E-1 (i). Four each of the biscuits shall be assembled face to back and tightly wrapped as a unit in amber or bleached greaseproof, waxed glassine. In lieu of waxed glassine, 300 M. S. A. T. cellophane or its equivalent may be used. Wrapper or label shall contain name of product, net weight and the name and address of manufacturer. Net weight of this assembly shall be not less than two ounces.

E-2. Type II, Compressed Graham Biscuit, shall be prepared according to best commercial practice from ingredients in the following proportions:

Whole Wheat Flour	200 pounds
Shortening	33 pounds
Invert Sugar	10 pounds
Molasses	20 pounds
Sugar	45 pounds
Honey	5 pounds
Dried Skim Milk	70 pounds
Soda	2 pounds
Salt	2 pounds
Calcium Carbonate	1 pound

Moisture content of finished product shall not exceed 6.5%.

E-2 (a). Invert sugar shall be best commercial quality.

E-2 (b). Honey shall conform to Federal Specification C-H-571.

E-2 (c). Soda shall conform to Federal Specification EE-S-571.

E-2 (d). Calcium carbonate shall be U. S. P.

E-2 (e). Product shall be uniformly well baked, of reasonably uniform size and thickness, with reasonably clean-cut edges, shall be free from excessive dusting flour and shall have a characteristic appetizing flavor. Biscuits shall be rectangular in shape with dimensions approximately and not exceeding $3\frac{3}{16}''$ long, $1\frac{3}{16}''$ wide, and $\frac{1}{4}''$ thick.

E-2 (f). Four each of the biscuits shall be assembled face to back and tightly wrapped as a unit in amber or bleached greaseproof, waxed glassine. In lieu of waxed glassine, 300 M. S. A. T. cellophane or its equivalent may be used. Wrapper or label shall contain name of product, net weight and the name and address of manufacturer. Net weight of this assembly shall be not less than 1.7 ounce.

F. Methods of Sampling, Inspection, and Tests.

F-1. Unless otherwise specified in the invitation to bid, inspection for compliance with this specification shall be made at point of origin during the process of manufacture and packing. Products inspected at origin shall be inspected for condition only at the point of delivery.

F-2. Chemical analyses, if required by the purchaser in the examination or testing of samples and deliveries under this specification, shall be made in accordance with methods of the Association of Official Agricultural Chemists in effect on date of invitation to bid and by approved methods in general use in the trade.

G. Packaging, Packing, and Marking.

G-1. Packaging and packing shall be in conformity with instructions issued with invitations to bid.

Abstracts

Oils and Fats

Edited by
M. M. PISKUR and SARAH HICKS

Symposium on the molecular structure of fats and oils. Introduction to the symposium. C. G. King. *Chem. Rev. 29*, 199-200 (1941). Composition and structural characteristics of glycerides in relation to classification and environment. H. E. Longenecker. *Ibid.* 201-24. Structural peculiarities of acid-fast bacterial lipid. R. J. Anderson. *Ibid.* 225-43. The structure of the phospholipids. E. B. Working and A. C. Andrews. *Ibid.* 245-56. Constituents of fats and oils affecting the development of rancidity. H. S. Olcott and H. A. Mattill. *Ibid.* 257-68. Synthetic fatty acid glycerides of known constitution. B. F. Daubert and C. G. King. *Ibid.* 269-85. Preparation and properties of optically active derivatives of glycerol. H. O. L. Fischer and E. Baer. *Ibid.* 287-316. The separation of natural components of fats and oils by molecular distillation. N. D. Embree. *Ibid.* 317-32. Low-temperature crystallization of the fatty acids and glycerides. J. B. Brown. *Ibid.* 333-54. The polymorphic forms or phases of triglyceride fats. R. H. Ferguson and E. S. Lutton. *Ibid.* 355-84. Surface films of fatty acids, alcohols and esters. W. D. Harkins. *Ibid.* 385-417. Ultraviolet absorption spectra of fatty acids and their application to chemical problems. G. O. Burr and E. S. Miller. *Ibid.* 419-38.

Synthetic food fats. A. E. Williams. *Food Manuf. 16*, 161-3 (1941). Synthetic fats are produced from the hydrogenation of water gas (equal vols. CO and H_2) at 300° with metallic Pt and CrO_3 as catalysts, resulting in 10% CH_4 and 90% higher paraffin hydrocarbons. The latter are oxidized to solid fat acids at 140-160° for 6-8 hrs. in presence of oxides of Fe, Mn or V. Esterification is carried out under vacuum at 200-220° by use of glycerol with a sulfonic acid as catalyst. The synthetic product is not identical with the natural products, but is satisfactory as nutriment. Synthetic lard compares favorably in cost with the wartime price of true lard. Glycerol is hard to obtain in wartime, so in Germany it is synthesized by (1) hydrogenation of water gas, chlorination resulting in trichloropropane which, when treated with caustic alkali, produces glycerol, or (2) fermentation of glucose with yeast and Na_2SO_3, then addn. of lime and $CaCl_2$ and activated C, filtration, distn, of alc., leaving weak glycerol in the still, which is then concd. and refined. Sometimes substitutes for glycerol are used, such as glycol or mannitol. Certain molds and yeasts synthesize fats. *(Chem. Abs.)*

A measure of total unsaturation in the presence of conjugated doublebonds. J. D. Von Mikusch and Charles Frazier. *Ind. Eng. Chem. Anal. Ed. 13*, 782-9 (1941). The I reagents now in use react incompletely with substances containing conjugated double bonds. The methods recommended for detn. of the total unsatn. of conjugated oils and fatty acids are complicated and have not found general use in industrial analysis. Hanus soln. when used in large excess, measures the total unsatn. of dehydrated castor oil, but this procedure is unsuitable for other conjugated oils and fatty acids. By employing IBr solns. of up to twice the concn. used in the Hanus method, a simple procedure is evolved for both conjugated and nonconjugated substances. Fatty acids with conjugated double bonds, made by an isomerization process from natural fatty acids, give low I values with the standard methods. With the proposed method, their I values are identical with those of the nonconjugated fatty acids from which they were made. With dehydrated castor oil, constant values result over a wide range of excess of reagent. With tung oil, a reproducible value of about 225 is obtained if temp., excess, and time of contact are kept within certain limits. The effect of changes in working conditions on the value for the total unsatn. of tung oil somewhat resembles the effect of similar changes in detn. of the Wijs I value of this oil. Theoretical values are obtained with betaeleostearic acid, 9, 11-linoleic acid and blends of the latter with nonconjugated fatty acids, if proper conditions are used. Values for oiticica oil and for nonconjugated oils and acids are listed.

ULTRAVIOLET ABSORPTION SPECTRA OF LINSEED OIL. DETERMINATION OF BODIED IN VACUO AND BLOWN LINSEED OIL IN MIXTURES WITH RAW LINSEED OIL. J. H. Mitchell, Jr., and H. R. Kraybill. *Ind. Eng. Chem. Anal. Ed. 13,* 765-8 (1941). The ultraviolet absorption curves for two series of linseed oils, one heat-bodied at 585° F. and the other blown at 220° F., are presented and discussed. A distinguishing characteristic between these two series is the development, in the blown series, of an absorption band with a max. between 2600 and 2700 Å. The specific absorption coefficient of this band increases with the viscosity, on blowing with air, until a viscosity of about 4.5 poises is attained. After this stage of the process, contd. blowing causes practically no change in the specific absorption coefficient at 2700 Å., although the viscosity continues to increase. Another absorption band with a max. at 2320 Å. develops in the blown series. The specific absorption coefficient of this band continues to increase with the viscosity. The development in the heat bodied series of a strong absorption band with a max. at 2320 Å., attributed to the formation of conjugated octadecadienates, takes place with relatively little change in the viscosity. On further heating the specific absorption coefficient of this band decreases gradually as the viscosity increases. The presence of an absorption band at 2600 to 2700 Å. may be be used to distinguish between linseed oil polymerized *in vacuo* and oxidized linseed oil in mixtures with raw linseed oil. By use of the specific absorption coefficient at 2320Å., quant. analyses of oxidized or heat-bodied linseed oil, ranging from 5 to 50%, in mixtures with raw linseed oil have been made with an average percentage error of 2.12. The physical constants for each of the samples are given. The acid number, sp. gr., and refractive index increase with the viscosity in each case, while the I no. drops.

INFLUENCE OF 2-4 DINITROPHENOL ON LIVER LIPIDS OF THE WHITE MOUSE. W. E. Chalecki, *et al. Proc. Soc. Exptl. Biol. & Med. 48,* 302-4 (1941). Under the stress of increased metabolic rate, due to dinitrophenol injection, liver phospholipid and cholesterol are decreased. These changes are consistent with the belief that at least part of the phospholipid and cholesterol of the liver are important in fat metabolism.

THE ADRENAL LIPIDS OF FASTED GUINEA PIGS. Margaret C. Oleson and W. R. Bloor. *J. Biol. Chem. 141,* 349-54 (1941). The following changes were noted in the right adrenal of fasted male guinea pigs. There was no change in the weight of the adrenal. The phospholipid, in mg. per gland, showed a slight increase. The free and ester cholesterol decreased, the most marked change occurring in the ester cholesterol fraction. The total fatty acid decrease was significant only to the 5 per cent level.

FAT-TOLERANCE TESTS IN PSORIASIS. Edward B. LeWinn and I. Zugerman. *Am. J. Med. Sci 201,* 703-11 (1941). Fat was administered to 10 psoriatic and 13 nonpsoriatic patients and blood cholesterol detd. at 5 intervals during 7½ hrs. No significant differences in the two groups were seen. Conclusion: Psoriasis is due to local conditions in the skin and not to a generalized disturbance in lipidemetabolism. *(Chem. Abs.)*

STUDIES OF DIGESTION IN THE DOG. H. Wasteneys, B. F. Crocker, and Paul Hamilton. *Am. J. Physiol. 135,* 6-19 (1941). Some of the factors affecting the digestion of protein *in vivo* were investigated, using dogs with a re-entrant fistula situated just below the junction of the jejunum and duodenum. The effects of the presence or absence of fat and of nitrogenous extractives were studied, as well as the influence of "bulk." Observations are reported which suggest that it is not justifiable to interpret "emptying time" (as obtained from x-ray studies) in terms of relative digestibility. Errors in the determination of "per cent digestion" from an analysis of the chyme are discussed and a method which avoids these errors is proposed. Retardation varied with the nature of the fat. The digestion of protein was increased in the presence of fat. There was no parallelism between the extent of digestion and the "emptying time."

THE INFLUENCE OF A DIET WITH A HIGH PROTEIN CONTENT UPON THE APPETITE AND DEPOSITION OF FAT. E. M. MacKay, R. H. Barnes, and H. O. Carne. *Am. J. Physiol. 135,* 193-201 (1941). When the carbohydrate in an adequate synthetic diet is replaced with protein (casein) the appetite of albino rats is definitely less than on the carbohydrate containing diet. Alternation of the diets demonstrates the difference in appetite very clearly. Rats offered such diets for a time show marked differences in body weight and fat content, those on the high protein diet having less deposit fat. The reduced appetite on a high protein diet is due to the protein content and not lack of carbohydrate as such, for replacement of the carbohydrate calories with fat instead of protein does not result in the same marked reduction in the appetite and body fat.

PATENTS

REFINING OF ANIMAL AND VEGETABLE OILS. B. H. Thurman (Refining, Inc.). *U. S. 2,260,730.* The process of refining vegetable oils containing free fatty acids comprises mixing in a closed system a stream of said oil with a stream of a solvent which is miscible with said free fatty acids but substantially immiscible with said oil, thereby forming a concurrent stream containing a mixture of an oil phase and a solvent-fatty acid phase, continuously centrifugally separating said oil phase from said solvent fatty acid phase, and vaporizing the solvent from said solvent-fatty acid phase for re-use in said process.

PROCESS OF REFINING ANIMAL AND VEGETABLE OILS. Benj. H. Thurman (Refining, Inc.). *U. S. 2,260,731.* The method of producing refined vegetable oils comprises, extracting the oils by means of a solvent, therefore, continuously mixing a refining reagent with said oil in the presence of said solvent, continuously centrifugally separating foots produced by said refining reagent from said oil, and thereafter separating the solvent from the oil for re-use in the extraction step, said process being carried out in a closed system for preventing loss of solvent and admixture of air with the materials in said process.

DEHYDRATING CASTOR OIL. Alfred E. Rheineck and Samuel B. Crecelius. (Devoe & Reynolds). *U. S. 2,261,663.* The process of dehydrating castor oil comprises adding to the castor oil catalytic quantities of yellow tungstic acid corresponding to the formula H_2WO_4, prepared by precipitation with a strong acid from an alkaline solution of tungstic oxide, WO_3, and heating the mixture to a temperature of from about 225° C. to 305° C., until the tungstic acid turns blue and the oil is largely dehydrated.

PROCESS OF PREPARING HIGH MOLECULAR WEIGHT FATTY ACID CHLORIDES. Anderson W. Ralston, Miles R. McCorkle, Robert J. Vander Wal. (Armour & Company, Chicago). *U. S. 2,262,431.* In the preparation of fatty acid chlorides having at least six carbon atoms by reacting the corresponding fatty acid with a phosphorus halide used in excess, the method of removing unreacted phosphorus halide from the fatty acid chloride thus prepared comprises hydrolyzing the unreacted phosphorus halide to its corresponding acid and then separating the acid from the thus purified fatty acid chloride. The products are used as intermediates for prepn. of other products.

METHOD OF PREPARING HIGHER FATTY ACID ESTERS OF CELLULOSE. G. D. Hiatt and C. L. Crane (Eastman Kodak Co.). *U. S. 2,254,652.* A method of preparing cellulose acetate stearate which comprises reacting upon an acetyl cellulose contg. esterifiable hydroxyl groups with a reaction mixture free of sulfuric acid, comprising an impelling anhydride, a solvent, stearic acid, and phosphoric acid as the catalyst until a substantial amt., but not all of the esterification, has occurred, then adding sulfuric acid catalyst to the mass and completing the esterification, is described.

PROTEIN PLASTIC MOLDING COMPOUND AND METHOD OF PREPARING THE SAME. George H. Brother and Leonard L. McKinney. (Henry W. Wallace, as Secy. of Agriculture.) *U. S. 2,262,422.* An article of manufacture, a thermosetting water-resistant protein molding powder, comprises 20 parts thermoplastic formaldehyde-hardened at a pH of 4.1 0.1 soybean alpha protein that has been mixed with substantially 5 parts ethylene glycol and substantially 75 parts of a phenolic molding powder consisting of a mixture of a B-stage phenol-formaldehyde resin, wood flour, and a suitable accelerator.

Abstracts

Soaps

Edited by
M. L. SHEELY

GLYCERINE. SOME OBSERVATIONS ON ITS RECOVERY AND REFINING IN MODERN SOAP PLANT PRACTICE. J. W. McCutcheon. *Soap 17*, No. 11, 24-8, 69 (1941). It is predicted that the future development of glycerine uses will lie in the field of polymerization, condensation, and esterification. There has been a gradual lowering of the nitroglycerine content in industrial dynamites, and an increased use of nitroglycols for the purpose of improving stability at low temperatures. As a military explosive large quantities of nitroglycerine are being used in double base propellants and as an agent for controlling the ballistics of straight nitrocellulose powders, but the single base or nitrocellulose powders are providing keen competition.

Yields are discussed. Generally speaking, the amount of glycerine left in the soap ranges from 0.2-1.2% and represents approximately 2-11% of the total glycerine available. Washing normally gives approximately 1.20 lbs. of lye to every pound of 63% soap, or approximately two pounds of lye per pound of fat consumed. This should give a normal figure for glycerine left in soap of 0.5-0.7%, representing a loss of 7% to 10%. Increasing the washes to say 1.4 pounds of lye per pound of 63% soap made under normal operation conditions would probably reduce the glycerine left in soap to 0.2-0.4%, representing a total glycerol loss of only 3%-6%. The effect of such changes will result in weakening the glycerine content of the lye from say 6% to 5% with a resulting increase in evaporation costs. Counter-flowing lyes from high grade to low grade soaps greatly reduce the wash water used and increase the glycerine content up to 15-17%, leaving 0.5-0.7% glycerine in soap or down to 11-12%, where the glycerine content left in soap is only 0.2-0.4%.

Purification of soap lyes with iron salts and aluminum sulfate is discussed; the latter is unsatisfactory for single treat systems because of the necessity of a close pH control, and its high content of water of crystallization from a cost standpoint. In a double lye treat it is advisable to operate on a low pH first and work up to a higher one. A pH of 3.7 may give effective operation, but 5.0-5.5 is much to be preferred. The second treat should be held between a pH 7.0-7.7. The two-treat system is discussed in detail, including percentage of chemicals involved and equipment.

GLYCERINE. J. W. McCutcheon. *Soap 17*, No. 12, 34-7, 77 (1941). Double effect evaporators are not justified on a production of less than 3,000 lbs. of crude glycerine per day. It is desirable to have a steady vacuum system to minimize bumping in the evaporator, to prevent entrainment losses and serious vibrations which may lead to leaks in the callandria. The Foster verticle tube evaporator is discussed. Corrosion on the lower plate is due to the electrolytic action between the copper on the tubes and alloy steel on the bottom plates, or to the aerated lye which flows through these areas. The No. 1 effect lye should be adjusted to a pH 8.9 for evaporation, and the lye