encountered in practice, and works control must be adapted to each product. The method used and the frequency of testing vary according to the importance of the work. Methods of interpreting and using the tests must be defined exactly. The expenses incurred by works control are determined with the aid of a cost diagram. Benefits gained by works control exceed those normally obtained by investment of the same capital. 4 figs. L.J.M.

See also Sect. VIII: The term "porcelain"—its scope and its limitations.

silicon-boron reaction phase, the article having an oxygen gain of 19.6 to 43.8%(wt) and the material being characterized by chemical inertness in air to mixtures of boron and boron oxide between the mp of boron oxide and 2700°F. D.J.B.

Silicon carbide resistance body and method of making it. John A. O'Connor and Stanley J. Matys (Carborundum Co.). U. S. 3,094,679, June 18, 1963.—The method comprises joining the hot section of a silicon carbide electrical resistance heating element to a cold end with a carbon-containing welding composition, siliconizing the joint to form a weld of beta silicon carbide containing free carbon and free silicon, and annealing the joint above 1800°C to increase the percentage of silicon carbide in the joint and to reduce the content of free silicon and free carbon. D.J.B.

Sintered refractory material. Temple W. Ratcliffe (Babcock & Wilcox Co.). U. S. 3,094,424, June 18, 1963.—A pouring nozzle for molten metal comprising a chrome-magnesite mix combined with a bonding agent and water is molded at >1000 psi and fired at <2700° to 2750°F, the mix containing 3.6 to 7.5 FeO, 4.0 to 7.0 Al_2O_3, 9.3 to 15.0 Cr_2O_3, and 50 to 70 MgO (the sum of FeO, Al_2O_3, Cr_2O_3, and MgO being at least 70%) and including no more than 11.0 CaO, 8.6 Fe_2O_3, and 8.7% SiO_2. D.J.B.

Stable silica-clad thoria sols and their preparation. Wayne T. Barrett, Moises G. Sanchez, and Milton C. Vanik (W. R. Grace & Co.). U. S. 3,097,175, July 9, 1963.—The hydrothermally stable sol consists of an aqueous alkaline dispersion of 10 to 60% thoria particles having a surface layer of silica sufficient to impart a negative charge to the particles, as measured by the electrophoretic method, and contains enough alkali metal hydroxide to give a pH of 7.0 to 10.0. D.J.B.

See also Sect. VI: (*patent*) Article stacking and strapping machine.

VIII—Whiteware

Behavior of a Bingham fluid in the cone-and-plate viscometer. G. Boardman and R. L. Whitmore. *Brit. J. Appl. Phys.*, 14 [6] 391–95 (1963).—A theoretical explanation of the shear-stress characteristics of a Bingham fluid as given by this viscometer is developed for the case when the fluid is separated from the surfaces of the instrument by a thin layer of Newtonian liquid. It is shown to apply qualitatively to china clay suspensions, and a method is given for deriving the true parameters of the fluid from the flow curve. 3 figs., 4 refs. W.A.

Control of manufacture in a ceramic sanitary ware plant. G. Eynard. *Ind. Ceram.*, 1963, No. 551, pp. 165–69.—The developing market for sanitary ware has encouraged change in production methods and equipment and has resulted in the need for closer collaboration with the industrial laboratory. The primary subjective qualities of the technician, based on experience and intuition, have had to be augmented by rational data supported by regular controls and precise standards. At the Societe Generale de Fonderie, where vitreous ware is made by single firing, efforts have been concentrated on glazing, the determining factor of the quality of the product. To combat silicosis, spraying has been gradually abandoned in favor of dipping. Basic and secondary controls are indispensable with this primitive method. Control of green strength reduced rejects before firing and confirmed the need for drying. Control of viscosity and fusibility assured glaze maturity. Intermittent control of the whiteness and thickness of the glaze improved quality. By equating volume of manufacture and sale price with risks (hypothetical or statistical) and their effect on cost price, the limits for the application of control can be set. 7 figs. L.J.M.

Control of the properties of glazes by the aid of eutectics—study of fusion behavior and other properties of ceramic mixtures in the eutectic areas: IV, Alkali-B_2O_3-SiO_2 systems; V, System PbO-B_2O_3-SiO_2. Arhtur S. Watts. *J. Am. Ceram. Soc.*, 46 [8] 371–73 (1963).—Glasses of the systems were prepared and tested for solubility in water. 4 figs., 2 tables, 1 ref. For part III see *ibid.*, 44 [6] 272–76 (1961).

Effect of various additives on the behavior of porcelain bodies during firing. Evzen Kraomes. *Sklar Keram.*, 11 [2] 48–50 (1961).—Several additives were introduced into the basic porcelain body. Firing behavior was studied on bisque-fired test pieces by determining the starting deformation temperature and the temperature at which the middle of the test piece showed a sag of 10 mm. Evaluation of the results showed a close correlation between the deformation or its rate and the molar ratio R_2O_3:(R$_2$O + RO) computed from the body compositions. 1 fig., 3 refs. A.D.

Faulty brown glazes having a metallic luster effect. Friedrich Dettmer. *Keram. Z.*, 15 [5] 264–65 (1963).—Previous investigators have attributed this luster to precipitation in the glaze of the spinel $MnO \cdot Al_2O_3$ or the ferrites $FeO \cdot Fe_2O_3$ or $MnO \cdot Fe_2O_3$, to a sulfide of Mn, or even to the formation of immiscible glassy phases. X-ray analysis, supported by the magnetic nature of the luster, shows that the luster is due to the γ-Fe_2O_3 phase; the presence of some sulfide may nucleate the precipitation. 4 refs. J.A.S.

Gold plating with spray guns. G. S. Gomes and D. J. Levy. *Prod. Finishing*, 27 [10] 36–44 (1963).—Simultaneous spraying of two water-base solutions, one containing gold in solution and the gold plate. Ceramic items have been satisfactorily coated. 9 figs., 3 tables. W.W.P.

Higher zinc oxide content in mat glazes for Seger cone 05a. Karl Groessl. *Keram. Z.*, 15 [5] 272–73 (1963).—Although ZnO gives a very good mat finish (especially with blue and certain green glazes), it causes peeling and shrinking of the glaze when it is used in the necessarily high proportion. The difficulty is partly alleviated by precalcining the ZnO, but there is no difficulty in introducing up to 11.6% ZnO as a fritted mixture of wollastonite 41.7 and ZnO 58.3 (or $CaCO_3$ 31, quartz 13.6, and ZnO 50.4%) or up to 18.4% ZnO as a fritted mixture of wollastonite 26.4 and ZnO 73.6% (or $CaCO_3$ 20.6, quartz 12.4, and ZnO 67.0%). The mixture is best fritted at the maturing temperature of the glaze. J.A.S.

Increasing the green mechanical strength of porcelain bodies. Zbygniew Syska. *Sklar Keram.*, 11 [2] 35–39 (1961).—S. studied the possibility of increasing green strength by various additions. He discusses the improvement obtained by aging and by the addition of highly plastic clays and bentonites (Ca bentonites and activated Na clays), sulfite lye, humus, and glykocel (carboxymethylcellulose). The advantages and disadvantages of the additives indicate that humin substances and glykocel might have practical application; both are discussed in detail. Results of laboratory and plant tests are given. 8 tables, 12 refs. A.D.

Investigation of the surface of a glaze by light interference. M. Mehmel. *Keram. Z.*, 15 [5] 265–68 (1963).—The method of M. Uhlig (*Zeiss-Werkz.*, 30, 70–77 (1958)) is applied to reveal glaze surface irregularities by observing (and photographing) the light interference patterns formed by the reflection of Tl radiation $\lambda = 0.54\mu$. Instead of using a lacquer replica, a "silver mirror" is chemically deposited on the surface of the glaze. Photographs show the patterns caused by unevenness as small as 0.03μ and by the presence of small bubbles just beneath the surface of the glaze. The bowing of, e.g., the bottom of a plate, is indicated by a pattern of concentric closed loops. 7 photos, 8 refs. J.A.S.

Manufacture of plates by pressing. Ernst Brueckner. *Keram. Z.*, 15 [3] 128–29 (1963).—B. challenges the statements made by Apfelbeck, Cach, and Jeuthe that die pressing is a practicable method for manufacturing acceptable flatware. The difficulties of sufficiently compacting the body in a dry or semiplastic state to produce a fine surface finish and good mechanical strength are described and discussed. B. knows of no manufacturer who has produced salable ware by die pressing a dry or semidry powder. Cf. *Ceram. Abstr.*, 1961, Oct., p. 244*e*; 1963, March, p. 79*e*. J.A.S.

Moisture expansion of a ceramic body and its internal surface area. W. F. Cole. *Nature*, 196 [4850] 127–28 (1962).—It has been found that for an earthenware body fired above the temperature of the moisture expansion peak at 1000°C, moisture expansion and internal surface area follow parallel courses, but below 1000°C they move in reverse directions. The cause of this is attributed to variation in pore size with increasing firing temperature. 3 figs., 1 table, 4 refs. Cf. *J. Am. Ceram. Soc.*, 45 [9] 428–34 (1962). A.M.L.

Problems in the slip casting of porcelain. P. P. Budnikov. *Sklar Keram.*, 11 [2] 40–42 (1961).—P. gives the theoretical basis

Porcelain enamel slip control—are today's methods adequate? Anon. *Metal Prod. Mfg.*, 20 [6] 37 + 3 pp. (1963).—Current methods of applying porcelain enamel slip (flow coating, mechanical dipping, automatic spraying, etc.), to which production schedules are geared, require close control. The pneumatic viscosity control, specific gravity-pickup, specific gravity-slump, drain time, flow through an orifice, and water-content techniques are adequate or near adequate in specific instances, but they are subject to the type of product coated, type of slip, method of application, and other processing details. Thus, better controls and techniques are desired. 4 photos. L.S.O'B.

Progress of vitreous enameling industry and research in India. S. S. Verma. *Central Glass Ceram. Res. Inst. Bull.* (India), 10 [1] 23–30 (1963).—A review. 4 tables, 26 refs. R.L.T.

Techniques for controlling porcelain enamel slip. Anon. *Metal Prod. Mfg.*, 20 [7] 28, 31 (1963).—Techniques are described for measuring specific gravity (relative weight of slip per unit volume), pickup (weight of enamel retained on standard panel dipped in slip), slump (flow of measured column of slip released on standard flat surface), and rate of flow (volume of slip passed through standard orifice under standard pressure). 2 photos. L.S.O'B.

PATENTS

Antifouling pigment. Edward J. Dunn, Jr., and Martin Kushner (National Lead Co.). U. S. 3,100,719, Aug. 13, 1963.—A composite pigment particle consists of a silica core (25 to 75% silica) and a coating of copper oxide. D.J.B.

Coating composition. Takeichi Oshima and Yukichi Uyemura. U. S. 3,100,154, Aug. 6, 1963.—A refractory, solvent-proof, and anticorrosive coating consists of 1.5 to 2.5% metal salt of a fatty acid dissolved in an aqueous solution of 15 sodium silicate, 10 to 15 comminuted zirconium silicate, 5 to 10 comminuted silica, and 15 to 30%(wt) admixed metallic oxide. D.J.B.

a **Copper borate antifouling pigment.** Edward J. Dunn, Jr., and Martin Kushner (National Lead Co.). U. S. 3,100,718, Aug. 13, 1963.—A composite pigment particle consists of a silica core (25 to 75% silica) and a coating of copper borate. D.J.B.

Energy conversion process and apparatus. Ernest H. Lyons, Jr. U. S. 3,100,163, Aug. 6, 1963.—The process comprises heating at > 800°K, in the absence of substantial amounts of reducing agents, CuO, Co_3O_4, MnO_2, PbO_2, Pb_3O_4, and/or Fe_2O_3 to convert it to Cu_2O, CoO, Mn_3O_4, PbO, and/or Fe_3O_4, cooling the lower oxide to below 400°K, immersing it in oxygen-transferring electrolyte and using it as an anode in cooperation with an oxygen-supplying cathode to produce electric current with resultant re-oxidation to the higher oxide, returning the higher oxide to the heating step, and repeating the process continuously so that the energy used to heat the higher oxide is converted at high efficiency into electrical energy. D.J.B.

b

c **Method of joining carbon.** John G. Lewis and Harold A. Ohlgren (American Metal Products Co.). U. S. 3,101,403, Aug. 20, 1963.—The method comprises placing the surfaces together in a nonreactive atmosphere and striking an electric arc between a welding rod made of a metal from group IV-A, V-A, or VI-A of the periodic table and the carbon to melt the metal and cause it to penetrate into the carbon surfaces. D.J.B.

d **Submerged-melt welding and composition therefor.** Robert A. Kubli and William B. Sharav (Union Carbide Corp.). U. S. 3,100,829, Aug. 13, 1963.—A composition for producing high impact low temperature welds is composed of 33 to 55 CaO, 30 to 45 SiO_2, 2 to 6 MnO, 2 to 8 fluoride, and a trace to 10% TiO_2. D.J.B.

V—Glass

Automatic glass batching—key to modern glassmaking: I. Alvin J. Gold. *Ceram. Ind.*, 80 [6] 60–62 (1963).—G. discusses batch plant structure, unloading systems, and cullet handling. 2 figs. **II.** *Ibid.*, 81 [1] 66–68, 76–79.—Scales, diluting or premixing of minor ingredients, feeders to the scales, controls, addition of coloring ingredients, and wet batching are discussed. 4 figs., 1 table. W.K.S.

Coloration of glass containing titanium. Teruo Sakaino, Taro Moriya, and Kenji Koide. *Yogyo Kyokai Shi*, 70 [798] 190–94 (1962).—Nine silicate, borate, and phosphate glasses were used as the base. Ti^{3+} and Ti^{4+} coexist in glass, and melting in a reducing atmosphere increased the content of the former, coloring the glass blue. There are two forms of Ti^{4+}, one being a network modifier, TiO_6, and the other a network former, TiO_4 or $(TiO_4)_n$. The former gives colorless glass, and the latter gives yellow to brown glass. Equilibria such as $TiO_6 \rightleftarrows TiO_4 \rightleftarrows (TiO_4)_n$ are assumed. 4 figs., 2 tables, 11 refs. Cf. *Ceram. Abstr.*, 1962, July, p. 163*h*; 1963, Aug., p. 208*h*. K.Y.

Devitrification of optical glasses. Tetsuro Izumitani and Yosiro Moriya. *Yogyo Kyokai Shi*, 70 [797] 131–42 (1962).—Liquidus temperature, viscosity, and surface tension of glasses of the B_2O_3–CdO–La_2O_3 system were measured, and the devitrification was studied. Addition of SiO_2, GeO_2, BeO (< 2%), and Al_2O_3 lowered the liquidus temperature, and the first three increased the viscosity; thus these compounds were effective in reducing devitrification. The more stable the glass, the lower is the liquidus temperature and the higher is the viscosity. 14 figs., 5 tables, 18 refs. K.Y.

Fiber glass fabric filters for high temperature dust and fume control. I. J. Gusman and R. C. Horton. *J. Air Pollution Control Assoc.*, 13 [6] 266–67 (1963); *APCA Abstr.*, 9 [3] 3 (1963).—The basic qualities of fiber glass filter fabrics are breaking strength, weight, count, width, flexural strength, and air permeability. It is important that filter fabrics be judged by the variation in properties rather than by an absolute value. Although no one system of air filtration can be appropriate for all problem areas, fiber glass filter fabrics perform efficiently for the carbon black, cement, gypsum, iron, steel, nonferrous metal, chemical, and public utility industries. New yarns with improved flex life, high temperature lubricants, use of available weaves, accumulation of engineering data, and proper combination of glass yarn, weave, and finish will result in the effective use of fiber glass in the field of air pollution control.

Anon. *Brit. Chem. Eng.*, 8 [8] 555 (1963).—Project FINGAL (Fixation in Glass of Active Liquors) disposes of fission product wastes by mixing them, as a nitric acid solution, with slurried borax and silica and fusing to a glass. 1 fig. W.W.P.

Flame-spectrometric determination of Na and K with $BaCl_2$ as buffer. Friedrich Hegemann, Heinrich Kostyra, and Barbara Pfab. *Glastech. Ber.*, 30 [1] 14–17 (1957).—Quantitative analysis of Na and K contents of >1% can be simplified by buffering with $BaCl_2$. Na and K are determined in one solution. Sample and standard solution may differ in content of the second alkali. The mutual influence of K is reduced to one half, and that of Na to one fifth. Equal contents make analysis difficult; for samples with unknown contents it is advisable to determine the values roughly in advance. The average relative error of this procedure is ±0.7% of the Na or K content. Under given conditions the content of the standard may differ from that of the sample solution as follows: for Na analysis ±60% of the K_2O value, and for K analysis ±100% of the Na_2O value. In this case, the analytical error will not exceed 0.5%. Several examples are given. 2 figs., 4 tables, 12 refs. Cf. *Ceram. Abstr.*, 1959, Feb., p. 65*a*. I.N.

f

g

Formation and growth of bubbles in the process of glass melting. Tetsuro Izumitani and Ryohei Terai. *Yogyo Kyokai Shi*, 70 [799] 203–209 (1962).—The formation and the growth of bubbles were treated as a phase transition phenomenon. Theoretical equations were derived based on the theory that bubbles form in a supersaturated solution and grow by gas diffusion in the solution. The results of experiments on CO_2 bubbles in water and glycerine agreed with the theory. In molten BK 7 glass, bubbles were found to grow during the process of melting. 11 figs., 2 tables, 4 refs. K.Y.

h

i **High-pressure effects on oxide glasses: I, Densification in rigid state.** J. D. Mackenzie. *J. Am. Ceram. Soc.*, 46 [10] 461–70 (1963).—Densification of SiO_2, GeO_2, and B_2O_3 glasses in the rigid state was studied at pressures up to 80 kbars and at temperatures up to 600°C in different pressure-transmitting media. The infrared, ultraviolet, and nuclear magnetic resonance absorptions of the compressed glasses were examined. Densification increased with time, temperature, pressure, and, more important, with applied shear. This process of volumetric shrinkage in the rigid state at low temperatures is fundamentally different from that at temperatures at or above the glass transition. A qualitative model involving mutual entanglement of parts of the ran-

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