ABSTRACTS

R. A. REINERS, Editor. ABSTRACTORS: J. G. Endres, Kazuo Fukuzumi, J. Iavicoli, K. Kitsuta, F. A. Kummerow, Gladys Macy, E. G. Perkins, T. H. Smouse, J. A. Thompson and R. W. Walker

• Fats and Oils

ANALYSIS OF OXIDIZED PARAFFINS BY COMBINED TECHNIQUES. R. A. Brown, M. I. Kay, J. M. Kelliher and W. A. Dietz (Anal. Res. Div., Esso Res. and Eng. Co., Linden, N. J.). *Anal. Chem.* 39(14), 1805–11 (1967). A difficult analytical problem was solved by combined use of several techniques to assay products from the liquid phase oxidation of paraffins. The method provides a quantitative measure for six classes of oxygenated compounds in the C_{12}-C_{18} carbon number range. The procedure can be modified to handle mixtures outside of this molecular weight range. Samples are first separated into hydrocarbon and oxygenated compound fractions by elution through silica gel. The two fractions are then analyzed by combined use of potentiometric titration, gas chromatography, mass and infrared spectrometry. Individual compound types that are measured include: alcohols, ketones, diols, acids, esters, and lactones. Precision for each type is in the range 0.3 to 1.5 wt %. Absolute accuracy is of the order 0.3 to 1.5 wt %. However, a bias of 1.2% occurs for alcohols and diols. The method includes a number of internal checks on the accuracy of each individual analysis. Mass spectra of selected silica gel and gas chromatographic fractions provided some insight as to the structure of the alcohols.

GAS CHROMATOGRAPHIC ANALYSIS OF THE FATTY ACID ESTERS OF GLYCEROL AND POLYGLYCEROLS. M. R. Sahasrabudhe. *Instrument News* 17, No. 2, 8–9 (1966). Mono- and di-glycerides of myristic, palmitic, stearic and oleic acids, diglycerol and triglycerol were quantitatively analyzed by gas/liquid chromatography. The partial fatty acid esters were analyzed as trimethylsilyl ether derivatives using 6 ft columns of 2.25% SE-30 programmed at 4C per minute from 270–340C. (Rev. Current Lit. Paint Allied Ind. No. 304.)

RAPID PROCEDURE FOR LOCATING DOUBLE BONDS IN UNSATURATED FATTY ACIDS. J. Tinoco and P. G. Miljanich. *Anal. Biochem.* 11, No. 3, 548–54 (1965). Fatty acid esters were oxidized with solid $KMnO_4$ in anhyd. acetic acid medium to form new mono- and di-carboxylic acids; the reaction mixture was treated with H_2O, $K_2S_2O_5$ and H_2SO_4, and the acids were extracted into light petroleum. The combined extracts were concentrated, then heated with absolute methanol and H_2SO_4, and the resulting methyl and dimethyl esters were extracted from the dil. mixture into light petroleum. The extracts were evaporated to dryness, and the residue was dissolved in 2,2,4-trimethylpentane for gas/liquid chromatography at 100C or ~192C on columns of diethylene glycol succinate polyester supported on silanized Chromosorb W. The major components of a mixture of isomers can be identified, and the approx. proportions can then be measured. (Rev. Current Lit. Paint Allied Ind. No. 304.)

GAS-LIQUID CHROMATOGRAPHY OF ISOMERIC METHYLTOCOLS AND THEIR DERIVATIVES. P. P. Nair and Joan Machiz (Biochem. Res. Div., Dept. of Med., Sinai Hosp. of Baltimore, Baltimore, Md.). *Biochim. Biophys. Acta* 144, 446–451 (1967). The study described the microquantitative separation and characterization by gas-liquid chromatography of the methyl substituted tocols (tocopherols). Standard retention time data are presented for the parent unaltered compounds as well as for a series of derivatives. It has been shown that all three isomeric monomethyltocols could be chromatographically resolved in the form of their trimethylsilyl ethers. The *p*-quinones obtained upon oxidation of the methyltocols generally exhibited greater retentivity than the parent compounds, with the exception of the oxidation product of 5-methyltocol which gave a shorter relative retention time than 5-methyltocol itself. The acetate and propionate esters of the substituted tocols exhibited distinctly different retentivities, in sharp contrast to their fully fluorinated derivatives which were indistinguishable from each other by retention data alone. Bis(trimethylsilyl)-acetamide has been used in a one-step reaction for the preparation of the trimethylsilyl ethers of the substituted tocols.

ALKOXYLIPIDS III. NATURALLY OCCURRING D(+)-1-O-CIS-ALK-1'-ENYL-DIGLYCERIDES. H. H. O. Schmid, W. J. Baumann and H. K. Mangold (Univ. of Minn., The Hormel Inst., Austin, Minn.). *Biochim. Biophys. Acta* 144, 344–54 (1967). Three classes of neutral liqids were isolated from liver oil of the ratfish (*Hydrolagus colliei*). Spectroscopic data, specific optical rotations and chemical reactions proved that the least polar fraction consisted of D-(+)-1-O-*cis*-alk-1'-enyl-diglycerides ("neutral plasmalogens"). The long-chain moieties of these compounds and of the alkyl diglycerides ("alkoxy-diglycerides") and triglycerides were analyzed.

IV. SYNTHESIS AND CHARACTERIZATION OF NATURALLY OCCURRING ETHERS, ESTERS AND ETHER ESTERS OF DIOLS. W. J. Baumann, H. H. O. Schmid, H. W. Ulshofer, and H. K. Mangold. *Ibid.*, 355–65. Long-chain alkyl ethers of 1,2-ethanediol were prepared from alkyl glyceryl-(1) ethers by glycol cleavage and subsequent reduction of the resulting alkoxy-acetaldehydes. Alkyl ethers of 1,3-propanediol were synthesized by alkylation of 3-trityloxy-propanol with methanesulfonates, followed by hydrolytic removal of the trityl group. Dialkyl ethers, ether esters, as well as mono- and diesters of 1,2-ethanediol and 1,3-propanediol also were prepared. Chromatographic methods based on partition rather than on adsorption phenomena were found to be suitable for the separation of diol lipids, as classes, from the corresponding glycerol derived lipids. The critical solution temperatures of the compounds synthesized proved to be a satisfactory means of distinction.

ACYL GALACTOSYLDIGLYCERIDES FROM LEAF HOMOGENATES. E. Heinz (Botanisches Inst. der Univ. zu Koln, Koln, Deutschland). *Biochim. Biophys. Acta* 144, 321–32 (1967). By homogenization of leaves of higher plants a hitherto unknown glycolipid is formed. This substance could not be found when the leaves were placed into boiling water for a short time before homogenization, indicating an enzymatic process. The glycolipid was isolated from spinach leaves (*Spinacia oleracea*) and obtained in a pure form, as judged by thin-layer chromatography. The substance, which is more hydrophobic than monogalactosyl diglyceride, is composed of glycerol, galactose and fatty acids in a molar ratio of 1:1:3. After deacylation a glycerylgalactoside was obtained in a crystalline form and identified as 1-O-β-D-galatopyranosyl-D-glycerol. In order to determine the position of the three acyl groups, the glycolipid was methylated. Upon hydrolysis this substance yielded a mixture of trimethylgalactoses, which consisted of about 65% of 2,3,4-, to about 30% of 2,3,6,- and contained only a small amount of 2,4,6-tri-O-methyl-D-galactose. Thus the isolated glycolipid is a mixture of isomers, of which the main component is 2,3-di-O-acyl-1-O-(6-O-acyl-β-D-galactopyranosyl)-D-glycerol.

A SIMPLIFIED PREPARATION OF PHOSPHATIDYL INOSITOL. G. Colacicco and M. M. Rapport (Dept. of Biochem., Albert Einstein College of Med., Yeshiva Univ., Bronx, New York). *J. Lipid Res.* 8, 13–15 (1967). A method is described for the rapid isolation of phosphatidyl inositol from soybean phosphatides (Asolectin). The product is obtained pure as the crystalline sodium salt.

SIMPLE DEVICES FOR THE APPLICATIONS OF SAMPLES AS NARROW STREAKS FOR THIN-LAYER CHROMATOGRAPHY. P. G. Roughan and C. G. Tunnicliffe (Dept. of Chem. and Biochem., Massey Univ., and Plant Physiol. Div., Dept. of Scientific and Ind. Res., Palmerston North, New Zealand). *J. Lipid Res.* 8, 511–513 (1967). The construction and use of devices, based on the design of Achaval and Ellefson, for the application of samples as 1–12 cm streaks at the origin of thin-layer chromatograms is described. These devices are simple to make, and rapid and quantitative in their operation.

MOLECULAR WEIGHT DISTRIBUTIONS OF MILK FAT TRIGLYCERIDES FROM SEVEN SPECIES. W. C. Breckenridge and A. Kuksis (Banting and Best Dept. of Med. Res., Univ. of Toronto, Toronto, Canada). *J. Lipid Res.* 8, 473–78 (1967). The triglyceride compositions of the milk fats of man, dog, guinea pig, cow, sheep, goat and horse were compared by gas-liquid chromatography of the intact triglycerides and of the butyl esters of the component fatty acids. The milk fats of man, dog, and guinea pig, which were largely made up of long-chain fatty acids, showed a common pattern with major contributions made by the glycerides with 48-54 acyl carbon atoms. The milk fats of cow, sheep and goat, which were rich in short-chain acids, showed significant proportions of triglycerides with 28–54 acylcarbon atoms. Horse milk, which contains large amounts of medium-chain fatty acids, gave a characteristic triglyceride pattern in the 26–54 carbon atoms range. The experimentally determined distributions of the

molecular weights of the triglycerides of all milk fats deviated significantly from the distributions predicted by random association of the fatty acids from a single pool. The data suggest that in all species the milk fat may be formed by a partial resynthesis of preformed glycerides.

SEED FATS OF ASTELIA AND COLLOSPERMUM, FAMILY LILIACEAE. I. M. Morice (Dept. of Scientific and Ind. Res., Wellington, New Zealand). *J. Sci. Food Agr.* 18, 343–6 (1967). The seed fats of thirteen species of *Astelia* and two of the closely related genus *Collospermum* have been examined. On the basis of their fatty acid composition they fall into two groups, one containing 12–30% γ-linolenic acid and the other containing no γ-linolenic acid. The latter group is distinguished from the New Zealand Agavaceae by the presence of traces of C_{20} and C_{22} alkanoic, C_{16}, C_{20}, and C_{22} alkenoic, C_{20} alkadienoic and C_{18} alkatrienoic acids, and from the New Zealand Juncaceae by the absence of C_{12}, C_{14}, C_{17}, C_{19} and C_{24} alkanoic and C_{17} and C_{24} alkenoic acids. The two groups, based on chemical constituents, do not coincide with the botanical classification suggested by Skottsberg.

OILS AND FATS IN THE 1970'S. J. G. Collingwood. *Chem. Ind. (London)* 1967, 1202–11. Statistical data on current world consumption of fats and oils are presented, as well as projections for the coming decade.

THE COMPONENTS ACIDS OF CARICA PAPAYA (CARICACEAE) SEED OIL. R. C. Badami and C. D. Daulatabad (Karnatak Univ., Dharwar, India). *J. Sci. Food Agr.* 18, 360–1 (1967). By the application of reversed-phase partition column chromatography, the oil from the seeds of *Carica papaya* was found to contain the following acids: laurie, 0.4%; myristic, 0.4%; palmitic, 16.2%; stearic, 5.0%; arachidic, 0.9%; behenic, 1.6%; hexadecenoic, 0.8%; oleic, 74.3%; and linoleic, 0.4%.

THE LIPIDS FROM THE BRAINS OF ONE-YEAR-OLD CHILDREN. P. Lesch and K. Bernhard (Univ. of Basel, Switzerland). *Helv. Chim. Acta* 50, 1125–30 (1967). Pure lipids from different parts of brains of one-year-old children were isolated and separated into different fractions. In comparison to previous results concerning brains of new-born and 6-weeks-old children, clear differences were found, i.e. an increase of cerebrosides and a decrease of lecithins with increasing age and progressing myelinization.

GAS CHROMATOGRAPHIC STUDIES ON LARD. B. Doro (Prov. Chem. Lab., Trieste, Italy). *Riv. Ital. Sostanze Grasse* 44, 349 (1967). The usefulness of the C_{14}/C_{16} and $C_{18:2}/C_{18:1}$ ratios as means to detect the adulteration of lard is discussed.

RECENT ADVANCES OF OIL TECHNOLOGY IN FRANCE. A. Uzzan (Inst. des Corps Gras, Paris, France). *Riv. Ital. Sostanze Grasse* 44, 350–3 (1967). Three technical innovations capable of producing improvements in current oil technology are discussed. They are: a continuous extraction procedure, a continuous process for olive stone hulling and separation of shells and kernels and a process for the separation of the components of an emulsion by filtration on highly hydrophobic surfaces.

COMPARATIVE STUDIES ON THE LIPIDS PRESENT IN SEEDS AND IN BULBS. G. Lotti and V. Averna (Univ. of Palermo, Palermo, Italy). *Riv. Ital. Sostanze Grasse* 44, 336–40 (1967). A study conducted on 17 vegetable species has evidenced essential differences in the fatty acid composition and in the mechanism of fatty acid formation between the bulb fat and the fat contained in seeds belonging to the same plant. Comparisons between the two organs are very irregular, but there has been noted a generally greater variety of fatty acids in bulbs, as well as a higher incidence of saturated acids.

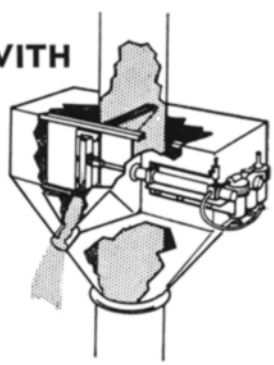
THE COLOR OF REFINED SEED OILS IN RELATIONSHIP TO THE REFINING TECHNIQUE. G. Giovetti and A. Decanale (Centr. Ital. Chem. Ind., Ancona, Italy). *Riv. Ital. Sostanze Grasse* 44, 331–5 (1967). The possibility of controlling the color of edible refined seed oils by appropriate selection of the refining technique has been examined. It has been confirmed that refining causes a downward shift in the wavelength of the absorption maximum generally related to the intensity of the refining treatment. The degree of decoloration is most highly affected by the use of very active bleaching earths and by very high deodorizing temperatures. Avoidance of these conditions will, consequently, produce oils with intermediate color values.

PROCESS FOR PREPARING FERULATES FROM ALKALI FOOTS OF VEGETABLE OILS. M. Takubo, K. Tachibana and S. Watanabe (Toyo Koatsu Industries, Japan). *U.S. 3,354,143.* A process for obtaining a therapeutically active extract from alkali foots obtained by alkali-refining vegetable oils containing ferulates comprises leaching the alkali foots at 20–40C with 1–6 times their volume of methanol, ethanol or acetone, to remove water and soap components; extracting the residue with a solution, no higher than 0.5N, of an alkali metal hydroxide, carbonate or bicarbonate in methanol, ethanol or acetone containing less than 10% water; and neutralizing the resulting extract with a non-aqueous solution of a monocarboxylic acid to a pH of 6.0 to 9.0, thereby precipitating the therapeutically active extract.

THE FAT OF SHEEP MILK. A. Lotito and A. Cucurachi (Agr. Exper. Stat., Bari, Italy). *Riv. Ital. Sostanze Grasse* 44, 341–8 (1967). The gas-chromatographic analysis of 81 samples of sheep milk has yielded the following results: C_4 3.53%, C_6 2.35%, C_8 2.10%, C_{10} 6.26%, $C_{10:1}$ 0.26%, C_{12} 4.03%, C_{13} 0.15%, C_{14R} 0.19%, C_{14} 11.03%, C_{15R} 0.34%, $C_{14:1}$ 0.54%, C_{15} 1.61%, C_{16R} 0.39%, C_{16} 25.59%, $C_{16:1}$ 1.81%, C_{17R} 0.53%, C_{17} 0.84%, $C_{17:1}$ 0.40%, C_{18} 10.56%, $C_{18:1}$ 23.72%, C_{19} 0.46%, $C_{18:2}$ 2.03% and $C_{18:3}$ 1.59%. Traces of C_7, C_9, $C_{12:1}$, C_{13R}, $C_{15:1}$, C_{18R} and C_{20} have also been observed. Although qualitatively similar in composition to cow milk, sheep milk can be identified by the higher level of capric acid (6.26% vs. 2.64%) and the lower level of myristoleic (0.54% vs. 1.35%). The average values of the ratios C_{12}/C_{10} and $C_{15}/C_{14:1}$ are, respectively, 0.65 and 3.11 for sheep milk fat and 1.27 and 1.19 for cow milk fat.

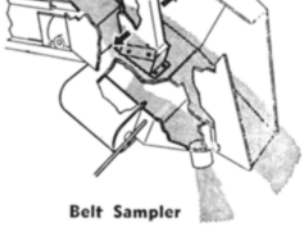
PROCESS FOR SEPARATING AND RECOVERING FATS AND SOLIDS. L. R. Lyon (Lycoil, Inc.). *U.S. 3,352,841.* A process for treating material from the slaughter of poultry and animals for recovery of oils and protein solids consists of the steps of: reducing the size of the material to a particle size not exceeding one inch; moving the material in a stream and subjecting it to steam heat to raise its temperature to 180–190F; centrifugally separating the material into a flowable liquid phase and a solid phase in the form of a wet cake; adding water to the wet cake to form a pumpable mixture which is then again centrifugally separated into a liquid phase and a

GET ACCURATE MEAL SAMPLES AUTOMATICALLY WITH SEEDBURO STRAND MECHANICAL SAMPLERS*



Spout Sampler

The Strand takes a cut across the full width of the meal stream and conveys the sample to your lab or sample room anywhere in the plant. The cutter rests outside the material flow when not in use and has a seal that automatically closes to shield the system from dust.



Belt Sampler

The Seedburo Strand works equally well on spouts or belts. Let us suggest a sampling set-up for you.

Write, wire or phone today.

* Meets A.O.C.S. Requirements.

SEEDBURO EQUIPMENT COMPANY

Dept. JAOC-1 • 618 W. Jackson Blvd. • Chicago, Illinois 60606
Phone 312 263-2128

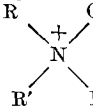
solid phase, and finally removing water from the wet cake obtained in the second centrifugal separation to form a low fat, high protein cake.

PROCESSING OF OFFAL OR THE LIKE FOR OBTAINING SEPARATED FAT AND PROTEIN MATERIAL THEREFROM. L. R. Lyon (Lycoil, Inc.). *U.S. 3,352,842.* A process for treating raw poultry and animal offal and recovering oils and low fat content protein from them consists of the steps of: reducing the size of solids in the offal; heating a moving stream of offal solids with steam to 180–190F; centrifugally separating the heated offal into a flowable liquid phase and a solid phase, and finally drying the solid phase from the previous separation to remove water and form a cake having a fat content of less than 15% on a dry basis.

• Fatty Acid Derivatives

WHIPPING ASSISTANT AND COMESTIBLES USING SAME. J. Moncrieff, W. M. Cochran, R. Ellinger and D. E. Miller (Glidden Co.). *U.S. 3,346,387.* A whipping assistant particularly adapted for foaming an aqueous, normally fluent foodstuff consists of a blend of 40–80% by wt of stearyl and palmityl monolactylic acids and 20–60% by wt of free stearic and palmitic acids. The blend is promoted by fatty acid mixed mono- and diglycerides having an I.V. below about 20, the ratio of blend to mono- and diglycerides being 0.1:1 to 7:1 and the ratio of mono- to diglycerides being between 0.2:1 and 9:1.

STABLE MICROBIOLOGICALLY ACTIVE LAUNDRY SOFTENER. V. Zuccarelli (Millmaster Onyx Corp.). *U.S. 3,349,033.* A stable microbiocidally active laundry softener composition is claimed, consisting essentially of (1) a quaternary ammonium fabric softener, having the structure: R CH_3 X^-, where R and



R′ are C_{10}-C_{20} alkyl radicals and R″ is either methyl, ethyl or a $(CH_2\text{-}CH_2O)_nH$ group, with n an integer equal to at least 1, and X is a chlorine, bromine, sulfate or methosulfate anion; (2) a microbiocidally effective amount of a quaternary ammonium salt having only one C_8-C_{22} alkyl group attached to the quaternary nitrogen and having a phenol coefficient of at least 200, and (3) 1–3% by wt of an emulsifying agent consisting of a C_{10}-C_{18} fatty alcohol.

PROCESS FOR PREPARING SUCROSE ESTERS OF HIGH MOLECULAR WEIGHT FATTY ACIDS. L. Nobile (Ledoga S.p.A.). *U.S. 3,349,081.* An improvement is claimed in the process for preparing sucrose monoesters of high purity by transesterification of sucrose with natural triglycerides in dimethylformamide, followed by evaporation of the reaction solvent, treatment of the residue with a butanol-aqueous sodium chloride mixture and evaporation to dryness of the separated butanol layer. The improvement consists in heating the residue from the evaporation of butanol with about 5 times its weight of a solvent of the class consisting of dichloroethane, methyl ethyl ketone and ethyl acetate at the boiling temperature of the solvent, cooling the solvent and collecting the precipitate.

SOLVENT FOR OBTAINING VERY HIGH YIELDS OF ALDEHYDIC PRODUCTS FROM SOYBEAN OIL. D. J. Moore (U.S. Sec'y of Agr.). *U.S. 3,349,106.* A process is claimed for obtaining substantially theoretical yields of methyl azelaaldehydate, which comprises: (1) forming a reaction mixture consisting of 1 part methyl oleate, 1–10 parts of acetic or propionic acid and a quantity, equimolar to that of the acid, of an alcohol selected from the group consisting of ethanol, propanol, butanol, 2-methoxyethanol, cyclohexyl alcohol and benzyl alcohol; (2) bubbling ozonized oxygen through the stirred reaction mixture until the theoretical amount of ozone is absorbed; (3) bubbling hydrogen through the reaction mixture in the presence of palladium catalyst until reduction is essentially complete; (4) forming a washable solution of the filtered and neutralized reaction mixture in a volatile solvent; (5) washing the solvent solution, and (6) distilling the washed solution under reduced pressure to obtain methyl azelaaldehydate in yields of not less than about 92% of theoretical.

STABILIZED TOPPING. E. B. Rodgers (Germantown Mfg. Co.). *U.S. 3,350,209.* A stabilized whipped composition is claimed, comprising 10–35% of a vegetable fat, 5–16% sugar, 2–5% of a stabilizer, and the rest water. The stabilizer consists of: 48–62% caseinate, 16–22% sugar, 7–10% of a sorbitan partial ester of a C_{12}-C_{20} fatty acid, 1.5–3.0% of a polyoxyethylene adduct of a sorbitan partial ester of a C_{12}-C_{20} fatty acid having 12 to 25 ethylene oxide units, and 6–14% of a lactylate having the formula $[RCO(OCHCH_3CO)_nO]_2Ca$ in which n is an integer from 1 to 5 and RCO is the acyl radical of a C_{12}-C_{24} fatty acid.

• Biochemistry and Nutrition

ON THE SPECIFICITY OF THE OXYGENATION OF UNSATURATED FATTY ACIDS CATALYZED BY SOYBEAN LIPOXIDASE. M. Hamberg and B. Samuelsson (Dept. of Chem., Karolinska Inst., and the Dept. of Med. Chem., Royal Vet. College, Stockholm, Sweden). *J. Biol. Chem.* 242(22), 5329–35 (1967). The positional and stereochemical specificities of the soybean lipoxidase-catalyzed oxygenation of unsaturated fatty acids have been investigated. It was found that the oxygen function was introduced at position ω6 in all of the fatty acids which reacted. In one case a small amount of the substrate was oxygenated in position ω10. The structural requirement for substrates is the presence of a *cis,cis*-1,4-pentadiene group with its methylene group located in position ω8. The structure of the hydroperoxy acid formed from 8,11,14-eicosatrienoic acid was 15L-hydroperoxy-8(*cis*),11(*cis*),13(*trans*)-eicosatrienoic acid. By using sterospecifically tritium-labeled 8,11,14-eicosatrienoic acids, it was found that the removal of hydrogen from the ω8 methylene group is stereospecific. Thus, only the hydrogen of the L configuration removed by the enzyme during the conversion into 15L-hydroperoxy-8(*cis*),11(*cis*),13(*trans*)-eicosatrienoic acid is accompanied by an isotope effect, suggesting that the hydrogen removal occurs as the initial step of the reaction.

ON THE MECHANISM OF THE BIOSYNTHESIS OF PROSTAGLANDINS E_1 AND $F_{1\alpha}$. *Ibid.*, 5336–43. The mechanism of the conversion of 8,11,14-eicosatrienoic acid into prostaglandin E_1 (PGE_1) and prostaglandin F_1 ($PGE_{1\alpha}$) has been studied. Incubation of radioactive 8,11,14-eicosatrienoic acids showed that the hydrogen removed from C-13 during the conversion into PGE_1 and $PGF_{1\alpha}$ has the L configuration. The conversion of 13L-^{3}H,3-^{14}C, 8,11,14-eicosatrienoic acid into PGE_1 is accompanied by a hydrogen isotope effect. No conversion of 2-^{14}C, 15L-hydroperoxy-8(*cis*),11(*cis*),13(*trans*)-eicosatrienoic acid or 2-^{14}C, 15L-hydroxy-8(*cis*),11(*cis*),13(*trans*)-eicosatrienoic acid into PGE_1 or $PGF_{1\alpha}$ could be detected. Incubations of 9-^{3}H,3-^{14}C, 8,11,14-eicosatrienoic acid revealed that $PGF_{1\alpha}$ is not formed via PGE_1 in the system used. The mechanistic implications of the results obtained are discussed. It is suggested that 11-peroxy-8,12,14-eicosatrienoic acid is the first intermediate in the conversion. The peroxy acid is cyclized into an endoperoxide, which is eventually transformed into PGE_1 or $PGF_{1\alpha}$ by independent reactions.

OXYGENATION OF UNSATURATED FATTY ACIDS BY THE VESICULAR GLAND OF SHEEP. *Ibid.*, 5344–54. The products formed on oxygenation of certain unsaturated fatty acids in preparations of sheep vesicular gland have been studied. Oxygenation of linoleic acid yielded 9-hydroxy-10,12-octadecadienoic acid (82%) and 13-hydroxy-9,11-octadecadienoic acid (18%). Oxygenation of 8,11,14-eicosatrienoic acid, 15-hydroxy-8,11,13-eicosatrienoic acid, 12-hydroxy-8,10-heptadecadienoic acid, prostaglandin E_1 (PGE_1), and prostaglandin $F_{1\alpha}$. The biosynthesis of 12-hydroxy-8,10-heptadecadienoic acid was studied with the use of 2-^{14}C-, 9-^{3}H,3-^{14}C-, 10-^{3}H,3-^{14}C-, 11-^{3}H,2-^{14}C-, 13D-^{3}H,3-^{14}C-, 13L-^{3}H,3-^{14}C- and 15-^{3}H,3-^{14}C, 8,11,14-eicosatrienoic acids. These experiments showed that C-9, C-10, and C-11 are eliminated from the precursor and that the stereochemistry of the removal of hydrogen from C-13 is identical with that occurring during the biosynthesis of PGE_2. The 3-carbon compound formed together with 12-hydroxy-8,10-heptadecadienoic acid from 8,11,14-eicosatrienoic acid was identified as malonaldehyde. The identification could be accomplished by condensing malonaldehyde with L-arginine, yielding δ-N-2(pyrimidinyl)-L-ornithine. The mode of formation of 12-hydroxy-8,10-heptadecadienoic acid and malonaldehyde from 8,11,14-eicosatrienoic acid is discussed. The compounds are proposed to originate in a cyclic peroxide, which has earlier been postulated to be an intermediate in the biosynthesis of *prostaglandins.*

EFFECTS OF DIETARY FAT ON MAMMARY CARCINOGENESIS BY 7,12-DIMETHYLBENZ(a)ANTHRACENE IN RATS. E. B. Gammal, K. K. Carroll and E. R. Plunkett (The Collip Med. Res. Lab., Univ. of Western Ontario, London, Ontario, Canada). *Cancer Res.* 27, 1737–42 (1967). A semisynthetic high corn oil diet enhanced the development of mammary cancer induced by 7,12-dimethylbenz(a)anthracene (DMBA) in intact female Sprague-Dawley rats. This was in comparison to two other groups of

(Continued on page 74A)

(Continued from page 72A)

similarly treated rats fed a high coconut oil and a low fat semisynthetic diet, respectively. The average daily caloric intake was similar, and the average growth rate, based on body weight, was comparable in all three groups. Fatty acid analyses demonstrated that, at the time of DMBA administration, the composition of mammary fat was different in the three different groups, reflecting their dietary fat intake. The data from this study suggest that dietary effects upon DMBA mammary carcinogenesis were related to the nature as well as the amount of fat used.

GEKKONID LIZARDS ADAPT FAT STORAGE TO DESERT ENVIRONMENTS. H. R. Bustard (Queen Elizabeth II Fellow, Dept. of Zool., Australian Nat. Univ., Canberra). *Science* 158(3805), 1197–98 (1967). *Coleonyx v. variegatus* is adapted to feed voraciously after deprivation of food and to withstand long periods without food. In 4 days specimens converted enough food into reserves to increase their weight by about 50%. Total deprivation of food resulted in very gradual loss of weight, which, if maintained, would result in 4 days of feeding being sufficient to sustain the animal for periods of 6 to 9 months.

DIETARY FAT FOR THE LACTATING BOVINE. I. EFFECT ON FATTY ACIDS OF SERUM CHOLESTEROL ESTERS. W. H. Brown and J. W. Stull (Dept. of Dairy Sci. The Univ. of Arizona, Tucson). *J. Dairy Sci.* 50, 1905–8 (1967). Twenty-four Holstein cows were randomly assigned to treatment sequence and fed two levels of alfalfa hay (1.0 kg/100 kg body weight and 2.5 kg/100 kg body weight) and three types of concentrate (control, 6% added tallow, and 6% added cottonseed oil). The low roughage diet increased the 18:2 serum cholesterol esters while depressing the 20:1 fraction. Feeding tallow caused a depression of 12:0, 14:0, and 14:1 on the low roughage diet. While tallow caused an increase in 16:1, 16:2, and 18:3 on both roughage groups, the increase was significant only on the high roughage group. Cottonseed oil in the diet lowered 18:3 and 20:4 on the low roughage fed animals. Tallow raised 20:1 for both roughage groups. There were no significant correlation coefficients between the fatty acids of serum cholesterol esters and milk fatty acids.

EFFECT OF OZONE ON LIPID PEROXIDATION IN THE RED BLOOD CELL. B. D. Goldstein and O. J. Balchum (Univ. of Southern Calif. School of Med., and Los Angeles County Gen. Hosp., Los Angeles, Calif.). *Proc. Soc. Exptl. Biol. Med.* 126, 356–8 (1967). *In vitro* exposure of erythrocytes to ozone resulted in an increased osmotic fragility associated with the formation of TBA reactants. This suggests that lipid peroxidation may be involved in the mechanism of ozone toxicity.

MICELLULAR SOLUBILIZATION OF HEXADECANE AND ITS PASSAGE THROUGH THE LYMPH OF THE RAT. P. Savary and M. J. Constantin (Inst. de Chimie Biologique, Faculte des Sciences, Place Victor Hugo, Marseille, France). *Biochim. Biophys. Acta* 137, 264–76 (1967). Small quantities of hexadecane can be incorporated in the micelles of a conjugated bile acids solution. This solubilization is somewhat increased when oleic acid is present at pH 6.3. However, in spite of the liquid state of the hexadecane, its solubilization remains lower than that of palmitic and stearic acids. When hexadecane is included as the only lipid in the diet of rats, small quantities of this hydrocarbon appear in thoracic duct lymph. Rather more is found when the hydrocarbon is ingested in admixture with free oleic acid or with triolein. The micellar solubilization of hexadecane and of various lipids was measured, and the quantities of these compounds which are found in thoracic lymph in the 24 hrs following their oral administration were evaluated. On the whole, the results seem to demonstrate that the solubilization in a micellar form is a requirement for the adsorption by the lymphatic pathway, as has been suggested by others. However, it is not quite certain whether all the hexadecane not excreted by the rat is found in thoracic duct lymph. The possibility that fatty esters (methyl and ethyl esters, triglycerides) might reach thoracic duct lymph without a previous intraluminar hydrolysis is briefly discussed.

Established 1904

HOUSTON LABORATORIES

Analytical and Consulting Chemists

311 Chenevert Street P.O. Box 132 Houston, Texas 77001
CA 2-1319

LIPOLYTIC ACTIVITY OF ADIPOSE TISSUE. I. POTENTIOMETRIC MEASUREMENT OF RAT TISSUE EXTRACTS. J. Boyer (Lab. de Biochemie Med., et Clin. Endocrinol. de la faculte de Med., Marseille, France). *Biochim. Biophys. Acta* 137, 59–69 (1967). A kinetic assay is described for the measurement of the lipolytic activity of rat adipose tissue. In this assay, the hydrolysis of emulsified glycerides is continuously monitored by potentiometric titration of the fatty acids released in the medium. By this method a crude extract of rat adipose tissue is shown to contain a lipase activity measured between pH 6.8 and 9.2 with a main peak at pH 8.5. This activity, which is specifically Ca^{2+}-dependent and partially inactive in media of high ionic strength, resembles in many respects the lipoprotein-lipase activity. A strong inhibition of this activity is demonstrated by increasing concentrations of bovine serum albumin. Preliminary data suggest that two distinct enzymes of this type might be present in the tissue. A different lipase activity is measured at pH 6.8 in the presence of high concentrations of serum albumin. This activity is measured at pH 6.8 in the presence of high concentrations of serum albumin, does not require the presence of Ca^{2+} and is not affected by high concentrations of salts in the medium. This activity shows many similarities with the hormone-sensitive lipase of adipose tissue. The role of serum albumin in these different assay systems is discussed.

THE EFFECT OF LIPIDS ON THE ACCUMULATION OF CERTAIN AMINO ACIDS BY STAPHYLOCOCCUS AUREUS. E. F. Gale and J. P. Folkes (Sub-Dept. of Chem. Microbiol., Dept. Biochem., Univ. of Cambridge, Cambridge). *Biochim. Biophys. Acta* 144, 461–466 (1967). Washed cells of *Staphylococcus aureus* accumulate free amino acids within the cell; kinetic studies show that two processes can be involved in the accumulation of lysine. The rate of transport and degree of concentration attained within the cell for glutamate or aspartate are decreased if cells are preincubated in buffer, or increased if staphylococcal lipid is added to the medium. Lipid restores accumulation in preincubated cells to that attained in freshly harvested cells. The accumulation of lysine is inhibited by lipid. The stimulatory effect of lipid on the accumulation of glutamate or aspartate is reproduced by the fatty acid fraction therefrom. Separation of the fatty acids shows that all fractions are stimulatory but the largest effect is produced by the fraction containing C_{18} unsaturated acids. Oleic and linoleic acids are markedly more stimulatory than stearic or other saturated fatty acids tested.

THE EXCRETION OF FREE AND ESTER CHOLESTEROL BY TISSUE CULTURE CELLS: STUDIES WITH L5178Y AND L-CELLS. G. H. Rothblat and D. Kritchevsky (The Wistar Inst. of Anatomy and Biol., Philadelphia, Pa.). *Biochim. Biophys. Acta* 144, 423–29 (1967). Growing cultures of L5178Y cells (mouse lymphoblasts) and L-cells (mouse fibroblasts) are capable of excreting free cholesterol into the culture medium. Cholesteryl esters are excreted at much slower rates than free cholesterol; however, free cholesterol derived by cellular cholesteryl ester hydrolysis is excreted at rates similar to that of free cholesterol incorporated by cells from exogenous sources. Dihydrocholesterol and Δ^4-cholesten-3-one are excreted at rates similar to that of free cholesterol.

CONCENTRATIONS AND DISAPPEARANCE POST MORTEM OF POLYPHOSPHOINOSITIDES IN DEVELOPING RAT BRAIN. J. Eichberg and G. Hauser (Res. Lab., McLean Hosp., Belmont, Mass. and Dept. Biol. Chem., Harvard Med. School, Boston, Mass.). *Biochim. Biophys. Acta* 144, 415–22 (1967). The content of di- and triphosphoinositide in the brains of young rats of different ages was determined. Appreciable quantities of these phospholipids are present as early as two days after birth, possibly in extramyelin structures, and their levels increase during myelination at a rate greater than that for total lipids. Rat brain triphosphoinositide undergoes rapid partial breakdown post mortem after which degradation proceeds only very slowly. The persistence of some brain polyphosphoinositides after death is not due to the irreversible inactivation of triphosphoinositide phosphomonoesterase or triphosphoinositide phosphodiesterase.

IMMUNOCHEMICAL STUDIES OF PHOSPHOLIPIDS. III. PRODUCTION OF ANTIBODY TO CARDIOLIPIN. K. Inque and S. Nojima (Faculty of Pharmaceutical Sciences, Univ. of Tokyo, Hongo, Tokyo, Japan). *Biochim. Biophys. Acta* 144, 409–14 (1967). An effective method for obtaining antibodies against cardiolipin was developed by injection of a complex of cardiolipin antigen (cardiolipin, lecithin and cholesterol) and methylated bovine serum albumin resulting in the formation of high titer anti-cardiolipin antibodies. Of the lipid components of the antigen,

lecithin seems to be important as an auxiliary lipid for the immunogenicity of cardiolipin, while cholesterol is not essential.

METABOLISM OF PHOSPHOLIPIDS. X. PARTIAL PURIFICATION AND PROPERTIES OF A SOLUBLE PHOSPHATIDATE PHOSPHOHYDROLASE FROM RAT LIVER. B. Sedgwick and G. Hubscher (Dept. of Med. Biochem. and Pharmacol., Biol. Bldg., Univ. of Birmingham, Birmingham, Great Britain). *Biochim. Biophys. Acta* **144**, 397–408 (1967). A method is described for the partial purification (15 fold) of a soluble phosphatidate phosphohydrolase (EC 3.1.3.4) from rat-liver mitochondria. Purified preparations catalyzed the hydrolysis of 2.5–3.0 μmoles of phosphatidate per mg protein per hr. In addition to phosphatidate, the purified preparation also hydrolyzed hexadecyl phosphate, 2-glycerolphosphate and adenosine 5′-triphosphate, the latter two at a smaller rate. Evidence is presented that phosphatidate hydrolysis was catalyzed by an enzymic activity different from those catalyzing the hydrolysis of the other three substrates. Using phosphatidate prepared from egg phosphatidyl choline as substrate, the enzyme was stimulated by 0.1 M Na^+, K^+ or Cs^+ and by 2–3 mM Mg^{2+} or Ba^{2+}. The enzyme was strongly inhibited by 1 mM Be^{2+} or 10 mM F^-. The hydrolysis of phosphatidate, hexadecyl phosphate and 2-glycerolphosphate was inhibited by medium and long-chain fatty acids. At 6.25 mM, C-12:0 gave 90% inhibition of phosphatidate hydrolysis while C-10:0, C-14:0, C-18:0 and C-18 unsaturated acids also inhibited but to a lesser extent.

SOME ASPECTS OF PHOSPHOLIPID METABOLISM IN THE RED CELL. M. E. McLeod and R. Bressler (Depts. of Med., Physiol. and Pharmacol., Duke Univ. Med. Center, Durham, N. C.). *Biochim. Biophys. Acta* **144**, 391–96 (1967). Long chain carnitine acyl transferase activity in red cell membranes was demonstrated by their capacity to incorporate oleic acid-1-^{14}C and linoleic acid-1-^{14}C into the respective acylcarnitines. The addition of (−)-carnitine to red cell membranes enhanced palmitate-1-^{14}C incorporation into palmitylcarnitine, whereas (+)-carnitine was without effect. (+)-Palmitylcarnitine caused a depression of palmitate-1-^{14}C incorporation into palmitylcarnitine, and this inhibition was reversed by the addition of (−)-carnitine. Fatty acylcarnitine derivatives were shown not to be obligatory intermediates in the incorporation of fatty acyl CoA into lecithin, and the addition of (−)-carnitine increased incorporation of palmitate-1-^{14}C into palmitylcarnitine while decreasing incorporation of palmitate-1-^{14}C into lecithin. 'Methyltransferase' activity was demonstrated in human and sheep erythrocytes. Significant incorporation into lecithin, sphingomyelin, methylated phosphatidylethanolamine derivatives and lysolecithin was found with S-[Me-^{14}C] adenosylmethionine. Methionine-activating enzyme activity was absent.

FATTY ACID BIOSYNTHESIS AFTER IRRADIATION IN VIVO. J. Gendt. R. Gaumert and O. Ulbrich (Radiologisches Inst. der Univ. Freiburg im Breisgau, Deutschland). *Biochim. Biophys. Acta* **137**, 43–53 (1967). After whole-body X-irradiation with 690 R (L.D.^{90} 30 days) the specific activities of the enzymes participating in the biosynthesis of fatty acids were measured in a particle-free homogenate of mouse liver over a period of 14 days after irradiation. In fed mice a few hours after irradiation the activities of the overall system (acetate incorporation into fatty acids), acetyl-CoA carboxylase (actyl-CoA incorporation), acetatethiokinase and isocitric dehydrogenase were significantly enhanced and then decreased to the values for fasted, unirradiated mice within 48 hr. The specific activity of synthetase (malonyl-CoA incorporation) decreased immediately after irradiation to the value for fasted mice, without an initial increase. Obviously the acetyl-CoA carboxylase is influenced by irradiation. It is well known that this enzyme is the pacemaker of fatty acids synthesis from acetate. In 24-hr-fasted mice, all activities measured remained unchanged as compared with those in fasted, unirradiated mice. Hence, the stimulation or deficiency of malonyl-CoA synthesizing enzyme is responsible for changed rates of fatty acid synthesis following irradiation.

COMPOSITION AND TURNOVER OF THE PHOSPHOLIPIDS IN ESCHERICHIA COLI. Y. Kanemasa, Y. Akamatsu and S. Nojima (Dept. Microbial Chem., Faculty of Pharmaceutical Sciences, Univ. of Tokyo, Hongo, Tokyo, Japan). *Biochim. Biophys. Acta* **144**, 382–90 (1967). Cardiolipin, in addition to phosphatidyl ethanolamine and phosphatidyl glycerol, was isolated and identified in the phospholipids extractable with chloroform and methanol from *Escherichia coli* B. The content of cardiolipin was shown to be from 5–12% of the total phospholipids. By pulse labeling experiments with ^{32}P, it was confirmed that phosphatidyl glycerol has a large turnover rate while phosphatidyl ethanolamine is rather stable in the growing cells of *E. coli* B. Furthermore, cardiolipin has a similar pattern of turnover behavior to phosphatidyl glycerol. Several possible explanations for the phospholipid turnover are given.

GANGLIOSIDES IN THE MYELIN FRACTION OF DEVELOPING RATS. K. Suzuki, S. Poduslo and W. T. Norton (Albert Einstein College of Med., N. Y., N. Y.). *Biochim. Biophys. Acta* **144**, 375–381 (1967). Highly pure myelin fractions have been obtained from whole rat brains of various developmental stages. They contained 0.13–0.26% nucleic acids and a total ATPase activity of 0.3–0.8 μmole P per mg per hr. These fractions contained a relatively constant amount of total ganglioside N-acetylneuraminic acid at all ages, but the distribution of individual major gangliosides changed drastically as the animal matured. The proportion of the normal major monosialoganglioside in myelin was higher than that in whole brain even at 15 days of age. With increasing age, its proportion increased rapidly reaching 90 mole % of total ganglioside in myelin by the age of 5 months. It is not known whether the gangliosides in the myelin fractions are intrinsic myelin components, or present in contaminating subcellular structures.

CARNITINE DEPLETION IN THE CHOLINE-DEFICIENT STATE. C. Corredor, C. Mansbach and R. Bressler (Depts. of Biochem., Med., Pharmacol. and Physiol., Duke Univ. Med. Center, Durham, N. C.). *Biochim. Biophys. Acta* **144**, 366–74 (1967). Dietary choline deficiency causes a decrease in the heart and liver levels of carnitine and in the rate of long-chain fatty acid oxidation by myocardial and hepatic homogenates. Addition of carnitine *in vitro*, but not of choline, to tissue homogenates increases the rate of long-chain fatty acid oxidation, and decreases the rate of esterification. Administration of choline *in vivo*, or of carnitine, increases the rate of long-chain fatty acid oxidation by liver and heart homogenates. Choline administration to choline-deficient animals increases their tissue carnitine levels. This increase is not blocked by the prior administration of a protein synthesis inhibitor. It is suggested that the decreased rate of long-chain fatty acid oxidation observed in animals fed a choline-deficient diet is, at least in part, due to the decrease of levels of tissue carnitine.

A NEW GROUP OF ESSENTIAL FATTY ACIDS AND THEIR COMPARISON WITH OTHER POLYENOIC FATTY ACIDS. H. Schlenk and D. M. Sand (The Hormel Inst., Univ. of Minnesota, Austin, Minn.). *Biochim. Biophys. Acta* 144, 305–20 (1967). Polyenoic C_{17} acids (mainly 9,12-heptadecadienoic and 6,9,12-heptadecatrienoic with some 6,9,12,15-heptadecatetraenoic), polyenoic C_{16} acids (mainly 9,12-hexadecadienoic and 6,9,12-hexadecatrienoic), and 10,13-nonadecadienoic acid were fed as methyl esters for 50 days to fat-deficient rats and their effects on fat deficiency symptoms were compared with those of linoleic acid and of fat-free diet. The polyenoic C_{17} acids cured the external symptoms nearly as well as linoleic acid. Weight gain and food efficiencies were equal with both acids. Accordingly, fatty acids derived from 9,12-heptadecadienoic acid have essentiality similar to those derived from linoleic acid. The triene/tetraene ratio in liver lipids is applicable as index of essential fatty acid nutrition when modified from 5,8,11-eicosatrienoic/arachidonic to 5,8,11-eicosatrienoic/5,8,11,14-nonadecatetraenoic acids. Deficiency symptons increased with polyenoic C_{16} and 10,13-nonadecadienoic acids as with the fat-free diet. Fatty acids of the liver were analyzed. 9,12-Heptadecadienoic acid is converted up to 4,7,10,13,16-heneicosapentaenoic acid with 5,8,11,14-nonadecatetraenoic being prominent. Similarly, 6,9,12,15-heptadecatetraenoic acid is converted up to 4,7,10,13,16,19-heneicosahexaenoic acid. Conversion products from other unusual dietary acids were identified but are very minor in amount. Acids which converted readily were also essential and acids which converted only to a minor extent were not essential. Conversion and essentiality may require the same double-bond structure and both properties may be functionally correlated.

THE TOTAL SYNTHESIS AND METABOLISM OF 7,10,13,16-DOCOSATETRAENOATE IN THE RAT. H. Sprecher (Dept. of Physiol. Chem., Ohio State Univ., Columbus, Ohio). *Biochim. Biophys. Acta* 144, 296–304 (1967). Methyl-7,10,13,16-docosatetraenoate was prepared by total synthesis. Arachidonate and 7,10,13,16-docosatetraenoate were fed to rats raised on a fat-deficient diet. The liver lipid fatty acid composition, as determined by gas-liquid chromatography, was compared with the fat-deficient controls. Both acids suppressed the biosynthesis of polyunsaturated fatty acids derived from oleate and palmitoleate. The amount of 7,10,13,16-docosatetraenoate incorporated directly into liver lipids was small. Instead it was preferentially converted to arachidonate by elimination of a two-carbon fragment or desaturated to give 4,7,10,13,16-docosapentaenoate.

THE EFFECT OF UNSATURATED FATTY ACIDS AND THE PARTICLE-FREE SUPERNATANT ON THE INCORPORATION OF PALMITATE INTO GLYCERIDES. D. N. Brindley, M. E. Smith, B. Sedgwick and G. Hubscher (Dept. of Med. Biochem. and Pharmacol., Biol. Bldg., Univ. of Birmingham, Birmingham). *Biochim. Biophys. Acta* 144, 285–95 (1967). Biosynthesis of glycerides was measured using rat-liver mitochondria or the microsomal fraction of cat intestinal mucosa. With glycerolphosphate as precursor, the incorporation of radio-active palmitate into glycerides was stimulated up to 2.6-fold by the addition of 20 to 100 μM unsaturated long-chain fatty acids which were themselves incorporated. At the same time, the amount of labelled phosphatidate present showed a corresponding decrease. Out of 5 unsaturated long-chain fatty acids tested, linoleate and linolenate gave the largest stimulations, while saturated fatty acids were ineffective. Under optimum conditions, the molar ratio of palmitate to linoleate incorporated into glycerides was about 2.5. The addition of particle-free supernatant to either the mitochondrial or microsomal system brought about a much larger stimulation of palmitate incorporation than did unsaturated fatty acids. Evidence is presented that the stimulating effect of the particle-free supernatant is partially due to the presence of unsaturated fatty acids.

β-OXIDATION AS AN ALTERNATIVE PATHWAY FOR THE DEGRADATION OF BRANCHED-CHAIN FATTY ACIDS IN MAN, AND ITS FAILURE IN PATIENTS WITH REFSUM'S DISEASE. O. Stokke, K. Try and L. Eldjarn (Inst. of Clinical Biochem., Univ. of Oslo, Rikshospitalet, Oslo). *Biochim. Biophys. Acta* 144, 271–84 (1967). The metabolism of β-methyl fatty acids has been studied in healthy humans as well as in patients with Refsum's disease who show phytanic acid accumulation. As a test substance 3,6-dimethyl(8-^{14}C)octanoic acid was used. This acid possesses a methyl group in the β-position to the carboxyl group, even after an initial oxidation. The medium chain length facilitates the excretion of metabolites in the urine. During the first 7 hr after the administration of 3,6-dimethyl(8-^{14}C)octanoic acid, about 65% of the radioactivity appeared in the urine. The main metabolites were: 7-hydroxy-3,6-dimethyloctanoic acid, 6-hydroxy-3,6-dimethyl-octanoic acid, 3,6-dimethyloctane-1,8-dioic acid, 7-keto-3,6-dimethyloctanoic acid, 3,6-dimethyloctanoic acid and 2,5-dimethylheptanoic acid. After ingestion of 3,6-dimethyl(8-^{14}C)octanoic acid, healthy controls excreted $^{14}CO_2$ in the expiratory air, and the metabolite 2,5-dimethylheptanoic acid was demonstrated in the urine. These findings show that 3,6-dimethyloctanoic acid can be degraded in man, and than an initial α-decarboxylation takes place, rendering the acid susceptible to normal β-oxidation. When 3,6-dimethyl(8-^{14}C)-octanoic acid was given to patients with Refsum's disease, no $^{14}CO_2$ could be detected in the expiratory air, and no excretion of 2,5-dimethylheptanoic acid was found in the urine. The patients seem to lack the ability to degrade this acid.

DEGRADATION OF GLYCEROPHOSPHATIDES DURING STORAGE OF SALINE-WASHED, SALINE-SUSPENDED RED CELLS AT −20C. P. O. Ways (Dept. of Med., Univ. of Washington School of Med., Seattle, Washington). *J. Lipid Res.* 8, 518–21 (1967). When fresh intact red cells were washed and suspended in 0.153 M NaCl and then frozen-stored, the glycero-phosphatide levels decreased significantly. Degradation began within 2 wk. Loss of phospholipid was not observed with hemoglobin-free red cell ghosts or plasma stored as long as 2 and 6 months, respectively.

AUTOOXIDATION OF POLYUNSATURATED ESTERS IN WATER: CHEMICAL STRUCTURE AND BIOLOGICAL ACTIVITY OF THE PRODUCTS. E. Schauenstein (Dept. of Biochem., Univ. of Graz, Graz, Austria). *J. Lipid Res.* 8, 417–28 (1967). When polyunsaturated esters or fatty acids are dispersed for long periods in water in the presence of air, water-soluble substances are formed in great variety. Because these short-chain products are constantly eluted by the aqueous phase and are consequently not available for further reaction in the oil phase, many intermediates of classical autoxidation can be isolated and identified. The identification of several of these compounds is described. Some of the peroxidic and nonperoxidic autoxidation products show biochemical activity—in particular, inhibition of glycolysis and of respiration during incubation with tumor cells *in vitro*. Minimal inhibitory concentrations of pure, isolated products have been determined for Ehrlich ascites tumor cells. Synthetic short-chain (C_4-C_{10}) hydroxylated α,β-unsaturated aldehydes have been shown to have this action and also to cause morphological changes in these cells which quickly lead to their death. Normal cells are not affected. Possible therapeutic use of these compounds in the treatment of malignant neoplasms is discussed.

BIOSYNTHESIS OF PHOSPHATIDYL GLYCEROPHOSPHATE IN ESCHERICHIA COLI. Y. Chang and E. P. Kennedy (Dept. Biol. Chem., Harvard Med. School, Boston, Mass.). *J. Lipid Res.* 8, 447–55 (1967). An enzyme (L-glycerol 3-phosphate: CMP phosphatidyltransferase) catalyzing the synthesis of phosphatidyl glycerophosphate from CDP-diglyceride and L-glycerol 3-phosphate has been rendered soluble by treatment of the particulate, membrane-containing fraction of *E. coli* with Triton X-100 and has been partially purified. The enzyme, devoid of phosphatidyl glycerophosphatase activity is specific for L-glycerol 3-phosphate and is completely dependent upon added Mg^{++} or Mn^{++} for activity. It has high affinity for CDP-diglyceride and can be used for the assay of this nucleotide.

PHOSPHATIDYL GLYCEROPHOSPHATE PHOSPHATASE. *Ibid.*, 456–62. An enzyme (phosphatidyl glycerophosphate phosphatase) that catalyzes the formation of phosphatidyl glycerol from phosphatidyl glycerophosphate has been rendered soluble by treatment of the particulate fraction of *E. coli* with Triton X-100 in the presence of EDTA, and has been partially purified. The enzyme is specific for phosphatidyl glycerophosphate and does not catalyze the hydrolysis of other simple phosphomonoesters. It required Mg^{++} for activity and is inhibited by sulfhydryl agents.

STUDIES IN THE BIOSYNTHESIS OF HEPATIC AND BILIARY LECITHINS. J. A. Balint, D. A. Beeler, D. H. Treble and H. L. Spitzer (Dept. of Med., Albany Med. College, Albany, N. Y.). *J. Lipid Res.* 8, 486–93 (1967). Male rats with biliary cannulae were injected with linoleate-1-^{14}C, stearate-1-^{14}C, palmitate-9-10-^{3}H, phosphate ^{32}P, L-methionine-methyl-^{14}C, and choline-methyl-^{3}H in various combinations and the incorporation of these isotopes into the phospholipids of liver, bile and plasma was determined for 1–4 hr. The results favor the view (a) that exchange of saturated fatty acids plays a role in the formation of lecithins; (b) that the unsaturated fatty acids do not undergo significant exchange and determine the pathway of biosynthesis of lecithins; and (c) that there is either more

than one pool of CDP-choline in liver or a pathway of biosynthesis of lecithin from choline not involving CDP-choline as an intermediate. Linoleoyl lecithin of liver attained higher specific activity with respect to phosphate-^{32}P and choline-methyl-^{3}H than did arachidonoyl lecithin. Lecithin in bile attained higher specific activities with respect to phosphate-^{32}P, choline-methyl-^{3}H, and linoleate-1-^{14}C than the corresponding hepatic lecithins. Stearate-1-^{14}C and palmitate-9-10-^{3}H attained highest specific activities in the hepatic lecithin fraction rich in arachidonic acid.

ELECTRON MICROSCOPIC AND BIOCHEMICAL STUDY OF LIPOPROTEIN SYNTHESIS IN THE ISOLATED PERFUSED RAT LIVER. A. J. Jones, N. B. Ruderman and M. Guillermo Herrera (Dept. of Med., Harvard Med. School, Boston, Mass.). *J. Lipid Res.* 8, 429–46 (1967). The isolated perfused rat liver was used to study the 300–800 Å electron-opaque bodies which had previously been described in the liver cell Golgi apparatus, smooth endoplasmic reticulum, and space of Disse. When the perfusion medium was enriched with linoleate, the number and electron opacity of these particles increased markedly. Sequential biopsies showed that they appeared first in the smooth surfaced terminal ends of the rough reticulum, the smooth endoplasmic reticulum proper, and the Golgi apparatus and later in the space of Disse. After 60 min of perfusion, particles of the same size and shape as those in the liver cells could be isolated in large numbers from the $d < 1.006$ fraction of the perfusate. Control livers perfused with an identical medium but without linoleate did not show these changes. Puromycin markedly depressed the production of 300–800 Å particles by livers perfused with an oleate-rich medium; however, in keeping with these findings, puromycin blocked the incorporation of oleate-^{14}C into lipoprotein triglyceride isolated from the perfusate. Puromycin also blocked the incorporation of leucine-^{3}H into both tissue protein and perfusate lipoprotein.

ADIPOSE TISSUE LINOLEIC ACID AS A CRITERION OF ADHERENCE TO A MODIFIED DIET. S. Dayton, S. Hashimoto, and M. L. Pearce (Med. Services of Wadsworth Hosp. and Domiciliary, Veterans Admin. Center, Los Angeles, Calif.). *J. Lipid Res.* 8, 508–10 (1967). In elderly, institutionalized men on a diet of high linoleic acid content, there was little correlation after 1 yr between adipose tissue linoleic acid concentration and dining room attendance. The correlation improved thereafter, with a correlation coefficient of +0.81 after 5 yr and +0.74 after 6 yr.

SEPARATION AND SIZE DETERMINATION OF HUMAN SERUM LIPOPROTEINS BY AGAROSE GEL FILTRATION. S. Margolis (Depts. of Med. and Physiol. Chem., The Johns Hopkins Univ. School of Med., Baltimore, Maryland). *J. Lipid Res.* 8, 501–07 (1967). A method is described for the separation of the three major classes of human serum lipoproteins by gel filtration on columns of 4 and 6% agarose gel. After calibration of the columns, the elution volumes of the lipoproteins were used to calculate the molecular sizes and molecular weights of these macromolecules. The technique was employed to demonstrate aggregation of low density lipoprotein following partial delipidation, partial proteolysis, or mild heat denaturation. Agarose gel filtration shows promise as a useful method for the isolation, purification and characterization of lipoproteins.

CHARACTERIZATION AND IDENTIFICATION OF GLYCERYL ETHER DIESTERS PRESENT IN TUMOR CELLS. R. Wood and F. Snyder (Med. Div., Oak Ridge Inst. of Nuclear Studies, Oak Ridge, Tenn.). *J. Lipid Res.* 8, 494–500 (1967). The previously unidentified neutral lipid present in tumor tissues has been isolated from Ehrlich ascites cells and unequivocally identified as a lipid class of glyceryl ether diesters containing various degrees of unsaturation, and ranging in approximate molecular weight from 760 to 990. The glyceryl ether diester fraction was shown to be free from neutral plasmalogens (glyceryl diacyl alk-1′-enyl ethers). The tumor lipid was subjected to saponification, transesterification, and lithium aluminum hydride reduction. The glyceryl monoethers that resulted from deacylation were the 1-isomers ranging in hydrocarbon chain length from C_{12} to C_{24}. The predominant glyceryl ethers were the hexadecyl (49%), octadecyl (21%), and octadecenyl (14%) derivatives. Saturated and mono- and polyunsaturated fatty acids ranging in chain length from C_{12} to C_{24} carbon atoms were esterified to the glyceryl monoether. Gas-liquid chromatography, thin-layer chromatography, and nuclear magnetic resonance and infrared spectroscopy were used to characterize and identify the intact tumor lipid and its derived products.

(Continued on page 78A)

THE POPE TESTING LABORATORIES
Analytical Chemists

2618½ Main P.O. Box 903 Dallas, Tex.

British Petroleum Plans Full-Scale Protein Production

British Petroleum plans to build a $5,600,000 plant at the Group's Lavera refinery in France to produce protein concentrate from a gas oil feedstock. Construction is expected to start in 1968 and the plant, with an annual capacity in excess of 16,000 tons, should be in production by 1970. The protein will be marketed as a component of animal feedingstuffs.

Extensive tests on the new BP product have been carried out over a period of years in Holland at the Central Institute of Nutrition and Food Research (C.I.V.O.) and the Institute of Agricultural Research of Biochemical Products (I.L.O.B.), two specialist organizations with very long standing experience in the field of nutrition and agricultural research.

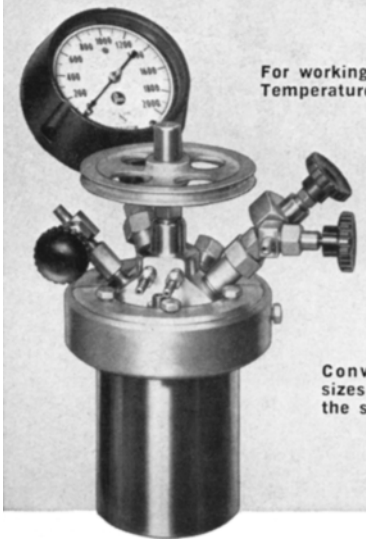
Microwave Power Symposium

Papers dealing with microwave-induced chemical plasmas and with the chemical aspects of biological effects of microwave energy will be presented at the Third Annual Symposium of the International Microwave Power Institute.

Papers presented will include "A Comparison of Nitrogen Atom Yields in a Microwave Discharge Using Pulsed and CW Power," "Model for Large Scale Microwave Plasma Facilities," and "Chemical Aspects of Biological Effects."

The three-day meeting will be presented at the Statler-Hilton Hotel, Boston, Mass., March 21–23, 1968.

PARR STIRRED REACTORS



For working pressures up to 1000 psig. Temperatures to 350° C.

Convenient one and two liter sizes operate interchangeably in the same electric heater.

These compact, bench-scale units provide excellent facilities for alkylation, catalytic reduction, digestion, extraction, halogenation, hydrogenation, methylation, nitration, polymerization, pressure leaching, sulfonation and many other laboratory operations in which heat and pressure must be applied to a chemical system. They can be supplied in any of eight different corrosion resistant alloys.

Ask for Specification 4500

PARR INSTRUMENT COMPANY
211 Fifty-Third St. Moline, Illinois

(Continued from page 77A)

• Drying Oils and Paints

AUTOXIDATION OF ALLYL COMPOUNDS. J. Mleziva, J. Jarusek, J. Toms and M. Bleha. *Deutsche Farben-Z.* 21, No. 3, 119–28 (1967). The rate of O-absorption of model allyl compounds in comparison with linolenic acid and ester at 20C, 40C and 60C, in presence and absence of Co drier, has been measured volumetrically. Autoxidation of none of the allyl compounds was as fast as that of the linolenic compounds, but glycerol mono- and di-allyl ethers were the fastest. Allyl butyl ether and diallyl formal also autoxidized at a reasonable rate but allyl benzene and allyl butyrate hardly at all. (Rev. Current Lit. Paint Allied Ind. No. 304.)

NONDRYING ALKYD RESINS AND PROCESS OF MAKING SAME. R. P. Silver (Hercules Inc.). *U.S. 3,350,335.* A process for preparing an improved non-drying alkyd resin comprises: (1) heating at 190 to 250C a polyhydric alcohol component in an amount corresponding to 120–150% of the hydroxyl equivalents theoretically required in the reaction with both the mono- and dicarboxylic acids used in preparation of the alkyd resin, with at least one fatty acid component selected from the group consisting of C_8-C_{18} saturated fatty acids and fatty acid triglycerides in which at least 80% of the fatty acids are C_8-C_{18} saturated acids, the amount of the fatty acid component being sufficient to provide 20–50% of the total carboxyl equivalents needed for reaction with the alcohol; (2) cooling the reaction mixture and further carrying out the reaction at 140–170C with the combination of at least one carbocyclic dicarboxylic acid anhydride and at least one acyclic dicarboxylic acid anhydride, the mole ratio of the carbocyclic to the acyclic anhydride being in the range 6:1 to 2:1, and the total amount of anhydrides being sufficient to provide 50–80% of the total carboxyl equivalents needed; (3) adding to the reaction mixture from (2), at a temperature of 125–160C, a solution of an organic peroxide in a C_1-C_4 alkyl acrylate or methacrylate, the amount of acrylate monomer being 10–50% by wt based on the solids content of reaction mixture (2), and the amount of peroxide being 1–10% by wt based on the amount of vinyl monomer; and (4) heating the reaction mixture from (3) at a temperature of 200–300C until the acid number of the alkyd resin product has been reduced to less than 15.

• Detergents

POURABLE AND FREE-FLOWING DETERGENT, WETTING AND EMULSIFYING COMPOSITIONS. W. Stein, H. Weiss and O. Koch (Henkel & Cie G.m.b.H.). *U.S. 3,345,301.* A powdered surface active detergent composition characterized by outstanding pouring and free-flowing properties consists of: (1) 35–95% by wt. of a surface active water soluble alkyl or cycloalkyl sulfonate, and (2) 5–65% by wt. of a salt of an alpha-sulfo-fatty acid having 10–24 C atoms in its molecule and a cation selected from the group consisting of Na, K, Mg, NH_4, mono-, di- and tri-alkanolamines.

PROCESS FOR THE PRODUCTION OF SUCROSE ESTERS OF FATTY ACIDS. R. Ismail, H. Corsepius and H. Simonis. *U.S. 3,347,848.* A process for the production of sucrose mono-esters of C_{12}–C_{22} fatty acids by transesterification of sucrose with a lower alkyl ester of a fatty acid in inert solvents, comprises (1) forming a liquid two-phase system, one phase being a solution of the fatty acid alkyl ester in an aliphatic or aromatic hydrocarbon non-polar solvent having a boiling point above 100C, the second phase containing sucrose and a potassium carbonate catalyst dissolved in a polar solvent at 70–90C, the sucrose and the fatty acid ester being present in a 1:1 mol ratio, (2) stirring the two phases at a temperature of 40–180C while distilling off the lower alcohol liberated by the transesterification reaction, and (3) distilling off the remaining solvents.

MICROWAVES AND MOISTURE IN SOAP. T. H. N. Rance (AEI Electronics, New Parks, Leichester). *Soap, Perfumery Cosmetics* 40(7), 463–471 (1967). This paper is a review of the development of a moisture-measuring technique new to the soap industry. The measurement of moisture in soap during production is important for reasons of quality control and economic production. The relationship between the water content of a material and the energy losses in that material when placed in a very high frequency electric field, has been established for a wide variety of industrial products including soap. A device has been developed which can be connected in line with plodders and dryers.

EFFECT OF PROCESS VARIABLES ON THE STABILITY OF SOME SPECIFIC EMULSIONS. H. E. Jass (Carter Prod. Div., Carter-Wallace, Inc., Cranbury, N. J.). *J. Soc. Cosmetic Chemists* 18, 591–598 (1967). Three case histories of cosmetic emulsion problems involving rheological and emulsion deterioration with time are described. The three cases involve products which are quite diverse in their emulsion type. However, the changes could be traced to a change in physical state of the crystalline viscosity builders, primarily glyceryl monostearate. Processing and formulation alterations were used to arrest the changes and stabilize the product. Photomicrography was helpful in analyzing the problem and in predicting the results of process or formula changes.

SPECTROSCOPIC STUDIES OF SKIN IN SITU BY ATTENTUATED TOTAL REFLECTANCE. N. A. Puttnam and B. H. Baxter (Res. and Dev. Dept., Colgate-Palmolive Ltd., Manchester, Eng.). *J. Soc. Cosmetic Chemists* 18, 469–472 (1967). Attenuated total reflectance (ATR) can be used to obtain an IR spectra of skin *in situ*. A "V" shaped ATR crystal into which the side of the hand (the hypothenar eminenie) was placed was used. The main features of such spectra agreed with those reported earlier from transmission studies through thin sections of various tissues. There were relatively small differences in the ratios of the intensities of the absorptions in the 1300–1000 cm^{-1} region between individuals. The differences were not explored further. Minor components of a hand cream could be detected using the ATR technique.

THERMOGRAVIMETRIC AND THERMONANALYTICAL EXAMINATION OF CONDENSED PHOSPHATES. B. Lorant and M. Szeplaki (Fats and Detergents Res. Inst., Budapest, Hungary). *Tenside* 4, 357–63 (1967). The results of a thermoanalytical study conducted on sodium tripolyphosphates are discussed and interpreted as casting some doubt on the generally accepted existence of two crystalline modifications of tripolyphosphate. Contrary to literature data, heating to 400C did not produce pure Form II tripolyphosphate but rather a complex mixture of phosphates, containing still some unreacted orthophosphates. It is concluded that industrial tripolyphosphates are, in many cases, insufficiently heated products which may at times yield poorly reproducible results when used as builders in washing powders. Experimental conditions for further investigation of the problem are recommended.

THE REMOVAL OF OIL FROM WATERWAYS; A POSSIBLE USE FOR SURFACTANTS? H. Hellmann (Fed. Hydrolog. Dept., Koblenz, Germany). *Tenside* 4, 352–6 (1967). The conditions for the formation of dilute oil emulsions using surfactants as well as the stability of the resulting emulsions have been examined on a laboratory scale. An interpretation of the results suggests that the use of emulsifiers to remove oil pollution from rivers and waterways may be questionable and superfluous. This method of combatting oil pollution is deemed unsatisfactory for large scale disasters (such as the sinking of oil tankers). The problems connected with the additional water pollution by solvent-containing and partially toxic substances are also briefly discussed.

THE CHARACTERISTICS OF WATER-SOLUBLE SURFACTANTS AS EMULISIFIERS. H. Sonntag, F. Püschel and B. Strobel (German Acad. of Sci., Berlin, Germany). *Tenside* 4, 349–52 (1967). It is suggested that the emulsifying power of a surfactant for a given system be characterized by the concentration corresponding to the formation of coalescence stable so-called "black films." The method of investigation is theoretically explained and demonstrated in practical cases. The emulsifying power of a large number of surfactants has been determined in this manner, particularly of substituted sodium alkyl sulfonates, nonyl phenol polyethylene oxide adducts and cetyl trimethyl ammonium bromide.

NEW OLEFIN SULFONATION FOR DETERGENTS. S. Holtzman and B. M. Milwidsky (Zohar Soap & Deterg. Factory, Israel). *Soap Chem. Specialties* 43(11), 64–8, 112–5 (1967). A method of sulfonating olefins is described, which uses conventional SO_3 sulfonation equipment and produces detergent material containing a minimum amount of undesirable disulfonates.

DETERMINATION OF ANIONIC DETERGENTS BY TWO-PHASE TITRATION. V. W. Reid, G. F. Longman and E. Heinerth (Shell Research Lts., Egham, England). *Tenside* 4, 292–304 (1967). A survey of the methods for analyzing anionic surfactants by means of two-phase titration is presented as an official report of the International Analytical Committee of the International Surfactant Committee. A new two-phase titration method is described in which the indicator is a mixture of a cationic

dyestuff (dimidium bromide) and an anionic one (disulphine blue VN), the cationic titration solution being Hyamine 1622, which is standardized against pure sodium lauryl sulfate. The method is subject to relatively little interferenee by the various ingredients present in a detergent formulation. The indicator mixture shows a good proportionality between anionic surfactant concentration and the consumption of titration solution, better than in the methylene blue method.

SURFACE ACTIVE SUGAR DERIVATIVES. F. Schneider and H. U. Geyer (Tech. Hochschule Braunschweig, Braunschweig, Germany). *Tenside* 4, 330–4 (1967). Surface active sugar derivatives have been prepared by linking sugars or hydrophilic sugar derivatives with lipophilic substances with nitrogen as the connecting link. In order to make it easier to vary the reaction, predominantly bifunctional connecting parts were used, in the form of aliphatic compounds with at least one amino group, e.g. diamines, aminoalcohols or aminoacids. As a result of this reaction, 1-N-alkylamino-D-ketoses, aldose-fatty acid hydrazones, 1-desoxy-1-N-(1′-amino-2′-fatty aminoethane)-D-fructose-oxalates, aldosecystein-esters, gluconamido-alkanes, 1-D-gluconamido-2-fatty acylamidoethanes and gluconyl-glycin esters were obtained. These substances, in 0.001 molar aqueous solutions, depress the surface tension of water down to values sometimes considerably below 30–35 dyn/cm. The effective optimum is mostly attained with compounds having 10–14 CH_2 groups.

MECHANICAL DISHWASHING COMPOUNDS. A. E. Lintner (Calgon Corp.). *Soap Chem. Specialties* 43(7), 39–42 (1967). An attempt is made to formulate a classification of mechanical dishwashing compounds by general composition type. The role of the major ingredients commonly present in dishwashing compounds is briefly discussed.

CAR WASH DETERGENTS. W. Shortreed (Malco Products, Inc.). *Soap Chem. Specialties* 43(9), 57–9 (1967). Performance characteristics required of car wash detergents are reviewed.

NOTES ON THE EXAMINATION OF NEKAL BX. G. Sonnek and F. Wolf (Univ. Halle, Germany). *Tenside* 4, 325–30 (1967). Nekal BX is a mixture of various butylated naphthalene sulfonic acids. Alkali fusion produces α-naphthols exclusively, indicating that the sulfonic acid groups are in the α position. Hydrolysis with 50–60% sulfuric acid at 130C, as well as reduction with sodium amalgam at 40C, produces three unknown compounds as well as mono-, di- and tributyl naphthalene. The position of the butyl groups in the naphthalene ring was determined by IR methods. A study of the reaction kinetics showed that sulfonation precedes butylation during the preparation of the butylated naphthalene sulfonic acid.

HIGHER MOLECULAR WEIGHT SULFONIC ACIDS, VI. SYNTHESIS AND PROPERTIES OF HIGHER MOLECULAR WEIGHT ALKENE SULFONATES AND OXO- AND HYDROXY ALKANE SULFONATES. F. Püschel (German Acad. of Sci., Berlin, Germany). *Tenside* 4, 320–5 (1967). The solubility, critical micelle concentration and surface active properties of the sodium salts of 2-alkene-, 2- and 3-oxoalkane- and 2- and 3-hydroxy alkane sulfonic acids containing 12 to 18 C atoms are reported and compared with those of normal alkane sulfonates.

RAPID SULFONATION WITH SULFUR TRIOXIDE GAS ACCORDING TO THE CHEMITHON PROCESS. W. Fricke (Lurgi Gmbh, Frankfurt, Germany). *Tenside* 4, 317–20 (1967). A sulfonation process using sulfur trioxide as the sulfonating agent is described and results obtained by the use of this process are discussed.

HIGH MOLECULAR WEIGHT SULFONIC ACIDS, V. PREPARATION OF SURFACTANTS THROUGH SULFONATION OF OLEFINS. F. Püschel (German Acad. of Sci., Berlin, Germany). *Tenside* 4, 286–92 (1967). The reaction between sulfur trioxide or its complex compounds with unbranched alpha olefins with about 12–18 C atoms in the molecule produces mixtures of surface active sulfonic acids and ester-type compounds, especially 1,3- and 1,4-sultones which are also transformed into surface active substances by hydrolysis. The chemical principles underlying these reactions are discussed, as well as the reaction mechanisms involved and the characteristics of the reaction products.

THE CONNECTION BETWEEN THE CONSTITUTION AND PROPERTIES OF ANIONIC SURFACTANTS MADE FROM DERIVATIVES OF RICINOLEIC ACID AND 12-HYDROXY STEARIC ACID. H. Bertsch, G. Czichocki and H. Reinheckel (German Acad. of Sci., Berlin, Germany). *Tenside* 4, 277–85 (1967). The surface active properties of the sodium salts of sulfuric acid esters of alkyl esters are compared with those of N-alkyl amides of ricinoleic acid and 12-hydroxy stearic acid. The connection between the structure of these anionic compounds and their properties is demonstrated. The effect of a double bond as well as that of the ester and acid amide groups on solubility and resistance to hydrolysis are also discussed.

BLEACHING COMPOSITION. H. E. Wixon (Colgate-Palmolive Co.). *U.S. 3,346,502.* A bleaching composition is claimed, consisting essentially of 1–99% by wt of a heterocyclic N-chloroimide selected from the group consisting of trichlorocyanuric acid, dichlorocyanuric acid and salts thereof, about 0.01 to 5% by wt of a fluorescent brightener substantive to cotton and stable in the presence of the N-chloroimide, and ultramarine blue pigment of a particle diameter less than 0.05 mm, sufficient to impart a faint blue shade to fabrics treated with an aqueous solution of the composition. The composition is in the form of a finely divided particulate product having a maximum particle diameter of about 0.5 mm so as to be readily dispersible in water when used in a household washing machine.

HEAVY-DUTY LIQUID DETERGENT EMULSION COMPOSITIONS AND PROCESSES FOR PREPARING THE SAME. J. M. Huggins (Monsanto Co.). *U.S. 3,346,503.* A process for preparing a phase-stable, bacteriostatically active, heavy-duty liquid detergent composition comprises preparing an emulsion consisting of: 1) an aqueous continuous phase containing 5–60% by wt of a dissolved inorganic builder and 0.1–8% by wt of a co-polymer having mol wt between 1,000 and 100,000 of equimolar proportions of maleic anhydride with a compound selected from the group consisting of ethylene, propylene, isobutylene and vinyl methyl ether, as a stabilizing component; and 2) a dispersed phase of a water soluble nonionic detergeent selected from the group consisting of C_6-C_{20} alkyl phenols, C_{10}-C_{18} monohydric primary alcohols, C_{10}-C_{18} fatty acids, C_{12}-C_{14} fatty amines, C_{10}-C_{18} fatty acid esters of hexitol anhydrides, and containing at least one polyoxyalkylene chain having 5–50 oxyalkylene units, to which nonionic detergent is added and admixture of 0.1–1% by wt of a polyhalogen-substituted carbanilide and 1–3% by wt, based on the total composition, of a detergent material selected from the group consisting of the nonionics described above, plus anionic alkyl benzene sulfonates and nonionic fatty acid alkanolamides.

(Continued on page 80A)

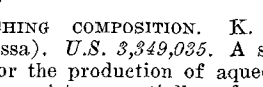
SODIUM METHYLATE
(Sodium Methoxide)
Spec 101. Packaged in airtight steel drums of 10, 25, 50 and 200 pounds net.
Free flowing white powder.
Formula $NaOCH_3$.
Bulk density 4.15 pounds per gallon.
Molecular weight 54.03.
Write today for full information.
HARSHAW
Division of Kewanee Oil Company
THE HARSHAW CHEMICAL COMPANY
CLEVELAND, OHIO 44106

(Continued from page 79A)

SULPHONATION OF ORGANIC COMPOUNDS. J. M. Blakeway and P. Marshall (Colgate-Palmolive Co.). *U.S. 3,346,505.* A process for the co-sulphonation of a higher alkyl benzene and a lower alkyl benzene comprises reacting a molar excess of the higher alkyl benzene in liquid phase with a gaseous mixture of sulphur trioxide and air in a reaction zone under sulphonating conditions until the reaction is at least about 50% complete; introducing the lower alkyl benzene and additional gaseous sulphur trioxide diluted with air into the partially sulphonated reaction mixture, the weight ratio of xylene to higher alkyl benzene being selected in the range 1:4 to about 1:16, and the additional sulphur trioxide added being sufficient to complete the sulphonation of the higher alkyl benzene and of the xylene; and maintaining the mixture in the reaction zone under sulphonating conditions until absorption of the sulphur trioxide is substantially complete.

PROCESS FOR PREPARING A HIGHLY POROUS SODIUM PERBORATE. L. Pellens, H. Honig and R. Siegel (Kali-Chemie A. G.). *U.S. 3,348,907.* A process for preparing free-flowing, highly porous sodium perborate having a particle size range of 0.25 to 1 mm and a bulk density of 0.25 to 0.45 g/cc, comprises forming a reaction mixture, at a temperature of 10–15C, of an aqueous solution of sodium metaborate and hydrogen peroxide, until crystallization of sodium perborate from the reaction mixture starts. Subsequently, sodium metaborate solution and hydrogen peroxide solution are further added to the reaction mixture, while maintaining a mol ratio of hydrogen peroxide to sodium metaborate in the range 1.1 to 1.8. After completion of the desired amount of crystallization the excess hydrogen peroxide present is reacted with an additional amount of sodium metaborate, the mixture is cooled to about 1C and the precipitated sodium perborate is separated from the mother liquor.

ACTIVATED BLEACHING COMPOSITION. K. Dithmar and P. Koblischek (Degussa). *U.S. 3,349,035.* A solid, stable bleaching composition for the production of aqueous baths having a bleaching action consists essentially of a solid, stable inorganic peroxygen bleaching compound and a 1-substituted-3-acylhydantoin activator of the structure:



where R_1 is a member selected from the group consisting of alkyl, cycloalkyl, phenyl, alkyl-phenyl and phenyl-alkyl, the alkyl groups indicated being lower alkyl, and R_2 is an acetyl group, the amount of activator being 0.3 to 1.25 mols per mol of peroxygen present.

DETERGENT COMPOSITIONS. E. B. Michaels and C. A. Wetmore (Stamford Chem. Ind., Inc.). *U.S. 3,349,038.* A detergent composition suitable for use in charging a dry-cleaning solvent consists essentially of a major amount of an oil-soluble petroleum sulfonate having molecular weight of 425–465 and a minor amount of a water-soluble alkyl-aryl sulfonate having a molecular weight of 200–350, the alkyl-aryl sulfonate being present at a level of 1–8% by wt based on the oil-soluble sulfonate.

PROCESS FOR THE PRODUCTION OF ALKANE SULFONATES. E. Segessemann (Atlas Refinery, Inc.). *U.S. 3,349,122.* A process for the production of an alkane sulfonate from a C_5 to C_{24} alkyl olefin comprises finely dispersing an oxygen-containing gas at 90–200C through the olefin, until its viscosity is increased by a factor of five- to tenfold to produce an oxygenated bodied olefin, which is then reacted with an aqueous solution of sulfurous acid or a salt of sulfurous acid.

DETERGENT ALKYLATE COMPOSITION OF SECONDARY PHENYL-SUBSTITUTED N-ALKANES. W. A. Sweeney (Chevron Res. Co.). *U.S. 3,349,141.* A detergent alkylate composition consists essentially of secondary phenyl-substituted n-alkanes, of which 5 to 50% by wt has 11 C atoms in the alkane portion of the molecule, the remainder having 12 to 14 C atoms and consisting of a major proportion of mid-chain substituted phenyl alkanes, 5–30% by wt of 4-phenyl alkanes and a minor proportion, not exceeding 35% by wt, of 2- and 3-phenyl alkanes.

METHOD OF PRODUCING DETERGENT COMPOSITION. R. L. Green (FMC Corp.). *U.S. 3,350,318.* A method of producing a low foaming dishwashing detergent composition comprises forming an aqueous solution of either sodium aluminate, sodium zincate or the reduction compounds of $ZnO \cdot NaOH \cdot H_2O$ and $BeOH \cdot NaOH \cdot H_2O$, then spraying the aqueous solution of inhibitor onto granules of sodium polyphosphate and mixing the sprayed granules with sodium silicate having an $Na_2O:SiO_2$ ratio from 1:1 to 1:3 to produce a composition containing essentially 20–50% by wt of sodium polyphosphate, 10–30% by wt of sodium silicate and 0.02 to 1.5% by wt of inhibitor.

AQUEOUS DETERGENT-INORGANIC BUILDER CONCENTRATES. N. A. Schonfeldt (Mo Och Domsjo Aktiebolag, Sweden). *U.S. 3,350,319.* A clear aqueous detergent-inorganic builder concentrate consists essentially of 0.015% to 50% by wt of an inorganic neutral or low alkalinity builder, 0.015% to 2% by wt of a high alkalinity builder, 1–40% by wt of a polyoxyalkylene glycol ether precipitatable from the concentrate in the presence of the inorganic builder, having the formula: $R\text{-}A\text{-}(Y\text{-}O)_x\text{-}Y\text{-}OH$, where R is a C_8-C_{24} alkyl or aralkyl hydrocarbon group, A is selected from the group consisting of ethereal oxygen and sulfur, amino, carboxylic esters and thiocarboxylic ester groups, Y is a C_2 to C_4 alkylene group and x is a number from 8 to 20, and 0.5 to 20% by wt of an alkylphenol having an SO_3 group which is able to prevent precipitation of the polyoxyalkylene glycol ether.

DETERGENT BAR CONTAINING FATTY KETONE. G. T. Hewitt (Colgate-Palmolive Co.). *U.S. 3,350,320.* A detergent bar composition is claimed, consisting essentially of 50–99% of a sodium salt of a sulfated organic detergent containing a C_{12} to C_{18} saturated straight chain alkyl group and 0.5 to 10% by wt of a fatty ketone selected from the group consisting of stearone and palmitone.

CONTINUOUS SULFONATION PROCESS. R. J. Brooks and B. Brooks (Chemithon Corp.). *U.S. 3,350,428.* A continuous process is claimed for sulfating organic reactants having an alcoholic hydroxyl group (or for sulfonating sulfonatable organic reactants) by reaction with sulfur trioxide. The process comprises simultaneously and continuously introducing into an externally cooled reaction zone a stream of the organic reactant and a stream of a gaseous mixture of sulfur trioxide and an inert diluent, without prior premixing of the two streams, at a temperature which reduces the viscosity of the organic reactant sufficiently to effect optimum mixing. The organic reactant and the sulfur trioxide streams are thoroughly mixed in the reaction zone for a time of about 10 seconds to provide a reaction mixture in the form of a thin film, after which time the reaction mixture is removed from the reaction zone and introduced into a quench cooling zone where it is cooled to below 130F and provides a substantially non-degraded organic sulfuric acid-rich product which is finally neutralized, after removal from the quench cooling zone and separation of the gaseous inert diluent containing any unreacted sulfur trioxide.

PREPARATION OF NONIONIC SURFACE ACTIVE AGENTS OF HIGH WETTING POWER. R. E. Leary, L. J. Nehmsmann III and L. M. Schenck (Gen. Aniline & Film Corp.). *U.S. 3,350,462.* A process is claimed, which comprises in a first stage passing propylene oxide into a C_8-C_{20} secondary alkanol at a temperature of 0–125C in the presence of an acidic catalyst until between one and four moles of propylene oxide have reacted per mole of alkanol. The resultant propoxylated reaction mixture is neutralized and further reacted in a second stage with ethylene oxide in the presence of an alkaline catalyst at a temperature of 50–200C, until between 1 and 150 moles of ethylene oxide have reacted per mole of the propoxylated reaction mixture coming from the first stage.

METHOD OF SOFTENING TEXTILE FABRICS. C. S. Miner, Jr., K. A. Park and W. F. Weiss (A. D. Little, Inc.). *U.S. 3,351,483.* A method of treating a textile fabric to clean and soften the fabric comprises washing the fabric with a household laundry detergent in the presence of a solid fabric softener composition. The laundry detergent consists of anionic and/or nonionic detergents with or without detergency builders and the solid softener composition, present during the wash cycle, consists of a complex of urea with (1) a quaternary ammonium textile softening compound containing at least one straight-chain hydrocarbon radical of at least 8 C atoms or (2) an amine textile softening compound containing at least one straight-chain hydrocarbon radical of at least 8 C atoms.

CLEANSING COMPOSITION. E. T. Hinkel, Jr. (Sterling Drug Inc.). *U.S. 3,355,387.* A stable, non-soap cleansing composition consists essentially of an aqueous emulsion of alkylphenoxy-polyalkylene ether sulfonate containing 0.1–1.0% by wt of a halogenated salicylic acid having from 1 to 3 atoms of a halogen, the amount of sulfonate being 10 and 20% by wt of the composition, and the pH of the emulsion being 5–6.