The composition of the acids in the precipitate- and filtrate-portions can be calculated from the iodine values of the two portions to be as follows: filtrate-acids, 5.2% stearic acid and 94.8% oleic acid; precipitate-acids, 75.6% stearic acid and 24.4% oleic acid. In these calculations the iodine values of pure oleic and stearic acids are taken as 89.9 and 0, respectively.

Since there was 0.771 g. of fatty acids associated with 13.838 g. of solvent in the recovered filtrate, it can be calculated that the entire amount of solvent, 17.080 g., must have contained 0.952 g. of fatty acids. The entire body of liquid, including that entrained in the solids, then consisted of the following:

Stearic acid	0.049 g. or 0.272%
Oleic acid	0.902 g. or 5.003%
Solvent	17.080 g. or 94.726%

The composition of the solid-phase, free of liquid is given by the difference between the original amounts of stearic and oleic acids and the amounts of these acids in the liquid phase, as indicated above. The figures obtained are as follows:

Stearic acid	0.542 g. or 98.91%
Oleic acid	0.006 g. or 1.09%

Although the above method provides all essential data, more reliable figures for the composition of the solid phase are probably obtained if this composition is calculated directly from data on the acids in the precipitate-fraction. The method is as follows:

According to their iodine value, the acids in the precipitate-fraction consisted of the following:

Stearic acid	0.549 g. or 75.6%
Oleic acid	0.177 g. or 24.4%

However, from the analysis of the filtrate it can be calculated that the 3.231 g. of solvent entrained in the precipitate carried with it 0.180 g. of fatty acids, consisting of 0.171 g. of oleic acid and 0.009 g. of stearic acid. If these amounts of entrained acids are deducted from the above amounts of total fatty acids in the precipitate, the following figures are obtained for the composition of the liquid-free crystals:

Stearic acid	0.540 g. or 98.90%
Oleic acid	0.006 g. or 1.10%

It is to be noted that calculations by the two methods provide a check on the accuracy of the chemical analyses. The two sets of calculated values will agree only if there has been no substantial alteration in the chemical characteristics of the fatty material during the course of the experiment. If, for example, the oleic acid had been permitted to oxidize during the course of the above experiment, some reduction in the iodine value might have resulted. This would have had the effect of making the amount of oleic acid in the crystals too high, as calculated by the first method, but too low as calculated by the second method.

REFERENCES

1. Bailey, A. E., and Singleton, W. S., Oil & Soap, *22*, 265-71 (1945).
2. Sager, T. P., Ind. Eng. Chem. Anal. Ed., *4*, 388 (1932).

Abstracts

Oils and Fats

Edited by
M. M. PISKUR and SARAH HICKS

THE FATTY ACIDS OF HUMAN MILK FAT. J. B. Brown and B. M. Orians (Ohio State Univ., Columbus). *Arch. Biochem. 9,* 201-19 (1946). A large specimen of human milk fat has been examined quantitatively with reference to the amounts and nature of its component fatty acids. No evidence could be found for the presence of more than traces of acids below C_{10}. As a result of distillation of 2 specimens of Me esters, prepared from this fat, and applying low temperature crystallization technics to the main fractions, a number of pure esters and acids have been isolated for the first time and identified. This specimen of fat is much more similar to human body fat than it is to a typical milk fat.

THE CHEMICAL ESTIMATION OF VITAMIN E IN VEGETABLE OILS. J. Tosic and T. Moore (Univ. of Cambridge). *Biochem. J. 39,* 498-507 (1945). A method based on the $\alpha:\alpha'$-dipyridyl-$FeCl_3$ reaction has been evolved for the estimation of vitamin E in vegetable oils.

THE IDENTITY AND POLYMORPHISM OF OLEYLDISTEARIN FROM KOKUM BUTTER. E. S. Lutton (Procter and Gamble Co.). *J. Am. Chem. Soc. 68,* 676-9 (1946). Thermal and x-ray diffraction data on 3 crystalline forms of the oleyldistearin from kokum butter agree closely with similar data on the synthetic 2-oleyldistearin of Filer, *et al.,* and lend further confirmation to previous conclusions of others that the naturally occurring glyceride is the symmetrical isomer.

SPECTROPHOTOMETRIC STUDIES OF THE OXIDATION OF FATS. VI. OXYGEN ABSORPTION AND CHROMOPHORE PRODUCTION IN FATTY ESTERS. R. T. Holman and G. O. Burr (Univ. of Minn.). *J. Am. Chem. Soc. 68,* 562-6 (1946). The rates of development of the various chromophores appearing during the oxidation of Et linolate, Et linolenate and Me arachidonate have been followed and related to the O_2 absorbed. At 37° oxidation of linolenate, and possibly arachidonate, is accompanied by the formation of chromophores which exhibit fine structure in the spectra of their alcoholic and alkaline solutions. This was not observed with Et linolate. The rate of formation of chromophores absorbing at 2325 A. in oxidizing linolate and the rate of O_2 uptake agrees with the postulated formation of a conjugated monohydroperoxide as suggested by Bolland and Koch. The development of color or of ultraviolet chromophores cannot be taken as a measure of O_2 uptake (degree of oxidation) unless the composition of the fatty acid mixture is known.

THE RATE OF AUTOXIDATION OF MILK FAT IN ATMOSPHERES OF DIFFERENT OXYGEN CONCENTRATION. P. S. Schaffer, G. R. Greenbank, and G. E. Holm (Bur. Dairy Ind., U.S.D.A., Washington). *J. Dairy Sci. 29,* 145-50 (1946). Data have been presented which indicate that autoxidation of milk fat with 0.80% by volume of O_2 is sufficient to render it inedible. In the atmosphere of a container of dried milk this is equivalent to 0.20% of O_2. This level of O_2 concentration is difficult to attain even by "regassing" procedures. However, studies of the relative keeping quality of samples of milk fat and samples of a dried milk in atmospheres of different O_2 concentration indicate that the keeping quality increases markedly with decreases in the O_2 concentration below 5%.

DIMORPHISM OF HIGH MOLECULAR WEIGHT SYMMETRICAL NORMAL ALIPHATIC SECONDARY AMINES. C. W. Hoerr, H. J. Harwood, and A. W. Ralston (Armour and Co., Chicago). *J. Org. Chem. 11,* 199-206 (1946). The freezing and melting points of a series of high molecular weight aliphatic secondary amines have been accurately determined. It is found that the amines below ditetradecylamine in the series present dimorphic tendencies, except in a very highly purified condition.

SYNTHESIS OF CHOLESTEROL IN SURVIVING LIVER. K. Bloch, E. Borek, and D. Rittenberg (Columbia Univ., New York). *J. Biol. Chem. 162,* 441-9 (1946). The cholesterol isolated from the liver slices incubated with D_2O contained deuterium, and both deuterium and C^{13} after incubation with isotopic acetate, demonstrating the *in vitro* synthesis of cholesterol. No synthesis took place under anaerobic conditions, in preparations of disintegrated liver, nor in slices of kidney, testes, spleen, or gastrointestinal tract. The fatty acids isolated from liver slices in which isotopic cholesterol had been formed contained small but significant concentrations of deuterium.

THE DEMETHYLATION OF N^1-METHYLNICOTINAMIDE AND THE INFLUENCE OF THE METHYL GROUP ON THE FATTY LIVER OF RATS. V. A. Najjar and C. C. Deal (Johns Hopkins Hosp., Baltimore). *J. Biol. Chem. 162,* 741-2 (1946). The N^1-methylnicotinamide is demethylated with the release of nicotinamide. This explains the authors' finding that the compound possesses antipellagra activity in the dog. The effect on fat deposition in the liver suggests that the Me group is biologically active. Further confirmation with a large group of rats is in progress.

PATENTS

HIGH VACUUM DISTILLATION APPARATUS. K. C. D. Hickman (Distillation Products, Inc.). *U. S. 2,396,374.* This invention relates to improved high vacuum distillation apparatus wherein the vaporizing surface rotates and causes the distilland to flow thereover in a thin film by centrifugal force.

PROCESS OF REFINING OIL. B. Clayton (Refining, Uninc.). *U. S. 2,392,973.* In the process of recovering a neutral oil from crude fatty oils containing gums including phosphatidic material which process includes mixing said oil with a non-saponifying neutralizing agent and separating the resulting soap stock from the oils in the presence of substantial amounts of water, the improvement comprises supplying sufficient heat to the oil prior to separating the soap stock therefrom to set a substantial portion of the phosphatidic material therein but insufficient to cause gums to be rendered insoluble in dry oil, to thereby produce a substantially neutralized oil containing a substantial amount of the phosphatidic material after separation of the soap stock.

REFINING FATTY OILS. Katherine Lloyd and H. L. Keil (Armour and Co.). *U. S. 2,397,874.* A process for refining fatty oil containing oil soluble proteins to obtain a refined oil substantially free of the proteins comprises subjecting the oil to the action of a hydrolyzing proteolytic enzyme in the presence of water to produce from the proteins and water a gelatinous water-insoluble flocculation which is insoluble in the oil, and separating the oil-insoluble water-insoluble flocculation from the oil.

PREHEATER FOR FATS. E. W. Pitman. *U. S. 2,396,748.* This invention relates to preheaters for cooking fats, and pertains more particularly to improvements in fat melting tanks desirably employed to liquefy and preheat solid fats for subsequent use in frying apparatus designed to deep-fry doughnuts, potatoes, and other foods.

SURFACE ACTIVE AGENTS. M. Lintz. *U. S. 2,394,083.* Ground linseed and alkali treated linseed are used as flocculating agents for ore slurries.

ALPHA-HALOGENATED KETO ACIDS. D. Price and F. J. Sprules (National Oil Products Co.). *U. S. 2,396,969.* In accordance with the invention, the unsaturated fatty acids are treated with hypohalous acids, *i.e.,* hypochlorous and hypobromous acids, to produce halo hydrin acids, the halo hydrin acids may then be oxidized under the conditions set for the U. S. application Serial No. 467,810 to mono, halo, keto acids in quantitative yields.

POLISHING WAX. L. A. Stegemeyer (Emery Industries, Inc.). *U. S. 2,393,202.* A method of making a hard, high melting, waxy material comprises reacting an amide of a fat acid with formaldehyde in the proportion of approximately 4-12 parts formaldehyde by weight to 100 parts of amide at a temperature of 100-130° for a period of about one hour, and thereafter heating the composition at a temperature of 160-170° for a period of several hours, thereby producing a molten composition which when cooled provides the waxy body.

PROCESS OF PREPARING AN ALUMINUM SOAP FROM SPENT ALUMINUM HALIDE CATALYST AND A GREASE FROM SAID SOAP. A. J. Morway (Standard Oil Development Co.). *U. S. 2,396,744.* The process comprises mixing an $AlCl_3$ catalyst spent in a hydrocarbon conversion process and consisting of an $AlCl_3$-hydrocarbon complex, with a high molecular weight fatty acid, heating the mixture to about 200° F. until evolution of HCl ceases, washing the resultant Al soap with water, and drying the soap.

LUBRICANTS. J. M. Musselman and H. P. Lankelma (Standard Oil Co.). *U. S. 2,396,719.* A composition of matter suitable for use as a lubricant and as an addition agent to improve the characteristics of lubricating oils comprises a metal compound of a reaction product of P_2S_5 and lauryl alcohol reacted at a temperature above 100° to prevent thiophosphate formation.

TEXTILE LUBRICANT. A. Moscowitz (L. Sonneborn Sons, Inc.). *U. S. 2,396,718.* The product contains petroleum mahogany soap, oleic acid, soap, water, and diethylene glycol.

DESTRUCTION OF ALGAE. H. M. Corley (Armour and Co.). *U. S. 2,393,293.* Algae in water are destroyed by the presence of 15 p.p.m. of a water- soluble salt of a fatty amine.

ESTERS OF 12-HYDROXYSTEARIC ACID. M. J. Hunter and H. N. Fenn (Dow Chemical Co.). *U. S. 2,397,008.* The alkyl radical of these esters contains 7-14 C atoms. The products are useful as mold lubricants or intermediates for wetting agents.

STABILIZING ICE-CREAM COMPOSITIONS. S. Musher (Musher Foundation, Inc.). *U. S. 2,395,061.* An ice cream and ice milk stabilizer comprises polyhydric alcohol esters of fat acids having at least one free hydroxyl group and a finely divided, dry milled oat product.

EGG PRODUCT. E. C. Scott and C. H. Parsons (Industrial Patents Corp.). *U. S. 2,395,587.* Partial glycerol esters of fat acids are used to restore the emulsifying value of sugared egg yolks.

Abstracts

Drying Oils

Edited by
HOWARD M. TEETER

STYRENE COPOLYMERS IN SURFACE COATINGS. D. H. Hewitt and F. Armitage. Paint Manuf. *16,* 91-94 (1946). Styrene was copolymerized with dehydrated castor oil in the presence of xylene as a solvent. Particularly useful products were obtained within the range of from 40 parts of styrene to 60 parts of oil, to 60 parts of styrene to 40 parts of oil, the solvent being kept constant at 100 parts. In the absence of solvent heterogeneous masses resulted unless the styrene was added to the oil at intervals or unless certain varnish resins were present. The solventless type of product differed fundamentally from the solvent type in so far as it was permanently thermoplastic. When mineral spirits was used as a solvent, polymerization was less complete although more rapid, and solutions were opalescent. Polymerization could be increased by adding the styrene at intervals. The final films from solutions in mineral spirits were not perceptibly different from those made in xylene solution. The salient properties of the styrene copolymers are rapid air dry to touch by solvent release, after-hardening by oxidation, low acid value, stable toward all pigments, moderate wetting properties but excellent suspension for pigments, pale color, good color retention, lack of dirt retention, good water resistance, and good electrical properties.

BUTYL ACETYL RICINOLEATE. EVALUATION AS A PLASTICIZER FOR POLYVINYL CHLORIDE. C. Soyka and H. F. Wilson (Telegraph Construction and Maintenance Co., Ltd.). *British Plastics 17,* 433-42 (1945). Incompatibility of butyl acetyl ricinoleate samples with polyvinyl chloride is due to the presence of high boiling residues, such as estolides and ricinoleins, and other incompatible esters, such as butyl oleate, butyl ricinoleate, and butyl stearate. To form compatible compounds with polyvinyl chloride, commercial butyl acetyl ricinoleate must conform to the compatibility formula: 3.25 × percent residue + 4.25 × percent other incompatible esters (expressed as butyl oleate) shall not exceed percent butyl acetyl ricinoleate. The factors involved in this formula may be estimated from saponification equivalents, rotatory power, iodine values, or acetyl values. The objections to use of these values are: (1) because of the number of compounds present in commercial butyl acetyl ricinoleate and the wide range of results when their iodine values or other similar constants are expressed in terms of butyl acetyl ricinoleate, it is possible to obtain high apparent content of butyl acetyl ricinoleate when little is present (and *vice versa*) and (2) no constant is directly determined upon butyl acetyl ricinoleate alone. It is therefore proposed to distill the sample of butyl acetyl ricinoleate whereby four fractions are obtained: (1) most volatile impurities, such as butyl acetate, (2) incompatible esters, such as butyl oleate or ricinoleate, (3) butyl acetyl ricinoleate, (4) non-volatile residue. Analysis of each fraction then permits an accurate estimate of the factors involved in the compatibility equation.

TOTAL SYNTHESIS OF LINOLEIC ACID. P. Baudart (Inst. Tech. superieur Chambre Commerce Marseille). *Bull. soc. chim. 11,* 336-8 (1944). A linoleic acid was synthesized and shown to be an isomer of natural linoleic acid. Intermediates prepared include 1-bromopentane, b_{760} 122-4°, n_D^{25} 1.4290, d_4^{25} 1.1552; 1-methoxypentane, b_{760} 100-2°; 1,6-hexanediol, b_3 121-4°; 1,6-dibromohexane, b_3 77-80°; 1-bromo-6-methoxyhexane, n_D^{25} 1.4469, d_4^{25} 1.1887. Glutardialdoxime (180 g.) and 240 g. ethyl nitrite were added gradually in alternate portions to 50 ml. of 95% ethanol containing 5 ml. acetic acid at 0°. The mixture was acidified with alcoholic hydrogen chloride and allowed to stand 5 hours at 0° and 48 hours at room temperature over $CaCl_2$, yielding after ether extraction and distillation 175 g. glutaraldehyde bis (diethyl acetal) (I), b_3 97-100°, n_D^{25} 1.4232, d_4^{25} 0.9009. I was reacted with 290 g. PCl_5 at 30-40°, ethyl chloride and phosphorus oxychloride removed under vacuum, and the residue of 1,5-diethoxy-1,5-dichloropentane (II) distilled $b_{0.8}$ 90-100° (partial decomposition); yield 118 g. II with bromine at 0° gave 240 g. impure, very unstable 1,5-diethoxy-1,2,4,5-tetrabromopentane (III) which was used at once. To III in ether at 0° were added ether solutions of 78 g. amyl magnesium bromine and 120 g. 1-bromo-6-methoxyhexane. The product was isolated and reduced with Zn in butanol, yielding after distillation 11 g. impure 1-methoxy-7,10-hexadecadiene (IV), b_3 144-7°, as well as 6,9-pentadecadiene and 1,17-dimethoxy-7,10-heptadecadiene. IV (9 g.) was reacted with bromine at 0°, then with hydrogen bromide at 100-130° and finally debrominated with zinc in ethanol to produce 8 g. 1-bromo-7,10-hexadecadiene (V), $b_{0.3}$ 136-40°. V was transformed to the iodide with sodium iodide in acetone, reacted with sodiomalonic ester, decarboxylated and distilled, giving 3.2 g. of a linoleic acid, $b_{0.8}$ 179-83°, iodine number 152. Bromination of 2 g. of acid produced a large amount of an oily bromide and 0.35 g. of a tetrabromide, m. 77-8°, identical with the bromide of natural linoleic acid elaidinized by selenium. (*Chem. Abs. 40,* 1782.)

CASHEW OIL. J. van Loon. *Verfkroniek 19,* 8-10 (1946). A review of the technology and physical and chemical properties of cashew oil. Its applications as a raw material for the paint and varnish industry are pointed out.

ANALYTICAL TESTS ON BLOWN OILS. I. MOLECULAR WEIGHT. M. Carrière (Faculté Sci. Marseille). *Industries corps gras, 1,* 76-7 (1945). The molecular weight determinations by the cryometric method varied with