zene or acetone show the B-spacings only." In later studies these workers (5) found one fatty acid which gave B- and C-spacings when crystallized from glacial acetic acid. Also these workers found that impurities of from 1 to 3% were indicated when an aliphatic acid, crystallized from benzene, had both B- and C-spacings.

In view of the data of the present work it appears that the temperature at which crystallization of stearic acid from a solvent occurs is the dominant factor with respect to the polymorphic form obtained, and not the type of solvent; *i.e.*, crystallization below the beginning of transition at 35.2° C. for the B-form and above the final transition at 52.9°C. for the C-form. Either the B- or C-spacing can be obtained from the same solvent with proper temperature conditions. Furthermore to use the crystal spacing as a criterion of the purity of fatty acids, it must be known that the conditions of crystallization were such as to give the B-spacing only so that a mixture of B- and C-forms will be a valid indication of the degree of purity, and not due to polymorphism.

In crystallographic observations of B-form stearic acid, temperatures in the range of the reluctant transition of this acid (35-53°C.) should be avoided since it is in this range that separation of a mixture of B- and C-forms from the crystallization solvent is possible.

Although results have been obtained only for stearic acid, the principles are probably applicable to other even numbered *n*-aliphatic acids, as indicated by preliminary results with palmitic acid.

Summary

1. Purified stearic acid (freezing point 69.20° C., melting point 69.5°C.) when slowly crystallized from benzene at room temperature, yielded transparent monoclinic crystals exhibiting an X-ray diffraction pattern (long spacing) corresponding to the B-form of the acid. Crystallization of stearic acid from hot glacial acetic acid resulted in a product exhibiting an X-ray diffraction pattern (shorter spacing) corresponding to the C-form of the acid.

2. Rapid chilling of a melted sample of stearic acid likewise yielded a product exhibiting the diffraction pattern characteristic of the C-forms of the acid.

3. The specific volume, expansion in both solid and liquid states, and melting dilation of stearic acid in both B- and C-forms were calculated from dilatometric data.

4. The irreversible transition of stearic acid from the B- to the C-form was rapid and visible at 52.9°C. but also occurred at 35.2°C. when sufficient time was allowed for the transition to occur.

5. The form of stearic acid which was obtained was found to be dependent upon the temperature at which crystallization occurred. When crystallization was carried out at temperatures below the transition point of the acid, the B-form was obtained, and above the transition point only C-form of the acid was obtained, irrespective of the solvent used for crystallization.

6. The specific heat of stearic acid was determined, and equations developed for expressing the specific heat of the acid in both solid and liquid states. From the calorimetric data, the heat of fusion, and the entropy of stearic acid were calculated.

Acknowledgment

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ABSTRACTS . . . . Don Whyte, Editor

• Oils and Fats

A. R. Baldwin, Abstractor

THE MANUFACTURE OF SULFONATED OIL AND THE DETERMINATION OF THE WETTING POWER AND THE SURFACE TENSION OF ITS EMULSIONS. Liu-Chiao Fu and Chien-Hon Chen. *J. Chem. Eng. China 15*, 72-80(1948). Good sulfonated oil can be prepared from any vegetable oil except those with high fatty acid content or high unsaturation. Sulfonated oils obtained by sulfonating castor, peanut, sesame, and cottonseed oils show little difference in surface tension; the wetting powers of these products decrease in the order named. These sulfonated oils are satisfactory for use in the textile industry. (*Chem. Abs. 44*, 353.)

THE CHEMIST AND THE COTTONSEED INDUSTRY. T. L. Rettger (Buckeye Cotton Oil Co.). *Oil Mill Gazetteer 54* (7), 34-7 (1950). This paper reviews historically the development of the cottonseed processing industry.

HYDROPHOBIC MONOLAYERS ADSORBED FROM AQUEOUS SOLUTIONS. E. G. Shafrin and W. A. Zisman (Naval Research Laboratory). *J. Colloid Sci. 4*, 571-90(1949). Experimental methods are described for the preparation and examination of hydrophobic monomolecular films adsorbed into platinum surfaces from aqueous solutions of primary normal alkyl amines. The critical limits to hydrophobic film formation and the degree of hydrophobicity are found to be functions of the amine concentration and the pH of the generating solution. A definite correlation is established for the relative effectiveness of these factors and the length of the hydrocarbon chain in the aliphatic portion of the amine molecule. The short chain amines (up through dodecyl) are found to be most adsorptive in the alkaline region, whereas film formation of the hexadecylamine is limited to the highly acid regions. The intermediate tetradecylamine evinces a transitional behavior, having two separate pH regions favorable to film formation.

OLEATE SYSTEMS CONTAINING POTASSIUM CHLORIDE. IV. FLOW PROPERTIES AS A FUNCTION OF SHEARING STRESS AT 15° AND CONSTANT KCL CONCENTRATION. V. VISCOUS AND ELASTIC BEhavior compared. VI. Elastic properties as function of KCl concentration; influence of alcohols and fatty acid anions on elastic behavior. H. G. Bungenberg de Jong and H. J. van den Berg. *Proc. Kon. Ned. Akad. Wet. 52,* 363-76, 377-88, 465-78(1949). This is a very detailed series of articles describing the properties of oleate solutions. A lengthy abstract may be found in the *J. Text. Inst. 40,* A417(1949).

Elastic-viscous stearate system. H. J. van den Berg and L. J. de Heer. *Proc. Kon. Ned. Akad. Wet. 52,* 457-62(1949). This is a paper describing the stearate system analogous to the oleate systems previously described. [*J. Text. Inst. 40,* A417(1949).]

Objective evaluation of odor deterioration in orange oil. B. E. Proctor and E. M. Kenyon (Massachusetts Institute of Technology. *Food Technol. 3,* 387-92(1949). The development of "terpeney" odors in citrus oils due to air oxidation was studied by several techniques. A standard Warburg manometric system was used to measure the quantity of oxygen absorbed by the oil under controlled conditions. Changes in the infrared absorption spectra of the samples were studied, to follow the chemical changes during oxidation and to suggest possible reaction products. Calibrated odor panels employing the method of paired comparison gave data on the quantity of oxygen necessary to produce "terpeney" odors.

Detection of glycerol by condensation with aniline to quinoline. B. Stempel. *Z. anal. Chem. 129,* 232-3(1949). As little as 1 mg. of glycerol will give a positive test. (*Chem. Abs. 44,* 75.)

The index of Bellier. Its application to the control of edible fats. G. E. Brunetti. *S. Rev. Sanidad y asistencia social (Venezuela) 13,* 486-94(1948). The Evers-Bellier method was modified in several ways. The range of values obtained with various oils using this modified method were as follows: peanut oil 39-42.5, olive oil 6-8.5, sunflower oil 19.8-20.7, sesame seed oil 12-14, and cottonseed oil 15-17. (*Chem. Abs. 44,* 349.)

Spectrophotometric determination of total nitrogen in oils. C. H. Hale, N. H. Margie, and W. H. Jones (Esso Laboratories). *Anal. Chem. 21,* 1549-51(1949). A semimicro-Kjeldahl procedure has been devised to use small samples and to allow the determination of very low concentrations of nitrogen. The ammonia is determined by spectrophotometric measurements of the color developed with Nessler's reagent. Nitrogen compounds can be determined on an average to ±10% over a concentration range of 0.002 to 1.0%. The method was developed for petroleum products but may be applicable to glyceride oils.

The essential oil of *Pittosporum tenuifolium.* A. J. Calder and C. L. Carter. *J. Soc. Chem. Ind. (London) 68,* 355-56 (1949). The oil was fractionated and the following constituents were isolated and characterized: *d*-α-pinene 43.2%, *d*-β-pinene 2.2%, myrcene 0.9%, dipentene and *d*-limonene 0.3%, β-terpinene 0.4%, a terpene aldehyde 0.3%, *l*-bornyl acetate 1.4%, unknown sesquiterpene 8.5%, tricyclic sesquiterpene 11.4%, impure bicyclic sesquiterpene 10.5%, guaiazulene 0.3%, solid paraffins 0.05% and unidentified sesquiterpene alcohols and diterpenes 3.3%.

The essential oil of *Libocedrus bidwillii*—new zealand cedar. R. D. Batt and C. H. Hassell. *J. Soc. Chem. Ind. (London) 68,* 359(1949). The following fifteen constituents have been separated. *l*-α-pinene (24.8%); *d*-sabinene (3.3%); myrcene (2.7%); ketone ($C_{10}H_{16}O$) (3.7%); limonene and dipentene (7.4%); *p*-cymene (3.4%); terpinolene (0.7%); terpinen-4-ol (1.2%); unidentified tricylic sesquiterpene (1.6%); unidentified sesquiterpene (3.7%); caryophyllene (3.0%); γ-curcumene (18.4%); *d*-cadinene (2.7%); green oil (5.8%) and tar (including hydrocarbon) (8.2%).

Analytical standard methods of testing fats and their derivatives. G. B. Martinenghi. *Olearia 3,* 807-810(1949). A critical review of the analytical methods of A.O.C.S. and N.G.D., particularly in respect to the control of the free acidity of the oil contained in oil-seeds.

Determination of the per cent neutral oil in a fat. J. Martinez Moreno. *Olii minerali, grassi e saponi, colori e vernici 26,* 81-82(1949). An equation for calculating the amount of neutral oil present in a fat based on its constants was developed.

Solubility diagram used for the removal of free fatty acids from fish oils by extraction with solvents. A. Rius and L. Gutierrez Jodra. *Anales fís. y quím. (Madrid) 45* (B), 245-268(1949). Solubility diagrams of total fatty acids, neutral oil, and solvent were determined for cod-liver oil and hake-liver oil. The corresponding ternary diagrams show that none of the equations proposed in the literature—neither those for the tie lines, nor the ones for the saturation isotherm—are of general validity.

Studies on vegetable oils. II. Bromine absorption by castor oil. J. R. Velasco and C. Piazza. *Anales fís. y quím. (Madrid) 45* (B), 197-206(1949). The speed of addition determined colorimetrically at 10 and 20°C. from which an equation covering the reaction can be calculated.

Ergot oil. II. Behavior of the oil on vacuum distillation. J. Dominguez and I. Ribas Marques. *Anales fís. y quím. (Madrid) 45* (B), 89-110(1949). Vacuum distillation of two ergot oils with similar ricinoleic acid content but of a very different hydroxyl value gave neither enanthole or undecilenic acid. From a study of these distillations and those of castor oil and acetylated castor oil, it is concluded that the acid esterifying the hydroxyl group in ricinoleic acid is removed in the pyrolytic process with formation of a double bond, thus hindering the pyrolytic formation of enanthole and undecilenic acid.

Ergot oil. III. The high optical activity of the oil. I. Ribas Marques and J. Dominguez. *Anales fís. y quím. (Madrid) 45* (B), 433-440(1949). The optical rotation ($\alpha + 10{,}7$) is reduced by saponification. This is due to hydrolysis of the hydroxy ester of ricinoleic acid.

Oxidation of abietic acid with hypochlorite. I. Preparation of a dichloroabietic acid. A. Rius and P. Rife. *Anales fís. y quím. (Madrid) 45* (B), 767-784(1949). The reaction between sodium hypochlorite and abietic acid was followed potentiometrically.

Oxidation of abietic acid with hypochlorite. II. Saponification of dichlorodihydroxyabietic acid. A. Rius and P. Rife. *Anales fís. y quím. (Madrid) 45* (B), 785-794(1949). An oxide-dihydroxide acid ($C_{20}H_{32}O_5$) and a tetra-hydroxylated acid isolated from the reaction products.

Thermochemistry of the vegetable fats. I. Heat of bromine addition to olive oils. J. Oliver Ruiz, Isabel Borrero, and Josefina de la Maza. *Anales fís. y quím. (Madrid) 45* (B), 873-892(1949). The thermal effect of the addition of bromine to different types of olive oil dissolved in carbon tetrachloride was studied. The method was used for the measurement of the rancidity of the olive oils.

Studies on the vegetable oils. III. Adsorption of hydrogen by olive and castor oils. J. R. Velasco and F. Ramos Ayerbe. *Anales fís. y quím. (Madrid) 45* (B), 207-216(1949). The effect of time and temperature on hydrogenation of these oils was studied.

Hydrogenation of fatty oils. I. Finback whale oil. R. Miyake. *J. Pharm. Soc. Japan 68,* 1-4(1948). II. Soybean oil. *Ibid.* 8-10. III. Seed oil of *Xanthium strumarium. Ibid.* 12-13. IV-XI. Study of the activities of Adkins' and other catalysts. *Ibid.* 14-39. (*Chem. Abs. 44,* 352.)

The effects of radioactivity on oleic acid. V. L. Burton (M.I.T., Cambridge, Mass.). *J. Am. Chem. Soc. 71,* 4117-19 (1949). Purified oleic acid has been bombarded with deuterons in a cyclotron. Analysis of the irradiated material has revealed the formation of stearic acid, heptadecene, and polymerized acids. It has been shown that the hydrogen produced by decomposition of an organic molecule under the influence of radioactivity can enter the double bond of a neighboring molecule. It has thus been demonstrated that hydrogen which may be produced by the effects of radioactivity on the organic constituents of a petroleum source sediment could, in part, be removed from the gas phase by reaction with unsaturated components of the sediments.

The thermal polymerization of monoölefinic compounds. W. F. Whitmore and J. F. Gerecht (Polytechnic Inst. of Brooklyn). *J. Am. Chem. Soc. 72,* 790-3(1950). A mechanism based on the formation and reaction of allylic free radicals has been proposed to explain the thermal transformations of simple unsaturated compounds. Evidence which supports this allylic radical mechanism was obtained from a study of two terminally unsaturated compounds, methyl undecylenate and *l*-octene.

Isolation and structure of a dihydroxyoctadecadienoic acid from tung oil. S. B. Davis, E. A. Conroy, and N. E. Shakespeare (American Cyanamid Co., Stamford, Conn.). *J. Am. Chem. Soc. 72,* 124-8(1950). Tung oil was mixed with an anion-active ion exchange resin and a small fraction was recovered by elution of the resin with alkali and extraction of the acidified eluate with carbon tetrachloride. Storage of this product at 5° resulted in the separation of an oil and a crystalline product. The latter was identified as 9,14-dihydroxy-10, 12-octadecadienoic acid.

Preparation of salts of aliphatic acids. E. A. Nikitina and S. N. Maksimova. *Zhur. Obshchei Khim. 19,* 1108-14(1949). Bismuth trioleate, tripalmitate, and tristearate, and antimony monooleate, tripalmitate, tristearate, and trioleate were prepared by precipitation of the salts from the sodium soaps in alcohol.

Oswego soy plant. T. G. Luby. *Am. Miller and Processor*

78 (2), 27, 46(1950). A brief description is given of the combined expeller and solvent extraction (basket type) plant.

CHEMICALS FROM FATS. R. L. Kenyon, D. V. Stingley, and H. P. Young. *Ind. Eng. Chem. 42,* 202-13(1950). The manufacture of chemicals from fats at the Armour and Co. plant in McCook, Illinois, is described. Refining, hydrogenation, and splitting of fats produce high grade fatty acids for use in the preparation of nitriles, amines, amine acetates, amides, and quaternary ammonium salts.

WATER-INSOLUBLE FATTY ACIDS AND BUTYRIC ACID IN CREAM AND BUTTER. F. Hillig, H. A. Lepper, and W. I. Patterson. *J. Assoc. Off. Agr. Chem. 33,* 731-45(1949). Progressive decomposition experiments on 321 samples of butter show that, as cream ages and decomposes, the fat may break down forming water-insoluble acids in amounts far in excess of those normally present in sweet cream as well as forming butyric acid, and sometimes propionic acid.

SOME ADVANCES IN THE PRODUCTION OF EDIBLE OILS AND FATS. H. S. Mitchell (Swift and Co.). *Food Tech. 4,* 50-4 (1950). A review on the processing methods and the performance requirements of shortenings.

ARMOUR'S STAR. R. H. Potts and G. W. McBride (Armour and Co.). *Chem. Eng. 57* (2), 124-7, 172-5(1950). A description with flow sheet is given for the new McCook Plant of Armour and Co. The fat treating and splitting unit produces mixed glycerine and fatty acids for use in the distillation, nitrile preparation, hydrogenation, and solvent crystallization units.

NEW USES FOR FATS AND OILS. R. G. Gibbs (C. and E. News). *Chemurgic Dig. 9* (1), 10(1950). The Department of Agriculture's research program to find new uses or expand old uses of fats and oils is summarized.

RICE, TALLOW NUTS, AND GOLDENROD YIELD VALUABLE PRODUCTS. L. J. Horn. *Chemurgic Dig. 9* (2), 8-9(1950). A brief description of some of the research at the Texas Engineering Experiment Station. Experiments have been made to recover oil from gourd seed, orange seed, pecan waste, rice bran, sweet goldenrod, and the Chinese tallow nut tree.

REVIEW OF ANALYTICAL CHEMISTRY. *Anal. Chem. 22,* 2-136 (1950). A series of 26 papers on all phases of fundamental analysis. ''Light Absorption Spectrophotometry,'' ''Infrared Spectroscopy,'' ''Ultraviolet Absorption Spectrophotometry,'' ''X-Ray Diffraction,'' ''Chromatography,'' ''Distillation,'' ''Extraction,'' and ''Biochemical Analysis'' are titles which may be of interest.

DIFFERENTIAL ANALYSIS WITH A BECKMAN SPECTROPHOTOMETER. R. Bastian, R. Weberling, and F. Palilla (Sylvania Electrical Prod., Inc., N. Y.). *Anal. Chem. 22,* 160-6(1950). The differential method of colorimetric analysis as applied to the Beckman Model DU spectrophotometer is discussed. Maximum increases in accuracy over the normal method are computed for the entire working range of the instrument.

THERMOGRAPHIC INVESTIGATION OF LONG-CHAIN ALIPHATIC COMPOUNDS. A. G. Anikin and G. B. Ravich. *Doklady Akad. Nauk U.S.S.R. 68,* 309-11(1949). Triglycerides or higher aliphatic acids are crystallized in a thin layer directly in a microthermocouple, made of 0.05-mm. wire and having a loop instead of the usual junction. The couple with the substance, and a similar blank thermocouple, were placed between 2 slides, in a way ensuring maximum thermal insulation from surrounding objects. This procedure permits simultaneous thermal and microscopic examination of samples of the order of a few tenths of a mg. Trilaurin gave heating curves identical with those obtained by macro methods. (*Chem. Abs. 44,* 898.)

THE THIOBARBITURIC ACID REAGENT AS A TEST FOR THE OXIDATION OF UNSATURATED FATTY ACIDS BY VARIOUS AGENTS. K. M. Wilbur, F. Bernheim, and O. W. Shapiro (Duke Univ.). *Arch. Biochem. 24,* 305-13(1949). Methyl linolenate after autoxidation or oxidation catalyzed by ascorbic acid, mercapto compounds, or ultraviolet light yields a compound which reacts with thiobarbituric acid to produce a characteristic color. At pH 6.0 the intensity of the color is about 16 times greater after ultraviolet irradiation than after catalysis by ascorbic acid or mercapto compounds, and amounts of the order of 0.2 μg. of methyl linolenate per ml. can be detected after ultraviolet irradiation. Under the same conditions linoleic acid produces very much less color and this may be due to the presence of small amounts of linolenic acid. Methyl arachidonate produces no color after incubation with ascorbic acid or mercapto compounds but does after exposure to ultraviolet light. Oleic and stearic acids are inactive, but a crude mixture of C_{20} acids gives a color after incubation with ascorbic acid. Certain aliphatic aldehydes and sugars react with thiobarbituric acid to give colors. The color given by glyoxylic acid approximates most closely that given by linolenic acid.

STALE FLAVOR COMPONENTS IN DRIED WHOLE MILK. II. THE EXTRACTION OF STALE BUTTER OIL FROM STALE DRIED WHOLE MILK BY ORGANIC SOLVENTS. R. McL. Whitney and P. H. Tracy (University of Illinois). *J. Dairy Sci. 33,* 50-9(1950). Stale flavor was extracted in approximately the same ratio to the fat as existed in the original stale dried whole milk and was, therefore, considered to be more than 90 per cent extracted.

COMBINED DETERMINATION OF THE SAPONIFICATION AND REICHERT-MEISSL VALUES. K. Täufel. *Fette u. Seifen 52,* 10-11 (1950). Five grams of fat are saponified and titrated as in regular saponification value determination. The soap is freed of alcohol, dissolved in water, and R-M value is determined by the usual method.

ADSORPTION OF LOW MOLECULAR WEIGHT FATTY ACIDS BY AN ACTIVATED CHARCOAL. USE OF CHROMATOGRAPHY TO OBTAIN ADSORPTION ISOTHERMS. F. H. M. Nestler and H. G. Cassidy (Yale Univ.). *J. Am. Chem. Soc. 72,* 681-9(1950). Measurement of the adsorption isotherms of the aliphatic fatty acids, acetic, propionic and butyric, from aqueous solution and on a commercial activated charcoal, showed each acid to be preferentially adsorbed throughout the concentration range of 0-100% by weight. The Freundlich isotherm equation was applicable over only a narrow concentration range of approximately 0.005-0.5%. The technique of frontal analysis has been used in order to obtain data relating to the adsorption of binary mixtures of low molecular weight aliphatic fatty acids, with a view to an analytical method.

DISPLACEMENT ANALYSIS OF LIPIDS. II. INCREASED SEPARABILITY OF FATTY ACIDS BY DEPRESSED SOLUBILITY. L. Hadgahl and R. T. Holman (College Station, Texas). *J. Am. Chem. Soc. 72,* 701-5(1950). Adsorption isotherms for lauric and myristic acids in 95% alcohol on a series of varied adsorbents are given. The depression of solubility of fatty acids in alcohol by admixture with water, or by lowering temperature increases adsorption and spreads isotherms. The lowered solubility caused by addition of water increases separability of fatty acids as shown in frontal and displacement analysis. The use of isotherms to predict the character of displacement diagrams for fatty acids has been verified. The best displacer found thus far for a fatty acid is its nearest homolog of lower solubility in a solvent which just dissolves the desired concentration of displacer.

DISPLACEMENT ANALYSIS OF LIPIDS. III. SEPARATION OF NORMAL SATURATED FATTY ACIDS FROM FORMIC TO BEHENIC. R. T. Holman and L. Hagdahl (College Station, Texas). *J. Biol. Chem. 182,* 421-427(1950). Displacement separation of fatty acids has been shown to take place for all normal saturated acids from 1 to 20 carbon atoms in length by the proper choice of solvent for each group of acids with Darco G-60 as adsorbent.

THE SOLUBILITIES OF THE NORMAL SATURATED FATTY ACIDS IN WATER. D. N. Eggenberger *et al. J. Org. Chem. 14,* 1108-10 (1949). The solubilities of octanoic, nonanoic, decanoic, and hendecanoic acids were determined in water at 30°, 40°, 50°, and 60°; of dodecanoic acid at 40°, 50° and 60°, and of tetradecanoic acid at 50° and 60°.

RELATIVE EFFECTIVENESS OF TWO SYSTEMS OF SELECTION FOR OIL CONTENT OF THE CORN KERNEL. G. F. Sprague and B. Brimhall (Iowa Agricultural Exp. Station). *Agronomy J. 42,* 83-8 (1950). The recurrent selection procedure at the end of a 5-year period was 2.6 times more efficient than selection during inbreeding. This efficiency would be expected to increase as the time period is increased.

REFINING AND HARDENING OF VEGETABLE OILS. A. Arneil. *Chem. and Ind. 20* (1), 3-10(1950). A review of the current practices in refining, bleaching, deodorizing, and hardening technology with specific reference to methods and equipment used in the United States, Germany, and Britain.

CHARACTERISTICS OF GREASES AS RELATED TO ANTIFRICTION BEARING APPLICATIONS. E. S. Carmichael and R. C. Robinson (Socony-Vacuum Oil Co.). *Mech. Eng. 72,* 137-41, 43, 44 (1950). The important factors effecting resistance of a grease are metal component of soap, fatty component of soap, mineral oil, reaction of finished grease, additives, bearing design, and operating conditions.

FILM TEST. WATER SATURATION VALUES OF WATER-IN-OIL EMULSIONS. Alfred Russ. *Seifen-Ole-Fette-Wachse 75,* 254-6 (1949). Spreading of water-in-oil emulsions on glass plates shows whether their water-saturation value has been reached or whether more water can be added without breaking the emulsion. (*Chem. Abs. 44,* 903.)

PATENTS

LIQUID INJECTABLE OIL-PECTIN-DRUG COMPOSITION. H. Welch (U. S. A.). *U. S. 2,491,537.* A normally liquid oil is combined with a therapeutic drug, which is rapidly assimilable, and pectin giving an essentially anhydrous mixture which is used for therapeutic injections.

STABILIZATION OF ORGANIC COMPOUNDS. R. B. Thompson. *U. S. 2,492,334-6.* A method of stabilizing an organic material subject to oxidative deterioration comprises adding an inhibitor comprising a ketone having a sulfur atom attached to the carbon atom β to the keto group.

POLYOXYETHYLENE ESTERS IN FROZEN CONFECTIONS. A. B. Steiner and A. Miller (Kelco Co.). *U. S. 2,493,324.* A mixture of an edible colloid and polyoxyethylene ester of stearic acid is added as a stabilizer in frozen desserts.

METHOD AND APPARATUS FOR RENDERING FATS. R. Koppit and C. J. Davis, Jr. (Armour and Co.). *U. S. 2,493,459.* Pork fat stocks are rendered with steam to produce a mixture of lard, floaters, tankwater, and tankage. After settling, the various strata are separated by draw-off arrangements in the cooker-tank.

PRODUCTION OF ALKYL ESTERS OF FATTY ACIDS. F. J. Sprules and D. Price (Nopco Chem. Co.). *U. S. 2,494,366.* Trans-esterification is first accomplished with an alkaline catalyst, then an acid catalyst is added to release fatty acids from soap and the trans-esterification is continued to completion.

CYANOETHER ESTERS OF DIHYDRIC ALCOHOLS (PLASTICIZERS). L. T. Crews (Armour & Co.). *U. S. 2,495,214.* A process for the esterification of a β-cyanoether of a low molecular weight aliphatic dihydric alcohol with a fatty acid.

A HYDROGENATED SEMIDRYING OIL AND METHACRYLATE RESIN MIXTURE AS A LUBRICANT. V. A. Navikas (Armstrong Cork Co.). *U. S. 2,495,277.* An extrudable cork composition comprises cork particles, a binder capable of being set by heat, a mixture of hydrogenated cottonseed oils, and butyl methacrylate resin.

POLYHYDRIC ALCOHOL ESTERS OF FATTY ACIDS. A. C. Bell and W. G. Alsop (Colgate-Palmolive-Peet Co.). *U. S. 2,496,328.* Polyhydric alcohol and fatty acids are heated together with efficient agitation to form an intimate dispersion at 200°. The mixture after coming to equilibrium is cooled below 100° when the unreacted alcohol separates from the esters.

PURIFICATION OF OLEIC ACID. C. G. Goebel (Emery Inds., Inc.). *U. S. 2,482,760.* Subject the oleic acid to polymerizing conditions and then distill off pure oleic acid from the polymerized polyunsaturated acids.

WATER INSOLUBLE LUBRICATING GREASE FOR ANTIFRICTION BEARINGS. A. J. Morway. *U. S. 2,491,054.* A lubricating composition consists of a dibasic acid ester, a metal soap of a fatty acid, and a copolymer of styrene and isobutylene.

NON-SPATTER, ADHESIVE LUBRICATING GREASE. A. Beerbower and A. J. Morway. *U. S. 2,491,028.* A tacky lubricating grease composition consists of a dibasic acid ester, a lithium soap, and a C_3 to C_5 alkyl methacrylate polymer, the polymer having a moderate but limited solubility in the ester so as to impart substantial tackiness and stringiness properties to the composition.

MIXED GLYCEROL ESTERS OF FATTY AND HYDROXY ACIDS. L. L. Little. *U. S. 2,480,332.* This emulsifier comprises the glycerol ester of a saturated fatty acid having at least one free hydroxyl radical on the glyceryl group, the latter being esterified with lactic acid, the mixed ester being free from glycerine-trilactate.

PREPARATION OF PARTIAL ESTERS. H. D. Allen *et al. U. S. 2,478,354.* Completely esterified polyhydric alcohol esters of fatty acids are converted into partial esters by heating the esters in the presence of water but in the absence of alkaline material in an amount sufficient to serve as an efficient catalyst, while the mixture is under sufficient pressure to keep water in the system, reducing the pressure to remove water from the system, and cooling the reaction product.

PREPARATION OF ALIPHATIC NITRILES. W. D. Niederhauser (Rohm & Haas Co.). *U. S. 2,493,637.* Ammonia and oleic acid are reacted in the liquid phase at 250-290° in the presence of a cobalt soap.

DIALKYL SILANE DERIVATIVE OF RICINOLEIC ACID ESTER. R. E. Christ (U. S. Industrial Chemicals). *U. S. 2,496,335.* A compound consisting of a diether of ricinoleic acid esters and dialkyl silane is useful as a plasticizer for nitrocellulose.

TRIALKYL SILANE DERIVATIVE OF RICINOLEIC ACID. K. E. Earhart (U. S. Industrial Chemicals, Inc.). *U. S. 2,496,340.* A compound consisting of a monoether of ricinoleic acid ester and trialkyl silane.

WOOL TREATMENT. H. F. Leupold and M. J. Kelley (Nopco Chem. Co.). *U. S. 2,496,631.* A fatty acid is heated with an alkylamine to form a condensation product which in combination with a nonresinifying oil forms a stable emulsion in water. The emulsion is suitable for self-fulling and scouring of wool.

SYNERGISTIC ANTIOXIDANTS. L. A. Hall (Griffith Labs.). *U. S. 2,493,288.* Alkyl esters of gallic acid can be added to fatty materials in amounts greater than are normally soluble by dissolving the ester in a molten phospholipid.

TREATMENT OF POLYENE COMPOUNDS. A. W. Ralston, O. Turinsky and L. Van Akkeren (Armour and Co.). *U. S. 2,498,133.* A fatty polyene compound containing unconjugated double bonds is contacted at an elevated temperature with a hydrogen reactable iodine compound as a catalyst, to effect an increase in refractive index of the compound, and the iodine is thereafter removed from the polyene compound by the use of lead, copper, or silver compounds. The product has improved drying properties.

FEED FORTIFICATION. D. Melnick (Astrol Products, Inc.). *U. S. 2,496,634.* Fat-soluble vitamins are incorporated into a high-melting (58°) physiologically available edible fat. A premix of this mixture and defatted enzyme-inactivated soy flour is used for fortification of feedstuffs.

• Biology and Nutrition

A. R. Baldwin, Abstractor

THE ABSORPTION AND DISPOSITION OF ORALLY ADMINISTERED I^{131}-LABELED NEUTRAL FAT IN MAN. M. M. Stanley and S. J. Thannhauser. *J. Lab. & Clin. Med. 34,* 1634-9(1949). Characteristic curves of absorption and utilization of physiologic amounts of lipid taken by mouth by subjects on a mixed diet were demonstrated by the use of unsaturated fats iodinated with I^{131}. The proportion of the administered radioactive I which was collected by the thyroid and excreted in the urine, as well as the magnitude of the water-soluble portion in the serum, indicated the extent of breakdown of the labeled fat. Under these circumstances in normal subjects, degradation of from 50-73% of the orally administered iodinated fat took place within 24 hours. Subjects with "Idiopathic" hyperlipemia and the nephrotic syndrome utilized the labeled lipid much more slowly.

POLYETHENOID FATTY ACID METABOLISM. II. DEPOSITION OF POLYUNSATURATED FATTY ACIDS IN FAT-DEFICIENT RATS UPON SINGLE FATTY ACID SUPPLEMENTATION. C. Widmer and R. T. Holman (College Station, Texas). *Arch. Biochem. 25,* 1-12 (1950). Supplements of 0.05 ml. of Et stearate, oleate, linoleate, and linolenate per day were fed to each of 4 groups of fat-starved rats for a period of 8 weeks. Spectrophotometric analysis of the alkali-isomerized samples of fatty acids extracted from the various tissues was made. Rats fed a normal stock ration showed deposition of polyunsaturated fatty acids in the heart, liver, brain, kidney, blood, and skeletal muscle, arranged in order of decreasing concentration. Negligible amounts were found to be present in adipose tissue. The rat was shown to synthesize arachidonic acid from linoleic acid but not from linolenic acid. The rat was shown to synthesize hexaenoic acid from linolenic acid but not from linoleic acid.

SYNTHESIS OF ENANTIOMERIC α-LECITHINS. E. Baer and M. Kates (Univ. of Toronto). *J. Am. Chem. Soc. 72,* 942-9(1950). Both enantiomeric forms of fully saturated α-lecithins of assured constitutional and configurational purity have been synthesized. Three homologous α-lecithins of the *L*-series, namely, distearoyl-, dipalmitoyl-, and dimyristoyl-lecithin were prepared. X-ray diffraction patterns, solubilities, and other physical data of the pure crystalline lecithins are given. The synthetic *L*-α-dipalmitoyl-lecithin and natural dipalmitoyl-lecithin were found to be identical.

HISTOCHEMICAL LOCALIZATION OF TRUE LIPASE. G. Gomori (Univ. Chicago). *Proc. Soc. Exptl. Biol. & Med. 72,* 697-700 (1949). Water-soluble unsaturated fatty acid esters are hydrolyzed almost exclusively by the pancreatic type of esterase (true lipase) while similar esters of saturated fatty acids are readily attacked by esterases of both the hepatic and pancreatic type.

LIPOXYDASE. Wm. Franke. *Fette u. Seifen 52,* 11-19(1950). A comprehensive review from 110 references.

PARENTERAL NUTRITION. X. OBSERVATIONS ON THE USE OF A FAT EMULSION FOR INTRAVENOUS NUTRITION IN MAN. S. W. Gorens *et al. J. Lab. & Clin. Med. 34,* 1627-33(1949). Observations are reported on the intravenous administration of a 15% fat emulsion to 11 patients representing a variety of common illnesses. The emulsion was effective as indicated by favorable clinical response, the prevention of weight loss, and the maintenance of positive nitrogen and potassium balance. Subsequent postmortem examination of 3 of these patients revealed that the fat emulsions had produced no pathologic changes, either gross or microscopic.

MECHANISM OF FAT ABSORPTION AS EVIDENCED BY CHYLOMICROGRAPHIC STUDIES. H. C. Tidwell (Southwestern Medical College). *J. Biol. Chem. 182,* 405-14(1950). The absorption of neutral fat, or the free fatty acids prepared from it gave a similar systemic lipemia in rats and man. This does not agree with the suggestion of different pathways for these substances after absorption. An emulsifying system, fatty acids with monoglyceride, did not cause the increased number of chylomicrons in the blood when ingested with either mineral oil or a diether of glycerol. An increased rate of fat absorption followed the ingestion of fat with added lecithin or of monoglyceride alone. The fact that choline given along with the fat had a similar effect suggests that this increased rate of absorption cannot be exclusively the result of an increased emulsification of the fat in the intestine.

INTRAVENOUS INFUSIONS OF CONCENTRATED COMBINED FAT EMULSIONS INTO HUMAN SUBJECTS. B. G. P. Shafiroff, J. H. Mulholland, and E. Roth (N. Y. Univ.). *Proc. Soc. Exptl. Biol. & Med. 72,* 543-7(1949). Two types of combined fat emulsions, one containing 15% fat and the other 20% fat, were infused into 25 human subjects intravenously. The incidence of constitutional reactions was 27%.

THE THIOBARBITURIC ACID TEST APPLIED TO TISSUES FROM RATS TREATED IN VARIOUS WAYS. S. K. Donnan (Duke Univ.). *J. Biol. Chem. 182,* 415-19(1950). The amount of oxidized linolenic acid, either free or combined, in the phopholipide molecule is measured by the TBA test. The oxidation product is in all probability a peroxide. Ascorbic acid is an excellent catalyst for this oxidation. Tissues incubated with an excess of ascorbic acid give a value by the TBA test which denotes the amount of linolenic acid and possibly certain C_{20} acids, oxidizable by ascorbic acid. The results obtained by the thiobarbituric acid test parallel those by the more conventional methods.

ARTERIOSCLEROSIS IN RELATION TO FAT METABOLISM. Anon. *Nutrition Rev. 8,* 61-2(1950). A brief review of the subject indicates that there is a marked change in fat metabolism in the aged. This results in prolonged chylomicronemia after fat ingestion and a relationship is suggested between continued chylomicronemia and the genesis of arteriosclerosis.

THE ROLE OF LIPIDS AND LIPOPROTEINS IN ATHEROSCLEROSIS. J. W. Gofman, F. Lindgren, H. Elliott, W. Mantz, J. Hewitt, B. Strisower, V. Herring, and T. P. Lyon (University of California, Berkeley). *Science 111,* 166-71, 186(1950). The mechanism of cholesterol transport in the serum of rabbits and humans via giant lipid and lipoprotein molecules of low density has been characterized. In both species there exist classes of molecules of higher S_f rate and lower density than the major group of cholesterol-bearing lipoproteins. Evidence implicating the cholesterol-bearing molecules of the S_f 10-30 class in the production of cholesterol-induced atherosclerosis in the rabbit has been presented. A study of 104 patients with proved myocardial infarctions reveals an almost universal occurrence of cholesterol-bearing molecules of the S_f 10-20 class (a class of molecules similar in many respects to the S_f 10-30 class in rabbits). at fairly high levels in the blood. All categories of normal humans studied show a lower frequency of occurrence of measurable concentrations of S_f 10-20 molecules than do the myocardial infarction patients with coronary artery atherosclerosis.

EFFECT OF CHOLINE AS A LIPOTROPIC AGENT IN THE TREATMENT OF HUMAN ATHEROSCLEROSIS. L. M. Morrison and W. F. Gonzales (Los Angeles County Gen. Hosp.). *Proc. Soc. Exptl. Biol and Med. 73,* 37-8(1950). Choline was effective in reducing the mortality rate due to recurrent coronary-thrombosis with myocardial infarction in 115 patients.

STUDIES ON ETHIONINE. II. THE INTERFERENCE WITH LIPIDE METABOLISM. E. Farber, M. V. Simpson, and H. Tarver (University of California, Berkeley). *J. Biol. Chem. 182,* 91-9 (1950). Ethionine is capable of inducing fatty livers in fasted female rats in 12 hours. Methionine is the only amino acid capable of counteracting this effect. Choline and other known lipotropic agents have little or no effect. Carbohydrate in large doses prevents or cures this type of fatty liver.

THE EFFECT OF SOYBEAN GROWTH INHIBITORS ON THE AVAILABILITY OF METHIONINE FOR GROWTH AND LIPOTROPISM. I. E. Lienr, H. Spector, H. L. Fevold, and G. H. Berryman (The Q. M. Food and Container Inst.). *Arch. Biochem. 24,* 299-304 (1949). The presence of methionine at effective levels of 600, 1000, 1500, and 2500 mg. % in a low-choline, 12.5% protein diet containing raw or autoclaved soybean meal caused a progressive decrease in liver lipids of weanling rats. Differences in protein efficiency were not parallel to the changes in liver lipids described above. The growth-promoting value of diets containing raw soybean meal was consistently less than similar diets containing autoclaved soybean meal.

HEXADECENOIC ACID AS A GROWTH FACTOR FOR LACTIC ACID BACTERIA. J. B. Hassinen, G. T. Durbin, and F. W. Bernhart (Wyeth, Inc.). *Arch. Biochem. 25,* 91-6(1950). Palmitoleic acid (9-hexadecenoic acid) supports good acid production of a mutant strain of *L. bifidus* at lower levels of concentration, and inhibits at higher levels, in contrast to oleic acid which supports acid production at both high and low levels of addition. With *L. arabinosus* hexadecenoic acid, in a medium containing no biotin, stimulates acid production in a manner similar to oleic acid. A synergistic effect of saturated fatty acids and oleic acid on the growth of a mutant strain of *L. bifidus* has been demonstrated. With *L. arabinosus,* the growth stimulation caused by oleic acid is slightly inhibited by palmitic and stearic acids.

ACETATE AND OLEATE REQUIREMENTS OF THE LACTIC GROUP OF STREPTOCOCCI. E. B. Collins, F. E. Nelson, and C. E. Parmelee (Iowa Agr. Exp. Sta.). *J. Bact. 59,* 69-74(1950). A chemically defined medium made by adding sodium acetate and sorbitan monooleate to the medium of Niven (1944) permitted the growth of all tested strains of the lactic group of streptococci that did not grow in the unsupplemented medium.

STEROLS AND FATTY ACIDS IN THE NUTRITION OF ENTOZOIC AMOEBAE IN CULTURES. A. M. Griffin and W. G. McCarten (Geo. Washington University). *Proc. Soc. Exptl. Biol. and Med. 72,* 645-8(1949). Cholesterol in adequate amounts can be substituted for serum in liver infusion media for culture of entozoic amoebae. Oleic acid in optimum concentrations reinforces the action of cholesterol.

THE ACTION OF STREPTOMYCIN. IV. FATTY ACID OXIDATION BY *Mycobacterium tuberculosis,* AVIAN TYPE. E. L. Oginsky, P. H. Smith, and M. Solotorovsky (Merck Institute for Therapeutic Research). *J. Bact. 59,* 29-44(1950). A study of fatty acid oxidation by *Micobacterium tuberculosis,* avian type, strain Kirchberg, showed that the oxidation of the higher fatty acids was partially inhibited by streptomycin. Streptomycin apparently inhibited the oxidation of the breakdown products of the fatty acids rather than the oxidation of the chain itself. The resistant strain derived from this organism also oxidized the fatty acids, but without comparable streptomycin inhibition. Similar inhibition by this antibiotic of stearate oxidation by *Escherichia coli* was also observed. Streptomycin-resistant *E. coli* had lost the major portion of the oxidative mechanism for higher fatty acids.

THE OXIDATION OF β-CAROTENE. N. L. Wendler, C. Rosenblum, and M. Tishler (Merck & Co.). *J. Am. Chem. Soc. 72,* 234-9(1950). The oxidation of β-carotene with hydrogen peroxide-osmium tetroxide has yielded vitamin A aldehyde, β-ionylideneacetaldehyde and 2,7-dimethyloctatriendial. Vitamin A aldehyde was found to posses a biological activity approaching that of vitamin A. It has been converted to vitamin A by reduction with lithium aluminum hydride.

ELECTROPHORETIC ANALYSIS OF PEANUT AND COTTONSEED MEAL PROTEINS. M. L. Karon, M. E. Adams, and A. M. Altschul (South. Reg. Res. Labs. U.S.D.A.). *J. Phys. and Colloid Chem. 54,* 56-66(1950). Peanut protein has been found to consist of two major and several minor components. Cottonseed meal protein has two major and two minor components.

FURTHER STUDIES ON THE METABOLISM IN VITRO OF RADIOACTIVE TRILAURIN AND SODIUM OCTANOATE. R. P. Geyer, L. W. Mathews, and F. J. State (Harvard Univ.). *J. Biol. Chem. 182,* 101-8(1950). The amount of radioactive carbon dioxide derived from carboxyl-labeled lipids incubated with tissue slices was increased by the addition of fumarate, maleate, oxalacetate, pyruvate, and α-ketoglutarate. Malonate decreased the activity of the respired carbon dioxide in such a way that the concurrent addition of any of the above compounds had little effect on the malonate inhibition.

THE INFLUENCE OF SOME QUINONE DERIVATIVES ON THE LIPID FORMATION IN YEAST. O. Hoffman-Ostenhof and E. Kriz. *Arch. Biochem. 24,* 459-61(1949). Some quinones caused inhibition of fat formation in yeast while in other cases there was either no effect or an activation took place. With certain concentrations of all quinones, there was a remarkable increase of the sterol portion in the total lipids.

STUDIES ON STEROID METABOLISM. VII. IDENTIFICATION AND CHARACTERIZATION OF ADDITIONAL KETOSTEROIDS ISOLATED FROM URINE OF HEALTHY AND DISEASED PERSONS. S. Lieberman, D. K. Fukushima and K. Dobriner (Sloan-Kettering Institute for Cancer Res.). *J. Biol. Chem. 182,* 299-315(1950). Seven steroids have been isolated from human urine for the first time and four urinary steroids which were partly characterized previously have been identified.

Studies in steroid metabolism. VIII. Detection and location of ethylenic double bonds in steroids by infrared spectrometry. R. N. Jones, P. Humphries, E. Packard, and K. Dobriner (Sloan-Kettering Institute for Cancer Research, N. Y.). *J. Am. Chem. Soc. 72,* 86-91(1950). The infrared absorption spectra of unsaturated steroids have been examined. A comparative study of steroids containing ethylenic linkage at different positions has shown that the frequency of the maximum in the region of the C=C stretching vibration (1580-1680 cm.$^{-1}$) is specific for a given location of the bond in the steroid molecule. In conjugated dienes, α,β-unsaturated ketones and the estrogens these bands are intense. In steroids containing non-conjugated ethylenic double bonds the bands, although weak, can generally be observed.

Studies in steroid metabolism. IX. Further observations on the infrared absorption spectra of ketosteroids and steroid esters. R. N. Jones, P. Humphries, and K. Dobriner (Sloan-Kettering Inst. for Cancer Res.). *J. Am. Chem. Soc. 72,* 956-61(1950). Measurements of the position of the carbonyl stretching vibration in the infrared spectra of carbon disulfide solutions of an additional 180 steroids are reported.

• Waxes

E. H. McMullen, Abstractor

Latest carnauba wax study. Charles J. Marsel (New York Univ.). *Chem. Ind. 66,* 216-18(1949). Physical constants, including dirt and moisture content, flash point, melting point, acid number, saponification number, iodine number, and emulsifiability, were determined on 56 samples (4 types) of carnauba wax. No correlation between emulsifiability and any of the physical constants could be found. An improved method for acid number determination was developed using a mixture of isopropyl alcohol, n-amyl alcohol, and toluene as the solvent and a phenolphthalein indicator with methylene blue as a masking agent to give a sharp end-point.

Polyesteramides in paint media for application to natural rubber. H. G. White. *J. Oil & Colour Chemists' Assoc. 32,* 461-71(1949). A hard wax is obtained by heating together adipic acid, ethylene glycol, and monoethanolamine until a molecular weight of 5,000-10,000 is reached. This product can be treated with a more reactive monomer containing two reactive groups to form a polymer with molecular weight in the 100,000-500,000 region. This product shows rubber-like properties and is useful in the preparation of varnishes and lacquers for rubber goods.

A method of resolving oil-field-waste emulsions. J. W. Horne and J. Wade Watkins. *Bur. of Mines pamphlet,* 47 pp., 23 figs. Supt. of Documents. Describes study undertaken to recover microcrystalline (high-melting-point) waxes (from pit-waste emulsions). Method of resolving such emulsions and thereby recovering the oil and wax was developed and perfected in a field pilot plant. Discusses laboratory tests and analyses that differ from standard methods. (Bur. of Mines, List 417, Jan., 1950.)

New method of determining saponification number, particularly of waxes. Werner Zollner. *Farben, Lacke, Anstrichstoffe, 1949,* 385-90. The new ("Hezel") method of determining the saponification number consists in heating to 130° for two hours 3-5 g. of wax or fat with 40-50 ml. of approximately 0.5 *N* potassium hydroxide solution in ethylene glycol in a covered flask placed inside an oven; a little xylene can be added to make the mixture fully soluble. After saponification, the mixture is transferred into a beaker, washed with ethylene glycol, and titrated with 0.5 *N* hydrochloric acid, first to thymolphthalein, then at a boil with bromophenol blue (blue-yellow); the latter amount is equal to the saponified fatty acids. Saponification numbers by the International Commission method (6 hrs.) and by the Hezel method follow: Beeswax, bleached, 84.7, 92.2; carnauba wax, 73.7, 81.6. The Hezel method requires no blank, no reflux or water bath, only two hours of heating, and only one quantitative solution. (*Chem. Abs. 44,* 1724.)

PATENTS

Wax dispersions. G. B. Holtzclan and J. E. Clemens (Standard Oil Development Co.). *U. S. 2,311,338.* A method for producing a highly dispersed colloidal solution of a crystalline high-molecular weight ester wax is described.

Two-stage process for the synthesis of hydrocarbons. Clinton H. Holder (Standard Oil Development Co.). *U. S. 2,483,771.* Liquid hydrocarbons are produced by means of bringing the synthesis gas mixture of carbon monoxide and hydrogen into contact with a dense bed of fluidized alkali metal salt promoted iron synthesis catalyst. The product stream containing partially spent very fine catalyst particles is scrubbed with a high-boiling hydrocarbon oil. The catalyst particle slurry thus formed is introduced into a second reaction zone where a synthesis gas containing 3 to 7 parts of hydrogen to 1 part carbon monoxide is brought into contact with the slurry at a pressure between 300 and 750 lb./sq. in. at a temperature of 350-500°F. to produce a product containing a substantial amount of high-melting wax. (*Chem. Abs. 44,* 1673.)

Solvent extraction of oils, fats, waxes, gums, resins, etc. Charles R. Kincaide. *U. S. 2,491,115.* The apparatus is designed to extract a wide variety of oils, fats, waxes, gums, and resins from their solids. Discoloration and decomposition are reduced to a minimum by employing a short solvent contact with the solid, clarification of the raffinate by filtration and chemical treatment, and by flash evaporation at atmospheric pressure of the clarified raffinate. (*Chem. Abs. 44,* 1727.)

Flame-resistant finishes. (The British Thomson-Houston Co., Ltd.) B. P. *593,414.* Wax-like materials that are suitable for coating and/or impregnating materials such as asbestos, cotton and glass fibers, and lead wire are obtained by the reaction between a chlorinated aromatic acid or acid chloride and an aliphatic diamine containing from 2-6 carbon atoms. After application, the finishes are heated to about 170°C., giving smooth dry films that are flexible and abrasion-resistant, and are claimed to have a high degree of flame resistance. (*Paint Technology 15,* No. 169, 31-32, 1950.)

• Drying Oils

Robert E. Beal, Abstractor

Safflower oil. L. M. Christensen (Western Solvents, Inc., Longmont, Colo.). *Am. Paint J. 34,* No. 20, 54, 56, 58, 60, 62, 63(1950). The composition and properties of the oil are reviewed. At 585°F. the oil bleached from 10 to 2 (Gardner) in a few minutes and on continued heating it bodied at about 75% the rate of linseed oil but developed less acidity than the latter.

The oil of the cotia chesnut. II. Extraction, physical and chemical characteristics. M. da C. P. B. Cavalcanti. *Rev. quím. ind.* (Rio de Janeiro) *16,* No. 180, 16-8(1947). The oil proved equal to oiticica and tung oils in drying tests and had the following characteristics: color (Lovibond) 3 yellow, 0.8 red, absolute viscosity 1.4 poise at 25°, acidity 1.63% as oleic, ester number 184.2, acetyl number 139.9. (*Chem. Abs. 43,* 8700.)

Synthesis of linoleic acid. R. A. Raphael and F. Sondheimer (Imperial College of Science and Technol., London). *Nature 165,* No. 4189, 235(1950). The acid has been synthesized by partial hydrogenation of 9,11-octadecadiyneoic acid. The latter was obtained by condensing octyne-2-ol-1 methane sulfonate with the Grignard complex of ω-chlorooctyne-1, replacing chlorine in the product with iodine, and condensing the iodo-derivative with sodiomalonic ester. The synthetic linoleic acid gave a tetrabromide, m.p. 112-113° and could be hydrogenated to stearic acid.

The constitution and properties of a conjugated diene acid present in stillingia oil. A. Crossley and T. P. Hilditch (Univ. of Liverpool). *J. Chem. Soc. 1949,* 3353-7. About 5% of n-deca-2:4-dienoic acid was recovered from carefully saponified stillingia oil. The acid was characterized through its methyl ester by ultimate analysis, saponification equivalent (171.8), melting point of the hydrogenated product and its derivatives, and melting point of the permanganate oxidation product. The absorption spectrum of the pure acid had a peak at 260 mμ. Half-hydrogenation of the methyl ester with Raney nickel at 110° produced about 15% unchanged ester, 15% completely hydrogenated ester, 40% methyl dec-3-enoate, and 30% of the isomeric Δ^2- and Δ^4-monoethylenic esters.

Reactions of unsaturated dibasic acids with linseed oil. C. Cosgrove and K. Earhart. *Ind. Eng. Chem. 41,* 1492-6 (1949). Maleic anhydride adducts with cyclopentadiene and substituted cyclopentadiene react with linseed oil and glycerol at 260° in a manner similar to maleic and fumaric acids alone, to form alkyds. Maleic anhydride adducts with butadiene, isoprene, 2-methylbutadiene, and piperylene do not react with linseed oil under similar conditions. The data indicate that the drying oil double bonds do not conjugate before the addition of an unsaturated acid. (*Chem. Abs. 43,* 8700.)

Drying catalysts for linseed oil. D. Pagani. *Congr. tech. intern. ind. peintures inds. assoc. 1,* 369-74(1947). The drying action of the manganese salts of the fat acids of oiticica oil, chinawood oil, perilla oil, and grapeseed oil on linseed oil fell in the order given (0.6% manganese optimum). The drying time for linseed oil with lead abietates and resinates are given. Of 18 linoleate driers tested the calcium salt was the best and gave the lowest water vapor permeability for linseed oil films. (*Chem. Abs. 43,* 8699.)

The catalytic effect of vinoleates on the drying of linseed oil. D. Pagani. *Congr. tech. intern. ind. peintures inds. assoc. 1,* 364-8(1947). Lead vinoleate (lead salt of grapeseed oil fat acids) compared favorably with lead resinate as a drier for linseed oil. The optimum drier concentration and drying time for other metallic vinoleates are given. (*Chem. Abs. 43,* 8699.)

The action of modern dryers on tobacco and sunflower seed oils. C. Castorina. *Olearia 3,* 801-806(1949). The drying qualities of tobacco-seed, sunflower-seed and linseed oils when heated with equal amounts of ''soligen'' or the more modern ''hexogen'' dryers were compared and the latter found to be preferable. If an oil which has been heated with lead and cobalt is mixed with a like quantity of oil which has been heated with lead and manganese, drying is more rapid than would be the case with the same oil which was heated with all three driers at once.

ALM varnish. J. D. von Mikusch. *Farben, Lacke, Austrichstoffe 3,* 232-3(1949). A new air-drying exterior enamel based on a 3:1:1 ratio of linseed, chinawood, and oiticica oils plus an ''oil-saving'' synthetic resin, is described. (*Chem. Abs. 43,* 8701.)

Lac-linseed oil varnishes. III. Lac-linseed oil-lime. Y. Sankaranarayanan. *J. Sci. Ind. Research (India) 8B,* 87-8 (1949). Lac can be incorporated in linseed oil into which calcium hydroxide (5%), calcium linoleate or stearate, zinc stearate, or potassium linoleate have been added. Partial replacement of calcium hydroxide by PbO improves the drying characteristics. (*Chem. Abs. 43,* 8701.)

The linoxyn gel in linoleum manufacture. M. R. Mills. Paint Technol. *14,* No. 167, 487-93 and No. 168, 535-41(1949). The gel is produced by repeatedly flooding sheets of cotton suspended vertically, with boiled linseed oil containing lead drier (I), by blowing the oil with air or oxygen in a jacketed drum equipped with beaters, at about 60° until thick and then heating in open trays at 40° until solid (II), or by blowing the oil at 250° for several hours until thick, in an open kettle, heating in small kettles at 290° until gelled, and then dumping in cooling troughs (III). I requires several months, II requires several days, and III requires about one day. The linoxyn gel is fluxed with molten rosin and after the addition of powdered resins it is heated at 140°-145° until it again gels. This gel is masticated and mixed with pigments and fillers and then calendered or pressed into a suitable backing and heated at about 55° until hard. II is most widely used because it is faster than I and gives a more satisfactory product than III. Mechanical oxidation (II) produces a fraction (60%) insoluble in hexane, believed to be an intermolecular polymer considerably larger than dimers. Final heating to gelation gives an ether-insoluble fraction probably formed from the hexane-insoluble fraction and results in a micellar structure. Fluxing with rosin probably changes the gel structure into long chain polymers which cross-link during the final hardening of the linoleum.

PATENTS

Paint compositions from catalytically conjugated oils. A. J. Lewis and J. C. Cowan. *U. S. 2,494,565.* A paint mixture consists essentially of basic carbonate white lead pigment; soy bean oil that has been conjugated by treatment in the presence of nickel-carbon catalyst, paint drier, and calcium oxide.

Process of modifying fatty oils. S. B. Radlove (Maytag Co.). *U. S. 2,497,689.* An oil having at least 20% of fat acids with 3 non-conjugated double bonds is selectively hydrogenated to saturate all but two of the double bonds in the acid. At least 50% of the two remaining double bonds and those originally present are isomerized in the presence of the hydrogenation catalyst to produce an oil of improved coating properties.

Drying oils. P. Kass and J. Nichols (Interchemical Corp.). *U. S. 2,497,890.* The drying properties of mixtures of tung oil with other drying oils are improved by refluxing the mixture with acetic anhydride at 160-180° and removing the anhydride.

Modified drying oils. J. Nichols (Interchemical Corp.). *U. S. 2,497,904.* The drying qualities of tung oil are improved by refluxing the oil with acetic anhydride at 160-180° and removing the anhydride.

Process of making a polyester. D. W. Young and J. P. Rocca (Standard Oil Development Co.). *U. S. 2,497,968.* Substantially pure methyl dilinoleate is reacted with decamethylene glycol in the presence of about 1.0% of Zn dilinoleate having a molecular weight of about 1000, at 180-220°, for a sufficient reaction time to produce a high molecular weight polyester.

• Detergents

Lenore Petchaft, Abstractor

The activity coefficient of surface-active materials in aqueous solutions. H. M. Scholberg. *J. Phys. & Colloid Chem. 54,* 107-114(1950). The experiments are an attempt to show that surface tension measurements can be used to determine the activity coefficients of surface-active materials. The method allows a considerable increase in accuracy, for it is in the very dilute regions that surface tension measurements show the greatest changes. Surface pressure measurements provide a good method for the determination of the critical point corresponding to the beginning of micelle formation. The change in the absorption spectrum of a cyanine dye also gives good results.

Surface-active agents. B. J. Garceau (Arnold, Hoffman & Co., Inc., Providence, R. I.). *Am. Dyestuff Reptr. 39,* 87-90 (1950). A general review article giving fundamentals of detergency and describing anionic, cationic, and non-ionic surface-active agents.

Analysis of washing and cleansing agents. I. Gravimetric determination of silicic acid. Richard Neu. *Seifen-Öle-Fette-Wachse 75,* 215-16(1949). The method of conversion to silica with a mixture of 3 parts of ammonium chloride and 1 part ammonium sulfate followed by evaporation with hydrofluoric acid gives good results with washing powders containing silicates as fillers, and can also be applied to liquids containing soluble silicates. II. Determination of carbonic acid by volume displacement. *Ibid.* 473-4. The method and apparatus of Rauscher (*Pharm. Zentralhalle 88,* 362(1947) for the determination of carbon dioxide in baking powders gives satisfactory results with washing powders. (*Chem. Abs. 44,* 1725.)

Measuring detergent power. K. Tomlinson. *Mfg. Chemist 20,* 477-80(1949). Laboratory methods for determining wetting power—surface tension, loosening power—interfacial tension, emulsifying and suspending power, and lather are described. However, it is emphasized that the only real test of a detergent is under full-scale washing tests.

Limiting concentration of electrolytes in concentrated (soap) solution. K. Löffl. *Seifen-Öle-Fette-Wachse 75,* 471-2 (1949). The maximum allowable concentrations of electrolytes for solutions of various types of soap, without occurrence of layer separation are discussed. (*Chem. Abs. 44,* 1269.)

Clarification of the work on soap foams in aqueous solutions. E. Otero Aenlle and S. García Fernández. Anales fís. y quím. (Madrid) 45(B), 217-224(1949). Studied the separation and concentration of fatty acids by the technique of foaming, from an aqueous solution of their alkaline salts.

Mechanism of formation of emulsions. R. J. Dvoretskaya. *Kolloid, Zhur. 11,* 311-13(1949). When air was bubbled through a mixture of 1 volume of water in 1 volume oil (kerosene) the emulsion formed was of the oil-in-water type if the vessel was of glass well wetted with water, and of the water-in-oil type if the vessel was of a plastic nonwetted by water. Emulsifiers such as oleic acid, calcium oleate, and calcium naphthenate were used at 0.01-0.03 *N* concentrations.

The formation and surface activity of a mixed micelle. Louis Desalbres. *Bull. soc. chim. France 1949,* 591-3. There is an accentuation of the minimum in surface tension as a function of concentration of fatty acid salt in aqueous solution when a polar substance is present. The pH of the solution is also important in accentuating the minimum. A distinct minimum is observed with 0.00066 M sodium oleate and with 0.0024 M sodium laurate when α-terpineol is added with the soaps to water adjusted to pH 9. The accentuation is caused by the formation in basic solution of a mixed micelle containing the alcohol and soap which is very stable and less surface-active than a pure soap micelle. A maximum in surface tension is observed when the soap is added to a saturated solution of α-terpineol in water. This is because of a change in the surface composition caused by the salting out of the alcohol by the soap. When the medium is made alkaline, this maximum disappears. (*Chem. Abs. 44,* 906.)