amounts of phases already precipitated as well as the total composition of phases precipitating on a boundary curve at a given temperature. The author's unique method of distinguishing between eutectic invariant and noneutectic invariant points in ternary systems is of interest. The book should be of value to all students of phase diagrams.

HERBERT INSLEY

Text-Book of Physical Chemistry: Vol. 2, Principles Involved in Chemical Reactivity. J. NEWTON FRIEND. Charles Griffin and Co., Ltd., London, 1935. xii + 483 pp., 3 plates. Price 24s. Reviewed in *Nature*, **136** [3428] 51 (1935).—The principal subjects considered are thermochemistry, chemical equilibrium, reaction velocity and chemical change in homogeneous systems, combustion in gases, the phase rule, catalysis, electrochemistry, structure of the atom and of the molecule, and chemical thermodynamics. For Vol. I see *Ceram. Abs.*, **12** [10–11] 404 (1933). J.L.G.

Text Book of Quantitative Chemical Analysis. A. C. CUMMING AND S. A. KAY. 6th ed., revised by F. C. Guthrie and J. T. Nance. Gurney and Jackson, London and Edinburgh, 1934. xv + 482 pp. Price 15s net. Briefly reviewed in *Nature*, **135** [3425] 1020 (1935).—The increased use of electrolytic and colorimetric methods is given special attention. Chapters on the analysis of ores and alloys, gas, and water have been added. J.L.G.

PATENTS

Ceramic masses preventing the formation of carbon deposits. HANS WOLF AND HERMANN LEUCHS (I. G. Farbenind. A.-G.). U. S. 2,020,713, Nov. 12, 1935 (Aug. 4, 1931). Ceramic masses containing iron or iron oxide to be used in conjunction with hot gases containing carbon compounds and in which no carbon is deposited from the gases containing carbon compounds when coming into contact therewith at high temperatures, the ceramic masses containing an amount of a copper compound not exceeding 0.2% of their weight calculated as metallic copper

Method of producing crystalline hydrates of alkali-metal silicates. C. L. BAKER (Philadelphia Quartz Co. of California). U. S. 2,017,561, Oct. 15, 1935 (July 18, 1931). In a method of making a definite crystalline hydrate of an alkali-metal silicate, the steps include preparing a solution of the hydrate, establishing the solution at a temperature below the melting point of the crystal sought but high enough to keep the solution relatively fluid, initiating crystallization while substantially maintaining the temperature, mechanically separating the crystals from the liquor without material reduction of the temperature, and therefore, of the fluidity of the residual mother liquor, and drying the separated crystals at substantially the same temperature.

Method of recovering lithium from its ores. WALTER ROSETT AND F. R. BICHOWSKY. U. S. 2,020,854, Nov. 12 1935 (Oct. 6, 1933). A process for recovering lithium from its ores consists of the steps of intimately mixing comminuted ore with a calcium-containing material that yields calcium oxide, at least in part, on roasting, roasting the mixture at 800° to 1000°C until clinkered, reducing the coarse clinker to a suitable size for leaching, leaching the clinker with hot water until the clinker is free of alkali salts, precipitating as a carbonate the calcium contained in the liquor, separating the liquor from the carbonate, and adding to the liquor an acid to form the desired salt of lithium.

Process of making sodium aluminate. R. E. CUSHING AND C. W. BURKHART (Pennsylvania Salt Mfg. Co.). U. S. 2,018,607, Oct. 22, 1935 (Nov. 10, 1934). The process of preparing solid sodium aluminate by reacting powdered alumina hydrate and solid caustic soda directly without aqueous dissolution or fusion of the caustic soda comprises mixing together powdered alumina hydrate and solid caustic soda, in the absence of sufficient added water to dissolve the caustic soda, and reacting the mixture of solid materials at a temperature insufficient to fuse the caustic soda.

Production of alkali perborates. N. V. INDUSTRIEELE MAATSCHAPPIJ VOORHEEN NOURY & VAN DER LANDE. Brit. 434,991, Sept. 25, 1935 (Aug. 9, 1933).

Zirconium silicon alkali acid solution and method for stabilizing. C. J. KINZIE (Titanium Alloy Mfg. Co.) U. S. 2,017,125, Oct. 15, 1935 (July 27, 1932). A method of converting zirconium silicate or zircon into a stabilized acid zirconium solution containing silicon and an alkali metal comprises decomposing the zirconium silicate mixed with the alkali through heating, treating the roasted product with nitric acid to solution of silicon and soluble zirconium compounds, separating the clear acid liquor containing zirconium, silicon, and alkali in solution, and adding a readily water-soluble organic compound selected from the group consisting of tartaric acid, citric acid, and sodium zirconium tartrate to stabilize it.

General

After the flood. G. A. VAN BRUNT. *Factory Management & Maintenance*, **93** [9] 400–401 (1935).—Electrical equipment that has been submerged in flood waters requires prompt and careful treatment to avoid serious damage. All dirt, grease, and oil should first be removed before sending small motors to the repair shop. Large motors can be dried in place. All bearings should be cleaned thoroughly to remove the silt usually contained in flood waters. All transformer oil should be filtered. Motor and transformer windings should be dried at temperatures not exceeding 85°C. If coils are dried, not in ovens but by passing low-voltage current through them, care must be taken to avoid producing hot spots inside the coils. Resistance tests on insulation will indicate when the drying is complete and if the insulation has been permanently injured. Before putting in service again, windings and conductors should have two or three coats of air-drying varnish. Speed reducers, chain drives, and gears should be cleaned carefully of grit, dirt, and oil. Rubber belts usually suffer no harm from water and are ready for service after cleansing from grit and drying the surface. If water penetrates through cuts to fabric under the rubber, such places must be cut out. Wet leather belts should be cleaned and coated with belt dressing on both sides to insure that they dry slowly. Such drying should not be hastened by the application of heat. Waterproof

fabric belts require only cleaning and surface drying before use. If they have been submerged too long, however, they may shrink on drying and put undue tension on shafts and bearings. Nonwaterproof fabric belts should be removed from pulleys and stretched flat to dry under tension since they shrink considerably. After machines have been cleaned and reassembled, they should be tested for alignment and accuracy and the bearings run in for a short time. Illustrated by photos taken at the Corning Glass Works during the flood of July 7 and 8, 1935. J.L.G.

Anomalies of siliceous matter in boiler-water chemistry. R. E. SUMMERS. *Combustion*, **6** [7] 13–15 (1935).—S. discusses several apparently divergent views of authorities concerning theories of siliceous scale prevention. He points out that hardness is not an index of the tendency of siliceous water to incrust boilers, that the use of evaporators does not insure the complete elimination of such matter, and that higher p_H values are desirable with high silicate content of boiler water; furthermore, increased rate of blowdown usually results in increased rate of scale accumulation under such conditions. H.E.S.

Ceramic collection in Rome. L. ARIMATTEI. *Ind. Vetro Ceram.*, No. 8, pp. 327–29 (1935).—A collection of about 200 majolica pieces is described. The Spanish Moorish group dates from the 15th to the 17th Century, and the Italian, particularly important, from the 14th to the 18th Century. Some specimens are unparalleled. F.E.V.

Dust problem. ANON. *Ceram. Ind.*, **24** [5] 263–66 (1935).—Special mechanical and medical precautions taken in a newly designed pottery plant to avoid dust conditions are described. Illustrated. E.J.V.

Economics of preheated air for stokers. R. E. DILLON AND M. D. ENGLE. *Combustion*, **6** [7] 17–20 (1935).—Maintenance data are supplied by 33 operating companies covering 122 underfeed stokers operating with average air temperatures of 120 to 460°F and maximum air temperatures as high as 600°F. Aside from preheat temperatures, the factors affecting stoker maintenance are area of stoker, coal burned per square foot per hour, and per cent of ash in the coal burned. Up to 300°F the preheating of air supplied to underfeed stokers does not seem to increase maintenance above reasonable figures, but above 300° or 350°F there is a sharp increase in maintenance. H.E.S.

Effects of adverse atmospheric conditions encountered in various industries on mental and muscular efficiency. G. E. GLOCK. *Jour. Hygiene*, **35** [1] 78–92 (1935).—The observations were made in an air-conditioning hut with control of circulation, humidity, and temperature. The subjects were dressed in a standard uniform, and their diet was controlled. Measurements under different conditions were made of their pulse rate, blood pressure, blood sugar, respiration rate, metabolic rate, mental efficiency, and muscular efficiency. It was found that the physiological reactions produced by alterations in the atmospheric conditions closely followed the subjective sensations experienced. Bad air conditions produced an increased pulse rate, respiration rate, and metabolic rate, and a decreased blood pressure, and decreased muscular and mental efficiency. To produce normal physiological factors, a wind of 200 ft./min. was required. G.H.A.

Fatal case of silicosis. S. V. GUDJONSSON AND C. J. JACOBSON. *Jour. Hygiene*, **34** [2] 166–71 (1934).—A typical uncomplicated case of silicosis is described. Up to the time of his death the worker was a porcelain turner in a Copenhagen factory. His work was mainly with wet or moist clay but also required putting the finishing touches to the dry pieces of pottery. Samples of dust taken from the works contained a considerable proportion of free silica. A Roentgenographical examination of the worker 16 months previous to death showed silicosis in the third stage. The findings on autopsy are given in detail. No tuberculosis was found in any of the sections. Microscopic examination of lung tissue showed numerous needles of sericite and needles from kaolin. The findings support the theory advanced by W. R. Jones that silicosis can be produced by fibrous minerals. In a comprehensive examination of porcelain workers in Denmark many were found to present marked silicotic changes in the lungs. Illustrated. G.H.A.

Glass enemy No. 1. ALEXANDER SILVERMAN. *Glass Ind.*, **16** [10] 305–309 (1935).—S. discusses the present Tariff Act and its failure to protect the glass industry, with special reference to false invoicing, false entering, and improper classification, and suggests possible means for overcoming these. E.J.V.

Importance of dust abatement in cement manufacture. P. POUTIER. *Génie Civil*, **104** [12] 267–70 (1935).—Large amounts of dust produced during the manufacture of cement are objectionable both from the economic and health standpoints. Means for the reduction of its amount and for the recovery of the dust produced are described Filtering of the outcoming air is the best solution. Mechanical filters offer several objections. Electrostatic precipitation was used with pronounced success on the plant scale. Cottrell Lurgi apparatus appear to be the best. J.D.G.

Influence of improved design on marketing strategy. EDITORIAL. *Bull. Amer. Ceram. Soc.*, **14** [11] 375 (1935).

International Congress on Glass Technology, 1936. ANON. *Bull. Amer. Ceram. Soc.*, **14** [11] 375–76 (1935).

Inventory control. H. P. DUTTON. *Factory Management & Maintenance*, **93** [8]. *S77–92* (1935).—The article is divided into chapters entitled (1) need to overhaul current practice, (2) speculative elements, (3) economic lot sizes, (4) perpetual inventory records, (5) taking physical inventory, (6) pricing materials, (7) layout of the stockroom, (8) symbolization of materials, (9) organization and personnel, and (10) measures of storeroom performance. Illustrated by charts, graphs, and a photo. J.L.G.

Manganese occupational poisoning. V. DHERS. *Med. du Travail*, **6**, 63–94, 147–94 (1935); abstracted in *Chem. Eng. Mining Rev.*, **27**, 408 (1935).—The symptoms of poisoning by MnO_2 and other Mn compounds are described. Since treatment is useless, it is important to exclude the dangerous dust from the air of workshops. H.H.S.

Method of expressing the silica content of the lung. D. H. COLLINS AND J. H. DIBLE. *Jour. Hygiene*, **35** [1] 64–68 (1935).—Four methods are used: (1) per cent of moist weight of the organ, (2) per cent of dry weight, (3) per cent of mineral ash, and (4) total silica. The merits of each method are discussed. It is concluded that estima-

tion as total silica is the method least liable to errors. The quantity of silica recoverable from samples of lung may be valuable evidence on autopsy of contributory, pulmonary fibrosis. G.H.A.

Mines Branch laboratory and field program. EDITORIAL. *Can. Mining Met. Bull.*, No. 281, pp. 423–26 (1935).—Current activities of the Dominion Government Mines Branch are outlined. The Ceramics Division is testing the physical properties of Canadian brick, especially in reference to their weather-resisting properties, and is investigating the treatment of certain shales used in brickmaking in an effort to reduce the porosity, as well as conducting a number of minor investigations. G.M.H.

Oil, trail blazer for business. EVERETT T. MARTIN. *Nation's Business*, p. 46 (Aug., 1934).—The oil industry, its birth, development, present expanse, and probable future, is discussed. Technical obstacles and their solutions are outlined. P.T.C.

Operating time and trouble saved. SABIN CROCKER. *Heating, Piping, & Air Conditioning*, 7 [7] 331–32 (1935).—C. shows how operating time and trouble can be saved by considering coal and ash handling and accessibility for repairs and operation in the installation of single-retort underfeed stokers in medium-sized boilers. Five photos of actual installations are shown. J.L.G.

Practical interpretations of feed-water tests. C. W. RICE. *Combustion*, 6 [8] 29–32 (1935).—R. points out how simple, daily, routine tests by the operating engineer for controlling the water conditioning can be utilized to reveal much additional information, *e.g.*, the condition of the boiler, leaky blowoff connections, whether the blowdown is excessive, waste in carryover, ratings being carried, and the detection of pending trouble. In these the salt and alkalinity readings are indicative. Examples are included. H.E.S.

Preparation of raw materials for ceramics. G. GERTH. *Sprechsaal*, 68 [27] 419–22 (1935).—By preparation is understood the separation of the useful minerals from those that accompany them in deposits. This includes mechanical processes by the wet method, flotation, magnetic separation, and centrifuge. The cases in which these processes are used in the preparation of ceramic raw materials are described. M.V.C.

Preventing belt static. WAYNE DAVIES. *Factory Management & Maintenance*, 93 [8] 355–56 (1935).—Dangerous static charges can be prevented by proper drive design and by keeping belts soft and pliable. Proper ventilation will usually prevent static charges from building up since the open air is normally too humid to allow static charges to develop. When the generation of static charges can not be prevented, the machines and surrounding handrails should be grounded as should the jack- and line-shaft hangers. A good practical ground for a belt or machine likely to develop static charges consists of two small flat pieces of carbon with a thin sheet of pure mica between them. The mica sheet should have a $^3/_{16}$-in. hole through its center. A charge carried to one plate from the belt or machine will cross the gap to the other carbon plate and be grounded without sparking. Two needle points may be used as a rough voltmeter in testing for static voltages, remembering that 20,000 v. will cause a discharge to jump an inch gap in the air and that the voltage is directly proportional to the distance the spark jumps. Humidity b low 30% favors the development of static charges; 40 50% and above will generally prevent the build-up of da gerous static charges. Illustrated. J.L.G.

Properties of crystalline magnesium oxide. R. V DITCHBURN AND J. HARDING. *Nature*, 136 [3428] 70–: (1935).—D. and H. sealed artificial crystals of MgO in soda glass and obtained vacuum-tight seals. The edg of the crystal should be polished before sealing in. The mal expansion coefficient of the crystal is 11×10^{-6} ar that of the glass used is 9.6×10^{-6} in the range 0 to 100°(Crystals were about 1 x 1 x 0.5 cm. with some up to 3 x 3 1 cm. Clear specimens were transparent to λ 2200Å Most specimens showed some double refraction due t strains. The crystals seem impervious to attack by lith ium, potassium (400°C), sodium (500°C), lead (1050°C magnesium (1100°C), and aluminum (1100°C), but ca cium (1050°C) and copper (1100°C) etched the surfac slightly. They are thus more resistant to penetration b metal vapors than either glass or quartz. J.L.G.

Quality control. H. P. DUTTON. *Factory Management & Maintenance*, 93 [9] S93–108 (1935).—Quality con trol insures that the customer always receives satisfactory goods and calls attention to points or processes where a control is failing to act and a correction is needed. The following subjects are considered: (1) objective of quality control, (2) inspection specifications, (3) where and what to inspect, (4) inspection by sampling, (5) inspecting the inspector's work, (6) tools of inspection, (7) layout of inspection operations, (8) inspection organization, (9) managing the department, and (10) applications of inspection. Illustrated by graphs. J.L.G.

Quality control. F. M. THORMAN. *Bull. Amer. Ceram. Soc.*, 14 [11] 355–59 (1935).

Silicates of soda in the ceramic industry. J. G. VAIL. *Ceram. Age*, 23 [1] 3–4 (1934).—A brief classification of sodium silicates with respect to physical form, water content, and chemical composition is given. The following applications of sodium silicates are described: (1) deflocculation of clays, (2) composition of acidproof, fritted enamels, (3) cleaning of sheet steel, (4) preparation of glazes, (5) bonding of abrasive wheels, and (6) manufacture of refractory cements. See also "Sodium silicate—" *Ceram. Abs.*, 13 [9] 246 (1934). F.G.H.

Silicosis—industrial enemy. C. O. SAPPINGTON. *Factory Management & Maintenance*, 93 [7] 291–92 (1935).—S., a doctor and consulting industrial hygienist, defines silicosis as a general replacement of normal, elastic lung tissue by unyielding, inelastic fibrous tissue brought about by continuous breathing of microscopic particles of free silica dust for an extended period of time. This fibrous tissue causes a shortness of breath, a decrease in lung expansion, and an increased tendency to tuberculosis. Nature's primary defenses against silicosis are the hairs in the nose, the mucous secretion on the surface of the lining of nose, throat, and windpipe, and the cilia or microscopic hairs on the lining of these passageways. The secondary defense is the so-called lymphatic system which acts to carry waste from the lungs. The four exposure factors involved in the production of silicosis are (1) the concentration of the dust (number of particles per cubic foot of air), (2) size of the dust particles (particles under ten mi-

crons in largest diameter are considered to cause silicosis since no larger ones are able to enter the tiny air sacs of the lungs), (3) mineral composition of the dust with quartz the dangerous constituent, and (4) length of time exposed to the dust. A rating of the health hazards of a particular plant can be made only after considering the physical conditions of the plant, the processes and materials, duties of the employees, their previous medical and occupational histories, the four exposure factors listed, and the medical findings on employees. This last should include a thorough history and examination of the chest, with stereoscopic X-ray films. Medical methods of prevention include preëmployment examinations with chest films, periodic examinations with chest films, and placement of employees according to the results of these examinations. Engineering prevention includes making dust analyses, rating the efficiency of protective devices, and comparing the information gained with the established criteria. The protection used may take the form of protection for individual employees or of control of the dust particles. The measurement of the remaining hazard is not concerned with what the protective devices take away but rather with what remains for the worker to breathe. Illustrated.

J.L.G.

Steel prepares to meet new opportunities. V. G. IDEN. *Nation's Business*, p. 22 (March, 1934).—Numerous examples of the applications of stainless steels, sheet steels, and improved welding methods are given, and it is shown how these advances have lead the steel industry, the business barometer, back toward better times.

P.T.C.

Views on silicosis. W. E. COOKE. *Jour. Hygiene*, **35** [2] 207–18 (1935).—It is claimed that the consensus of opinion is that the chemical action of free silica plays the major part in the production of silicosis. The theory of W. R. Jones that sericite and not free silica is the cause of silicosis is discredited. The size of the particles is important only on account of their effect on the solubility. Sharp and angular particles do not necessarily cause respiratory disability. Pneumonoconiosis from asbestos may be due to the liberation of free silica from solution of asbestos in tissue fluids. No explanation is given for the immunity from silicosis of some workers under adverse conditions. G.H.A.

BOOKS

Ceramic Data Book and Catalogs. 8th ed. Industrial Publications, Inc., Chicago, 1935. 330 pp. No charge. This edition carries 80 pages of well-illustrated advertisements, each of which contains informational matter of value to every ceramist. These 80 pages of advertising are not by any means of small value; they are sources of information. There are 44 pages devoted to a review of the literature with bibliographies on enamel, whiteware, glass, refractories, and structural clay products and production. There are 150 pages devoted to a compilation of tables, charts, definitions, and data which are frequently used. Forty-five pages are devoted to ceramic raw materials. Eleven pages are devoted to formulas and calculations. While some of the material of this eighth edition appears in the previous editions, a great deal of it is new, bringing the information up to date. This has characterized all previous editions, making of these books valuable and fairly exhaustive reference works on ceramics.

ROSS C. PURDY

Ceramic Engineering (Ingeniería Cerámica). T. W. GARVE, Columbus, Ohio. 8 pp., 11 figs. This small bulletin discusses driers, kilns, etc., and is written for the needs of the clayworker in Latin-American countries. It contains an improved design of a chambered continuous kiln especially suitable for the prevailing capacities and requirements of the Spanish and Portuguese South. This kiln permits the firing of all structural and other ware, enabling flashing, salt-glazing, etc. An appendix contains a table of pyrometric cones and other vital data relative to the conversion from the English to the metric (Spanish) system. T.W.G.

Chemical Engineering Catalog. 20th annual ed. Reinhold Publishing Corp., New York, 1935. 863 pp. Price $3.00. The publishers have once more rendered valuable service to the industries in the issuance of this book. The technical and scientific book section of 50 pages is alone worth the price of this catalog. The many equipment and instrument concerns have furnished 800 pages of condensed alphabetized and indexed catalog, thus providing a handy reference book. It has a separate index of the laboratory and reagent chemicals.

ROSS C. PURDY

Chemical Guide Book, 1935. Chemical Markets, Inc., New York, 1935. 803 pp. Price $2.00. Reviewed in *Ceram. Age*, **26** [4] 159 (1935). F.G.H.

Dynamic Economics. Theoretical and Statistical Studies of Demand, Production, and Prices. (Monograph of the Cowles Commission for Research in Economics, No. 1). CHARLES FREDERICK ROOS. Principia Press, Bloomington, Ind., 1934. 275 pp. Price $3.50. A good general description of this book by the former Director of Research and Planning of the NRA is found in the first sentence of his preface. "In 1929 I decided to refrain from publishing research papers in economics until I had a sufficient number to justify the publication of a book which would relate these researches to each other and to my earlier papers." Unfortunately, R. has not quite succeeded in all he set out to do, for in spite of certain points of correlation between the chapters they remain a collection of research studies lacking in continuity and of uneven quality, the more mathematical ones being, in general, superior to the others. This is partly due to the fact that, like Alfred Marshall whom he quotes, R. obviously thinks' 'much more easily in mathematics. . .than in English." His text is not well finished and is sometimes wordy, as in the case of Chapter I, in which he takes 12 pages to develop the concept of "dynamic economics" which must be clear to anyone who is competent to understand what follows. There is also a tendency to overwork certain symbols which occasionally leads to confusion. For example on page 196, reference is made to the letters *A*, *B*, and *C* without further comment except that they are "described in the preceding chapter," which in turn seems to contain several kinds of *A*'s, *B*'s, and *C*'s.

In regard to subject matter, R., whose mathematical equipment is impressive and beyond question, has attempted to provide a broad basis for economic theory and in so doing has made frequent excursions into highly ab-

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