The American Ceramic Society

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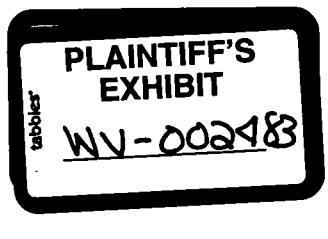
Christine Schnitzer
Product Manager
Ceramic Information Center

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



CERAMIC ABSTRACTS

1961

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Compiled by

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using a number of small brick units of a special interlocking design for tunnel kiln car tops. W.K.S.

PATENTS

Burner apparatus. Henry W. Schramm and Chester Cipriani (Midland-Ross Corp.). **U. S. 2,952,307,** Sept. 13, 1960.—An apparatus for burning fuel at a wide range of inputs in a furnace chamber comprises a refractory block containing a cylindrical tunnel chamber extending longitudinally therethrough, a holder for attaching the block to a wall of the furnace, first wall means attached to the holder and forming a small cylindrical chamber extending into the tunnel chamber, a tapered chamber with its smaller end meeting the end of the smaller cylindrical chamber away from the tunnel chamber, and a larger cylindrical chamber with one end meeting the larger end of the tapered chamber, the three chambers being axially aligned with the tunnel chamber. D.J.B.

Burner control apparatus [gas]. Russell B. Matthews (Baso, Inc.). **U. S. 2,953,197,** Sept. 20, 1960. D.J.B.

Dielectric drying of materials. Hugh J. Cameron (Magnetic Heating Corp.). **U. S. 2,949,677,** Aug. 23, 1960.—A method for removing a volatile liquid from solid material in air at atmospheric pressure, the liquid in the vapor phase having a density different from that of the air, comprises generating heat sufficient to cause the vapor to be evolved from the material by subjecting it to a high frequency electric field between electrode means. D.J.B.

Electrical ignition and safety systems for [liquid fuel] burners. Gunther Schwank (American Infra Red Radiant Co., Inc.). **U. S. 2,952,308,** Sept. 13, 1960. D.J.B.

Safety control apparatus for [gas] fuel burners. Glenn E. Andrews and Fred B. Aubert. **U. S. 2,953,196,** Sept. 20, 1960. D.J.B.

See also **Sect. III:** (*patent*) Apparatus for charging [vertical lime] kilns.

XIII—Materials

Acid leaching of uraniferous clay. Hirozo Mizuno and Kiyoshi Morita. *Nagoya Kogyo Gijutsu Shikensho Hokoku,* **9** [4] 192–95 (1960).—The conditions of the extraction of uranium with H_2SO_4 of various concentrations from montmorillonite which had been made to adsorb uranium are discussed. The same procedure was applied to the uraniferous clay of Mizunami district in Gifu prefecture, Japan, an anion exchange resin being used to shorten the leaching process. The amount of uranium was estimated by fluorescence analysis at a wave length of 556 mμ. The effective acid concentrations for the leaching were $2N$ H_2SO_4 for montmorillonite and $18N$ H_2SO_4 for the uraniferous clay. 5 figures, 1 table, 2 references. K.F.

Asbestos industry in 1959. Anon. *U. S. Bur. Mines Mineral Market Survey,* **1959,** MMS 3079, 2 pp. **Bauxite in 1959.** *Ibid.,* MMS 3096, 12 pp. **Bentonite production increased in 1959.** *Ibid.,* MMS 3114, 2 pp. **Feldspar, 1959.** *Ibid.,* MMS 3087, 12 pp. **Fire clay production increased in 1959.** *Ibid.,* MMS 3105, 2 pp. **Fuller's earth production increased in 1959.** *Ibid.,* MMS 3116, 2 pp. **Graphite in 1959.** *Ibid.,* MMS 3061, 5 pp. **Increased ball-clay production sets record in 1959.** *Ibid.,* MMS 3117, 2 pp. **Kaolin production sets record in 1959.** *Ibid.,* MMS 3118, 2 pp. **Quartz crystal (electronic grade) in 1959.** *Ibid.,* MMS 3063, 4 pp. **Talc, soapstone, and pyrophyllite in 1959.** *Ibid.,* MMS 3091, 6 pp. Each survey free from Pubs. Distrib. Sect., U. S. Bur. of Mines, Pittsburgh 13, Pa. M.J.K.

Blue asbestos from Lusaka, Northern Rhodesia, and its bearing on the genesis and classification of this type of asbestos. A. R. Drysdall and A. R. Newton. *Am. Mineralogist,* **45** [1–2] 53–59 (1960).—An occurrence of blue asbestos near Lusaka consists of an anastomosing stockwork of predominantly slip-fiber veins in a semicalcareous host rock in a strongly deformed dolomite formation. Chemical analysis shows that it is magnesioriebeckite according to the classification of Miyashiro; the geological evidence suggests that it is of metasomatic origin. This and a similar occurrence in Bolivia are in strong contrast to the normal South African and Australian occurrences, where the asbestos is of riebeckite composition and probably of metamorphic origin. The name crocidolite has been widely used to describe blue asbestos, but as it applies only to fibrous varieties of riebeckite and magnesioriebeckite, it should not be used as a mineral name. 2 tables, 9 references. H.I.

Ceramic fuels—properties and technology. R. W. Nichols. *Nuclear Eng.,* **3** [29] 327–33 (1958).—The physical and mechanical properties as well as the fabrication processes are covered for uranium oxide, uranium monocarbide, uranium silicide, and thorium dioxide. It is concluded that much work remains to be done in the fields of property determination and irradiation testing, particularly on the effects of material variables on irradiation behavior. The promising characteristics of ceramic fuels include higher burn-ups, higher fuel ratings, and higher coolant temperatures. A complete data sheet is included which covers all the known properties of the four types of fuel compounds mentioned. 15 figures, 2 tables, 37 references. J.M.K.

Closed-circulation systems for determining water, carbon dioxide, and total carbon in silicate rocks and minerals. P. G. Jeffrey and A. D. Wilson. *Analyst,* **85** [1015] 749–55 (1960).—Apparatus is described for determination by recycling air in a closed-circuit system, thus eliminating predesiccation of a large volume of air. Values for the blank determinations are smaller than those with conventional apparatus. 4 figures, 10 references. W.A.

Concept of diagenesis in argillaceous sediments. Ralph E. Grim. *Bull. Am. Assoc. Petrol. Geologists,* **42** [2] 246–53 (1958).—The thesis is presented that some of the clay minerals are more "at home" in certain environments than in others. Structural considerations indicate that possibilities of the transformations of the clay minerals and the ease with which they may take place are not the same for all varieties. The transformations during diagenesis, therefore, vary with the nature of the environment and the material brought to the environment; they may be substantial or almost nonexistent. There may be a considerable change immediately when a sediment enters a new environment with different characteristics, followed by a further very slow gradual change. Evidence favoring this concept is presented. S.A.F.

Description of the Mackereth portable core sampler. Alec J. Smith. *J. Sediment. Petrol.,* **29** [2] 246–50 (1959).—This corer is capable of collecting fine-grained bottom samples from lakes and shallow seas at depths up to 300 ft. At the sampler's present stage of development, cores up to 20 ft. long and 1.5 in. in diameter can be collected. The corer operates as a piston which is pushed into the sediments by compressed air; it is held on the surface of the sediment for the duration of the coring operation by hydrostatic pressure. When the sample has been taken the corer is raised to the surface by compressed air. S.A.F.

Diatomite. L. M. Otis and James M. Foley. *U. S. Bur. Mines Minerals Yearbook* (preprint), **1959,** Vol. I, 6 pp., 1 figure. 5 cents. Govt. Printing Office, Washington 25, D. C. **Graphite.** Donald R. Irving and Betty Ann Brett. *Ibid.,* 11 pp. 10 cents. **Kyanite and related minerals.** James D. Cooper and Gertrude E. Tucker. *Ibid.,* 4 pp. 5 cents. **Minor nonmetals.** Albert E. Shreck and James M. Foley. *Ibid.,* 3 pp. 5 cents. M.J.K.

Effect of source and environment on clay minerals. I. H. Milne and J. E. Earley. *Bull. Am. Assoc. Petrol. Geologists,* **42** [2] 328–38 (1958).—The clay mineral assemblage in an area of active deposition is dependent largely on the character of the source area. This conclusion is based on a study of the clay mineralogy of sediments of the lower Mississippi River, the active delta region, the St. Bernard Subdelta, and the Mississippi Sound-Mobile Bay area. Montmorillonite, the predominant clay mineral in the Mississippi River and Delta sediments is apparently the stable product of soil development and rock weathering in the drainage basin of the Mississippi River. The sediments of the Mississippi Sound-Mobile Bay area, east of the Mississippi Delta and derived ultimately from the Appalachian Province, contain considerably more kaolinite. Transition zones between the two sediment types can be differentiated. Alteration of clay minerals in a depositional area can be expected where the sedimentation rate is low and sufficient time is available for chemical equilibria between the sea water and the clay minerals. In areas of rapid mud deposition, the blanketing effect of overlying clay material probably reduces the chemical interaction to that which is possible between the clay and the entrapped water. The Mis-

(4) Simple correlation, control limits, and simple groupings of data helped to determine the variables in glass production. Data and methods are given in detail. 6 tables. S.M.L.

Ceramic materials produced from glass. H. R. Lillie. *Glass Technol.*, 1 [3] 115–20 (1960).—L. gives a historical summary of the development of photosensitive glasses and of materials associated with the Fotoceram and Pyroceram trade names. Fundamental and technical problems encountered in their production are discussed. Properties of two standard varieties of glass-ceramic are compared with those of heat-resisting glasses and alumina ceramics, and some of the applications of glass-ceramics are mentioned. 8 figures, 11 references. S.M.L.

Colors and magnetic properties of iron in glasses of various types and their implications concerning structure: II, Cabal glasses. Adli Bishay. *J. Am. Ceram. Soc.*, **44** [1] 16–21 (1961).—The effect of changes in the glass structure on the colors and magnetic susceptibilities of iron was studied in glasses made of CaO, B_2O_3, and Al_2O_3 (cabal glasses). As the number of gaps in the structure increased, an increase in the general absorption and a decrease in magnetic susceptibility were observed, attributed to ferrous iron in network-forming positions. Further increase in the number of gaps was accompanied by a general increase in transmission as well as by an increase in magnetic susceptibility. This was attributed to the loosening of the structure around the ferrous iron which could easily escape from the interstices and be oxidized to colorless ferric iron taking network-forming positions. The intensity of the ferrous band depended on the concentration of the ferrous iron and was affected by the polarizing power of the neighboring cations. 2 tables, 7 figures, 7 references.

Comparison of the chemical composition and magnetic properties of tektites and glasses formed by fusion of terrestrial rocks. Irving Friedman, Arthur Thorpe, and Frank E. Senftle. *Nature*, **187** [4743] 1089–92 (1960). 3 tables, 9 references. V.R.E.

Copper films by galvanic techniques. Samuel Wein. *Glass Ind.*, **38** [7] 383, 402 (1957).—A chronological review of the technical and patent literature on mirror making. 11 references. Cf. *Ceram. Abstr.*, **1960**, Aug., p. 187*i*, and "Sensitizing...," this section. S.M.L.

Current Japanese concepts of glass structure. Ikutaro Sawai. *Glass Ind.*, **38** [4] 197–208, 234 (1957).—A detailed review is given of research projects undertaken in the past five years by T. Moriya, M. Mine, E. Kanai and T. Satoh, J. Furukawa, T. Abe, T. Tamura and Y. Mori, R. Yokota, and T. Yamate and S. Sakka. 3 tables, 24 figures, 26 references. S.M.L.

Density change of glass by heating: VI, Density change of K_2O–Na_2O–SiO_2 glasses. Toru Kishii. *Yogyo Kyokai Shi*, **68** [771] 63–70 (1960).—Glasses of the system K_2O–Na_2O–SiO_2 were prepared by melting purified sand and reagent grade materials in a platinum crucible. The quenched samples were reheated by holding at a constant temperature in the range of 300° to 325°, and the change in density was determined by the floating method. The results were analyzed by the author's theory (*Ceram. Abstr.*, **1958**, Nov., p. 305*j*). 22 figures, 37 references. For part V see *ibid.*, **1960**, April, p. 84*j*. K.Y.

Devitrification of borosilicate glasses. O. Knapp. *Acta Tech. Acad. Sci. Hung.*, **28** [1–2] 111–19 (1960) (in English); abstracted in *J. Appl. Chem.* (London), **10** [8] ii-148 (1960).—Devitrification of clear (I) and amber-colored (II, MnO_2 1, Fe_2O_3 0.5%) 6% B_2O_3 glasses and a clear 20% B_2O_3 glass (III) was studied at 800° to 1125°C. Borosilicates devitrify irregularly with sporadic formation of a leathery film and few defined crystals (chiefly from I); rates of crystal growth are difficult to establish. III devitrifies relatively slowly. The coloring agents in II do not affect the liquidus temperature (approximately 1130°). 3 tables, 32 figures, 3 references. Cf. *Ceram. Abstr.*, **1960**, Sept., p. 206*f*. V.R.E.

Different methods for determining the thickness of the silver film. P. Sen and P. S. Rao. *Glass Ind.*, **38** [2] 89, 112 (1957).—The authors studied (1) volumetric analysis by titration, (2) direct weighing, and (3) Fizeau's iodine crystal test. Details of the analyses are given. The direct weighing method gave somewhat higher results than the other two, which may have been due to difficulty in elimination of moisture from the film and oxidation of the silver during drying. The direct weighing method required at least twice the time of the other two. Because of ring distortion with thicknesses of more than 200 × 10^{-6} mm., the iodine method was not acceptable. With thin films the method was rapid and approximate but not dependable for accuracy. The titrimetric method is the fastest and most accurate method of those studied. 2 tables, 6 references. S.M.L.

Diffusion of oxygen from contracting bubbles in molten glass. R. H. Doremus. *J. Am. Ceram. Soc.*, **43** [12] 655–61 (1960).—Experimental measurements on the rate of contraction of oxygen bubbles in molten glass were compared with an equation for the diffusion-controlled contraction of a sphere. The equation was valid until about 80% of the oxygen had diffused from the bubbles, so that the diffusion coefficient of the oxygen in the molten glass could be calculated from the experimental measurements. These values of the diffusion coefficient were higher than one would expect from the Stokes-Einstein equation for diffusion in liquids. It was therefore concluded that some short-circuiting mechanism such as diffusion in channels in the glass was operative. It also appeared that the oxygen diffused in the glass as atoms, rather than as molecules. From contraction measurements on glasses with different fining agents it was concluded that the mechanism of fining by such agents as antimony and arsenic oxides was not discharge of oxygen gas as had been generally supposed but was reduction of the concentration of oxygen in the glass, which caused the oxygen in the bubbles to diffuse into the glass more rapidly. 2 tables, 4 figures, 17 references.

Diffusion into silicon from glassy layers. J. E. Cline and R. G. Seed. *J. Electrochem. Soc.*, **105** [12] 700–701 (1958).—The diffusion of boron into silicon from glassy layers containing the system K_2O–SiO_2–B_2O_3 was investigated. These glassy layers can be formed by dehydrating aqueous solutions, and they are fluid at the diffusion temperature of 1200°C. Methods were explored for obtaining controllable initial concentrations and penetrations of diffusant. Uniformly flat junctions were obtained, apparently due to the solvent action of the glassy layers in preventing masking by silicon dioxide. 2 figures, 6 references. J.M.K.

Dust control in glass manufacturing. Edward F. Wilson. *Glass Ind.*, **41** [4] 202–203, 236–38 (1960).—The sources and treatment of dust in the glass industry and the secondary source of dust from power plants are described. Modern dust treatment methods use automatic controls to provide dependable operation. Properly applied, these systems give better quality control, lower equipment maintenance through clean process areas, and lower operating costs. S.M.L.

Effect of partial replacements of soda by lithia in opal and alabaster glass. H. W. Rauch, C. H. Commons, Jr., and A. Silverman. *Glass Ind.*, **41** [5] 261–63, 292 (1960).—As was previously determined for soda-lime glass, the introduction of lithia reduces melting and fining time, increases fluidity, lowers thermal expansion, and slightly increases the refractive index in commercial opal and alabaster glasses. In each glass, soda was replaced by about 0.25 and 0.50% (wt.) lithia. Complete glass compositions are given. The following properties were measured: coefficient of linear thermal expansion from 100° to 300°C.; reflectance of disks 0.12, 0.20, and 0.60 in. thick under green, blue, and amber illumination; opacity; and coefficient of scatter. The lithia-substituted glasses melted faster and should be commercially desirable because of probable lower operating temperatures. Whiter colors and improved light transmission were noted. 6 tables, 5 figures, 2 references. S.M.L.

Experiments using selenium as decolorizer in container glass. H. R. Persson. *Central Glass & Ceram. Research Inst. Bull.* (India), **6** [3] 127–35 (1959).—Experiments were carried out under factory conditions to determine the optimum additions of minor constituents in a soda-lime-silica glass used for making tumblers and bottles. Taking into consideration the melting conditions of the batch, P. found the most suitable additions of minor constituents to be as follows, per 1000 kg. of sand: niter 2 kg., salt cake 8 kg., arsenic 300 gm., selenium 20 gm., and cobalt oxide 2 gm. A variation of about 20° in the annealing temperature, however, had a marked influence on the color of the glass. 6 figures, 3 tables, 10 references. R.L.T.

Fracture velocity and fracture energy of glass in the fatigue range. Errol B. Shand. *J. Am. Ceram. Soc.*, **44** [1] 21–26 (1961).—A method was developed for determining crack velocities from the stress-time curve of fracture. Velocities of glass broken in air and in vacuum converge at a value between 1 and 10 mm./sec. This convergence is considered to be the upper limit of the fatigue range. Fracture energy was computed in terms of strain energy release rates. For glass broken in air under low stress this energy is about equal to the surface energy of the glass; in vacuum it is fifteen times greater, at the upper limit of the fatigue range it is thirty times greater, and at the terminal veloc-

table, 8 references. **VI, Effect of surface on the development of $Ca(O_2)_2$ from $CaO_2 \cdot 2H_2O_2$.** I. I. Vol'nov and V. N. Chamova. *Ibid.*, pp. 1098–99.—Experiments are described in which the calcium peroxide diperoxyhydrate $CaO_2 \cdot 2H_2O_2$ was spread out in boats of different sizes and vacuum dried at 50° and 10 mm. Hg pressure. The resulting material contained, after about 100 min., various amounts of $Ca(O_2)_2$ depending on the amount of surface covered by the sample on the bottom of the boat. The thinner the layer of material, the higher was the percentage of calcium superoxide formed; thus, when 1 gm. of the original material was spread over 900 $cm.^2$, the final products contained, along with CaO_2, $Ca(OH)_2$, and $CaCO_3$, about 40%(wt.) $Ca(O_2)_2$. The data tend to support the reaction equation put forward by I. A. Kazarnovskiĭ describing the formation of the superoxide from the peroxyhydrate. 1 table, 1 figure, 3 references. For parts I–IV see *Ceram. Abstr.*, **1960**, Sept., p. 221*e*. D.T.W.

Thermal analysis of selenates of strontium, barium, and lead. N. M. Selivanova, V. A. Shneider, and G. A. Zubova. *Zhur. Neorg. Khim.*, **3** [6] 1295–1303 (1958).—The heating and cooling curves of selenates of strontium, barium, and lead were obtained with a Kurnakov pyrometer; the changes in composition, weight, and speed of vaporization of these salts at different temperatures were investigated. $SrSeO_4$, $BaSeO_4$, and $PbSeO_4$ are less stable thermally than the respective sulfates. The selenates of strontium, barium, and lead, in contrast with the respective sulfates, upon heating, do not undergo polymorphic enantiotropic transformations. They decompose on heating with formation of the selenites and generation of oxygen. The thermal decomposition of lead selenate occurs in more than one valence. 7 figures, 6 tables, 33 references. D.T.W.

Thermal conductivity: XIV, Conductivity of multicomponent systems—correction. W. D. Kingery. *J. Am. Ceram. Soc.*, **43** [12] 669 (1960).—An equation in the original paper (*ibid.*, **42** [12] 617–27 (1959)) is corrected.

Transformation of quartz to cristobalite. A. C. D. Chaklader and A. L. Roberts. *J. Am. Ceram. Soc.*, **44** [1] 35–41 (1961).—The transformation of quartz to cristobalite was studied in the range 1400° to 1650°C. The process, which was believed to be a direct one, was found to be a consecutive reaction involving an intermediate transition phase. The reaction rate was found to be much faster for Madagascar quartz than for Brazilian quartz, although no difference in their impurity content was found in the spectrographic analysis. An approximate consecutive reaction kinetic approach was applied, and the deviation of the experimentally observed values of the transition phase at a particular temperature from the mathematically predicted values is discussed. 3 tables, 8 figures, 9 references.

PATENTS

a **Apparatus for the manufacture of single crystals.** Jan Goorissen (North American Philips Co., Inc.). **U. S. 2,956,863,** Oct. 18, 1960.—The apparatus comprises a refractory vessel with an open top for holding a quantity of molten semiconductive material, a hollow truncated conical conductive reflecting member having open ends mounted on and over the vessel with its wide end adjacent the vessel and with its inner reflecting surface exposed to the vessel interior, a coil surrounding the vessel for heating its interior by high-frequency currents, and means for drawing a growing crystal upward from the melt and through the interior of the reflecting member along its axis, whereby thermal radiation from the melt surface is reflected onto the grown crystal. D.J.B.

b **Method of separating rare earths by ion exchange.** Frank H. Spedding and Jack E. Powell (United States of America as represented by the U. S. Atomic Energy Commission). **U. S. 2,956,858,** Oct. 18, 1960. D.J.B.

c **Methods of decomposing complex uranium-rare earth tantalocolumbates.** John R. Ruhoff, Charles O. Gerfen, and George B. Wills (Mallinckrodt Chemical Works). **U. S. 2,956,857,** Oct. 18, 1960. D.J.B.

d **Separation of rare earths by solvent extraction.** Donald F. Peppard and George W. Mason (United States of America as represented by the U. S. Atomic Energy Commission). **U. S. 2,955,913,** Oct. 11, 1960.—A process of separating lanthanum, cerium(III), praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, and yttrium from each other consists in providing an aqueous medium having free mineral acid in a concentration of at least $3N$ and a substantially water-immiscible organic alkyl phosphate-containing medium, one of the media containing the elements, contacting the media whereby those elements which have the highest atomic number are preferentially held by the alkyl phosphate and the extractability of the various elements by the alkyl phosphate decreases in the order of the atomic number, contacting the alkyl phosphate with aqueous mineral acid solutions whereby fractions of aqueous rare earth solutions are formed, and collecting each fraction separately. D.J.B.

e

f

See also **Sect. VII**: Thermal conductivity of UO_2 to 2100°C.

XV—General

Application of photoelectric densitometry to the assessment of respirable dust samples. A. R. Budgen, R. J. Hamilton, and G. H. S. Jones. *Brit. J. Appl. Phys.*, 11 [8] 371–77 (1960).—A technique has been developed for the rapid assessment of samples of respirable mine dusts obtained with the long-running thermal precipitator (National Coal Board/MRE dust sampler type 101). The size segregation of particles in the sample makes it possible for the optical density of a thin strip across the deposit to be converted to the number of particles in the strip. 9 figures, 11 references. W.A.

Health control in the ceramic industry. Russell W. Frank. *Proc. Porcelain Enamel Inst. Forum*, **20,** 138–40 (1958).—Housekeeping procedures to minimize health hazards in the handling of lead-bearing porcelain enamels are described. The solubility of lead-bearing glasses is much less than that of many lead compounds used in other industries. The finer the material, the greater is the solubility. Lead vapor is released from glass to the atmosphere at elevated temperatures, but this is of minor significance in well-ventilated areas. L.S.O'B.

Potography. Charles E. Walls. *Pottery and Glass*, **38** [9] 725–27 (1960).—W. discusses the photography of pottery ("potography") and the promotion of sales of pottery and glass by photos. 6 photos. C.M.C.

g

Problems of technical documentation and the new ceramic classification. G. Biéler and P. Lapoujade. *Bull. soc. franç. céram.*, **1959,** No. 42, pp. 17–28.—A new method for classifying ceramic literature is proposed and discussed. It is believed that this new classification would be easily used by industry as well as by research groups. 3 tables, 7 references. R.K.W.

h **Recognition and power as motives of management.** Felix Eisele. *Ziegelind.*, **13** [9–10] 278–82 (1960).—E. presents the human factor in management, pointing to the importance of the recognition of employees and the danger of becoming dictatorial and thus undermining initiative. He compares the Western system of cooperation with the Eastern system of obedience, concluding that the former is the better and more advanced. T.W.G.

i **Trends in ceramic education.** R. M. King. *Proc. Porcelain Enamel Inst. Forum*, **20,** 119–21 (1958).—Trends indicate a movement away from empiricism to scientific treatments, the addition of humanities and nontechnical courses, and a movement away from the handbook type of instruction. L.S.O'B.

ing the signal with reference data obtained by examination of a sample of similar substance of predetermined thickness as an indication of the thickness of the substance. D.J.B.

See also **Sect. V:** Nucleation and growth of sodium disilicate crystals in sodium disilicate glass. **Sect. XII:** Tunnel kiln instrumentation and control.

XII—Kilns, Furnaces, Fuels, and Combustion

Combustion system improvements for oxidation section of tunnel kiln. Arthur L. Wittmer. *Am. Ceram. Soc. Bull.*, **40** [3] 122–25 (1961).—Forced introduction of excess air into the oxidation zone of tunnel kilns creates problems of burner design and selection. To avoid the aspirating of unknown and uncontrolled quantities of secondary air into the kiln, sealed type burners are often utilized. Burner choice by itself is not the complete answer unless the firing tunnel has been designed to provide the hot gas flow pattern required for the type of load being fired. The burner control system should contain means for adjusting the fuel-air ratio for a graduated and known degree of change over the length of the oxidation section of the kiln. 7 figures.

Continuous roller conveyer kiln. L. B. Coffin and David O. Anderson. *Am. Ceram. Soc. Bull.*, **40** [3] 126–30 (1961).—A scale model roller conveyer tunnel kiln was constructed for the continuous automatic production of brick, hollow building tile, etc. The kiln operates at 1800° to 2400°F. and can be adapted to firing other types of ceramic products in the higher temperature range. 11 figures, 2 references.

Oxidizing and reducing firing—understanding the significance of the kiln atmosphere. Rudolf Rasch. *Glas-Email-Keramo-Tech.*, 11 [9] 313–19 (1960).—The atmosphere is oxidizing, neutral, or reducing according to whether the oxygen partial pressure is greater than, equal to, or less than the dissociation pressure of the components of the body. Thus an atmosphere of CO_2 may be reducing or oxidizing according to the composition of the body and the temperature of firing, and an atmosphere of N_2 may be reducing. This general principle is exemplified by the dissociation of the iron oxides, the reaction $SiO_2 \leftrightarrows SiO + {}^1/_2O_2$, and the decomposition of the sulfates. Many differences in the results from plant and laboratory kilns are attributable to the atmosphere, e.g., it is usually much easier to obtain oxidizing conditions in a laboratory kiln, especially if it is electrically heated. 8 figures, 8 tables, 13 references. J.A.S.

Safety in kiln and furnace operation. J. B. Smith. *Ceram. Age*, 71 [3] 20–21, 42–45 (1958).—A gas safety control system developed by the Factory Mutual Engineering Division Laboratories is described. 4 figures, 1 photo. W.K.S.

Shuttle kiln. T. W. Garve. *Am. Ceram. Soc. Bull.*, **40** [3] 134–35 (1961). 6 figures.

Solving firing problems with differential thermal methods. Richard R. West. *Ceram. Age*, **72** [3] 14–16, 42 (1958).—The solution of a firing problem by the use of a small laboratory tunnel kiln and DTA is described. 2 tables, 3 figures, 1 photo. W.K.S.

Thermodynamic properties of the combustion products of graphite and oxygen in idealized dust flames. Robert W. Smith, Jr., Edwin B. Cook, and Hans M. Cassel. *U. S. Bur. Mines Rept. Invest.*, 1960, No. 5668, 12 pp. Free.—Examples are given of composition profiles at atmospheric pressure and room temperature in an idealized oxygen-dust flame, with mass and enthalpy preserved. M.J.K.

Trials with a tunnel kiln fired with "liquid gas." Josef Müller. *Ber. deut. keram. Ges.*, **37** [9] 441 (1960).—M. describes the successful production of electrical porcelain in a tunnel kiln (internal width 1.2, height 1.3, and length 80 m.) and two chamber kilns (33 cm.³) fired with propane gas. The only necessary modification was the replacement of the original burners. J.A.S.

Tunnel kiln instrumentation and control. Arthur P. Watts. *Am. Ceram. Soc. Bull.*, **40** [3] 131–33 (1961).—W. discusses methods of measuring and controlling temperature, pressure, flow, atmosphere, and kiln car movements. 2 figures.

PATENTS

Automatic ware car conveyer. William D. Bozman (Hanley Co.). **U. S. 2,961,973,** Nov. 29, 1960.—An automatic system for the movement of kiln cars on storage tracks takes over after delivery from the transfer car. The pushing is done by a reciprocating movement provided by a hydraulic cylinder to two rails located between the normal car trackage. At each car length there is an engaging mechanism attached to the rails that stays in contact with the car while the forward motion is in progress. The cycle is instituted by photoelectric cells, and no manpower is required. The cars are put on the tracks with alternate positions open to provide faster cooling until more than half the capacity is required, at which time they are progressively moved forward until in actual contact with the preceding car. Provision is made to prevent the cars from being pushed off the far end of the track. D.J.B.

Driers for powdered or granular material. Cyril H. Matthews. **U. S. 2,968,103,** Jan. 17, 1961.—A drier comprises a vertical drying chamber with inlet and outlet means, means for passing heated gases through the chamber, a pair of vertical rods slidably mounted in the chamber, resilient members secured to a fixture coacting with the rods to retain them in animated suspension, means for animating the rods, and grids equal to the cross-sectional area of the chamber in spaced relation on the rods, whereby material fed into the chamber is given a pulsating movement causing it to fall successively on the grids and be impelled from each grid upward to travel for a period freely suspended to delay its passage through the chamber and ensure an extended drying period for the material. D.J.B.

High temperature furnace. Robert M. Witucki and Richard L. Curtis (Curtiss-Wright Corp.). **U. S. 2,966,537,** Dec. 27, 1960.—A high temperature furnace comprises an outer cylindrical shell, an inner cylindrical shell of less diameter, thermal insulation in the space between them, a resistance heating element in the inner shell spaced radially inwardly from the interior wall, the outer and inner shells having aligned lateral openings, electrodes passing through the aligned openings to connect to and support the heating element, at least one sight tube passing laterally through the walls of the outer and inner shells to render specimens adjacent the heating element visible, a transparent member in the sight tube, and means for introducing an inert gas adjacent to the transparent member and through the tube to the interior of the inner shell. D.J.B.

See also **Sect. VIII:** Particle size of feldspar and flint as a factor in slip behavior.

XIII—Materials

Asbestos industry in 1960 (preliminary). Anon. *U. S. Bur. Mines Mineral. Market Survey*, **1960,** MMS 3152, 1 p. Each survey free from Pubs. Distrib. Sect., U. S. Bureau of Mines, Pittsburgh 13, Pa. **Crude perlite in 1960 (preliminary).** *Ibid.*, MMS 3138, 1 p. **Diatomite in 1960 (preliminary).** *Ibid.*, MMS 3137, 1 p. M.J.K.

Ceramic fibers for filtering dust from hot gases. L. J. Kane, C. E. Chidester, and C. C. Shale. *U. S. Bur. Mines Rept. Invest.*, 1960, No. 5672, 18 pp. Free.—Results are given of tests made with an aluminum silicate filter to develop methods for removing dust from hot gases at 1800°C. 17 figures. M.J.K.

Ceramic magnetic wet drum separator for cobbing. Anon. *Mining J.* (London), **255** [6536] 600 (1960).—The Stearns permanent ceramic wet drum separator is designed for cobbing applications in concentrating magnetite and reduced hematite ores. The units employ Indox V, a new ceramic magnetic material giving field strength readings up to 850 gausses $2^3/_8$ in. from the magnet face. V.R.E.

Ceramic tests of Illinois clays and shales. W. Arthur White and J. E. Lamar (compilers). *Illinois State Geol. Survey Circ.*, **1960,** No. 303, 72 pp.—About 125 tests of clays and shales from 59 counties are presented by county. One sample is Cretaceous clay from the southern tip of the state; eight samples are from pre-Pennsylvanian shales; the others are from Pennsylvanian shales and clays. Other publications on ceramic tests are listed.

Method and apparatus for detecting minute concentrations of gases and vapors. Robert A. Morris and Robert von Heine-Geldern (Mine Safety Appliances Co. of Pittsburgh). **U. S. 2,968,730,** Jan. 17, 1961.—The apparatus comprises means for exposing a gaseous mixture as it enters an ionization chamber to a specific reagent that will react with the constituent to be detected to form nascent particulate matter and means for measuring the ionization current in the chamber before and after the mixture is exposed to the reagent. D.J.B.

Method and installation for carrying out glow discharge processes. Bernhard Berghaus (Elektrophysikalische Anstalt Bernhard Berghaus). **U. S. 2,969,475,** Jan. 24, 1961.—In a method of performing metallurgical, chemical, or other technical processes under the influence of an electric glow discharge in a discharge vessel containing electrodes, the steps comprise (*a*) charging a gas into the vessel in the region of a first electrode and simultaneously withdrawing gas from the chamber at a point removed from the charging region and at such rates that a pressure gradient is created in the space surrounding the electrode in which the gas pressure diminishes with increasing distance from the electrode and (*b*) disposing a cooperating electrode at a distance from the first electrode and in the direction of diminishing pressure, whereby migration of the discharge away from the first electrode and into the zone of decreasing pressure is favored and the first electrode is at least partly relieved of the load otherwise imposed thereon by the energy of the discharge. D.J.B.

Process for crystalline growth employing collimated electrical energy. Grady W. Clark and Robert A. Lefever (Union Carbide Corp.). **U. S. 2,970,895,** Feb. 7, 1961.—A process for growing an electrically conductive crystalline boule comprises concurrently establishing an electric arc between a first electrode and a boule-growing surface, passing a gas stream in intimate contact with the first electrode to contain the arc, passing the arc-containing gas stream through an orifice to collimate the arc energy and the gas stream as well as to produce a high-pressure arc and a high thermal content effluent, passing the hot effluent to a boule-growing zone and heating the boule-growing surface, introducing the feed constituents into the zone and heating them by passage in the hot effluent to produce boule-growing material, and fusing and accumulating the material on the boule-growing surface as a crystalline boule of increasing size. D.J.B.

Radiation measuring apparatus [for thickness or density] having means for compensating errors due to atmospheric conditions. Arthur N. Otis, Jr. (Curtiss-Wright Corp.). **U. S. 2,968,727,** Jan. 17, 1961. D.J.B.

Sample cell for spectroscopic apparatus. Richard A. Magrath (Baird-Atomic, Inc.). **U. S. 2,970,216,** Jan. 31, 1961.—A sample cell for spectroscopic examination comprises a base for prepositioning and orienting the cell with respect to a photometric system, a body component having an elongated small diameter capillary first bore of circular cross section, the body being secured to the base for transmitting radiation from the system through a sample within the bore, a probe providing a capillary second bore communicating with one end of the first bore, and a syringe including a cylinder communicating with the other end of the first bore and a piston slidable in the cylinder, the body including an insert that is transparent to the radiation, the bore being formed in the insert and a shell for the insert, the shell having opposed windows aligned with the first bore, the periphery of the insert being flattened at positions adjacent to the windows, the axis of the first bore and the second bore intersecting at an oblique angle. D.J.B.

Silicon-oxygen-nitrogen composition of matter. William D. Forgeng and Russell W. Gerby (Union Carbide Corp.). **U. S. 2,968,530,** Jan. 17, 1961.—The composition disilico oxymononitride has the empirical formula Si_2ON and has an X-ray diffraction pattern exhibiting prominent lines at 3.38, 4.44, and 4.69 a.u. for diffracted beams having relative intensities of 100, 95, and 55, respectively. D.J.B.

Ultramicro electrode titration assembly. Edwin P. Arthur and Roger Gilmont (Beckman Instruments, Inc.). **U. S. 2,968,535,** Jan. 17, 1961. D.J.B.

XV—General

Dust diseases in the pottery industry. E. Posner. *Pottery Gaz.*, **86** [1006] 503–505 (1961).—P. describes the excellent facilities available and the modern equipment used for combating pneumoconiosis; 923 persons died from this disease between 1950 and 1960, and 2000 are receiving disablement benefits. Early detection of the disease is vital if its development is to be checked. 5 figures. C.M.C.

Scientific problems in the field of silicate chemistry and technology. P. P. Budnikov. *Silikattech.*, 11 [10] 450–53 (1960).—B. discusses problems in cement chemistry and technology, refractories, rare earths, crystalline bonds, sintering processes, crystal growth, physical chemistry of clays, clinker structure and the effects of impurities, hydration and setting processes, mortar and concrete technology, and industrial wastes. L.M.

XVI—Books

Determination of Gases in Metals. Report of a symposium organized by the Society for Analytical Chemistry in conjunction with the Iron and Steel Institute and the Institute of Metals. *Iron Steel Inst.* (London) *Spec. Rept.*, **1960,** No. 68, viii+308 pp., illus. Price £3 3*s*.—Fifteen papers cover the determination of oxygen, hydrogen, and nitrogen in iron and a few nonferrous metals. Vacuum-fusion analysis, spectroscopy, radioactivation and isotope-dilution analysis, carrier-gas techniques, X-ray diffraction and X-ray fluorescence analysis, and internal friction measurements were used.

Flame Photometry. John A. Dean. McGraw-Hill Book Co., Inc., New York 36, 1960. viii+354 pp., illus. $11.50.—In the field of flame photometry it is often said that "everything interferes with everything else." This book is virtually a documentation of that statement. The author presents, simply and clearly, the information needed by the analytical chemist who wishes to use this somewhat limited but, where indicated, extremely useful and efficient technique. The first half of the book gives the theoretical and experimental basis of practical flame photometry. A full third of the book is then devoted to a detailed consideration of each individual element which can be excited to emit radiation in a flame. A section is devoted to the more important applications of flame photometry, including a chapter on cement and glass analysis. There is a very extensive, though not complete, bibliography of almost 800 references. Modern flame photometry is only about twenty years old, and there are only two books on the subject in English. This is the first written with emphasis on United States practice, and it would be a worth-while addition to the library of any analytical chemist. J. J. Diamond

Fluidization and Fluid-Particle Systems. Frederick A. Zenz and Donald F. Othmer. Reinhold Publishing Corp., New York 22, 1960. x+513 pp., illus. $15.—Although the first few pages of this book represent an effective general presentation of the state of the art in this field, the remainder represents a highly comprehensive and technical treatment of the subject. The book traces the development of fluid particle operations and cites the sources of these developments along with significant patent and literature information. Reference is made to catalytic cracking in the petroleum industry, fluid bed production of ores and chemicals, fluidized sizing and drying, and spray drying. Mathematical treatment of the rheology of powders is presented. This includes data on the angle of repose of various particles and powders in bins. The physical characteristics, such as size and shape distributions, and powder viscosities under various conditions are discussed. Technical considerations such as the prediction of flow rates for powders in free flow through restrictions are presented. The motion of a single particle in fluids is examined in a comprehensive manner. Highly technical treatments of such subjects as flow through fluidized beds and bubble phenomena are presented. Pneumatic and hydraulic conveying systems are examined in a separate section of the book. The subject of particle carryover from fluidized beds as well as a theoretical treatment of particle recovery equipment is also included. Heat transfer in fluidized beds is the final subject matter presented. In summary,

slag as a free falling column into a vertical cellulating chamber having nozzles about its upper end for projecting converging streams of gaseous fluid and water on the molten slag column and disrupting it into small molten discrete masses. D.J.B.

Apparatus for the manufacture of spherical particles [pressure chamber]. Marvin A. Smith (Universal Oil Products Co.). **U. S. 2,980,628,** April 18, 1961. D.J.B.

Filter element for extremely fine dust. Gerhard M. Neumann (Delbag-Luftfilter G.m.b.H.). **U. S. 2,980,208,** April 18, 1961.—The element comprises a rectangular sheet of filter material creased first lengthwise zigzag fashion and then creased transversely to define panels of equal length, the panels being then folded transversely accordion fashion through 90° from their initial position at intervals. D.J.B.

Grinding mills. Oscar H. Johnson (American Brake Shoe Co.). **U. S. 2,980,352,** April 18, 1961.—A rod mill has alternating rows of dissimilar shell liners secured for rotation with the shell, certain rows being depressed and wide enough to contain several rods and the remaining rows having raised lifter pads spaced apart along the length of those rows. D.J.B.

Magnetic separator operating in an aqueous medium. Robert C. Forrer. **U. S. 2,976,995,** March 28, 1961.—The apparatus comprises two pole pieces, the cross sections of which throughout their height and in a direction perpendicular to that intended for the flow of the suspension have meandering outlines, the pole pieces defining a gap comprising a median part and comparatively small recesses whereby the paramagnetic and weakly ferromagnetic particles accumulate in and are discharged from the median part of the gap and only the weakly magnetic particles are discharged from the recesses. D.J.B.

Method of sintering. Edward C. Creutz (General Dynamics Corp.). **U. S. 2,976,598,** March 28, 1961.—The method includes working a plastic ceramic mix to form a compact having the prescribed dimensions and shape, immersing the compact in a bath of inert molten metal, and keeping the compact in the bath for a sufficient time and at a high enough temperature to convert it into a sintered ceramic product. D.J.B.

Mixer for granular material [muller type]. Robert L. McIlvaine (Herbert Simpson Corp.). **U. S. 2,978,147,** April 4, 1961. D.J.B.

Regulating electric precipitators [by a transducer]. Bengt Berg (A. B. Svenska Fläktfabriken). **U. S. 2,978,065,** April 4, 1961. D.J.B.

Slip casting. Jan W. Szymaszek (Union Carbide Corp.). **U. S. 2,979,401,** April 11, 1961.—The method of forming cast articles of a metal and/or metallic compound comprises coating particles of a powder of the material with a resin while suspending them in a nonpolar organic medium in intimate contact with a porous mold, absorbing the medium through the mold to form a green casting, removing the casting, and sintering it. D.J.B.

XI—Instruments and Test Methods

Automatic fringe counting interferometer for use in the calibration of line scales. Herbert D. Cook and Louis A. Marzetta. *J. Research Natl. Bur. Standards,* **65C** [2] 129–40 (1961).—A reversible fringe counting interferometer is described in which mechanical, optical, and electronic adjustments are maintained stable by servomechanism control or by balancing. Mirror parallelism is achieved by detecting the angular error electronically and correcting by means of barium titanate actuators. An electronic interpolator permits recording of the count in digital form to 0.01 fringe without ambiguity. A rate of more than 1200 fringes/sec. has been achieved over a range of 14 cm. Higher counting rates are possible over shorter ranges. Design factors and details are discussed. A correction factor is derived for the error introduced by finite collimation of the interferometer beam. 7 figures, 15 references. M.J.K.

Differential thermal analysis. J. A. Schedling. *Radex Rundschau,* **1959,** No. 4, pp. 600–11.—The principles, historic development, qualitative and quantitative aspects, apparatus, and applications of the DTA method are surveyed in detail. Although it offers great advantages as a dynamic measuring method, thus giving insight on the reaction kinetics, interpretation of the diagrams is not always easy and a critical attitude toward the interpretation is imperative. 17 figures, 31 references. L.M.

Evaluation of resistance strain gauges at elevated temperatures. Roscoe L. Bloss. *Materials Research & Standards,* 1 [1] 9–15 (1961).—Equipment and techniques for obtaining information on the probable performance of resistance strain gauges at 1500°F. are described. 11 references, 1 table, 13 figures. M.P.H.

High-temperature furnaces for X-ray diffractometers. William J. Campbell, Stephan Stecura, and Clark Grain. *U. S. Bur. Mines Rept. Invest.,* **1961,** No. 5738, 30 pp. Free.—Developments in the field of high-temperature X-ray diffractometers through 1959 are summarized, various furnace designs are evaluated, and the Bureau's X-ray diffraction facilities are described. 16 figures. M.J.K.

Microhardness testing at high temperatures. J. H. Westbrook. *Am. Soc. Testing Materials Proc.,* **57,** 873–97 (1957).—W. describes the construction, operation, and characteristics of a hot-hardness tester of modified Bergh design with a range of 20° to 1500°C. and a load range of 20 to 900 gm. The problems encountered in this type of test, particularly with respect to hard, brittle materials, are discussed in some detail. Typical results are shown, and examples of the application of the test are described. 5 tables, 15 figures, 47 references.

New apparatus for rapid differential thermal analysis. V. P. Ivanova and F. Ya. Bindul'. *Zapiski Vsesoyuz. Mineral. Obshchestva,* **89** [5] 560–64 (1960).—The apparatus is capable of obtaining data between 20° and 1000° to 1300°C., with a heating rate of 90° to 110°C./min., on samples of 0.02 to 0.08 gm. 3 figures, 5 references. D.T.W.

Physical investigations at high temperatures on fuel ash, slags, and ceramic materials with the heating microscope. A. Metz. *Radex Rundschau,* **1959,** No. 4, pp. 612–16.—The design, construction, and operation of the heating microscope are surveyed. 10 figures. L.M.

Remote-controlled microscope for "hot" metallography. F. Gabler. *Radex Rundschau,* **1959,** No. 3, pp. 557–62.—The design, construction, and operation of a remote-controlled microscope for polished surface examination of highly radioactive samples are described. The microscope was designed for the study of construction materials for nuclear reactors and is provided with appliances for observing and photographing polished specimens. 4 figures. L.M.

Syllabus of clay testing. T. A. Klinefelter and H. P. Hamlin. *U. S. Bur. Mines Bull.,* **1957,** No. 565, 67 pp. (reissue). 45 cents. 12 figures. Govt. Printing Office, Washington 25, D. C. M.J.K.

Telescope for measurement of optic angle of mica. Stanley Ruthberg. *J. Research Natl. Bur. Standards,* **65C** [2] 125–28 (1961).—The instrument allows rapid measurement of the apparent optic angle to an accuracy of 5′ of arc for samples as large as 2 in. in diameter. This angle is a property pertinent to the quality of mica. Instrumentation is quite simple but dependent upon the complex phenomena of interference figures produced by biaxial crystals in polarized light. Magnification is great, dispersion can be determined, and the uniformity of samples can be observed. 8 figures, 5 references. M.J.K.

Thermocouples for use in carbon atmospheres. M. R. Nadler and C. P. Kempler. *Rev. Sci. Instr.,* **32** [1] 43–47 (1961).—Criteria are discussed for the use of thermocouples in C atmospheres below 2000°C. Experimental data are given for W/Re, W/W-25Re, Re/W-25Re, graphite/Re, and graphite/Ir thermocouples in C atmospheres from room temperature to 2200°C. Reaction temperatures of C with thoria, urania, and yttria were measured to be below 1730°, 1620°, and 1590°C., respectively. 5 figures, 4 references. V.R.E.

PATENTS

Crossed dispersion photographic spectrometer. Richard F. Jarrell and William G. Fastie (Jarrell-Ash Co.). **U. S. 2,975,669,** March 21, 1961. D.J.B.

Electrical hygrometer device. Stanley R. Morrison (Minneapolis-Honeywell Regulator Co.). **U. S. 2,975,638,** March 21, 1961.—The apparatus determines the moisture content of a gaseous mixture. D.J.B.

Means for sampling bulk material. Fred Jordison (Birmingham Small Arms Co., Ltd.). **U. S. 2,977,800,** April 4, 1961.—For sampling bulk material as it falls in a stream, the apparatus comprises a sample container mounted on a pair of spaced arms and means for applying linear motion to the arms to move the sample container through the material stream. D.J.B.

Pyrometer construction. Sabert N. Howell (Servo Corp. of

viously analyzed reference clay minerals of the American Petroleum Institute Research Project 49 served to establish the calibration. 7 tables, 9 figures, 15 references. H.I.

ZnS:Cu,Cl and (Zn,Cd)S:Cu,Cl electroluminescent phosphors. A. Wachtel. *J. Electrochem. Soc.*, **107** [7] 602–608 (1960).—Procedures for the preparation of ZnS:Cu,Cl and (Zn,Cd)S:Cu,Cl electroluminescent phosphors are based on firing in an atmosphere containing elementary S. Cl incorporation is controlled by firing in capped silica tubes or in open boats in a current of $N_2 + S_2Cl_2$. Dependence of brightness on activator concentration is established on the basis of presumably constant excess Cu as Cu_2S. The use of Pb was found to be disadvantageous. Introduction of Cd causes the formation of the hexagonal phase and a (Cu,Cd)S compound and simultaneous decrease of electroluminescence brightness as well as dependence of electroluminescence emission color on Cd concentration. A two-step firing procedure is given, by means of which this effect may be partially avoided. 5 figures, 4 tables, 24 references. J.M.K. *a*

PATENT

Method for recovering plutonium values from solution using a bismuth hydroxide carrier precipitate. Burt F. Faris (United States of America as represented by the U. S. Atomic Energy Commission). **U. S. 2,981,591,** April 25, 1961.—A process for the recovery and decontamination of plutonium contained in an aqueous nitric acid solution of plutonium and uranium fission products comprises maintaining the plutonium in the hexavalent oxidation state, precipitating bismuth phosphate in the solution, separating the precipitate and its associated uranium fission products, precipitating bismuth hydroxide in the supernatant solution, digesting the slurry at 80° to 125°C., and separating the digested precipitate and its associated plutonium values. D.J.B. *b*

XV—General

Ceramics and the new federal housing program. Walter J. Miller. *Am. Ceram. Soc. Bull.*, **40** [7] 468–69 (1961). 3 photos.

Hyalurgy—an old but forgotten internationally understood technical specification. Epaminondas Vretos. *Sprechsaal*, **92** [7] 446 (1959).—A study of the philological correctness of the term "hyalurgy" and its applicability to the glassworking profession is presented. L.M.

Ideas in ceramics—old into new. A. L. Roberts. *Trans. Brit. Ceram. Soc.*, **59** [11] 505–14 (1960).—Some of the major themes on which J. W. Mellor worked established basic concepts in the science of ceramics which today have been amplified rather than changed. His classical studies of kaolinite laid the foundations of modern clay mineralogy, and his principle of "arrested reactions" is now seen to apply not only to reactions in the mass but also in the synthesis of minerals, though unstable modifications may appear and persist until the final and stable form develops. X-ray analysis and other physical methods have advanced the knowledge of the structure of clays immeasurably, and the properties based on structure are becoming understood. Increasing use of ion exchange is likely in the field of adsorption. Three stages can be seen in the development of the science of ceramics: (1) the beginning of the application of science to industry, (2) the acceptance by industry of the scientific principle and of research as a worthwhile investment, and (3) the solution of industrial problems by fundamental work. The properties of the solid state of matter are of prime importance, in particular, the defect structure of crystals on which so many ceramic reactions depend for their initiation and progress. A.W.N. *c*

Opportunities for ceramic industry development in Egypt. I. Y. Bakr. *Sprechsaal*, **91** [17] 418–26 (1958).—Egyptian raw materials, products, and the future evolution of the ceramic industry are discussed. 6 references. L.M.

Silicosis and its prevention. H. Fr. G. Schmidt. *Sprechsaal*, **3** [23] 611 (1960); reprinted in *Ziegelind.*, **14** [4] 117 (1961).—Silicosis may be held in check for years or even prevented by good food and healthful living. T.W.G.

Status of ceramic research. Winston Duckworth. *Ceram. Age*, **76** [4] 27–30 (1960).—D. notes that ceramic research, becoming deeper probing and wider ranging in scope, is gaining in stature. Progress has shown that past restrictions on the use, composition, and processing of ceramics often have no real basis. Supporting examples of this thesis from recent Battelle research include studies of antimony glasses, porcelain enamel adherence, pure refractory oxide sintering temperatures, and microstructural limits of strength. The importance of an interdisciplinary approach to bring about new uses for ceramics is emphasized. 5 photos. P.E.R. *d*

Structure and space demand of the elements. Hans Vetter. *Ziegelind.*, **14** [4] 99–106; [5] 127–31; [6] 149–56; [7] 199–202; [8] 226–29; [9] 267–78 (1961).—V. subjects all the elements, as such and in minerals and other combinations, to a thorough study. 52 tables, 3 figures, 24 references. T.W.G. *e*

Summing up—a round table discussion. William M. Branham, Winston H. Duckworth, Einar P. Flint, John M. Neff, and Eugene W. Wainer. *Ceram. Age*, **76** [4] 76–77, 79–89 (1960).—The ceramic research managers of Battelle Memorial Institute, Arthur D. Little, Inc., Armour Research Foundation, and Horizons, Inc., discuss the status and future of ceramic education, technology, and research and present their views for correcting problem areas in education and industry. 18 photos. P.E.R. *f*

Where are the patents? Eugene Wainer. *Ceram. Age*, **76** [4] 35–42 (1960).—W. concludes that the ceramic industry is spending less per sales dollar in research than comparable industries and that research and invention in the industry seem to be lagging. He suggests as a solution, not only a reorientation of ceramic education from technology to pure scientific aspects, but also an adjustment in ceramic industrial philosophy with stress on the need to obtain a greater dollar return per unit of ceramic raw material sold. 3 figures. P.E.R. *g*

XVI—Books

Application of Quantitative Methods in Archaeology. Edited by Robert F. Heizer and Sherburne F. Cook. Viking Fund Publications in Archaeology, No. 28. Quadrangle Books, Inc., Chicago 1, 1960. x + 358 pp., 12 illus. $7.50.—The editors and 13 other scholars prepared papers for a nine-day meeting in Austria in 1959, sponsored by the Wenner-Gren Foundation. These papers are published in this book, as well as the discussions of the meeting and a short list of recommendations drawn up at the end of the meeting by the participants. The papers cover the many techniques that can be used to interpret the residues of human activity on early archeological (prehistoric) sites, and all are concerned with the proper quantitative interpretation of such evidence. Of special interest to ceramists is "Quantitative study of ceramic materials," by Frederick R. Matson, which briefly covers the newer techniques applied to ceramic materials. These include nuclear bombardment, X-ray fluorescent spectrometry, emission spectrometry, X-ray diffraction, magnetic dating, and microscopic studies, as well as chemical analysis. The information to be gained from modern primitive pottery manufacture and from technical studies including modern reproduction of ancient materials is also covered. There is a useful bibliography of 76 references. Marie Farnsworth *h*

Bibliography of Glass. Compiled by George Sang Duncan; edited by Violet Dimbleby. Published for the Society of Glass Technology by Oceana Publications, New York 3, 1960. 544 pp. $45.—Designed to give a comprehensive coverage of publications on glass from the earliest records to 1940, the 15,752 entries in this bibliography were selected by Mr. Duncan over a period of 28 years. After his death, the task of organizing and editing was completed by others under the direction of the Society of Glass Technology. Entries in the main section are alphabetized by author names, with anonymous works included under subject headings. Titles are given in the language of original publication with an English translation or explanation following foreign titles. In some cases, additional information is given, particularly in reference to some of the rare works. A supplement includes approximately 400 entries which were found or in which some of the data were confirmed after the main section was in type. *i*

Ceramics. P. William Lee. Reinhold Publishing Corp., New *j*

1200°C. to dissociate the gel and expel the water and any volatile substances formed. D.J.B.

Neutron-capture, gamma-ray prospecting method. James W. Barley, Charles W. Tittle, and Albert R. Graham (Gulf Research & Development Co.). **U. S. 2,983,817,** May 9, 1961.—A method for detecting an anomaly in the degree of alteration of igneous and metamorphic rock bodies comprises procuring equal weight samples of the rock body, identically subjecting each sample to a fixed slow neutron flux and concurrently measuring the rate at which γ rays are produced by the sample having a predetermined range of energy levels, and correlating the measured rates with the locations of the points from which the samples were procured. D.J.B.

Preparation of anhydrous cerium chloride, uranium bromide, or plutonium fluoride. Kent M. Harmon and Edward Wichers (United States of America as represented by the U. S. Atomic Energy Commission). **U. S. 2,982,603,** May 2, 1961. D.J.B.

Production of plutonium fluoride from bismuth phosphate precipitate containing plutonium values. Harrison S. Brown and Edward G. Bohlmann (United States of America as represented by the U. S. Atomic Energy Commission). **U. S. 2,982,599,** May 2, 1961. D.J.B.

a **Scanner element for particle analyzers.** Wallace H. Coulter, Robert H. Berg, and Fred L. Heuschkel (Coulter Electronics, Inc.). **U. S. 2,985,830,** May 23, 1961.—A scanner element comprises a vitreous ceramic wall having an orifice and an inert wafer of highly heat resistant material having a permanent contour aperture therein fused to the wall with the aperture and orifice aligned. D.J.B.

b **Tube furnace for carrying out gas reactions in ceramic tubes.** Friedrich Endter and Julius Schüffler (Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler). **U. S. 2,987,382,** June 6, 1961. D.J.B.

Vacuum coating apparatus. James H. Gardner and Charles A. Baer (National Steel Corp.). **U. S. 2,989,026,** June 20, 1961. D.J.B.

XV—General

Cement ceramics. H. J. Rolke. *Ceram. Age,* **74** [5] 26–29 (1959).—R. describes the possible use of hydraulic cement to improve wet and dry strength and to produce "cold grog." W.K.S.

Ceramic engineering and materials engineering. Lawrence H. Van Vlack. *Am. Ceram. Soc. Bull.,* **40** [9] 568–69 (1961). 2 tables.

[Ceramic industry—history and present development.] Sylvio Proes de Abreu. *Cerâmica* (São Paulo), **4** [16] 26–31 (1958). V.R.P.

Foreign competition in the ceramic industries. Jennings Randolph. *Am. Ceram. Soc. Bull.,* **40** [8] 512–13 (1961).

High temperature lab designed on functional rather than product lines. Anon. *Ceram. News,* **10** [3] 16, 27 (1961).—A brief description of the new laboratory for inorganic, chemical, ceramic, metal, and mineral research of Metal & Thermit Corp., Rahway, N. J. 3 photos. D.J.B.

Hope for 1961—growing markets, no inflation. Anon. *Rock Prods.,* **64** [1] 84–95 (1961).—A forecast of business conditions includes cement, lime, and lightweight aggregate with tonnage output charts from 1950 to date and a 1961 projection. 20 figures. D.J.B.

Managerial aspects of plant operation—elements of inventory control. Garrison F. Finzer. *Ceram. Age,* **74** [6] 22–24, 30–31 (1959).—Means of better inventory control through planning are discussed. 5 figures. W.K.S.

Modern ceramics, ally of modern metals. Anon. *Metal Progr.,* **78** [5] 69 (1960).—Recent reports on more ductile ceramic products and the use of familiar metallurgical tests and procedures for studying compositions indicate that metals and ceramics are coming closer together. The combined talents of the ceramist and metallurgist should produce wonderful new products. D.J.B.

Prestressed ceramic structures. F. R. Shanley and W. G. Knapp. *PB Rept.* **130928,** 72 pp.; *U. S. Govt. Research Repts.,* **30** [5] 419 (1958).—Use of prestressed ceramics as primary aircraft structures is discussed. Several semispan wings were assembled and prestressed. Failure during prestressing in each case precluded static tests. Methods of cellulating ceramics to reduce the apparent density were developed and tested. The following tests and studies were conducted: (1) determination of Poisson's ratio for various ceramics; (2) fatigue tests of ceramics; (3) ceramic body study in the clay–Al_2O_3–flux field systems; and (4) study of gasketing materials.

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e **Properties and applications of glasses and ceramics.** J. R. Blizard. *Machine Design,* **33** [14] 166–67, 169 (1961).—Mechanical and thermal properties are given in tabular form for glasses, fused SiO_2, glass-ceramics (Pyroceram), high temperature oxides, and bonded SiC. A brief discussion of guides to be followed in design is included with some possible applications. 2 photos. D.J.B.

f **Science in the ceramic industry.** N. F. Astbury. *Trans. Brit. Ceram. Soc.,* **60** [1] 1–32 (1961); cf. *Ceram. Abstr.,* **1961,** April, p. 104*f*. A.W.N.

g **Symposium on materials research frontiers.** *Am. Soc. Testing Materials Spec. Tech. Publ.,* **1959,** No. 243, 52 pp. $2.00.—The following papers are included: "Tailoring the properties of materials," by E. P. Stevenson; "Materials in the nuclear age," by John J. Antal; "New advances in physical metallurgy," by W. R. Hibbard; and "Recent developments in glass research," by W. W. Shaver.

Warning to ceramists. Herbert Insley. *Am. Ceram. Soc. Bull.,* **40** [8] 511 (1961).

XVI—Books

h **Barium Bibliography—A Comprehensive Survey of the Literature on Applications of Barium Chemicals.** Inorganic Chemicals Research & Development Dept., Food Machinery & Chemical Corp., Mineral Products Div., 161 E. 42nd St., New York 17, N. Y., 1961. 433 pp.

Building Research, 1960. Department of Scientific and Industrial Research, 1961. iv + 91 pp., illus. Price 7*s*. Available from H. M. Stationery Office, London.—The report covers materials, design and performance of structures, soil mechanics, efficiency of buildings, and building operations.

i **Encyclopedia of Microscopy.** Edited by George L. Clark. Reinhold Publishing Corp., New York 22, 1961. xiii + 693 pp., illus. $25.—This book is composed of 109 chapters under approximately 20 sections. There has been an obvious effort to include a notice, even of the briefest, of the latest developments in this field. Emphasis is laid on the application and results of microscopic study in specialized areas rather than on techniques of microscopy and preparation of materials. Particularly in the field of electron microscopy, there are chapters, often beautifully illustrated with micrographs, that will appeal to the specialist in the microscopy of organic materials. There is a lack of coherent organization and over-all editing. Gaps exist and considerable overlap is often evident. Some chapters which have little to do with microscopy are included, e.g., "Microscopists and Research Management," whereas such an important topic as the reflecting light microscope (metallographic microscope) is barely mentioned. Brief descriptions of phase microscopy, interference microscopy, and polarization microscopy may be found by diligent search in three or more different chapters. Although there are chapters concerning electron microscope lens design and the history of electron lens development, chapters on the historical development of microscope design with informative illustrations are either absent or very brief. To the ceramist, the chapters with the most usefulness and appeal are those on minerals (under electron microscopy), industrial research, optical theory of the light microscope, optical mineralogy, and geological, mineralogical, and ceramic applications of microradiography. In the chapter on minerals the morphology of very fine grained minerals is well illustrated. The chapter on optical mineralogy is concerned with the application of the polarizing microscope to the elucidation of the chemical relations of minerals; the behavior of light in crystalline materials is not discussed here or elsewhere in the book. The chapter on petrographic thin sections describes briefly the older methods of preparation. That on geological,

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