hydes. The absence of semialdehydes higher than azelaaldehydate may indicate that the resulting unsaturated semialdehydes decompose under the conditions of gas-liquid chromatography. Evidence for higher semialdehydes than azelaaldehydate was recently obtained by hydrogenating decomposition products of autoxidized methyl linolenate. A more detailed account of this work is being prepared.

The evidence for a type (b) cleavage during autoxidation of fats leads one to expect a new series of substances that may contribute to the color and flavor components of fat-containing foods. According to scheme (b), the alkyl radical $R_2\bullet$ may be expected to combine with hydrogen or hydroxyl radicals to give low-molecular-weight hydrocarbons or alcohols, respectively. Unpublished evidence has been obtained in this laboratory (3) that hydrocarbons and alcohols may be constituents of the volatile fraction of reverted soybean oil.

E.N. FRANKEL, JANINA NOWAKOWSKA,
and C.D. EVANS, Northern Regional
Research Laboratory, Peoria, Ill.

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ABSTRACTS . . . . R. A. REINERS, Editor

ABSTRACTORS: S. S. Chang, Sini'tiro Kawamura, F. A. Kummerow, H. S. Liles, Louise R. Morrow, and E. G. Perkins

• Fats and Oils

SYNTHESIS OF TRANS-10-HYDROXY-2-DECENOIC ACID. Masahiro Fujii, Nobuko Koga, Yoshio Osawa, and Isso Chuman (Tsurumi Chem. Labs., Yokohama). *Nippon Kagaku Zasshi* **81**, 1782 (1960). This acid, present in royal jelly from queen bees, was synthesized from ricinoleic acid, through 10-hydroxydecanoic acid, 10-acetoxydecanoic acid, 10-acetoxy-2-bromodecanoic acid, and debromination. Infrared spectrum is presented.

INTERMOLECULAR HYDROGEN BONDING OF HYDROXYSTEARIC ACIDS. I. 10-HYDROXYSTEARIC ACID. Isokichi Nakajima and Yoshiyuki Toyama (Nagoya Univ.). *Nippon Kagaku Zasshi* **81**, 1472–4 (1960). The infrared absorption spectrum was similar for crystalline 10-hydroxystearic acid and its methyl ester in the range of vibrating OH (3290–3380 cm^{-1}). Thus the OH formed H bonding with the OH of the adjacent molecule in rectangular direction to the fatty acid C chains. The OH forming H bonding in the mixed crystals of 10-hydroxystearic and stearic acids was proportional to the square of hydroxystearic acid content.

II. D-12-HYDROXYSTEARIC ACID. I. Nakajima and Y. Toyama. *Ibid.*, 1474–76. The infrared absorption of vibrating OH of D-12-hydroxy stearic acid appeared in much lower frequency than that of OH in the H bonding of the type OH . . . OH. Thus COOH might be involved with intermolecular H bondings.

FORMATION OF PERACETIC ACID. Koichi Murai, Giichi Akazome, and Yasuto Murakami (Sansuiso Fats & Oils Inds. Co., Fushimi, Kyoto). *Kôgyô Kagaku Zasshi* **63**, 1233–5 (1960). This is Part VI of the studies on epoxy-fatty acid esters. Peracetic acid is often used in synthesizing epoxy unsaturated fatty acids. The equillibrium const. in the formation of peracetic acid from acetic acid and H_2O_2 was $K = 3.26$ in the range of 25–45°. The activation energy was 11.7 kcal./mole with H_2SO_4 as the catalyst.

REACTIONS BETWEEN UNSATURATED FATTY ACIDS OR AROMATIC CARBOXYLIC ACIDS AND SODIUM HYDROXIDE AT HIGH TEMPERATURE. Kenjiro Takeshita (Kyûshû Univ., Fukuoka). *Kôgyô Kagaku Zasshi* **63**, 2159–63 (1960). Reactions with NaOH at high temperatures (200–500°) were studied of acrylic, methacrylic, oleic, cinnamic, hydrocinnamic, phenylpropionic, benzoic, phenylacetic, and propionic acids. These reactions could be well interpreted by the following general formula:

$$RCH_2CH_2COONa + 3NaOH + H_2O \longrightarrow$$
$$RH + CH_4 + 2H_2 + 2Na_2CO_3.$$

UREA-INCLUSION COMPLEXES IN FATS. B.B.L. Srivastava (Banaras Hindu Univ.). *Indian Oil & Soap J.* 3, 51–55 (1960). The use of urea adducts to separate mixtures of fatty acids, esters, and waxes is discussed.

THE USE OF SILICONE RUBBER GUMS OR GREASE IN LOW CONCENTRATION AS STATIONARY PHASE FOR THE HIGH TEMPERATURE GAS CHROMATOGRAPHIC SEPARATION OF LIPIDS. N. Nicolaides (Dept. of Food Science and Technology, Univ. of California, Berkeley, Calif.). *J. Chromatography* **4**, 496–9 (1960). Silicone rubber gums and grease were used at low concentrations (5% of substrate) and at high temperatures (240–300°) as stationary phase of gas-liquid chromatography. The retention times at 5% liquid phase in 5-foot column are about one-third those at 25% and this occurs at no loss in resolution. Methyl esters of fatty acids, waxes, sterols, and tocopherols were chromatographed.

RHEOLOGY OF COCOA BUTTER. III. CRYSTALLINE CHANGES DURING STORAGE AT VARIOUS TEMPERATURES. C. Sterling (Dept. of Food Science and Technology, Univ. of California, Davis, Calif.). *Food Research* **25**, 770–6 (1960). Oxidation of purified cocoa butter results in decreased crystalline organization and increased amorphous fraction, in a direct dependence upon temperature. Potentiality of organization of normal (α,β',β) crystals is progressively decreased, but at some stage in oxidation, probably involving a large amount of dimer formation, the crystalline form suddenly changes. It is speculated that a new type of crystal (ω) is produced. This is gradually superseded by a less crystalline, gel-like structure as oxidation continues.

CHEMICAL CHANGES IN ANIMAL AND VEGETABLE FATS DURING HEAT TREATMENT AND REFLECTIONS ON THE EVALUATION OF THEIR PHYSIOLOGICAL PROPERTIES. J. Wurziger and H. Ostertag (Health Inst., Hamburg). *Fette Seifen Anstrichmittel* **62**, 895–903 (1960). The authors have studied the relationship between the chemical and physiological properties of heat treated fats, and have determined the changes which occur in fats heated for 12 hours at 180°. Soybean oil, lard, hydrogenated soybean oil, and hydrogenated lard were employed in the study; and acid number, epoxide, carbonyl value, and iodine value were measured. Values determined and in the above mentioned order for soybean oil, lard, hydrogenated soybean oil and hydrogenated lard, respectively, were: 0.9, —, 6.0, 119; 1.6, —, 3.4, 57.6; 0.9, —, 3.0, 24.0; 0.6, —, —, 3.6. After heating these oils in the absence of oxygen for 12 hours at 180°, the values were: 0.9, —, 13.6, —; 1.7, —, 14.8, 55.4; 1.0, —, 15.0, 23.5; 0.7, 1.3, —, 3.4. Heating for 12 hours at 180° in the absence of air reduced the polyunsaturated fatty acid content somewhat. When these oils were heated under the same conditions in the presence of air the following values were obtained: 2.0, 56.1, 582.7, 79.6; 16.0, 180.2, 178.2, 13.2; 21.7, 160.3, 204.4, 15.6; 52.1, 48.2, 25.8, —. The content of linoleic acid and linolenic acid decreased from the initial values of 52.4, 10.2; 12.5, 0.5; 5.7, 0.25; and .006, — to 36.7, 3.3; 1.4, —; 0.6, —; 0.7, —. Rats were fed the various oxidized fats at the 10–20% level and the animal fats examined for carbonyl compounds. The carbonyl value of the rat body fat was 0.04–0.13. The authors have shown that carbonyl compounds from highly oxidized fats are deposited in rat carcass fat.

DEPENDENCE OF THE DIELECTRIC CONSTANTS ON THE HYDROXYL VALUE OF FATS. F. Oehme (Inst. for the Development of Chemical and Physical Methods of Analysis, Weilheim-Obb.). *Fette Seifen Anstrichmittel* **62**, 910–912 (1960). The author reports on the technique of measuring the dielectric constant of fatty alcohols. The dependability of the dielectric constants and the influence of temperature coefficient on the dielectric constant of aliphatic alcohols was investigated. It was found that the temperature coefficients were directly proportional to the carbon chain length of the aliphatic group. The influence of paraffins and of the presence of isomers was also investigated.

VAPOUR-LIQUID EQUILIBRIUM OF FATTY ACIDS IN VACUUM. J. Hollo and T. Lengyel (Inst. Agr. Chem. Technol., Tech. Univ., Budapest). *Fette Seifen Anstrichmittel* **62**, 913–918 (1960). The vapour-liquid equilibrium of oleic-ricinoleic, palmitic-oleic, and palmitic-stearic acid mixtures has been determined using a new apparatus designed by the authors. The fatty acid mixtures were shown to be exempted from the expected relationships of vapour-liquid equilibrium as calculated according to the Raoult-Dalton law.

PREPARATION OF SOME DIACID ASYMMETRIC TRIGLYCERIDES. K. Taufel, Cl. Franzke, and P. Dietze (Inst. Food Chem. and Tech., Humboldt Univ., Berlin). *Fette Seifen Anstrichmittel* **62**, 926–928 (1960). The authors report the synthesis of 2,3-dibutyro-, 2,3-di-isobutyro-, and 2,3-di-isovalero-1-olein from the corresponding acid chlorides and 1-mono-olein. Infrared spectra, physical and chemical properties of the triglycerides are reported.

PREPARATION OF DIACIDS BY OXIDATIVE OZONOLYSIS OF MONOUNSATURATED FATTY ACIDS. J. Pasero and Naudet (ITERG., Fac. Science Marseille). *Fette Seifen Anstrichmittel* **62**, 190–200 (1960). The authors investigated the various aspects of the oxidation by ozonolysis of oleic acid and erucic acid and especially the various secondary reactions which take place. The effects of solvents on the ozonolysis of unsaturated acids was investigated using acetic acid, petroleum ether, cyclohexane, and chloroform. It was found that ozone was most soluble in petroleum ether (124 mg./100 ml.) and least soluble in acetic acid (less than 10 mg./100 ml.). It was found that the stability of the ozonides of oleic and erucic acids in chloroform and petroleum ether was dependant upon the conditions under which solvent was removed or the concentration of the ozonide would differ significantly between successive determinations. The effects of oxygen and hydrogen peroxide on the oxidative cleavage of oleic and erucic ozonides in chloroform was studied as a function of substrate concentration and temperature. The greatest yield of acidic products was obtained using hydrogen peroxide at 75° to cleave the ozonide. The conditions of ozonolysis and decomposition greatly influenced the nature of secondary reaction products. The authors also discuss the influence of impurities in starting materials and the method of separation of the dibasic acids on the yield of acids obtained.

RHODANOMETRIC DETERMINATION OF THE FATTY ACID COMPOSITION OF PARTIALLY HYDROGENATED FATS. II. P. Moller and M. Gabrielsson (Res. Labs., Karlshamms Oljefabriker, Karlshamm, Sweden). *Fette Seifen Anstrichmittel* **62**, 936–937 (1960). The authors describe a method for the determination of 8,12 linoleic acid, which is formed during the hydrogenation of oils that contain linoleic acid. The acid was separated from the 9,12 containing acid by means of the rhodan-derivatives and paper chromatography, as reported in a previous paper [*Fette Seifen Anstrichmittel* **60**, 806 (1958)]. The authors also give a survey of the new methods used for the determination of the fatty acid composition of partially hydrogenated fats.

A NOVEL METHOD TO DISTINGUISH BETWEEN ANIMAL AND VEGETABLE FATS AND OILS BY PAPER CHROMATOGRAPHY. E. Hatzopoulos (L'Ecole Polytechnique, Athens). *Rev. Franc. Corp. Gras* **7**, 575–576 (1960). A paper chromatographic method to distinguish animal from vegetable fats is reported, which depends upon the separation and detection of the types of sterols present in the fats. Whatman's No. 1 paper is impregnated with 2% paraffin oil in a mixture of 10% *n*-butanol and 88% ethanol and allowed to dry for 15 minutes at 120°. The paper is spotted with 5 microliters of sample (prepared from acetylation of sterol concentrate obtained from the test fat), and developed for 20 to 24 hours in methanol or ethanol. The spots are detected by spraying the paper chromatogram with a 25% solution of silicotungstic acid in ethanol and heating the sprayed paper at 115° until the spots appear. By comparison with standards containing phystosterols and zoosterols the spots are identified. The results obtained in this way can be related to the test fat and up to 5% of one oil adulterating another can be detected.

A NOVEL DILATOMETRIC METHOD. Loncin (Inst. Alimentaires, Brussels). *Rev. Franc. Corp. Gras* **7**, 569–573 (1960). The author has presented a modification of the dilatometric method for determining the solid/liquid ratio in fats which has the advantage of greater speed and less sample handling prior to the determination. The method involves the determination of specific densities of the fat under test at various temperatures and comparison with standard samples having known specific densities at various temperatures. The method was shown to compare favorably with existing methods.

ALTERATION OF SOME LONG CHAIN ESTERS DURING GAS LIQUID CHROMATOGRAPHY. L.J. Morris, R.T. Holman, and K. Fontell (Hormel Inst. and Dept. of Physiological Chemistry, Univ. of Minn., Austin, Minn.). *J. Lipid Research* **1**, 412–420 (1960). Methyl esters of some naturally occurring fatty acids or their autoxidation products are altered during gas liquid chromatography. Conjugated trienoates undergo *cis-trans* isomerization. The esters of vicinally unsaturated hydroxy derivatives, with either ethylenic or acetylenic bonds are dehydrated. Acetylation of the hydroxy group provides little or no protection against such changes. Unsaturated hydroperoxides, which are primary products of autoxidation, are similarly altered to more highly unsaturated derivatives. Conjugated dienoates and hydroxy esters which are not vicinally unsaturated are stable under the same conditions. It is considered that these changes are caused primarily in the flash heater because of high temperature, and that metal catalysis by components of the flash heater, promotes alterations involving dehydration and deacetylation.

AN IMPROVEMENT IN QUANTITATIVE SEPARATION OF PHOSPHOLIPIDS WITH SILICIC ACID IMPREGNATED FILTER PAPER. L. Zieve, W.C. Vogel, R.O. Carleton (Dept. of Med., Vet. Admin. Hos., Univ. of Minn., Minneapolis, Minn.). *Proc. Soc. Exptl. Biol. Med.* **105**, 508–510 (1960). A technique is described for avoiding loss of lecithin at point of origin during quantitative separation of phospholipids on silicic acid impregnated paper.

MICRODETERMINATION OF LONG-CHAIN FATTY ACIDS IN PLASMA AND TISSUES. V.P. Dole and H. Meinertz (Rockefeller Inst., N.Y.). *J. Biol. Chem.* **235**, 2595–99 (1960). A single extraction of blood plasma with a two phase heptane-isopropyl alcohol-water system provides sufficient analytical specificity for determination of long-chain nonesterified fatty acids under usual conditions. If exceptional quantities of lactic, acetic, acetoacetic, or β-hydroxybutyric acids are present, a second extraction eliminates their interference. The system is also useful for countercurrent distribution. The table of partition coefficients of fatty acids and various organic acids, given in the present paper, permits one to calculate the number of transfers needed for analytical or preparative work. As an initial step in studying unknown mixtures, a simple 8-transfer procedure, requiring less than one-half hour, separates the acidity of an extract into three classes: long-chain fatty acids, cephalins, and polar organic acids.

TREATMENT OF MEATS WITH IONIZING RADIATIONS. V. RADIATION PASTEURIZATION OF BEEF FOR CHILLED STORAGE. C.H. Lea, J.J. MacFarlane, and L.J. Parr (Low Temp. Res. Sta., Cambridge). *J. Sci. Food Agr.* 11, 690–4 (1960). Small scale experiments on the storage of cuts of beef and of beef fatty tissue at chilling temperatures showed that microbial spoilage was considerably retarded by doses of ionizing radiation between 25,000 and 100,000 rads, as indicated by a delay in the development of ''tainted'' odor and flavor, by a retarded appearance of visible bacterial growth, and by a slower rate of increase in the free fatty acid content of the fat. Symptoms of accelerated oxidation were also present as shown by the development during storage of a tallowy odor and flavor perceptible in the raw or lightly cooked fat. The yellow carotenoid pigment bleached noticeably and peroxide accumulated more rapidly in the irradiated than in the control fat. All of these changes were most marked near to the surface exposed to air.

PHOSPHORATED OIL. T.D. Findley (Swift & Co.). *U.S. 2,965,657.* A method is described for the reaction of a polybasic phosphorus acid with an epoxidized fatty oil having acyl radicals of a carbon chain length of 10 to 22 carbons and an epoxy content above about 2% oxirane oxygen.

MONO-PROPELLANT CHARGE COMPOSITIONS. J. Taylor and S.M. Budd (Imperial Chemical Ind. Ltd.). *U.S. 2,966,404.* A thickened mono-propellant composition consists of a stable homogeneous dispersion of a solid oxidizing agent which is essentially powdered ammonium nitrate in a viscous solution of an organic thickening agent (natural resin, gum resin, synthetic resin, pitch, fatty oil, fat, wax, long chain fatty acid, or cellulose ester) and dissolved in a nonexplosive liquid solvent. The solvent should be a liquid nitric ester of a lower saturated aliphatic monohydric alcohol containing not less than 3 carbon atoms and having an oxygen deficiency of between 42.5 and 130%. The available oxygen content of the oxidizing agent should be sufficient to permit all of the carbon and hydrogen in the organic constituents to be convertible into gaseous products.

SHORTENING EMULSIFIERS AND METHOD OF USING SAME. S.S. Chang, F.L. DeVore, and M.A. Friedman (Swift & Co.). *U.S. 2,966,410.* An improved shortening for use in icings consists of the following: a shortening selected from the group consisting of vegetable fats, meat fats, and mixtures thereof, and at least about 1.0% of the diglyceride reaction products of glycerin, higher fatty acids (at least 60% by weight of myristic), and an alkyl monohydroxy monocarboxylic acid of 2 to 6 carbon atoms. At least 50% of the diglyceride reaction products should have a monohydroxy, monocarboxylic acid radical of from 2 to 6 carbon atoms and a higher fatty acid radical.

PLASTIC SHORTENINGS AND MANUFACTURE THEREOF. T. J. Weiss (Swift & Co.). *U.S. 2,966,411.* A method is described for the manufacture of a shortening product having a wide plastic range and good creaming and cake baking characteristics. To tallow is added a small amount of a mixture of glycerides containing a minor amount of long chain acid groups and a major amount of short chain acid groups having 2 to 4 carbons.

ITACONIC ACID-MODIFIED TRIGLYCERIDE SHORTENING COMPOSITION AND METHOD OF PREPARING THE SAME. J.J. Gleason (The Rath Packing Co.). *U.S. 2,966,412.* An improved edible shortening is prepared by molecularly rearranging a triglyceride fat substantially free of mono- and diglycerides in the presence of an interesterification catalyst at a temperature at which some of the fat remains in the liquid phase. From 0.1% to 4% by weight of itaconic acid is added, and the reaction is continued under the same conditions to cause substitution of the ethylene carboxylic acid radical of the itaconic acid for some of the fatty acid radicals originally present in the triglyceride fat.

STABILIZATION OF FATS AND OILS. S.S. Chang and P.E. Mone (Swift & Co.). *U.S. 2,966,413.* The addition of at least 0.001% of *alpha* sitosterols to a glyceride oil protects the oil against darkening in color, nutritional losses, and increases in viscosity upon prolonged heating at elevated cooking temperatures.

UTILIZATION OF N-HYDROXYPHENYL UREAS AS ANTIOXIDANTS FOR EDIBLE FATS AND OILS. M.F. Zienty (Miles Labs., Inc.). *U.S. 2,967,775.* Edible fats and oils which are subjected to oxidative deterioration are treated with from 0.025 to 0.1% of N-*p*-hydroxyphenyl urea or N-*o*-hydroxyphenyl urea to retard the rate of deterioration.

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• Fatty Acid Derivatives

POLYOXYETHYLENE FATTY AMIDES AS PICKLING INHIBITORS. Tomio Baba and Takeshi Bushita (Nittô Phys. & Chem. Research Inst., Urawa). *Kôgyô Kagaku Zasshi* **63**, 1238–40 (1960). Six to 50 moles of ethylene oxide were added to various fatty amides, substituted amides (RCONHR′), and bisamides ($RCONHCH_2NHOCR$) and the properties were compared as the pickling inhibitors for soft steel. The most desirable was that obtained from soybean oil fatty amides by adding 15 moles of ethylene oxide.

BEHAVIOR OF FATTY ACID ESTERS OF METHYLENE GLYCEROL IN THE FRIEDEL CRAFTS REACTION WITH BENZENE. P. Blaizot and M.T. Richert (Inst. of Research on Fats and Oils, Paris). *Oleagineux* **15**, 851–853 (1960). The authors prepared *alpha* and *beta* methylene glycerol esters of fatty acids by heating the methylene glycerol, both isomers, in the presence of the fatty acid ester and litharge at 180 to 190°. The methylene glycerol was prepared by reaction of glycerol with formaldehyde, 60% of the *alpha* and 40% of the *beta* isomer was formed. Friedel Crafts reaction of the methylene glycerol esters, with benzene and aluminum chloride for 2.5 hours produced a 75% yield of monoglycerides consisting of 88% *alpha* and 12% *beta* monoglycerides. A similar reaction carried out with isopropylidine glycerol esters was not successful.

SYNTHESIS OF ENANTIOMERIC MIXED ACID 1,2-DIGLYCERIDES. D. Buchnea and Erich Baer (Banting and Best Dept. of Medical Research, Univ. of Toronto, Toronto, Canada). *J. Lipid Research* **1**, 405–411 (1960). The synthesis of mixed acid diglycerides in any one of the four theoretically possible forms has been carried out. Each was obtained as a pure compound devoid of any contamination with positional or spatial isomers. They may contain as fatty acid constituents either two dissimilar saturated fatty acids or a saturated or unsaturated fatty acid. The procedure was applied to the synthesis of D-1-stearoyl-2-oleoylglycerol and D-1-oleoyl-2-stearoylglycerol, which are the first mixed acid diglycerides to be obtained in enantiomeric form.

HYDROXYLATED OR EPOXIDIZED FATS UTILIZABLE AS PLASTICIZERS. Naudet (Fac. Sciences, Marseille). *Rev. Franc. Corp. Gras, Spec. No.*, April 28, 1960, pp. 7-13. The author discusses and reviews various methods of preparation of the many derivatives of long chain fatty acids. Hydroxy, acetoxy, and formoxy stearic acids as well as other derivatives are discussed from the point of view of their preparation and uses. The various methods of epoxidation in use are compared.

MONOMERS DERIVED FROM THE CLEAVAGE OF FATS. J. Pasero (Lab. ITERG, Paris). *Rev. Franc. Corp. Gras, Spec. No.*, April 28, 1960, pp. 24–31. The formation of short chain products from fatty acids is discussed. The oxidative degradation of methyl stearate to a mixture of short chain mono and dibasic acids is described and given as an example. The oxidant was a mixture of nitric and sulfuric acids. The preparation of azaleic, suberic, and pelargonic acids by oxidation is illustrated as is the preparation of sebacic acid and isooctyl alcohol from ricinoleic acid. The preparation of terminally substituted amino acids from fatty acids is also described by the preparation of *omega*-amino-undecanoic, and pelargonic acids from oleic acid by oxidation and hydrogenation of the corresponding nitrile.

VINYL ESTERS AND ETHERS OF FATS. A. Uzzan (Inst. Corp. Gras, Paris). *Rev. Franc. Corp. Gras, Spec. No.*, April 28, 1960, pp. 13–23. The preparation of vinyl esters by the following methods are described: 1) esterification of fatty acids by fatty acids reaction with acetaldehyde to give the vinyl ester, 2) interesterification of fatty acids with vinyl esters, and 3) direct vinylation of fatty acids with acetylene. Polymerization of vinyl stearate gives a polymer of molecular weight *ca* 90,000, which is used as a plasticizer. Copolymers of vinyl acetate and stearate and of vinyl chloride and stearate have been prepared. Elastomers have been prepared from the copolymerization of vinyl stearate, and butadiene-acrylonitrile, butadiene-styrene, and acrylonitrile-butylacrylate mixtures. Vinyl ethers have been prepared by transetherification of fatty alcohols with vinyl ethers, and by direct vinylation of fatty alcohols with acetylene. Vinyl ethers of fatty alcohols have been copolymerized with several derivatives of fats and other chemicals. Vegetable oils have been modified by copolymerization with vinyl ethers with aliphatic substituents ranging from two to eight carbons in length. The current uses of these polymeric products are discussed.

DETERMINATION OF UNSATURATION IN HIGH MOLECULAR WEIGHT FATTY NITROGEN DERIVATIVES. A.J. Milun (Central Res. Lab., General Mills, Inc., Minneapolis 13, Minn.). *Anal Chem.* **33**, 123–125 (1960). Modification of the Wijs iodine value method have been worked out for application to certain fatty nitrogen derivatives of high molecular weight. End point difficulties and high apparent iodine values usually encountered with these compounds have been eliminated. The procedure entails a preliminary acetylation of primary and secondary amines, use of acetic acid solvent for tertiary amines, and addition of sodium lauryl sulfate before the titration in the case of quaternary ammonium chlorides.

AQUEOUS DISPERSIONS OF ZINC STEARATE AND POLYETHYLENE GLYCOL MONOESTER. R.M. Price (Dow Chemical Co.). *U.S. 2,965,589.* A method is described for forming an adherent nondusting lubricant coating on surfaces of plastics. Polystyrene is contacted with a dispersion of zinc stearate in water containing at least one monoester of a polyethylene glycol (monostearates of polyethylene glycols having a molecular weight between 400 and 1500, monooleates of polyethylene glycols having a molecular weight between 400 and 6000, and monolaurates of polyethylene glycols of molecular weight between 400 and

4000). The ingredients are present in proportions of 1 to 10 parts by weight of the zinc stearate and from 1 to 10 parts of the monoester at concentrations of 2 to 20% by weight of the total dispersion. It is recommended that the dispersion be used in amounts of 300 to 4000 parts per million parts of polystyrene.

FOAMED LIQUID EXPLOSIVE COMPOSITION. J.E. Pool. *U.S. 2,967,-099.* A foamable liquid explosive composition consists of a liquid nitroparaffin hydrocarbon, from 7.6 to 10% of a metal stearate (magnesium, lithium, zinc, or sodium), and from 5 to 15% of a sensitizing agent such as ethylene diamine or morpholine.

PROCESS FOR MAKING ACYL TAURIDES. C.P. Lorentzen (Procter & Gamble Co.). *U.S. 2,967,872.* At least one mole of a higher molecular weight fatty acid anhydride is reacted, with agitation, with one mole of a taurine salt in aqueous solution having the formula $HNXCH_2CH_2SO_3M$ (X may be hydrogen or an alkyl radical having 1 to 4 carbon atoms and M may be alkali or alkaline earth metal, magnesium, ammonium or substituted ammonium). The reaction is carried out at a temperature above the melting point of the anhydride.

• Biology and Nutrition

STUDIES ON KITOL. III. FORMATION OF KITOL FROM VITAMIN A BY THE ACTION OF LIGHT. Ryohei Kaneko (Tôkyô Kôgyô Shikenjo, Tokyo). *Nippon Kagaku Zasshi* **81**, 1876–82 (1960). Free and ester-type vitamin A could be changed to kitol, photodimer, by light of longer waves than 300 mμ. Vitamin A was decomposed by light (ultraviolet) with shorter waves. β-Carotene was very stable to light. Antioxidants could not prevent vitamin A from dimerization by light. Retinene was also changed to the dimer by light.

ADDITION REACTION OF HYPOCHLOROUS ACID TO EPICHOLESTEROL DERIVATIVES. Fumikazu Mukawa (Tsurumi Chem. Labs., Yokohama). *Nippon Kagaku Zasshi* **81**, 1348–9 (1960). 3α-Benzoyloxycholest-5-ene in acetone containing acetic acid was made to react with isocyanuric chloride to form $C_{34}H_{51}O_3Cl$, m.p. 87°, which was revealed to be 3α-benzoyloxy-5-chloro-5α-cholestan-6β-ol from infrared spectroscopy. This means that the addition at 3α C belong to the type of anti-Markownikoff addition.

THE ROLE OF FAT IN THE FLAVOR OF LAMB AND MUTTON AS TESTED WITH BROTH AND DEPOT FAT. Joyce Hofstrand and Marion Jacobson (Washington Agr. Expt. Sta., Pullman, Wash.). *Food Research* **25**, 706–11 (1960). The amount or absence of fat did not significantly affect the taste of the mutton and lamb broths. There was an indication however that fat may contribute to the aroma of lamb and mutton broths. When expressed fat was compared with the treated fats, depot fats were found to have flavor components. These flavor components were easily volatilized and changed by heat, soluble in cold water, and partially removed by activated carbon.

ESTIMATION OF TOTAL BODY FAT FROM POTASSIUM-40 CONTENT. G.B. Forbes, J. Gallup, and J.B. Hursh (School of Med. and Dentistry, Univ. of Rochester, Rochester, N.Y.). *Science* **133**, 101–102 (1960). On the assumption that the potassium content of the lean body mass is constant, it should be possible to estimate fat content in living man from a measurement of potassium-40 activity in the whole body scintillation counter. A series of such measurements on children and young adults shows good correlations with skin-fold thickness and weight/height ratio as indices of fatness.

EFFECTS OF ANDROSTERONE ON ATHEROGENESIS AND PLASMA LIPIDS IN COCKERELS. D.L. Cook (Div. of Biological Res., G.D. Searle and Co., Chicago, Ill.). *Proc. Soc. Exptl. Biol. Med.* **105**, 586–588 (1960). The effects of androsterone and testosterone propionate on atheroma and plasma lipid shifts induced by cholesterol feeding in cockerels were compared. Both compounds produced significant inhibition of coronary arterial atheroma. Aortic atherogenesis was not affected. The effects on plasma lipids were similar: non-significant reduction in cholesterol (C), significant decrease in phospholipid (P), and with elevated C/P ratios. Testosterone propionate, but not androsterone, caused a significant reduction in testicular weight; both compounds stimulated comb growth. Further experimentation with androgens should provide useful information on the relationship between plasma lipid changes and inhibition of coronary atherogenesis.

FACTORS AFFECTING EXTRACTABILITY OF CHOLESTEROL FROM LYOPHILIZED SERA BY COLD CHLOROFORM. J.C. Forbes, A.L. Forbes, and O.M. Peterson (Dept. of Biochem., Med. Coll. of Virginia, and Veterans Admin. Hosp., Richmond). *Proc. Soc. Exptl. Biol. Med.* **105**, 628–632 (1960). A study has been conducted on factors which affect the "readily extractable" cholesterol (REC) concentrations in serum. The results showed that (a) in general, REC values increased as triglyceride and cholesterol contents of the serum and chylomicra increased, but a notable exception was high REC values in nephrotic subjects in whom chylomicron contents of cholesterol and triglyceride were low, (b) addition of sodium salts of long chain fatty acids to serum prior to lyophilization markedly increased cholesterol extractability, (c) addition of crystalline human serum albumin to sera with high REC concentrations markedly reduced REC values; the albumin also reduced REC concentration in most normal sera but in no case did it completely disappear, (d) traces of moisture in the chloroform used for the extraction had little or no effect on most sera with low REC concentration but markedly increased it in sera with high REC concentration. It is suggested that the concentration of nonalbumin bound free fatty acids may play a major role in regulating REC concentrations in various sera.

LIVER KETOGENESIS (3). HIGH FAT FEEDING ON ACETOACETATE PRODUCTION IN LIVER SLICES, UTILIZATION BY KIDNEY SLICES. J.M. Khanade and M.C. Nath (Dept. of Biochem., Nagpur Univ., Nagpur, India). *Proc. Soc. Exptl. Biol. Med.* **105**, 566–569 (1960). High fat feeding increases blood sugar, liver fats and tissue weights (liver and kidneys). It increases acetoacetate production by liver slices and utilization by kidney slices, but this high rate of utilization is not maintained on prolonged feeding (19 weeks). High fat feeding augments hypothyroidism and suppresses hyperthyroidism to some extent. A beneficial effect of hydrolyzed GCA feeding with high fat diets to hyper- and hypothyroid rats is indicated.

EFFECT OF PREMARIN ON SURVIVAL IN MEN WITH MYOCARDIAL INFARCTION. J. Marmorston, F. J. Moore, O.T. Kuzma, O. Magidson, and J. Weiner (Depts. of Med. and Public Health, Univ. of S. Calif. School of Med., Los Angeles County General Hospital, and Cedars of Lebanon Hospital, Los Angeles). *Proc. Soc. Exptl. Biol. Med.* **105**, 618–620 (1960). The incidence of deaths due to arteriosclerotic heart disease is being compared in men recovered from myocardial infarction and treated 75 days or more with either Premarin or no estrogen (control), allocation of treatments being randomized. Survival rate in those receiving Premarin is significantly higher than in controls.

ERYTHROCYTE SURVIVAL IN VITAMIN E-DEFICIENT MONKEYS. H.N. Marvin, J.S. Dinning, and P.L. Day (Depts. of Anatomy and Biochem., Univ. of Arkansas Med. Center, Little Rock). *Proc. Soc. Exptl. Biol. Med.* **105**, 473–475 (1960). Survival of Cr^{51} tagged erythrocytes, autologously transfused, is severely shortened in monkeys maintained on vitamin E-deficient diets. Maximal survival times of 35, 45, and 49 days were obtained after monkeys had been on the diet for 349 or more days, as compared with about 100 days for replete controls. The shortened survival time, associated with anemia, could be reversed upon addition of vitamin E. The mechanism is discussed.

BIOSYNTHESIS OF SQUALENE BY RAT PREPUTIAL GLAND. J.F. Patterson (Dept. of Med., Pratt Clinic-New England Center Hospital, Boston, Mass.). *Proc. Soc. Exptl. Biol. Med.* **105**, 461–463 (1960). Preputial glands from rats, when incubated with C^{14} acetate show a marked incorporation of C^{14} into squalene, a sterol precursor, and little into sterols. In this regard, the preputial glands differ from many other mammalian tissues which show incorporation of C^{14} mainly into sterols and little into squalene. Human dermis, which contains sebaceous glands, is another mammalian tissue which shows preferential accumulation of the C^{14} into squalene. The mechanism of the difference is unknown, though it seems likely that factors necessary for conversion of squalene to sterols are missing in these tissues, or that an inhibitor of this reaction is present.

EFFECT OF PROTEIN, ENERGY, AND FAT CONTENT OF THE RATION ON CALCIUM UTILIZATION. H.M. Edwards, Jr., W.S. Dunahoo, J.L. Carmon, and H.L. Fuller (Poultry Dept., Univ. of Georgia, Athens, Georgia). *Poultry Sci.* **39**, 1389–94 (1960). When rations containing three different calorie and protein levels, but the same calorie:protein ratio was fed young chickens, the requirement expressed as a per cent of the ration for dietary calcium increased in relation to the increase in feed efficiency. When expressed as mg. of calcium required per gm. gain, to obtain maximum bone ash, 20 mg. were required. Further studies showed that the level of dietary fat as well as the type of fat have a definite effect on calcium utilization by the chick as measured by growth rate and percentage of ash in the tibiae.

Influence of dietary fat and choline on serum and egg yolk cholesterol in the laying chicken. N.J. Daghir, W.W. Marion, and S.L. Balloun (Dept. of Poultry Husbandry, Iowa State Univ., Ames). *Poultry Sci.* 39, 1459–66 (1960). The results presented show that choline had no effect on cholesterol levels either separately or when used with the different fat treatments. Analyses of variance of the data showed that there were no significant differences at any monthly determination between groups receiving choline chloride supplement and those not receiving it. This was also true when 700 mg. was compared with 1,000 mg. of total choline per pound of diet. Serum cholesterol levels of the groups receiving no added fat showed a tendency toward an increase as the choline level of the diet was increased.

Plasmalogen in human blood platelets. R.D. Zilversmit, A.J. Marcus, and H.L. Ullman (Hematology Section, N.Y. Veterans Admin. Hospital, N.Y. 10, N.Y. and the Dept. of Med., Cornell Univ. Med. College, New York, N.Y.). *J. Biol. Chem.* **236**, 47–49 (1961). Plasmalogen in human blood platelets was measured by two independent, stoichiometric analytical methods. The plasmalogen content was found to be approximately 25 μ moles per g. of dry weight. The total phospholipid of platelets was 155 μ moles per g. of dry weight, of which 16% represented plasmalogen. An indirect evaluation of the possible role of plasmalogen in blood coagulation was carried out. The results suggest that this group of phosphatides does not play an essential role in blood thromboplastin formation.

Effect of animal fat and mixtures of animal and vegetable fats containing varying amounts of free fatty acids on performance of cage layers. C.M. Treat, B.L. Reid, R.E. Davies, and J.R. Couch (Depts. of Poultry Sci. and Biochem. and Nutrition, Texas A&M, College Station, Texas). *Poultry Sci.* **39**, 1550–55 (1960). A 32-week experiment concerning the effect of free fatty acid content in fats upon the performance of laying hens is reported. The results of this experiment show there was no difference in the performance of laying hens receiving a diet supplemented with 2.5 or 5% animal fat or a mixture of hydrolyzed animal and vegetable fats ranging from 14.2 to 90.60% free fatty acids.

Fatty acid composition of the monoglycerides from lipolyzed milk fat. R.G. Jensen and G.W.Gander (Dept. of Animal Indus., Storrs Agri. Exp. Sta., Storrs, Conn.). *J. Dairy Sci.* **43**, 1758–61 (1960). The monoglycerides from eight samples of lipolyzed milk fat were converted to allyl esters and identified by gas-liquid chromatography. Fresh milk fat did not contain monoglycerides detectable by the methods used. The majority of the samples contained butyrate through stearate and oleate. Many contained C_{10}–C_{16} monounsaturates, C_9–C_{17} saturates, and linoleate, and up to eight additional unidentified esters. The fatty acids present in largest quantity, reported as per cent by weight of total allyl esters, were: palmitate—31.2, oleate—17.7, myristate—15.6, caprate—5.7, palmitoleate—5.6, linoleate—4.1, laurate—4.0, and stearate—3.9. The patterns were distinctly different from the reported fatty acid composition of intact milk fat.

Specificity of milk lipase toward the primary ester groups of some synthetic triglycerides. G.W. Gander and R.G. Jensen (Dep. of Anmal Indus., Storrs Agri. Exp. Sta., Univ. of Conn., Storrs, Conn.). *J. Dairy Sci.* **43**, 1762–65 (1960). Two symmetrical triglycerides, 2-oleoyl dipalmitin and 2-palmitoyl diolein, were synthesized and then subjected to hydrolysis at pH 6.6 by milk lipase. The results indicate that milk lipases preferentially hydrolyze the primary hydroxyl esters of synthetic long-chain triglycerides.

Catabolism in vitro of cholesterol. II. Further studies on the oxidation of cholesterol by rat liver mitochondria. M.W. Whitehouse, E. Staple, and S. Gurin (Dept. of Biochem., School of Med., Univ. of Penn., Philadelphia, Penn.). *J. Biol. Chem.* **236**, 68–72 (1961). Rat liver mitochondria are able to oxidize carbon atoms 25, 26, and 27 of the cholesterol side chain to carbon dioxide. Cholesterol oxidation is stimulated by reduced triphosphopyridine nucleotide, ferric ions, and a soluble cofactor(s) prepared from liver, testis, ovaries, adrenal cortex, placenta, and spleen. Acetone has been identified among the products of cholesterol catabolism. The labeling pattern indicates that the methyl carbons of acetone are derived from the terminal methyls of cholesterol, whereas C_{25} of cholesterol is converted to the carbonyl group of acetone. The implications of this metabolic pathway are discussed.

III. Oxidation of 3α,7α,12α-trihydroxycoprostane, 3α,7α,12α-trihydroxy-24-ketocoprostane, and 3α,7α,12α,24ξ-tetrahydroxycoprostane by rat liver mitochondria. *Ibid.*, 73–75 (1961). Rat liver mitochondria readily oxidized 3α,7α,12α-trihydroxycoprostane and, to a lesser degree, its 24-hydroxy and 24-keto derivatives. Coincubation of these compounds with cholesterol and with each other, indicates that 3α, 7α,12α-trihydroxycoprostane is the most nearly related to, if not actually on, the pathway of metabolism of cholesterol to form cholic acid. *3α,7α,12α-Trihydroxycoprostane is oxidized only by rat liver and spleen.* Triphosphopyridine nucleotide and an unknown cofactor, presumed to be a cohydroxylase, are required for optimal oxidation of 3α,7α,12α-trihydroxycoprostane and its 24-keto derivative.

Differences in reactivity of legume lipoxidase. M.G. Dillard, A.S. Henick, and R.B. Koch (Quartermaster Food and Container Institute for Armed Forces, U.S. Army, Chicago, Ill.). *J. Biol. Chem.* 236, 37–40 (1961). The effects of surface-active agents and antioxidants on legume lipoxidase activity have been studied. Triton X-100 proved to have an inhibitory effect against both trilinolein and linoleic acid oxidation. It appeared to be somewhat more effective than Tween 40 in the inhibition of linoleic acid activity. However, the triglyceride lipoxidase activity was highly sensitive to the latter surface-active agent, whereas the linoleic lipoxidase appeared to be competitively inhibited by it. Two antioxidants, γ-tocopherol and dibutylhydroxytoluene, were studied for their action on lipoxidases. It was postulated that the markedly greater effect observed for tocopherol is related to its molecular similarity to a lipid. Inactivation of the lipoxidases of legume extracts on standing in both dilute and concentrated solutions was studied. In dilute solution the trilinolein-specific enzyme was more stable in all species tested. In the more concentrated extracts the relative stabilities varied with legume species. All of these observations further support the existence of at least two lipoxidases in legumes, one specific for linoleic acid or other fatty acids with methylene-separated dienoic systems, and the other for glycerol esters of these fatty acids.

Lipid fatty acid composition of several areas of the aorta in subjects with atherosclerosis. L. Swell, H. Field, Jr., P.E. Schools, Jr., and C.R. Treadwell (Vet. Admin. Center, Martinsburg, W. Va.). *Proc. Soc. Exptl. Biol. Med.* **105**, 662–665 (1960). The cholesterol ester, triglyceride and phospholipid fatty acid composition (gas-liquid chromatography) of aortic media, thickened intima and plaque material were determined in six human subjects. For comparison, the fatty acid composition of those fractions in serum was determined in 6 subjects (aged 55–70) with occlusive atherosclerosis in a good nutritional status. The triglyceride fraction of those tissues and serum were similar in their fatty acid composition. Some slight differences were noted in the fatty acid composition of the phospholipid fractions, most notably in the arachidonic and long chain fatty acids. The cholesterol ester fraction of the tissues studied showed the greatest differences in fatty acid composition. Both early and advanced plaques had significantly less linoleic and more oleic acid in that fraction than serum or media. Media and serum cholesterol esterified fatty acids were similar in their fatty acid composition. The significance of these findings in relation to atherogenesis is discussed.

Myo-inositol phosphates obtained by alkaline hydrolysis of beef brain phosphoinositide. C. Grado and C.E. Ballou (Dept. of Biochem., Univ. of Calif., Berkeley, Calif.). *J. Biol. Chem.* **236**, 54–60 (1961). Beef brain phosphoinositide, isolated according to Folch, has been found to contain three phosphate groups per myo-inositol residue, and to yield on base hydrolysis mainly myo-inositol triphosphate. The total myo-inositol phosphate fraction contained two isomeric triphosphates, two diphosphates, and one monophosphate. All were optically active. The major triphosphate yielded D-iditol on periodate oxidation, reduction of the dialdehyde, and dephosphorylation. Thus, it must be L-myo-inositol 1,4,5(6)-triphosphate, and the configurational relationship to L-myo-inositol 1-phosphate obtained from soybean monophosphoinositide is revealed. One of the myo-inositol diphosphates yielded D-threitol in the periodate reaction sequence, a result which limits its structure to either L-myo-inositol 4,5-diphosphate or L-myo-inositol 1,6-diphosphate. The monophosphate was myo-inositol 4-phosphate, the assignment of D or L configuration not being possible at this time. The structure proposed for the original phosphoinositide, based on the above findings, is that of a triphosphoinositide with the 1,4,5(6)-trisubstituted L-myo-inositol structure. In agreement with this proposal, the original lipid reacted with periodate to give a dialdehyde which upon reduction and dephosphorylation yielded iditol.

INTERPRETATION OF THE INFLUENCE OF FOOD FATS ON CARDIOVASCULAR ACCIDENTS AS A FUNCTION OF INTERMEDIARY METABOLISM. L. Randouin and P. Brun (Sci. Inst. Health, Paris). *Rev. Franc. Corp. Gras* 7, 639–653 (1960). The literature concerning the influence of fats on heart disease is reviewed. The equilibrium between protein, fat, and carbohydrate metabolism and the intermediary metabolism of the sterols, especially cholesterol, is discussed. The authors differentiate between arteriosclerosis, atheromatosis, and atherosclerosis, and discuss the requirements for and the effects of essential fatty acid deficiencies.

THE FLAVOR POTENTIAL OF EDIBLE FATS IN FUTURE FOOD PRODUCTS. J.F. Angeline and L.B. Sjostrom (Arthur D. Little, Inc.). *Perfumery & Essent. Oil Record* 12, 681–683 (1960). Fats should make a positive flavor contribution to foods by blending flavors, contributing to the natural flavor of the food, or adding a distinctive flavor of its own. It is suggested that animal and vegetable fats might be given unusual flavors by altering the molecular compositions of the fat.

THE CAROTENOIDS OF THE FLAGELLATED ALGA, EUGLENA GRACILIS. N.I. Krinsky and T.H. Goldsmith (Harvard Univ., Cambridge, Mass.). *Arch. Biochem. Biophys.* 91, 271–279 (1960). The principal carotenoid was found to be antheraxanthin (3,3′-dihydroxy-5,6-epoxy-β-carotene) accounting for over 80% of the carotenoid present. β-Carotene is present to the extent of about 11% and neoxanthin, 7%. Small amounts of γ-carotene, cryptoxanthin (3-hydroxy-β-carotene), an uncharacterized xanthophyll monoepoxide, echinenone (4-keto-β-carotene), and two new keto carotenoids—euglenanone (probably 3,4-diketo-β-carotene), and hydroxy echinenone (probably 3-hydroxy-4-keto-β-carotene)—also are present. The last three pigments are orange or red, and it is suggested that any or all may be the pigment(s) of the eyespot or of the light receptor for phototaxis. No astaxanthin, astacene, vitamin A, or retinene was observed.

A SYNTHETIC ROUTE TO "MIXED ACID" L-α-LECITHINS AND D-α,β-DIGLYCERIDES. D.J. Hanahan and H. Brockerhoff (Univ. of Washington, Seattle). *Arch. Biochem. Biophys.* 91, 326–328 (1960). L-α-glycerylphosphorylcholine (GPC) was treated with palmitoyl chloride and cadmium chloride. The dipalmitoyl-L-α-lecithin thus formed was converted by phospholipase A action to α′-palmitoyl-L-α-GPC-lysolecithin and purified through reprecipitation from chloroform by diethyl ether. The cadmium chloride complex was prepared and acylated by oleoyl chloride and the α′-palmitoyl-β-oleoyl-L-α-lecithin was isolated by chromatography on silicic acid-Hyflo-supercel in a 12% over-all yield from L-α-GPC. By a similar technique α′-oleoyl-β-stearoyl-L-α-lecithin was synthesized in 45% yield.

MITOCHONDRIAL DEHYDROGENASE ACTIVITY OF RAT LIVER DEFICIENT IN ESSENTIAL FATTY ACIDS. T. Hayashida and O.W. Portman (Harvard School of Public Health, Boston). *Arch. Biochem. Biophys.* 91, 206–209 (1960). Mitochondrial β-hydroxybutyric, isocitric, and malic dehydrogenase activities for essential fatty acid deficient rats were greater than those of control rats when the mitochondria were protected by 0.5*M* sucrose. This difference still persisted even when the mitochondria were modified by exposure to water media. Sonic disruption of the mitochondria increased the dehydrogenase activities of both groups greatly, and eliminated the differences in activities related to diet.

THE METABOLISM OF VITAMIN A ACID AND ITS C_{25} HOMOLOG. E.R. Redfearn (Univ. of Liverpool, Liverpool, England). *Arch. Biochem. Biophys.* 91, 226–229 (1960). Vitamin A acid exhibited a curative action when administered to vitamin A deficient rats; it did not appear to exert this action through its prior conversion into vitamin A alcohol. When the methyl ester of the acid was administered, some of it escaped breakdown and was carried to the fat depots where it was stored. The utilization of this stored ester enabled the animal to continue growing for a fairly long period after the dose was discontinued. Again, there was no storage of vitamin A alcohol. The C_{25} homolog of vitamin A acid also exhibited a curative action, but in this case there had been a conversion into vitamin A. The conversion was small (0.3%) compared with that of β-carotene (21–25%). The C_{25} acid methyl ester may also be stored in the fat depots.

CHOLESTEROL LOWERING ACTIVITY OF LIPIDE IN WHEAT GLUTEN. G. Moruzzi, M. Martinelli, C.M. Caldarera (Univ of Bologna, Bologna, Italy). *Arch. Biochem. Biophys.* 91, 328–329 (1960). Wheat gluten was found to contain 5.3 to 5.6% total lipide. Analysis by gas chromatography indicated that the principal fatty acids present were palmitic, 19.8 mg. %; oleic, 6.7; linoleic, 60.1; linolenic 3.9; and arachidic, 7.1. The authors suggest that the cholesterol lowering effect of diets having wheat gluten as the protein source may be related to the composition of the fatty acids of the wheat gluten.

PHOSPHOLIPID HYDROLYSIS IN COD FLESH STORED AT VARIOUS TEMPERATURES. June Olley and J.A. Lovern (Torry Res. Sta., Aberdeen). *J. Sci. Food Agr.* 11, 644–652 (1960). Phospholipid hydrolysis in cod flesh stored at temperatures ranging from +20 to −29° appeared to be promoted entirely by tissue enzymes, with nonenzymic reactions and the bacteria present playing negligible roles. Freezing appeared to activate the system, eliminating the initial lag at 0° and permitting nearly as rapid hydrolysis at −14 as at 0°. The temperature coefficient was about 8 times greater in frozen than in unfrozen fish over the ranges −22 to −14 and 0 to 20°, respectively. In all cases there seemed to be virtually simultaneous loss of both fatty acids from the phospholipid molecule. Phospholipid degradation and protein denaturation followed a similar course in frozen fish, but this was not considered by the authors to be evidence of a causal relationship.

STUDIES ON THE LIPIDS OF FLOUR. I. EFFECT OF CHLORINE DIOXIDE TREATMENT ON THE ESSENTIAL FATTY ACIDS. N.W.R. Daniels, P.W.R. Eggitt, and J.B.M. Coppock (Spillers Ltd., Technological Res. Sta., Cambridge). *J. Sci. Food Agr.* 11, 658–664 (1960). The essential fatty acid (E.F.A.) contents of white flour treated with twice and with 20 times the present usage rate of chlorine dioxide were examined by gas-liquid chromatography and by u.v. spectrophotometry of the isomerized oil. Although little change occurred at both levels immediately after treatment, the heavily overtreated flour suffered loss of E.F.A. on storage for 12 days in air. When this flour was stored under nitrogen the loss was considerably reduced, suggesting that heavy treatment, in destroying the protective tocopherols, exposes the EFA to rapid oxidation in the presence of air. At the lower level of treatment the presence of chlorine in the chlorine dioxide gas did not have any significant effect on the E.F.A.

CHANGES IN THE LIPIDS OF FLOUR INDUCED BY TREATMENT WITH CHLORINE DIOXIDE OR CHLORINE, AND ON STORAGE. D.G.H. Daniels. *Ibid.*, 664–670 (1960). Flour treated with chlorine dioxide (up to 120 p.p.m.) and stored for periods up to 15 weeks showed no changes in the fatty acid composition of the mixed oil extracted successively by light petroleum and acetone. Heavier treatment resulted in significant oxidative changes. After 27 weeks' storage, however, both untreated and lightly treated flour (up to 33 p.p.m. of ClO_2) showed changes in the acetone but not in the light petroleum extracts. Chlorine treatment of the flour caused decreases in linoleic acid contents of the extracted mixed oils at all levels of treatment.

PHARMACEUTICAL PRODUCT FOR REDUCING THE PROPORTION OF CHOLESTEROL IN THE BLOOD. A. Castaigne. *U.S. 2,965,542.* A new pharmaceutical product for reducing an excess of the lipids, especially cholesterol, in the blood, consists of a mixture containing at least 6% by weight of each of the following racemic amino acids: alanine, isoleucine, valine, serine, and glycine.

• Drying Oils and Paints

OIL-MODIFIED ALKYD COMPOSITIONS WITH COAL ACIDS. H.B. Rickert (Dow Chemical Co.). *U.S. 2,965,587.* The described composition consists of the esterified product of reaction between (a) 2 to 3 equivalents of a polyhydroxy glycol compound; (b) 1.9 to 0.2 equivalents of coal acids which are the water-soluble mixed aromatic polycarboxylic acids produced by the oxidation of coal (average molecular weight 200 to 300, apparent equivalent weight 70 to 90, average of 2.5 to 5 carboxylic groups per aromatic nucleus); and (c) 0.1 to 1.80 equivalents of a monobasic unsaturated drying oil fatty acids mixture.

MIXTURE OF AN OIL MODIFIED ALKYD COMPOSITION, A POLYACRYLAMIDE, AND A RESINOUS REACTION PRODUCT OF AN ALKYLENE OXIDE ADDUCT WITH A POLYHYDRIC ALCOHOL. F.R. Spencer (American Cyanamid Co.). *U.S. 2,965,588.* The described composition is a mixture of (1) an alkyd modified with a glyceride oil or glyceride oil fatty acids or their monoglycerides; (2) the resinous reaction product of (a) an aliphatic polycarboxylic alkylene oxide having from 2 to 4 atoms with a polyhydric alcohol having at least 5 carbon atoms and at least 4 hydroxy groups, the adduct containing 3 to 7 mols of the alkylene oxide per hydroxy group of the polyol; and (3)

0.1 to 5% by weight on total solids of the mixture of a polyacrylamide.

RAIN REPELLENT COMPOSITION COMPRISING A STYRENATED OIL MODIFIED ALKYD RESIN WITH PARAFFIN WAX. J.M. Fain and A. Goldman (Sec. of the Navy, U.S.A.). *U.S. 2,967,163.* An optically transparent water-repellent composition which dries hard in about 4 hours consists of (1) 7.5 to 25.0 parts by weight of a phthalic anhydride-glycerol alkyd modified with styrenated castor oil acids, (2) 0.1 to 0.3 parts of paraffin wax, (3) 2.0 to 5.0 parts of a film hardener, and (4) 90.4 to 69.7 parts of a solvent.

NEW SYNTHETIC DRYING OILS. A.M. Partansky (Dow Chemical Co.). *U.S. 2,967,838.* The oxyalkylated reaction product of (a) a phenol-formaldehyde novolak in which there are 4 to 10 phenolic hydroxyls per molecule with (b) from 0.85 to 1.2 moles for each phenolic nucleus of ethylene or propylene oxide is esterified with an amount of carboxylic acids to provide from 0.35 to 0.9 carboxyl group per alcoholic hydroxyl of the oxyalkylated product. At least 60% of the carboxyl groups should be furnished by fatty acids having drying characteristics.

• Detergents

EFFECT OF METHYLCELLULOSE AS A SIZING POLYMER FOR THE POLYMERIZED FABRIC METHOD. Tetsuya Matsukawa (Ochanomizu Univ., Tokyo). *Kôgyô Kagaku Zasshi* **63**, 1609–13 (1960). Single use of methylcellulose as the sizing polymer was ineffective on cotton as well as on polyester fiber. Use of a mixture of soap and methylcellulose was very efficient. Use of Na laurylsulfate or Na dodecylbenzenesulfonate instead of soap was not so effective in the polymer-sized method.

PREFERENTIAL WETTING OF HIGH POLYMERS (FILMS) AND NONIONIC SURFACE ACTIVE AGENTS. Shigetaka Kuroiwa (Shinshû Univ., Ueda). *Kôgyô Kagaku Zasshi* **63**, 2064–5 (1960). Films of polyvinyl acetate, nitrocellulose, and cellulose acetate were used. The nonionic agents used were polyoxyethylene glycol decyl, dodecyl, and hexadecyl ethers (with 10–11 moles of ethylene oxide). Preferential wetting tensions were measured on films in linseed oil and aqueous solutions of nonionic agents. The films, more easily wetted by oil than by water, became more easily wetted by aqueous solutions of nonionic agents than by oil. The effect was higher when hydrophobic radical was smaller.

TEMPERATURE DEPENDENCE OF INTRINSIC VISCOSITY OF THE AQUEOUS SOLUTION OF NONIONIC SURFACE ACTIVE AGENTS. Shigetaka Kuroiwa (Shinshû Univ., Ueda). *Kôgyô Kagaku Zasshi* **63**, 1235–8 (1960). This is Part X of colloidal studies on textile agents. The nonionic agents used were ethylene oxide derivatives of stearyl and cetyl alcohol with about 10 moles of ethylene oxide. The cloud points were 67 and 76°, respectively. The curves of intrinsic viscosity *versus* temperature had a maximum at a slightly lower temperature than cloud points in both cases.

VISCOELASTICITY OF THE HIGHLY CONCENTRATED AQUEOUS SOLUTIONS OF NONIONIC SURFACE ACTIVE AGENTS. *Ibid.*, 1384–7 (1960). This is Part XI of the colloidal studies on textile agents. Viscoelasticities were measured on 30–80% solutions of polyoxyethylene glycol dodecyl ether (about 4, 7, and 12 moles of ethylene oxide) and polyoxyethylene glycol monyl phenyl ether (about 5, 8.5, and 17 moles of ethylene oxide). Maximum viscoelasticities occurred at about 60% concentration. The micelle structure of concentrated solutions of such surfactants was discussed.

FLOW BIREFRINGENCE OF THE AQUEOUS SOLUTIONS OF NONIONIC SURFACE ACTIVE AGENTS. *Ibid.*, 1968–71 (1960). This is Part XII of the colloidal studies on textile agents. The nonionic agent examined was polyoxyethylene glycol oleyl ether (with 8 moles of ethylene oxide). Examination of birefringence at various concentrations showed that the micelles of this agent behaved like a rigid body.

TEMPERATURE DEPENDENCE OF VISCOELASTICITY OF HIGHLY CONCENTRATED SOLUTIONS OF NONIONIC ACTIVE AGENTS. *Ibid.*, 2065–7 (1960). This is Part XIII of the colloidal studies of textile agents. The samples were 30, 60, and 80% solutions of polyoxyethylene glycol nonyl phenyl ether with 8.5 or 17 moles of ethylene oxide. Viscoelasticity was measured in the range of 10–60°. The viscoelasticities were much lower at temperatures higher than 20°. At 30% concentration the viscosity was higher with the agent with less ethylene glycol moles, while the reverse was true at 60% or higher concentration.

STUDIES ON NONIONIC SURFACE ACTIVE AGENTS. V. REACTION VELOCITY OF POLYETHYLATION OF ALCOHOLS. Yoshio Ishii and Noritsugu Ozeki (Nagoya Univ.). *Kôgyô Kagaku Zasshi* **63**, 1387–90 (1960). The velocity constants for polyethylation of 2-ethylhexanol and cetyl alcohol were, respectively (with different catalysts) $C_8H_{17}OK$ 38.8, 23.3; *tert*-C_4H_9ONa 31.9, 20.0; KOH 29.5, 18.5; $C_8H_{17}ONa$ 28.0; —; C_2H_5ONa 27.6, 17.7; CH_3ONa 26.6, 16.8; and NaOH 25.3, 12.8, at 100°. Various catalysts were compared at 150, 130, 115, 100, and 85° on 2-ethylhexanol. The reaction velocity at the same temperature with the same catalyst was in the order, 2-ethyl-hexanol>lauryl alcohol>cetyl alcohol>oleyl alcohol.

INFRARED SPECTRA OF SODIUM STEARATES, CALCIUM STEARATES, SODIUM PALMITATES, AND CALCIUM PALMITATES. Michio Kewano (Research Inst., Japan Governmental Railways, Tokyo). *Nippon Kagaku Zasshi* **81**, 1805–8 (1960). Infrared spectra were compared among α-,β-, and γ-forms of Na salts and between monohydrate and anhydrate of Ca salts, in the range of 4000–650 cm^{-1}.

CORROSION OF METALS IN AQUEOUS SOLUTIONS OF ANIONIC SURFACE ACTIVE AGENTS. Yoichi Kato and Seimi Sato (Aichi Pref. Ind. Expt. Sta., Nagoya). *Kôgyô Kagaku Zasshi* **63**, 1726–9 (1960). The rate of corrosion of soft steel, zinc, aluminum, and tin was determined in the presence of 10 anionic agents and triethanolamine in aqueous solutions. Soft steel was not corroded with aqueous solutions of Na oleate, triethanolamine oleate, Turkey red oil, and triethanolamine. Zinc was corroded with every agent tested. Tin was not corroded with triethanolamine salts except triethanolamine dodecylbenzenesulfonate and Turkey red oil.

CORROSION OF METALS BY AQUEOUS SOLUTIONS OF AMPHOLYTIC SURFACE ACTIVE AGENTS. Y. Kato and S. Sato. *Ibid.*, 1739–32. The corrosive effect on soft steel, zinc, and aluminum of N-lauryl-N,N-di(polyoxyethylene)-α-betaine, N-stearyl-N,N-di(polyoxyethylene)-α-betaine, N-stearyl-N,N-di(carboxymethyl)-α-betaine, and N,N-di(2-hydroxy-3-sulfopropyl)-stearylamine was determined. Effect of pH was taken into consideration.

DETECTION AND ESTIMATION OF POLYOXYETHYLENE GLYCOL SURFACTANTS BY ASCENDING PAPER CHROMATOGRAPHY. M.E. Ginn, C.L. Church, Jr., and J.C. Harris (Res. and Eng. Div., Monsanto Chemical Co., Dayton, Ohio). *Anal. Chem.* **33**, 143–145 (1960). Paper chromatographic procedures were developed for detecting polyoxyethylene glycol (PEG) in nonionic surfactants. A semiquantitative, spot area method is described, permitting estimation of PEG to the nearest per cent.

FLUORESCENT BRIGHTENING AGENTS. D.A.W. Adams. *Indian Oil & Soap J.* **3**, 56–73 (1960). The history, properties, methods of application, and reactions of fluorescent brighteners are discussed.

POLYPHOSPHATE DETERGENT COMPOSITIONS CONTAINING DICYANDIAMIDE TARNISH INHIBITOR. C.E. Light (American Cyanamid Co.). *U.S. 2,967,832.* A detergent composition suitable for use in washing copper-containing metals consists of from 15 to 35 parts by weight of an organic detergent, 5 to 50 parts of an inorganic alkali metal polyphosphate normally causing tarnishing of the copper-containing metal, and from 0.01 to 2 parts by weight of dicyandiamide as a tarnish-inhibitor.

METHOD FOR PREPARATION OF EMULSION TYPE PIGMENTED METAL DRAWING COMPOUNDS. E.W. Brennan, E.T. Fronczak, and T.W. Martinek (Pure Oil Co.). *U.S. 2,965,567.* Water is mixed with sufficient hydrophilic gel-forming particulate substance (montmorillonites, bentonites, carboxymethylcellulose, or gelatin) to form a gelatinous slurry and then treated with particulate pigment, no larger than 325 mesh. To the paste is added an amount of fatty acids having 12 to 24 carbon atoms per molecule which when saponified will completely emulsify the final composition. The fatty acids are saponified by the addition of concentrated aqueous alkali metal hydroxide solution and the saponified product is mixed with a mineral oil and/or a fatty oil in an amount sufficient to obtain a smooth, homogeneous paste.

DETERGENT COMPOSITION. E.R. Wilson (Procter & Gamble Co.). *U.S. 2,965,576.* A cleansing and detergent composition consists of (1) at least one water-soluble salt of an organic sulfuric reaction product having in its molecular structure an alkyl group of from 8 to 18 carbon atoms and a sulfonic or sulfuric acid radical and (2) a fatty acid amide. The amide should be present at 5 to 60% of the amount of the water-soluble salt, sufficient to enhance at temperature below 100°F. the sudsing properties of the salt.