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Abstracts

Oils and Fats

Edited by
M. M. PISKUR and SARAH HICKS

REPORT OF THE COMMITTEE ON ANALYSIS OF COMMERCIAL FATS AND OILS. V. C. Mehlenbacher *et al.* *Ind. Eng. Chem., Anal. Ed. 17*, 336-40 (1945). Activities on (SCN) value, fat stability test, hexabromide test, congeal point, unsaponifiable matter and color are recorded.

A NEW TECHNIQUE FOR EXAMINING COD OILS FOR CURRYING AND CHAMOISING. D. Burton and G. F. Robertshaw. *J. Intern. Soc. Leather Trades' Chem. 29*, 28-45 (1945). The difficulty of assessing the quality and properties of cod oil is illustrated by the variation in the analytical figures given by different authorities for Newfoundland cod oil. The unsaponifiable matter is an important constituent of cod oil and is useful in showing the presence of adulterants. The polybromide index may be a useful guide as to the suitability of a cod oil for currying when sufficient results are available to serve as standards. Gummy spue has been obtained in practice with 2 oils giving values of 45 and 46. A new technic has been evolved for isolating and determining the properties of the free fatty acids, and the "liquid" and "solid" fatty acids derived from the glycerides. In examining a series of commercial cod oils and a herring oil, it has been shown that (1) the free fatty acids isolated from 3 of the cod oils were solid, (2) 3 of the oils rapidly thickened and formed a skin after removal of their free fatty acids and (3) the "liquid" fatty acids from 4 of the cod oils changed into pale yellow sticky compounds, insoluble in petroleum ether, on standing. It has been shown that cod oils for currying should contain about 6% of free fatty acids and that oils containing 14% or more should not be used since the high melting-point fatty acids tend to spue to the surface and carry the oxidizable oil with them and so lead to gummy spue. This can be prevented by using mineral oil along with the cod oil in the currying.

COLLECTION OF SLUDGE FAT. G. Chr. Kornmesser. *Gesundh.-Ing. 65*, 24 (1942); *Wasser u. Abwasser 40*, 56 (1942). The yield of fat is increased by leaving some sludge on the H_2O surface of the fat separator. The size of fat separator is determined by the number of animals handled in slaughter houses, and by the number of meals served in eating houses. (*Chem. Abs.*)

POTENTIOMETRIC PRECIPITATION TITRATION OF HIGH-MOLECULAR FATTY ACIDS WITH $AgNO_3$. Per Ekwall and Gösta Juup. *The Svedberg 1944*, 104-12. At 67-70° the Na salts of lauric, myristic, palmitic and stearic acids can be titrated potentiometrically with 0.02-1.1 *N* $AgNO_3$. The titration curves are typical with breaks of 100-250 mv. at the end points. Titration of soap solutions gave results which were 1-5% too low, possibly because undecomposed soap was included in the Ag precipitates. The solubility of the different Ag salts can be calculated approximately from the titration curves and if the molecular weight of the acid differs by more than 2 CH_2 groups from that of another acid, the 2 acids can be titrated independently in a mixture. Two saturated acids with an even number of C atoms of fairly close molecular weight are hard to titrate in the presence of one another but these preliminary experiments indicate that the difficulty can probably be overcome. (*Chem. Abs.*)

DETERMINATION OF GAMMA-TOCOPHEROL IN VEGETABLE OILS. G. S. Fisher. *Ind. Eng. Chem., Anal. Ed. 17*, 224-7 (1945). The details of a method for determining γ-tocopherol in the presence of α-tocopherol by oxidation with nitric acid in the presence of acetic acid, followed by photometric estimation of the red color produced, are presented with results of its application to several vegetable oils. Use of the method presupposes absence of β-tocopherol.

SOUTH AFRICAN FISH PRODUCTS. PART XIII. THE JACOPEVER, SEBASTICHTHYS CAPENSIS (GMELIN) AND THE SANCORD, HELICOLENUS MACULATUS (C. AND V.). W. S. Rapson, H. M. Schwartz and N. J. Van Rensburg. *J. Soc. Chem. Ind. 64*, 47-50 (1945). Fat storage in the jacopever has been studied at monthly intervals over a period of one year. Head, body, liver, intestine and pyloric caeca are all used as fat depots, though the liver and other visceral organs are of minor importance in this respect, each containing approximately 10% of the total lipoid matter. The head and body are the main fat depots, containing the residual lipoid matter in approximately equal proportions. The head is the organ least susceptible to changes in oil content. The seasonal variation in fat content was of the same type as that already recorded for the other fishes from the west coast so far examined; that is, the fat content was at a maximum in the early winter and at a minimum in the spring. The vitamin-A and -D contents for the liver and visceral oils are recorded. The liver oils were more saturated than those from the other organs, but the relative degree of saturation was dependent on the condition of the fish. Some discussion of this latter effect is given. Oil distribution in the closely related sancord has also been studied and found similar to that in the jacopever. The properties of the oils were also analogous in all respects.

SOUTH AFRICAN FISH PRODUCTS. PART XI. THE KABELJOU (SCIAENA HOLOLEPIDOTA, LACEP), THE GEELBEK (ATRACTOSCION AEQUIDENS, C. AND V.), AND THE BAARDMAN (UMBRINA CAPENSIS, PAPPE). W. S. Rapson, H. M. Schwartz and N. J. Van Rensburg. *J. Soc. Chem. Ind. 64,* 7-11 (1945). Organ and fat distribution have been studied in the 3 most important species of the family Sciaenidae in Cape waters, and have been found essentially the same in each, though oil deposition in the geelbek has been found greater than in the kabeljou and the baardman. In both the kabeljou and geelbek the liver oils are more saturated than the oils from the heads, bodies and "intestines." Liver oils from the kabeljou have been studied in considerable detail. Data for laboratory studies over the period 1940-1944 are recorded as well as data on liver oils produced commercially during 1944.

SOUTH AFRICAN FISH PRODUCTS. PART X. SOME SPARID FISHES OF THE CAPE. J. H. Corbett, W. S. Rapson, H. M. Schwartz and N. J. Van Rensburg. *J. Soc. Chem. Ind. 64,* 5-7 (1945). Organ and fat distribution has been studied in the following Sparid fishes in Cape waters: The white stumpnose, the panga, the red stumpnose, the roman, the hottentot, the white steenbras, the striped steenbras, the silverfish, the seventy-four and the red steenbras. In all cases, the mode of fat storage is essentially the same, the main fat depots being in the head and body. The visceral organs tend to be very small, and to yield little lipoid material, which is probably mainly functional in character. With the exception of the older specimens of the larger species, they are of little interest as a source of vitamin A. The heads, containing 5-20% of fat, are well suited to the production of oil and meal; where facilities for this are lacking, their processing for oil alone seems feasible by alkali digestion in installations producing liver oil. With the exception of one individual sample the liver oils were all more saturated than the head and body oils, an observation which links up with similar results obtained with other species discussed in this series of the communications.

IOWA BUTTER VITAMIN-RICH. E. W. Bird and F. E. Ferguson. *Farm Sci. Reptr. 6,* No. 2, 13-14 (1945). This study has shown to date that Iowa butter is a rich source of vitamin A. This agrees with the long accepted fact that butter is the natural food with the highest vitamin A value. The study indicates the need for more research on winter feeding of our dairy herds to see what can be done to increase vitamin A in Iowa winter butter to make it more nearly reach the very high value it has during the pasture months.

THE SYSTEM OCTADECYLAMINE-ACETIC ACID. W. O. Pool, H. J. Harwood and A. W. Ralston. *J. Am. Chem. Soc. 67,* 775-6 (1945). The temperature-concentration curve for the system octadecylamine-acetic acid has been completed throughout the entire concentration range. The existence of the new solid compound $C_{18}H_{37}NH_2 \cdot 2HC_2H_3O_2$ has been demonstrated. These modifications of $C_{18}H_{37}NH_2 \cdot 2HC_2H_3O_2$ and $C_{18}H_{37}NH_2 \cdot HC_2H_3O_2$ have been shown to occur. It has been suggested that the formation of the acid salts of the alkyl amine series parallels the formation of the amine hydrates.

STUDIES ON THE COMPARATIVE NUTRITIVE VALUE OF FATS. V. THE GROWTH RATE AND EFFICIENCY OF CONVERSION OF VARIOUS DIETS TO TISSUE IN RATS WEANED AT 14 DAYS. H. J. Deuel, Jr. and E. Movitt. *J. Nutr. 29,* 237-44 (1945). In experiments on 120 male and 112 female rats, the rate of growth of animals weaned at 14 days was found to be identical over a period of 12 weeks on diets of mineralized skimmed milk powder to which was added vitamin-fortified corn, cottonseed, peanut or soybean oil or a margarine as on similar diets containing butter as the fat. The efficiency of transformation of these diets to body tissue was also similar within experimental error.

STUDIES ON THE COMPARATIVE NUTRITIVE VALUE OF FATS. VI. GROWTH AND REPRODUCTION OVER TEN GENERATIONS ON SHERMAN DIET B WHERE BUTTERFAT WAS REPLACED BY A MARGARINE FAT. H. J. Deuel, Jr., L. F. Hallman and E. Movitt. *J. Nutr. 29,* 309-16 (1945). Experiments are reported on reproduction and growth rate of 10 generations in which the lineage is through the first litter and of 8 generations in which the lineage is through the second litters where the diets have been a modification of the Sherman diet B in which butterfat has been replaced by vitamin A-fortified margarine fat. The growth rate considerably exceeded that obtained with animals on the stock diet of the authors and progressively improved with the later generations. Somewhat faster growth was obtained with the first litter rats than with those in the second litter group. It is concluded that a vegetable fat such as that contained in a margarine can serve adequately in place of butterfat for growth and reproduction on a diet otherwise nutritionally satisfactory.

THE NUTRITIVE VALUE OF THE FATTY ACIDS OF BUTTER INCLUDING THEIR EFFECT ON THE UTILIZATION OF CAROTENE. E. F. Brown and W. R. Bloor. *J. Nutr. 29,* 349-60 (1945). When the fatty acids of butter were obtained in 5 fractions designated as volatile, low molecular weight liquid, high molecular weight liquid, low molecular weight solid and high molecular weight solid, and substituted for the milk fat in a normal diet, the following results were observed. The efficiency of the butter diet in producing gains in body weight was either matched or improved upon by the liquid acid diets. With the exception of 1 group out of 6 the solid acid diets were inferior to the butter diet in this respect, due largely in all probability to poorer absorption of the solid acids. The diet containing the volatile acids was the poorest. When the results on growth were studied without reference to the amounts of food eaten, then the liquid fractions did not show a consistent superiority over the solid ones. The liquid acids were absorbed very well but the average absorption of the low solid acids was 71.3% and of the high solid acids only 42.2%. The lipid composition of the livers studied showed no real differences.

THE RELATIONSHIP OF GLYCERIDE STRUCTURE TO FAT DIGESTIBILITY. I. SYNTHETIC GLYCERIDES OF STEARIC AND OLEIC ACIDS. K. F. Mattil and J. W. Higgins. *J. Nutr. 29,* 255-60 (1945). Synthetic glycerides containing stearic and oleic acids have been prepared and incorporated into the diets of rats. The stearic acid in the glycerides has been shown to be very indigestible. It is better utilized when fed as mixed glycerides than when fed as tristearin mixed with triolein. The possibility of selective utilization of fat acids has been indicated. Support is given to the hypothesis that either hydrolysis of glycerides or ester interchange precedes absorption.

EMULSIFICATION OF FAT IN THE INTESTINE OF THE RAT AND ITS RELATIONSHIP TO ABSORPTION. A. C. Frazer, J. H. Schulman and H. C. Stewart. *J. Physiol. 103*, 306-16 (1944). Ingested triglyceride is finely dispersed when it enters the small intestine following intragastric administration to rats. The average diameter of the fat globules is less than 0.5μ. Paraffins are not finely emulsified in the intestine. Finely dispersed paraffin emulsion with an average particle size of less than 0.5μ is absorbed from the intestine in amounts comparable to olive-oil emulsion of similar dispersions. In vitro experiments on the merits of bile salts, oleic acid, soap, cholesterol and glyceryl monostearate as emulsifying agents, singly or in double and triple combinations, show that over the pH range 6.0-8.5 only the combination bile salts-oleic acid-monoglyceride is effective in producing spontaneous emulsification, fine dispersion and good stability. The significance of these data is discussed. (*Chem. Abs.*)

FATTY ACID METABOLISM. III. REACTIONS OF CARBOXYL-LABELED ACETIC ACID IN LIVER AND KIDNEY. S. Weinhouse, G. Medes and N. F. Floyd. *J. Biol. Chem. 158*, 411-19 (1945). The distribution of C^{13} in acetoacetic acid formed by condensation of acetic acid, labeled with C^{13} in the carboxyl group, indicates that the reaction proceeds by coupling of 2 acetyl groups. Of the total acetoacetate, 41-45% came from the isotopic acetate and the remainder presumably from constituents of the liver slices. Although the results establish the ketone bodies as an intermediate stage of acetate metabolism in liver, the data are inconclusive as to whether or not acetate is also metabolized by some other pathway not involving ketone body formation.

PRESENT AND POSSIBLE USES FOR TALL OIL. W. H. Jennings. *Paper Trade J. 120,* No. 19, 41-2 (1945). Several of the important uses are listed as well as some of the possible future uses of the rosin and fatty acids from tall oil once the process for separation of these components is perfected on a commercial scale. The chemical composition of tall oil is variable over wide limits and a research program is now underway to determine the limits of variation under various conditions. Some of the findings to date are discussed.

PATENTS

STABILIZATION OF FATTY MATERIALS. G. W. Phelps and H. C. Black (Industrial Patents Corp.). *U. S. 2,374,234.* The process comprises steam deodorizing a relatively non-volatile fatty material in the presence of a small amount of gum guaiac.

APPARATUS FOR SAPONIFICATION AND EXTRACTION. D. S. Binnington (General Mills, Inc.). *U. S. 2,373,646.* Special apparatus is designed for removing the unsaponifiable material (vitamin concentrates) from oils by saponification and solvent extraction.

PHOSPHATIDE PRODUCT AND METHOD OF MAKING. P. L. Julian, E. W. Meyer and H. T. Iveson (American Lecithin Co.). *U. S. 2,373,686.* The process comprises reacting cephalin with a methylating agent for cephalin to produce methylated cephalin. Products are used as chocolate viscosity reducing substance.

CONFECTION AND METHOD OF MAKING. P. L. Julian, E. W. Meyer and H. T. Iveson (American Lecithin Co.). *U. S. 2,373,687.* The process of reducing the viscosity of chocolate comprises incorporating therein a phosphatidic material comprising methylated cephalin in an amount sufficient to reduce the viscosity of chocolate.

UNSATURATED FAT ALCOHOLS FROM UNSATURATED FAT ACIDS. W. Rittmeister (American Hyalsol Corp.). *U. S. 2,374,379.* This is a hydrogenation process using Zn-V catalyst, temperatures of 280-350 and pressures of about 50 atmospheres.

TALL OIL TREATMENT. E. Segessemann (National Oil Products Co.). *U. S. 2,373,978.* A process of treating tall oil to separate a fatty fraction therefrom comprises dissolving the tall oil in ethanol, decreasing the temperature of the solution to effect precipitation of a fatty fraction and removing the precipitated fraction from the remaining solution.

ESTERIFIED TALL OIL TREATMENT. E. Segessemann (National Oil Products Co.). *U. S. 2,373,979.* A process for treating tall oil comprises esterifying the same so as to produce lower alcohol esters of the fatty acids in said tall oil; lowering the temperature of the esterified tall oil in the presence of acetone so as to effect a separation thereof into a fatty ester fraction insoluble in said acetone at the lowered temperature and a solution of constituents soluble in said acetone at the lowered temperature and separating the insoluble fatty ester fraction from said solution.

DRYING OIL PRODUCTS AND PROCESS OF MAKING. F. B. Root (Ellis-Foster Co.). *U. S. 2,374,381.* This invention relates to products obtained by heating drying oils and ethylene-α-β-dicarboxylic acids, such as maleic, in the presence of a special type of catalyst, for the purpose of improving the properties of products of the drying oil-maleic type.

ANTIDIMMING COMPOSITION. Harry Bennett. *U. S. 2,372,171.* The composition for prevention of fogging of glass surfaces contains a 1:1 mixture of mono fat acid ester of mono ethylene glycol and fat acid ester of ethylene glycol.

DEMULSIFIERS FOR PETROLEUM. G. Allen (Petrolite Corp., Ltd.). *U. S. 2,372,641.* A composition of matter consists of a phthalic-acid-reacted sub-rubbery polymeric sulfur-converted tri-ricinolein; the reaction involving the polycarboxylic acid reactant being conducted above 100° until examination reveals complete elimination of the uncombined reactant, and the ratios of reactants being as follows: for each 100 parts by weight of the high molal detergent-forming monocarboxy ester, there is employed 10-17 parts by weight of S and 10-20 parts by weight of the polycarboxylic reactant.

STIFFENED SYNTHETIC LINEAR POLYAMIDE WOVEN FABRICS. R. G. Bartlett, C. Dunbar and P. J. March (Imperial Chemical Industries, Ltd.). *Brit. 555,490.* A process for obtaining a stiff-springy and resilient woven fabric composed of yarns comprising a synthetic linear polyamide, the individual fibres of said yarns being more or less cemented together and the warp and weft yarns of said fabric being more or less cemented together at their points of mutual contact in the weave comprises immersing a woven fabric of the kind described in a liquid which has a solvent action on the polyamide from which the fabric is made, allowing the fabric to remain in contact with the liquid for a short time, removing it from the liquid, drying whilse the fabric is not in a relaxed condition, as by ironing or stentering, and then, if necessary and/or if desired, rinsing the fabric to remove any of the solvent medium which remains thereon.

Lubricating oil composition. F. L. Johnston (Shell Development Co.). *U. S. 2,372,955.* A mineral lubricating oil suitable for internal combustion engines contains dissolved about 0.25-10% of an oil-soluble alkali metal salt of a phthalic acid mono alkyl ester in which the alkyl radical contains about 10-20 C atoms and has at least 2 atoms selected from the class consisting of tertiary and quaternary C atoms.

Sulphurized hydrocarbon derivatives. M. A. Dietrich (E. I. du Pont de Nemours). *U. S. 2,373,879.* The stability of mineral lubricating oils is improved by addition of phosphate esters of sulfurized mixture of fat alcohols.

Abstracts

Drying Oils

Edited by the
STAFF OF THE NORTHERN REGIONAL RESEARCH LABORATORY*

Acetylated castor oil. O. Grummitt and H. Fleming. *Ind. Eng. Chem. 37*, 485-91 (1945). Castor oil (I) may be acetylated satisfactorily with HOAc (II) in the presence of *p*-toluenesulfonic acid (III) as catalyst if the water of esterification along with some II is continuously removed from the reaction mixture by fractional distillation. In a typical experiment 200 g. I, 120 g. II and 0.6 g. III were reacted for 3 hours to achieve 96% acetylation. The product had an acid number of 9.1 and a saponification number of 301. The thermal decomposition of I acetylated with acetic anhydride was studied. The product of acetylation with II was also suitable for study if all III were removed by treating with 1% clay for 2 hours at 100°. Decompositions were conducted under N_2 in glass flasks heated with a free-flame to reaction temperature in 5-9 minutes. After reaction temperature was reached the decomposition was followed by noting the rate of formation of II either by collecting and weighing it or by absorbing evolved II in excess standard alkali and titrating aliquots at various time intervals. The decomposition, which begins at 250°, was studied at 295°, 300°, 306° 312°, 320°, 330° and 340°. The process was found to be first order with an energy of activation of 44.5 kg.-cal. The following substances were shown to increase the rate or lower the temperature of decomposition: H_3PO_4 (65%), H_2SO_4 (96%), *p*-toluenesulfonic acid, $Zn(OAc)_2$, $FeCl_3$, $ZnCl_2$, titania gel (from $TiCl_4$) and *p*-toluenesulfonyl chloride. High temperatures (320°-340°) and short reaction times minimize thermal polymerization which occurs during decomposition. The product contains 30% conjugation and is suitable for use as a drying oil.

Mechanism of heat polymerization of drying oils. D. S. Bolley. *Am. Paint J. 29*, No. 37, 19-22, 48-50 (1945). A review with 18 references.

The effect of organic substances on the drying of oils. Kia-Khwe Jeu, Chia-Cheng Tong, Chi-Tsiang Lin and Hsueh-Fang Ma. *J. Chinese Chem. Soc. 11*, 25-33 (1944). Samples of tung, stillingia and linseed oils containing a small amount of Cu soap as catalyst are treated with organic substances in AcOEt solution and diluted with the solvent to 25 ml. Aliquots are removed and evaporated and the I number of the oils is determined after definite time intervals. All the substances examined inhibited oxidation of the oil in descending order of potency as follows: pyrogallol, *p*-aminophenol, thiourea, catechol, hydroquinone, resorcinol. (*Chem. Abs.*)

PATENTS

Water repellent composition. J. J. Cohen. *U. S. 2,375,348.* A water repellent composition comprises a water emulsion resulting from the mixture of Japan wax, aluminum stearate, uncooked and unpolymerized China-wood oil, water-soluble A-stage urea-formaldehyde resin, ammonium hydroxide and a hydrocarbon solvent, and acid ammoniacal base reacting with free fatty acids in said mixture to form a thermo-labile soap acting as the active emulsifier for the entire mixture.

Petroleum demulsifier. M. De Groote, B. Keiser, and A. F. Wirtel (Petrolite Corp.). *U. S. 2,375,531.* A hydroxyacetylated drastically-oxidized dehydrated ricinoleic acid compound selected from the class consisting of drastically-oxidized castor oil, drastically-oxidized dehydrated triricinolein, drastically-oxidized dehydrated diricinolein, drastically-oxidized dehydrated monoricinolein, drastically-oxidized dehydrated ricinoleic acid, drastically-oxidized dehydrated polyricinoleic acid, and the estolides of drastically oxidized dehydrated castor oil. In the manufacture of the compound just claimed, the step of hydroxyacetylating a drastically-oxidized dehydrated ricinoleic acid compound, selected from the class just described, is also claimed.

Process for breaking petroleum emulsions. M. De Groote (Petrolite Corp.). *U. S. 2,375,539.* A process is claimed for breaking petroleum emulsions of the water-in-oil type, characterized by subjecting the emulsion to the action of a demulsifier comprising a member of the class consisting of oxyalkylated monohydric lower alkyl esters of a polymerized polyethylenic higher fatty acid and oxyalkylated sulfurized monohydric lower alkyl esters of a polymerized polyethylenic higher fatty acid.

Coating composition and method of producing. P. H. Scrutchfield (Hercules Powder Co.). *U. S. 2,376,823.* A coating composition comprising a material selected from the group consisting of drying oils and semidrying oils and a reaction product of a polyhydric alcohol and a conjoint condensation product of the simultaneous reaction of reactants consisting essentially of a rosin compound selected from the group consisting of rosin acids and lower monohydric alcohol esters thereof, an aldehyde and an alpha-beta-unsaturated polycarboxylic acid.

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* This new abstract section is a primary step in reorganizing the abstract service. We are receiving these abstracts through the courtesy of the research staff of the Northern Regional Research Laboratory, Peoria, Illinois, and Howard M. Teeter, the local chairman, pro tem.