

pomace, and vinegar. A short bibliography of the most important books relating to the subject is appended.

**Experiments with Potatoes.** BY CHAS. D. WOODS AND J. M. BARTLETT. *Me. Agr. Expt. Sta. Bull.*, 57, 145-158.—Experiments have been made with regard to the effect upon the starch content of potatoes of spraying them with Bordeaux mixture. The average amount of starch found in the sprayed samples was 19.06 per cent., and in the unsprayed samples 17.43 per cent.

**Cider Vinegar: Its Solids and Ash.** BY R. E. DOOLITTLE AND W. H. HESS. *J. Am. Chem. Soc.*, 22, 218-220.—The solids of pure cider vinegar consist of glycerol, albuminous substances, gums, malic and other organic acids, and mineral matter; they give no rotation with the polariscope and little or no reduction of Fehling solution after clarification with lead acetate. The ash, which should not be less than 0.75 per cent., consists mainly of potash with small amounts of sulphuric and phosphoric acids. A spurious vinegar was found to be composed of dilute acetic acid, glucose, and soda ash; another, of acetic acid, boiled cider, and lime.

**The Oregon Prune.** BY G. W. SHAW. *Ore. Agr. Expt. Sta. Bull.*, 61, 1-18.—This bulletin contains the results of analysis of fresh and cured prunes, showing their proximate composition, food value, and soil draught.

**Commercial Fertilizers.** *Me. Agr. Expt. Sta. Bull.*, 60, 24-29; *R. I. Agr. Expt. Sta. Bull.*, 60, 39-48; *La. Agr. Expt. Sta. Bull.*, 58, 190-264; *Ky. Agr. Expt. Sta. Bull.*, 85, 79-129; *Wis. Agr. Expt. Sta. Bull.*, 81, 1-8; *N. Y. Agr. Expt. Sta. Bull.*, 173, 531-552; *Vt. Agr. Expt. Sta. Bull.*, 77, 141-147.

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## ANALYTICAL CHEMISTRY.

### PROXIMATE ANALYSIS.

A. G. WOODMAN, REVIEWER.

**Foreign Coloring Matter in Milk.** BY ALBERT E. LEACH. *J. Am. Chem. Soc.*, 22, 207-210.—The principal substances used at present to color milk are annatto, caramel, and yellow aniline dyes. To detect their presence about 150 cc. of milk are curdled by heat and acetic acid and the curd separated as much as possible from the whey. The curd is macerated for an hour or more with ether which extracts only the annatto. If the curd, after pouring off the ether, is not left perfectly white the presence of one of the other colors may be suspected. A portion of the fat-free curd is placed in a test-tube and shaken with con-

centrated hydrochloric acid. The gradual formation of a blue color indicates the presence of caramel, the immediate formation of a pink tinge the presence of the aniline color.

**A Comparison of Some Formaldehyde Tests.** BY B. M. PILHASHY. *Pharm. Rev.*, 18, 115-118.—From a study of several qualitative tests proposed for formaldehyde the author finds that in the method proposed by Trillat (*Compt. Rend.*, 116, 891), using dimethylaniline and sulphuric acid, the reaction is due to the excess of dimethylaniline and not to the formaldehyde. He considers the best reagent for formaldehyde to be phenylhydrazine hydrochloride, used either with sulphuric acid and sodium acetate or with sodium nitroprusside and strong caustic soda, the limit of delicacy being about 1 : 250,000 in the first case, and 1 : 1,000,000 in the second. The reviewer would point out, however, that the value of the test is limited by the fact that the reaction is given by furfural in the first instance, and that acetaldehyde gives a red color which tends to mask the reaction in the second case.

**Methods for the Detection of "Process" or "Renovated" Butter.** BY W. H. HESS AND R. E. DOOLITTLE. *J. Am. Chem. Soc.*, 22, 150-152.—The methods proposed are based mainly upon an examination of the curd. The curd of process butter consists mainly of coagulated casein in distinction from the curd of true butter which contains the proteids of the cream. The two kinds of curd may be distinguished readily by the greater amount of albumin found in the "process" butter curd.

**The Technical Analysis of Licorice Pastes.** BY M. TRUBEK. *J. Am. Chem. Soc.*, 22, 19-21.—The author describes the methods in ordinary use together with the method which he has devised for the determination of glycyrrhizin. The results of analysis are given for fresh and spent licorice root.

**The Determination of Glycogen and Relative Quantities of Glycogen in Different Parts of the Flesh of a Horse.** BY J. K. HAYWOOD. *J. Am. Chem. Soc.*, 22, 85-93.—After trying a number of methods proposed for the determination of glycogen with unsatisfactory results, the following method was settled upon. About 50 grams of the ground meat are digested on the water-bath for six hours with 300 cc. of a one per cent. potassium hydroxide solution. The solution is then made slightly acid, and the proteids completely precipitated by alternate additions of hydrochloric acid and double iodide of potassium and mercury. An aliquot part of the filtered extract is exactly neutralized with potassium hydroxide, three or four drops of strong hydrochloric acid are added, and the glycogen is precipitated by the addition

of 95 per cent. alcohol. This is filtered off, washed, dried at  $80^{\circ}$ - $100^{\circ}$  C.; then at  $115^{\circ}$ , and weighed. A number of analyses are given showing the amount of glycogen in different cuts of horse meat.

**Chemical Methods for Ascertaining the Lime Requirement of Soils.** BY H. J. WHEELER, B. L. HARTWELL, AND C. L. SARGENT. *J. Am. Chem. Soc.*, 22, 153-177.—Among a number of methods tried, those which gave results most nearly comparable with the results of field tests on Rhode Island soils were: (1) Treatment of the soil with dilute ammonia and weighing the humus extracted. This method is applicable only when the acidity is due largely to organic matter. (2) A method of titration, based on measuring the number of milligrams of nitrogen, combined as ammonium salts, held by the soil when treated with very dilute ammonia. The results by this method agree quite closely with the results of crop tests. (3) Comparison of the color of a direct ammonia extract of the soil with the color of a similar extract of a soil of known character. This method is rapid and gives fairly good results.

A. H. GILL, REVIEWER.

**On Hubl's Iodine Method for Oil Analysis.** BY A. H. GILL AND W. O. ADAMS. *J. Am. Chem. Soc.*, 22, 12-14.—The authors recommend the use of mercuric iodide instead of the chloride, whereby the formation of chloride of iodine is prevented. The results obtained show a decided decrease in the amount of substitution, nearly the theoretical value being obtained for oleic acid.

**On the Determination of Volatile Combustible Matter in Coke and Anthracite Coal.** BY R. K. MEADE AND J. C. ATIX. *J. Am. Chem. Soc.*, 21, 1137.—The authors find that by the usual method (of Blair) some carbon is burned. Their study of the matter has led to the following results: The larger the crucible and flame used, the greater the loss; the tighter the joint between cover and crucible, the less the loss; the larger the sample, the less the loss; the fineness and per cent. of ash also exercise some influence. It is suggested that the amount of carbon burned during the heating process can be very closely determined by a second ignition, the difference in weight being the amount burned. This gives results approximating closely to those obtained by ignition in nitrogen or hydrogen.

**The Determination of the Bromine Absorption of Oils.** BY P. C. MCILHINEY. *J. Am. Chem. Soc.*, 21, 1084-1090.—The process resembles that published some years ago by Snodgrass

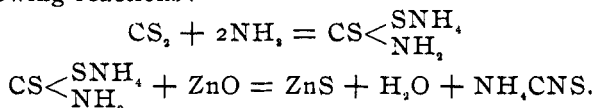
and Mills, except that it is more rapid, and the quantity of bromine both added and substituted is determined. For this purpose the oil is dissolved in carbon tetrachloride, and a measured quantity of one-third normal bromine in the same solvent added; after the reaction is completed, which requires two minutes, the excess of bromine is determined by potassium iodide and thio-sulphate. The hydrobromic acid formed by substitution is determined similarly by using potassium iodate. The process seems accurate, easily executed, rapid, and cheap, and should find wide acceptance.

**On the Rancidity of Fats.** BY ISKAR NAGEL. *Am. Chem. J.*, 23, 173-176.—The paper gives the results of some experiments upon rancid fats which were carried on under the late Prof. Benedikt. Free fatty acids and hydroxy acids are easily removed by an aqueous solution of water-glass, which completely prevents emulsions. Volatile lactones, alcohols, esters, some aldehydes, acetals and terpenes can usually be removed by distillation with steam. Either steam alone or steam mixed with hydrogen or carbon dioxide, or distillation at  $100^{\circ}$ - $170^{\circ}$  with a gas current or at diminished pressure may be employed for the purpose. The non-volatile lactones are boiled with alkali to change them to salts; the aldehydes are removed by the bisulphite method; and the acetals are changed to the alcohols and aldehydes by treatment with sulphuric acid, and these substances are then removed as already explained.

**The Analysis of Essential Oils.** BY CLEMENS KLEBER. *Am. J. Pharm.*, 71, 566-584.—The subject is one requiring a thorough knowledge, especially as the oils contain double-bonded compounds which change rapidly. An example of this change is shown in the case of the oil of cloves, which, when prepared by an improved process in half the usual time, gave an increased yield and finer fragrance. It is shown further that an oil prepared in the laboratory where only a seven per cent. yield was obtained, could not be considered as a criterion by which to judge of an oil obtained by a technical distillation in which 18 per cent. was obtained. With each sample of oil should be a statement giving: (1) genus and species of plant used; (2) portions of plant used; (3) time at which plant was collected; (4) method of distillation; (5) time since distillation was made; (6) specific gravity, rotation, refraction, and dispersion; (7) solubility in various strengths of alcohol; (8) saponification and esterification numbers. A specific gravity below 0.84 indicates aliphatic compounds, above 0.9, oxygenated substances, and above 1.0, aromatic substances. Insolubility in 70 or 80 per cent. alcohol indicates hydrocarbons, in larger quantities of 90 per cent. alcohol

paraffines, sesqui- and polyterpenes. After these preliminary tests the analysis proper is undertaken, using first a small portion of the oil and then if the method employed has proved successful, the bulk of the oil, never trusting the entire stock of the oil to an untried or doubtful method of procedure. As cold does not decompose the oils, they are subjected to a chilling process, often separating crystals of menthol, borneol, etc. This can be followed by treatment with sodium bisulphite, thus separating the aldehydic and ketonic bodies, which would be destroyed by the subsequent treatment. In this process it should be borne in mind that in some cases the bisulphite compounds form very slowly, requiring several days, as in the case of thujone. Another difficulty is due to the fact that some aldehydes, like citral, unite with a second molecule of sodium bisulphite yielding liquid compounds. The aldehydic substances being removed, the acids and phenols are separated by treatment with caustic potash or soda solution, too strong solutions not being used as these dissolve hydrocarbons. Fractional distillation of the residue now follows, preferably at a reduced pressure of 15 mm.; various distilling flasks and receivers employed for this purpose are shown. The article closes with a table giving the more frequently occurring constituents of the essential oils arranged in the order of their boiling-points.

**The Estimation of Bisulphide of Carbon.** BY A. GOLDBERG. *Am. Gas Light J.*, 72, 531.—The method depends upon the following reactions:



The substance under examination is heated on a water-bath in a strong, tightly-closed flask with 5 cc. ammonia (sp. gr. 0.91) and 25 cc. absolute alcohol, to a temperature of 60°, although 100° does no harm. When the reaction is finished, the solution which should be of a yellow color, is considerably diluted, a known volume of a standard ammoniacal solution of zinc is added, and the solution is heated to boiling with continuous stirring. The excess of zinc is determined by a standard solution of sodium sulphide using sodium nitroprusside as an indicator. The results of four analyses agreed well.

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## APPARATUS.

A. H. GILL, REVIEWER.

**Description of a New Respiration Calorimeter.** BY W. O. ATWATER AND E. B. ROSA. *U. S. Dept. Agr. Bull.*, 63; *Phys.*