

creasing concentration. The form of the PV curves varied with the solute, and was in general similar to the well-known curves exhibited by imperfect gases under high pressure. It would seem that each solute therefore deviates from the Boyle-van't Hoff Law in much the same way that most gases deviate from the ideal gas laws, each substance having its own characteristic "condition-equation." Azobenzene investigated by Noyes and Abbot follows the perfect gas laws more nearly than any of the other substances thus far investigated.

ANALYTICAL CHEMISTRY.

ULTIMATE ANALYSIS.

H. P. TALBOT, REVIEWER.

The Determination of Potash as Perchlorate. By F. S. SHIVER. *J. Am. Chem. Soc.*, 21, 33-42.—Following a review of the various methods proposed for the determination of potassium, the author presents the results of experiments from which he concludes that the method of Caspari (*Ztschr. angew. Chem.*, 1893, 68), as modified by Kreider (*Am. J. Sci.*, 149, 443), will yield results equal in accuracy to those obtained by the use of platinum, in the case of mixtures free from other bases and non-volatile acids, and that it seems likely to prove satisfactory in the presence of these substances. Four procedures for the preparation of perchloric acid, those of Schlösing and of Porrey (both to be found in Grandeau's *Traité d'Analyse des Matières agricoles*, 1, 88-91), Caspari (*Ztschr. angew. Chem.*, 1893, 68), and Kreider (*Loc. cit.*), are briefly described.

A New Method for the Determination of Zinc. By A. C. LANGMUIR. *J. Am. Chem. Soc.*, 21, 115-118.—In the method proposed, the zinc precipitate (sulphide) is dissolved in nitric acid, the solution evaporated, and the zinc converted to oxide by ignition. It is recommended that the zinc be thrown down from a dilute solution, and that the precipitate be dissolved without washing, to avoid the usual difficulties at this point, and that the impurities in the ignited oxide be determined and deducted from the apparent weight. In the analysis of many alloys containing zinc, the solution from which the copper and lead have been removed by electrolysis, may be directly evaporated and the residue strongly ignited.

The Determination of Arsenic in Glycerine. By A. C. LANGMUIR. *J. Am. Chem. Soc.*, 21, 133-136.—The glycerine is destroyed by evaporation with sulphuric and nitric acids, transferred to a Marsh generator, and the gas passed through a hard glass tube, constricted as usual, with a piece of filter-paper

moistened with mercuric chloride solution beyond the constriction to detect any escaping arseniuretted hydrogen. The portion of the tube containing the mirror is cut off and weighed. It is then cleaned, dried, and again weighed. The Gutzeit test, using mercuric chloride instead of silver nitrate, also yields good results.

Note—Drown's Method of Determining Silicon. BY A. C. LANGMUIR. *J. Am. Chem. Soc.*, 21, 215.

Notes on the Rapid Determination of Tungsten in Steel. BY GEORGE AUCHY. *J. Am. Chem. Soc.*, 21, 239-245.—The author finds that the amount of ferric oxide which remains with the tungstic acid in the Blair procedure is, for the same class of steels, fairly constant, and that fusion with sodium carbonate may possibly be omitted. He finds that the amount of hydrochloric acid present when the tungstic acid is filtered off affects the determination, and that evaporation to dryness from a nitric acid solution does not always effect complete separation of the tungsten, while the separation is complete when hydrochloric acid is used. About 5 cc. of hydrochloric acid should be present when filtration takes place. In low phosphorus steels, the phosphorus may be determined as usual in the presence of the tungsten, provided the precipitate does not stand more than $2\frac{1}{2}$ hours, and an excess of ammonia is avoided. The same procedure as for steels is found to succeed with ferrotungstens.

W. H. WALKER, REVIEWER.

Volumetric Method for the Estimation of Boric Acid. BY L. C. JONES. *Am. J. Sci.*, 157, 147-153.—In order that boric acid may be estimated volumetrically by titration with standard alkali, it is necessary to obtain it as the uncombined acid in a solution of neutral salts free from carbonic acid. The following procedure is found to fulfil these requirements more perfectly than any other method hitherto proposed, and to furnish a rapid and convenient method for estimating boric acid in any compound decomposable by hydrochloric acid. The boric acid is set free by the addition of dilute hydrochloric acid in slight excess, and 5 cc. of a ten per cent. barium chloride solution are added to combine with any carbonic acid that may subsequently be introduced with the standard alkali solution. The excess of hydrochloric acid is now destroyed by adding a considerable quantity of a solution of potassium iodate, and the iodine set free by this reaction is taken up by a dilute solution of sodium thiosulphate. The boric acid may now be neutralized by standard sodium hydroxide, phenolphthalein being used as an indicator. When the red color first appears, 1-2 grams mannite are added and the alkali again run in to a faint alkaline reaction, which if per-

manent on the addition of more mannite, may be taken as the end-point. The best results are obtained in a cold concentrated solution, and under these conditions the experimental data given show the method to be very accurate.

PROXIMATE ANALYSIS.

A. H. GILL, REVIEWER.

The Heat of Bromination Test for Oils. BY AUGUSTUS H. GILL AND ISRAEL HATCH, JR. *J. Am. Chem. Soc.*, **21**, 27-29.—The calorimeter employed was double jacketted. The values obtained with the oils were compared with that obtained by brominating camphor; the results are expressed as a "specific temperature reaction," which, by multiplying by a constant, gives an iodine number which agrees well with that found in the usual way.

The Analytical Constants of American Linseed Oils. BY AUGUSTUS H. GILL AND AUGUSTUS C. LAMB. *J. Am. Chem. Soc.*, **21**, 29-30.—The specific gravity, Valenta, Maumené, iodine, and drying tests of raw, boiled, and bleached oils of undoubted purity are given.

Analytical Research on Sod Oil. BY E. HOPKINS, D. L. COBURN, AND E. SPILLER. *J. Am. Chem. Soc.*, **21**, 291-300.—Sod oil is the excess of oil extracted from ordinary leather in the currying process, menhaden and cod oils being used principally for this purpose, although other oils and greases are employed. It can hence have no well-defined constants, but there is little difficulty in distinguishing it from other oils. Moisture is determined by sucking air through the oil absorbed upon filter papers contained in a tube heated in an oven at 100° C. The oil is obtained by extracting this residue with 40° b. pt. gasoline; and this is followed by extraction with alcohol giving the soap; upon igniting the residue the ash is determined, and the hide fragments are ascertained by difference. Dégras former is estimated by saponifying the oil, evaporating to dryness, extracting the soap formed with water, and precipitating this with salt. The solution is filtered, the dégras former passing into the filtrate, where it is precipitated by hydrochloric acid; it is filtered off and dissolved in alcohol, the alcohol is evaporated, and the residue weighed. In addition to these determinations, tables are given showing the saponification number, mineral acid, free acid, total acid, ether number, Reichert-Meissl, iodine, and unsaponifiable numbers.

The Absorption of Methane and Ethane by Fuming Sulphuric Acid. BY R. A. WORSTALL. *J. Am. Chem. Soc.*, **21**, 245-251.—The article shows that contrary to accepted facts,

both these gases are absorbed by the acid. The absorption in the case of methane was as follows: In $\frac{1}{2}$ hour, 0.1 cc.; in 2 hours, 1.7 cc.; in 4 hours, 5.4 cc.; 24 hours, 6.8 cc.; and in 5 days, 11 cc. Natural gas containing 96 per cent. of methane showed an absorption varying from 0.3 to 3.3 per cent. Ethane is absorbed in a quantity varying from 3.5 to 7 per cent. The results of this investigation show that in gas analysis the gas should not stand longer than an hour over sulphuric acid, and if ethane be present not more than fifteen minutes.

A. G. WOODMAN, REVIEWER.

Butter and Butter Adulterants. BY C. B. COCHRAN. *J. Franklin Inst.*, 157, 85-97.—For the purpose of detecting and estimating small amounts of foreign fat in butter, the author considers the following tests most satisfactory: Direct microscopic examination of the sample by polarized light; microscopic examination of the crystals from solution in amyl alcohol, both with and without polarized light; Valenta test; Reichert number; reading of butyrefractometer. It is concluded that if the conditions of crystallization are kept uniform the crystalline deposit obtained from the solution of pure butter-fat in amyl alcohol is characteristic of butter. Photomicrographs are given illustrating this. Results are also given of the examination of several samples of renovated butter; that is, stale butter in which the fat has been separated from the curd and water, and then emulsified with milk or buttermilk, being thus made again into butter.

Detection of Caramel in Spirits and Vinegar. BY C. A. CRAMPTON AND F. D. SIMONS. *J. Am. Chem. Soc.*, 21, 355-358.—It has been found that fuller's earth has a greater affinity for the artificial coloring-matter of spirits than for that derived naturally from the wooden containers, and the method given for the detection of caramel is based upon the observation that a much greater percentage of color is removed from the artificially colored samples by means of this substance.

G. W. ROLFE, REVIEWER.

Study of Starch Grains and Its Application. BY H. KRAEMER. *Am. J. Pharm.*, 71, 174-189.—This paper treats of the origin of starch in plants as indicated by the researches of the biologist and botanist, and of the physical and chemical examination of starch by the microscope. The author argues for more expert work by the botanist and biologist in food analysis.

Some Notes on the Estimation of Carbohydrates. BY F. W. TRAPHAGEN AND W. M. COBLEIGH. *J. Am. Chem. Soc.*, 21, 369-373.—The authors describe their modification of the Feh-

ling determination. They measure the amount of precipitated copper oxide volumetrically by the permanganate method. They eliminate errors to a large extent by checking the process on solutions of similar known composition and of practically identical reducing value. Excellent results are obtained. As the Fehling determination is influenced so much by apparently insignificant points of manipulation, a more detailed description of the authors' method would be desirable.

E. H. RICHARDS, REVIEWER.

The Estimation of Nitrates and Ammonia in Water. BY FRANK X. MOERK. *Am. J. Pharm.*, 71, 157-161.—Instead of using milk of alumina to remove the organic matter which interferes with the color in the phenol-sulphonic acid test for nitrates in water samples, the author makes a duplicate determination for color due to the organic matter. The remarks on ammonia determinations do not agree with the experience of the reviewer; for, while it is true that "dilute ammonium chloride will not keep indefinitely," unless under conditions of complete sterilization, it is not true "that it is useless to attempt" to free alkaline potassium permanganate "from ammonia, as it cannot be kept so." With pure reagents and suitable preparation of them, the solution, even if not at first, yet on standing, yields ammonia-free distillates.

BIOLOGICAL CHEMISTRY.

A. G. WOODMAN, REVIEWER.

Digestive Ferments with Especial Reference to the Effects of Food Preservatives. BY HENRY LEFFMANN. *J. Franklin Inst.*, 147, 97-108.—The author has studied the action of the more commonly used food preservatives in preventing starch digestion by various enzymes. A number of qualitative experiments in which the action was followed by means of tests with a solution of iodine in potassium iodide are recorded, and in a few cases the amount of dextrose formed was determined by Fehling's solution. It was found that salicylic acid is distinctly antagonistic to the starch-converting enzymes but does not interfere very much with proteid digestion; sodium benzoate, boric acid, borax, and boroglycide do not interfere appreciably with either starch or proteid digestion; beta-naphthol interferes with the action of malt-diastase but not seriously with takadiastase or pancreatic extract, although it interferes decidedly with the peptic and pancreatic digestion of proteids. Sodium fluoride and sodium silicofluoride offer but little hindrance to starch transformation except in the case of the pancreatic digestion.