Abstracts

Oils and Fats

Edited by
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Solvent extraction of cottonseed and peanut oils. Boiling point-vapor pressure-composition relations for miscellas of oils in hexane. E. F. Pollard, H. L. E. Vix and E. A. Gastrock. *Ind. Eng. Chem. 37,* 1022-6 (1945). The boiling points and densities of mixtures of cottonseed and peanut oils with commercial hexane are reported. They are useful in the design of vacuum evaporators and strippers and for control operations involving temperature, time of heating, and concentration of oil-solvent mixtures of various compositions, to prevent or minimize fixation of objectionable coloring matter or other deteriorative heat effects.

The determination of fat in mixtures containing fatty acids, and the determination of unsaponifiable matter in oils and fats. N. D. Sylvester, A. N. Ainsworth and E. B. Hughes. *Analyst 70,* 295-8 (1945). The method depends on adsorbing the free fat acids on Al_2O_3 in an adsorption column. With oils free fat acids are removed from glycerides and unsaponifiable. When the glycerides are saponified, and the acid freed with acid, the acids can be removed from the unsaponifiable by the process.

Spectrophotometric studies of the oxidation of fats. V. The color of oxidized fats in alcoholic alkali. R. T. Holman, W. O. Lundberg and G. O. Burr. *J. Am. Chem. Soc. 67,* 1669-72 (1945). The ultraviolet absorption spectra of diacetyl, acetylpropionyl, 9,10-diketostearic acid, *p*-xyloquinone, duroquinone, diduroquinone, chroman-5,6-quinone, and rancid lard have been determined and compared with their spectra in alkaline solution. Diketostearic acid in alkali may give rise to a quinone homologous to duroquinone. The alcoholic alkali color of rancid fats is probably not due to the formation of *p*-quinones from α-dicarbonyl compounds formed during the oxidation of the fat. The alcoholic alkali color is only to a very small extent due to chroman-5,6-quinone derived from tocopherol or its degradation products in alkali. The alcoholic alkali color may to an appreciable extent be due to compounds derived from the unsaturated fatty acids which are closely related to the compounds obtained from chroman-5,6-quinone by treatment with alkali. The alcoholic alkali color may largely result from other unsaturated carbonyl compounds which are oxidation products of unsaturated fatty acids.

Flavor reversion in hydrogenated linseed oil. II. Effect of variations in processing procedures. H. W. Lemon, A. Lips and W. H. White. *Can. J. Res. 23F,* 295-303 (1945). Shortenings prepared from various linseed oils by different methods were stored at 43.3° and sampled at 8-week intervals for 56 weeks. Storage life in terms of flavor reversion was not highly correlated with mean peroxide value or unsaturation. All shortenings were resistant to normal oxidation, but unstable to reversion unless hydrogenated to a very low I number. Hot and cold pressed oils yielded products equally susceptible to flavor reversion. Changes in stability attributable to variations in methods of alkali refining, bleaching, and hydrogenation were only minor. High alkali concentrations (30-40° Bé) were beneficial, while hydrogenation at 190° was preferable to hardening at lower temperatures (140° and 115°). Blending with other vegetable oils, or the use of hydroquinone or a wheat-germ oil preparation as antioxidants, slightly retarded the onset of reversion. None of the laboratory or commercially prepared samples examined was considered to be a satisfactory stable product.

Corrosion of lead by oxidizing agents and lauric acid in hydrocarbon solvents. C. F. Prutton, D. Turnbull and D. R. Frey. *Ind. Eng. Chem. 37,* 917-24 (1945). Corrosion of lead by an acyl peroxide is independent of acid concentration down to concentrations as low as 10^{-3} mole of acid per liter and is determined only by peroxide concentration. Detailed studies of the mechanism of reaction of quinone and lauric acid with Pb in benzene at 70° showed that at reactant concentrations below 0.05 mole per liter the reaction is second order, and the rate is proportional to the concentration of both quinone and lauric acid. Further, Pb laurate had a pronounced catalytic effect upon the rate of this reaction. For hydroperoxides and O_2 it is probable that $Pb(OH)_2$ or PbO is intermediate in the corrosion process. At low temperatures insoluble soap films formed on the Pb surface are very effective in slowing the corrosion rate. A film formed slowly appears to be more protective than one formed rapidly.

Hydroxylation of monounsaturated fatty materials with hydrogen peroxide. D. Swern, G. N. Billen, T. W. Findley and J. T. Scanlan. *J. Am. Chem. Soc. 67,* 1786-9 (1945). A new and rapid general reaction for the quantitative hydroxylation of long-chain, monounsaturated, aliphatic compounds has been described. The oxidizing agent, performic acid, is not isolated but is prepared and utilized in situ. This is accomplished by dissolving the unsaturated compounds in HCOOH and adding H_2O_2. Because of the rapidity of the reaction and the mild conditions, only one mole of H_2O_2 is required for each mole of monounsaturated compound. This reaction has been applied to pure oleic, elaidic, and hendecenoic (undecylenic) acids, oleyl alcohol, and Me ricinoleate to give excellent yields of the corresponding hydroxy derivatives. In addition, it has been shown that substantially identical results are obtained when HOAc containing catalytic quantities of H_2SO_4 is substituted for HCOOH in the mixture with H_2O_2. The oxidizing agent in the case is peracetic acid. Either of the 2 hydroxylation methods described should be suitable for the industrial production of hydroxylated fatty acids and related compounds.

Tall oil esters as plasticizers for GR-S. W. I. Harber and C. S. Yoran. *Ind. Eng. Chem. 37,* 953-6 (1945). Tall oil is a rich source of resin and fatty acids. Previous work has shown that this material exerts a plasticizing effect on GR-S. The structure of tall oil was modified by esterification with alcohols. Most interesting were those esters derived from hydroxy compounds related to GR-S unit structure. They were superior to tall oil in rate of incorporation into the GR-S and general plasticizing action. For a comprehensive picture of the properties of tall oil esters, data are also given for esters of aliphatic, phenolic, cycloaliphatic, and polyhydroxy alcohols.

Nutritional studies on milk fat. I. The growth of young rats fed milk fat and certain synthetic glycerides as supplements to a fat-free diet. J. L. Henderson, E. L. Jack, S. Lepkovsky and D. F. Reid. *J. Nutr. 30,* 169-73 (1945). A fat-free diet is described in which all the components are pure compounds with the exception of casein extracted with alcohol and ether. This diet was found to be satisfactory for use in the fat-nutritional experiments. The rats on the milk-fat diet and on the triolein diet grew faster than those on the other diets. There was no significant difference between the milk-fat diet and the triolein diet with respect to their effect on growth. Trilaurin, when fed at the level of 20%, enabled the rats to grow at about the same rate or slightly slower than the rats on a fat-free diet. When 10% each of trilaurin and triolein were fed, the growth of the rats was intermediate between those receiving trilaurin and those receiving triolein. The growth-promoting effects of the different diets could not be attributed to differences in feed consumption. II. The growth of young rats fed glyceride fractions separated from milk fat. *Ibid.* 175-81. Five glyceride fractions separated from milk fat by precipitation from a solvent were fed to weanling rats, and the gain in weight was measured. The growth responses place the fractions in 3 groups. The —53° filtrate was superior to all other diets containing solvent-treated fat; the —7° ppt. and the fat-free were the poorest; the others formed an intermediate group. The diet containing natural milk fat which had not been solvent-treated gave greater growth than any other diet. The diets containing the solvent-treated milk fats (natural, synthetic and composite) fell in the intermediate group with no significant difference between them. The fatty acid composition of the fats suggests that either the oleic acid content or the total unsaturation might be a factor contributing to differences in growth.

The absence of ricinoleic acid from phospholipids of rats fed castor oil. W. C. Stewart and R. G. Sinclair. *Arch. Biochem. 8,* 7-11 (1945). Rats were fed for several weeks on a diet containing 48.4% castor oil. No catharsis occurred. The fat excreted amounted to only about 2% of the intake. As there was no increase in the acetyl number over the control value, no evidence was found of the presence of ricinoleic acid in the phospholipids of the small intestine, liver and muscle, nor in the liver glycerides. However, ricinoleic acid made up about 7% of the fat acids of the depot fat. Since only about 1-2% of the ricinoleic acid absorbed was deposited as fat, it is evident that this hydroxy acid is readily metabolized.

Fat excretion in the guinea pig kidney. R. L. Zwemer and R. M. Wotton. *Anat. Rec. 90,* 107-14 (1944). It is claimed on histological evidence that in the guinea pig fat is both excreted and re-absorbed in the kidney tubules. (*Nutr. Abs. & Revs. 15,* 122.)

Lipotropic action of lipocaic. A study of lipocaic, methionine and cystine on dietary fatty livers in the white rat. D. E. Clark, M. L. Eilert and L. R. Dragstedt. *Am. J. Physiol. 144,* 620-5 (1945). Fatty livers were produced in rats by diets rich in fat and low in protein. These fatty livers could be prevented by the addition of 0.5% methionine or of 1.25-5.0% pancreas extract (lipocaic). The addition of 0.5% cystine to the diet produced no significant effect on liver fat. Since there was no choline and less than 2% methionine in the pancreas extract it is concluded that the lipotropic effect of lipocaic on dietary fatty livers in rats must be due to some constituents other than choline, methionine, or the non-specific action of protein.

Thiouracil in the prevention of experimental dietary cirrhosis of liver. P. György and H. Goldblatt. *Science 102,* 451-2 (1945). Thiouracil mixed to a cirrhosis producing synthetic diet in amount of 0.1% has a preventive effect on the production of cirrhosis in rats.

Vitamin E and adipose tissue. Z. Menschik. *Edinburgh Med. J. 51,* 486-9 (1944). A total of 115 mice was used in the study. A group of controls receiving a stock diet with milk and lettuce put on a moderate amount of fat and gained weight slightly. A second group, fed on a diet containing 22% fat but deficient in vitamin E, gained some weight and deposited some adipose tissue at first but, after a period varying from 40-70 weeks, they lost weight and, at autopsy, very little fat, subcutaneous or subperitoneal, was found, A third group, receiving the same diet as the second group but with vitamin E added as synthetic α-tocopheryl acetate, gained weight and deposited much fat all over the body. After 70 weeks they showed fatty livers. (*Nutr. Abs. & Revs. 15,* 62.)

Effect of soybean phosphatides on vitamin A metabolism. C. A. Slanetz and A. Scharf. *J. Nutr. 30,* 239-43 (1945). Liver storage and blood levels of vitamin A in the rat have been investigated as influenced by specific factors used as supplements in a purified basal diet containing synthetic B vitamins instead of yeast. Under the conditions of the experiment commercial soybean lecithin markedly influenced storage and blood levels of vitamin A in the rat. I interfered with this effect while heating of soybean lecithin interfered but little. The presence of an unknown factor in commercial soybean lecithin is indicated.

PATENTS

Process of treating waxes.• C. S. Treacy (Mamaroneck Chemical Corp.). *U. S. 2,383,629.* The process for bleaching and improving the properties of candelilia wax comprises emulsifying the candelilia wax in the presence of an aqueous solution of a hydrogen-oxygen-chlorine acid, heating the mass until the bleaching is accomplished and breaking the emulsion by the action of a strong mineral acid.

Method of esterification. J. H. Bruun and J. H. Perrine (Sun Oil Co.). *U. S. 2,384,793.* Fat acids and alcohols are reacted to form esters in a special apparatus, in which the reagents are flowed at 100-150° through catalyst, countercurrently to an inert gas.

Alcoholysis of fats and oils. H. D. Allen and W. A. Kline, *U. S. 2,383,579*; C. J. Arrowsmith and J. Ross, *2,383,580*; E. E. Dreger, *2,383,596*; G. I. Keim, *2,383,601*; G. I. Keim and J. Ross, *2,383,602*; J. H. Percy, *2,383,614*; W. R. Trent, *2,383,633* (Colgate-Palmolive-Peet Co.). The process comprises reacting a fatty glyceride with a monohydric alcohol having 1-6 C atoms per molecule in the presence of an alkaline alcoholysis catalyst to produce a liquid body containing esters of the alcohol with fatty acids, glycerin and unreacted alcohol; volatilizing the unreacted alcohol from said liquid body; acidifying the residue of said liquid body; and separating the esters from the glycerin.

TREATING FATTY GLYCERIDES. G. A. Glossop (Colgate-Palmolive-Peet Co.). *U. S. 2,383,599.* A process comprises treating a fatty glyceride containing free fatty acid with a solvent for said free acid at least partially immiscible with the fatty glyceride to form 2 phases, separating a fatty glyceride phase from a solvent phase containing free fatty acid, and reacting the fatty glyceride with a monohydric alcohol having 1-6 C atoms per molecule in the presence of an alcoholysis catalyst.

MONOGLYCERIDES. C. J. Arrowsmith and J. Ross (Colgate-Palmolive-Peet Co.). *U. S. 2,383,581.* A process for preparing fatty acid monoglycerides comprises reacting a fatty triglyceride with an excess of glycerin in the presence of an alcoholysis catalyst to provide a liquid body containing a fatty acid monoglyceride and unreacted glycerin, bringing the liquid body to a pH of about 6 to about 7, and distilling said liquid body under reduced pressure to obtain a distillate comprising the fatty acid monoglyceride.

PETROLEUM DEMULSIFIERS. M. De Groote (Petrolite Corp., Ltd.). *U. S. 2,384,605-7.* The products are fat acid derivatives of 5-amino-1, 3-dioxanes.

PETROLEUM DEMULSIFIERS. M. De Groote and B. Keiser (Petrolite Corp., Ltd.). *U. S. 2,384,608.* The products are fat acid aminoalcohol esters of carbonic acid.

LUBRICANT MANUFACTURE. J. C. Zimmer (Standard Oil Development Co.). *U. S. 2,383,904.* This invention relates to the manufacture of soda soap grease from an oil suspension of kerosene-dehydrated caustic soda.

LUBRICANTS. J. C. Zimmer and G. M. McNulty (Standard Oil Development Co.). *U. S. 2,383,905.* An extreme pressure lubricant consists of 10% Pb oleate, 40% asphaltic mineral lubricating oil and 50% water.

FLOTATION OF IRON ORES. J. B. Clemmer and B. H. Clemmons (Sec. Int.). *U. S. 2,383,467.* The flotation reagent used is a mixture of soluble phosphate salts, Na oleate, and oleic acid.

CONDENSATION PRODUCTS AND METHODS OF PREPARING AND USING THE SAME. E. Lieber (Standard Oil Development Co.). *U. S. 2,384,935.* The process comprises reacting stearyl benzene with formaldehyde and subjecting the reaction mixture to distillation up to about 600° F. under reduced pressure to obtain the desired high molecular weight condensation product as distillation residue.

PLASTIC COMPOSITION AND METHOD OF PREPARING SAME. J. C. Cowan and H. M. Teeter (Sec. Agr.). *U. S. 2,384,443.* The process of manufacturing a plastic composition comprises intimately mixing a dihydric alcohol polyester of a polymeric fat acid with rubber compounding agents, heating the mixture until it becomes millable and then plasticizing the resulting composition by milling.

SOLVENT FOR OILS, WAXES, RESIN, ETC. O. Huppert. *U. S. 2,385,281.* The solvent is a condensation product prepared by reacting isophorone, maleic anhydride and a primary 1,2-hydroxyalkyl amine.

Abstracts

Drying Oils

Edited by
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RAPID DETERMINATION OF THE IODINE VALUE OF CASTOR OIL. R. Rosenbusch and R. Parker. *J. Soc. Chem. Ind. 64,* 211-212 (1945). The use of mercuric acetate to catalyze the addition of Hanus reagent to castor oil gives results which are 6 to 7 units higher than those determined by standard methods. The deviation is shown to increase with an increase in the amount of mercuric acetate employed, but it can be reduced to the normal experimental error by acetylation of the hydroxyl group. It was found by experiment that satisfactory analyses could be made by reducing the volume of mercuric acetate employed. The procedure requires addition of 2.3 ml. of Hanus solution to a solution of 0.307 g. of castor in 10 ml. of carbon tetrachloride and immediately thereafter 2 ml. of 2.5 volume-percent mercuric acetate solution in glacial acetic acid. After an absorption time of 3-5 minutes at 21-24° C., the sample is titrated in the usual way. With one sample of oil, iodine values of 83.77 to 84.04, average 83.91, were obtained as compared with values ranging from 84.04 to 84.7, averaging 84.13, obtained by the standard Hanus method.

SPECTROPHOTOMETRIC DETERMINATION OF ALPHA-ELEOSTEARIC ACID IN FRESHLY EXTRACTED TUNG OIL. R. T. O'Connor, D. C. Heinzelman, A. F. Freeman and F. C. Pack. *Ind. Eng. Chem., Anal. Ed., 17,* 467-470 (1945). The extinction coefficients of freshly prepared eleostearic acid in 99 percent ethyl alcohol, iso-octane, and cyclohexane are 183.4, 169.8, and 168.6 respectively. After storage of the acid in the dark at about 0° C. for 24 hours, the value in alcohol dropped to 170 and there were similar changes in the hydrocarbon solvents. Measurements were made with a Beckman spectrophotometer at 270 $m\mu$ for alcohol and iso-octane and at 271 $m\mu$ for cyclohexane. Using these constants, α-eleostearic acid content of 5 samples of tung oil was determined by dissolving a weighed sample of the oil in the solvent, diluting to about 0.005 g. per l, and reading the density in a 1-cm. cell in the spectrophotometer. The values ranged from 78.7 to 81.8 percent. It is not necessary that tung oil be examined the same day it is extracted since the combined acid is more stable than the isolated acid, but the examination should be made as soon as practicable.

THE USE OF LOW-TEMPERATURE CRYSTALLIZATION IN THE DETERMINATION OF COMPONENT ACIDS OF LIQUID FATS. I. FATS IN WHICH OLEIC AND LINOLEIC ACIDS ARE MAJOR COMPONENTS. T. P. Hilditch and J. P. Riley. *J. Soc. Chem. Ind. 64,* 204-207 (1945). Low-temperature fractional crystallization has been applied to the quantitative estimation of the component acids from sunflower, sesame, and ground nut oils. The acids are first crystallized from acetone (5 g. per ml.) at —30°