ABSTRACTS

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

• Fats and Oils

Studies on the separation of vegetable oil fatty acids. I. Separation of vegetable oil fatty acids by urea adduct formation and acceleration of the reaction. Kazuhiko Yoshitomi, Tetsuo Arai and Toshikazu Tokunaga (Nissin Oil Mills, Ltd., Yokohama). *Yukagaku* 11, 641–6 (1962). Urea adduct formation was studied using fatty acids from linseed, safflower, and rice bran oils. Using 49% urea solution at pH 3.5, non-adduct fatty acids containing a reduced amount of saturated acids were obtained without washing of the adducts with solvent. Increase of the urea/fatty acid ratio caused the decrease in yield of non-adduct fatty acids, and their iodine no. became higher, but the maximum iodine no. was limited for the reason that the yield of non-adduct fatty acids became zero. By using this method, linoleic acid of 85.9% purity was obtained from safflower fatty acids.

Bran oil of Hordenum sativum var. vulgare. Akio Tanaka and Tomotaro Tsuchiya (Government Chem. Ind. Res. Inst., Tokyo). *Yukagaku* 12, 26-8 (1963). Dried bran contained 2.7% oil. Properties of the oil follow: d_4^{30} 0.9226, n_D^{20} 1.4761, acid no. 6.46, saponification no. 182.5, iodine no. 122.3, and unsaponifiable matter 5.33%. The oil contained oryzanol (λ 230, 291 and 390 mμ) and a substance showing an absorption similar to that of α-tocopherylquinone.

Fish oils from fishes caught in the inland sea of Japan. I. Oils from Harengula zunasi, Saurida and Half-beak. *1.* Seiichi Ueno and Shigeru Hamada (Kinki Univ.). *Yukagaku* 11, 526–32 (1962). The oils examined showed the following characteristics (% yield, d^{15}, n^{20}, acid no., sapon no., iodine no. and % of unsaponifiable matter): *Harengula zunasi* oil: 6.95, 0.9233, 1.4758, 12.3, 192.4, 168.1, 1.34; *Saurida* oil (*Saurida argeyrophane*): 0.73, 0.9391, 1.4828, 19.0, 192.2, 195.4, 4.13; Half-beak oil: 0.69, 0.9235, 1.4817, ..., 158.0, 160.4, 12.79.

II. Broiled whole sea bream oil and dried spart oil. *Ibid.*, 630–7. The oil obtained as a by-product in the preparation of broiled *Pagrosumus major* showed d^{15} 0.9252, n^{20} 1.4767, acid no. 6.35, sapon. no. 189.2, iodine no. 164.4 and unsaponifiable matter content 1.43%. The oil obtained from boiling and drying operation of *Engraulis japonica* showed acid no. 11.8, iodine no. 106, and unsaponifiable matter content 5.28%; it contained 52.42% solid acid and 47.58% liquid acid.

Treatments of thuja oil by ion exchange resin. Hiroshi Inoue and Tatsuo Noguchi (Ind. Research Inst., Hokkaido). *Yukagaku* 11, 523–6 (1962). Hinokitiol in the thuja oil is easily absorbed by commercial ion exchange resins, such as Amberlite ITA-401 (OH form). It may be possible to recover hinokitiol from the resin.

Purification of oils and fats by ion exchange resins. X. Some components of rice bran oil adsorbed by ion exchange resins. Hiroshi Inoue and Tatsuo Noguchi (Ind. Research Inst., Hokkaido). *Yukagaku* 11, 517–23 (1962). The ultraviolet absorption spectra were investigated for the substances absorbed from the rice bran oil by several types of ion exchange resins, such as —OH, —Cl, and —HCO_3 type of Amberlite IRA 401, —OH type of Amberlite IRA-410 and IR-4B, and —H and —Na type of Amberlite IR-120. Spectral analyses of these substances indicated the presence of components having the maximum absorption at 350, 290, 230 and 280 mμ.

Volatile products obtained from edible oils by open air heating. II. Thermal decomposition products from soybean oil and oxidation products from safflower oil and olive oil. Bun-ichi Toi, Shizuyuki Ota, and Naoki Iwata (Food Research Lab., Ajinomoto Co., Inc.). *Yukagaku* 11, 504–7 (1962). Soybean oils, having the peroxide value of 10 or 290, were heated at 250C under a stream of nitrogen. Volatile substances were caught in a trap cooled by dry ice-acetone, and then identified by gas chromatography. There were very few decomposition products from soybean oil having a peroxide value of 10. Most of them were hydrocarbons, contaminated with a small amount of carbonyls. In the hydrocarbons, olefins were present in higher concentration than saturated hydrocarbons. In case of soybean oil having peroxide value of 290, decomposition occurred mostly at an early stage of heating. The amount of decomposition products was much higher. The gas chromatogram of the decomposition products at an earlier stage of heating had high peaks due to *n*-pentane, propionic aldehyde and caproic aldehyde. The gas chromatogram of the decomposition products from the later stage of heating soybean oil having the higher peroxide value was similar to that from the oil of lower peroxide value. Volatile substances produced by heating safflower oil and olive oil in a stream of air at 250C were identified by gas chromatography. Some hydrocarbons and carbonyls were found in these volatile products, and their quantitative proportions were found to differ depending on the kind and amount of fatty acids composing of these oils. The quantitative proportions of these compounds in the volatile decomposition product obtained from these vegetable oils by heating at 250C suggest that the first step in the decomposition of vegetable oil is the formation of hydroperoxides, followed by cleavage on either side of the carbon atom containing the hydroperoxide group. III. Decomposition products from methyl oleate. *Ibid.* 508–13. Decomposition products of methyl oleate, heated in a stream of air at 200C, were identified by gas chromatography. Volatile decomposition products were collected in two traps cooled by ice-water and dry ice-acetone, respectively. The products remaining in methyl oleate were separated with 1*N* Na_2CO_3 and Girard-T reagent into various fractions on the basis of their reactivities. Each fraction was gas-chromatographed by using silicon grease or glycol succinate column. The results showed that major decomposition products were water, C_8- and C_9-aldehydes, semialdehyde methyl esters, C_7-and C_8-hydrocarbons, and methyl esters of fatty acid. Several fatty acids, monomethyl esters of dibasic acids and alcohols were positively identified.

The influence of added copper on margarine. Kimitoshi Nakazawa, Isao Niiya, and Kazuko Furukawa. *Yukagaku* 11, 477–80 (1962). Twenty margarine samples containing 81% fat and oil, 16% water and other compounding ingredient with 0.1, 1.0, 10 and 100 p.p.m. Cu as Cu stearate, respectively, were kept 16 weeks and their deterioration measured. Sample containing 0.1 and 1.0 p.p.m. Cu showed no difference from the control without Cu, while those containing 10 and 100 p.p.m. Cu showed the development of rancidity. However, there was no growth of mold in all cases. Margarines blended with milk had a lower peroxide value.

Components of rice bran oil. II. Isolation of unsaponifiable matter. Yasuhiko Takeshita and Yumi Watanabe (Tokyo Oil & Fat Co.). *Yukagaku* 11, 459–63 (1962). The residue after distillation of methyl ester of fatty acid from rice oil soap stock and further separation with Al_2O_3 chromatography gave 0.7% of a new steroid having a conjugated double bond and showing strong absorption at 268 and 280 mμ, and weak absorption at 300 and 315 mμ. The residue gave also β-sitosterol, m.p. 134.5C, $[\alpha]_D^{15}$ —45.5° (acetate, m.p. 128C, $[\alpha]_D^{15}$ —34.5°).

Precursors of methyl ketones in butter. B. Van der Ven, P. Haverkamp Begemann, and J. C. M. Schogt (Unilever Res. Lab., Vlaardingen, The Netherlands). *J. Lipid Res.* 4, 91–95 (1963). Butterfat, when treated with Girard-T reagent, yields a series of six pyrazolones, corresponding to six even-numbered β-ketoacids (C_6 up to and including C_{16}). This is in agreement with the formation of six odd-numbered methyl ketones (C_5 up to and including C_{15}) on subjecting butterfat to steam-deodorization. The presence in butterfat of non-volatile β-ketoacid esters has been proved. If they are glycerides, their amount is estimated at 0.03%.

Prospecting for uranium by analyzing the waste liquids from olive oil mills. J. M. Martinez, E. Bermudez, C. Gomez, and C. Janer (Instituto de la Grasa y sus Derivados, Seville, Spain). *Grasas y Aceites (Seville, Spain)* 13, 165–170 (1962). Olive trees growing in uranium-containing soils were found to contain up to 123 ppm uranium in their olives. 63–92% of the uranium content of olives being pressed in an oil mill was found in a colloidal fraction in the waste liquids from the processing. This colloidal fraction was precipitated with alcohol and analyzed for uranium content. Uranium deposits in olive orchard areas could be located by this method.

Physical-chemical studies on ground olive pastes. XV. Effects of surfactants on waste liquids, foots, and pastes. J. M. Martinez and J. M. Martinez-Swarez (Instituto de la Grasa y sus Derivados, Seville, Spain). *Grasas y Aceites (Seville, Spain)* 13, 155–160 (1962). Previous laboratory ex-

(Continued on page 25)

(Continued from page 23)

periments on the use of surfactants to improve the yield of olive oil obtained by the hydraulic pressing of olive pastes, the breaking of oil emulsions in the waste liquids *(alpechines)*, and the treatment of foots *(borras)* were repeated on a pilot plant scale. Addition of dialkylsulfosuccinate to the olive pastes improved oil yields in some cases. An economic evaluation of the results is made.

A RAPID METHOD FOR DETERMINING THE OIL CONTENT OF SUNFLOWER SEED. N. Costanzo and F. I. Sameh (Instituto Argentino ,de Grasas y Aceites, Chile, 1192, Buenos Aires, Arg.). *Rev. Arg. Grasas y Aceites* 3, 57–59 (1961). A rapid gravimetric method for determining the oil content of sunflower seed was developed. The ground seed was extracted with hexane in a Twisselmann extractor and the weight of the lipid extract determined. The procedure took 2½ hours to perform and gave results equivalent to standard methods.

OILS OF ARGENTINIAN PROTEACEAE SEEDS. P. Cattaneo, G. Karman de Sutton, R. H. Arias, R. R. Brenner, and M. E. de Thomas (Universidad de Buenos Aires, Facultad de Ciencias Exactas y Naturales, Buenos Aires, Arg.). *Anales de Asoc. Quimica Arg.* 50, 31–57 (1962). The physico-chemical characteristics and fatty acid composition of three *Proteaceae* seed oils were determined: *Gevuina avellana Mol., Lomatia hirsuta (Lam.) Diels,* and *Embothrium coccineum Forst.* All three oils were very rich in hexadecenoic acid (22–23%) and also contained substantial amounts of oleic (37–50%) and linoleic (11–12%) acids.

THE VIZERN TEST APPLIED TO ARGENTINIAN OLIVE OILS AND THEIR MIXTURES WITH OTHER SEED OILS. R. A. Macchi (Instituto Argentino de Grasas y Aceites, Chile 1192, Buenos Aires, Arg.). *Rev. Arg. Grasas y Aceites* 3, 60–64 (1961). Vizern's test gave negative results with almost all Argentinian olive oils tested. The presence of as little as 5% sunflower, grapeseed, or soybean oil or 10% cottonseed, corn, or rapeseed oil in olive oil made the Vizern test positive.

PREPARATION AND ANALYSIS OF GLYCERYL MONOELEOSTEARATE. F. Crespo, R. A. Macchi, and Isabel Gallardo (Instituto Argentino de Grasas y Aceites, Chile 1192, Buenos Aires, Arg.). *Rev. Arg. Grasas y Aceites* 3, 76–81 (1961). Glyceryl-1-monoeleostearate was prepared by glycerolysis of methyl eleostearate in pyridine with a $NaOCH_3$ catalyst. Recrystallization of the products from hexane at —20C yielded 95–98% monoglyceride. The standard periodic oxidation method for monoglyceride determination was found ineffective in the presence of conjugated triene fatty acids. Glyceryl-1-monoeleostearate had to be hydrogenated before accurate analyses could be run.

THERMAL POLYMERIZATION OF ELEOSTEARIC ACID DERIVATIVES. I. POLYMERIZATION OF GLYCERYL-1-MONOELEOSTEARATE. I. Gallardo de Kuck, A. R. Macchi, and F. Crespo (Inst. Argentino de Grasas y Aceites, Chile 1192, Buenos Aires, Arg.). *Rev. Arg. Grasas y Aceites* 4, 3–6, 10 (1962). Glyceryl-1-monoeleostearate was polymerized by heating in sealed tubes at 200–270C for 1–6 hours. The amount of free glycerol in the products increased with time and temperature. Analysis of the glycerol-free products for unsaturation, mean molecular weight, and ultraviolet spectra indicated the presence of mostly dimer, although other structures were believed present.

DETECTING THE PRESENCE OF ANIMAL FATS IN VEGETABLE OILS. Isabel Gallardo and Ivonne Sameh (Inst. Argentino de Grasas y Aceites, Chile 1192, Buenos Aires, Arg.). *Rev. Arg. Grasas y Aceites* 3, 105–108, 118 (1961). The presence of 5% or more animal fat in vegetable oils could be determined by the presence of arachidonic acid. Samples were saponified and acidulated to obtain the fatty acids. Urea adduct formation followed by removal of the unsaponifiables and oxidation products produced a concentrate which could be analyzed for arachidonic acid by alkali isomerization and ultraviolet spectrophotometry.

CORRELATION BETWEEN OIL CONTENT AND PERCENT KERNEL IN SUNFLOWER SEEDS. N. Costanzo and J. Maymo (Inst. Argentino de Grasas y Aceites, Chile 1192, Buenos Aires, Arg.). *Rev. Arg. Grasas y Aceites* 3, 109–112 (1961). Examination of 177 samples of sunflower seed showed a very poor correlation between oil content and percent kernel in the seed.

SPECTROPHOTOMETRIC DETERMINATION OF PRIMARY, SECONDARY, AND TERTIARY FATTY AMINES IN AQUEOUS SOLUTION. R. M. Silverstein (Betz Laboratories, Inc., Philadelphia, Pa.). *Anal. Chem.* 35, 154–157 (1963). Conditions are established for the spectrophotometric analyses of aqueous solutions of fatty amines in the parts per million concentration range. A method is developed whereby primary, secondary, and tertiary amines may be differentiated. These amines react with methyl orange at pH 3 to 4 to form a yellow complex soluble in an organic liquid. The color intensity is a direct measure of total amine concentration. In the presence of salicylaldehyde, primary amines do not react with methyl orange. In the presence of acetic anhydride, only the tertiary amine reacts with methyl orange. Analyses of aqueous mixtures of octadecylamine, dioctadecylamine, and trioctadecylamine in the 0- to 2-p.p.m. range show an accuracy to 0.1 p.p.m. The analysis is nonspecific and may be applied to various amines.

CHARACTERIZATION AND DETERMINATION OF ALDEHYDES BY THE ULTRAVIOLET SPECTRAL CHANGES RESULTING FROM ACETAL FORMATION. E. P. Crowell, W. A. Powell and C. J. Varsel (Philip Morris Research Center, P. O. Box 3D, Richmnod 6, Va.). *Anal. Chem.* 35, 184–189 (1963). Acetal formation in conjunction with ultraviolet spectrophotometry has been employed as a convenient and useful analytical tool for the characterization and determination of aldehydes. The ultraviolet spectra of acetals formed from aldehydes in solutions of acidified methanol are significantly different from the spectra of the parent aldehydes in methanol. These differences in spectral properties between the aldehydes and their corresponding dimethyl acetals are used in the quantitative and qualitative analyses of aldehydes. The general qualitative application of the method was demonstrated on 49 aldehydes of various molecular structures. The quantitative aspects of this technique were demonstrated by the analysis of furfural and cinnamaldehyde in the presence of compounds that would normally offer serious interference to direct ultraviolet determinations.

COMPARISON OF SPECTROPHOTOMETRIC AND SPECTROPHOTOFLUOROMETRIC METHODS FOR THE DETERMINATION OF MALONALDEHYDE. E. Sawicki, T. W. Stanley, and H. Johnson (Robert A. Taft Sanitary Engineering Center, Cincinnati 26, Ohio). *Anal. Chem.* 35, 199–205 (1963). Ten new methods for the determination of malonaldehyde are compared with the thiobarbituric acid method. The reagents used in the new procedures are aniline, 4-hexyl-resorcinol, N-methylpyrrole, indole, 4′-aminoacetophenone, ethyl p-aminobenzoate, 4-4′-sulfonyldianiline, p-nitroaniline, and azulene. The most sensitive spectrophotometric method is the thiobarbituric acid method; the most highly selective is the p-nitroaniline method. The spectrophotofluorometric methods are by far the most sensitive; they are highly selective also. Nanogram amounts of malonaldehyde can be determined with very little interference from other compounds. All methods measuring absorbance are in compliance with Beer's law. The spectrophotofluorometric methods measuring emission show a similar linear relation between the emission reading and the concentration. Most of the methods have a reasonable precision and color stability.

METHOD OF FAT EXTRACTION AND EXTRACTANT THEREFOR. B. B. Anderson, D. W. Bailey, and J. C. Ash (Anderson Laboratories, Inc.). *U.S. 3,074,982.* The extractant consists of a nonionic surfactant selected from a group of polyoxyethylene esters having an average of 16 oxyethylene groups per mol. of tall oil acids having from 12 to 30 carbon atoms in the chain, urea, dibasic sodium phosphate, ethylenediaminetetraacetic acid, and sodium carbonate. The proportions of the several ingredients are: 3.0 to 6.5 parts nonionic surfactant, 3.0 to 5.5 parts urea, 1.0 to 4.0 parts dibasic sodium phosphate, 1.0 to 5.5 parts ethylenediaminetetraacetic acid, and 1.0 to 5.5 parts sodium carbonate.

FAT RENDERING. F. P. Downing (Sharples Corp.). *U.S. 3,078-287.* Fatty tissue is reduced into a mass of particles of size from 1/32 to 3/4 inch, and the mass is initially warmed to a temperature not exceeding 110F. Mechanical energy in the form of high friction is then applied to the warmed mass to the extent necessary to raise the mass to a second temperature above the first temperature by at least 5F and sufficiently high to melt the higher melting fats present but not in excess of 120F. The mass is then centrifuged to separate at least 70% of the protein solids from melted fats.

CONTINUOUS MANUFACTURE OF MONOGLYCERIDES. S. S. Chang and L. H. Wiedermann (Swift & Co.). *U.S. 3,079,412.* A homogenized mixture of a glyceride and a first portion of glycerol are continuously passed into a reaction zone maintained at a temperature of from 200–350C; simultaneously a second portion of the glycerol is passed counter-currently into the reaction zone in the presence of an alkaline alcoholysis catalyst. The reaction mixture is continuously withdrawn from the reaction zone and the catalyst is immediately inactivated prior to any appreciable cooling of the mixture. The reaction is thus halted at the reaction-temperature equilibrium-content of monoesters.

(Continued on page 27)

(Continued from page 25)

ENZYMATIC OMEGA CARBOXYLATION OF FATTY ACIDS. K. C. Robbins (Armour Pharmaceutical Co.). *U.S. 3,080,296.* The process of *in vitro* oxidation of monocarboxylic acids to corresponding straight chain non-substituted terminal dicarboxylic acids consists of contacting terminally saturated straight chain normal monocarboxylic acids having a carboxyl group attached to the carbon atom, normal position, and having 8 to 18 carbon atoms, with animal visceral organ tissue homogenates having omega oxidation activity and being substantially mitochondria-free.

FATTY ACIDS. HENKEL & CIE. *Ger. 1,131,835; Ger. Patents Abs.*, 1962, 2, No. 29, Gp. 5, p. 3. Fatty acids are treated to improve their colour by distillation in the presence of esters of boric acid, preferably with alcohols having 1–18 C atoms, especially 1–6 C atoms, or with hydroxy-carboxylic acids, especially ricinoleic acid, as alcohol component. Typically cotton oil fatty acid is distilled in the presence of 3% tri-isopropyl borate at 1 mm. Hg. The process may be applied to animal, vegetable or synthetic fatty acids which may be saturated or unsaturated, straight- or branched-chain aliphatic or cycloaliphatic carboxylic acids with 8–25 C atoms, especially 10–22 C atoms. The borate esters may be used in amounts of 0·01–3%, especially 0·05–1%, based on the fatty acid, and distillation may be carried out at 120–260°C. and 5 mm. Hg. The fatty acids are obtained as a light distillate and the borate esters remain dissolved in the residue. (Rev. Cur. Lit. Paint Allied Ind.).

• Fatty Acid Derivatives

DETERMINATION OF THE ALDEHYDES AND KETONES AS THEIR 2,4-DINITROPHENYLHYDROZONES BY SPECTROPHOTOMETRIC PROCEDURE. Yoshihito Suzuki and Senjiro Maruta (Nagoya Univ.). *Yukagaku* 12, 44–7 (1963). Ultraviolet spectra of the 2,4-dinitrophenylhydrazones of aliphatic, saturated aldehydes and ketones were measured. The former gave λ_{max} at 358 mμ and that of the latter at 363 mμ in ethanol solution, but both showed similar absorption curves. Therefore, it was possible to determine the total carbonyl compounds in the mixture but the determination aldehyde 2,4-dinitrophenylhydrazone in the presence of ketone 2,4-dinitrophenylhydrazone was impossible. When the mixture of these 2,4-dinitrophenylhydrazones was made alkaline, the λ_{max} in ultraviolet region was disappeared and the λ_{max} was appeared in visible region at 440 mμ. The color-fading of aldehyde 2,4-dinitrophenylhydrazone was noticed with the lapse of time while that of ketone 2,4-dinitrophenylhydrazone remained stable. The color-fading of aldehyde 2,4-dinitrophenylhydrazone was proportional to the molar concentration. Thus, the determination of aldehyde and ketone was possible by measuring of ultraviolet absorption spectra in a neutral solution and color-fading velocity in the visible region from alkaline solution.

STUDIES ON CHLORINATED FATTY ACID ESTERS AS PLASTICIZERS FOR PVC. II. APPLICATION OF METHYL PENTACHLOROSTEARATE AS A PLASTICIZER FOR PVC. Hisato Murata (Asahi Electro Chemical Co., Ltd.). *Yukagaku* 11, 513–17 (1962). Methyl pentachlorostearate (MPCS) which was stabilized by epoxidized soybean oil and by the butyl ester of epoxidized soybean fatty acid was examined as a plasticizer for poly (vinyl chloride) (PVC). Stability of MPCS was improved by the addition of epoxidized soy bean oil and butyl ester of epoxidized soybean fatty acid, but mechanical strength and electrical resistivity of the PVC compounds became inferior. Permanency of plasticized sheets in hot air and oil was improved by the addition of epoxidized soybean oil, but it became inferior by the addition of butyl ester of epoxidized soybean fatty acid. Low temperature flexibility and efficiency of plasticizer was improved markedly by the addition of butyl ester of epoxidized soybean fatty acid. The stabilized MPCS appears to be of broad utility applicable to a wide range of vinyl processing techniques.

EFFECT OF ADDED ALIPHATIC ACIDS IN THE AMIDATION OF METHYL ESTERS OF ALIPHATIC ACID. Seimei Nitanai, Kozo Nakamura, and Hisanori Nakamura (Toyo Koatsu Co., Hokkaido). *Yukagaku* 11, 637–42 (1962). Amidation of methyl esters of monobasic or dibasic acid by blowing in ammonia for 6 hours at 200C was very slow. Addition of 10% fatty acid increased the rate.

THERMAL DEGRADATION OF HIGHER FATTY ACIDS AND THEIR DERIVATIVES. Yasuo Suhara (Government Chem. Indust. Res. Inst., Tokyo). *Yukagaku* 11, 473–6 (1962). Epoxy fatty acids and their derivatives were heated in nitrogen atmosphere at 70, 95, 120, and 150C and oxirane oxygen content (and neutralization no.) of each sample was determined. When solid epoxy compound lost about 20% of oxirane oxygen by heating, it was changed into a viscous liquid. The loss of 70% of oxirane oxygen gave a gel. The oxirane oxygen in *cis*-epoxy fatty acids was destroyed more readily than the carboxyl group by heating, whereas *trans*-epoxy fatty acids lost carboxyl groups faster than oxirane oxygen. At the experimental temperatures, *trans*-epoxy compounds were more stable than *cis*-epoxy compounds, and ester and amide derivatives of epoxy fatty acid were much more stable than the epoxy fatty acids. Metal epoxy stearate were not stable excepting the barium salt.

CHARACTERIZATION OF THE KETODIENES FORMED IN THE OXIDATION OF LINOLEATE BY LIPOXIDASE. E. Vioque and R. T. Holman (Hormel Institute). *Arch. Biochem. Biophys.* 99, 522–8 (1962). The oxidation products of ethyl linoleate, which have an absorption maximum at 277 mμ, have been isolated by column chromatography and thin-layer chromatography. Ultraviolet, near infrared, and infrared spectra and the microchemical analysis for ester and ketone functions have indicated that the chromophore is a mixture of 9-keto-11,13-octadecadienoate and 13-keto-9,11-octadecadienoate. Reduction to the hydroxy compounds and subsequent dehydration yielded octadecatrienoate. The methods used required 1–10 mg. of sample which were isolated and purified via thin-layer chromatography.

MOLDING STARCH COMPOSITION. J. F. McGowan, Jr., and N. G. Marotta (National Starch and Chemical Corp.). *U.S. 3,074,803.* A molding starch composition to be used in the manufacture of confections consists of an intimate mixture of: (1) an ungelatinized, cold water insoluble starch; (2) a fatty acid ester selected from the class consisting of propylene glycol stearate, glyceryl monostearate, -distearate, -tristearate, -mono-oleate, -trioleate, -oleostearate, and propylene glycol monolaurate; and (3) a solubilizer for the fatty acid ester selected from the class consisting of glyceryl triacetate, triethyl citrate, tributyl citrate, glyceryl monoacetate, -diacetate, triethyl phosphate, propylene glycol, ethyl acetoacetate, and ethylene glycol diacetate. The proportions by weight of the ingredients are from 94.0 to 99.9% starch, 0.02 to 5.0% fatty acid ester, and 0.08 to 5.0% solubilizer.

(Continued on page 30)

(Continued from page 27)

PROCESS FOR MANUFACTURE OF PHENOLATED FATTY ACIDS. F. O. Barrett and C. G. Goebel (Emery Industries, Inc.) *U. S. 3,074,983.* At least one unsaturated fatty acid (selected from the group consisting of undecylenic, oleic, linoleic, linolenic, palmitoleic, and erucic acids) is reacted with a phenolic compound (selected from the group consisting of phenol and lower-alkyl substituted phenols) in the continuing presence of a minor percentage of a surface active clay mineral and from about 0.5 to 2.5% of available water, at temperatures of from 125 to 200C.

CATALYTIC DECARBOXYLATION OF FATTY ACIDS TO PRODUCE KETONES. E. S. Hammerberg and R. Chesrown (Armour & Co.). *U.S. 3,075,016.* The described process comprises mixing from 0.5 to 2.0% by weight of a magnesium compound which upon calcination will yield magnesium oxide with a fatty acid having from 8 to 22 carbon atoms, and continuously contacting the resulting mixture at a decarboxylating temperature with a magnesium oxide catalyst supported upon an inert carrier.

PROCESS FOR POLYMERIZING UNSATURATED FATTY ACIDS. L. D. Myers, C. G. Goebel, and F. O. Barrett (Emery Industries, Inc.). *U.S. 3,076,003.* In a process in which polymerization of unsaturated fatty acids is effected by heating the acids in the continuing presence of minor proportions of surface-active crystalline clay mineral and water, the improvement comprises incorporating in the reaction mixture a catalytic amount of a nitrogenous compound capable of reacting in some measure with the fatty acids in the mixture to form an ammonia soap.

OIL COMPOSITIONS CONTAINING SOAP-SALT MIXTURES. A. J. Morway (Esso Research and Engineering Co.). *U.S. 3,077,450.* A lubricant composition consists of a lubricating oil and about 3 to 60 wt. % (on total composition) of a soap-salt mixture consisting essentially of alkaline earth metal salt of acetic acid and alkaline earth metal soap of C_{14} to C_{30} fatty acid having an iodine number of 35 to 110 and a saponification number within the range of 250 to 150 mg. KOH/gm., in which a major proportion of the long chain fatty acid is monounsaturated. The mol equivalent ratio of the salt to the soap is within the range of about 100:1 to 1,000:1.

DOUBLE DECOMPOSITION SOAP PROCESS. H. M. Olson (Harshaw Chemical Co.). *U.S. 3,078,288.* A calcium soap of a fatty acid having from 9 to 22 carbon atoms is dispersed in water. To the dispersion is then added a water soluble salt having an anion which has the ability of forming water soluble salts with calcium and a metallic cation selected from the cations of the group III, IV, V, VI-A and VIII elements.

PREPARATION OF LONG-CHAIN ALIPHATIC PEROXY ACIDS. L. S. Silbert and D. Swern (U.S.A., Sec'y. of Agriculture). *U.S. 3,079,411.* A process for the preparation of an aliphatic peroxy acid comprises contacting an aliphatic compound of a general formula selected from the group consisting of $ROOC\text{-}(CH_2)_n\text{-}Y$ in which R is H or a short carbon chain alkyl radical, Y is CH_3 or COOR, and n is an integer from 4 to 20; $ROOC\text{-}(CHX)\text{-}(CH_2)_n\text{-}CH_3$ where R is H or a short carbon chain alkyl radical, X is F, Cl, or Br, and n is an integer from 3 to 19; and $ROOC\text{-}(CH_2)_m\text{-}(CHOH)\text{-}(CH_2)_n\text{-}H$ where R is H or a short carbon chain alkyl radical, m is an integer from 4 to 20, n is an integer from 0 to 16, and the maximum sum of m and n is 20; in an alkanesulfonic acid selected from the group consisting of methane or ethane sulfonic acid and mixtures thereof at a temperature in the range of 10–60C, with hydrogen peroxide, thus converting the aliphatic compound to an aliphatic peroxy acid. The peroxy acid is then separated from the reaction mixture.

METHOD OF PRODUCING SHORT CHAIN METHYL ESTERS. K. J. Moulton, T. W. Findley, and V. I. Komarewsky (Swift & Co.). *U.S. 3,079,413.* A method of producing a mixture of short chain methyl esters and hydrocarbons comprises: (1) reacting unsubstituted methyl esters of higher fatty acids in the vapor phase at a temperature above the vaporization temperature of the esters but below 1100F; (2) collecting the condensable reaction products including short chain methyl esters and hydrocarbons; and (3) separating the short chain products from the unreacted unsubstituted methyl esters.

EPOXIDATION. HENKEL & CIE. *Brit. 865,271; J. Appl. Chem. Abs.*, 1962, 12, No. 7, ii–51. In the epoxidation of compounds containing at least one olefinic double bond and 30 C atoms per double bond, which boil at <50C at normal pressure (soyabean oil, oleyl alcohol, *etc.*) by treatment with percarboxylic acids, the reaction is carried out in the presence of an Al compound, the composition and/or crystal structure of which lies in a range extending from $Al_2O_3,2H_2O$ to $\gamma\text{-}Al_2O_3$. (Rev. Cur. Lit. Paint Allied Ind.)

• Biology and Nutrition

THIN-LAYER CHROMATOGRAPHY OF STEROIDS. J. Avigan, D. W. S. Goodman, and D. Steinberg (Section on Metabolism, National Heart Inst., National Institutes of Health, Bethesda, Md.). *J. Lipid Res.* **4**, 100–101 (1963). Thin-layer chromatographic fractionation of several sterols that are metabolic precursors of cholesterol was carried out both for analytic and preparative purposes in the course of studies of cholesterol biosynthesis.

EFFECT OF IODINE TREATMENT ON LIPID, PROTEIN, AND LIPOPROTEIN FRACTIONS OF THE BLOOD AND ON BASAL METABOLISM OF PATIENTS WITH ATHEROSCLEROSIS. N. Ya. Pitel (Clinic of Faculty Therapy, Leningrad Med. Inst. for Sanitation and Hygiene). *Federation Proc.* 22, T135–137 (1963). (Terapevticheskii Arkhiv **34**(4), 53, 1962). The author observed 107 (62% men) patients with atherosclerosis, mainly of the coronary arteries; 33 of them were not given iodine therapy and constituted a control group. In half the subjects (both the control and the experimental group) atherosclerosis was accompanied by hypertensive disease. After treatment for 20–30 days with large doses of iodine under hospital conditions, the condition of patients improved. Increase of phospholipids and of the phospholipid-cholesterol ratio was observed, while blood cholesterol tended to fall; no important changes in basal metabolism were observed. In all the atherosclerosis patients, the initial β-lipoprotein level was high. A connection between the development of the atherosclerotic process and the presence in the blood of high β-lipoprotein levels was noted and undoubtedly confirms the diagnostic importance of these fractions in clinical examination of the patient. Under treatment with large doses of iodine, decrease in the β-lipoprotein and β-globulin levels was observed in more than one-third of the patients, attended by a rise of the α-lipoprotein and albumin levels.

INCIDENCE OF AORTIC ATHEROSCLEROSIS IN THE HOT CLIMATE OF THE FERGANA VALLEY, UZBEK SSR. M. YA. Laufer (Andizhan Regional Clinical Hospital). *Federation Proc.* 22, T59–62 (1963). (Arkhiv Patrlogii **24**(4), 38, 1962). This paper analyzes data collected by the Department of Pathological Anatomy at the Andizhan Clinical Hospital over a period of ten years and data collected by the Office of Forensic Medicine in five years. Because atherosclerosis is believed to be less common among the indigenous populations of Asia and Africa than among Europeans domiciled there, its incidence in each of these two population groups, was studied separately, and the information was classified by age and sex. In the hot climate of the Fergana Valley, atherosclerosis of the aorta is far less common and follows a far more benign course than in the central regions of the USSR. Atherosclerosis of the aorta is far less common and follows a more benign course among the indigenous population than among the nonindigenous population. The reasons for the lower morbidity of atherosclerosis of the aorta among the indigenous population are to be found in dietary peculiarities involving the predominance of carbohydrates and vegetable oils in the diet and in the climatic conditions peculiar to the Fergana Valley. These factors also affect the nonindigenous population but to a lesser extent.

BREAKDOWN OF PHOSPHOLIPIDS IN MILD ALKALINE HYDROLYSIS. H. Brockerhoff (Fisheries Research Board of Canada, Halifax, Nova Scotia, Canada). *J. Lipid Res.* **4**, 96–99 (1963). Deacylation of phospholipids by mild alkaline hydrolysis is usually accompanied by some hydrolysis of phosphate ester bonds. This undesired side reaction is suppressed by polar solvents. Deacylation with lithium hydroxide in chloroform-methanol (2:8) will cause the breakdown of not more than 0.1% of egg lecithin.

FATTY ACID METABOLISM IN SERRATIA MARCESCENS: III. THE CONSTITUENT FATTY ACIDS OF THE CELL. D. G. Bishop and J. L. Still (Dept. of Biochem., Univ. of Sydney, Sydney, Australia). *J. Lipid Res.* **4**, 81–86 (1963). An analysis of the lipids of the bacterium *Serratia marcescens* has shown that palmitic acid and 9,10-methylenehexadecanoic acid constitute about 75% of the total fatty acid and consist predominately of 9,10-hexadecenoic acid (palmitoleic acid) and 11,12-octadecenoic acid (vaccenic acid). Three hydroxy acids that may function as intermediates in the biosynthesis of unsaturated fatty acids have also been isolated and characterized.

IV. THE EFFECT OF TEMPERATURE ON FATTY ACID COMPOSITION. *Ibid.*, 87–90. An analysis of the fatty acids of *Serratia marcescens* grown at different temperatures shows that three medium-chain hydroxy acids, present in cells grown at 30C,

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are greatly decreased in quantity when the cells are grown at 37C. The content of unsaturated and cyclopropane acids in microorganisms requires hydroxy acids as intermediates, it is suggested that the temperature-sensitive reaction is a reaction leading to the trapping of the hydroxy acids in a bound form. An analysis of the cellular fatty acids of a nonpigmenting strain of *S. marcescens* has revealed the presence of 12 unidentified acids. These acids, which constitute 36% of the total fatty acids of the "free" lipid of cells grown at 30C are almost entirely absent in cells grown at 37C.

Effects of prolonged intake of sunflower oil on experimental hypertension. T. A. Braksh, O. YA. Kurtsin', A. V. Popova, and L. F. Roshchina (Lab. of Higher Nervous Activity and Lab. of Metabolism, Inst. of Nutr., Academy of Med. Sciences of the USSR, Moscow). *Federation Proc.* 22, T132–134 (1963). (Voprosy Pitaniya 21(2), 11, 1962). The present work is concerned with the effects of prolonged intake of sunflower oil (as the sole dietary fat) on experimental conditioned-reflex adrenalin hypertension. The oil did not show a consistently beneficial effect on higher nervous activity.

Effect of certain vegetable oils on cholesterol and lecithin levels in atherosclerosis patients. A. M. Pleshkov (No. 1 Therapeutic Clinic, Novokuznetsk Advanced Training Inst. for Doctors). *Federation Proc.* 22, T138–140 (1963). (Klinichesdaya Meditsina 40(3), 126, 1962). A daily ingestion of sunflower oil (100 and 50 g per day) in addition to a diet containing up to 40 g of animal fat leads, in most cases, to a rapid drop of the blood cholesterol level, especially during the first month of oil ingestion. No regular changes in the blood lecithin level were noted. After the ingestion of sunflower oil was stopped, the blood cholesterol level again began to increase rapidly; therefore, in order to maintain the lowered cholesterol level, it is necessary to take sunflower oil for a prolonged time. A considerably weaker effect is noted with a daily ingestion of 50 g of cottonseed oil.

The biochemistry of plasmalogens: II. Hemolytic activity of some plasmalogen derivatives. E. L. Gottfried and M. M. Rapport (Dept. of Med. and Biochem., and the Unit for Res. in Aging, Albert Einstein College of Med., Yeshiva Univ., New York 61, N. Y.). *J. Lipid Res.* 4, 57–62 (1963). A series of lysophosphatides was prepared from the plasmalogens phosphatidal choline and phosphatidal ethanolamine, and their hemolytic activity compared with that of α-palmitoyl lysolecithin. The nature of the linkage of the hydrocarbon chain (acyl ester, αβ-unsaturated ether, or alkyl ether) did not appreciably affect lytic activity. Unsaturation in the hydrocarbon chain of lysolecithins decreased hemolytic activity considerably; lysocephalins were significantly different in this respect. Sheep erythrocytes were much more sensitive to differences in lysolecithin structure than human or rabbit erythrocytes.

Thromboplastic activity of phosphatidylethanolamine from natural and synthetic sources. D. L. Turner, R. R. Holburn, M. DeSipin, M. J. Silver, and L. M. Tocantins (Cardeza Foundation, Jefferson Medical College, Philadelphia 7, Penn.). *J. Lipid Res.* 4, 52–56 (1963). Improvements are described in the preparation of phosphatidylethanolamine from hen's egg and in the preparation of intermediates used in the total synthesis of racemic dioleoyl-phosphatidylethanolamine. Both preparations have been found to be potent accelerators in the Hicks-Pitney test and moderately active in the thromboplastin generation test.

Effects of palmitate on the metabolism of leukocytes from guinea pig exudate. W. H. Evans and P. S. Mueller (Lab. of Biochem., Cytochem. Sec., Nat'l Cancer Inst., Bethesda 14, Md., and Lab. of Clinical Science, Nat'l Inst. of Mental Health, Bethesda 14, Md.). *J. Lipid Res.* 4, 39–45 (1963). The metabolism of palmitate by polymorphonuclear leukocytes (PMN) from guinea pig exudate in the presence of physiological concentrations of hyman serum albumin has been studied. The data indicate that with increasing concentration of palmitate in the medium, there is a concomitant increase in uptake of oxygen and palmitate. Palmitate uptake and the stimulation of oxygen uptake by palmitate were markedly inhibited by the glycolytic inhibitors sodium fluoride and iodoacetic acid. Cyanide and dinitrophenol had no effect on palmitate uptake or on the stimulation of oxygen uptake by palmitate. Guinea pig monocytes (MN) were found to be more active metabolically than PMN. Palmitate had no significant effect on the oxygen uptake of guinea pig circulating blood leukocytes and no net palmitate uptake was observed with such cells.

The dynamics of plasma free fatty acid metabolism during exercise. S. J. Friedberg, P. B. Sher, M. D. Bogdonoff, and E. H. Estes, Jr. (Cooperative Lipid Lab. and Radioisotope Unit, Veterans Admin. Hosp., Durham, N. C. and Dept. of Med., Duke Univ. Med. Center, Durham, N. C.). *J. Lipid Res.* 4, 34–48 (1963). Palmitic acid-1-C^{14} was given intravenously to volunteer subjects before, and toward the end of, 35–45 min of exercise. The fractional turnover rate and total turnover rates for plasma free fatty acids were greater during exercise. The concentration of free fatty acids in the plasma fell at the beginning of exercise, then rose and exceeded the resting levels. Immediately after exercise, there was a further abrupt rise and then another decline. The results indicate that exercise accelerates the efflux of plasma free fatty acids and then, secondarily, increases mobilization of free fatty acids from depots.

The lipoprotein lipase of mammary gland and the correlation of its activity to lactation. O. W. McBride and E. D. Korn (Lab. of Cellular Physiology and Metabolism, Nat'l Heart Inst., Bethesda, Md.). *J. Lipid Res.* 4, 17–20 (1963). The concentration of lipoprotein lipase of guinea pig mammary gland increases markedly just prior to parturition, reaching a maximum level within 2 hr post-partum. This level is maintained until the cessation of suckling, when the enzyme becomes undetectable within 18 hr. Most of the lipoprotein lipase of the mammary gland would appear to be accounted for by that in the retained milk.

Thin-layer chromatography of bile acids. P. Eneroth (Dept. of Chemistry, Karolinska Institutet, Stockholm, Sweden). *J. Lipid Res.* 4, 11–16 (1963). Solvent systems suitable for thin-layer chromatographic separation of 40 different bile acids are described. The influence of substituents and chain length on the separation factors in different solvent systems has been examined.

Factice chromatography: An automatically monitored, liquid-gel system for the separation of nonpolar lipids. J. Hirsch (The Rockefeller Inst., N. Y. 21, N. Y.). *J. Lipid Res.* 4, 1–10 (1963). A technique of column chromatography using factice, a hydrophobic polymer, as stationary phase, and aqueous acetone as moving phase is described. With this liquid-gel system, the major nonpolar lipid classes (cholesterol esters, triglycerides, cholesterol, diglycerides, and monoglycerides) are easily separated from each other. Separations of components with different fatty acid composition within the same lipid class can also be obtained. With the exception of cholesterol esters, lipids within a given class containing fatty acids of equivalent polarity are inseparable. Elution is performed with a single solvent mixture and detection of lipid in the effluent stream can be achieved by the use of automatic differential refractometry. Free fatty acids and phospholipids are poorly separated and must be removed from the lipid mixture prior to chromatography.

Studies on fatty liver induction by 4-aminopyrazolopyrimidine. J. F. Henderson (Department of Pharmacology, The George Washington Univ., School of Medicine, Washington, D. C.). *J. Lipid Res.* 4, 68–74 (1963). The effects of the adenine analogue, 4-aminopyrazolopyrimidine, on lipid metabolism in mouse liver have been studied in an attempt to ascertain the mechanism by which this drug causes fatty livers. Injection of 1 mg of APP caused an increase in the total liver lipid of 3- to 4-fold in 24 hr. which was almost entirely accounted for as neutral lipid. There was a small increase in the cholesterol content of treated livers, but no change in the amount of phospholipid. The plasma lipid concentration was decreased by APP treatment, and this was caused by a drop in triglycerides and cholesterol, whereas phospholipids and FFA did not change. The hyperlipemina normally elicited by Triton WR-1339 was inhibited by APP, which strongly suggest that this compound inhibits the secretion of triglycerides from the liver.

Studies on the biotin-oleic acid requirements of a Lactobacillus Plantarum variant isolated from chick feces. W. A. Zygmunt, H. E. Conrad, W. C. Stevenson and P. A. Tavormina (Mead Johnson Research Center, Evansville, Indiana). *Poultry Sci.* 42, 194–196 (1963). When condensed fish solubles or certain other materials are used to supplement a semi-synthetic diet, the intestinal flora of chicks becomes enriched with a *Lactobacillus plantarum* variant. The specific nutritional requirement of this strain for unsaturated acids in the presence of biotin sets it apart from other strains of *L. plantarum* which it otherwise resembles in cultural characteristics. The significance of these observations in bacterial taxonomy and in chick nutrition are discussed.

The uptake of C^{14}-β-carotene and its conversion to retinol ester (vitamin *A* ester) by the isolated perfused rat liver. R. S. Zachman and J. A. Olson (Dept. of Biochem. Univ. of Fla., College of Med., Gainesville). *J. Biol. Chem.* **238**, 541–546 (1963). C^{14}-β-carotene is converted into retinol ester by the isolated perfused rat liver. The amount of retinol ester formed was directly proportional to the time of perfusion, 0.6 to 0.8 μg per hour at initial β-carotene concentrations of 20 to 22 μg per 100 ml of perfusate, and was dependent on the initial concentration of β-carotene in the perfusate. The kinetics of the uptake of β-carotene was first order for experimental periods up to 2 hours ($k = 5.6 \pm 0.81 \times 10^{-3}$ min^{-1}), with no evidence of a saturating effect at the levels of β-carotene used (10 to 70 μg). Sodium glycocholate had no effect on the uptake or conversion of β-carotene in this perfused liver system at concentrations to 0.1%, but at a concentration of 0.4%, β-carotene uptake (or adsorption) was stimulated and retinol ester formation was inhibited. Liver damage was evident at 0.4% glycocholate. Bovine serum albumin and serum from rats deprived of food inhibited the uptake of β-carotene and its conversion into retinol ester.

Effect of oxidative phosphorylation inhibitors on synthesis of liver mitochondria phospholipids. J. N. Youngs and W. E. Cornatzer (Guy and Bertha Ireland Res. Lab., Dept. of Biochem., Univ. of North Dakota School of Med., Grand Forks). *Proc. Soc. Exp. Biol. Med.* **112**, 308–311 (1963). The effect of single doeses of arsenate, bilirubin, dinitrophenol and oligomycin on synthesis of mitochondria phospholipids of the liver of rats was studied. A statistically significant decrease occurred in synthesis of phosphatidyl inositol, sphingomyelin, lecithin, phosphatidyl serine and phosphatidyl ethanolamine of liver mitochondria following administration of dinitrophenol. Administration of arsenate, oligomycin and bilirubin inhibited statistically the incorporation of the isotope into all the phospholipid fractions of liver mitochondria except sphingomyelin and phosphatidyl inositol. However, oligomycin inhibited incorporation of the isotope into the sphingomyelin fraction and arsenate inhibited the phosphatidyl inositol fraction.

Simultaneous distillation of water and extraction of fat from mouse carcasses and tissues. G. L. Wolff and B. Bakay (Inst. for Cancer Research, Philadelphia, Pa.). *Proc. Soc. Exp. Biol. Med.* **112**, 524–526 (1963). Distillation of body water and extraction of fat were performed in one simple operation based on the lower specific gravity (0.87) and higher boiling point (110.6°C) of toluene as compared with water and the solubility of lipids in toluene.

Estimates of genetic parameters of serum cholesterol level. F. H. Wilcox, F. L. Cherms, Jr., L. D. VanVleck, W. R. Harvey, and C. S. Shaffner (Dept. of Poultry Husbandry, Univ. of Maryland, College Park, Md.). *Poultry Sci.* **42**, 37–42 (1963). Genetic parameters in respect to serum cholesterol level were estimated on random bred White Leghorns. The heritability estimate of the trait in the young chicken was 0.25. Phenotypic correlations were estimated between cholesterol level at two ages and several productive traits. The only repeatable and significant ones were between adult cholesterol level and cholesterol level of the young chicken (positive), egg weight (negative), and albumen quality (negative). Genetic correlations were calculated between cholesterol level of the young pullet and productive traits. They were positive for chick body weight, age at first egg, egg production, and albumen quality, and negative for adult body weight. No or inconsistent genetic correlations were found for egg weight, shell strength, meat spots, and blood spots. Average cholesterol levels in reciprocal crosses of high and low cholesterol lines were close to each other and to the average of the two lines.

Production of octadecenoic acid in plasma by Staphylococcus aureus. J. T. Weld, B. H. Kean and W. M. O'Leary (Dept. of Public Health and Microbiology, Cornell Univ., Med. College, New York City). *Proc. Soc. Exp. Biol. Med.* **112**, 448–451 (1963). Macroscopically visible lipid plaques were produced on the surface of human blood agar plates and on 10% plasma agar plates when they were inoculated centrally with certain strains of coagulase-positive *S. aureus* or exposed to active sterile agar segments (ASA). Similar lipid plaques covered the surface of liquid media containing plasma when activated sterile agar segments were suspended in the media. Staphylococcus antioxin prevented the appearance of the lipid plaques. The lipid plaques consist primarily of octadecenoic acid, both free and in triglycerides. Lesser amounts of stearic, palmitic and various shorter chain acids are also present. The most likely explanation for the phenomenon is that a lipase released by certain strains of staphylococci acts upon the lipids in human plasma.

Human lipoproteins: Role in transport of thyroid hormones. E. Toro-Goyco and M. Cancio (Veterans Admin. Hosp. and Dept. of Biochem. and Nutr., School of Med., Univ. of Puerto Rico, San Juan). *Science* **139**, 761–762 (1963). Lipoproteins from patients receiving therapeutic doses of iodine-131 were isolated by density-gradient techniques. The binding of circulating thyroid hormones by beta lipoproteins (those of low density) was negligible. Alpha lipoproteins (those of high density) bound appreciable amounts. The bulk, however, was bound by proteins of density higher than 1.23 g/ml.

The effects of dietary fat and energy levels on the performance of caged laying birds. B. E. March and J. Biely (Poultry Nutrition Lab., Univ. of British Columbia, Vancouver, B. C., Canada). *Poultry Sci.* **42**, 20–24 (1963). The effects of adding fat, with and without a concomitant increase in energy level, to the ration fed to 11-months-old laying birds are reported. Body weight, mortality, rate of egg production, albumen quality and shell thickness were not significantly affected by the level of fat in the ration. Egg size was reduced when 10 per cent of fat was added to the ration without increasing the energy level. It is concluded that the reduction in egg size was related to the decrease in feed intake of the birds fed this ration.

Effect of chemical additives on the spreading quality of butter. II. Laboratory and plant churnings. J. G. Kapsalis, T. Kristoffersen, I. A. Gould, and J. J. Betscher (Dept. of Dairy Tech., The Ohio Agricultural Expt. Sta., Wooster). *J. Dairy Sci.* **46**, 107–113 (1963). To determine the effect of additives on the spreadability and hardness of butter, 37 materials were added singly or in combination to the cream or to the butter in concentrations of 0.5 to 6%. The materials investigated in 280 laboratory churnings and 42 commercial conventional and continuous churnings included glyceride preparations, Tweens and Spans, stabilizers, vegetable oils, crystal inhibitors, salts, enzymes, detergents, skimmilk solids, and buttermilk solids. The results revealed that several materials, particularly certain glyceride preparations and Tweens and Spans, lecithin, buttermilk solids, and skimmilk solids were effective in improving the spreadability and decreasing the hardness of the butter.

• Detergents

Intermediates in ABS degradation. R. D. Swisher (Monsanto Chemical Co.). *Soap Chem. Specialties* **39**(2), 58–62 (1963). River water biodegradation of straight chain secondary alkylbenzene sulfonates is characterized by the buildup of a few transient intermediates which can be detected by desulfonation and gas chromatography. Identities of these intermediates have been deduced. A picture of the biodegradation process has been developed consistent with the observations: (1) Initial oxidation attack is at one end of the chain. (2) Once initiated, the chain is rapidly degraded by the β-oxidation process until a terminal carboxyl group is formed either 2 or 3 carbons away from the phenyl group. (3) The β- or γ-sulphenyl alkanoic acid thus formed is then attacked at the other end of the chain, after which complete oxidation of the molecule proceeds rapidly. (4) A minor fraction of the chain oxidation may involve a singly 1-carbon step instead of the 2 carbon β-oxidation process.

Creamy high-foam liquid built detergent composition. W. A. Tidridge and L. E. Cohen (FMC Corp.), *U.S. 3,072,578.* The described composition consists of: from 13 to 30% by weight of tetrapotassium pyrophosphate, 1.4 to 2.3% of SiO_2 as sodium silicate in which the ratio of SiO_2/Na_2O may vary from 3.2/1 to 1/1, from 14 to 23.6% of sodium dodecyl benzene sulfonate, from 0.1 to 3% of sodium carboxymethylcellulose, from 4.3 to 10% of a mixture of sulfated monoesters of lauryl and myristyl acids and 2-amino-2-methyl-1,3-propanediol water. The ratio of tetrapotassium pyrophosphate to the mixture of lauryl and myristyl esters is approximately 3:1.

Shampoo composition. D. D. Laiderman (Gillette Co.). *U.S. 3,072,580.* A shampoo composition consists of water and (A) from 8 to 20% by weight, based on the total weight of the shampoo, of a surface active agent selected from the class consisting of (1) the sodium salt of N-acyl-N-methyl taurine and (2) a mixture of the sodium salt with up to an equal amount of a member of the class consisting of the sodium, magnesium and triethanolamine salts of an alkyl sulfuric acid, the acyl and alkyl groups of the surface active agents each having from 10 to 18 carbon atoms, (B) from 6 to 50% by weight, based on the weight of the surface active agent, of an alkylolamide of a fatty acid having from 10 to 14 carbon atoms in the chain, and (C) from 6 to 50% of a compound having the

(Continued on Page 39)

(Continued from page 36)

structure $R_1R_2R_3COH$ in which R_1 and R_2 are lower alkyl groups having 1-4 carbon atoms, and R_3 is a member of the class consisting of $-C\equiv C-R_4-R_5-OH$ and $-CH_2-CH_2-C-R_4R_5OH$ in which R_4 and R_5 are alkyl groups having 1–4 carbon atoms. *The total weight of (B) and (C) together is from 20 to 75% by weight of the surface active agent.*

SUBSTITUTED PEROXYBENZOIC ACID BLEACHING AGENTS. P. Brocklehurst and P. J. Pengilly (Procter & Gamble Co.). *U.S. 3,075,921.* A water-soluble detergent composition consists of a solid active anionic synthetic detergent ingredient (selected from the group consisting of alkyl benzene sulfonates, alkyl sulfates, fatty acid isethionates and fatty acyl taurides) and a solid substituted peroxybenzoic acid bleaching agent which is characterized by a stability to decomposition in its solid state. The bleaching agent is substituted in the benzene nucleus by at least one radical selected from the group consisting of nitro, chloro, cyano, lower alkyl and lower alkoxy radicals. *The substitution is such that the bleaching agent has a melting* point of at least 50C.

PREPARATION OF LIQUID DETERGENT COMPOSITIONS. H. E. Wixon (Colgate-Palmolive Co.). *U.S. 3,075,922.* A process for preparing a detergent composition in the form of a stable and homogeneous pourable liquid comprises: preparing an aqueous solution of sodium carboxymethylcellulose in a concentration from 0.1 to 10% by weight, adding a polyphosphate (potassium pyrophosphate in particulate form or in aqueous solution) slowly and with agitation to the cellulose solution to form a pourable liquid, and then admixing the cellulose-pyrophosphate solution with an alkali metal alkyl benzene sulfonate having 8 to 15 carbons in the alkyl group. The proportions should *be 0.2 to 3 parts of cellulose salt, 10 to 30 parts of the* pyrophosphate, 5 to 30 parts of the alkyl benzene sulfonate, and sufficient water to bring the total to 100 parts.

DETERGENT COMPOSITION. M. Rubin. *U.S. 3,075,924.* The described composition consists of: 0.5 to 10% by weight of sisal juice solids; 0.5 to 10% of the sodium salt of a chelating agent (selected from the group consisting of ethylenediaminetetraacetic acid, ethylenediaminetriacetic acid and beta hydroxy ethylenediaminetriacetic acid); 0 to 4% of a detergent selected from the group consisting of the higher alkyl-aryl sulfonates, the higher aliphatic sulfates, and the higher aliphatic sulfonates; and water.

DETERGENT BAR. R. M. Anstett (Colgate-Palmolive Co.). *U.S. 3,076,766.* A milled and plodded detergent bar has the following composition: 8–20% alkali metal salt of substantially saturated higher fatty glyceryl sulfuric acid compound selected from the group consisting of the sodium and potassium salt thereof; 3–10% alkali metal alkyl aryl sulfonate in which the alkyl group is of 10 to 18 carbon atoms and the aryl radical is benzene, toluene, or xylene; 3–10% alkali metal salt of higher acyl amide of an amino lower aliphatic sulfonic acid of 2 to 4 carbon atoms in which the higher acyl radical is of 12 to 18 carbon atoms and the alkali metal salt is either the sodium or potassium salt; 45–65% soluble alkali metal soap with a major proportion being sodium soap, more than 65% of the soap fatty acid content being saturated fatty acids, and having a predominant amount, over 75% of the soap fatty acid of 12–18 carbons, of which fatty acids 25–60% is of 12 to 14 carbons and 75–40% is of 16 to 18 carbon atoms; 6–14% moisture; and less than 7% total content of alkali metal sulfate and alkali metal chloride.

DETERGENT COMPOSITION INCLUDING DUST INHIBITING AGENT. W. Fries and H. Sinner (Henkel & Cie, G.m.b.H.). *U.S. 3,079,344.* An abrasive detergent composition consists of (1) a particle-form water-insoluble naturally occurring abrasive component of a particle size up to about 1 mm. selected from the group consisting of quartz, marble, limestone, dolomite, pumice stone and rock; (2) a particle-form water-soluble component of a particle size smaller than that of the water-insoluble component, selected from the group consisting of alkali metal carbonate, -bicarbonate, -triple orthophosphate, -double orthophosphate, or-polyphosphate, ammonium chloride, -sulfate, and -carbonate; (3) a surface active member selected from the group consisting of alkylsulfonate having an alkyl group of from 10 to 20 carbon atoms, alkylbenzenesulfonate having an alkyl group of 10 to 20 carbon atoms, alkylnapthalene sulfonate having a similar alkyl group, fatty alcohol glycerine ether sulfate, having a fatty alcohol radical of from 10 to 20 carbons, fatty alcohol sulfate having a fatty alcohol radical of from 12 to 16 carbons, and water-soluble soap; and (4) a nonhygroscopic inorganic salt dust-inhibiting component. The amount of water-insoluble component exceeds the amount of the water-soluble component and is from 65 to 90% by weight of the total composition; the amount of the dust-inhibiting component ranges from 1 to 5% of the total.

SURFACTANTS. F. E. Boettner and J. Dupre (Rohm & Haas Co.). *U.S. 3,079,348.* The described composition consists of a mixture of at least one sulfated and one unsulfated t-carbinamine polyoxyethylene compounds having the formulas $R_1R_2R_3CNH(C_2H_4O)_mH$ and $R_1R_2R_3CNH(C_2H_4O)_mSO_3^-X^+$ in which R_1, R_2 and R_3 are alkyl groups having a total of 11 to 14 carbon atoms, m is a value of from 12.5 to 17.5, and X is a monovalent cation from the class consisting of hydrogen and the alkali metals. The amounts of the respective compounds in the mixture are from 75 to 85% of the sulfated compound *and from 25 to 15% of the unsulfated compound.*

SURFACTANT COMPOSITIONS. J. Dupre and F. E. Boettner (Rohm & Haas Co.). *U.S. 3,079,416.* A surfactant composition essentially consists of a compound having the formula $R_1R_2R_3CNH(C_2H_4O)_mSO_3^-X^+$ in which R_1, R_2 and R_3 are alkyl groups having a total of 11 to 14 carbon atoms, m has a value *of from 12.5 to 17.5 and X is a monovalent cation selected* from the class consisting of hydrogen and the alkali metals.

LABORATORY NOTES ON THE INCORPORATION OF CARBOXY-METHYL-CELLULOSE TO COMMON SOAPS. I. EXPERIMENTS WITH OLIVE OIL SOAPS. C. Gomez and F. Ramos (Instituto de la Grasa y sus Derivados, Seville, Spain). *Grasas y Aceites (Seville, Spain)* 13, 161–164 (1962). Carboxy-methyl-cellulose (CMC) was dissolved in aqueous sodium silicate and added to the neat soap phase of soaps made from high FFA olive oil. The operation was carried out in a mixer before putting the soap into frames. CMC addition improved the resistance of the soap to deformation by air drying after contact with water. The CMC also made the soap more stable in hard water and improved its *foaming ability.*

SYNDET TESTING COULD FOLLOW GERMAN LEAD. Anonymous. *Chem. & Eng. News* 41(7), 65–66 (1963). The West German method for testing the biodegradability of synthetic detergents is described. Synthetic effluent containing the test detergent is metered into an aeration tank where it passes through an activated sludge and is degraded. Settled sludge is pumped back into the aeration tank, and clarified run-off

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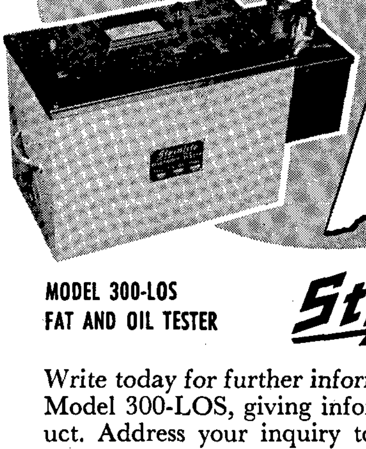

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from the system overflows into a collecting tank. After an initial period of 8 days, daily determinations of detergent content are made on the treated and untreated effluents for 21 days, and the percentage degradation computed. The arithmetic mean of these values is taken as the biodegradability of the detergent.

Non-ionic surfactants derived from ethylene oxide. A. Weiss (Conpania Quimica S. A., Argentina). *Rev. Arg. Grasas y Aceites* 4, 7–9 (1962). A review.

German firm develops new syndets. Anonymous. *Chem. & Eng. News* **41**(8), 55–56 (1963). The sugar esters of ricinoleic acid or mono-, di-, and trihydroxystearic acids were found to be effective nonionic detergents. Evaluations showed them to be non-toxic, low-foaming, and 100% biodegradable.

Effect of added impurities on the properties of purified polyoxyethylene nonylphenol ether. Koji Onoda (Miyoshi Oil & Fat Co., Tokyo). *Yukagaku* **12**, 48–51 (1963). Addition of polyethylene glycol had no effect on clouding points and foaming properties, but had a slight effect on wetting properties. Addition of nonylphenol had no effect on wetting but had remarkable effect on foaming properties and clouding points, and it had some effect on the form of curves in which the foaming properties were plotted against temperature.

Analysis of surface active agents. XIX. Ultraviolet absorption spectra of aromatic surfactants. Yasuji Izawa (Nagoya Univ.). *Yukagaku* **11**, 627–30 (1962). The λ_{max} (mμ) of surfactants were as follows: sodium alkylbenzenesulfonate 261, alkylpyridinium halide 259.5, alkylbenzyldimethylammonium chloride 263, polyoxyethylenealkylphenol 277, formaldehyde condensate of napthalene-sulfonate 289–290. A straight linear relationship between the extinction and concentration (%) was found at the λ_{max}.

Sodium alkylbenzenesulfonate. I. Separation and properties of o- and p-sodium alkylbenzenesulfonates. Yasushi Kimura, Kenkichi Oba, and Maomi Tobari (Lion Fat & Oil Co., Tokyo). *Yukagaku* **11**, 532–8 (1962). Sodium alkylbenzenesulfonates containing ortho- and para-isomers were converted into lead salts and extracted with 95% ethanol to give a soluble portion, rich in *o*-compound, and an insoluble portion, rich in *p*-compound. Infrared absorption spectra of *o*- and *p*-compounds are given. Solubilizing power and solubility were much greater in *o*-compounds than the *p*-compounds, but there was little difference in surface tension, wetting power and foaming power. There was no difference between *o*- and *p*-isomers of branched chain alkylbenzenesulfonate in bacteriostatic action and biological degradation.

Synthesis and properties of surface-active agents. IV. Synthesis of quarternary ammonium compounds with higher alkyl amine and propylene oxide. Takashi Yamamoto, Seiji Sumina and Yoshiro Nanba (Nippon Oils & Fats Co., Amagasaki). *Yukagaku* **11**, 464–9 (1962). The reaction of tertiary amine having little or no stearic hindrance with propylene oxide gave the quarternary ammonium compound. But, the reaction of secondary amine was difficult and the primary amine gave no reaction. The reactivity to produce the quarternary ammonium compounds depends on the back-strain of $CH_2CH(OH)CH_3$ radical formed by the addition of propylene oxide to secondary and primary amines. Quarternary ammonium salt obtained by this method showed surface activity.

Evaluation of dye-dispersing power by a semimicro azopigment electrophotometric method. Seiichi Imahori and Wasaburo Kimura (Nagoya Univ.). *Yukagaku* **11**, 470–3 (1962). For the evaluation of dye-dispersing power of surface-active agents, the semimicro determination of azopigment is suggested. The pigment is formed by coupling a diazotized base with naphthol in the presence of dispersing agent under definite condition. The determination of the amount of azopigment in the filtrate is made by electrophotometry. An accurate determination of dispersing power of surface-active agent is possible by this method.

• Drying Oils and Paints

Stability of model pigment dispersions in oil and alkyd media in relation to surface-active additives. B. Svoboda. *Plaste u. Kautschuk* **9**, 105–8 (1962). The relations between the critical pigment volume concentration (CPVC) and the amount of material adsorbed were studied with TiO_2 pigments in solutions of linseed oil with additions of fatty acids, amines and other surface-active agents. Film properties were found to change at about 40% PVC. The effect of storage was to raise the CPVC in alkyd solutions; with additions of fatty amines or fatty acids the changes were less marked. The degree of agglomeration and the CPVC value do not stand in direct proportion to the amount of material adsorbed on the pigment. By preliminary preparation of pigment pastes of high PVC, followed by dilution, there was an apparent dependence of the CPVC on the PVC, which was eliminated by addition of surface-active materials. (Rev. Current Lit. Paint Allied Ind.)

New paints and mastics. G. W. Mack. *National Builder* **42**, 1226–8 (1961). A short review is given of new types of paints and mastics and their composition; uses and general performance characteristics are listed. Corrosion-inhibiting primers for metals are considered, including those based on Zn dust, Zn chrome/Fe_2O_3 and Zn chrome/Zn tetroxychromate. Wash primers or etch primers and primers based on Ca plumbate are suitable for coating Zn surfaces. (Rev. Current Lit. Paint Allied Ind.)

Interaction between pigments and binders. K. Hamann. *VI F.A.T.I.P.E.C. Congress* **1962**, 76–85. The adsorption of binder on pigments and the electric charge of the pigments have been investigated The dependence of the adsorption on a variety of parameters, particularly on the type of pigment and the constitution of the binder, has been examined. The existence of binder adsorption layers on the pigments was confirmed under the electron microscope. The adsorption and the electric charge influence the agglomeration of the pigments, the stability of the disperse system and the sedimentation volume. The investigations showed that polystyrene dispersions can be regarded in many cases as typical pigment dispersions. (Rev. Current Lit. Paint Allied Ind.)

Selection and use of paints by local authorities. D. W. Marshall. *Surveyor* **120**, No. 3619, 1239–40 (1961). Various types of paint and their selection for specific exposures or purposes are reviewed. Stress is placed on the importance of a high standard of surface preparation as being the key to preservation of wood and steelwork. The economics of painting are also briefly discussed. (Rev. Current Lit. Paint Allied Ind.)

Electrically conducting paints. Anon. *Chem. Rundschau (Solothurn)* **14**, 466–9 (1961). The properties of different types of conducting paints (including a new one containing a leafing metallic pigment) are compared. (Rev. Current Lit. Paint Allied Ind.)

Urethane protective coatings. National Association of Corrosion Engineers (U.S.A.). *Materials Protection,* 1 No. 6, 105–8 (1962). This report defines urethane coatings, explains single and two-package types, briefly outlines formulation and forms available and gives detailed physical properties of this class of coating. Tabular data show chemical resistance to 95 acids, alkalies, salts, oxidising agents, gases, solvents and other chemicals. Surface preparation, primers, recoating over urethane, film thickness and coverage data are discussed. (Rev. Cur. Lit. Paint Allied Ind.)

Lacquers [containing halocyclopentadiene adducts]. Bayer, Farbenfabriken. *Ger. 1,131,345; Ger. Patents Abs.*, 1962, 2, No. 28, Gp. 1, p 1. Chemically resistant lacquers, coatings and impregnating agents contain addition products of polyhalocyclopentadienes with homo- and co-polymers of conjugated dienes. Preferably the addition products contain 10–70% polyhalocyclopentadiene, based on the polymer components. Stoved films have high resistance to boiling acids, alkalies etc., and their flame resistance may be increased by addition of chlorinated hydrocarbons or P or Sb derivatives. E.g., the addition product is prepared by heating 350 pts. of a butadiene/Na polymer of mol. wt. 12,000, 150 pts. hexachlorocyclopentadiene, 650 vols. petroleum ether and 15 pts. phenoxypropylene oxide under N_2 for 17 hrs. at 160C., so that no free hexachlorocyclopentadiene is detected by infrared spectroscopy, then filtered to give about 1000 pts. clear 45% soln. The soln. (100 pts.) is mixed with 0.7 pts. mixed naphthenates (1.5% Co, 22% Pb and 1.5% Mn) and painted on iron plates. After 6 hrs. the film is tack-free. The air-dried films are resistant to boiling 10% H_2SO_4 and 10% KOH. (Rev. Cur. Lit. Paint Allied Ind.)

Multicolored paints. Paint Manufacturers' Executive Council. *Chem. Trade J.* **150**, No. 3915, 1202 (1962). A brief review of their properties and uses. It is claimed that dirt is repelled from their surfaces because of the "antistatic" nature of the film and that there has recently been a remarkable demand for these paints from the decorative side of the building industry. (Rev. Cur. Lit. Paint Allied Ind.)

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