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ARTHUR A. NOYES, Editor.

REVIEWERS: Analytical Chemistry, H. P. Talbot and W. H. Walker; Biological Chemistry, A. G. Woodman; Carbohydrates, G. W. Rolfe; General Chemistry, A. A. Noyes; Geological and Mineralogical Chemistry, W. O. Crosby and M. L. Fuller; Inorganic Chemistry, Henry Fay; Metallurgical Chemistry and Assaying, H. O. Hofman; Organic Chemistry, J. F. Norris; Physical Chemistry, H. M. Goodwin; Sanitary Chemistry, E. H. Richards; Industrial Chemistry, A. H. Gill and F. H. Thorp.

INDUSTRIAL CHEMISTRY.

F. H. THORP, REVIEWER.

The Fertilizer Resources and the Fertilizer Industry of Alabama. BY B. B. ROSS. *Proc. Ala. Industrial and Sci. Soc.*, 9, 51–58.—The article is mainly a historical sketch of the development of the fertilizer industry in the southern states, the present status of the manufacture in Alabama being well set forth. It appears that the raw materials, excepting cotton-seed meal, are mainly imported from the neighboring states, although phosphate rock of some value has been found in Limestone Co. The author's analyses of this rock are quoted as showing from 9 to 25.1 per cent. phosphoric acid. An acid phosphate made from this rock showed 14.90 per cent. total phosphoric acid, of which 13.15 per cent. was water-soluble. Valuable deposits of green sand marl are found in the state, the analyses given showing them to contain 2.24–2.74 per cent. phosphoric acid and 3.78–3.86 per cent. potash. Other materials found in the state are mucks, which are highly recommended for building up the soil. An analysis of bat manure from the Tennessee Valley demonstrated its fertilizer value to be above $30 per ton, based on the scale of fertilizer values in the state. The paper closes with a discussion of the abstraction of nitrogen from the air by certain leguminous plants, such as the cow-pea, clover, and vetch, when grown upon land containing certain bacteria, which thus become valuable fertilizers when plowed under; and with a discussion of the advantages gained by inoculations of the soil with these bacteria from cultures.

Commercial Fertilizers. *Vt. Agr. Expt. Sta., Bull.* 79, 189–198; 80, 201–244.

The Effect of Salt Water on Cement. By A. S. Cooper. *J. Franklin Inst.*, **148**, 291–302.—Mortars containing various proportions of cement and sand were prepared with fresh water and with salt water. Briquettes made from each mixture were allowed to set for 24 hours in moist air, and then some from each mixture were put into salt water and fresh water to harden. Compression and tension tests were made on these after seven days and twenty-eight days, and at the end of six months and one year. The salt water briquettes showed better results in the earlier tests, but after longer periods the fresh water briquettes showed greater strength. It was also indicated that salt water tends to weaken concrete, but no definite opinion could be stated. It also appeared that rough, sharp sand, made by crushing hard rock, produced briquettes of greater strength, though much depends on the thoroughness of the ramming. It is also shown that mortar made with Portland cement suffers very little injury, even after several hours' standing, if it is kept thoroughly wet.

Manufacture of Alcohol from Acetylene. *U. S. Consular Rep.*, **62**, 287–293.—The article consists of four reports by the Consuls at Paris, Berne, Berlin, and Frankfort, setting forth the present status of the industry. Letters from the leading authorities, Berthelot, Maercker, Rossel, and Liebetang, regarding the future prospects of the industry, are included. Descriptions of the manufacture are also given. The concensus of opinion appears to be that the fermentation-alcohol industry need not anticipate any competition from this direction. The cost of calcium carbide and the small yield of alcohol make the acetylene product about ten times as expensive as ordinary alcohol.

A New Electrolytic Process of Manufacturing Chemicals. By James Boyle. *U. S. Consular Rep.*, **62**, 189–191.—A short, popular review of the Hargreaves-Bird process, stating its economies and advantages, forms the substance of the report.

What is Parianite? By S. F. Peckham. *J. Franklin Inst.*, **149**, 161–193.—The author's conclusion is that at present we know very little concerning the composition of parianite; but he contends that the course of investigation already entered upon "will ultimately lead to conclusions that will be final." A description of the specimens is first abstracted from a previous paper (*Am. J. Sci.*, 1896); then the method of analysis is discussed. Considering parianite as an emulsion of gas, mineral water, bitumen, organic matter not bitumen, and mineral matter such as silica and clay; or as an emulsion of gas, water holding mineral salts, bitumen, and organic salts of iron, alumina, lime, and magnesia with ulmic and other peat acids, with ferrous sul-

phide and silica, the author holds that it cannot be determined of what the mixture consists by "any process that separates a hypothetical substance called petrolene and a second called asphaltene, a third called organic-matter-not-bitumen, and a fourth called mineral matter." There is also considerable discussion of the work of C. Richardson (see *J. Soc. Chem. Ind.*, *1897* and *1898*) and numerous analyses by Miss L. Linton are given. An extended discussion of the paper follows in which Messrs. Endemann, Sadtler, Day, Keller, and Allen (Sheffield, England), and Prof. Peckham take part. Dr. Endemann concludes from his investigations that some asphalt contains a hydrocarbon, $C_{26}H_{38}$; and that hard asphalts contain an oxygen compound to which he assigns the formula $C_{26}H_{36}O_2$, or with new asphalts, $C_{20}H_{24}O_2$. He thinks the ulmic acid of Peckham comes from the turpentine used in the extraction rather than from the asphalt. He considers asphalt as an oxidation-product of petroleum; and he found, by heating a petroleum oil with potassium bichromate, sulphuric acid, and water, for two to four months on a water-bath, that the oil thickens and takes on the odor of asphalt.

Recent Progress in the Aluminium Industry. By Jos. W. Richards. *J. Franklin Inst.*, **149**, 451-459.—Reduction processes are still the same in principle as the Hall process of ten years ago. The cost of materials and working has been materially reduced. The cost of aluminum is now about two-thirds that of brass. Aluminum is now worked into light and strong alloys; five per cent. of copper, nickel, or manganese, or thirty per cent. of zinc make strong metals with aluminum. The use of the metal for culinary utensils, for novelty goods and bric-a-brac, for lithographic plates, and electric conductors has reached large proportions; over 500 tons were used last year for transmission lines and feed wires, replacing copper. Powdered aluminum is used for silvery printing and paint, as on the U. S. mail boxes; also for the reduction of refractory metallic oxides, such as those of manganese, chromium, tungsten, molybdenum, vanadium, uranium, and boron. Many of these, alloyed with iron, are used in making steel at Krupp's works.

Railway Bearings: An Investigation of Causes of Hot Boxes in Railway Service, and Methods for Their Prevention. By Robert Job. *J. Franklin Inst.*, **149**, 439-450.—Bearings which had run hot on cars from different railroads while passing over the Philadelphia and Reading R. R., were examined metallographically and chemically. Test sections were cut, and the tensile strength and elongation determined. Along with these tests a number of alloys were made, to check the accuracy of the

deductions and to determine the best conditions of foundry practice. In composition wide variations were found. Some consisted of copper-tin in the ratio of 7 : 11. Others were of copper-zinc, with as high as 35 per cent. of zinc; these seldom caused heating, but were subject to rapid wear. Phosphor bronzes were found in moderate numbers; but the copper-tin-lead alloys, averaging 10–15 per cent. of tin with from 15–5 per cent. of lead, were most common. In most cases it appeared that the composition caused but little of the difficulty, the chief causes of the heating effects being: segregation of the metals; coarse crystalline structure; dross or oxidation-products; and excessive amount of gas enclosed in the metal. Deficient lubrication appeared to have caused but little of the trouble. Segregation, caused by attempts to alloy the metals in improper proportions, especially in the copper-tin-lead compositions, where the liquation of the excess of lead or the separation of copper resulted, caused surfaces of high heating capacity. Photomicrographs are shown of a number of compositions. The composition of one which had heated in service was: copper, 74.67; tin, 15.27; lead, 10.27 per cent. Segregation is best prevented by slow pouring and rapid cooling in the mold. Crystalline structure was found to be due to antimony in some cases, but often was caused by rapid pouring at too high temperature, or by the use of an excess of deoxidizing agents. It increased local friction, decreased the tensile strength, and caused excessive wear. Particles of dross held mechanically caused friction and heating. Occluded gas tended to reduce the bearing surface of the metal, thus increasing the pressure and causing rapid wear. Deoxidizing agents, especially phosphorus, remove the occluded gases. Zinc in proportion of 1 or 2 per cent. has been shown by Dr. Dudley to act as a deoxidizer, but more than this weakens the metal. Sodium acts similarly. The author approves of the addition of silicon in small proportion with the zinc, to obtain a fine-grained ductile metal. Arsenic has been used as deoxidizer, but it has no advantage. Tensile strength and elongation limits in bearing metals are essential, as experiments demonstrated that increase of strength and ductility means increased life to the bearings in service. The etchings for microscopic examination were made on the polished metal, commonly by the use of decinormal solution of iodine in potassium iodide; but in a few cases, dilute chromic or nitric acid was used.

New Method of Bleaching in Germany. *U. S. Consular Rep.*, **63**, 253.—A short account of Koechlin's process of bleaching vegetable fibers by the use of bisulphite of sodium, or lime, or the "hydrosulphite" of calcium. The goods are then steamed under one to two atmospheres' pressure. In another pro-

cess the goods are exposed for six hours to the action of alkali, soap, calcined magnesia, and hydrogen peroxide. These bleaches are claimed to do no injury to the fibers.

Sod Oil, Wool Grease, and Degras. By ERASTUS HOPKINS. *J. Am. Chem. Soc.*, **22**, 351–353.—By a confusion of names in paragraph No. 279 of the tariff act of 1897, a question as to the identity of wool grease and sod oil arose, and an investigation of the nature of these substances was undertaken. It was shown that sod oil and wool grease have different constitutions and characteristics. Wool grease is extracted from sheep's wool; sod oil is an oxidized oil expressed from leather which has been curried with fish oils. Sod oil contains a substance designated as "degras former," which is stated to be characteristic of this oil; it is not present in wool grease, nor in other oils. Degras is a trade name including both substances.

A. H. GILL, REVIEWER.

Texas Petroleum. By F. C. THIELE. *Am. Chem. J.*, **22**, 489–493.—The Corsicana oil resembles the Lima oil, but does not have the disagreeable odor of the latter; it has a specific gravity of 0.829, and seems to be closely related to the Pennsylvania oil of the Washington district; it contains a certain proportion of substances closely resembling asphaltum, as is shown by its giving a precipitate with $SnCl_4$. The oil from the Nacogdoches district is black and very heavy, and strongly impregnated with sulphuretted hydrogen, resembling a maltha. Its specific gravity is 0.915. Saratoga oil has a gravity of 0.955, and that of Sour Lake a gravity of 0.963, the heaviest oil in this hemisphere. It leaves a residue of 71 per cent. above 641° F., and contains no paraffin, but 20 per cent. asphaltum. It is composed of hydrocarbons excellently well adapted for lubricating purposes. A pitchy mass was obtained from the oil, which resembled that obtained from the distillation of stearin, a fact which may substantiate the theory of Höfer and Engler regarding the origin of petroleum.

BIOLOGICAL CHEMISTRY.

A. G. WOODMAN, REVIEWER.

On the Elimination of Nitrogen, Sulphates, and Phosphates after the Ingestion of Proteid Food. By H. C. SHERMAN AND P. B. HAWK. *Am. J. Physiol.*, **4**, 25–49.—Experiments conducted upon healthy human subjects under normal conditions of nutrition show that the rates of excretion of nitrogen and sulphates are quite similar, the minimum being reached during the