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# CERAMIC ABSTRACTS

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vestigation of aluminum dust as a possible respiratory hazard resulted from the appearance in 1934 at the Occupational Disease Clinic, Berlin, of a patient who had been spraying aluminum bronze for nearly a year and who showed signs of a lung disease of a not very clear character. Early in 1934 an Italian doctor of the throat and nose clinic at the University of Rome published his observations upon the effect of aluminum dust on the air passages. The present research includes (1) the components and properties of the substance (which does not occur in nature in metallic form but is the result of mechanical and chemical processes), (2) 30 citations of previous studies on the injurious effects derived from the preparation of aluminum and its industrial uses, (3) the detailed case-history of the patient, with laboratory findings and Roentgen studies, (4) an intensive investigation of 70 workers in aluminum works, and (5) a critical analysis of the Italian data. The hazards were found to be completely negative, both in the processes of making aluminum and from inhalation of the dust. K.R.

Inhalation of dust and control of dust hazards. W. C. JAMES. *Concrete, Cement Mill Ed.*, 46, 200–201, 216–17 (1938).—Many persons inhale excessive dust into their lungs, with coal and iron-ore dust coloring the lung tissue. In most cases, however, these changes are of no more importance than callouses on the hands. Only two dusts actually cause diseases on inhalation, silicon dioxide (usually quartz) and asbestos. Only particles below 10 µ are effective, and these must be breathed in high concentration and over a long period of time. A safe maximum concentration is 5 million particles of quartz dust per cu. ft. The exposure of each man should be reduced to particle-hours to be comparable. The length of time necessary to develop silicosis is controlled by (1) concentration of dust, (2) proportion of free silica, (3) length of exposure, and (4) general health of the employee. It is unusual to have silicosis develop in less than seven years. Dust should be removed at the source. W.D.F.

Occupational diseases of the lungs in agricultural workers. RICHARD FAWCITT. *Brit. Jour. Radiol.*, 11, 378–92 (June, 1938).—In 1936, 749,700 persons were employed in the agriculture of Great Britain, forming one of the largest working groups. F., as a country practitioner in the hills of the Lake District, early became familiar with the agricultural types of asthma, bronchitis, and pneumonia which usually ran a protracted course among these workers: recovery, when occurring, appeared largely due to potassium iodide and creosote administration. The infections the working people are subject to are listed as organic matter (microfungi, and bacteria) existing in grasses, straw, grain, fruits, the soil, and in the excreta of farm animals; only occasionally does inorganic matter affect them, e.g., men cutting siliceous stones. The details of fungi infections and the procedure in identification are briefly and clearly given; types of fungi predominantly affecting six special groups of farm hands, e.g., hay or grain workers, stablemen, gardeners, etc., are described, with the resulting symptoms and injury. Nine points to be considered in a doctor's study of such cases are systematically presented for case-history record. Special comment is made upon the agricultural groups, with citations from case reports; 13 large-size radiographic reproductions of chest phenomena in the various fungi invasions concerned are interpreted for the lay reader. F. emphasizes these occupational diseases as rare, seldom reaching radiological departments or diagnosis. Yet common microfungi, often innocuous, do become pathogenic under certain conditions. The incidence of harmful infection is more common and more widespread than is generally realized. 19 references. K.R.

Practical significance of silicate research. A. DIETZEL. *Forsch. Ber.*, 14 [5] 161–64 (1930). J.F.H.

Prevention of disease in industry. D. HUNTER. *Ind. Welfare*, 13, 134–36 (1937).—The main principles underlying the prevention of disease in industry are (1) protection of workmen by law such as workmen's compensation acts, (2) medical inspection under state support, (3) education as to the nature of the danger, (4) importance of cleanliness (cleanliness of work places, bodily cleanliness, and general hygiene), and (5) reduction of manual operations. H.E.S.

Preventive measures in the use of crystalline silica. M. M. SHAFER. *Ind. Med.*, 7 [8] 472–75 (1938).—S. presents the subject systematically under three major aspects: (*A*) medical, (*B*) engineering, and (*C*) managerial. He suggests that, before any protective measures in the use of crystalline silica are resorted to, the fact be established that a silica hazard exists. Data involved include (1) a definite exposure to dust known to contain a certain percentage of silica and (2) sufficient dust exposure, as estimated by dust count and dust composition, to cause silicosis if the exposure is continued over a sufficiently long period of time. In emphasizing (*B*), S. states that it is entirely the problem of the engineer to prevent silicosis. The medical director can only check the adequacy of the engineer's methods of control. K.R.

Recovery metabolism of silicotics. A. BOHME. *Arch. Gewerbepath. & Gewerbehyg.*, 8, 601–10 (1938).—B. records the metabolism studies and muscular tests applied to silicotics in varying stages of the disease to improve their greatly impaired respiratory capacity and muscular action, if possible, and at least to record the success or failure of such efforts. Tables show a comparison of the metabolism of normal persons after 15 bendings of the knees (as in climbing stairs), after taking food, and after rest with the metabolism of the silicotics (four having a lessened industrial capacity of 80% and six lessened to 50 or 60% capacity). Items tabulated include age and vital capacity after food and after rest; respiration, minute volume, and $O_2$ requirement; the respiratory quotient, conversion rise in %, and these values after rest; and the $O_2$ needs (cc./min.). In the severest forms of silicosis, the total variation in the 10-min. recovery periods was higher than the highest shown in normal persons. Acid absorption had not returned to normal after 10 min., while in normal persons it was completed in 3 or, at most, 6 min. The minute values of respiration in the most severely ill subjects was markedly raised after the work attempted, and even after the 10 min. rest, it did not attain its previous value. The higher the lessened capacity for work in percentage value, the more the records varied in severe silicosis. Experiments on early or middle-period silicotics showed fewer certain, unmistakable results, their working capacity being still much higher. K.R.

Research laboratories of Mellon Institute. HARRY S. COLEMAN. *Ind. Eng. Chem., Anal. Ed.*, 10 [9] 530–58 (1938).—The design, construction, and equipment of the research laboratories in the new Mellon Institute building are described in detail. Illustrated. F.G.H.

Research laboratory of the Columbia Chemical Division of the Pittsburgh Plate Glass Co. ANON. *Ind. Eng. Chem., Anal. Ed.*, 10 [6] 329–30 (1938).—The physical equipment is briefly described. Illustrated. F.G.H.

Safety and hygiene in the foundry: I, Medical aspects. R. R. JONES. *Trans. Amer. Foundrymen's Assn.*, 8 [2] 554–64 (1937).—The more important industrial health problems associated with the foundry industry are those related to (*a*) general physical characteristics of the building, (*b*) housekeeping practices, (*c*) drinking water supply and lunchroom and toilet facilities, (*d*) exposure to extreme temperatures, (*e*) exposure to toxic or irritating dust, fumes, and gases, and (*f*) medical supervision. Success in the control of industrial health hazards is primarily dependent upon the employer's attitude toward the problem. Discussion. J. A. BRITTON ET AL. *Ibid.*, pp. 575–85. H.E.S.

Hermann August Seger. ANON. *Bull. Amer. Ceram. Soc.*, 17 [11] 463–64 (1938).

Silicate research and engineering. W. EITEL. *Z. Ver. Deut. Ing.*, 80 [2] 37–41 (1930).—The conditions and status of silicate research as carried out in the Kaiser Wilhelm Institute in Berlin with regard to glass, ceramics, cements, mortars, and concrete and the relation to application in practical engineering are explained. M.H.

Silicosis among grinders. J. L. A. GROUT. *Brit. Jour. Radiol.*, 11, 344–70 (June, 1938).—This interesting time labor limit in the German hard-coal industry for dry atmospheric localities, is an arbitrary limit. In general, working capacity seems to be lowered by high temperatures to 60% values. The physiological reactions of men continually vary when climatic conditions grow constantly worse. Injury to health from dry and high temperatures alone can not be definitely established, the relation to humidity present always being a factor. Omitting the heat factor, a humidity of 25° seems endurable. In regard to the elimination by the skin or lungs under high and humid conditions, results appear personal and individual. Greater water elimination occurs in men acclimated to hot humid air than in those not inured. Men habitually rather than occasionally at work eliminate larger quantities of water. Rising temperatures in a dry climate and rise in humidity increase elimination of water through the skin. Individuals showed, in their elimination through the skin, none of the expected correspondences which might be traced back to these changing environal states. In this investigation, bodily temperatures generally rose very little proportionally under higher outside temperatures and increased humidity. Blood pressure, respiratory frequency, and pulse frequency showed no quantitative relation to selected climatic conditions. Fourteen diagrams and two tables are given. 18 references. K.R.

Dust content in an asbestosis lung and the behavior of the so-called asbestosis bodies. N. SUNDIUS AND A. BYGDÉN. *Arch. Gewerbepath. & Gewerbehyg.*, 8, 26–70 (1937–1938).—This research upon the effects of asbestos dust when breathed in by industrial workers in asbestos was carried out by the State Geologist and the State Chemist of the Swedish Geological Survey. They indicate the differences between the asbestosis lung and the silicotic, the former being due to the action of a basic silicate (isotropic), accumulating in yellowish or reddish-brown needle-like masses, and the silicotic being due to quartz ($SiO_2$) degenerative action, exhibited in nodules and other quite different manifestations. Asbestosis was first identified in 1906 by an English physician, Montague Murray, of the English Compensation Committee of Industrial Diseases. The chief research studies since that time are reviewed by these authors in their cumulative value. Their own procedure in isolating asbestos dust and its accompanying "asbestosis bodies" by treating the affected lung substance with hydrogen peroxide, also by purely mechanical action upon a "heavy" solution, is given together with the ascertained percentage values derived chemically from the eight or more mineral components of asbestos. For the entire lung, approximations were 8.6 g. asbestos bodies, 0.5 free asbestos needles, and 1.4 total asbestos content. Total dust respired by the given lung was about 2.5 g. Some of the bodies built up in needle form were composed of titanium oxide ($TiO_2$). Intensive study and analysis of the coverings of the bodies seem to indicate that they are blood derivatives after the mineral has entered the lung. The fibrosis ultimately and generally distributed through the lung following the dust inhalations appears to have definite relation to the presence of the asbestos needles and their movements about the lung under the mechanical stimulation due to respiratory movements. 12 photomicrographs. K.R.

Heinrich Ries. ANON. *Bull. Amer. Ceram. Soc.*, 17 [12] 490–91 (1938).

History of glass industry at New York World's Fair. ANON. *Bull. Amer. Ceram. Soc.*, 17 [12] 489 (1938).

Hygienic dangers of nonferrous metals. H. BERGER. *Metallwirtschaft*, 17 [32] 865–67 (1938).—B. discusses the danger in handling Pb, Hg, Zn, Cd, As, Yb, Se, Te, Cr, Ni, Cu, Mn, light metals, W, Tl, and Os due to inhalation of dust or vapors or contact with each individual metal and means for eliminating or at least minimizing the risk. M.H.

Lung findings in foundry workers. O. A. SANDER. *Amer. Jour. Pub. Health*, 28, 601–608 (1938).—Of the various occupations in foundries, sandblasting is the most hazardous if done without protection; otherwise sand chipping and grinding of large castings are the most dangerous in regard to the health of the employees. Data obtained during a four-year survey are as follows:

| Years exposure | No. employees | Silicotic (%) |
|---|---|---|
| 1– 5 | 1174 | 0.5 |
| 6–10 | 812 | 3 |
| 11–15 | 602 | 5 |
| 16–20 | 532 | 10 |
| 21–25 | 365 | 15 |
| 26–30 | 263 | 22 |
| 31–40 | 215 | 21 |
| 41–50 | 47 | 21 |

From this data, S. concludes that simple silicosis as seen in foundry workers is only very slowly progressive, so much so that no visible changes appeared in four years observations, and is only rarely sufficiently advanced to cause symptoms and incapacity for work. Control of the foundry hazard is best accomplished by elimination at its source of the dust generated by sandblasting, sand chipping, sand grinding, and shake-out operations. Pre-employment and periodic examinations are essential to prevent tubercular individuals from carrying on a dusty trade and to discover new infection and reactivation cases as they arise. B.C.R.

Selenium as a potential industrial hazard. H. C. DUDLEY. *U. S. Pub. Health Repts.*, 53 [8] 281–92 (1938).—D. points out those industries which may have unrecognized hazards due to the possession of selenium-bearing materials. Increasing uses and applications of the element and its compounds necessitate the warning that in certain combinations selenium is toxic. Hence, industrial plants where these substances are utilized will need to afford their workers adequate protection. Selenium is obtained as a by-product from electrolytic refining of copper; this is the chief commercial source. Its first use was largely confined to the glass and ceramic industries, where it was used as a glass decolorizer and for the production of red glass and glazes. Rubber manufacturers next made heavy demands on domestic copper refineries; recent increased uses have not only exhausted domestic supplies but have required importation in larger and larger quantities. The ceramic industry alone has utilized more than 170,000 lb. According to D., new sources of supply will have to be opened. The occurrence and location in 21 states of 15 minerals, with the selenium parts per million, are tabulated. The selenium content of the earth's crust has been approximated at 0.005%; nearly all sulfur and sulfide deposits contain it; certain western phosphate rocks show amounts of even 55 parts to the million. In a large number of soil samples taken from areas surrounding smelters near Butte and Anaconda, Mont., Kennet, Calif., and Copper Hill, Tenn., selenium was found; it decreased in quantity with distance from the smelter. Extensive animal experimentation by ingesting selenium compounds shows that such substances, when soluble, have toxic effects, both acute and chronic. Early cellular destruction occurs in the liver, with later pathological characteristic changes throughout the organism. Guinea pigs experienced severe metamorphoses in the liver and, after inhalation of hydrogen selenide, hypertrophy of the spleen. Men employed in copper refineries which extract or purify selenium display the symptoms, respiratory and gastric, which characterize metal poisoning generally. The excretion of selenium in the urine, however, is conclusive evidence of selenium absorption by workers. D. gives in detail the procedure for urinalysis in detecting and estimating selenium in the urine. In the tabulation of industries with possible selenium hazards, the glass and ceramic industries are in the secondary group, *i.e.*, they utilize selenium and its compounds as basic materials in manufacturing processes. The immediate sources of hazards involved in this group are given as melting pots and furnaces, the fumes of Se and $SeO_2$ being given off. The sampling of vapors and gaseous constituents of industrial plant atmospheres and contaminations of laboratory workrooms is explained in detail in connection with

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tents and indicating just how closely the sampling represents the true character of a batch of material being tested. F.P.P.

**Volumetric analysis of copper.** M. Scotta and Y. Yamamoto. *Jour. Soc. Chem. Ind. Japan*, 41 [3] 348 (1938).—Copper can be reduced to the cuprous ion in an alkaline solution with sodium sulfite. This cuprous ion can be titrated with potassium permanganate solution. After the reduction is complete, the solution is acidified to expel the excess sulfur dioxide gas. An addition of a small amount of chlorine ion in the form of sodium chloride is necessary to avoid the precipitation of cuprous oxide. The sample of solution containing about 0.10 g. of copper should be treated as follows: pour the test solution into a 500-cc. flask, dissolve it in a small amount of water, and make it slightly acid either with sulfuric acid or sodium hydroxide solution; add 30 cc. of 10% solution of sodium sulfite and 6 cc. of 10% solution of sodium chloride; boil and redissolve the yellow precipitate in the flask (double salt of cuprous sulfite and sodium sulfite) and make the solution colorless; add 50 cc. hot sulfuric acid (prepared at this time by mixing 20 cc. of 20 N sulfuric acid and 30 cc. of 6 N sulfuric acid). The white precipitate of cuprous chloride is formed, and sulfur dioxide gas is expelled violently. Boiling is continued for 15 to 20 min. to expel sulfur dioxide gas completely and to expel excess hydrogen chloride. To fill the flask with carbon dioxide, 30 cc. of 3% sodium carbonate solution are added. Heating is discontinued and the solution is titrated with 1/10 N potassium permanganate solution which contains about 3% sodium carbonate. The presence of $Pb^{\cdot\cdot}$, $Sn^{\cdot\cdot}$, $Mn^{\cdot\cdot}$, etc., has no effect; therefore, no preliminary separation of these metals is needed. M.U.C.

PATENTS

**Making alkali metal silicates.** C. R. McDaniel (Diamond Alkali Co.). U. S. 2,153,872, April 11, 1939 (March 7, 1938).

**Production of polysilicates.** Dessaux Fils. Fr. 824,782, Oct. 5, 1937; *Chem.-Ztg.*, 63 [19] 173 (1939). D.A.S.

## General

**Air conditioning in industry:** I. W. L. Fleisher, A. E. Stacey, F. C. Houghten, and M. B. Ferderber. *Heating, Piping & Air Conditioning*, 11 [2] 107–11 (1939).—This study was conducted in the research laboratory of the American Society of Heating and Ventilating Engineers at the Pittsburgh Experiment Station of the U. S. Bureau of Mines. The physiological reactions of men while carrying on light work in atmospheric conditions including effective temperatures from 77° to 92°F with relative humidities of 60, 75, and 90% were investigated. The history of previous investigations is dealt with. Two charts. J.L.G.

**Appearance and prevention of silicosis and asbestosis.** Enrico C. Vigliani. *Rass. Med. Applicata Lavoro Ind.*, 9, 387–94 (1938); *Chem. Abs.*, 33, 2244 (1939).—A review is given.

**Asbestosis.** R. R. Sayers and W. C. Dreessen. *Amer. Jour. Pub. Health*, 29 [3] 205 (1939).—In a study of the North Carolina textile mills using asbestos fiber, a hydrated magnesium silicate containing no quartz, pulmonary asbestosis was the principal defect found. Exposures ranged from 0.10 to 76 million particles/cu. ft. Persons exposed from 5 to 10 years to dust concentrations exceeding 5 million particles/cu. ft. showed definite evidence of asbestosis. Data so far obtained indicate that 5 million particles/cu. ft. is the maximum safe concentration. B.C.R.

**Ceramic filters.** Anon. *Chem. Age* [London], 40, 45 (1939).—A new range of porous ceramic filtering materials has been introduced by a Glasgow firm. These ceramic materials are resistant to corrosive fluids and are made with a pore size ranging from below one micron up to several hundred microns, the distribution of pores and pore density being exactly regulated. The materials are produced in a great variety of shapes—they can be sawed, cut, or ground to suit individual requirements—and their mechanical strength and durability are very high. The materials, quartzite, biscuit porcelain, and diatomaceous or kieselguhr bodies, are described as follows: (1) Quartzite filters in the form of square or circular tile, of different thicknesses and sizes, and hollow cylinders from 2 in. to 6 in. in diameter and up to 24 in. long are produced in several grades, varying from coarse-grained bodies of extreme permeability down to a close-grained type with a pore size as low as 10 microns but of such high pore density that it ensures rapid permeability. The high rates of flow obtainable with these filters are exemplified by the P.17 grade which gives a flow of 1700 gallons of water/sq. ft./hr. at 5 lb. pressure. Quartzite filters are particularly suitable for industrial filtering and aerating operations of liquids and gases, especially where resistance to corrosive fluids is essential and in reactions between liquids and gases, as it presents the gaseous reactant in the form of minute bubbles, thus giving the maximum surface for reaction. (2) Biscuit porcelain is used in filtering operations where it is necessary to separate extremely minute particles from acidic or other corrosive liquors. It resembles porcelain in color and composition, but differs from it in that it is highly porous. Its pore dimension can be regulated in size from 15 microns down to below 1 micron. The nature of its ingredients and the temperature at which it is fired ensure resistance to acids by the more siliceous bodies or to caustic alkalis (where the alumina content predominates). Biscuit porcelain is also used for electrolytic processes in the filtration of oils and concentration of rubber latex. (3) Diatomaceous or kieselguhr bodies, while less resistant to corrosive chemicals than either biscuit porcelain or quartzite, combine small pore size with high permeability and are used for the filtration of neutral or nearly neutral liquids. They are usually employed in the form of candles or hollow cylinders of small diameter, closed at one end or with both ends open, up to a length of 12 in. A.B.S.

**Floors for industrial purposes.** R. Fitzmaurice and F. M. Lea. Read before Inst. Chem. Eng. and Inst. Struct. Eng., London, Jan., 1939; abstracted in *Chem. Trade Jour.*, 104, 79–80, 112 (1939). L.R.B.

**Industrial impairment of health and poisoning in the metal-working industry.** Freitag. *Oberflächentech.*, 16 [4] 35–38 (1939).—F. discusses the danger of silicosis in men working with sandblasting. Poisoning by nitrous gases in pickling, etching, and coloring processes, by Cr salts in Cr plating, by Pb in Pb welding, by CO in oxyacetylene welding, and by toxic gases developed in nitriding and hardening processes is also discussed. M.H.

**Life and work of Henry LeChatelier (1850–1936).** P. Pascal. *Bull. Soc. Chim. Mem.*, [5] 4 [10] 1557–93 (1937); see *Bull. Amer. Ceram. Soc.*, 16 [4] 156–57 (1937); *Ceram. Abs.*, 16 [10] 318–22 (1937). D.A.S.

PATENTS

**Repairing cement for ceramic objects.** E. Rosenthal. Brit. 500,375, Feb. 22, 1939 (Aug. 12, 1937).

**Satin white pigment and process of making.** L. Work. U. S. 2,145,149, Jan. 24, 1939 (Feb. 4, 1935). The process comprises treating finely divided clay with sulfuric acid, producing thereby a solution containing aluminum sulfate together with coloring impurities and an insoluble clay residue, removing coloring ingredients from the solution, and reacting the so-purified solution with hydrated lime in the presence of the clay residue.

**Tile for use in sewage filters.** J. E. Tucker. Brit. 500,378, Feb. 22, 1939 (Sept. 15, 1937).