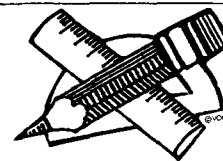


Abstracts



EDITOR: S. KORITALA—ABSTRACTORS: N.E. Bednarczyk, J.C. Harris, M.G. Kokatnur, F.A. Kummerow, B. Matijasevic, D.B.S. Min, and R.A. Reiners

• Fats and Oils

SURFACE ACTIVITY OF SOME FATTY ACID MONOGLYCERIDES. W. Zwierzykowski, B. Orzecka and K. Spich (Gdansk Tech. Univ.). *Tenside Deterg.* 13(6), 313-6 (1976). Monoglycerides of some saturated and unsaturated fatty acids were prepared. The surface activity of the purified monoglycerides was investigated by measurements of surface and interfacial tensions of oil solutions against water and air. The critical micelle concentration of each of the monoglycerides was determined and the effect of chain length of their molecules was discussed.

OIL PLANTS OF ZAIRE. II.—BOTANICAL FAMILIES PRODUCING OILS OF MEDIUM NON-SATURATION. C.K. Ngiefu, C. Paquot and A. Vieux *Oléagineux*, 31(12), 545-7 (1976). In this second article the authors examine medium nonsaturated acids drawn from plants of Zaire, indicating that some of them are of great interest from the alimentary point of view, especially *Citrullus lanatus* and *Luffa cylindrica*.

AUTOXIDATION OF OILS AT RELATIVELY HIGH TEMPERATURE. C. Paquot and P. Cuvier *Rev Fr Corps Gras* 24(1), 41-5 (1977). The autoxidation of peanut and sunflower oils is studied at temperatures ranged between 50 to 140°C. The peroxides are analyzed by the iodometric method and the epoxyperoxides by polarography. In these conditions the epoxyperoxide formation is correlated with the temperature and the duration of heating. Then epoxyperoxides may be the origin of the oxidized fatty acids and the splitting volatile components.

AUTOXIDATION OF ALKOXYLIPIDS. 1. ALKYLGLYCEROLS, DIALKYLGLYCEROLS AND TRIALKYLGLYCEROLS. N. Yanishlieva, H. Becker and H.K. Mangold (Bundesanstalt für Fettforschung, 44 Munster, West Germany) *Chem. Phys. Lipids* 17, 393-7 (1976). Saturated long-chained ethers of glycerol are rapidly autooxidized at elevated temperatures. The rates of their autoxidation are higher than those of other saturated lipids; they increase in the following order: 2-alkylglycerol, 1-alkylglycerol, 1,2,3-trialkylglycerol, 1,3-dialkylglycerol, 1,2-dialkylglycerol. Further reactions of the primary products of autoxidation lead to cleavage of the ether bonds which is followed by the formation of alcohols, aldehydes and acids.

1-HYDROXY-2-TERT-BUTYLDIMETHYLSILYL-SN-GLYCERO-3-PHOSPHORYLCHOLINE. A USEFUL INTERMEDIATE IN THE SYNTHESIS OF SHORT ACYL CHAIN 1-ACYL-SN-GLYCERO-3-PHOSPHORYLCHOLINES. K.K. Yabusaki and M.A. Wells (Dept. of Biochem., College of Med., Univ. of Arizona, Tucson, Arizona 85724) *Chem. Phys. Lipids* 17, 120-7 (1976). The synthesis of 1-acyl-sn-glycero-3-phosphorylcholines in particular those containing short fatty acyl chains are described. The method involves the use of 1-acyl-2-tert-butyl-dimethylsilyl-sn-glycero-3-phosphorylcholines which can be readily prepared by reacting hens' egg yolk 1-acyl-sn-glycero-3-phosphorylcholines with tert-butyl-dimethylchlorosilane with imidazole as catalyst and dimethylformamide as solvent. Deacylation of the 1-acyl-2-tert-butyl-dimethylsilyl-sn-glycero-3-phosphorylcholines with saturated anhydrous potassium carbonate in methanol yields the 2-tert-butyl-dimethylsilyl-sn-glycero-3-phosphorylcholine. Reacylation of the 2-tert-butyl-dimethylsilyl-sn-glycero-3-phosphorylcholine with fatty acyl anhydride in the presence of 4-dimethylaminopyridine in anhydrous chloroform followed by removal of the tert-butyl-dimethylsilyl protecting group by treatment with dry hydrogen chloride gas in anhydrous chloroform at 0° yields the desired 1-acyl-sn-glycero-3-phosphorylcholine. Various facets of the reactions involved in developing the synthetic procedures in this study are discussed.

OXIDATION OF LONG-CHAIN ALCOHOLS TO ALDEHYDES BY THE DIPYRIDINE CHROMIC ANHYDRIDE COMPLEX. A.J. Valicenti and R.T. Holman (The Hormel Inst., Univ. of Minn., Austin, Minn. 55912) *Chem. Phys. Lipids* 17, 389-392 (1976). The oxidation of alcohols by the dipyridine chromic anhydride complex is judged to be most suitable for the preparation of

long-chain aliphatic aldehydes. Thus, *cis*-9-octadecenol is oxidized in 93% yield within 30 min at room temperature with no detectable alteration of the double bond.

A DEUTERIUM NUCLEAR MAGNETIC RESONANCE STUDY OF THE CONDENSING EFFECT OF CHOLESTEROL ON EGG PHOSPHATIDYLCHOLINE BILAYER MEMBRANES. I. PERDEUTERATED FATTY ACID PROBES. G.W. Stockton and I.C.P. Smith (Div. of Biol. Sci., Natl. Res. Council of Canada, Ottawa, Ontario, Canada K1A 0R6) *Chem. Phys. Lipids* 17, 251-63 (1976). Deuterium nuclear magnetic resonance quadrupole splittings D_q and the related acyl chain segmental order parameters S_{m01} have been determined for perdeuteriostearic acid intercalated as a molecular probe in the lamellar liquid crystalline phase of egg yolk phosphatidylcholine-cholesterol-water mixtures. The 2H NMR data show that cholesterol induces a high degree of order in the acyl chains of the phospholipid while maintaining the general profile of high order near the head group and relatively low order in the middle of the bilayer. This results in a pronounced thickening of the bilayer and concomitant decrease in the average molecular area of the fatty acyl chains. The geometrical changes in the bilayer due to cholesterol are discussed in terms of trans-gauche isomerization in the fatty acyl chains.

TEMPERATURE-DEPENDANT ^{13}C NUCLEAR MAGNETIC RESONANCE STUDIES OF HUMAN SERUM LOW DENSITY LIPOPROTEINS. B. Sears, R.J. Deckelbaum, M.J. Janiak, G.G. Shipley and D.M. Small (Biophys. Div., Dept. of Med., Boston Univ. Sch. of Med., Boston, Mass. 02118) *Biochemistry* 15, 4151-7 (1976). The natural abundance ^{13}C nuclear magnetic resonance (NMR) spectrum of human serum low density lipoproteins (LDL) shows significant temperature-dependent changes. These temperature-dependent spectra have been used to monitor changes in the organization of cholesterol esters within the LDL particle. Comparison with ^{13}C NMR spectra of both cholesterol linoleate and an aqueous codispersion of cholesterol linoleate and egg phosphatidylcholine suggests that at low temperatures (10°C), the cholesterol esters in LDL are organized in a smectic-like, liquid-crystalline arrangement. At temperatures above the order-disorder transition exhibited by the cholesterol esters of LDL, the cholesterol esters appear to be partially melted but still are motionally restricted compared with liquid cholesterol esters.

AN ESR STUDY OF THE ANCHORING OF SPIN-LABELED STEARIC ACID IN LECITHIN MULTILAYERS. A. Sanson, M. Ptak, J.L. Rigaud and C.M. Gary-Bobo (Centre de Biophys. Moléculaire, C.N.R.S., 45045 Orleans Cedex, France) *Chem. Phys. Lipids* 17, 435-44 (1976). In egg lecithin-water lamellar phases, spin-labeled stearic acid gives two superimposed ESR spectra which are only well resolved when the temperature is $>30^\circ C$. These two spectral components are attributed to the dissociated and non-dissociated forms of the fatty acid carboxylic group, anchored at two different positions in the polar interface constituted by the hydrated lipid polar heads. Results on such interactions of other functional groups (spin-labeled fatty ester and fatty alcohol) are also presented.

AN ESR STUDY OF THE HYDRATION STEPS OF LECITHIN MULTILAYERS. A. Sanson, M. Ptak, J.L. Rigaud and C.M. Gary-Bobo (Centre de Biophys. Moléculaire, C.N.R.S., 45045 Orleans Cedex, France) *Chem. Phys. Lipids* 17, 445-55 (1976). A spin-labeled stearic acid and other spin-labeled molecules have been used for an ESR study of the hydration process of the egg lecithin lamellar phase for water concentrations, $C_w > 10\%$. Two hydration steps are found for $C_w \approx 20\%$ and $C_w \approx 30\%$, in good agreement with results of the literature. To explain discontinuities in the behavior of three spin-labeled molecules at $C_w \approx 20\%$, a conformational change of the phosphatidylcholine polar head and a phase transition in the polar interface are proposed.

APPLICATION OF MICROCALORIMETRY TO THE STUDY OF LIPID-PROTEIN INTERACTION. M. Rosseneu, F. Soetewey, V. Bleton, J. Lievens and H. Peeters (Simon Stevin Inst. voor Wet-

schappelijk Onderzoek, Jerusalemstraat 34, B-8000 Brugge, Belgium) *Chem. Phys. Lipids* 17, 38-56 (1976). The enthalpy changes associated with protein-lipid binding were measured in an isothermal microcalorimeter. This technique was applied to the study of the association between albumin with fatty acid and lysolecithin, and between the plasma apolipoproteins and phospholipids. Microcalorimetry enables determination of the maximal enthalpy of binding and of complex stoichiometry in systems where one ligand, such fatty acid or a phospholipid is bound to either BSA or an apolipoprotein. The competition between 2 ligands, such as fatty acid and a dye for albumin can also be followed. Interapoprotein association between the two major apoproteins of apoHDL was demonstrated in the presence of phospholipids and compared to the behaviour of the whole apoHDL. Finally the association of two phospholipids naturally occurring in the HDL molecule was demonstrated. The interpretation and relevance of these various types of application of microcalorimetry to the study of protein-lipid systems is discussed and evaluated.

DETECTION OF LIPID PHASE TRANSITIONS BY SURFACE TENSIONOMETRY. A.D. Purdon, D.O. Tinker and A.W. Neumann (Depts. of Biochem. and Mechanical Engineering, Univ. of Toronto, Toronto, Canada, M5S 1A8) *Chem. Phys. Lipids* 17, 344-52 (1976). A technique for the detection of lipid phase transitions is described, which involves measurement of the surface tension as a function of temperature. In the case of insoluble lipids, such as dipalmitoylphosphatidylcholine (DPPC) the lipid is spread as a multibilayer film on an aqueous substrate, while in the case of water-soluble lipids such as lysophosphatidylcholine (LPC) the surface tension of aqueous sols is measured. Surface tension at the interface, is monitored using a Wilhelmy plate while the temperature is continuously varied. Discontinuities or changes in slope in the surface tension-temperature (γ -T) curve reflect phase transitions in the lipid.

OZONIZATION PRODUCTS OF UNSATURATED FATTY ACID METHYL ESTERS. E.C. Nickell, M. Albi and O.S. Privett (The Hormel Inst., Univ. of Minn., Austin, Minn. 55912) *Chem. Phys. Lipids* 17, 378-88 (1976). Low temperature ozonization of the methyl esters of all-*cis* nonconjugated fatty acids, containing 1 to 4 double bonds in pentane, gave high yields of normal ozonides of the parent ester as the major product of the reaction. Ozonization of all-*cis* methyl eicosapentaenoate and docosahexaenoate under the same conditions gave a mixture of normal ozonides containing a large proportion of cross ozonides. Thin-layer chromatography (TLC) of the normal ozonides of the methyl esters of unsaturated fatty acids differing in the number and positions of ozonide groups and in chain length was demonstrated. Fractionation of the parent normal ozonides of methyl linoleate, linolealdate, linolenate and arachidonate by low temperature crystallization indicated that the normal ozonides of these esters consisted of mixtures of geometric isomers. The ozonization of the methyl esters of all-*trans* nonconjugated fatty acids gave low yields of normal ozonides of the parent ester by comparison to the corresponding all-*cis* isomers, and the yield of these ozonides decreased with increasing unsaturation. Infrared spectral analysis showed that the major products of the reaction with these esters contained both hydroxyl and/or peroxy and normal ozonide groups.

AN IMPROVED SYNTHESIS OF 1-O-[³H] ALKYL-2-ACYL-SN-GLYCEROL-3-PHOSPHORYLETHANOLAMINE WITH AN UNSATURATED ACYL CHAIN. F. Paltauf (Inst. für Biochem. der Technischen Univ. Graz, A-8010 Graz, Schlogelgasse 9, Austria) *Chem. Phys. Lipids* 17, 148-54 (1976). A method is described for the synthesis of 1-O-[9', 10'-³H] octadecyl-2-octadecenoyl-sn-glycerol-3-phosphorylethanol-amine, starting from rac 1-O-octadecen-9'-ylglycerol. The *sn*-1-alkyl enantiomer is obtained by an enzymatic reaction involving deacylation of rac 1-O-octadecen-9'-yl-2-octadecenoyl-glycerol-3-phosphoryl-N-(tert-butyl-oxy-carbonyl) ethanolaniline with phospholipase A₂. The resulting lyso compound is tritiated with ³H₂ in the presence of platinum catalyst and reacylated with oleoyl anhydride to yield the final product.

(Z)-17(20)-DEHYDROCHOLESTEROL. A NEW STEROL WITH C-21 AND C-22 SPATIALLY FIXED. W.R. Nes, T.E. Varkey, D.R. Crump and M. Gut (Dept. of Biol. Sci., Drexel Univ., Philadelphia, Penn. 19104) *J. Org. Chem.* 41, 3429-33 (1976). (Z)-3- β -Hydroxycholesta-5,17(20)-diene, in which the side chain lies on the same side of the 17(20) bond as the sterol nucleus (C-22 *cis* oriented with respect to C-13), was prepared by two independent routes from pregnenolone. The presence and geometry of the $\Delta^{17(20)}$ bond were demonstrated by proton

magnetic resonance and mass spectrometry and by conversion of the diene, through addition of osmium tetroxide followed by reduction, to the known 3 β ,17 α ,20 α -trihydroxycholesta-5-ene, as well as to 3 β ,20 α -dihydroxycholesta-5-ene by hydroboration. The physical and chemical evidence indicates that sterols with the natural configuration at C-20 assume a preferential conformation about the 17(20) bond such that C-21 and C-22 lie pseudoequatorially to the rear of the 17(20) bond with the third substituent on C-20 pseudoaxially oriented to the front opposing C-18.

IDENTIFICATION OF ISOMERIC DOXYL STEARIC ACIDS BY GAS-LIQUID CHROMATOGRAPHY AND MASS SPECTROMETRY. L. Marai, J.J. Myher, A. Kuksis, L. Stuhne-Sekalec and N.Z. Stanacev (Banting and Best Dept. of Med. Res. and Dept. of Clin. Biochem., Banting Inst., Univ. of Toronto, Toronto, Canada, M5G 1L6) *Chem. Phys. Lipids* 17, 213-21 (1976). Direct probe and GC/MS spectra were determined for the isomeric 4- to 16-doxyl stearic acids and their methyl and silyl esters in pure form and in mixture with natural fatty acids and their esters. The base peak for all free and esterified doxyl stearic acids was at *m/e* 281. The methyl esters of all isomers gave nearly identical fragments in the high mass regions having M+ at *m/e* 398 with intensities of 2-3%. The isomers were identified on the basis of the fragments retaining the doxyl group, which had positive charge and were different for each compound. It was shown that the fragment *m/e* 281 may be used to identify and quantitate the stearate derivatives in presence of natural fatty acids. The silyl esters of the doxyl stearates gave complex mass spectra. The isomeric doxyl stearates were resolved by GLC on 3 ft. glass columns containing 1% SE-30 packing as methyl esters.

A BIOSYNTHETIC METHOD FOR THE PREPARATION OF HIGH SPECIFIC ACTIVITY ³²P-LABELED PHOSPHOLIPIDS. W.D. Marggraf (Friedrich Miescher Lab. der Max Planck Gesellschaft, Spemannstrasse 37-39, 74 Tübingen, W. Ger.) *J. Lipid Res.* 17, 622-8 (1976). ³²P-Labeled phospholipids with specific activities up to 400 mCi/μmole as well as [³²P]CDP-choline were prepared by cultivation of mouse fibroblasts or mouse Ehrlich ascites cells in the presence of [³²P]orthophosphate. The method was also used to prepare [methyl-³H]choline-labeled glycerophospholipids from [³H]choline. The yields and the specific activities of the phospholipids were significantly lower when preparations of ox white blood cells were used.

ALIPHATIC MEDIUM CHAIN TRICARBOXYLIC ACIDS IN RAT URINE. B. Eliasson, S. Lindstedt, and G. Steen (Dept. of Clin. Chem., Univ. of Gothenburg, Sahlgren's Hosp., S-413 45 Gothenburg, Sweden) *J. Lipid Res.* 17, 637-46 (1976). Three aliphatic tricarboxylic acids have been found in rat urine. They have been identified as 6-carboxy-5-undecenedioic acid, 6-carboxy-5-dodecenedioic acid, and 6-carboxy-5-tridecenedioic acid. The carbon skeleton structure was determined by mass spectra of the hydrogenated methyl esters. The double bond position was determined after osmium tetroxide oxidation followed by trifluoroacetylation and mass spectrometry and by infrared spectrometry. The compounds were present in the urine when the rats were fed on pellets but disappeared when they received sucrose and water. The acids were not present in the pellets, and a metabolic relation to compounds of longer chain length, possibly mycolic acids, is likely.

A SULFONOLIPID AND NOVEL GLUCOSAMIDYL GLYCOLIPIDS FROM THE EXTREME THERMOACIDOPHILE BACILLUS ACIDOCALDARIUS. T.A. Langworthy, W.R. Mayberry and P.F. Smith (Dept. of Microbiol., School of Med., Univ. of South Dakota, Vermillion, S.D. 57069) *Biochim. Biophys. Acta* 431, 550-69 (1976). The total lipid content of the extreme thermoacidophile *Bacillus acidocaldarius* comprises about 8.1% of the cell dry weight. Total lipid had a distribution of 15.7% neutral lipids, 64.0% glycolipids and 20.3% acidic lipids. The glycolipid fraction contained a unique component initially characterized as an N-acylglucosamine β -linked to the primary hydroxyl of an unusual fully saturated pentacyclic triterpene derived tetrol (C₅₈H₁₀₂O₄, M_r 546), which appears to be a derivative of the pentacyclic triterpene hopane substituted at C-29 with a 1,2,3,4-tetrahydroxy pentane. The distributions of esterified and amide-linked fatty acids were similar, being comprised primarily of branched heptadecanoic, 11-cyclohexyundecanoic and 13-cyclohexyltridecanoic acids. The acidic lipids were composed of a sulfonoglycosyldiacylglycerol (43.2%), diphosphatidylglycerol (32.3%), lysodiphosphatidylglycerol (5.3%), phosphatidic acid (5.8%) and phosphatidylglycerol (13.4%).

THE LIPID CONTENT OF MECHANICALLY DEBONED RED MEATS. J.E. Kunsman and R.A. Field (Div. of Animal Sci., Univ. of Wyoming, Laramie, Wyo. 82071) *J. Food Sci.* 41, 1439-41 (1976). A definitive analysis of the lipids of mechanically deboned red meat (MDRM) was carried out on beef, pork and lamb. The total lipid content of lamb and pork MDRM was 28% while that of beef was 8.8%. The lipids of both lamb and pork were composed of 95% nonpolar, whereas the beef lipid was 83% nonpolar. Triglycerides were the major nonpolar lipid in the MDRM of all three species, whereas the major polar lipids were phosphatidylcholine and phosphatidylethanolamine. The total lipid from each of the species was low in polyunsaturated fatty acids (acids with two or more double bonds). The polyunsaturated fatty acid content of the phospholipid fraction from all species was 25% or higher. In beef and pork MDRM phosphatidylethanolamine was the most polyunsaturated phospholipid, whereas in lamb MDRM phosphatidylcholine was the most polyunsaturated. The MDRM lipids from all three species contained cerebroside and sulfatides which were highly polyunsaturated.

ARTIFACTS PRODUCED DURING ACID-CATALYZED METHANOLYSIS OF STEROL ESTERS. J.K.G. Kramer and H.W. Hulan (Animal Res. Inst., Res. Branch, Agr. Canada, Ottawa, Ontario, Canada K1A 0C6) *J. Lipid Res.* 17, 674-6 (1976). Sterol esters were transesterified within 1 hr using either acid or base catalysts. Acid-catalyzed methanolysis of sterol esters with HCl, H₂SO₄, or BF₃ leads to the formation of two artifacts derived from the sterol portion of the molecule; they were identified as dehydrated and methoxylated derivatives of sterols. These two artifacts were not produced using a base-catalyzed methanolysis with NaOCH₃.

MASS SPECTROMETRY OF STEROLS. ELECTRON IONIZATION INDUCED FRAGMENTATION OF C-4-ALKYLATED CHOLESTEROLS. F.F. Knapp, Jr. and G.J. Schroepfer, Jr. (Depts. of Biochem. and Chem., Rice Univ., Houston, Tex. 77005) *Chem. Phys. Lipids* 17, 466-500 (1976). The electron impact ionization of C-4-alkylated cholest-5-en-3 β -hydroxy-sterols has been investigated. The mass spectra of the C-4-alkylated cholesterol contain a number of ions in the high mass region for which analogous ions are not found in the spectrum of cholesterol. Detailed studies of the composition and origin of these ions have been made by high resolution mass spectrometry and analysis of metastable ions. In addition, a large number of isotopically (deuterium and ¹⁸O) substituted C-4-alkylated analogues have been prepared to assist in the interpretation of the spectra. The combined results indicate the occurrence of a number of very complex and unusual electron ionization induced fragmentations. Most notable of the findings reported herein concerns the demonstration of the formation of an ion involving loss of the elements of ring A with an intramolecular shift of the oxygen and hydrogen atoms of the hydroxyl function to the charge-retaining species.

STEAROYL PARATOLUENESULFONATE. A POWERFUL ACYLATING AGENT FOR LIPID SYNTHESIS. J.F.W. Keana and A.R. Ertle (Dept. of Chem., Univ. of Oregon, Eugene, Ore. 97403) *Chem. Phys. Lipids* 17, 402-6 (1976). The utility of the mixed carboxylic-sulfonic acid anhydride stearoyl *p*-toluenesulfonate as a powerful, mild acylating agent for lipid synthesis is shown by the synthesis of *rac* 1,2-distearoyl-3-iodopropane, lecithin and a spin-labeled choline derivative from the corresponding alcohols. The method constitutes a significant improvement of earlier acylating methods.

SYNTHESIS OF MONOPHYTANYL ETHER ANALOGUES OF LYSOPHOSPHATIDIC AND LYSOPHOSPHATIDYL GLYCEROL. M. Kates and A.J. Hancock (Dept. of Biochem., Univ. of Ottawa, Ottawa, Canada, K1N 6N5) *Chem. Phys. Lipids* 17, 155-68 (1976). The chemical synthesis of 3-*O*-phytanyl-*sn*-glycero-1-phosphoric acid (monophytanyl ether analogue of lysophosphatidic acid) was effected by condensation of 1-iodo-2-*O*-benzyl-3-*O*-phytanyl-*sn*-glycerol with silver di-*p*-nitrobenzyl phosphate in anhydrous toluene followed by catalytic hydrogenolysis of the resulting phosphotriester to remove the benzyl and *p*-nitrobenzyl groups. Synthesis of 3-*O*-phytanyl-*sn*-glycero-1-phosphoryl-1'-*sn*-glycerol (monophytanyl ether analogue of lysophosphatidyl glycerol) was carried out by conversion of the above phosphotriester to the monosilver salt of the suitably blocked lysophosphatidic acid which was condensed with 1-iodo-2-*O*-*t*-butyl-3-*O*-benzyl-*sn*-glycerol. Removal of the protecting aromatic and *t*-butyl groups from the resulting blocked triester intermediate gave the desired phytanyl ether analogue of lysophosphatidyl glycerol. Both lyso analogues were isolated as analytically and chromatographically pure potassium salts. Their physical

properties and behavior towards acid hydrolysis are described.

ORD AND CD STUDIES OF GLYCERIDES. II. THE EFFECT OF BRANCHING IN SATURATED GLYCERIDES. S. Gronowitz, B. Herslof and R. Ohlson (Organic Chem. 1, Chem. Center, Univ. of Lund, Sweden) *Chem. Phys. Lipids* 17, 244-50 (1976). The effect of branching in the acyl group on the ORD and CD curves of 1,2-isopropylidene-3-acyl-*sn*-glycerols, 3-acyl-*sn*-glycerols and triacyl-*sn*-glycerols has been studied. Branching of the acyl group in 1,2-dimyristoyl-3-acyl-*sn*-glycerols reverses the sign of the rotation and CD effect compared to straight chain analogues.

FATTY ACIDS. PART 48. ¹³C NUCLEAR MAGNETIC RESONANCE STUDIES OF ACETYLENIC FATTY ACIDS. F.D. Gunstone, M.R. Pollard, C.M. Scrimgeour, N.W. Gilman and B.C. Holland (Dept. of Chem., Univ. of St. Andrews, St. Andrews, Fife KY169ST, Scotland) *Chem. Phys. Lipids* 17, 1-13 (1976). The ¹³C NMR spectra of thirty-seven alkyenoic acids (C₈-C₁₈) and ten alkadienoic acids (C₁₈ and C₂₀) are reported and interpreted. The influence of COOH, COOCH₃, CH₃ and C \equiv C groups on the chemical shifts of nearby carbon atoms is assessed. These influences are largely additive so that available spectra are readily interpreted and the spectra of new compounds of this type can be predicted. These preliminary results indicate that ¹³C NMR spectroscopy should be of considerable value in the structural identification of acetylenic compounds.

LIPIDS AND FATTY ACIDS IN MULLET (MUGIL CEPHALUS): SEASONAL AND LOCAL VARIATIONS. J.C. Deng, F.T. Orthofer, R.A. Dennison and M. Watson (Food Sci. Dept., Univ. of Florida, Gainesville, Fla. 32611) *J. Food Sci.* 41, 1479-83 (1976). Total lipids and fatty acids of neutral lipid in boneless mullet filets were studied. The mullet harvested between September and November had the highest lipid content. Samples were obtained from four locations on the Florida Coast. At these locations the highest total lipid contents were in the following order: Pine Island > Oakhill > Cedar Key > Port St. Joe. Mullet harvested at Pine Island had the highest ratio of odd chain fatty acids to total fatty acids in neutral lipid fraction, ranging from 18.4-25.8; the odd chain fatty acids of other locations were lower than 20%. Generally, the polyunsaturated fatty acid content of mullet is highest between August and October.

NOVEL LIPIDS OF BUTYRIVIBRIO SPP. N.G. Clarke, G.P. Hazlewood and R.M.C. Dawson (Biochem. Dept., A.R.C. Inst. of Animal Physiol., Babraham, Cambridge CB2 4AT, UK) *Chem. Phys. Lipids* 17, 222-32 (1976). An analysis has been conducted of the lipids present in three obligately anaerobic bacteria isolated from the ovine rumen belonging to the genus *Butyrivibrio*. Two of these organisms are rich in phospholipase (A₁ + A₂) activity, and appear to be different strains of the species *fibrisolvens*. The only N-containing lipids comprise *N*-acyl-phosphatidylethanolamine occurring as a minor component in all organisms and a new lipid, diglyceride galactosylphosphorylethanolamine in one of these. All three organisms contained the *n*-butyryl ester of phosphatidylglycerol and in one this represented the major phospholipid present. Valeryl, iso-valeryl, propionyl and myristoyl esters of phosphatidylglycerol were also detected. Two organisms contained glycerylphosphoryl-galactosyldiglyceride and one of these also contained a large proportion of a less polar galactophospholipid which is probably a diacyl derivative of the former lipid. All three organisms contained monogalactofuranosyl diglyceride and from one a *n*-butyryl ester of this galactolipid was isolated. In all of the lipids examined the 'diglyceride' moiety consisted almost entirely of plasmalogenic diglyceride (alk-1-enyl, acyl, glycerol).

¹³C-NMR OF METHYL, METHYLENE AND CARBONYL CARBON ATOMS OF METHYL ALKENOATES AND ALKYNOLATES. J. Bus, I. Sies and M.S.F. Lie Ken Jie (Unilever Res., Vlaardingen, The Netherlands) *Chem. Phys. Lipids* 17, 501-18 (1976). The carbon magnetic resonance spectra of 102 fatty acid methyl esters with *cis* and *trans* double bonds and triple bonds at various positions and in many different combinations have been investigated. A comprehensive set of chemical shift parameters has been developed for the various substituents. With the aid of these parameters, the chemical shifts of all methyl, methylene and carbonyl carbon atoms can be predicted with an accuracy of ± 0.1 ppm or better.

STUDIES DIRECTED TOWARD THE SYNTHESIS OF PROSTAGLANDINS. USEFUL BORON-MEDIATED OLEFIN SYNTHESSES. D.A. Evans, T.C.

Crawford, R.C. Thomas and J.A. Walker (Labs. of Chem., Calif. Inst. of Tech., Pasadena, Calif. 91125) *J. Org. Chem.* **41**, 3947-53 (1976). The reactions of bis(2-ethylcyclopentyl) borane, dicyclopentyl-borane, with 3-(*tert*-butyldimethylsiloxy)-1-octyne and subsequent iodine-promoted rearrangement to Z olefins or unsymmetrical acetylenes are reported. Mixed dialkyl-boranes are also examined in this olefin-acetylene cross process. Significant amounts of the *xy*-migrated acetylenic by-products are observed in several instances. The synthesis of either E- or Z-1,2-disubstituted olefins by reaction of boronic esters with both (E)- and (Z)-alkenyllithium reagents is examined. This study demonstrates that 50-70% yields of either E- or Z-1,2-disubstituted olefins are obtainable from the aforementioned reagents. The overall objectives in this investigation are to assess the potential of employing organoborane intermediates in the coupling of the C₁₃-C₂₀ prostaglandin olefinic side chain to cyclopentenoid precursors.

HIGH PRESSURE REVERSE PHASE LIQUID CHROMATOGRAPHY OF FATTY ACID *p*-BROMOPHENACYL ESTERS. P.T.-S. Pei, W.C. Kossa, S. Ramachandran and R.S. Henly (Applied Sci. Lab., Inc., State College, Penn. 16801) *Lipids* **11**, 814-6 (1976). High pressure reverse phase liquid chromatography has been employed to rapidly separate saturated and unsaturated fatty acids as the corresponding *p*-bromophenacyl esters. Through the use of a highly efficient C₁₈ reverse phase column packing, it has also been possible to distinguish among geometrical and positional isomers of the unsaturated acids. The use of ultraviolet-sensitive esters has permitted the detection of low (nanogram range) concentrations of fatty acids. The time required for analysis has been further reduced by employing a novel and rapid method for the preparation of the esters.

DISTRIBUTION OF ISOMERIC OCTADECENOIC FATTY ACIDS IN MILK FAT. P.W. Parodi (The Butter Marketing Board, Hamilton Central, 4007 Queensland, Australia) *J. Dairy Sci.* **59**, 1870-3 (1976). Milk fat octadecenoic acids were isolated by preparative gas-liquid chromatography of their methyl esters and separated into *cis* and *trans* isomers by argentation thin-layer chromatography. The distribution of the double bonds in the two fractions was determined by reductive ozonolysis. *Cis* octadecenoic acids had double bonds in positions 6 to 14. The *cis*-9 isomer was the most abundant isomer representing approximately 95% of the total. *Trans* octadecenoic acids had double bonds in positions 6 to 16, the predominant isomer being *trans*-11 octadecenoic acid. Data illustrating the range of variation in the distribution of positional isomers of octadecenoic acid for herd milk fat and butter are presented. There was no obvious seasonal variation in the distribution pattern. Fat from perirenal and subcutaneous adipose tissue of a dairy cow had composition similar to that of butter samples.

VITAMIN A SYNTHESIS BY SULFONE ALKYLATION-ELIMINATION. C₁₆ HALIDE, C₆ HYDROXY SULFONE APPROACH. G.L. Olson, H.-C. Cheung, K.D. Morgan, C. Neukom and G. Saucy (Chem. Res. Dept., Hoffmann-La Roche, Inc., Nutley, NJ 07110) *J. Org. Chem.* **41**, 3287-93 (1976). Condensation of 1-arylsulfonyl-2-methyl-4-hydroxy-2-butenes with 1-chloro- and 1-bromo-3-methyl-5-(2,6,6-trimethylcyclohexen-1-yl)-penta-2,4-diene to afford 1-hydroxy-3,7-dimethyl-4-arylsulfonyl-9-(2,6,6-trimethylcyclohexen-1-yl)nona-2,6,8-triene and the subsequent elimination of sulfonic acid from 3 to give vitamin A alcohol has been studied. An efficient and stereoselective synthesis of halide 2 from vinyl- β -ionol using HX in ether at low temperature has been achieved. The use of diethyl- and disilylamides with the *p*-tolyl sulfone compound 1b and bromide 2b gave 3b in 83-84% isolated yield. Sodamide-ammonia-*tert*-butyl alcohol effected elimination of sulfonic acid in 3b to afford, after acetylation, vitamin A acetate in 75% yield from 3b. In a through process, crystalline, all-*trans* vitamin A acetate was obtained in 67-68 and 72-73% yield based on 14 and 1b, respectively.

FURTHER STUDIES OF THE SATURATED METHYL BRANCHED FATTY ACIDS OF VERNIX CASEOSA LIPID. N. Nicolaidis, J.M.B. Apon and D.H. Wong (Dept. of Med., Sec. of Dermatol., Univ. of Southern Calif. School of Med., Los Angeles, Calif. 90033) *Lipids* **11**, 781-90 (1976). By the method of capillary gas chromatography-mass spectrometry, we have identified 35 monomethyl and 46 dimethyl branched acids in the saturated acids of vernix caseosa lipid with chain lengths ranging from C₁₁ to C₁₈. Many other mono-, di-, and trimethyl branched acids have been partially identified. All methyl branches were found to be on the even numbered C-atoms except for some terminal iso methyl groups. Three types of dimethyl branched

acids were found: those with a terminal iso structure, those with a terminal anteiso structure, and those with neither iso nor anteiso structures. The 4-methyl branch predominated for all types of branched acids. Equivalent chain length data for di- and trimethyl branched acids were determined on a Pentasil (nonpolar) wall coated capillary column and checked by calculation from monomethyl branched acid data. Mass spectral identification was performed with and without the aid of a data system. A possible mode of formation of these acids is discussed.

SOLUBILITY OF PHOSPHATIDYLCHOLINE IN CHLOROFORM. FORMATION OF HYDROGEN BONDING BETWEEN PHOSPHATIDYLCHOLINE AND CHLOROFORM. M. Okazaki, I. Hara and T. Fujiyama (Dept. of Chem., Faculty of Sci., Tokyo Metropolitan Univ., Setagayaku, Tokyo, Japan) *Chem. Phys. Lipids* **17**, 28-37 (1976). The solubility of phosphatidylcholine (PC) was studied by the spectroscopic analysis and the measurement of the solubility. The qualitative analysis of infrared absorption spectra confirmed the existence of two types of hydrogen bondings between chloroform and PC, one between chloroform and the C=O group of PC and the other between chloroform and the phosphorylcholine group of PC. The quantitative analysis of the C-D stretching vibration bands of the chloroform-d solution of PC showed that the latter hydrogen bonding mainly contributes to the solubility and that PC dissolves in chloroform to form a complex consisting of a few or more molecules of chloroform and one molecule of PC. We discussed in this report about the molecular organization of PC in chloroform solution.

DIESTER WAXES CONTAINING 2-HYDROXY FATTY ACIDS FROM THE UROPYGIAL GLAND SECRETION OF THE WHITE STORK (CICONIA CICONIA). J. Jacob (Biochem. Inst. fur Umweltcarcinogene, D-2070 Ahrensburg/Holst., Sieker Landstraße 19, West-Germany) *Lipids* **11**, 816-8 (1976). The uropygial gland of the white stork secretes mono- and diester waxes as well as triglycerides, all of which contain unbranched medium chain fatty acids. n-Decanol and n-dodecanol have been the only alcohols detected in both types of waxes. The diester waxes contain 2-hydroxy fatty acids.

THE SYNTHESIS OF A 1-ALKENYL THIOETHER OF GLYCEROL. A.F. Hirsch (Div. of Chem. Res., Ortho Pharmaceutical Corporation, Raritan, N.J. 08869) *Chem. Phys. Lipids* **17**, 399-401 (1976). The synthesis of 3-(1-heptenylthio)1,2-propanediol has been achieved by the reaction of 1-ethylthio-1-heptene with lithium in ammonia followed by the addition of 1-bromo-2,3-propanediol.

SYNTHETIC STUDIES ON (2*R*,4'*R*,8'*R*)- α -TOCOPHEROL. FACILE SYNTHESIS OF OPTICALLY ACTIVE, SATURATED, ACYCLIC ISOPRENOLIDS VIA STEREOSPECIFIC [3,3] SIGMATROPIC REARRANGEMENTS. K. Chan, N. Cohen, J.P. De Noble, A.C. Specian, Jr. and G. Saucy (Chem. Res. Dept., Hoffmann-La Roche Inc., Nutley, New Jersey 07110) *J. Org. Chem.* **41**, 3497-505 (1976). (R)-(+)-3,7-Dimethyloctanoic acid (12b) was synthesized from isovaleraldehyde (5) using a stereospecific, five-carbon homologation process. The key transformations involve [3,3] sigmatropic rearrangements of (R)-(+)-(Z)-6-methylhept-2-en-4-ol (10a) and the (S)-(-)-(E) isomer 11a which were prepared from 5 via (\pm)-6-methylhept-2-yn-4-ol (7a). Under a variety of conditions, Claisen rearrangements of 10a and 11a were shown to proceed with 97-99% chiral transmission, leading, ultimately, to (S)-(+)-(E)-3,7-dimethyl-4-octenoic acid [4b, 94-96% (S)] and 12b. Repetition of this sequence starting from (R)-(+)-3,7-dimethyloctanal (12a) produced ethyl (3*S*,7*R*)-3,7,11-trimethyl-4-dodecenoate (6c) in a state of high enantiomeric purity [99% (3*S*), 96% (7*R*)]. Ester 6c was converted to (3*R*,7*R*)-3,7,11-trimethyldodecan-1-ol (1d), an important, 15-carbon side chain intermediate in the synthesis of (2*R*,4'*R*,8'*R*)- α -tocopherol (1a).

SYNTHETIC STUDIES ON (2*R*,4'*R*,8'*R*)- α -TOCOPHEROL. AN APPROACH UTILIZING SIDE CHAIN SYNTHESIS OF MICROBIOLOGICAL ORIGIN. N. Cohen, W.F. Eichel, R.J. Lopresti, C. Neukom and G. Saucy (Chem. Res. Dept., Hoffmann-La Roche Inc., Nutley, N.J. 07110) *J. Org. Chem.* **41**, 3505-11 (1976). A synthesis of (2*R*,4'*R*,8'*R*)- α -tocopheryl acetate (1, R=Ac) is described in which key, optically active side chain synthons are produced starting from (S)-(+)-3-hydroxy-2-methylpropanoic acid (6), itself a readily available enantiomerically homogeneous substance of microbiological origin. In the most expeditious approach, (S)-(+)-3-*tert*-butoxy-2-methyl-1-propanol *p*-toluenesulfonate (13), produced in three steps from 6) is coupled with (R)-3,7-dimethyl-1-octylmagnesium bromide [33; derived

from (*R*)-(+)-pulegone] giving (2*R*,6*R*)-(+)-1-*tert*-butoxy-2,6,10-trimethylundecane (20). The derived 14-carbon Grignard reagent, 22, is then coupled with (*S*)-(+)-6-benzoyloxy-2,5,7,8-tetramethylethroman-2-ethanol *p*-toluene-sulfonate (36) giving (2*R*,4'*R*,8'*R*)- α -tocopheryl benzyl ether and subsequently 1, *R* = Ac. The ten-carbon synthons (i.e., 33) could also be prepared from 13 via (*R*)-(+)-3,7-dimethyloctanoic acid (28) thus providing an approach in which both chiral centers as well as eight carbon atoms of the tocopherol side chain are derived from the acid 6.

SYNTHETIC STUDIES ON (2*R*,4'*R*,8'*R*)- α -TOCOPHEROL. AN ALTERNATIVE SYNTHESIS OF (2*R*,6*R*)-(+)-2,6,10-TRIMETHYLUNDECAN-1-OL, A KEY SIDE CHAIN SYNTHON. N. Cohen, W.F. Eichel, R.J. Lopresti, C. Neukom and G. Saucy (Chem. Res. Dept., Hoffmann-La Roche Inc., Nutley, N.J. 07110) *J. Org. Chem.* 41, 3512-5 (1976). Ortho ester Claisen rearrangement of both (2*R*,4*S*)-(Z)-1-*tert*-butoxy-2-methylhept-5-en-4ol (10) and its (2*R*,4*R*)-(E) isomer, 11, gave ethyl (3*R*,7*R*)-(E)-8-*tert*-butoxy-3,7-dimethyl-4-octenoate (12) having an enantiomeric composition of 87-89% 3*R* and >99% 7*R*. The allylic alcohol substrates were prepared starting from (*S*)-(+)-3-*tert*-butoxy-2-methyl-1-propanol *p*-toluene-sulfonate (3) or (*S*)-(+)-3-*tert*-butoxy-2-methyl-1-bromopropane (6), both intermediates of microbiological origin. Coupling of the tosylate 17 (prepared from 12 via 13 and 16) with 2-methyl-1-propylmagnesium bromide followed by trifluoroacetic acid treatment of the resultant ether 18 gave the desired, 14-carbon alcohol, 1.

COMPOSITION PHOSPHOLIPIDIQUE DE MUTANTS THERMOSENSIBLES D'ESCHERICHIA COLI K 12. A. Barbin, F. Peypoux and G. Michel (Lab. de Biochim. Microbienne, Univ. Claude Bernard, Lyon 1, 43, Boulevard du 11 Novembre 1918, 69621 Villeurbanne, France) *Biochem. Biophys. Acta* 431, 416-25 (1976). Quantitative phospholipid composition was investigated on various thermosensitive mutants of *Escherichia coli* K 12. Phosphatidylethanolamine was the major component. Three mutants (T1, T46 and T5) grown at 40°C, had more anionic phospholipids (phosphatidylglycerol and diphosphatidylglycerol) and less bipolar phospholipids (phosphatidylethanolamine and lysophosphatidylethanolamine) than the wild type. Mutations leading to the alteration of the phospholipid composition are unrelated to other mutations leading to changes in the morphology and cellular division.

BREEDING AND PRODUCTION OF LOW-ERUCIC RAPESEED IN EUROPE. G. Roebelen (Institut f. Pflanzenbau u. Pflanzenzuechtung der Universitaet Goettingen, 34 Goettingen, Germany) *Fette, Seifen, Anstrichm.* 78, 10-7 (1976). In rapeseed the world's highest yields are obtained in Europe and particularly in Germany. Because of this high production level the selection of varieties with low contents in erucic acid, which started in Canada, met various difficulties in this part of the world. Especially the breeding cycle is much lengthened on account of the wintertype of most European varieties as compared to the spring type varieties, dominating in Canada. Different ways of selection for low erucic varieties were followed in Europe by the various plant breeding institutions. The present state in the genetic improvement and agricultural production of "quality rapeseed" in the Federal Republic of Germany, however, justifies the measures here taken, although the total changeover of rapeseed production to zero erucic varieties was not without problems in 1974/75 due to unfavourable season. Nevertheless, the German rapeseed processing industry may in future expect even better qualities of the domestic supply through further improved rapeseed varieties.

ANALYSIS OF CAROTENES IN CRUDE PALM OIL. W. Mueller-Mulot (Hoffmann-La Roche AG, 7889 Grenzach-Wyhlen 1, Germany). *Fette Seifen Anstrichm.* 78, 18-23 (1976). Structure and properties of natural carotenes as well as their behaviour especially towards adsorbents are discussed. Literature on the occurrence of carotenes in palm oil is reviewed and a short history of the development of analytical methods for the separation of carotenes is presented. A tentative method of the DGF for the analysis of minor components is reported, which enables quantitative determination of the total carotenes as well as α - and β -carotenes, separately in fats and oils. Usefulness of this method is shown in the analysis of 10 samples of crude palm oil from various sources. Determination of free fatty acids and peroxides round up the analytical picture of palm oil samples.

STUDIES AND OBSERVATIONS ON THE INFLUENCE OF INSECTICIDES ON THE PROCESS OF AUTOXIDATION IX. INFRARED SPECTROSCOPIC EVALUATION OF LIPID AUTOXIDATION. K. Benzec (Institut f.

oekologische Chem. der Technischen Universitaet Muenchen in Weihenstephan, 8050 Freising, Germany) *Fette, Seifen, Anstrichm.* 78, 23-30 (1976). Under definite conditions, IR-spectroscopy can provide extensive information on the autoxidative alteration of lipids at a minimum requirement of material and time. Techniques for the optimum preparation of samples are discussed. For evaluation, the infrared spectrum is divided into various regions; this enables a simple, yet thorough interpretation. In the region of 4000-2000 cm^{-1} the OH- and CH-vibrations occur. The region 2000-1500 cm^{-1} shows the vibration of carbonyl groups and double bonds. The fingerprint region, 1500-1000 cm^{-1} , provides information on chain length, degree of branching, methylene groups and ester bands. The region 1000-600 cm^{-1} indicates further characteristics of the carbon skeleton, e.g. steric configuration etc., and reveals the course of autoxidation. The greatest advantage of infrared spectroscopy compared to other methods used for studying autoxidation consists in the variety of information which can be obtained from one single spectrum by skillful interpretation.

HOMOGENEOUS SELECTIVE CATALYTIC HYDROGENATION OF SOYBEAN OIL. E. Fedeli and G. Jacini (Stazione Sperimentale per le Industrie degli Oli e dei Grassi Milano, 20133 Milano, Italy) *Fette, Seifen, Anstrichm.* 78, 30-5 (1976). Chelates derived from the Schiff bases of the 2,2-dialkyl propylene-1,3-diamine with salicylaldehyde have been used as homogeneous catalysts in the hydrogenation of soybean oil. Copper, iron, cobalt, nickel, palladium chelates were tested and different catalytic trends observed. The most active catalysts were the copper chelates. A marked reduction of trienes to give, mostly monoenes accompanied by no marked increase of conjugated dienes or trans double bonds was observed in some of the hydrogenation experiments. Selectivity values have been calculated; the iron catalysts showed the highest selectivity values but their catalytic activities were usually lower than that of the copper chelates.

DETERMINATION OF PHOSPHATIDES IN COCOA PRODUCTS. M.J. Schmid (Landesuntersuchungsamt f. Gesundheitswesen Nordbayern, Fachbereich Chemie, Aussenstelle Regensburg, 84 Regensburg, Germany) *Fette, Seifen, Anstrichm.* 78, 35-7 (1976). An improved method for the determination of phosphatides in cocoa products is given. This method is based on extraction and subsequent precipitation of phosphatides suspended in water using cobalt thiocyanate. Phosphorus content of the complex formed is measured in usual manner for the determination of phosphatide content.

A SEMIAUTOMATIC LABORATORY DEVICE FOR THE DETERMINATION OF TURBIDITY POINT. H. Ackermann (Henkel & Cie GmbH, 4000 Duesseldorf, Germany) *Fette, Seifen, Anstrichm.* 78, 37-40 (1976). A semiautomatic batchwise operating laboratory device is described which can be used for the determination of turbidity point of liquid fatty acids. The region of measurement can be adjusted between 0° and 30° C. Moreover, the region of measurement and the rate of cooling can be varied. This device is currently in use in a plant for the production of fatty acids and it is operated in the region of 0°-10° C at a cooling rate of 0.5° C/min.

INFLUENCE OF SYNTHETIC SURFACTANTS ON THE COMPOSITION OF SKIN SURFACE LIPIDS. M. Gloor et al. (Universitaets-Hautklinik, 6900 Heidelberg 1, Germany) *Fette, Seifen, Anstrichm.* 78, 40-4 (1976). Twenty male persons were subjected to bath in a surfactant solution for 15 minutes each on 5 consecutive days. Before beginning and 3 days after the end of the experiment percent free fatty acids and triglycerides of the skin surface lipids were determined by thin-layer chromatography. It could be shown that the aforesaid treatment led to significant reduction of free fatty acids and increase of triglycerides. The significance of these findings on the therapy of *Acne vulgaris* and *Seborrhoea capitis* is discussed.

SEPARATION OF MONOGLYCERIDES OF OLEIC ACID FROM A GLYCERIDE MIXTURE USING COMPRESSED CARBON DIOXIDE IN COUNTER-CURRENT COLUMNS. S. Peter et al. (Institut f. Technische Chemie II d. Universitaet Erlangen-Nuernberg, 8520 Erlangen, Germany) *Fette, Seifen, Anstrichm.* 78, 45-50 (1976). Use can be made of the solubility of substances in compressed gases for the separation of substances with low vapour pressure. By adding an entrainer it is possible to influence the separation factor of the substances with lower vapour pressure. Therefore with the new process the possibilities for the separation of such substances compared to vacuum and molecular

distillation are remarkably increased. It proved possible to omit steps of expansion and recompression in the circulating gas by washing the low-volatile components out of the gas in a second column. The feasibility of the process is demonstrated by the separation of glycerol-monooleate from a mixture of glycerides with acetone as entrainer and carbon dioxide as compressed gas.

FRACTIONATION OF TALL OIL AS AN EXAMPLE OF OPTIMIZATION OF CONVENTIONAL PACKED COLUMNS. W. Kehse (2070 Ahrensburg, Hintern Vogelherd 41, Germany) *Fette, Seifen, Anstrichm.* **78**, 50-6 (1976). The present communication records a simple calculation for optimization of packed columns in an example of layout of columns for fractional distillation of crude tall oil into the main products, i.e. fatty acids and resin acids. This calculation requires, apart from knowledge on the temperature stability of the material, only the HETP value, which is the height of chosen packing material equivalent to one theoretical plate. An arrangement of three columns is necessary for complete separation of crude tall oil in continuous manner. In the example shown, calculation of the first column for a capacity of 20,000 t per year is given.

DESOLVENTIZER-TOASTER-COOLER—A NEW METHOD IN THE PROCESSING OF OILSEEDS. H. Schumacher (2050 Hamburg 80, Hoepferfeld 26, Germany) *Fette, Seifen, Anstrichm.* **78**, 56-9 (1976). A new process is described for the treatment of extracted flakes and seeds in the oil milling industry with special consideration of product quality and plant economy. Construction and operation of this unit are described in details and economical aspects are explained on the basis of processing data.

CHANGES IN THE LIPIDS OF SOYBEANS DURING STORAGE AND GERMINATION. A.K. Sengupta and H.E. Rost (Unilever Forschungsgesellschaft mbH, 2000 Hamburg 50, Germany) *Fette, Seifen, Anstrichm.* **78**, 59-61 (1976). In storing soybeans as well as in germinating beans the oxirane content of the oil increases. In addition to this, the water content of the beans influences this increase. The increase runs parallel to the increase in ffa content and that of the conjugate extinctions. Nothing is known of the biological role of oxirane containing lipids in storing or germinating soybeans.

THE LIQUID CHROMATOGRAPHIC DETERMINATION OF UNCHANGED TRIGLYCERIDES IN USED FRYING FATS. K. Aitzetmüller and G. Guhr (Unilever Forschungsgesellschaft mbH, 2000 Hamburg 50, Germany) *Fette, Seifen, Anstrichm.* **78**, 83-8 (1976). Unchanged triglycerides in used frying fats are separated from the remaining more polar products by adsorption liquid chromatography. After the elution of the unchanged triglycerides, the non-volatile products of oxidation, polymerization and hydrolysis reactions are displaced from the column by a very polar solvent and the column is then reconditioned by a rinsing program. Each analysis is completed within 8 min after injection of the sample. Samples may be injected in 32-minute intervals. The contents of unchanged triglycerides in used frying fats is usually between 60 and 90%. Special emphasis is placed on a detailed description of the working procedure.

SPECIFICITY OF COCOA AROMA. W. Mohr et al. (Institut f. Lebensmitteltech. u. Verpackung e.V., Technische Universität München, 8000 München 2, Germany) *Fette, Seifen, Anstrichm.* **78**, 88-95 (1976). Aroma precursors in crude cocoa from Ghana were separated into substance classes and their significance in aroma formation was examined. Coaction of a peptide, which was isolated and characterized for the first time, is especially necessary for the specific reaction which occurs via a side path of Maillard-reaction. Furthermore, aroma formation in other varieties of cocoa was studied on the basis of precursors. From chemical viewpoint the 310 aroma components known so far were classified and compared with other food aromas in order to obtain information on the specific components.

SKIN LIPIDS X. A GROUP OF UNUSUAL LIPIDS IN MAN AND ANIMALS. G. Grimmer (Biochem. Inst. f. Umweltcarcinogene, 207 Ahrensburg, Germany) *Fette, Seifen, Anstrichm.* **78**, 101-5 (1976). Skin lipids in man and animals show significant structural differences in comparison to other organ lipids, which is documented by the unusual positions of double bonds and the degree of substitution of the fatty acids. This is demonstrated for human skin and birds uropygial gland lipids as example. The structures of these lipids are supported to

correlate with certain functions. Bacteriostatic and fungistatic functions, individual odoration profile, and lipids as excretion vehicles for fat-soluble substances are discussed.

STUDIES ON STEROL MIXTURES IV: RETENTION BEHAVIOR OF FREE STEROLS IN GAS CHROMATOGRAPHY. A. Seher and H. Vogel (Bundesanstalt f. Forschung, 4400 Muenster, Germany). *Fette, Seifen, Anstrichm.* **78**, 106-7 (1976). Retention behaviour of a number of free sterols was studied by gas chromatography using SE-30, UCCW-982, OV-17 and OV-25 as stationary phases. In a similar manner as tested for sterol acetates, the separation factors were determined for sterol pairs which differ by one constitutional characteristic. The efficiency of separation of the stationary phases OV-17 and OV-25 were found to be distinctly superior to those of less polar phases. Sterols having $\Delta^{24(25)}$ double bonds are especially well separated from their saturated counterparts. Steryl acetates exhibit on all four stationary phases longer retention times compared to free sterols whereas the trimethylsilyl ether derivatives show on SE-30 and UCCW-982 columns longer and in OV-17 and OV-25 columns greatly reduced retention times.

UTILIZATION OF THE MICELLE FORMATION OF PHOSPHATIDES IN CHROMATOGRAPHIC SEPARATIONS. A.K. Sen Gupta (Unilever Forschungsgesellschaft mbH, 2000 Hamburg 50, Germany) *Fette, Seifen, Anstrichm.* **78**, 111-8 (1976). Under utilization of the micelle formation of phospholipids in hydrocarbon solvents, a column chromatographic method for the analysis of phosphatide-containing lipid mixtures was developed. It permits a direct gravimetric determination of the total phosphatides and triglycerides and simultaneously an isolation of these substances in unchanged form. Moreover, the method allows a determination of the free fatty acids without any interference due to the presence of phosphatides, amino acids and glucuronic acids. The method can be carried out quickly without the use of complicated equipments and the results obtained with lecithin preparations are well reproducible.

THIN-LAYER AND GAS CHROMATOGRAPHY OF TOCOPHEROLS. W.U. Dompert and H. Beringer (Inst. f. Pflanzenernahrung, Univ. Hohenheim, 7000 Stuttgart-70, Germany) *Fette, Seifen, Anstrichm.* **78**, 108-11 (1976). Oilseeds, to which an internal standard of tocopherol was given, were extracted for tocopherols with ethanol under conditions inhibiting oxidation using an Ultra-Turrax homogenizer. After filtration the ethanolic extract is briefly saponified and the unsaponifiable matter containing the tocopherols extracted into n-hexane. Then the hexane-fraction is washed alkalifree with water, dried over Na_2SO_4 , concentrated and applied on a silicagel GF₂₅₄-plate, which is developed with dichloromethane. With co-chromatographed reference-tocopherols on the margins of the TLC-plate the presence of tocopherolquinones can be checked in UV-light, whereas the bands of tocopherols and tocotrienols are located by spraying the margins with Emmerie and Engel-reagent. The corresponding zones were scrapped off the plate, the silicagel extracted with 15×1 ml ethanol, the ethanol evaporated to dryness and the residue derivatised to trimethylsilylethers. Gaschromatography on 3 m SE-52/XE-60 or 1.5 m SE-30 columns gave a good separation of tocopherols and tocotrienols. Simultaneous qualitative and quantitative determination of tocopherols by GLC combined with the possibility of automation makes this analytical procedure superior to TLC and colorimetry of tocopherols. About 500 tests with different oilseeds in the range between 50-800 mg lipid and 20-2000 μg of total tocopherol/sample gave a recovery of 60% at a coefficient of variation of approximately 6%.

AN APPROXIMATE CALCULATION OF DOUBLE BOND DISTRIBUTION IN ISOMERIZED METHYL OLEATE AND ITS APPLICATION TO THE HYDROGENATION OF LINOLEIC ACID. Y. Kubota (National Chemical Laboratory for Industry, Honmachi, Shibuya-ku, Tokyo, Japan) *Fette, Seifen, Anstrichm.* **78**, 118-23 (1976). An approximate calculation of the distribution of positional isomers formed by the isomerization of methyl oleate was carried out. It was confirmed that the calculated distribution is in good agreement with the distributions in actual reaction products. Further, the calculated result was applied to the discussion on the relation between the reaction mechanism and the double bond distribution in monoene fraction from hydrogenated linoleic acid.

A PROCESS FOR THE RECOVERY OF LECITHIN FRACTIONS. H. Liebing and J. Lau (Eisenbau Essen GmbH, 4300 Essen 1, Germany) *Fette, Seifen, Anstrichm.* **78**, 123-7 (1976). A plant for the fractionation of crude lecithin, such as soybean

lecithin, sunflower lecithin and rapeseed lecithin is described in which ethanol, methanol or isopropanol is used as extracting solvent. In this context, the liquid liquid extraction and its relationship to the quality and yield of product are discussed. Technical problems involved in transport of miscella and solvent recovery are discussed with aid of diagrams, material data, consumption of utilities and a simple scheme of layout.

CHARACTERIZATION OF BRANCHED HYDROCARBONS OF VASELINE AND THEIR INFLUENCE ON THE PROPERTIES OF OINTMENT BASES 8: INFLUENCE OF CHEMICAL AND PHYSICAL DATA ON THE PRACTICAL PROPERTIES. H. Kassebaum and H. Sucker (Inst. f. Pharmazent. Chem., Abt. Pharmazent. Technol., 2000 Hamburg, Germany) *Fette, Seifen, Anstrichm.* 78, 132-8 (1976). From saturated branched hydrocarbons obtained from 18 different qualities of vaseline 10-22% of possibly pure methyl branched hydrocarbons were separated by formation of thiourea adducts and 19-54% paraffin oil were separated by solvent fractionation. The remaining 18-45% soft wax consisted of long chain branched paraffins which strongly influenced the plasticity of vaseline. Viscosity of the oil was correlated with the average molecular weight of the fraction. No relationship was found between viscosity and the proportion of structural groups.

POSSIBLE CONTAMINATIONS BY THE USE OF COSMETICS. J. Meyer-Rohn (Univ. Hautklinik, 2000 Hamburg 20, Germany) *Fette, Seifen, Anstrichm.* 78, 138-40 (1976). Modern hygienic manufacturing processes ensure that cosmetics free of pathogenic germs are delivered by the producer to the consumer. In this respect the situation has changed compared to past years. Possible contaminations occur today mainly at the consumer's side, for example if cosmetics in open containers are used commonly, as practiced in families. Conditions that lead to skin infection are discussed. Pyoderma resulting from contaminated cosmetics have not been observed by the author during the past 24 years.

EFFECT OF REFINING ON THE CONCENTRATION OF TRACE METALS IN OILS AND FATS. A. Thomas (F. Thoenl's Vereinigte Harburger Oelfabriken, 2100 Hamburg 90) *Fette, Seifen, Anstrichm.* 78, 141-4 (1976). The published concentrations of trace metals in edible oils and fats vary considerably. This is probably not only caused by samples being of different origin but also by different methods of analysis. Values determined by us for lead and mercury in crude oils and fats are relatively frequently above the limits featuring in German draft legislation dating from May 1974. Refining, as normally done for oils and fats, reduces the lead contents to or below the draft limit of 0.15 ppm. Even after refining the draft limit of 0.025 ppm mercury is sometimes exceeded. The neutralisation step is primarily responsible for the reduction of the lead content.

STUDIES ON CRYSTAL STRUCTURES OF FATTY ALCOHOLS AND FATTY ACIDS USING ELECTRON AND X-RAY DIFFRACTION I. D. Precht (Inst. f. Physik, Bundesanstalt f. Milchwirtschaft, 2300 Kiel, Germany) *Fette, Seifen, Anstrichm.* 78, 145-9 (1976). For the homologous series of even numbered saturated fatty alcohols from dodecanol ($C_{12}H_{26}OH$) up to hexacosanol ($C_{26}H_{54}OH$) the almost orthorhombic unit cells of the β_0 -modifications can be shown by using electron and X-ray diffraction. Fourier synthesis based on hk0-reflexes showed the presence of a β_0 -form which has half the edge length c compared to the β_1 -modification. Moreover, the eight γ_3 - to γ_{10} -modifications of the various alcohols were detected. Unit cell parameters and the chain tilt were determined for all crystal structures. By X-ray diffraction, stearic acid was shown to exhibit five β_n - ($n = 2, 4, 5, 8$) and seven γ_2 - to γ_8 -forms. The β_n -forms consist of molecules tilted over the short subcell a_s -axis, whereas in γ_n -forms the molecular chains are tilted over the b_s -axis. All the modifications of alcohols and fatty acids studied have an orthorhombic subcell, while the neighboring molecules in monomolecular layers are turned to each other at an angle of about 90° .

COFFEE OILS IN THE ASSESSMENT OF RAW AND ROASTED COFFEE BEANS. W. Wurziger (Chem. u. Lebensmittel untersuchungsanstalt im Hygienischen Institut, 2000 Hamburg 36, Germany) *Fette, Seifen, Anstrichm.* 78, 172-6 (1976). Increasing amounts of robusta coffee is used for the production of roasted coffee mixtures for the preparation of beverages and coffee extract powders. Owing to the differences between arabica and robusta coffee varieties with respect to composition and flavour, the detection of the latter variety is desirable. The composition of coffee oils from the arabica

and robusta varieties is reported and colour reactions of the coffee oils are discussed which enable to distinguish between raw and roasted, whole and powdered beans of arabica and robusta varieties and permit the detection of robusta coffee in mixtures with arabica coffee.

FATTY ACID COMPOSITION OF SHEEP TAIL FATS FROM FIVE IRANIAN NATIVE BREEDS. M. Mehran and M. Filsoof (Dep. Food Sci., Coll. Agric., Tehran Univ., Karaj, Iran) *Fette, Seifen, Anstrichm.* 78, 187-9 (1976). Fifteen fat samples provided from 5 sheep of 5 different Iranian native breeds were examined for their fatty acid composition by means of gaschromatography. Over 30 components could be detected in most samples. Fifteen fatty acids occurred in measurable amounts commonly higher than 0.1% up to 53.5% of the total. The saturated part consisted for the major of myristic (2.4-5.5%), pentadecanoic, (0.6-1.0%), palmitic (18.2-23.6%), heptadecanoic (0.9-2.3%), stearic (7.1-22.1%) and arachidic (0.1-0.3%) acids. Myristoleic (0.3-2.1%), palmitoleic (1.4-3.6%), oleic (39.6-53.5%), linoleic (2.1-3.7%) and linolenic (2.2-2.9%) acids were the main unsaturated fatty acids identified in this investigation. The differences in fatty acid composition of fats from sheep of various breeds were considerably high in stearic and oleic acids in some cases. The variation in fatty acid composition of fat samples obtained from different parts of a tail was insignificant in all 5 sheep examined. No conclusion could be made as to whether the above mentioned considerable differences in fatty acid composition of tail fats from various sheep are due to difference in their breed or due to other factors.

DETERMINATION AND COMPARISON OF OIL CHARACTERISTICS IN IRANIAN ALMOND, APRICOT AND PEACH NUTS. M. Filsoof et al. (Dep. Food Drug Control, Coll. Pharm. Tehran Univ., Tehran, Iran) *Fette, Seifen, Anstrichm.* 78, 150-1 (1976). Oil characteristics of sweet and bitter kernels of 5 Iranian cultivars of almond, apricot and peach were determined. Fatty acid composition and fat constants of peach oil were very similar to those of almond oils. Apricot oils were considerably different from almond and peach oils. The differences, however, did not seem to be valuable for any practical use.

A NEW PROCESS FOR DEACIDIFICATION AND DEODORIZATION OF OILS AND FATS. H. Schumacher (Hoepferfeld 26, 2050 Hamburg 80, Germany) *Fette, Seifen, Anstrichm.* 78, 192-6 (1976). A newly developed process for the deodorization of oils and fats is described, which is preceded by a brief description of the classical processes. The main novelty of the process is that the actual deodorization occurs with the fraction of a second at temperatures between 220° - 250° C and relatively high pressures (ca. 20-30 Torr). The oil is subjected to temperatures higher than 200° C for a few minutes only. The size of the plant is very small; thermocompressors for producing vacuum are not required, and, consequently the steam consumption is reduced. Using the operational data, it has been shown that it is possible to deodorize and deacidify simultaneously.

CONTINUOUS PROCESSES FOR PRESSING ROASTED COCOA BEANS. H. Thomschke et al. (Fried. Krupp GmbH, Harburger Maschinenbau, 2100 Hamburg 90, Germany) *Fette, Seifen, Anstrichm.* 78, 169-72 (1976). Cocoa butter, that has been extracted by the pressing out of roasted cocoa beans, is required for the manufacture of chocolate products. So far the cocoa beans have been pressed out by means of discontinuous operational hydraulic presses, whereby, for the pressing process, a specific processing for the preparation of the raw cocoa beans is required. This pressing method is opposed to a method which utilizes a continuous operational cage screw press. The comparison shows that by means of the continuous pressing method the number of units is reduced, that it is energy saving and that a straightforward control and supervision of the process is possible.

THE OIL PLANTS OF ZAIRE. I. BOTANICAL FAMILIES GIVING OILS OF RELATIVELY LOW UN-SATURATION. C. Kabele Ngiefu et al. (Univ. nat. Zaire, Kinshasa-11, Zaire). *Oléagineux* 31, 335-7 (1976). The authors present analytical results concerning 23 oil plants of Zaire giving oils of relatively low un-saturation, and show that some of them (in particular *Irvingia gabonensis*, *Carapa guianensis*, *Allanblackia floribunda*, and *Terminalia catappa*) could be suitable for industrial exploitation.

STUDIES ON RANCIDITY OF OILS AND FATS. ON THE AUTOXIDATION OF PHOSPHOLIPIDS. M. Favez El-Tarras et al. (Faculty

of Pharmacy, Cairo University, Cairo, U.A.R.). *Oléagineux* 31, 229-32 (1976). The autoxidation of samples of crude egg yolk phospholipids and of chromatographically homogeneous lecithin was monitored in aqueous and non-aqueous media by measuring the total oxygen uptake and by determination of the labile and total peroxides, the carbonyl value, the benzidine value, and the thiobarbituric acid value. It was found that phospholipids and lecithin suffer from browning reactions during autoxidation. The process is recognized as the main route for the changes in color and flavor.

RESEARCH ON THE STRUCTURE OF THE GROUNDNUT SEED COAT AND ITS INFLUENCE ON THE PENETRATION BY ASPERGILLUS FLAVUS. Ch. Zambettakis and A. Bockelee-Morvan (C.N.R.S. Lab. Cryptogamie du Muséum d'Histoire Naturelle, Paris). *Oléagineux* 31, 219-28 (1976). The groundnut seed coat plays an important part in resistance to contamination by *Aspergillus flavus*. An examination of the surface of the seed coat by electron scan microscope and of transversal sections by photonic microscope was carried out on 36 varieties of groundnuts, and showed great diversity in the structure of this integument. These varieties can be classified according to a certain number of characters which may have their importance in resistance to the penetration of the fungus into the seed.

ACCUMULATION OF ANTIBIOTIC RESIDUES IN THE FRUIT OF COCONUT PALMS TREATED WITH OXYTETRACYCLINE FOR THE CONTROL OF LETHAL YELLOWING. R.E. McCoy (Univ. of Florida, Agric. Res. Center Fort Lauderdale, Fla. 33314, USA). *Oléagineux* 31, 215-8 (1976). Fruit from coconut palms, whose trunk was injected with oxytetracycline-hydrochloride for control of the lethal yellowing disease, was assayed for antibiotic residues. Fruit in all stages of maturity was harvested, 1 week after treatment, from trees receiving the highest recommended remedial dosage, 6 g oxytetracycline-HCl per tree. Coconut meat from approximately 25% of the nuts sampled contained traces of oxytetracycline-HCl and the overall mean concentration in coconut meat was 0.11 µg/g. Oxytetracycline-HCl concentrations in coconut meat declined with time so that no residues were detected in fruit harvested 4 weeks after treatment.

INFLUENCE OF FREE FATTY ACIDS ON THE SPEED OF HYDROGENATION OF A MIXTURE OF SUNFLOWERSEED OIL AND FATTY ACIDS. N.P. Gavrilko. *Maslo-zhir. Promst.* 1975(12), 15-6. In the combined process of hydrogenation-hydrolysis of vegetable oils, the hydrogenation can proceed even if the concentration of free fatty acids in the oil varies from 0-100%. The study of the speed of hydrogenation as a function of the concentration of free fatty acids in the sunflowerseed oil established that in the combined process, the speed of hydrogenation doesn't depend on the content of free fatty acids of the starting oil, which gives the possibility of treating the sunflowerseed oil without previous neutralization of this oil. (Rev. Fr. Corps Gras)

ABOUT THE POSSIBILITY OF REGENERATION OF USED VEGETABLE OIL. A.A. Taran et al. *Pishch. Tekhnol.* 1975(5), 16-9. The authors studied the use of some kinds of bleaching earths for the regeneration of used oil. The following bleaching earths were examined: bentonite, tripoli of Georgian origin, and Czechoslovakian bleaching earth. The experiments have been done on sunflowerseed oil used for fish frying. It was established that the used oil must first be neutralized (2 parts of used oil, 1 part of hexane, and an excess of 400-500% of a 10% KOH solution) and then it is enough to pass it over a layer of bentonite to obtain an edible oil. (Rev. Fr. Corps Gras)

INFLUENCE OF THE CHEMICAL COMPOSITION OF MILK FAT ON THE DEGREE OF SOLIDIFICATION. A.K. Avvakumov. *Pishch. Tekhnol.* 1975(6), 26-8. During the enrichment of milk fat with one of its fractions, the degree of solidification of glycerides in the mixture depends on the quantity and on the particularity of crystallization of this fraction. The more it is present in the mixture, the more marked its influence is on the physical properties of the mixture. An increase of the fractions which melt easily intensifies the crystallization of glycerides, increases the quantity of solid fats at low temperatures and decreases the final melting points. (Rev. Fr. Corps Gras)

INFLUENCE OF DIFFERENT INDIVIDUAL PACKAGINGS ON THE VARIATION OF THE QUALITY OF SUNFLOWERSEED OIL DURING STORAGE. M. Czechowska et al. *Tluszczc jadale* 19, 272-8

(1975). The addition of 50 mg of vitamin E (per 100 g) in sunflowerseed oil results in increased stability during storage. The best protection against the decomposition of vitamins E and A in refined sunflowerseed oil is obtained by the use of dark glass (orange) packaging. Poor results are obtained by the use of mat packaging of vinyl polychloride of milk color, and even worse with the use of colorless glass. (Rev. Fr. Corps Gras)

COMPOSITION OF TRIGLYCERIDES OF ALMOND AND HAZELNUT OILS. N.S. Geiko et al. *Khlebpok. Konditer. Prom-st.* 1975(8), 25-6. Almond and hazelnut oils contain, respectively, 53 and 50 individual triglycerides. The most common triglycerides of almond oil are triolein and dioleolinolein which represent 32 and 39% of the oil; hazelnut oil has about 76% triolein. (Rev. Fr. Corps Gras)

CAPILLARY GAS-LIQUID CHROMATOGRAPHIC STUDY OF POSITIONAL AND GEOMETRIC ISOMERS OF C_{18:1} FATTY ACIDS FORMED DURING HYDROGENATION OF SUNFLOWERSEED OIL. G. Alexander et al. *Olaj Szap. Kozmet.* 24, 72-5 (1975). The authors studied the possibility of using capillary glass columns for the determination of geometric isomers of C_{18:1} fatty acids. It was found that methyl esters of fatty acid isomers can be separated on OV-101. The results show that this method combined with thin-layer chromatography can be used successfully for the determination of isomers formed during the hydrogenation of vegetable oils. (Rev. Fr. Corps Gras)

STUDY OF THE STABILIZATION OF THE WHEAT GERM. II. B. Ivanova et al. *Maslo-sapunea Prom.* 12, 17-25 (1975). The authors studied the kinetics of sorption and desorption of humidity of wheat germ, fresh and stabilized by thermal treatment. It was established that the germ was strongly hygroscopic, the rapidity of the process is as high as the initial humidity of the material is low. The equilibrium humidity of the stabilized and non-stabilized germs is situated between 12 and 15%. It was found that the stabilized germ must be stored in hermetic packaging so that its initial humidity stays under the critical value of 3.5%. (Rev. Fr. Corps Gras)

MODIFICATION OF CORN OIL QUALITY DURING THE WET PRODUCTION OF CORN GERM. L. Stefanov. *Maslosapunea Prom.* 12, 10-6 (1975). The quality of corn germ obtained by wet milking and the quality of the oil from this germ are described. Corn oil obtained from this germ is of a lower quality than the oil from the non-treated germ. The protein content in the germ obtained by wet milling is 4% lower than the protein content in the germ in the grain. Finally, the lipase activity of the corn germ extracted by wet milling is approximately two times less than the lipase activity of the germ in the grain. (Rev. Fr. Corps Gras)

HYDROGENATED FISH OILS AS A RAW MATERIAL FOR SOAP INDUSTRY. W. Zwierzykowski et al. *TSPK-Pollena* 19, 377-89 (1975). Fish oil was hydrogenated with different catalysts at varying concentrations. In all experiments, the constant parameters were time (8 hours), temperature (180°C), and pressure (1 atm). Taking into account the requirements regarding the raw materials used in soap industry (iodine value = 50), it is convenient to increase the pressure up to about 3 atm., which allows a reduction of the time of hydrogenation and also of the quantity of catalyst required. (Rev. Fr. Corps Gras)

CHEMICAL, NUTRITIONAL, AND METABOLIC STUDIES OF HEATED FATS. II. NUTRITIONAL ASPECTS. E.G. Perkins (Dept. of Food Science, Burnside Res. Lab., Univ. Illinois, Urbana-Champaign, Ill. 61801). *Rev. Fr. Corps Gras* 23, 313-22 (1976). The nutritional aspects of heated fats are reviewed. In designing nutritional experiments, it is important to determine the percentage of oxidation products in oils by several methods since each method may actually be measuring a different type of product. A relation between the heating time, the percentage of polymers occurring in heated fats and the nutritional value of these was found. This latter is influenced as much by the diet as by the amount of polymers. The metabolic effects and toxicity of a few individual compounds, cyclic monomers and dimers of fatty acids, are reviewed.

INFLUENCE OF LONG STORAGE ON ORGANOLEPTIC AND CHEMICAL PROPERTIES OF MARGARINES. M. Naudet and S. Biasini (Lab. National des Matières Grasses-ITERG, Univ. d'Aix-Marseille, 13331 Marseille Cédex 3). *Rev. Fr. Corps Gras* 23, 337-40 (1976). Different types of table margarines, in various

packagings, were stored in different conditions, for about six months. Every fourth week, samples were examined for their organoleptic and chemical properties. The numerical values have been explained graphically by histograms. Regarding taste, the margarine is all the more acceptable as the temperature of storage is lower. A long storage does not seem to cause important chemical changes of the fat base, even if there is a notable alteration of flavor.

INTERESTERIFICATION AND ESTERIFICATION. REACTION MECHANISMS AND CONSEQUENCES ON THE STRUCTURE. M. Naudet (Lab. Nat. Matières Grasses-ITERG, Univ. d'Aix-Marseille, 13331 Marseille Cédex 3). *Rev. Fr. Corps Gras* 23, 387-91 (1976). The author described the reaction mechanism of esterification and interesterification. The consequences on the glyceride structure are also reviewed. In France, only interesterification is authorized, and in exactly defined conditions, for edible fats. The glyceride structure of some fats are given in the paper.

EFFECT OF HYDROGENATION ON THE FLAVOR OF SOYBEAN OIL. J.C. Cowan (Bradley Univ., Peoria, Ill.). *Rev. Fr. Corps Gras* 23, 397-8 (1976). Selective hydrogenation improved the flavor stability of a soybean oil, by lowering the linolenic content. A hydrogenated oil has lower flavor intensity value than the original oil. The classification of hydrogenated oils by odor intensity values (heat test and "room odor") is the same as that by the percentage of linolenic. A hydrogenated oil used in frying has a particular odor called "hydrogenated."

USE OF GLASS CAPILLARY COLUMNS IN GAS-LIQUID CHROMATOGRAPHY FOR THE ANALYSIS OF FATS. A.F. Prevot and F.X. Mordret (Lab. Inst. des Corps Gras, Paris). *Rev. Fr. Corps Gras* 23, 409-23 (1976). A recall of the simple theoretical notions shows the interest in using capillary columns and allows one to optimize their quality. The preparation of glass capillary columns, drawing and bending, offers no difficulty. Treating with gaseous hydrochloric acid at 350C for two hours produces a translucent surface and does not exclude a deactivation treatment by a silylating mixture. Two types of coating procedures with the stationary phase were compared. The glass needle injector helps to make the best possible use of these columns in the particular case of little volatile substances: fatty acids methyl esters with long and medium chains, sterols, tocopherols. The results are interesting: it is possible with a single column to obtain more than 2000 theoretical plates in a meter and to perform fast determinations (rapeseed oil composition determined in 3 minutes).

NEW METHODS OF DOSING FAT IN THE MARGARINES. R. Guillaumin et al. (ITERG, Paris). *Rev. Fr. Corps Gras* 23, 425-30 (1976). A method for the total fat determination in margarine is described. This method uses the absorption of water and the retention of non-fatty matter on a column of anhydrous sodium sulfate. The fat is separated by an organic solvent (ethyloxide or dichloromethane), the eluate is distilled, and the residue is weighed. A control is made under the same conditions. The results are highly repeatable.

STUDY OF THE NATURE OF SOME CRYSTALLIZED DEPOSITS IN THE FLUID PALM OILS. P. Archier and C. Bouvron (Lab. HSL Blohorn, Abidjan, Repub. Ivory Coast). *Rev. Fr. Corps Gras* 23, 455-7 (1976). For industrial fractionation of palm oil to obtain a fluid oil, different processes are applied. One of these fluid oils, iodine value 58, is especially studied. It was observed that in this fluid oil during storage of 15 days or more at 22-25C, fine deposits occur. These deposits are isolated by filtration and washed with hexane; their content is not higher than 0.1%. These deposits, analyzed by chromatography, consist exclusively of saturated 1,3 diglycerides.

APPLICATION OF FATTY ACID ESTERS IN INDUSTRY. L. Marcou (Société des Produits chimiques de la Montagne Noire Paris). *Rev. Fr. Corps Gras* 23, 459-71 (1976). Potential applications of fatty acid esters are reviewed, taking into account their structures and characteristic properties. Three large groups are studied: aliphatic alcohol esters, trialcohol triesters, polyol esters (with free hydroxyl groups). Many formulations are given in tables. Fatty acid esters are especially used in pharmaceutical and cosmetic industries.

SELECTIVE HYDROGENATION OF SOYBEAN OIL: RELATION BETWEEN ODOUR AND GLYCERIDE STRUCTURE. P.Y. Vigneron et al. (Lab. de Recherche, Lesieur-Cotelle et Associés-Coudekerque Branche). *Rev. Fr. Corps Gras* 23, 483-92 (1976). A comparative study of selective hydrogenation of soybean oil, with and without linolenic acid, with a copper catalyst is done. It

was found that residual isomers from hydrogenation of linolenic acid are responsible for the "hydrogenation odor." Successive fractionations of hydrogenated soybean oils suggest the precursors would be present in fractions containing polyunsaturated triglycerides high in isolinoleic acids. However, the complexity of these fractions does not allow the establishment of a connection between the presence of some compounds and odor.

THE FRENCH POLICY ON FATS. F. Chappuis (Ministère de l'Industrie de la Recherche, Paris). *Rev. Fr. Corps Gras* 23, 533-7 (1976). The French policy on fats is explained in a lecture given at the 53rd I.A.S.C. Congress in Monte Carlo. The supply of national or imported raw materials required for the French consumption is studied from the qualitative and quantitative point of view. As France shows a large deficit as much in fats as in oilseed protein for animal feeding, this deficit reaching 4.5 MF in 1974, the Administration foresees to promote greatly the culture of oilseeds. The desirable advance of new products is also discussed.

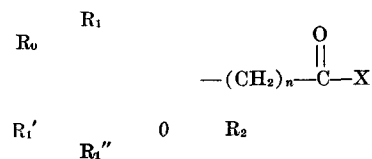
FATTY ACID CHEMISTRY. MEETING NATURE'S CHALLENGE. F.D. Gunstone (Univ. of St. Andrews, Scotland). *Rev. Fr. Corps Gras* 23, 539-45 (1976). The chemical properties of fatty acids which have been studied for many years can usually be understood in terms of reaction mechanisms that operate in organic chemistry. Despite the advances of recent years, chemists are a long way from being able to reproduce the selectivity of enzyme-controlled reactions which are revealed from the study of metabolism of fatty acids. A brief review of the major metabolic transformations followed by a description of chemists' attempts to secure the same specificity of reaction is given. Reaction at certain activated positions such as the carboxyl group, unsaturated centers, and methylene groups adjacent to the carboxyl group or an unsaturated center can be achieved, but selective reaction at most methylene groups remains an objective of further study.

ANALYTICAL METHODS OF CONTROLLING ESTERIFICATION AND INTERESTERIFICATION. R. Duterte (Société Industrielle des Oléagineux, Saint-Laurent-Blangy, 62002 Arras). *Rev. Fr. Corps Gras* 23, 547-56 (1976). Methods of controlling interesterifications triglycerides are reviewed: solid fat index determination (R.M.N.-Thermal differential analysis), gas-liquid chromatography, thin-layer chromatography, melting point, plasticity, cooling curve, cloud point, crystallization. The detection of interesterification is discussed. The esterification is studied by means of a few examples.

ADVANCES IN THE FIELD OF FATS: LIPID CHEMISTRY. R. Massoni (Société Robbe Hyfran, Compiègne, Oise). *Rev. Fr. Corps Gras* 23, 557-62 (1976). The use of fats and their by-products in lipid chemistry are reviewed. The very great advances in this field since 1945 are shown. Many new methods of control and analysis for raw materials and manufactured products have been developed. The use of oils and their derivatives for technical purposes is described particularly for the paint industry.

PREPARATION OF COMPOSITION FOR CONVERTING HYDROCARBONS AND FATS INTO BIODEGRADABLE AQUEOUS EMULSIONS. P. Fusey. *U.S. 4,005,043*. A process for the preparation of a composition for forming hydrocarbons or fats into a biodegradable emulsion comprises mixing at ambient temperature more than one mole of a C₆-C₈ carboxylic acid with a mole of a nitrogen compound selected from the group consisting of tertiary alkyl amines and tertiary alkanolamines, with the addition of 2-20% lecithin; adding ammonia to bring the pH to 7-9; and diluting the composition thus formed with a benzene-free petroleum solvent or water.

ANTIOXIDANT CHROMAN COMPOUNDS. J.W. Scott, D.R. Parrish, and G. Saucy (Hoffmann-LaRoche, Inc.). *U.S. 4,003,919*. The compounds have the formula:



R₁, R₁' and R₂'' are hydrogen, or lower alkyl; n is 0 or 1; R₂ is hydrogen, lower alkyl or phenyl; R is lower alkanoyl, benzoyl, benzyl, benzylhydryl, or tetrahydropyranyl; and X is halogen.

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HIGH PROTEIN LOW CALORIE DAIRY SPREAD. O.B.S. Strinning and K.E. Thurell (Mjolkcentralen, Ekonomisk Forening). *U.S. 4,000,332*. A dairy based high protein, low calorie water-in-oil emulsion, spreadable at refrigerator temperatures, contains 20-65% aqueous phase and 11-18% protein provided by a protein concentrate obtained from buttermilk soured bacteriologically and buffered with citrate and phosphate buffers to a pH of 6-7. The fat is provided by a mixture of butter oil and a polyunsaturated vegetable oil.

DEODORIZER FOR TRIGLYCERIDE OILS. L. Naylor (Simon-Rose-downs, Ltd). *U.S. 3,999,966*. A semi-continuous deodorizer is described.

METHOD FOR DETERMINATION OF TRIGLYCERIDES AND GLYCEROL. W.S. Stavropoulos and R.D. Crouch (Dow Chemical Co.). *U.S. 4,001,089*. In the method for determining triglycerides in biological fluids by hydrolysis followed by quantitative analysis of the liberated glycerol, there is claimed the improvement comprising mixing the biological fluid containing phospholipids with an alkali metal hydroxide and methanol to provide a hydrolysis mixture containing 75-99.8% of the methanol and an alkali metal hydroxide concentration of 0.15-0.45 normal. The mixture is held for a time sufficient to hydrolyze the triglycerides and then the glycerol content is quantitatively determined.

MILK FAT CONTAINING PRODUCTS AND PROCESSES. R. Norris. *U.S. 4,005,228*. A process for producing a soft dairy spread comprises the steps of (a) fractionating milk fat into three fractions comprising a high melting fraction which is solid at 20 C, a middle melting fraction solid at 0 C, and liquid at 20 C, and a low melting fraction liquid at 0 C; and (b) blending the high and low melting fractions in a ratio of 1:3 such that the solid fat content of the soft dairy spread remains constant over the range of 5-22 C.

FATTY ACIDS AND DERIVATIVES AS ANTIMICROBIAL AGENTS. J.J. Kabara. *U.S. 4,002,775*. A food grade microbiocide consists of a 1 or 2-monolaurin polyol ester. It is added to a food subject to spoilage in an effective amount of up to 30%.

PRODUCTION OF LIQUID EDIBLE OIL FROM OIL OR SIMILAR OILS. L. Koslowsky (H. L. S. Ltd., Industrial Engineering Co.). *U.S. 4,004,041*. A process for producing an improved edible liquid oil from natural and semiprocessed vegetable and animal fats and oils comprises the steps of (a) reacting a portion of the oil with an unsaturated fatty acid ester of a C₁₇-C₂₃ alkanol in the presence of a transesterification catalyst to form a first product mixture; (b) distilling the first product mixture under low pressure to yield a distillate comprising a mixture of alkanol esters of saturated and unsaturated fatty acids and a residue having a higher iodine value than the starting material; (c) fractionally distilling the first distillate obtained in (b) to separate a lower boiling saturated fatty acid ester fraction and a higher boiling one; (d) reacting the saturated fatty acid ester fraction from (c) with another portion of the oil in the presence of a transesterification catalyst to form a second product mixture; (e) distilling the second product mixture under reduced pressure to obtain a second distillate comprising a mixture of alkanol esters of saturated and unsaturated fatty acids and a second distillation residue comprising an oil having a lower iodine value than the starting material; (f) fractionally distilling the second distillate to separate a lower boiling saturated fatty acid ester fraction and a higher boiling one; and (g) recycling the unsaturated fatty acid ester fractions from steps (c) and (f) to the first transesterification step (a) and recycling the saturated fatty acid ester fraction obtained in step (f) to the second transesterification step (d).

COMPREHENSIVE EVALUATION OF FATTY ACIDS IN FOODS. X. LAMB AND VEAL. B.A. Anderson, G.A. Fristrom, and J.L. Wehrauch (Consumer and Food Economics Inst., A.R.S., U.S.D.A., Hyattsville, Md.). *J. Am. Diet. Assoc.* 70, 53-8 (1977). Based on a critical review of the literature on lipid composition of foods, representative values have been derived for the lipid and fatty acid contents of lamb and veal. Comprehensive tabulations of fatty acids in 100 g portions of raw and cooked retail cuts of these two meats are given. Mean fatty acid profiles of the lean and adipose tissues, which were used for computing the fatty acid values in the food tables, are presented. Comparisons are made between the types of fatty acids (saturated, monounsaturated, polyunsaturated, and total) in veal and beef lean and separable fat tissues. No data on fat or fatty acids in organ meats are given.

CLEARING FACTOR LIPASE (LIPOPROTEIN LIPASE) ACTIVATOR. A METHOD FOR THE MEASUREMENT OF THE NET ACTIVATING ABILITY OF HUMAN SERA. M. Perenna Rogers, D. Barnett and D.S. Robinson (Dept. of Biochem., and Leeds Univ. (St. James's) Hosp., Univ. of Leeds, Leeds, Great Britain) *Atherosclerosis* 24, 551-64 (1976). The hydrolysis of an emulsified triglyceride substrate by clearing factor lipase (lipoprotein lipase) normally requires the presence of particular activating polypeptide species. These are present in serum, together with other inhibitory species, as part of the serum lipoproteins. The paper describes a method whereby the net activating ability of individual human sera may be measured routinely. In a normal population, this activating ability is shown to be correlated positively with the fasting serum triglyceride concentration. As the fasting triglyceride concentration increases, there is a rise in the proportion of the total activating ability that is associated with the very low density lipoproteins. A dietary fat load does not raise the total activating ability but does increase the proportion of the total that is associated with the serum lipoproteins of lowest density. ●



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