# ABSTRACTS

**R. A. REINERS, Editor. ABSTRACTORS: J. G. Endres, J. Iavicoli, K. Kitsuta, F. A. Kummerow, C. C. Litchfield, Gladys Macy, Louise R. Morrow, E. G. Perkins, and T. H. Smouse**

## • Fats and Oils

Characteristic values and oil composition of some new sorts of sunflower cultivated in different regions of Bulgaria. G. Rankov, L. Stoilov and S. Spasov. *Izv. Inst. Obsta. i Neorg. Khimiya i Org. Khimiya, BAB* 8, 193–7 (1961). A certain difference between the characteristic values and composition of oils taken from different regions of the country is established. This is in agreement with Ivanov's climatic theory. The differences are not so great as to influence the technological properties of the oils, especially their drying properties. (Rev. Current Lit. Paint Allied Ind.)

Proton magnetic resonance absorption in ethyl stearate. R. F. Grant and D. L. Williams (British Columbia Res. Council, Univ. of British Columbia, Vancouver, British Columbia). *Can. J. Chem.* 41, 378–388 (1963). The proton magnetic resonance absorption of ethyl stearate was determined at –77, 0, and 24C in the solid α-form and at 28C in the solid β-form. Spin – lattice proton magnetic resonance relaxation times were measured in the liquid up to 75C and in the solid α-form. The results suggest that the α-form is composed partly of molecules in a liquid-like state and partly of molecules constrained to rotate about their longitudinal axes. The results also support the theory that dielectric dispersion observed in the β-form is due to molecular motion in crystal defects.

Dynamic mechanical behavior of suspension of fat particles in oil. C. J. Nederveen (Central Lab. T. N. O., Delft, The Netherland). *J. Colloid Sci.* 18, 276–291 (1963). Measurements were made at frequencies of approximately 50 C.P.S. using two methods; one, using bending vibrations and the other, using a torsional pendulum. Using these methods, suspensions of glyceryl tristearate particles were characterized by their moduli and damping at deformations between $10^{-5}$ and $10^{-2}$. Materials with different particle sizes were studied and regions could be found where modulus and damping were independent of the magnitude of the deformation. Kneading will decrease the modulus for suspensions of large or small particles. During storage the modulus was found to increase. The relationship between modulus and concentration could not be explained; however, the linearity limit and the order of magnitude of the modulus was explained by fat particles' attraction to each other by van der Waals' forces.

Insecticide residues in milk and fat. Residues in butterfat and body fat of dairy cows fed at two levels of kelthane (1.0 and 2.0 p.p.m.). Z. Gunter, E. L. Rye, and S. A. Peoples (Pesticide Residue Res. Lab. and Dept. of Physiological Sci., Univ. of Calif., Davis, Calif.). *J. Agr. Food Chem.* 11(1), 72–74 (1963). A microanalytical method for the analysis of Kelthane without the removal of the substrate material was developed. It consisted of alkaline decomposition of Kelthane to chloroform which was then determined colorimetrically. Cows fed 1.0 p.p.m. Kelthane for 39 days showed no residues in the butterfat while cows fed 2.0 p.p.m. for 71 days had 0.23 to 0.40 p.p.m. Kelthane in the butterfat. Body fat analyzed showed 1.07 to 2.70 p.p.m. Kelthane.

Gas chromatographic analysis of cyclopentenyl fatty acids. I. Zeman and J. Pokorny (Inst. of Fat Res., Usti N. L., Prague, Czechoslovakia). *J. Chromatog.* 10(1), 15–20 (1963). The fatty acid composition of chaulmoogra oil was investigated by means of gas-liquid chromatography. Normal straight chain fatty acids were identified directly, cyclopentyl fatty acids, characteristic of chaulmoogra oil, were identified on the basis of present knowledge of their structure and occurrence in the oil and on the relations of the retention volumes on two stationary phases of different polarities. The chromatographic behavior of cyclopentyl fatty acids differs from normal fatty acids and depends on their structure.

The importance of the frying medium in doughnut frying. D. E. Downs (Krispy Kreme Doughnut Corp., Winston-Salem, N. C.). *The Bakers Digest* 2, 66 (April, 1963). The two characteristics that have significance in influencing the acceptance of a doughnut are (1) the amount of fat absorbed and (2) the flavor and other properties imparted by the frying medium. It was shown that a slack batch, lowering the frying temperature, and the mixing of the batch will increase the amount of fat absorbed. The flavor and other properties of a fat are discussed as to the type of fat, care of the frying fat, changing the frying fat and color changes of the fat as it is used.

Insecticide residues in fat. A screening method for chlorinated pesticide residues in fat without cleanup. L. F. Krzeminski and W. A. Landmann (Div. of Anal. and Physical Chem., Am. Meat Inst. Foundation, Chicago, Ill.). *J. Agr. Food Chem.* 11(1), 81–83 (1963). Water-soluble inorganic chloride ions are removed from 10 grams of fat. The sample is treated with sodium in anhydrous liquid ammonia to reduce organic chlorine to the chloride ion which is measured potentiometrically. Reduction is complete in a few minutes and recovery is better than 90% for a sample containing 10 p.p.m. DDT.

Considerations on the determination of the Boemer value. Ph. Meskens and Ph. Vanderkelen. *Lab. and Tech.* 8, 103–122 (1963). An extensive discussion of the theory and use of the Boemer value is presented.

Rubber seed and oil. G. Azeimoddin and S. D. Thirumala Rao (Oil Tech. Inst., Anatapur, India). *Rubber Board Bull.* 6(2), (received 1963). There is an annual potential production of 30,000 tons of rubber seed, but no seed is being collected for oil extraction. The Indian rubber seed kernel, forming 58.3% of whole pod has an oil content of about 42% and a protein content of 21.4%, all on a moisture free basis. The oil is a semidrying oil with an average iodine value of 136 and with little non-saponifiable matter.

Phase behavior of some palmito-oleo triglyceride systems. D. P. J. Moran (Unilever Res. Lab., Port Sunlight, Cheshire, Eng.). *J. App. Chem. (London).* 13(2), 91–100 (1963). From a study of the melting behavior of binary mixtures of glycerides it is possible to predict the properties of some of those fats and oils which contain such glycerides. The result can be useful in margarine formulation, dry fractionation and solubility problems connected with the preparation of novel fat blends. The phase behavior of six binary mixtures of palmito-oleo-tryglycerides has been studied. The techniques used include the microscopic observation of melting behavior, x-ray powder photometry, and differential thermal analysis. In two of the systems, particularly the mixture of 2-oleopalmitin and 1,3-dioleopalmitin, evidence was found of favorable steric factors leading to closer association of unlike molecules at about 50% concentration. This fact can be used to explain certain phenomena in fat systems such as mixtures of palm oil and lard which contain significant amounts of these two glycerides. Graininess and enhanced crystallisation at certain concentration levels are two such phenomena.

Pro- and antioxidants in the area of fats. VII. Synthesis of cholesterol esters of hydroxy and keto fatty acids. H. Carloff and F. Deicke (Deut. Inst. Fettforsch, Munster). *Fette Seifen Anstrichmittel* 64, 1037–1042 (1962). Cholesterol esters of dihydroxy acids were prepared by the reaction of cholesterol with the isopropylidine derivative of the hydroxy acid, catalysed by *p*-toluene sulfonic acid. The cholesterol esters of 10,11-dihydroxyundecanoic acid, 9-10-dihydroxystearic acid, and 9,10,12,13-tetrahydroxystearic acid were prepared in this way. Cholesterol esters of β-ketoarachidic acid, β-ketoglutaric acid, and β-ketocaproic acid were prepared by sulfonic acid catalysed condensation.

Semi-micro determination of the neutralisation equivalents of higher fatty acids by nonaqueous titration. R. D. Tiwari, K. C. Srivastava and J. P. Sharma. *Z. Anal. Chem.* 187, 161–4 (1962). The determination of lauric, myristic, palmitic, elaidic, stearic, oleic and linoleic acids is described. *Procedure*—Dissolve the pure acid sample in methanol/benzene (1:3) (20 ml.) and de-aerate the solution with $N_2$. Add 4 or 5 drops of indicator (a 3:1:1 mixture of 0·4% phenol red, 0·4% cresol red and 0·4% bromothymol blue, each in methanol) and titrate with K methoxide solution. If the concentration of KOMe used is $< 0{\cdot}02N$, the sample should be dissolved in a known vol. of KOMe solution and the excess titrated with oxalic acid in methanol/benzene solution in the presence of the indicator.

Paper chromatography of resin acids. P. Daniels and C. Enzell. *Acta Chem. Scand.* 16, 1530–2 (1962). Wickberg's rapid and convenient method for the separation of unsaturated hydrocarbons by partition of their Ag complexes between hexadecane and aqueous methanol has been applied to the separation of the methyl esters of resin acids (dehydroabietic, abietic, neoabietic, palustric, levopimaric, pimaric, sandaracopimaric and isopimaric acids). Methanolic solutions of the ester mixture were applied to fibre-glass paper impregnated with hexadecane and the chromatograms developed with a

25–30% solution of Ag fluoroborate ($AgBF_4$) in *ca.* 80% aqueous methanol. The compounds were detected by immersing the partially dried paper in a 10% solution of $SbCl_5$ in $CHCl_3$ to give round or oval spots which darkened when the paper was heated at 100C for several minutes. The total time required for the separation did not exceed 2 hrs. Attempts to separate the free resin acids by the Hammarberg–Wickberg method were less satisfactory, partly because the $R_f$ values of the circular spots (applied as ether solutions and developed with light petroleum) were sensitive to the presence of moisture. (Rev. Current Lit. Paint Allied Ind.)

Application of gas chromatography in the field of fats. III. Influence of production methods of the methyl esters of fatty acids on the quantitative result. H. P. Kaufmann and G. Mankel (Deut. Inst. Fetteforschung, Münster). *Fette Seifen Anstrichmittel* 65, 179-184 (1963). Using olive oil, corn oil, sesame oil, and linseed oil, the same results were obtained with interesterification of methanol as by the esterification of the free fatty acids using diazomethane, borontrifluoride or hydrochloric acid. Mixtures of pure glycerides of short and long chain fatty acids with a mixture of docosane and petroleum ether as solvent for the methyl esters were analyzed.

Determination of small quantities of polymeric constituents in heat treated oils. H. E. Rost (Falonatonis, Margarine-union, Hamberg-Bahrenfeld). *Fette Seifen Anstrichmittel* 65, 463-466 (1963). Examination of the DGF official methods for the determination of polymerized fats showed that these methods have only practical value in the determination of heat treated oils. It was shown that small quantities of polymeric constituents in heat treated oils can be determined with certainty only as dimeric acids and not as glycerides.

The consistency of fats and margarines. A. J. Haighton (Unilever Res. Laboratories, Vlardingen, Holland). *Fette Seifen Anstrichmittel* 65, 479-482 (1963). It has been again demonstrated that the crystal lattices of the fat crystals are mainly responsible for the consistency of shortenings and margarines. The forces which bind the crystals in lattices are divided into two main groups, the primary irreversible and the secondary reversible binding forces. Rheological measurements before and after the treatment of fats such as that of margarine give an indication of the structure of the material.

Influence of column temperature in the gas-liquid chromatographic separation of methyl esters of fatty acids on polyester substrates. R. G. Ackman (Technological Research Laboratory, Fisheries Research Board of Canada, Halifax, N. S., Canada). *J. Gas Chromatog.* 1 (5), 11-16 (1963). Evidence is cited which indicates that the operation of any polyester column at any temperature of the ten selected will not be completely satisfactory for the detection of some of the components present in complex lipid systems.

The relative reaction velocities of different types of double bonds in the hydrogenation with hydrazine. K. S. Chilling (Dansk, Feelforskning-institut, Copenhagen). *Fette Seifen Anstrichmittel* 65, 395-397 (1963). During the hydrogenation of different unsaturated fatty acids and related compounds with hydrazine, it was shown that the isolated double bonds reacted with equal speed; *trans* double bonds were hydrogenated practically the same as *cis* double bonds. Clear deviations appeared in the case of conjugated double bonds and in terminal bonds such as undecenoic acid.

A view of the emulsified oily food (mayonnaise and related products). Kazuo Oshida (Kew Pie Co., Tokyo). *Yukagaku* 12, 468–74 (1963). A review with 26 references.

Fat production by microorganisms. Hiroaki Iwamoto (Meiji Univ., Kawasaki City, Japan). *Yukagaku* 12, 323-8 (1963). A review with 42 references.

The point of view on improving quality of edible oil. Kosaku Yasuda and Hisashi Watanabe (Nissin Oil Mills, Ltd., Yokohama). *Yukagaku* 12, 431–6 (1963). A review with 100 references.

Problems encountered at deep fat frying. Shizuyuki Ota (Ajinomoto Co., Tokyo). *Yukagaku* 12, 436–50 (1963). A review with 104 references.

Foaming tendencies of frying oils. I. Relation between foaming tendencies and chemical properties of soybean oil at different stages of thermal oxidation. Shizuyuki Ota, Akira Mukai, and Iwao Yamamoto (Ajinomoto Co., Inc., Tokyo). *Yukagaku* 12, 409–15 (1963). Soybean oil was heated for 2, 4, 6, 8, and 10 hours, respectively, at 200C. The depth of foams remaining after 30 sec. and 1 min. standing in the fryer increased linearly as the heating time increased. Similarly, hydroxyl no., acid no., epoxy no., carbonyl no. and dimer content increased with an increase in the time of heating, while iodine no. and monomer content decreased. The results indicated that the foaming tendencies of oil were closely related to the amount of polar fraction. Chemical properties and thin layer chromatogram of polar fractions obtained from fatty acids of foaming oil showed that these polar fractions contained polyhydroxy acids, especially a dihydroxy acid.

Volatile products of edible oils by open air heating. IV. Volatile substances from soybean oil at different stages of thermal oxidation. Shizuyuki Ota, Naoki Iwata, Akira Mukai, and Hitoshi Enei (Ajinomoto Co., Inc., Tokyo). *Yukagaku* 12, 403–9 (1963). Soybean oil was heated at 240C for 2, 4, 6, and 10 hours, respectively, and changes in chemical and physical properties studied. These oils were then heated for 1 hour at 240C and the volatile decomposition products coming therefrom were collected in two traps with cooling and the products were identified by gas chromatography. The volatile products from 2- to 10-hour heating were: *n*-pentane, *n*-hexane, *n*-octane, 1-heptene, 1-octene, other octenes, acetaldehyde, propylaldehyde, butylaldehyde, valerylaldehyde, caproylaldehyde, acrolein, crotonaldehyde, methyl ethyl ketone. During heating there was a general tendency for loss in weight of oil, iodine no., smoke point, monomer content, dienoic and trienoic acids, while there was an increase in viscosity, acid no., carbonyl no., and conjugated dienoic acid. The oils heated up to 4 hours at 240C had some values as edible oils but oil heated longer periods was of little value.

Separation of vegetable fatty acids. II. Side-reactions on rectification of unsaturated fatty acids. Kazuhiko Yoshitomi, Tetsuo Arai, and Toshikazu Tokunaga (Nissin Oil Mills Ltd., Yokohama). *Yukagaku* 12, 399–402 (1963). The distillation of linseed oil fatty acids by a batch system *in vacuo* gave decrease in yield with an increase of pressure due to an increase of boiling point. Fatty acid of high neutralization no. was obtained by acidification of rectified residue after saponification and about 60% of the distillate was recovered by redistillation. Refluxing of fatty acids *in vacuo* caused a decrease in neutralization no. This rate was much greater in linseed oil fatty acids than in stearic acid. Lower values of both saponification and iodine nos. in this case indicate the formation of acid anhydrides by the dehydration of carboxyl groups.

Properties of the autoxidized methyl esters of highly unsaturated acids. Kazuo Fukuzumi and Kosaku Shibata (Nagoya Univ.). *Yukagaku* 12, 396–9 (1963). Methyl esters of highly unsaturated acids (saponification no. 177.3 and iodine no. 322.5) from cuttlefish oil were oxidized by blowing dried air at 35C in the scattered sunlight and the product with peroxide value 2.73 x $10^3$ meq./kg. was obtained This was extracted with *n*-hexane-ethyl ether mixture and the following three fractions were obtained (fraction no., hexane-$Et_2O$ ratio, yield g. from 33 g. product, $n_D^{20}$, peroxide no. (meq./kg.) and mol. wt. given): 1, 96:4, 3.8, 1.4821, 1.26, 335; 2, 68:32, 0.8, 1.5058, 5.10, 670; 3, 50:50, 1.5, 1.5096, 5.24, 1020. Fraction 1, 2, and 3 represented a monomer, dimer and trimer, respectively. Fractions 1, 2, and 3 contained considerable amounts of conjugated dienes but no conjugated triene or higher. These products showed absorption arising from −OOH group shifted to longer wave length and the formation of aldehyde as the scission product. Fraction 2 and 3 contained *trans-trans* conjugated diene. The absorption band of *cis*-nonconjugated form was decreased in fraction 2 and 3.

DECOMPOSITION OF PEROXIDES FROM METHYL ESTERS OF HIGHLY UNSATURATED ACIDS. Kazuo Fukuzumi and Yoshio Ota (Nagoya Univ.). *Yukagaku* 12, 392–5 (1963). Methyl esters of highly unsaturated acids (saponification no. 172 and iodine no. 350.9) from cuttlefish oil were oxidized by blowing dried air at 35C into the oil while exposed to scattered sun light. The product had a peroxide value of 3 x $10^3$ meq./kg. This was decomposed in the dark under nitrogen at 35C. Iron or copper soaps were added in some cases. When the peroxide value was high, the decomposition of peroxide was not accelerated by the addition of iron and copper soaps but this effect was noticed after some decomposition of peroxide. There was no formation of conjugated triene or higher as judged by peroxide value, ultraviolet and infrared absorption spectra. The decomposition of peroxide was accompanied by the change of $-OOH$ groups to $-OH$ groups, decrease in $\alpha$-methylene group and increase of aldehyde group but there was not much change in numbers of *cis*-nonconjugated form. The above changes were more extensive in the presence of copper soap than of iron soap; in either case, there was no noticeable change in the number of double bonds.

BRASSICA PEKINESIS (HIROSHIMANA) AND ASTRAGALUS SINICUS OILS FROM SOME JAPANESE VEGETABLES. Seiichi Ueno and Shigeru Hamada (Kinki Univ., Fuse City, Japan). *Yukagaku* 12, 358–64 (1963). *B. pekinesis* seeds contained 36.6% oil, showing $d_4^{15}$ 0.9078, $n_D^{20}$ 1.4698, acid no. 3.06, saponification no. 173.2, iodine no. 104.4, and unsaponifiable matter 1.38%. It contained 57.8% solid acid (myristic, palmitic and behenic acids) and 41.7% liquid and (tsuzuic, oleic, gadoleic, zoömaric and unidentified acid similar to erucic acid). *A. sinicus* seeds contained 5.90% oil, showing $d_4^{15}$ 0.9276, $n_D^{20}$ 1.4719, acid no. 15.7, saponification no. 193.7, iodine no. 129.6, and unsaponifiable matter 5.04%. It contained 25.44% saturated acids ($C_{14}$-, $C_{16}$-, $C_{18}$- and $C_{24}$-acids) and 73.68% unsaturated acids (oleic, linoleic and linolenic acids), the unsaponifiable matter was separated as white crystals, m.p. at 117–20C.

IDENTIFICATION OF VOLATILE, UNSATURATED MONOCARBONYL COMPOUNDS EVOLVED DURING OXIDATION OF RAPESEED OIL. Yoshihito Suzuki and Tsuguo Takeuchi (Nagoya Univ.). *Yukagaku* 12, 354–8 (1963). Refined rapeseed oil was oxidized with dried air for 12–24 hours at 96C. The volatile carbonyl compounds evolved were caught in two traps of 2,4-dinitrophenylhydrazine solution. The hydrazones were then passed through alumina column with benzene to collect only monocarbonyl compounds. $C_6$- and $C_8$-unsaturated carbonyl compounds were separated by paper chromatography, and identified by ultraviolet and infrared spectra and paper chromatography of ozone oxidation product. The yield (m. moles) of volatile monocarbonyl compound was 4.068, in which 2.14 (or 52.7%) was saturated carbonyl and 1.93 was unsaturated carbonyl compound. $C_6$- and $C_8$-product, respectively, was composed of following components (%): saturated carbonyl compound, 0.9, 2.8; carbonyl monoene compound, 42.7, 25.2; carbonyl diene compound, 56.4, 72.0.

PEROXIDE CONCENTRATES FROM AUTOXIDIZED METHYL DOCOSAHEXANOATE. Kazuo Fukuzumi and Ippei Ando (Nagoya Univ.). *Yukagaku* 12, 351–4 (1963). Highly purified methyl docosahexanoate with saponification no. 165.8 and iodine no. 425.5 was prepared from cuttle-fish oil and its autoxidation was carried out in the dark at 33–5C. The peroxide value of the product was 1.33 x $10^4$ meq./kg. The product contained dihydroperoxides. The amount of conjugated diene was found to be less than 0.5 per molecule. Ultraviolet spectra showed the absence of conjugated triene or higher. The product was presumed to contain $-OOH$ groups at the $\alpha$-methylene position. Absorption at 1725 $cm^{-1}$ indicated the presence of some aldehyde. *Trans-trans* conjugated diene was formed. Considerable amounts of the *cis*-nonconjugated form remain unchanged. The product contained considerable amounts of polymers.

RETARDED AUTOXIDATION AND THE CHAIN-STOPPING ACTION OF INHIBITORS. J. R. Shelton and D. N. Vincent (Dept. of Chemistry, Case Inst. of Tech., Cleveland 6, Ohio). *J. Am. Chem. Soc.* 85, 2433–2439 (1963). Oxidation of purified *cis*-1,4-polyisoprene, inhibited with secondary aromatic amines and a hindered phenol, was studied to determine if the kinetic isotope effects previously observed with deuterated oxidation inhibitors could be demonstrated at an earlier stage of the reaction. A linear plot for oxygen absorption vs. time demonstrated isotope effects in the initial stage of oxidation consistent with a rate-controlling hydrogen-abstraction process for the chain-stopping action. The decrease in apparent observed isotope effect with increasing inhibitor concentration and increasing oxidation temperature has been confirmed. This, and the observed change in inhibitor action from antioxidant to pro-oxidant with increasing inhibitor concentration, indicates that direct oxidation of inhibitor is a significant initiation process. The oxygen-absorption plots obtained in this study showed two discrete stages of retarded oxidation. The amount of oxygen absorbed at the well defined break between the initial stage and the faster second stage was independent of temperature and inhibitor concentration. It is suggested that this phenomenon is due to the onset of bimolecular hydroperoxide decomposition as a major initiation process. This hypothesis is supported by the observation that oxidation of samples preoxidized to the second stage, and then heated in a nitrogen atmosphere to decompose peroxides, again showed two constant-rate stages of retarded oxidation.

DETERMINATION OF THE CARBON SKELETON AND OTHER STRUCTURAL FEATURES OF ORGANIC COMPOUNDS BY GAS CHROMATOGRAPHY. M. Beroza and R. Sarmiento (Entomology Res. Div., Ag. Res. Svc., U. S. Dept. of Ag., Beltsville, Md.). *Anal. Chem.* 35, 1353–1357 (1963). Improved catalysts have increased from $C_9$ to at least $C_{20}$ the length of carbon chain that can be analyzed by the hydrogenolytic gas chromatographic technique previously advanced by the senior author. The new catalysts are prepared by adding an amount of alkali equivalent to or in slight excess of that needed to neutralize the anion of the catalyst. Palladium catalysts prepared in this manner may be used to analyze amines or their precursors. The potential value of fragmentation studies has been illustrated by showing that primary-, secondary-, and tertiary-alkyl amines; mono-, di-, and tri-alkyl amines; and isomers containing ketone or hydroxyl groups can be readily distinguished and identified. Two new apparatus designs permit the collection of sufficient hydrocarbon product for characterization by another procedure. These innovations greatly extend the scope of the technique.

COSMETIC COMPOSITIONS CONTAINING LACTIC ACID ESTERS OF FATTY ALCOHOLS. S. I. Kreps (Van Dyk & Co.). *U.S. 3,098,795.* The described cosmetic composition comprises as essential ingredients a homogeneous dispersion of anhydrous lanolin, a vegetable oil and a straight-chain fatty alcohol lactic acid ester in which the fatty alcohol radical contains 8–18 carbon atoms. The composition is film-forming when applied to the human skin.

HIGHLY NUTRITIOUS FAT COMPOSITION. C. M. Gooding (Corn Products Co.). *U.S. 3,099,564.* The described composition consists of a mixture of about 50–80 parts of cottonseed stearine and about 50–20 parts of an essentially completely hydrogenated interesterified base fat having a Solids Content Index (SCI) at 50F of 55 to 70 and at 92F of 10 at 35. The finished composition has a SCI at 50F of from 36 to 45, at 70F of 8 to 17, at 80F of 6 to 14, and at 92F of 1.5 to 4.5.

PROCESS FOR THE PURIFICATION OF GLYCERIDE OILS. R. O. Schmitt (Procter & Gamble Co.). *U.S. 3,102,898.* The described process comprises the following steps: (1) Continuously adding a mixture of aqueous $Na_2CO_3$ and NaOH solutions to a stream of crude oil such as soybean oil; the $Na_2CO_3$ is added in an amount sufficient to suppress any evolution of $CO_2$ and greater than 2 molecular equivalents for each mole of free fatty acid present in the crude oil; NaOH is added in an amount sufficient to reduce the phosphatide content, expressed as phosphorus pentoxide, of the refined oil to between 3 and 30 p.p.m. (2) Subjecting the combination of the crude oil and alkali to shearing forces equivalent to turbine tip speeds in excess of 850 feet/minute for at least 15 seconds. (3) Maintaining the combination in contact for at least 1 minute to remove the major portion of the impurities to form a refined oil and a foots phase. (4) Separating the refined oil from the foots by centrifugation.

(Continued on page 36)

(Continued from page 33)

## • Fatty Acid Derivatives

The gas chromatography of long chain acid amides. L. D. Metcalf, G. A. Germanes, and A. A. Schmidt (Research Laboratories, Armour Industrial Chemical Co., McCook, Ill.). *J. Gas Chromatog.* **1**(5), 32–33 (1963). A gas chromatographic method is described for the determination of fatty acid amides by conversion to their corresponding nitrides directly on the chromatograph column. Phosphoric acid treated polyester columns and 5% apiezon L coated on KOH treated Chromasorb was used as the support. Columns were two feet long and were operated at 220C. Complete separation of the saturated and monoeneoic acid amides were achieved.

Study on organo-alkali metallic compounds. III. Preparation of mono- and dicarboxylic acids from butadiene. Michio Hiraoka, Takenobu Takase, and Akira Misono (Nippon Soda Co., Ltd., 4 2-Chome, Otemachi, Chiyodaku, Tokyo). *Yukagaku* **12**, 335–42 (1963). Butadiene was dimerized with sodium dispersion in tetrahydrofuran in the presence of catalytic amount of *o*-diphenylbenzene in the temperature ranges of −70C to −10C. The product was treated with carbon dioxide and resulting carboxylic acids were separated. The composition of reaction product was determined by gas chromatography. The results showed that the conversion and the composition of the carboxylic acids were dependent mainly on the dimerization temperature. The carboxylic acids obtained from butadiene was 95%, in which the content of $C_{10}$-dicarboxylic acid was 85% at −70C. The yield was decreased with an increase in dimerization temperature and $C_9$-monocarboxylic was predominant, while there was an increase in yield of polybutadiene of low molecular weight. The composition of the position isomers of the carboxylic acids caused by 1,4- and 1,2-addition of butadiene were also dependent on the dimerization temperature. The amount of *n*-carboxylic acids increased with an increase of temperature. The mechanisms of reaction were discussed.

IV. Preparation of $C_{12}$- and $C_{14}$-diols from butadiene. Michio Hiraoka, Akira Nagai, Yasukuni Kobayashi, and Akira Misono. *Ibid.*, 343–7. $C_{12}$- and $C_{14}$-diols were synthesized by the addition reaction of ethylene oxide and propylene oxide to disodium octadiene, prepared from the additive dimerization of butadiene with sodium dispersion in the presence of catalytic amount of *o*-diphenylbenzene in tetrahydrofuran at −70C. Unsaturated $C_{12}$- and $C_{14}$-diols in crude form were obtained in 90% and 88% yield, respectively. The compositions of the diols were determined by gas chromatography. These $C_{12}$- and $C_{14}$-diols consisted of three positional isomers formed by 1,2-1,2-, 1,2-1,4- or 1,4-1,4-addition of butadiene. The small amounts of alcohols derived from monomer, dimer, and trimer of monovalent anion of butadiene were found as the by-products. Polyalkyleneglycols or polyoxyalkylene glycol ether were not detected. The terminal hydroxyl groups of $C_{14}$-diols were mainly secondary OH.

Polyoxyethylene derivatives of esters of sucrose with long-chain fatty acids. S. Komori and M. Okahara. *U.S. 3,102,114.* The described material is a polyoxyalkylene-adduct of a sucrose fatty acid ester of which the fatty acid acyl group contains between 8 and 22 carbon atoms and the polyoxyalkylene moiety is a member selected from the class consisting of polyoxyethylene and polyoxypropylene.

Mixed esters and process for their preparation. K. Hennig, G. Lietz, and G. Meinhard (Dehydag, Deutsche Hydrierwerke G.m.b.H.). *U.S. 3,102,128.* A fatty alcohol having 12 to 30 carbon atoms is reacted with aqueous citric acid to form a citric acid di-fatty alcohol ester. The latter is then reacted with a pentaerythrite di-fatty acid ester in which the fatty acids have 12 to 30 carbon atoms in a molar ratio of about 1:1 to form a mixed ester of citric acid di-fatty alcohol ester and pentaerythrite di-fatty acid ester.

Process for producing monoglycerides of fatty acids. H. Birnbaum and J. Lederer (Hachmeister-Inc.). *U.S. 3,102,129.* In a recycling process for preparing monoglyceride esters of fatty acids, the steps consist of: (a) reacting 1 part of anhydrous glycerol with from 1 to 3 parts of a polyglyceride of a fatty acid in the presence of from 0.1 to 2%, based on the weight of the glycerol, of anhydrous alkali, the mixture being heated rapidly to a temperature of 475–525F; (b) holding the mixture at this temperature for at least 15 minutes to obtain a high proportion of monoglyceride; (c) acidifying the reaction product to a pH of below 7 by adding an excess of concentrated phosphoric acid to convert the alkali to the alkali metal acid phophate; (d) cooling the reaction mixture rapidly to a temperature of 200–350F to minimize reversion of the monoglyceride; (e) stripping free glycerol from the mixture; (f) vacuum distilling the reaction product while acidified to recover a high proportion of the monoglyceride without appreciable reversion during distillation; (g) removing by mechanical separations substantially all of the alkali metal acid phosphate salt from the residue of the vacuum distillation; (h) recycling the treated residue to the reaction step (a) to be combined with added fatty acid polyglyceride and the whole to be reacted with additional glycerol and alkali metal catalyst with substantially equal efficiency of conversion to monoglyceride.

## • Biology and Nutrition

Stability of serum cholesterol concentration in rats after injection of deoxyribonucleic acid (DNA). N. Lamonthezie, M. Piot and M. Guerineau (Dept. of Biochem., Institut Gustave Roussy, Villejuif-Seine, France). *Proc. Soc. Exp. Biol. Med.* **113**, 27–28 (1963). Contrary to data reported by Savitsky in rabbits, intravenous administration of heterologous DNA to rats causes no change in serum cholesterol concentration; nor did DNA alter the increase in cholesterol values seen in rats receiving a hypercholesterolemic diet.

Variations in per cent of protein, milk fat, and solids-not-fat between milkings and during the milking process. H. C. Gilmore and S. N. Gaunt (Dept. of Dairy and Animal Sci., Univ. of Mass., Amherst). *J. Dairy Sci.* **46**, 680–685 (1963). A total of 1,290 individual evening and morning milk samples in 11 herds of three breeds was tested for protein, solids-not-fat, and milk fat. Morning sample means were lower than evening samples for all components, milk fat 0.73% lower, solids-not-fat 0.11%, and protein 0.03%; whereas, milk weights were 4.21 lb higher. These differences and those between herds, herds by time of day and breed were all statistically highly significant. The differences between milking intervals of 12–12 and 10–14 hr were highly significant for milk fat and significantly different for solids-not-fat. Ten cows of each of four breeds were sampled at four stages of the milking process in the evening and morning. Protein and solids-not-fat percentages tended to drop as the milking process progressed, but the milk fat percentage increased markedly. The differences for solids-not-fat and fat were highly significant. Aliquot samples of evening and morning milk are not needed for protein testing, but they would be needed for solids-not-fat testing based on the milk fat test.

Biosynthesis of skin sterols. III. Conversion of squalene to sterols by rat skin. J. L. Gaylor (Graduate School of Nutrition, Cornell Univ., Ithaca, N. Y.). *J. Biol. Chem.* **238**, 1643–1648 (1963). Pieces of rat skin containing squalene that was labeled *in situ* formed labeled sterols when incubated aerobically. The rate of conversion of squalene to sterol was more rapid in thin slices of epidermis than in the dermis. After long periods of aerobic incubation, most of the epidermal squalene was converted to sterols. Only 66% of the activity that was lost from the dermal squalene was recovered in the sterol fraction. The relative rates of formation and decay of various intermediate fractions were studied. The time course changes of radioactivity in both crude fractions and various sterols were sufficiently different to indicate a stepwise formation of sterols in skin. A highly labeled companion of lanosterol was observed. The labeled companion of lanosterol appears to be a metabolic intermediate in the formation of skin sterols. Homogenates of rat liver converted the labeled metabolites from skin into cholesterol.

Corn sterols and avian atherosclerosis. H. Fisher, H. S. Weiss and P. Griminger (Dept. of Poultry Sci., Rutgers, The State Univ., New Brunswick, N. J.). *Proc. Soc. Exp. Biol. Med.* **113**, 415–418 (1963). Leghorn cockerels were fed for 20 months on diets containing either no supplement, whole egg powder, egg oil equivalent to that contained by egg powder or these diets in combination with corn sterols, the latter added in amounts equivalent to that supplied by 5% corn oil. An additional group was given egg powder for 12 weeks and then placed on the control ration for the remainder of the experimental period. The inclusion of corn oil sterol retarded the atherogenesis that was accentuated by the addition of egg powder or egg oil. Total fat deposition in the abdominal section of the aorta was reduced in the groups fed the sterols. The brief exposure to egg powder did not leave lasting effects on those animals that were changed over to the control diet. Egg oil appeared to be similar in its atherogenicity to egg powder. Sterol excretion patterns suggested that the beneficial effect of the corn sterol was not due to interference with cholesterol absorption alone.

LIPID METABOLISM OF CILIATED PROTOZOA. J. Erwin and K. Bloch (J. B. Conant Lab, Dept. of Chem., Harvard Univ., Cambridge 38, Mass.). *J. Biol. Chem.* 238, 1618–1624 (1963). The lipid and fatty acid composition of several species of ciliated protozoa (family *Tetrahymenidae*) has been determined. Four of the five species examined contain 30% or more of $\gamma$-linolenic acid. These organisms also contain *iso* acids of varying chain length. Saturated and monounsaturated fatty acids are the major acids of the triglycerides whereas linoleic and particularly $\gamma$-linolenic acids are concentrated in the phospholipids. The conversion of saturated to unsaturated fatty acids and of mono- to polyunsaturated fatty acids has been investigated in growing cultures of *Tetrahymena* species. Evidence has been obtained for the sequence: stearate → oleate → linoleate → $\gamma$-linolenate. Phylogenetic relationships of unsaturated fatty acid biosynthesis are discussed and it is pointed out that the pathway in ciliated protozoa combines reactions otherwise typical of either plants or animal tissues.

NUTRITIVE VALUE OF THE DAIRY CATTLE RATION AS AFFECTED BY DIFFERENT LEVELS OF UREA AND QUALITY OF INGREDIENTS. N. F. Colovos, H. A. Kenner, H. A. Davis, B. S. Reddy, and P. P. Reddy (Dept. of Dairy Sci., New Hampshire Agr. Expt. Station, Durham). *J. Dairy Sci.* 46, 696–702 (1963). Two types of concentrate mixtures for dairy cattle, a low-fiber and a high-fiber, which contained four levels of urea, were fed together with two types of field-cured hay to three sets of unbred twin dairy heifers. The levels of urea were 0, 10, 20, and 40 lb per ton of concentrate mixture and the hays were harvested in the post-bloom stage the first year, and pre-bloom stage for the second and third years. The nutritive evaluations of the 16 rations were made on the basis of digestible protein, total digestible nutrients, digestible energy, metabolizable energy, and net energy, all directly determined. Results of the experiment showed that without urea the low-fiber rations were generally superior to the high-fiber rations in digestible energy and total digestible nutrients, but when the level of urea in the concentrate mixtures was increased to 40 lb per ton, the high-fiber ration fed with early-cut hay was comparable to the low-fiber, more expensive concentrate mixture. The increase was due to a decrease in the heat increment as the urea in the ration was increased. The substitution of urea for protein did not affect the digestible crude protein content of the rations and had no significantly adverse effect on their nutritive values.

PURIFICATION AND CHARACTERIZATION OF MILK LIPASE. II. CHARACTERIZATION OF THE PURIFIED ENZYME. R. C. Chandan and K. M. Shahani (Dept. of Dairy Husbandry, Univ. of Nebraska, Lincoln). *J. Dairy Sci.* 46, 503–509 (1963). The enzymic characteristics of a pure and homogeneous milk lipase were studied. The enzyme was best stored in a frozen state and was extremely unstable at 20, 30, 37, and 45C. The enzyme exhibited a single pH optimum of 9.0 to 9.2, and its optimum temperature was about 37C. The enzyme hydrolyzed both milk fat and tributyrin. Upon storage at 37C the loss of the activities toward milk fat and tributyrin was of the same magnitude. Also, sodium para-chloromercuribenzoate, iodoacetic acid, and N-ethyl maleimide inhibited the activity of the enzyme toward the two substrates to the same extent, indicating that the lipolysis of both the substrates may be catalyzed by a single enzyme. The enzyme showed little or no activity on ethyl acetate, ethyl decanoate, ortho-nitrophenyl acetate, and para-nitrophenyl laurate esters in solution, but hydrolyzing the emulsions of milk constituents seemed to exert an inhibitory effect upon the enzymic activity. With the natural emulsion substrates a lag phase was observed in the time-activity curves for a period of 20 min, after which the reaction rate increased with time up to 2 hr.

FURTHER OBSERVATIONS ON PLASMA LIPIDS OF VEGETABLE OIL FED MONKEYS. S. Banerjee and A. Bandyopadhyay (Dept. of Physiology, Sardar Patel Med. College, Bikaner, India). *Proc. Soc. Exp. Biol. Med.* 113, 541–545 (1963). Sesame oil (iodine no. 110), mustard oil (iodine no. 104) and coconut oil (iodine no. 9), were fed to Rhesus monkeys at a 20% level in the diet for 8 months. Plasma lipids and fecal lipids were determined every month. Plasma insulin-like activity was measured before and at the end of eighth month. Some of the monkeys were also fed cholesterol along with the oils for 8 months. Plasma cholesterol of monkeys fed different oils did not change considerably during the experiment. There was a slight increase at the initial stage but it decreased below the basal values after 8 months of feeding the oils irrespective of their saturation or unsaturation. Plasma cholesterol of monkeys fed cholesterol along with the oils increased considerably but the increase was highest when sesame oil was fed. Plasma $\beta$-lipoprotein cholesterol increased in proportion to total plasma cholesterol after the oils were fed. After an initial increase, plasma triglycerides decreased to normal level at the end of fifth month of feeding the oils. The same was true for the plasma nonesterified fatty acids. There was an over-all increase in plasma phospholipids in all monkeys. Monkeys fed cholesterol along with oils had increased NEFA values possibly due to diminished plasma insulin. Fecal total lipid, Lieberman-Burchard reacting sterols and bile acid excretion diminished gradually in all the monkeys. Fluctuations in plasma cholesterol in cholesterol-fed monkeys could be correlated with fecal excretion of sterols and bile acids.

LIPIDS OF HUMAN ADRENALS. C. Riley (Royal Sussex County Hospital). *Biochem. J.* 87, 500–507 (1963). Lipids were extracted from human adrenals obtained at autopsy and at 2-stage surgical operations and were studied by chromatography on silicic acid. Evidence was found of the presence of a sterol diol at a concentration of about 8%. When human adrenal glands are stimulated, the sterol esters are depleted and the phospholipids increased. Free sterols and triglycerides are not appreciably changed. Oleic acid is the major component of the acids derived from the sterol esters; linoleic acid is present in relatively small amounts and $C_{20}$ triene in much greater quantities than arachidonic acid. The sterol ester of linoleic acid was less and that of arachidonic acid

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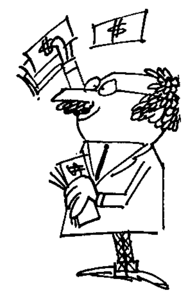

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greater in amount in the stimulated than in the unstimulated adrenal gland. In the triglycerides, linoleic acid was greater and stearic acid less in the stimulated gland; phospholipid stearic acid was greater in the stimulated glands.

IDENTIFICATION OF THE D-GLUCOSIDES OF STIGMASTEROL, SITOSTEROL AND CAMPESTEROL IN TOBACCO AND CIGARETTE SMOKE. A. G. Kallianos, F. A. Shelburne, R. E. Means, R. K. Stevens, R. E. Lax, and J. D. Mold (Liggett and Myers Tobacco Co.). *Biochem. J.* **87**, 596–600 (1963). A mixture of the D-glucosides of stigmasterol, sitosterol and campesterol has been isolated from a commercial blend of flue-cured, Burley, Maryland and Turkish tobaccos (0.044% of crude product on a dry-weight basis). A mixture of the same sterol glucosides was also isolated from the smoke of cigarettes manufactured from the same blend (1.59 mg./1000 cigarettes). Determination of the sugar in the aqueous hydrolysate indicated that the material was a monoglucoside. Gas-chromatographic analysis, infrared absorption-spectra determination and catalytic hydrogenation established the amounts of stigmasterol, sitosterol and campesterol in the mixture as 60, 25, and 15% respectively.

QUANTITATIVE ANALYSIS OF LIPIDS BY THIN-LAYER CHROMATOGRAPHY. A. N. Davison and Elizabeth Graham-Wolfaard (Guy's Hospital Medical School). *Biochem. J.* **87**, 31P (1963). Human brain or $P^{32}$-labeled rat-brain lipids were separated on Kieselgel G. Lipids were exposed to iodine vapor and stained zones on the plate were cut out and crushed. The powdered silicic acid mixture was transferred to glass columns. Each column was eluted with 10 ml. of chloroform and successively with appropriate solvent mixtures. Cholesterol and neutral triglycerides were removed with a further 10 ml. of chloroform-methanol (98:2, v/v); phospholipids with 10 ml. portions of chloroform-methanol (1:1 and 1:4) and 10 ml. ether-ethanol-0.04 *N* KOH (10:7:5, v/v/v); cerebrosides with 10 ml. of chloroform-methanol-water (7:7:1, v/v/v) and ethanol-chloroform-water (5:2:2).

A DIMERIC OXIDATION PRODUCT OF γ-TOCOPHEROL. D. McHale and J. Green (Vitamins Ltd., Walton Oaks Experimental Station). *Chem. Ind. (London)* **1963**, 982–983. A substance has been isolated from cottonseed oil deodorizer scum which, on the basis of its properties, is believed to be 5-γ-tocopheryl-oxy-γ-tocopherol. This product is also formed together with other high molecular weight tocopherol-like substances when γ-tocopherol is heated with one equivalent of *p*-benzoquinone in boiling benzene. The other high molecular weight substances have not yet been fully identified but are similar in chromatographic behavior to other fractions isolated from cottonseed oil.

ISOLATION ANALYSIS OF TISSUE FATTY ACIDS BY ULTRAMICRO-OZONOLYSIS IN CONJUNCTION WITH THIN-LAYER CHROMATOGRAPHY. O. S. Privett, M. L. Blank, and O. Romanus (The Hormel Inst., Univ. of Minnesota, Austin). *J. Lipid Res.* **4**, 260–265 (1963). Apparatus and technique for the detailed analysis of natural mixtures of fatty acids by a combination of thin-layer chromatography (TLC), gas-liquid chromatography (GLC), and reductive ozonolysis are described. The fatty acids, as methyl esters, are separated on the basis of differences in unsaturation and chain length by the application of TLC using chromatoplates coated with silver nitrate-silica gel followed by GLC. The general procedure is demonstrated with pure methyl esters and mixtures thereof, and it is applied to the analysis of the fatty acids of the liver phospholipids of rats fed a fat-free diet. The detection of endogenous 4,7,10,13-eicosatetraenoic acid of the palmitoleic acid family is reported. Isolation analysis of fatty acids can be carried out on less than 1 mg of lipid. The reductive ozonolysis technique of structural analysis described here is well suited to the identification of positional isomers because it is essentially free of side reactions.

MOVEMENT OF FREE FATTY ACIDS INTO AND OUT OF THE BLOOD STREAM IN NORMAL RABBITS AND IN RABBITS INJECTED SUBCUTANEOUSLY WITH THE PITUITARY ADIPOKINETIC SUBSTANCES, FRACTION H AND ADRENOCORTICOTROPIN. R. L. Hirsch, D. P. Rudman, R. Ireland, and R. K. Skaly (Columbia Univ. Res. Service, Goldwater Memorial Hospital, Welfare Island, N. Y.). *J. Lipid Res.* **4**, 289–296 (1963). Uptake and release of plasma free fatty acids by the tissues of the rabbit were investigated by measuring the arteriovenous difference in plasma FFA concentration across the perirenal fat depot, intestines and mesentery, leg, kidney, and liver. In animals given subcutaneous injection of glucose, the arteriovenous difference was negative (net release) across the intestines and mesentery, positive across the perirenal fat depot and kidney, and positive or negative across the leg and liver. After subcutaneous injection of a pituitary adipokinetic substance, either Fraction H or adrenocorticotropin (ACTH), the arteriovenous difference was negative across the perirenal fat depot, the intestines and mesentery, and the leg while large positive differences (net uptake) were found across the kidney and liver.

THE DISTRIBUTION OF FATTY ACIDS BETWEEN THE α′ AND β-POSITIONS OF THE GLYCEROPHOSOPHOLIPIDS OF BUTTERMILK. J. C. Hawke (Biochem. Dept., Massey Univ. College of Manawatu, Palmerston North, New Zealand). *J. Lipid Res.* **4**, 255–259 (1963). Fractionation of buttermilk phospholipids on silicic acid columns gave a cephalin (mixture of amino-N phospholipids) fraction, in which approximately 29% of the total fatty acids were saturated, and phosphatidyl choline, in which approximately 57% of the total fatty acids were saturated. The main difference between the fatty acids of the two phospholipid fractions was in the proportions of palmitic and oleic acid; a further difference was the predominance of the polyenoic acids in the cephalin fraction. In phosphatidyl choline, the ratio of unsaturated to saturated fatty acids in the α′-position was 0.54 and in the β-position, 1.05. Although the nature of the fatty acids present in minor quantities in lecithin and cephalin was very different, the positional distributions of the major fatty acids common to both phospholipid fractions were similar. Oleic and palmitic acids together contributed almost identical proportions to the α′ and to the β fatty acids in both the cephalin fraction and phosphatidyl choline. These two acids comprised 61% of the total acids in the cephalin fraction and 66% of the total acids in phosphatidyl choline. In both the amino-N and choline glycerophospholipids, most of the stearic acid was in the α′-position; whereas most of the dienoic, trienoic, and polyenoic acids were in the β-position. It has been found that the unsaturated acids are less randomly distributed than previously reported for milk glycerophospholipids, but are more randomly distributed than in many other mammalian tissues.

THE COMPOSITION AND BIOSYNTHESIS OF MILK LIPIDS. G. A. Garton (Rowett Research Inst., Bucksburn, Aberdeen, Great Britain). *J. Lipid Res.* **4**, 237–254 (1963). An excellent review: 201 references.

CHROMATOGRAPHIC SEPARATION OF ALLYLIC ALCOHOLS ON SILICIC ACIDS COLUMNS: ANALYSIS OF THE NONSAPONIFIABLE LIPIDS OF AN ASCITES TUMOR DERIVED FROM A BENZPYRENE-INDUCED SARCOMA. G. J. Schroepfer, Jr. and I. Y. Gore (Med. Res. Council, Experimental Radiopathology Res. Unit, Hammersmith Hospital, London, England). *J. Lipid Res.* **4**, 266–269 (1963). Chromatographic separations of dimethyl allyl alcohol, geraniol, nerol, nerolidol, and *trans-trans*-farnesol were achieved on silicic acid-Super Cel columns. Application of this chromatographic system to the radioactive nonsaponifiable lipids formed from mevalonic acid–$C^{14}$ by an ascites tumor is described.

ISOTOPIC STUDIES OF THE BIOSYNTHESIS OF THE CEREBROSIDE FATTY ACIDS IN RATS. A. K. Hajra and N. S. Radin (Mental Health Res. Inst., Univ. of Michigan, Ann Arbor). *J. Lipid Res.* **4**, 270–278 (1963). Groups of weanling rats were given a single injection of labeled acetate and were sacrificed at intervals up to 56 days. The total activity in the cerebroside acids, except 18:0, increased with time over a period of 14 days or more, then slowly decreased. The latter period of decreasing activity shows that these acids undergo metabolic conversion. The cerebroside acids are made by a chain-lengthening process from one or more shorter fatty acids. It is concluded that the $C_{23}$ acid is made by two enzyme systems, one being a 1–carbon degradation of a $C_{24}$ acid. The later samples of cerebroside 18:0 showed uniform distribution of activity, suggesting that it is made directly from acetate. The 16:0 of total brain showed the same effect, while the 18:0 of whole brain resembled the cerebroside longer acids. The specific activity data suggested that the hydroxy and normal acids are made from a common precursor.

LONG-CHAIN CARNITINE ACYLTRANSFERASE AND THE ROLE OF ACYLCARNITINE DERIVATIVES IN THE CATALYTIC INCREASE OF FATTY ACID OXIDATION INDUCED BY CARNITINE. I. B. Fritz and K. T. N. Yue (Department of Physiology, Univ. of Michigan, Ann Arbor). *J. Lipid Res.* 4, 279–288 (1963). Carnitine–H$^3$ or palmitate–C$^{14}$ incubated with heart muscle preparations was incorporated into a compound that had chromatographic behavior in several systems identical to that of palmitylcarnitine chemically synthesized from palmityl chloride and carnitine. Palmitylcarnitine biosynthesis from palmitic acid and carnitine was dependent upon ATP and CoA in addition to substrates and an enzyme preparation. In contrast, palmityl carnitine formation from palmityl CoA and carnitine did not require ATP or CoA. Addition of palmitylcarnitine to heart muscle mitochondria increased respiration more than did additions of palmityl CoA, suggesting that palmitylcarnitine can more readily contribute its acyl group to the fatty acid oxidase system than can exogenous palmityl CoA. Results are consonant with the hypothesis that the catalytic stimulation by carnitine of long-chain fatty acid oxidation is mediated via acylcarnitine formation, with subsequent transfer of the acyl group to CoA at the site of the fatty oxidase system.

CONCENTRATION OF NOREPINEPHRINE, SEROTONIN, AND HISTAMINE, AND OF AMINE-METABOLIZING ENZYMES IN MAMMALIAN ADIPOSE TISSUE. K. Stock and E. O. Westermann (Pharmacological Inst., Univ. of Frankfurt, Germany). *J. Lipid Res.* 4, 297–304 (1963). The norepinephrine content of adipose tissue is shown to be very different in various animal species and different sites of origin, ranging from 0.03–1.4 µg/g. Changes in the norepinephrine content of adipose tissue after the injection of either reserpine analogues or monoamine oxidase inhibitors followed a pattern similar to that found in the heart and brain, indicating that the storage mechanism in these organs is basically the same. In contrast to norepinephrine, serotonin in adipose tissue is rather resistant toward depletion by reserpine. Adipose tissue also contains monoamine oxidase and catechol-O-methyl-transferase activity, which are usually highest in tissues also rich in norepinephrine.

EFFECTS OF D- AND L–TRIIODOTHYRONINE AND OF PROPYLTHIOURACIL ON THE PRODUCTION OF BILE ACIDS IN THE RAT. O. Strand (Dept. of Chemistry, Karolinska Institutet, Stockholm, Sweden). *J. Lipid Res.* 4, 305–311 (1963). The influence of D- and L-triiodothyronine and propylthiouracil (PTU) on turnover rate and pool size of bile acids in rats on a normal diet has been investigated. No significant difference was observed between half-lives of bile acids in normal, thyroid hormone-treated, or PTU-treated rats.

FATTY ACID ESTERIFICATION AND CHYLOMICRON FORMATION DURING FAT ABSORPTION: 1. TRIGLYCERIDES AND CHOLESTEROL ESTERS. A. Karmen, M. Whyte and D. S. Goodman (Laboratory of Tech. Development and Lab. of Metabolism, Nat. Heart Inst., Bethesda 14, Md.). *J. Lipid Res.* 4, 312–321 (1963). With the exception of a slight discrimination against stearic acid, the processes of fatty acid absorption and chylomicron triglyceride formation displayed no specificity for one fatty acid relative to another. In contrast, chylomicron cholesterol ester formation showed marked specificity for oleic acid, relative to the other three fatty acids. This specificity was not significantly altered by varying the composition of the test meal, by including cholesterol in the test meal, or by feeding the animal a high-cholesterol diet for several weeks preceding the study. Considerable dilution of the dietary fatty acids with endogenous fatty acids was observed. In one experiment, 43% of the chylomicron triglyceride fatty acids was of endogenous origin. Relatively more (54%) of the cholesterol ester fatty acids was of endogenous origin.

FATTY ACID ESTERIFICATION AND CHYLOMICRON FORMATION DURING FAT ABSORPTION: 2. PHOSPHOLIPIDS. M. Whyte, A. Karmen, and D. S. Goodman. *Ibid.*, 322–329. Different fatty acids fed to the rat were not incorporated to equal extents into chylomicron lecithin. The incorporation showed a marked relative specificity for stearic acid and a lesser specificity for linoleic acid. Oleic acid was incorporated least of all into lecithin. The incorporation of different dietary fatty acids varied with the nature of the diet, but the addition of fatty acids from endogenous sources was of such magnitude as to make this change less evident, so that the over-all fatty acid pattern of lecithin was relatively constant and independent of the composition of the diet. The endogenous contribution to lecithin fatty acids was greater than the endogenous contribution to the sterol ester or triglyceride fatty acids of the same chylomicron sample. This endogenous contribution to lecithin also varied from fatty acid to fatty acid, being greatest with palmitic acid and least with oleic acid. Lecithin carried a relatively large share of stearic acid, and relatively very little oleic acid, within the chylomicron.

THE ABSORPTION, STORAGE, AND METABOLISM OF α-TOCOPHEROL-C$^{14}$ IN THE RAT AND CHICKEN. S. Krishnamurthy and J. G. Bieri (Lab. of Nutr. and Endocrinology, Nat. Inst. of Arthritis and Metabolic Diseases, Nat. Inst. of Health, Bethesda 14, Md.). *J. Lipid Res.* 4, 330–336 (1963). α-Tocopherol-C$^{14}$ was administered orally to rats and chicks, and its distribution in the body and rate of excretion were determined at short intervals up to 24 hr and at longer intervals to 21 days. No evidence was obtained for a significant accumulation of tocopheryl quinone or other metabolic products in either rat or chick tissues. α-Tocopherol in rat liver and intestinal mucosa cells was distributed about 50–60% in the mitochondria and 15-20% in the microsomal and supernatant fractions.

METABOLISM OF COPROSANOL-C$^{14}$ AND CHOLESTANOL-4-C$^{14}$ IN MAN. R. S. Rosenfeld, B. Zumoff, and L. Hellman (Division of Steroid Biochemistry and Metabolism, Sloan-Kettering Institute for Cancer Research; and, Division of Neoplastic Medicine, Montefiore Hospital, N. Y., N. Y.). *J. Lipid Res.* 4, 337–340 (1963). Coprostanol-C$^{14}$, biosynthetically prepared, was administered orally to two patients, and cholestanol-4-C$^{14}$ was administered to one of them 10 months later. At the time when radioactivity in the circulation was at a maximum, 3.6 and 3.5% of the administered labeled coprostanol was present in the plasma; the corresponding value after administration of cholestanol-C$^{14}$ was 4.7%. The dynamic behavior of absorbed radioactive cholestanol was identical with that of orally ingested cholesterol-4-C$^{14}$, including the esterification process; on the other hand, virtually no coprostanol ester was present in the circulation. It is suggested that the conformation of the A/B rings or configuration at C-3 are related to the esterification mechanism of sterols. After 5 days, over 50% of both compounds had been excreted in the feces. The conversion of coprostanol-C$^{14}$ to coprostanone-C$^{14}$ has been demonstrated.

EFFECT OF A FAT-FREE DIET AND OF DIFFERENT DIETARY FATTY ACIDS (PALMITATE, OLEATE, AND LINOLEATE) ON THE FATTY ACID COMPOSITION OF FRESH-WATER FISH LIPIDS. R. R. Brenner, D. V. Vazza, and M. E. DeTomás (Cátedra de Química Biológica, Instituto de Fisiología, Facultad de Ciencias Médicas, Universidad Nacional de La Plata, Calle 60 y 120, La Plata, Argentina). *J. Lipid Res.* 4, 341–345 (1963). When fresh-water fish, *Pimelodus maculatus*, were fed a fat-deficient diet, the concentration of linoleic and arachidonic acids in glycerides and phospholipids decreased, and the concentration of palmitic, palmitoleic, oleic, and eicosatrienoic acids increased. When fat-deficient, fresh-water fish *Parapimelodus valenciennesi* were fed a diet containing methyl palmitate, methyl oleate, and methyl linoleate, palmitic and oleic acid seemed to be stored mainly in the glycerides, whereas linoleic acid was deposited in both glycerides and phospholipids. Some linoleic acid was transformed into arachidonic. The concentration of palmitic acid in fish lipids was well regulated by the animal.

INFLUENCE OF VARIOUS CARBOHYDRATES ON THE UTILIZATION OF LOW PROTEIN RATIONS BY THE WHITE RAT. V. RELATIONSHIPS AMONG PROTEIN INTAKE, CALORIE INTAKE, GROWTH AND LIVER FAT CONTENT. R. P. Wiener, M. Yoshida and A. E. Harper (Dept. of Biochem., Univ. of Wisconsin, Madison). *J. Nutr.* 80, 279–290 (1963). Growth, nitrogen balance, carcass analysis and liver fat studies were made on rats fed low protein, low fat diets with sucrose or dextrin as the dietary carbohydrate. Substitution of dextrin for sucrose in isonitrogenous diets stimulated growth by stimulating food, and hence protein, intake. Growth was proportional to protein intake irrespective of the type of dietary carbohydrate; therefore, although protein or amino acid requirements expressed as *percentage of the diet* differed with the type of dietary carbohydrate, expressed as *protein required per unit of weight gained* they did not. Nitrogen balance experiments indicated that the type of dietary carbohydrate affected neither protein digestibility nor nitrogen retention; however, metabolic fecal nitrogen increased and endogenous urinary nitrogen decreased when dextrin was substituted for sucrose in low protein diet containing fibrin. Calorie intake per unit of body weight increased when dextrin was substituted for sucrose, particularly in diets containing low levels of high quality proteins, and this was accompanied by elevation of carcass fat content. Liver fat content was elevated when sucrose was substituted for dextrin in low protein diets containing methionine-supplemented casein; however, when liver fat content was expressed per unit of protein consumed, the difference due to the change in carbohydrate was small.

(Continued on page 48)

(Continued from page 41)

## • Drying Oils and Paints

SURFACE COATING MATERIALS FROM FATTY ACIDS. *Annual Report* **1960–61,** 15. (Hyderabad Reg. Res. Lab.). New surface coatings have recently been developed from fatty acids by heating them in the presence of boric acid catalyst. The work so far reported has been mostly with marine oil fatty acids. It is now intended to use the acids from some vegetable drying oils for the preparation of such coating materials. The fatty acids from tobacco seed oil were heated at temperatures varying from 240–290C. in the presence of 2% boric acid using tetralin as an azeotropic solvent till A.V. 12–15 were obtained. A temperature of 280C. was found to be the best, giving products which became surface dry in one hour and hard dry to tack-free overnight. The film was almost colourless and had good water resistance. (Rev. Current Lit. Paint Allied Ind.)

SPECIAL EFFECT PAINTS. G. Bruhn. *Galvanotechnik. u. Oberflächenschutz* 3, 87–91 (1962). The variety of special effect paints, lacquers and stoving enamels used industrially has increased as the demand for unusual surface decorative finishes has become greater. These rough finishes are also used to cover up incomplete surface preparation. The resin base of many of the special finishes has also changed. Hammer finishes, the type most commonly used, can be obtained on the traditional cellulose or cellulose/alkyd basis or can be derived from two-component materials such as polyurethanes and epoxy resins. Other finishes considered include wrinkle, ice, metallised, crackle, multicolour, marble and web finishes. (Rev. Current Lit. Paint Allied Ind.)

LIQUID CONDENSATION PRODUCT OF A DRYING OIL, A POLYALKANOL, AND A POLYOXYETHYLENE POLYOL. H. M. Schroeder and J. Pawlak (Textron Inc.). *U. S. 3,100,157.* A liquid, water-dispersible composition of matter having a viscosity of up to about 100 poises is a condensate of a mixture consisting of about 75–90% of a drying oil ester of an unsaturated fatty acid of 14 to 20 carbon atoms and a polyhydric alkanol of 3 to 6 carbon atoms and having 3 to 6 hydroxyl groups, and about 10–25% of a polyoxyethylene polyol having a molecular weight of about 500 to 2000. The polyol has the formula $R-[O(C_2H_4O)_nH]_m$ where R is an m-valent hydrocarbon radical of 3 to 6 carbon atoms, n is 4 to 12, and m is 3 to 6.

ISOMERISED AND POLYMERISED TALL OIL. Zenkoku Noson Kogyo Nogyo Coop. Union, *Jap.* 10,165/62. The oil is produced by adding 0·1–5 pts. of conc. $H_2SO_4$ and 0·5–10 pts. of clay to 100 pts. of tall oil, heating the mixture at 50–200C. under inert gas with stirring and filtering off the $H_2SO_4$ and clay from the heat-treated product. (Rev. Current Lit. Paint Allied Ind.)

TREATING VEGETABLE SEEDS. T. Nanatane. *Jap.* 10,163/62. Vegetable seeds such as soyabeans, rape seeds and cotton seeds, used as raw materials of oil production, are crushed and then treated with a substance which gelatinises proteins in the seeds, such as $H_3BO_3$, $K_2CO_3$, NaOH, KOH or $Ca(OH)_2$. Oil is extracted from the treated seeds with a suitable solvent and finally phosphatides are extracted from the extraction residues with an alcoholic solvent. (Rev. Current Lit. Paint Allied Ind.)

MANUFACTURING PAINT [FROM CASHEW OIL]. Y. Nagata. *Jap.* 16,424/62. The saturated alkyl derivatives and mono-olefinic components in crude cashew oil are separated by means of cooling non-decarboxylated oil, obtained by extraction, to −50 to −60C and heat-condensing the remaining oil, after decarboxylation, with methylol phenol or equivalent methylols. The resulting condensation product is dissolved in a solvent and driers are added. *E.g.,* 10 kg. of cashew oil are dissolved in a mixture of 40 kg. of methanol, 40 kg. of acetone and 20 kg. of petroleum ether in a tank cooled by adding solid $CO_2$ and kept for 15 hrs. at −50 to −60C. After removal of separated crystals, the solvent is evaporated under reduced pressure and the resulting brown oil (6·5 kg.) is decarboxylated by heating at 200C for 30 mins. in an inert gas. 5·8 Kg. of brown decarboxylated oil are obtained by cooling to 150C. The oil is heated with 4 kg. methylol octyphenol at 150C for *ca.* 1 hr. to form 9·5 kg. of condensate. The condensate is added to 3·5 kg. of turpentine oil and 150 g. of naphthenic acid drier to obtain 12 kg. of paint. (Rev. Current Lit. Paint Allied Ind.)

JAPANESE LACQUER PAINT. M. Saito. *Jap.* 16,425/62. The composition is made by forming a monoglycidyl ether by reacting a catechol derivative obtained from south Japanese lacquer liquid with epichlorohydrin, separately forming a methylolated compound from the residue obtained by separating saturated alkyl derivatives and mono-olefinic components in crude cashew oil, by means of cooling non-decarboxylated crude oil obtained by extraction at −50 to −60C and heat condensing the monoglycidyl ether and the methylolated compound. The condensate is mixed with small amount of paint solvent to prepare Japanese lacquer paints. *E.g.,* to 1 mole of catechol derivative are added 1·5 moles of epichlorohydrin with heating at 50–60C, caustic soda solution being added dropwise with stirring to obtain an oily glycidyl ether. 10 Pts. of non-decarboxylated crude oil are dissolved in a mixture of 40 pts. methanol, 40 pts. acetone and 20 pts. petroleum ether cooled to −50 to −60C with solid $CO_2$. The resulting oil is methylolated with 100 pts. of formalin and the methylolated compound is condensed with the monoglycidyl ether to form a condensate which is used for paint with addition of solvent and drier. (Rev. Current Lit. Paint Allied Ind.)

STOVING PAINT. Tokyo Tokushu Electric Wire Paint Co. *Jap.* 17,358/62. A paint is manufactured by adding propylene glycol and one or more of glycerol, trimethylolethane, trimethylolpropane and hexanetriol to monohydric alcohol diester or terephthalic acid, reacting with heat under atmospheric pressure to form polyester resin, dissolving the resin in a solvent, adding $< 20\%$ polycarbonate ester or its solution to the polyester resin, mixing with or without heating and adding $< 3\%$ titanic acid ester or Ti chelate compound to the polyester resin. (Rev. Current Lit. Paint Allied Ind.)

POLYAMIDE VARNISHES. N. N. Pavlov *et al. U.S.S.R.* 143,949. In the known methods of increasing the adhesion of paints and other coatings to metal, compounds of Cr or other metals may be added. In the present case, by way of improvement, salts of trivalent Cr or of Al are used. The polyamide film on the metal is obtained after drying, at 60–80C, an alcoholic solution thereof (some Russian brands are named) applied in known manner, with $CrCl_3$ and/or $AlCl_3$. They can be introduced when the polyamide is dissolved in 80% ethyl alcohol, to the extent of 3–9% by wt. of the polyamide and reckoned as the oxide. The coating on the metal may be repeated: the first as a 15–20% polyamide solution and the second and further layers with concentration raised to 30–35%. Resistance to peeling or stripping from a Cu surface was 1200 g./cm. for the $CrCl_3$; for the film containing $AlCl_3$ on an Al surface it was 1000 g./cm. (Rev. Current Lit. Paint Allied Ind.)

EPOXY RESIN-AMINE RICE OIL COMPOSITION AND METHOD OF MAKING SAME. A. V. Meigs (Ricco Products Corp. and Rice-Chem Soluplug, Inc.). *U. S. 3,099,634.* A process for preparing a hard infusible resinous polyepoxide composition from rice oil for coating metal surfaces without reacting the constituents in the rice oil which provide corrosion inhibiting and metal surface penetrating properties comprises the following steps: (1) forming an intermediate product by (a) gradually heating a mixture of rice oil and a polyfunctional amine in a vessel while stirring to approximately 300F in approximately one hour, (b) maintaining the temperature of the mixture for about 1 hour, (c) gradually raising the temperature to 400F for approximately 3 hours and maintaining that temperature; (2) cooling the intermediate product to approximately 80F; (3) and then mixing the intermediate product with a polyepoxide resin having at least 2 reactive epoxy groups in each molecule to form a hard infusible product which when initially applied to a metal surface exhibits the corrosion inhibiting and metal surface penetrating characteristics of the rice oil constituents.

HEAT-CURABLE COATING COMPOSITIONS. W. K. Moffett and A. N. Walus (E. I. du Pont de Nemours & Co.). *U.S. 3,102,866.* The described composition consists of a fatty glyceride oil acid modified polyhydric alcohol-polycarboxylic acid polyester resin and a soluble monohydric alcohol modified aminoplast condensate as the essential organic film-forming materials in solution in a volatile liquid organic solvent. The catalyst for accelerating the cure of the film-forming materials is a partial ester acid oxalate composition which consists of at least one monoester of oxalic acid and a monohydric alcohol having from 1 to 20 carbon atoms.

(Continued on page 53)

(Continued from page 48)

# • Detergents

SYNTHESIS AND PROPERTIES OF SURFACE-ACTIVE AGENTS. XI. FOAMING, DISPERSING AND BACTEROSTATIC PROPERTIES OF CATIONIC SURFACE-ACTIVE AGENTS. Takashi Yamamoto, Hiromitsu Yamada, Seiji Sumida, Shigeaki Takagi, and Yoshiro Namba (Nippon Oils & Fats Co., Amagasaki City). *Yukagaku* **12**, 415–21 (1963). Quaternary ammonium salts, $[C_{12}H_{25}NMe_2C_2H_4OH]^+A^-$, were prepared, where $A^- = F^-$, $Cl^-$, $Br^-$, $I^-$, $\frac{1}{2}SO_4{=}$, $ClO_4^-$, $H_3PO_4^-$, $NO_3^-$, $AcO^-$, $CCl_3COO^-$, $C_{11}H_{23}COO^-$, $\frac{1}{2}(COO^-)_2$, $PhCOO^-$, or $p{-}MeC_6H_4SO_3{=}$. Quaternary ammonium chlorides having various chemical constitutions were prepared by the reaction of corresponding amine salts with ethylene oxide. The foaming properties were affected little by cationic parts, but affected much by anions. Quaternary ammonium perchlorate, benzoate, and *p*-toluene-sulfonate were superior to others. The quaternary ammonium salts containing $BzO^-$ and $p$-$MeC_6H_4SO_3^-$ as anion and benzene and ether-linkages in catonic parts, such as $[p{-}C_8H_{17}C_6H_4OC_2H_4OC_2H_4N(CH_3)_2C_2H_4OH]^+Cl^-$, showed good dispersion properties. The bacteriostatic properties were affected little by the kind of anions.

SYNTHESIS AND PROPERTIES OF SURFACE ACTIVE AGENTS. VII. CATIONIC SURFACTANTS AS INHIBITORS FOR ACID-CLEANING OF METAL. Takashi Yamamoto, Seiji Sumida, and Yoshio Nanba (Nippon Oils & Fats Co., Amagasaki City). *Yukagaku* **12**, 365–70 (1963). Steel or iron is immersed for 3 hours at 60C in a pickling solution containing 5% acid plus 0.01–0.03% cationic surfactant such as $[C_{12}H_{25}NMe_2C_2H_4OH]^+X^-$ ($X =$ anion) as corrosion inhibitor. Corrosion with HCl was 5–10% and the cationic surfactant carrying $I^-$ was excellent. Corrosion with $H_2SO_4$ was prevented by using cationics carrying halogen ions and their effect was in the order of $I^- > Br^- > Cl^- > F^-$. Cationic surfactant carrying $I^-$ and the reaction with this and $H_2SO_4$ gives off HI and the HI acted as corrosion inhibitor. There was no cationic surfactant effective for $H_3PO_4$ but the addition of HI to it was effective in the prevention of corrosion. Chemical structure of cationic part of cationic surfactant was not so influential as in anionic part.

ANALYSIS OF POLYETHER AND POLYOLEFIN POLYMERS BY GAS CHROMATOGRAPHIC DETERMINATION OF THE VOLATILE PRODUCTS RESULTING FROM CONTROLLED PYROLYSIS. E. W. Neumann and H. G. Nadeau (Olin Res. Center, Olin Mathieson Chemical Corp., New Haven 4, Conn.). *Anal. Chem.* **35**, 1454–1457 (1963). Pyrolysis and gas chromatography are used to determine the composition of various ethylene oxide-propylene oxide copolymers and various ethylene-butene copolymers. The pyrolyses are performed in an evacuated glass vial at 360 and 410C. Analysis of the gases produced is accomplished by gas chromatography, using a flame ionization detector. Interpretation of the gas chromatographic data in most cases enabled identification of the polymer. Quantitative analysis is possible for the polyether mixed polymers. Possibilities of determining branched chains in the polyolefins are discussed.

DETERGENCY EVALUATION. R. C. Davis (Whirlpool Corp.). *Soap Chem. Specialties* **39** (8), 47–50 (1963). A method of detergency evaluation has been developed which involves removal of a clay-oleic acid soil from cotton cloth. The system has conformed quite closely to known reactions of naturally soiled textiles in relationship to 3 of the standard parameters of laundering: water hardness, concentration of detergent, and time of agitation. Numerous other parameters must be investigated. If the clay-oleic acid model material should deviate noticeably from observed nautral soil reactions in any of these parameters, it will be discarded.

CHEMICAL MECHANISM OF STRAIGHT CHAIN ABS BIODEGRADATION. R. D. Swisher (Monsanto Chemical Co.). *Soap Chem. Specialties* **39**(8), 57–60 (1963). Apparently the following sequence of reactions is involved in the biodegradation of straight chain alkylbenzene sulfonates: degradation begins with oxidative attack at one end of the chain, remote from the sulfonate group; once attack is initiated, the chain is rapidly degraded by the $\beta$-oxidation process until a terminal carboxyl group is formed either 2 or 3 carbons away from the phenyl group; the resulting $\beta$- or $\gamma$-sulfophenylalkanoic acid is then attacked at the other end of the chain, after which complete oxidation of the molecule proceeds rapidly; along with the 2 carbon $\beta$-oxidation process a minor fraction of the chain oxidation may involve a single carbon removal.

DRY CLEANING. P. V. Warren, M. B. Mathews, and Ernestine Hirschhorn (R. R. Street & Co., Inc.). *U.S. 3,101,239.* A water-immiscible dry cleaning liquid organic solvent contains (a) from 1.5–3% of an oil-soluble dry cleaning water-emulsifying detergent selected from the group consisting of sulfate and sulfonate detergents containing an alkyl group of at least 8 carbon atoms, and (b) from 0.2–4% of water so finely emulsified in the organic solvent as to form a clear homogeneous emulsion having an electrical conductivity between 50 and 100 x $10^{-7}$ mhos. The electrical conductivity of the emulsion is continuously measured. When it drops below the desired range, the detergent content is measured and adjusted to restore it to the described values. Water is then added in the requisite amounts to restore the electrical conductivity of the filtered emulsion to the desired range.

MECHANISM OF FATTY SOIL REMOVAL. B. A. Scott (Unilever Res. Lab., Islewarth, Middlesex, Eng.). *J. Appl. Chem. (London)* **13**(3), 133–44 (1963). The effects of temperature, detergents, electrolyte, agitation, and fabric structure on the removal from cotton of octadecane, tripalmitin, stearyl alcohol, and stearic acid labelled with carbon-14 have been studied. The following mechanisms appear to be operative in the removal of these materials: (1) rolling up mechanism, (2) mesomorphic phase formation, (3) soap formation, (4) break up of polycrystalline aggregates. In general, the addition of electrolyte in the presence of surface-active agents increases the amount of fatty soil removal. The magnitude of the electrolyte effect depends on (a) the degree of ionization, (b) the pH of the solution and (c) the valency of the added cation. By means of a chopped fiber technique it has been possible to show that about 35% of the fatty soil is on the surface of threads, about 30% between the fibers of which the threads are composed, about 30% inside the tubular fibers, while about 5% is held in the fibrile structure of the fibers.

DETERGENT POLYURETHANE PRODUCTS. M. V. Shelanski and T. Levenson (Industrial Biology Labs., Inc.). *U. S. 3,098,048.* The described product consists of a solid shaped body formed by the reaction of an organic diisocyanate and a surfactant in which the diisocyanate is present in an amount exceeding the stoichiometric amount necessary for the reaction. The surfactant comprises sequentially added hydrophobic and hydrophilic portions, the hydrophobic portion being an alkyl amide and the hydrophobic portion containing at least 2 ethylene oxide chains individually linked to the hydrophobic portion. The reaction product is cured and has an ethylene oxide content of 30–80% by weight.

BLEACHING AND DETERGENT COMPOSITION AND PROCESS OF USING SAME. D. D. Gagliardi and M. W. Pollock (Argus Chemical Corp.). *U. S. 3,099,625.* A bleaching composition consists of a hypochlorite bleaching compound, a detergent and an organic nitrogenous material having in the molecule at least one NH group reactive with hypochlorite to form an N-Cl group, in an amount of at least 5% by weight of the bleaching compound sufficient at a bleaching concentration of the hypochlorite bleaching compound to inhibit formation of N-Cl groups on polymer molecules adherent to textile materials bleached with the composition.

CLEAR MINERAL OIL IN WATER EMULSION FOR HAIR APPLICATION. B. Siegal, Rita M. Petgrave, and P. Thau (Bristol-Myers Co.). *U.S. 3,101,300.* A clear transparent gel composition consists of, by weight: (a) 15–30% of mineral oil; (b) 40–70% of water; (c) 5–12% of a higher fatty acid alkylolamide having the generic formula RCONR′R″ in which R is a fatty acid residue containing 9–13 carbon atoms, R′ is a member selected from the group consisting of hydrogen and a lower alkyl monohydric radical having from 1 to 4 carbon atoms, and R″ is a lower alkyl monohydric radical having from 1 to 4 carbons; (d) 6–20% of a non-ionic ether containing surfactant having the generic formula $RO(C_2H_4O)_nH$ in which R is an aliphatic radical with 8 to 18 carbons selected from the group consisting of the non-ionic ether containing surfactant in which n is an integer of 10–18, and a mixture of the ether surfactant in which n varies from 2 to 30 for each member of the mixture with the average value for n, based on the weight of the ether employed, being from 10 to 18 and (e) 2–4% of lanolin alcohols.