ABSTRACTS

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

• Fats and Oils

Separation of fatty acid esters on acid-treated Florisil impregnated with silver nitrate. D. Willner (New England Inst. for Med. Res., Ridgefield, Conn.). *Chem. Ind. (London)* **1965**, 1839–40. Acid-treated Florisil was mixed with a 50% aqueous solution of silver nitrate and shaken until free-flowing. It was then left overnight in an oven at 110–120C. A slurry of this material in redistilled hexane was poured into a column 2.0 x 50 cm, and the column was tapped lightly to form a compact packing. The packing was protected from light by covering it with aluminum foil. The flow rate of the solvent could be regulated easily and was kept at 150–180 ml/hr. A mixture of myristic, palmitic, stearic, palmitoleic, oleic, linoleic and linolenic acid methyl esters in hexane was poured on the column. The column was eluted with hexane containing increasing amounts of ether. Separation was satisfactory and recovery was almost quantitative.

Unsaponifiable fraction of pork fat as related to boar odor. L. D. Williams and A. M. Pearson (Dept. of Food Sci., Michigan State Univ., E. Lansing, Mich.). *J. Agr. Food Chem.* **13**, 573–77 (1965). The unsaponifiable matter obtained from pork fat was fractionated and found to contain carbonyls, cholesterol, squalene, vitamin A, and four saturated hydrocarbons. In addition, cholesterol esters, a 7-ketosterol, a triterpene alcohol, and two oxidation products of squalene were indicated. No evidence of primary or secondary alcohols or of sulfur- or nitrogen-containing compounds could be found. No important differences were observed in the components from fat containing boar odor as compared to fat free from boar odor.

Mass spectra of O-isopropylidene derivatives of unsaturated fatty esters. J. Am. McCloskey and Martha J. McClelland (Dept. of Biochem., Baylor Univ., College of Med., Houston, Texas). *J. Am. Chem. Soc.* **87**, 5090–93 (1965). The mass spectra of O-isopropylidene derivatives of diols obtained by stereospecific oxidation of a number of unsaturated fatty esters are interpreted, and are shown to be useful for the characterization of positional and geometrical isomers of the unsaturated esters. Deuterium and oxygen-18 labeling are used for the elucidation of fragmentation mechanisms. A simple preparation of oxygen-18 labeled diols is described.

Effect of solid support and liquid phase on the accuracy of quantitative gas chromatography. V. Kusy (Chem. Works of Czechoslovak-Soviet Friendship, Zaluzi, Czech.). *Anal. Chem.* **37**, 1748–52 (1965). It was ascertained that for gas chromatographic analyses the measured values are under certain conditions lower than the actual values. This phenomenon is most perceptible for the determination of mixtures of polar and nonpolar substances on a nonpolar liquid phase and is discussed in relation to a possible sorption of the analyzed polar substance on the solid support. It may be assumed that one of the causes of the irreversible sorption of polar substances is hydrogen bonding. The spatial arrangement of the molecule of the analyzed substance probably has a large influence. In addition to irreversible sorption, a possible interaction between the liquid phase and the analyzed substance is taken into account. Generally it may be assumed that the presence of the nonpolar substance influences the rate of dissolution of polar substances in the liquid phase, and make the approach of polar substances to the solid support much easier. Hence, for gas chromatographic analysis, the choice of the solid support and the liquid phase may influence the quantitative result.

Cashew nut processing—part I. F. J. Hall and L. Banks. *Trop. Sci.* **VII**, 12–26 (1965). Traditional methods of cashew nut processing are described, and developments in mechanical processing reviewed. An account is given of work at the Tropical Products Institute up to the end of 1964, including early work on a simple manually operated decortication device, and on centrifugal cracking.

Relation of composition of the aqueous phase to oxidized flavor development by dialyzed globular milk fat. A. M. El-Negoumy (Dept. of Animal and Range Sci., Montana State Univ., Bozeman, Mont.). *J. Dairy Sci.* **48**, 1406–12 (1965). Six per cent dialyzed milk fat and 4 ppm copper were incorporated into: 1) salt solutions containing sodium citrate, phosphate buffer, NaCl, KCl, and $CaCl_2$, and mixtures of those solutions; 2) salt solutions containing amounts of sodium caseinate ranging from 0.50 to 5.0%; 3) salt solutions containing 2 to 10% lactose; 4) the above model systems in presence of ascorbic acid. After 48 hr at 3–5C, oxidation rates and intensity were measured in terms of the optical density (OD) of the 2-thiobarbituric acid test. Both rates and intensity of oxidized flavor development varied significantly in the various salt solutions and their mixtures. Increasing lactose concentration increased the oxidation rates significantly in all systems (OD increased from 0.32 to 0.50 in phosphate and 0.14 to 0.21 in citrate). The reverse of this trend was obtained in presence of an increased concentration of sodium caseinate (OD decreased from 0.25 to 0.05 in phosphate and 0.15 to 0.05 in citrate). Homogenized fat showed much lower oxidation rates in presence of casein than did nonhomogenized fat.

Lipids of the fin whale (Balaentoptera physalus) from North Atlantic waters. I. Fatty acid composition of whole blubber and blubber sections. R. G. Ackerman, C. A. Eaton and P. M. Jangaard (Fisheries Res. Board of Canada, Halifax, Nova Scotia). *J. Bacteriol.* **43**, 1513 (1965). Oils from sectioned blubber, whole blubber oils, and commercial oils from the fin whale (*Balaenoptera physalus*) taken in Nova Scotia waters have been examined. The general properties include much lower iodine values (105–117) than those commonly reported for North Atlantic (Arctic) baleen whales. The fatty acid composition pattern has been determined by gas-liquid chromatography and varies systematically with the type of acid across the blubber section, the inner section having the highest iodine value. The roles of the blubber in physiological functions other than as an insulating layer are discussed in terms of fatty acid composition.

II. Fatty acid composition of the liver lipids and gas-liquid chromatographic evidence for the occurrence of 5,8,11,14-nonadecatetraenoic acid. *Ibid.*, 1521. The fatty acid composition of the liver lipids of the fin whale (*Balaenoptera physalus*) closely resembles that of terrestrial mammals. Gas-liquid chromatographic evidence indicates that 5,8,11,14-nonadecatetraenoic acid is present, and the origin of this acid in association with 5,8,11,14-eicosatetraenoic acid is discussed.

The heats of combustion, formation and isomerization of isomeric monoglycerides. L. S. Silbert, B. F. Daubert, and L. S. Mason (Dept. of Chem., Univ. of Pittsburgh, Pa.). *J. Phys. Chem.* **69**, 2887 (1965). Heats of combustion for the isomeric monoglyceride series ranging from monocaprin to monostearin and for one pair of unsubstituted benzoylmonoglycerols were determined and used for calculating the heat of formation, heat of isomerization from the enthalpy difference of the isomers, and energy increment per CH_2 for their solid states. The heat of isomerization ranged from −1.99 to −3.84 kcal. mole^{-1} for the aliphatic monoglycerides and −1.08 kcal. mole^{-1} for the aromatic series in contrast to a reported value of −9.52 kcal. mole^{-1}. The kinetic equilibrium constant reported for the isomerization of 2-monoglyceride to 1-monoglyceride was compared to the equilibrium constant computed from their isomerization energies. An entropy difference for the monopalmitin pair, $\Delta S° = -5.6$ cal. deg.$^{-1}$ mole^{-1}, was derived and interpreted. The energy increment per CH_2 ranged from 154.65 to 155.87 kcal. mole^{-1}, and the possible reasons for the range are briefly discussed.

Investigation on the infrared rocking bands of linear saturated, aliphatic mono and diacids. R. Perron and J. Perichon (Lab. of Lipochem. of C.N.R.S., Bellevue, Fr.). *Rev. Franc. Corps Gras* **12**, 381 (1965). The infrared spectra of various linear saturated aliphatic monoacids (C-3 to C-22) and α-ω diacids (C-4 to C-24) have beeen determined in solid state between 700 and 900 cm^{-1}. The distribution of the rocking bands of methylenic groups in this range may be correctly described for these two series of compounds by two equations of the same type as the one established by Snyder for hydrocarbons. These equations show that carboxylic groups have a certain action on the rocking vibrations of the hydrocarbon chain. The observed frequencies, as in the case of hydrocarbons, depend particularly on the difference of phase between adjacent oscillators. These angles $\phi_{K,M}$ for m oscillators and the kth normal mode, are represented respectively by $\phi_{K,M} = k\pi/m + 1$ (active bands for the odd and even values of k) for monoacids, and $\phi_{K,M} = k\pi/m + 2$ (active bands for even values of k) for diacids. From this investigation results a new means of identification of these acids. Distribution of the rocking bands and their positions in the spectra are analytically more advantageous than "progression bands."

ELECTRON SPIN RESONANCE SPECTRA OF RADICALS IN γ-IRRADIATED FATTY ACIDS. H. Luck, C. U. Deffner, R. Kohn (Deut. Forchanstatt for Lebensmittlechem, Munich). *Fette Seifen Anstrichmittel* 66, 665–69 (1964). Electron spin resonance spectra of some γ-irradiated crystalline saturated and unsaturated fatty acids showed that the resulting radicals have a relatively long life period. They show very little or no reactivity towards oxygen.

THE METAL COMPLEXES OF TRI- AND TETRAMETHYLENEDIAMINE-NN′-TETRAACETIC ACID. F. L'Eplattenier and G. Anderegg (Eidgen. Tech. Hochschule, Zürich, Switzerland). *Helv. Chim. Acta* 47, 1792–800 (1964). The stability constants of the complexes formed by various metal ions with ligands of the type $(^{-}OOC{-}CH_2)_2{=}N{-}(CH_2)_n{-}N{=}(CH_2{-}COO^{-})_2$ with $n = 3$ or 4 have been determined. In the case of $n = 3$, complex formation has been investigated by five different methods, all giving identical results. The stability of these complexes is lower than that of the homologue EDTA ($n = 2$), however the degree to which stability is affected by n is not the same for the various complexed metals.

REACTION ENTHALPY AND ENTROPY IN THE FORMATION OF METAL COMPLEXES OF THE HIGHER HOMOLOGUES OF EDTA. G. Anderegg (Eidg. Tech. Hochschule, Zürich, Switzerland). *Helv. Chim. Acta* 47, 1801–14 (1964). Complexing agents of the type discussed in the previous abstract with values of n from 2 to 8 have been investigated. The stability constants and the heats evolved during formation of the 1:1 complexes of Ca, Mg, Mn^{+2}, Fe^{+2}, Co^{+2}, Ni^{+2}, Cu^{+2}, Zn^{+2}, Cd^{+2}, Pb^{+2}, Hg^{+2} and La^{+3} have been determined. Based on their behavior in complex formation these cations can be divided into two groups. In the first one, including cations Ca^{+2}, Mg^{+2}, Mn^{+2}, Cd^{+2}, Pb^{+2} and La^{+3}, the stability constants and $-\Delta H$ of complex formation decrease rapidly when n is increased from 2 to 4. The second group contains all the other metal ions investigated except Hg^{+2}, and the drop in stability is observed between 4 and 5, whereas $-\Delta H$ increases slightly. The entropy gain by complex formation is approximately the same if the number of methylene groups in the chain connecting the two nitrogens is increased from 2 to 4. Replacement of one or two of these $-CH_2-$ groups by $-O-$ or $-S-$ generally decreases the free energy and the enthalpy of complex formation to a great extent if new 5-membered chelate rings are formed.

STRUCTURE AND ACTIVITY OF Cu^{+2}-COMPLEXES IN THE CATALYTIC RADICAL DECOMPOSITION OF HYDROGEN PEROXIDE. H. Brintzinger and H. Erlenmeyer (Univ. of Basel, Switzerland). *Helv. Chim. Acta* 48, 826–9 (1965). The bidentate N-chelates Cu^{+2}-bipyridine and Cu^{+2}-ethylenediamine have been found to be more active in catalyzing hydrogen peroxide decomposition than the O-chelate Cu^{+2}-diphosphate and the terdentate N-chelate Cu^{+2}-terpyridine. This is paralleled by changes in the tendency to form ternary peroxy complexes from the respective chelates. Mechanisms and consequences of these catalytic effects are discussed.

A RAPID DETERMINATION OF THE OIL CONTENT OF OLIVES. M. Catalano (Univ. of Bari, Italy). *Olearia* 19, 98–100 (1965). A rapid method for the determination of the oil content of olives, accurate to within ±0.5%, is described.

PROGRESS IN THE ANALYSIS OF 1- AND 2-FATTY ACID MONOGLYCERIDES. W. Wachs (Univ. of Berlin, Germany). *Tenside* 2, 254–6 (1965). A survey is made of the currently available analytical methods for determining 1- and 2-monoglycerides. Besides the old established methods based on the oxidation of 1-monoglycerides by means of periodic acid, more recent methods based on thin layer and gas chromatography are also discussed.

PROBABLE PHENOMENA OF ACID ISOMERISM AND ERRORS IN THE INTERPRETATION OF GAS CHROMATOGRAMS. E. G. Mondino (SAICA, Castelvetrano, Italy). *Olearia* 19, 94–7 (1965). Several peaks and shoulders present in fatty acid methyl ester chromatograms are caused by oxidation of the methyl esters during or after preparation and by the presence of unsaponifiables. The nature and the position of these peaks have been investigated and are reported on in detail.

CRYSTALLIZATION AND MELTING BEHAVIOR OF FATS. P. W. Hendrikse, J. Hannewijk and A. J. Haighton (Unilever Res. Lab., Vlaardingen, The Netherlands). *Riv. Ital. Sostanze Grasse* 42, 367–84 (1965). The principles governing the crystallization of fats and the various crystallographic forms are reviewed. The practical applications of dilatometry, calorimetry and DTA in the study of fat solidification and melting are also discussed.

DETERMINATION OF THE FAT CONTENT OF CHEESES. P. Armandola. *Ind. Alim.* 3, 45–8 (1965). Analytical methods for the determination of the fat content of cheeses, both in good and in poor state of preservation, are described and discussed.

ESTIMATION OF THE STABILITY OF OLIVE OILS. C. Cantarelli and F. Montedoro (Univ. of Perugia, Italy). *Riv. Ital. Sostanze Grasse* 42, 298–308 (1965). The aging characteristics of a number of olive oil samples, both under normal storage conditions and under accelerated testing, have been studied with respect to autocatalytic peroxidation and hydrolytic acid formation. The validity of the peroxide and carbonyl indices as criteria for estimating stability against rancidity is discussed. The data on the trend of autocatalytic hydrolysis show interesting differences of behavior with respect to other vegetable oils.

VARIATION OF THE CHEMICAL COMPOSITION OF OLIVES DURING THEIR GROWTH. G. Petruccioli (Exp. Olive Inst., Spoleto, Italy). *Olearia* 19, 5–13 (1965). The changes in the chemical composition of various types of olives have been followed at various stages of their maturation over a period of eight years. The fat content increases up to a maximum, reached towards the end of the season, after which it remains constant, while cellulose, pectins and mannite contents remain practically unchanged. The free fatty acid content becomes lower with progressive maturation, and so does the ratio of saturated to unsaturated fatty acids. The sugar content becomes somewhat lower while total nitrogen (especially proteic and amminic N) and pentosanes decrease markedly. These results confirm previous hypotheses that glucosides are the substances responsible mainly for the formation of fats and suggest that pentosanes and proteic substances also may play a role in the process.

THE FATTY ACID COMPOSITION OF ITALIAN AND FOREIGN OLIVE OILS. G. Petruccioli (Exp. Olive Inst., Spoleto, Italy). *Ind. Alim.* 3, 62–6 (1965). The fatty acid compositions of about 300 olive oil samples of different origins are reported, with results generally in agreement with previous literature. The existence of regional differences in fatty acid composition is confirmed.

A STUDY OF THE DISTRIBUTION OF FATTY ACIDS IN TRIGLYCERIDES. E. Fedeli, A. Lanzani, A. F. Valentini and G. Jacini (Exp. Stat. Fats and Oils, Milan, Italy). *Riv. Ital. Sostanze Grasse* 42, 67–9 (1965). The operating conditions for the separation (by GLC and TLC) of the glycerides present in olive oil are described. Gas chromatography allows separation by molecular weight but does not distinguish between saturated and unsaturated component acids. TLC, on the other hand, permits separation of the triglycerides by degree of unsaturation. By first operating a TLC separation and subsequently doing a GLC separation on the individual TLC fractions, one is able to characterize completely the glyceride composition of an oil. By including the technique of enzymatic hydrolysis, a very complete glyceride analysis can be performed.

PRODUCTION CAPACITY AND POWER REQUIREMENTS IN OLIVE OIL PROCESSING MACHINERY. A. Chelazzi (Veraci S.p.A., Florence, Italy). *Riv. Ital. Sostanze Grasse* 42, 79–103 (1965). The machinery commonly used in the first stage of olive oil processing, i.e. the stage preceding extraction, has been studied for the purpose of establishing theoretical-experimental formulas to calculate the hourly working capacity and the horsepower required. Among the subjects of this study are: rubber conveyor belt for olives, washing machinery, vertical screw conveyors, grinding crushers and mills.

THE USE OF CENTRIFUGAL SEPARATORS IN CONTINUOUS REFINING PROCESSES FOR VEGETABLE OILS. U. Armonioso (Alfa-Laval, Milan, Italy). *Riv. Ital. Sostanze Grasse* 42, 71–8 (1965). The various uses of centrifugal separators in vegetable oil production, refining and foots acidulation are described.

THE HYDROLYSIS AND OXIDATION OF CRUDE AND DEGUMMED SOYBEAN OIL. A. Rutkowski, W. Korzeniowski and J. Batura (Coll. of Agr., Olsztyn, Poland). *Riv. Ital. Sostanze Grasse* 42, 63–6 (1965). Undegummed crude soybean oil hydrolyzes rapidly on storage. Higher temperature and the presence of moisture accelerate the process, which is much more pronounced than in the case of degummed oil. Hydrolysis also greatly reduces the oil's resistance to oxidation, especially at higher storage temperatures.

CHEMICAL AND SPECTROPHOTOMETRIC CHARACTERISTICS OF CRUDE OLIVE OILS. R. Casillo (Chamb. of Comm. Lab., Naples, Italy). *Olearia* 19, 14–7 (1965). A treatment with activated alumina largely removes the free acidity and various oxidation products from low quality olive oils. These oils can still be identified as genuine olive oils (requiring refining) by spectrophotometric analysis after the alumina treatment.

COLUMN AND THIN-LAYER CHROMATOGRAPHY OF ORGANIC COMPOUNDS USING $AgNO_3$-IMPREGNATED ADSORBENTS. G. Jurriens (Unilever Res. Lab., Vlaardingen, The Netherlands). *Riv. Ital. Sostanze Grasse* 42, 116–21 (1965). $AgNO_3$-impregnated silica gel, an adsorbent developed by DeVries for the resolution of higher fatty acid methyl esters or of triglycerides with *cis* and *trans* double bonds, is suitable also for the separation into groups of other unsaturated organic substances, such as sterols, sterol esters, trimethyl sterols, sesquiterpenes, phospholipids. The specific properties of the adsorbent are especially evident in TLC resolutions. By using layers 1 mm. thick on 20 x 40 cm. plates it is possible to separate 50–100 mg of a mixture composed of a great number of constituents by a single operation. If fractions of a glyceride mixture are quantitatively extracted from the adsorbent, it is possible to further examine and analyze these fractions.

FATTY ACID COMPOSITION OF THE BARK OF AILANTHUS GLANDULOSA. B. Chiarlo and E. Tacchino (Univ. of Genoa, Italy). *Riv. Ital. Sostanze Grasse* 42, 122–4 (1965). One Kg. of dry bark of *Ailanthus glandulosa*, extracted with petroleum ether, gave 41.5 g. residue with a 58.97% total fatty acid content. The methyl ester gas chromatogram gave a series of 24 peaks, of which 17 were positively identified and three are probably unsaturated acids between C_{22} and C_{26}. The main identified components are: behenic (27.7%), oleic (14.4%), linoleic (12.7%) and palmitic (8.5%). The unsaturated acids represent about 30% of the total.

STUDIES ON POLYCYCLIC AROMATIC HYDROCARBONS PRESENT IN OLIVE OIL. W. Ciusa *et al.* (Univ. of Bologna, Italy). *Riv. Ital. Sostanze Grasse* 42, 175–9 (1965). Several polycyclic aromatic hydrocarbons have been separated and identified spectrophotometrically from the unsaponifiable fraction of olive oil, the principal ones being: pyrene, phenanthrene, fluoranthene, crysene, 1,2-benzanthracene, perylene. It has not yet been possible to establish within what limits the types and levels of these hydrocarbons may be considered typical in olive oils of various sources.

NEW FATS AND OILS PROCESSES. G. B. Martinenghi (Univ. of Milan, Italy). *Riv. Ital. Sostanze Grasse* 42, 133–7 (1965). Current trends in oil extraction, fat rendering and refining are reviewed.

SOLVENT EXTRACTION OF OIL SEEDS. M. Bernardini. *Riv. Ital. Sostanze Grasse* 42, 272–82 (1965). A review is given of the basic factors involved in commercial solvent extraction such as: seed preparation and handling, type and amount of solvent, extraction temperature and time.

NEW CHARACTERISTIC FATTY ACID RATIOS IN BUTTER AS DETERMINED BY GAS CHROMATOGRAPHY. B. Doro and G. Gabucci (Prov. Chem. Lab., Trieste, Italy). *Riv. Ital. Sostanze Grasse* 42, 105–7 (1965). A set of ratios of fatty acid contents (C_8/C_{10}, C_8/C_{12}, ..., C_8/C_{18}-) are proposed as a criterion for the detection of butter oil adulteration.

THE ANALYTICAL DETERMINATION OF ANTIOXIDANTS IN FATS AND OILS. P. Armandola. *Ind. Alim.* 3, 55–6 (1965). The U.S. F.D.A. method for antioxidant determination is discussed. The method has given very good results on BHA, BHT, NDGA and propyl gallate, allowing analysis of as little as 0.01%.

THE NATURE OF LIPIDS PRESENT IN THE GERMINAL ORGANS AND RESERVE TISSUES OF SEEDS. G. Lotti and C. Galoppini (Univ. of Pisa, Italy). *Riv. Ital. Sostanze Grasse* 42, 289–97 (1965). The analytical values and acid composition of the glycerides present in the germinal organs and reserve tissue of oil-bearing seeds has been studied on samples of 42 vegetable species of 14 families belonging to *Gymnospermae* and mono- and dicotyledon *Angiospermae*. Certain general relationships have been found between the type and amount of the lipids present in the different organs of the seeds of the vegetable species examined.

GAS CHROMATOGRAPHIC SEPARATION OF STEROIDS AND RELATED SUBSTANCES. E. C. Horning and W. J. A. Vandenheuvel (Coll. of Med., Houston, Texas). *Riv. Ital. Sostanze Grasse* 42, 418–29 (1965). A review is given of gas chromatographic techniques as applied to the analysis of sterols.

THE BLEACHING OF FATTY SUBSTANCES BY PHYSICAL ADSORPTION AGENTS. M. Naudet (Univ. of Marseille, France). *Riv. Ital. Sostanze Grasse* 42, 283–8 (1965). The distribution coefficient of pigments between the triglycerides in which they are dissolved and the adsorption agents used in bleaching is subject to the influence of several factors, both physical and mechanical (e.g., working temperature, type of contacting equipment), as well as chemical. Optimum bleaching can be expected if the oil has already been stripped of its non-glyceride components and if care has been taken to minimize the oxidation of the oil prior to bleaching.

SPECTROFLUOROMETRIC STUDIES ON OLIVE OILS. II. G. Kaderavek and G. Volonterio (Univ. of Milan, Italy). *Riv. Ital. Sostanze Grasse* 42, 270–1 (1965). Esterified olive oil can be identified by spectrofluorometric analysis of the residue of methanol extraction. The fluorescent substance to which this effect is attributed has been isolated but not yet identified.

THE USE OF LIQUID PROPANE IN OIL EXTRACTION. R. Rigamonti, G. Saracco and A. Gianetto (Polytech. Inst., Turin, Italy). *Riv. Ital. Sostanze Grasse* 42, 238–40 (1965). Pilot plant results are reported on the extraction of olive oil from husks in batch type equipment, using liquid propane as the solvent. This solvent has slightly lower extracting power than hexane and yields a more deeply colored extract with lower free acidity and lower iodine value. The economic factors involved in replacing hexane with propane are briefly discussed.

OLIVE OIL TECHNOLOGY. U. Amicucci (Soc. Jesina Macch. Agr., Jesi, Italy). *Riv. Ital. Sostanze Grasse* 42, 313–8 (1965). The various olive oil processing methods currently used in Italy are reviewed.

THE IDENTIFICATION OF ESTERIFIED OLIVE OILS BY INFRARED SPECTROPHOTOMETRY. F. Provvedi (Prov. Chem. Lab., Bergamo, Italy). *Riv. Ital. Sostanze Grasse* 42, 319–21 (1965). Esterified olive oils exhibit a characteristic absorption maximum at 2.5–3.5 μ which can best be evidenced by operating on relatively thick (0.4 mm) cells. This maximum can be used for identification purposes.

DISTINGUISHING VIRGIN OLIVE OIL FROM OTHER OILS BY SPECTROPHOTOMETRY. E. Synodinos (State Chem. Lab., Athens, Greece). *Riv. Ital. Sostanze Grasse* 42, 325–8 (1965). A spectrophotometric method in the visible region (450 mμ) is presented for the purpose of recognizing virgin olive oils from foreign oils (olive husk oil and seed oils) or from blends with foreign oils.

THE DETERMINATION OF ELAIDINIC ACID IN THE OILS OF CRUCIFERAE PLANTS. U. Pallotta, G. Losi and C. Zorzut (Univ. of Bologna, Italy). *Riv. Ital. Sostanze Grasse* 42, 142–8 (1965). The presence of elaidinic acid in rapeseed oil is not directly detectable by TLC due to the interfering *cis*-11-eicosenoic and *cis*-13-docosanoic acids which are present in substantial amounts. By gas phase chromatography of the methyl esters, separated by preparative TLC technique, it is however possible to detect the presence of about 0.3% elaidinic acid. The presence has also been noted in rapeseed oil of small quantities of two other fatty acids not previously reported, which appear to be positional isomers of *cis*-9-octadecenoic and *cis*-11-eicosenoic acids.

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• Fatty Acid Derivatives

ALPHA MONOERUCATE, A NEW EMULSIFIER FOR COSMETICS. J. Cyganska. *Tl. Sr. Pior* 9, 163–8 (1965). Monoerucate surpasses monostearate as an emulsifying agent for quality cosmetics. Monoerucate produces more stable and more homogenous emulsions than monostearate. The emulsions are free from odor (Rev. Franc. Corps Gras).

MORPHOLIDES OF EPOXIDIZED FATTY ACIDS. F. C. Magne, E. L. Skau, and R. R. Mod (Secretary of Agriculture, U.S.A.). *U.S. 3,219,664.* Claimed is the morpholide of epoxyoleic acid.

• Biochemistry and Nutrition

INFLUENCE OF 1,3-BUTANEDIOL ON TISSUE LIPIDS OF COLD-EXPOSED RATS. G. S. Stoewsand, H. A. Dymsza, M. A. Mehlman and D. G. Therriault (Nutr. Branch, Food Div., U.S. Army Natick Labs., Natick, Mass.). *J. Nutr.* 87, 464–68 (1965). The influence of feeding the polyhydric alcohol 1,3-butanediol (BD), on tissue lipids of normal and cold-exposed rats was investigated. The addition of 20% BD to a 30% fat diet lowered adipose tissue lipids with a concomitant elevation of liver lipids at either normal or cold environments. Feeding a 30% fat diet to rats for 2 weeks and then exposing them to moderate cold of 5C, or severe cold −10C without food for 72 hours produced decreases in the total lipid content of epididymal adipose tissue, liver and muscle. Rats fed a similar diet, without cold exposure but also starved for 72 hours, showed no decrease in the total quality of adipose tissue lipids.

CHOLESTEROL LEVELS IN THE HYPERCHOLESTEROLEMIC RAT: DIURNAL VARIATIONS. P. G. Rand and F. W. Quackenbush (Dept. of Biochem., Purdue Univ., Lafayette, Ind.). *J. Nutr.* 87, 485–88 (1965). A diurnal variation in the plasma cholesterol levels of rats fed cholesterol and sodium glycocholate in the diet was demonstrated. This variation was found to be associated with the feeding period rather than with the light-dark cycle. It was not eliminated by altering the dietary energy source or by supplying unsaturated fatty esters in the diet.

EFFECTS OF PURIFIED CIS- AND TRANS-FATTY ACID DERIVATIVES ON THE HYPERCHOLESTEROLEMIC RAT. *Ibid.*, 489–92. Fifteen compounds, derivatives of *cis* and *trans* unsaturated C_{18} fatty acids of high purity, were prepared in the laboratory and compared for plasma cholesterol-lowering effects in cholesterol-fed rats during an 11-day period. The *cis*-esters were more effective than their non-conjugated or conjugated *trans*-isomers. The *cis*-alcohols and hydrocarbons were as effective as their corresponding esters. An acetylenic compound, ethyl stearolate, was inactive. In these tests, and in 30-day tests with other compounds, effectiveness in cholesterol-lowering was also related to degree of unsaturation. Ethyl arachidonate was the most active compound tested. However, ethyl sorbate showed no activity.

GLYOXYLATE IN FATTY-ACID METABOLISM. R. Rabin, H. C. Reeves, W. S. Wegener, R. E. Megraw and S. J. Ajl (Albert Einstein Med. Center, Phila., Penna.). *Science* 150, 1548-58 (1965). These investigations relate to the central role of glyoxylate in the metabolism of fatty acids and other mono- and dicarboxylic acids in bacteria. Considerable progress has been made in elucidating the condensations of glyoxylate with various fatty-acid CoA esters and the metabolism of these condensation products.

STUDIES OF THE MECHANISM OF FATTY ACID SYNTHESIS. XIV. THE PROSTHETIC GROUP OF ACYL CARRIER PROTEIN AND THE MODE OF ITS ATTACHMENT TO THE PROTEIN. E. L. Pugh and S. J. Wakil. (Dept. of Biochem., Duke Univ., Durham, N. Carolina). *J. Biol. Chem.* 240, 4727–33 (1965). The finding that the prosthetic group of ACP is phosphopantetheine may account for some if not all of the non-CoA, protein-bound pantothenic acid of the cell. This finding further supports the concept that ACP functions as a coenzyme in fatty acid synthesis. It essentially replaces coenzyme A in fatty acid biosynthesis and possibly in other metabolic systems. Acyl coenzyme A derivatives appear to be primarily the intermediated in catabolic reactions for fatty acids (with the exception of β-hydroxy-β-methylglutaryl-CoA synthesis and conversion to mevalonate), whereas acyl-ACP derivatives are the intermediates in fatty acid synthesis. One reason for this distinction may be that there is very little choice to be made in the type of fatty acyl groups as intermediates in the two processes, but there is more choice at the coenzyme level. Thus, by using ACP as a coenzyme, an opportunity became available for the cell to distinguish catabolic from anabolic substrates.

COMPARATIVE EVALUATION OF THREE SPECIES OF NEW WORLD MONKEYS FOR STUDIES OF DIETARY FACTORS, TISSUE LIPIDS AND ATHEROGENESIS. O. W. Portman and S. B. Andrus (Dept. of Nutr., Harvard School of Public Health, Boston, Mass.). *J. Nutr.* 87, 429–38 (1965). Cebus (*Cebus albifrons*), woolly (*Lagothrix lagotricha*) and squirrel (*Saimiri sciurea*) monkeys were compared with respect to serum and other tissue cholesterol levels, serum β-lipoprotein concentrations, fatty acid distributions in various tissue lipids, and severity of aortic atherosclerosis. Monkeys individually caged and fed a semi-purified diet (basal) containing 16% of calories as corn oil were used. Assays of susceptibility to hypercholesterolemia and atherosclerosis were carried out using diets which supplied 45% of calories as corn oil or coconut oil with and without cholesterol. Cebus monkeys had the lowest mean serum cholesterol values of the 3 species studied with the basal diet. They also had the least spontaneous aortic sudanophilia. The responses of the serum cholesterol levels of the 3 species of monkeys to changes in dietary fat or the addition of cholesterol were similar. In the squirrel and woolly monkey the use of coconut oil (rather than corn oil) or the addition of cholesterol to either fat resulted in a marked increase in the serum cholesterol level and severity of atherosclerosis at 6 months; the cebus monkey had comparable serum cholesterol levels but little atherosclerosis with the high fat test diets. There was a high correlation in the squirrel and woolly monkey between the mean serum cholesterol levels with the test diets and extent of aortic sudanophilia, but the slopes of the regression lines of the cholesterol-sudanophilia plots for those 2 species were different. The susceptibility to diet-induced aortic sudanophilia was squirrel > woolly > cebus. Both diet and species affected cholesterol concentrations in several of the tissues studied.

CELLULAR LIPOPROTEINS I. THE ISOLATION OF LIPOPROTEIN FRACTIONS FROM CELLULAR MITOCHONDRIA AND MICROSOMES. E. A. Napier, Jr. and R. E. Olson (Grad. School of Public Health, Univ. Pitts., Pitts., Penna.). *J. Biol. Chem.* 240, 4244–52 (1965). A procedure has been developed for the separation of lipoproteins from rat heart and liver mitochondria and microsomes. The lipoproteins obtained from liver mitochondria were characterized as a group with regard to physiochemical and chemical properties. Density gradient studies of the lipoprotein fraction revealed a "family" of lipoproteins, analogous to those found in serum, with the principal components with a density range of approximately 1.14 to 1.16. Silicic acid chromatography of the lipid moiety revealed 78% phospholipid, consisting predominantly of phosphatides of ethanolamine, serine, and choline, and 22% neutral lipid, 2% of which was identified as coenzyme Q. The principal fatty acids in the lecithin and cephalin fractions were palmitate, stearate, linoleate, and arachidonic acid; the triglyceride fraction consisted predominantly of palmitate, oleate, and linoleate.

INFLUENCE OF DIETARY OILS ON REPRODUCTION IN THE HEN. H. Menge, C. C. Calvert and C. A. Denton (U.S. Dept. of Agr., Poultry Res. Branch, Animal Husbandry Res. Div., ARS, Beltsville, Md.). *J. Nutr.* 87, 365–70 (1965). A study was conducted to determine the effect of safflower or menhaden oil on the reproductive performance of essential fatty acid-deficient hens. Single Comb White Leghorn pullets were reared from hatching with an essential fatty acid (EFA)-deficient diet. At 32 weeks of age the pullets were distributed into 6 groups of 15 birds each. Groups 1 through 4 received safflower oil (calculated to supply zero, 20, 80, and 1600 mg of linoleic acid (18:2)/hen/day, respectively. Increasing the levels of dietary 18:2 supplied by safflower oil had a significant

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stimulatory effect on the reproductive characteristics of the EFA-deficient hen. Dietary menhaden oil fed to EFA-deficient hens promoted a significant increase in egg production, hatchability and to some extent egg size that could not be assigned to its 18:2 content. The data indicated that the polyunsaturated fatty acids (PUFA) present in menhaden oil were responsible for this stimulation. The amount of 20:3 in the tissues of the EFA-deficient hen was found to bear a definite negative relationship to the expression of the reproductive characteristics of the chicken. The results of this study suggested that the PUFA of menhaden oil depressed the synthesis of 20:3 and may have also substituted, at least in part, for 18:2 or 20:4, or both.

THE EFFECT OF GLYCEROL 3-PHOSPHATE ON FATTY ACID SYNTHESIS. C. F. Howard, Jr., and J. M. Lowenstein (Dept. of Biochem., Brandeis Univ., Waltham, Mass.). *J. Biol. Chem.* **240**, 4170–75 (1965). Glycerol 3-phosphate stimulates fatty acid synthesis by cell-free preparations of liver and lactating mammary gland. The concentration of L-glycerol 3-phosphate which gives one-half of maximum stimulation is 0.37 mM. Comparison of this value with concentrations of glycerol 3-phosphate *in vivo* under various conditions indicates that glycerol 3-phosphate may exert a controlling influence on fatty acid synthesis *in vivo.*

MEMBRANOUS MATERIAL OF BOVINE MILK FAT GLOBULES. I. COMPARISON OF MEMBRANOUS FRACTIONS RELEASED BY DEOXYCHOLATE AND BY CHURNING. S. Hayashi and L. M. Smith (Dept. of Physics, Sacramento State College, Sacramento, Calif.). *Biochemistry* **4**, 2550–57 (1965). The fat globules of milk are coated with a membrane composed of lipids and proteins. The nature of this membrane has been the subject of much investigation, but still is controversial. In the present work, water-soluble lipoprotein particles accounting for 45% of the total weight of the membrane were released from the intact fat globules by sodium deoxycholate (DOC), and were isolated by centrifugation. Chemical analyses of these lipoproteins showed that lipids and proteins were present in approximately equal amounts, and that 76% of the lipids were phospholipids.

II. SOME PHYSICAL AND ENZYMIC PROPERTIES OF THE DEOXYCHOLATE-RELEASED LIPOPROTEINS. S. Hayashi, D. R. Erickson, and L. M. Smith. *Ibid.*, 2557–65. The lipoproteins released by DOC have a wide range in ultracentrifugal heterogeneity. Sedimentation coefficients indicated that particle interaction occurred among the lipoproteins during the flotation procedure, and that both ionic strength of the flotation medium and the amount of lipid in the lipoproteins were factors in particle aggregation. DOC-released lipoproteins were precipitated irreversibly in an acidic medium; the maximum precipitation occurred at pH 3.8. Experiments to determine the solubility dependence of these lipoproteins on ionic strength were done at pH 7.0, using ammonium sulfate. Approximately 93% of the lipoproteins were salted out at 45% ammonium sulfate saturation; the process was reversible. Xanthine oxidase and alkaline phosphatase activities were assayed in fractions isolated, by ammonium sulfate precipitation, from the DOC-released lipoproteins. There was no marked precipitation of either enzyme, and it was concluded that these two proteins occur together in the lipoprotein particles.

FAT METABOLISM IN HIGHER PLANTS. XXVIII. THE BIOSYNTHESIS OF SATURATED AND UNSATURATED FATTY ACIDS BY PREPARATIONS FROM BARLEY SEEDLINGS. J. C. Hawke and P. K. Stumpf (Dept. of Biochem. and Biophysics., Univ. of Calif., Davis, Calif.). *J. Biol. Chem.* **240**, 4746–51 (1965). A number of carboxyl-C^{14}-labeled fatty acids were incubated with slices of barley seedlings. All the fatty acids from octanoic through stearic were readily metabolized to $C^{14}O_2$ but only octanoic, decanoic, and dodecanoic acids served as effective precursors for oleic acid formation. Both palmitic and stearic acids were ineffective. Oxygen was required for the formation of oleic acid. To test for the anaerobic β,γ elimination mechanism of oleic acid synthesis, 3-H^3-labeled 3-hydroxy fatty acids were used as substrates. In all cases oxygen was still required, and the principal monoene formed was oleic acid. Therefore, while this mechanism does not appear operative in barley seedling systems, these hydroxy acids are presumably reduced to saturated acids which then follow the pattern established previously for the further conversion of intermediate chain saturated fatty acids to the C_{16} and C_{18} fatty acids.

EFFECT OF VITAMINS A AND E ON LIPIDS IN SELECTED RAT TISSUES. Inez Harrill, Gladys Minarik and Elizabeth Gifford (Nutr. Div., Home Economics Section, Agr. Experiment Station, Colorado State Univ., Fort Collins, Colorado). *J. Nutr.* **87**, 424–28 (1965). To study the effect of vitamins A and E on lipids in selected rat tissues, groups of rats were fed weekly 70, 400 or 1200 IU of vitamin A with or without 10 mg of α-tocopherol. After 12 weeks, analyses were made for liver and plasma cholesterol and liver total lipids and vitamin A. Statistical analysis of group means showed that plasma cholesterol of vitamin E-deficient animals fed 1200 IU of vitamin A was significantly higher than that of corresponding animals fed tocopherol. Feeding tocopherol significantly decreased liver cholesterol in animals fed 400 or 1200 IU of vitamin A. Liver cholesterol of animals fed 400 or 1200 IU of vitamin A with tocopherol was significantly less than that of similar animals fed 70 IU of vitamin A. Total lipids in liver, which were not significantly affected by vitamin A, decreased in animals fed vitamin E with 400 or 1200 IU of vitamin A. The storage of vitamin A was significantly increased by increased intake of dietary vitamin A and by feeding vitamin E.

THE FATE OF DIETARY WAX ESTERS IN THE RAT. I. A. Hansen and J. F. Mead (Dept. of Biol. Chem., School of Med., Univ. of Calif., L. A., Calif.). *Proc. Soc. Exp. Biol. Med.* **120**, 527–32 (1965). Oleyl palmitate fed to rats as 15% of the diet was partly absorbed and partly excreted as a mixture of wax ester, free fatty acid and free alcohol. Because of purgative effects, animals caged together contaminated each other's fur with fecal lipid, giving them the appearance of seborrhea. Animals given oleyl alcohol as 4% of the diet did not show purgative effects but excreted lipid which was similar in composition to that excreted by rats given wax esters. Thus both hydrolysis and synthesis of waxes can occur in the intestine. Similar reactions have been carried out *in vitro* in the presence of a pancreatic enzyme. Wax ester and free oleyl alcohol were detected in the liver after feeding either compound and in both cases the predominant ester was oleyl palmitate. The question of whether oleyl alcohol is absorbed in the free or esterified form was not satisfactorily resolved.

METABOLISM OF OCTANOIC-1-C^{14} AND PALMITIC-1-C^{14} ACID BY RAT INTESTINAL SLICES. N. J. Greenberger, J. J. Franks and K. J. Isselbacher (Dept. of Med., Harvard Med. School, Boston, Mass.). *Proc. Soc. Exp. Biol. Med.* **120**, 468–72 (1965). Measurements were carried out on the *in vitro* metabolism of octanoic-1-C^{14} and palmitic-1-C^{14} acid by rat intestinal slices. Significantly more octanoic acid was catabolized to CO_2 and water soluble products and less recovered as lipid soluble products compared to when palmitic acid was the substrate. Analysis of these lipid soluble products by thin layer chromatography revealed that more of the palmitic acid was esterified to triglyceride compared to octanoic acid. Further analysis of the lipid soluble products by gas-liquid chromatography demonstrated that a small but significant amount (9%) of the label from octanoic acid-1-C^{14} was recovered in fatty acids with chain lengths of 10–20 carbon atoms. This suggests that some of the octanoic acid-1-C^{14} may have been catabolized to C^{14}-acetate which was then incorporated into long chain fatty acids. In contrast, virtually all of the label from palmitic acid-1-C^{14} was recovered as such, indicating that very little mucosal catabolism of palmitic acid had occurred.

IN VITRO INCORPORATION OF GLYCINE-1-C^{14} INTO TOTAL MUSCLE PROTEIN OF NORMAL AND VITAMIN E-DEFICIENT RABBITS. J. F. Diehl, C. D. Fitch and G. E. Nichoalds (Dept. of Biochem., Univ. of Arkansas Med. Center, Little Rock, Ark.). *Proc. Soc. Exp. Biol. Med.* **120**, 368–70 (1965). Skeletal muscle slices and homogenates from control and vitamin E-deficient rabbits were incubated in the presence of glycine-1-C^{14}. In both preparations vitamin E deficiency resulted in an increased glycine incorporation into total muscle protein which was accompanied by increased oxygen consumption.

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PATHWAYS OF ENZYMIC SYNTHESIS AND CONVERSION TO CHOLESTEROL OF $\Delta^{5,7,24}$-CHOLESTATRIEN-3β-OL AND OTHER NATURALLY OCCURRING STEROLS. Mary E. Dempsey (Dept. of Biochem., Univ. of Minn. Med. School, Minneapolis, Minn.). *J. Biol. Chem.* **240**, 4176–88 (1965). A sterol having the structure $\Delta^{5,7,24}$-cholestatrien-3β-ol was shown to be an intermediate in cholesterol (Δ^{5}-cholesten-3β-ol) biosynthesis from $\Delta^{7,24}$-5α-cholestadien-3β-ol and $\Delta^{8,24}$-5α cholestadien-3β-ol. The structure of the $\Delta^{5,7,24}$-trienol was established from its characteristic ultraviolet absorption spectrum, chromatographic behavior, formation of the epiperoxide (5α,8α-epiperoxy-$\Delta^{6,24}$-cholestadien-3β-ol) and triol (cholestan-3β,5α,8α-triol) derivatives, and conversion by enzymic catalysis to cholesterol, $\Delta^{5,7}$-cholestadien-3β-ol, and $\Delta^{5,24}$-cholestadien-3β-ol. These data offer evidence that enzymic conversion to cholesterol or naturally occurring sterols containing 27 carbon atoms can take place by several apparently irreversible pathways. These results also show that $\Delta^{5,7}$-intermediate sterols are essential components of all biosynthetic pathways leading to cholesterol.

SERUM VITAMIN E DETERMINED BY THIN-LAYER CHROMATOGRAPHY. J. G. Bieri and E. L. Prival (Nat. Inst. of Arthritis and Metabolic Diseases, Natl. Inst. of Health, Bethesda, Md.). *Proc. Soc. Exp. Biol. Med.* **120**, 554–57 (1965). Forty normal adult sera were analyzed by one-dimensional TLC. The averages in mg/100 ml were: α-tocopherol, 0.916; combined $\beta+\gamma$-tocopherols, 0.133. No δ-tocopherol was found. The procedure was checked by comparing the GLC analyses and also with 2-dimensional TLC.

INFLUENCE OF SOME NONIONIC SURFACTANTS ON PANCREATIC LIPASE ACTIVITY. E. P. Jorolan and B. W. Janicki (Basic Microbio. Res. Lab., V. A. Hosp., Wash., D. C.). *Proc. Soc. Exp. Biol. Med.* **120**, 313–16 (1965). Two nonionic surfactants, Triton WR-1339 and Macrocyclon inhibit the hydrolysis by pancreatic lipase of triglycerides in a coconut oil emulsion (Ediol), Trition inhibiting to a greater extent than Macrocyclon in a ratio of approximately 2:1. HOC-60, also a nonionic surfactant, is not inhibitory. The results of the present study indicate that during its incubation with the surfactant at 37C for 1 hour before adding the enzyme, the substrate may undergo a change which would result in an altered substrate molecule that is less reactive to pancreatic lipase. Two suggested mechanisms of the inhibitory action of the nonionic surfactants are discussed: (1) formation of an irreversible complex and (2) formation of a micelle. The ability of these agents to induce hyperlipemia in animals was reflected by inhibition of enzymatic lipolysis *in vitro.*

GROWTH OF ASPERGILLUS FLAVUS AND OTHER FUNGI IN WINDROWED PEANUTS IN GEORGIA—PART VII. C. R. Jackson (Georgia Costal Plain Exp. Sta., Tifton). *Trop. Sci.* **VII**, 27–34 (1965). This paper reports results of estimations of pod-surface mycoflora and cultural assays of kernels from pods taken from windrows during curing are tabulated. Aflatoxin analyses were made on selected samples. In one windrow experiment, representative of commercial practice, *A. flavus* invaded kernels to a slight extent during the excellent drying conditions which prevailed. Other fungi, notably *Fusarium* spp., *Penicillium* spp. and *Dematiaceous* species were more abundant throughout the windrow period. Aflatoxin was absent in kernels and shells from windrow samplings. In a second experiment kernels from peanuts windrowed during cooler weather were rarely invaded by any *Aspergillus* spp. and total numbers of other fungi in kernels were lower. Kernels from pods cured against the soil surface were not invaded to a greater extent than those from pods cured in the air, but estimated numbers of pod surface fungi were larger. *A. flavus* was present in pod surface mycoflora of both experiments.

THE MODE OF ACTION OF PANCREATIC LIPASE ON MILK FAT GLYCERIDES. A. Boudreau and J. M. deMan (Univ. of Alberta, Edmonton, Alberta). *J. Bacteriol.* **43**, 1799 (1965). Hydrolysis of tricaprylin by pancreatic lipase resulted in a stepwise hydrolysis, triglyceride to diglyceride to monoglyceride, as has been obtained with long-chain triglycerides. However, hydrolysis rates were much faster and considerable amounts of free glycerol were formed. Hydrolysis of an equimolar mixture of tricaprylin and triolein indicated that some of the short-chain fatty acid was released from the 2-position before all of the oleic acid was released from the 1-position. Hydrolysis of genuine and randomized milk fat resulted in preferential hydrolysis of glycerides containing short-chain fatty acids. This phenomenon was not dependent on a specific distribution of these acids, since it also occurred with the randomized fat. It was concluded that part of the short-chain fatty acids of milk fat is located in the 2-position. The distribution of caprylic and capric acids between the 1- and 2-positions is approximately at random. Lauric, myristic, and palmitic acids are predominantly located in the 2-position, and stearic and oleic acids in the 1-position, of milk fat glycerides.

STUDIES ON THE RAPID ACCUMULATION OF TRIGLYCERIDE IN THE LIVER IN CHOLINE DEFICIENCY. S. Mookerjea (Univ. of Toronto, Toronto, Ontario). *J. Bacteriol.* **43**, 1733 (1965). Studies with isolated liver perfusion preparations showed that, during 5 to 21 days of choline deficiency (acute phase), the livers fail to release any triglyceride into the perfusate, whereas during 1 to 2 days (early phase) and during 26 to 60 days of choline deficiency (prolonged phase), they tend to release triglyceride into the perfusate at a nearly normal rate. The rate of deposition of hepatic triglyceride in intact rats fed a choline-deficient diet showed a progression complementary to this triphasic pattern of triglyceride release, i.e. an early phase of slow triglyceride deposition and an acute phase of rapid accumulation followed by the establishment of a higher steady-state level. In the perfusion experiments changes in phospholipid levels in the perfusate followed the same pattern as the triglyceride levels. Increased uptake of free fatty acids by the choline-deficient livers was most margked after 2 days. *In vitro* additions of choline and several choline derivatives to the 5-day choline-deficient liver perfusion system were unable to restore triglyceride release. Similar studies with blood obtained from choline-supplemented rats showed a very significant restoration of triglyceride release into the perfusate.

RELATIONSHIP BETWEEN VITAMIN E AND POLYUNSATURATED FATTY ACIDS. H. Dam (Danmarks, Teknishe, Hijskole, Copenhagen). *Fette Seifen Anstrichmittel* **66**, 899–3 (1964). The addition of polyenoic acids to food accelerates the exhaustion of the vitamin E reserve of the body. Fetal resorption, decreasing resistance to oxidative hemolysis and liver necrosis in rats as well as muscle dystrophy and exudative diathesis in chicken can arise in the absence of polyenoic acids in the food. Peroxidation and ceroid formation and accompanying destruction of vitamin A are caused by the presence of higher unsaturated fatty acids. The addition of polyenoic acids in food must be accompanied by the addition of vitamin E.

THE EFFECT OF DIET ON THE CHANGES IN HEART LIPIDS FOLLOWING MUSCULAR STRAIN. M. Rinetti, O. Visioli and L. Colombi (Univ. of Parma, Italy). *Riv. Ital. Sostanze Grasse* **42**, 322–4 (1965). The changes in heart lipid composition after an intense muscular strain have been investigated in rats fed either a balanced diet or a diet deficient in essential fatty acids (EFA). In all cases, a decrease has been observed in total lipids, nonesterified fatty acids (NEFA) and cholesterol esters, while the phospholipid level was increased. The changes have been more marked in the animals fed an EFA deficient diet. Gas chromatographic analysis has shown, both in the total lipids and in the phospholipids, a general tendency towards higher amounts of unsaturates in both groups of animals. The fatty acid distribution in the NEFA fraction was quite different in the animals fed the regular diet in comparison to the ones fed the deficient diet.

THE EFFECT OF VITAMIN A DEFICIENCY AND DIETARY α-TOCOPHERAL ON THE STABILITY OF RAT-LIVER LYSOSOMES. O. A. Roels, Marian Trout and A. Guha (Columbia Univ. of Nutr. Sciences). *Biochem. J.* **97**, 353–9 (1965). Vitamin A-deficient rats and pair-fed controls were maintained on either normal or raised amounts of dietary α-tocopherol. Their livers were fractionated and free and total lysosomal phosphatase were determined in the various fractions. The deficient livers showed increased enzymic activity. Prolonged incubation caused more rapid enzyme release from the mitochondria-lysosome-rich fraction of the vitamin A-deficient rats receiving the normal amount of dietary α-tocopherol than from the equivalent fraction of their pair-fed controls receiving vitamin A. Raised dietary α-tocopherol reversed this phenomenon.

• Drying Oils and Paints

TRIETHANOLAMINE BORATE CATALYZED CONDENSATION OF BISPHENOL A GLYCIDYL ETHERS WITH POLYMERIC FAT ACIDS. J. R. Scheibli (Shell Oil Co.) *U.S. 3,219,602.* A process for preparing a linear acetone-soluble non-heat curable epoxy- containing condensate comprises adding a polymerized fatty acid prepared by polymerizing an unsaturated fatty acid having up to about 20 carbon atoms to 1.5–4 times the chemical equivalent amount of a polyepoxide containing more than one vic-epoxy group and having no additional substituent capable of reacting with the polymeric fatty acid other than hydroxyl and epoxy groups in the presence of 0.5–3% by weight (on reactants) of a tertiary amine borate prepared by reacting a tertiary amine with methyl borate at room temperature. The expression "equivalent amount" refers to that amount needed to furnish one acidic group per epoxy group.

THE EFFECT OF ULTRASONICS ON THE DRYING PROPERTIES OF LINSEED OIL. G. Saracco and E. Spaccamela Marchetti (Polytech. Inst., Turin, Italy). *Olearia* 19, 85-93 (1965). Ultrasonic energy has a definite accelerating effect on the drying properties of linseed oil. Experiments were run at 85C on 30% solutions of crude linseed oil in CCl_4 in the presence of 1% KI as the catalyst, with various intensities of supersonic energy applied. Examination of the characteristics of the treated product (drying time, refractive index, viscosity) indicates that the oil has undergone isomerization and polymerization reactions. Possible mechanisms are discussed.

TUNG OIL. Anon. *Informaciones sobre Grasas y Aceites (Buenos Aires)* 3 (1), 14–17 (1965). Argentinian standards (IRAM) are compared to ASTM standards for this oil, particularly concerning refractive index, viscosity and gelatinization time.

THE ARGENTINIAN TUNG OIL MARKET. Anon. *Informaciones sobre Grasas y Aceites (Buenos Aires)* 3 (3–4), 53–56 (1965). The Argentinian tung oil industry is analyzed from the economic view point, and compared to that of other producing countries (U.S.A., China, Paraguay, Brazil and Nyasanaland).

• Detergents

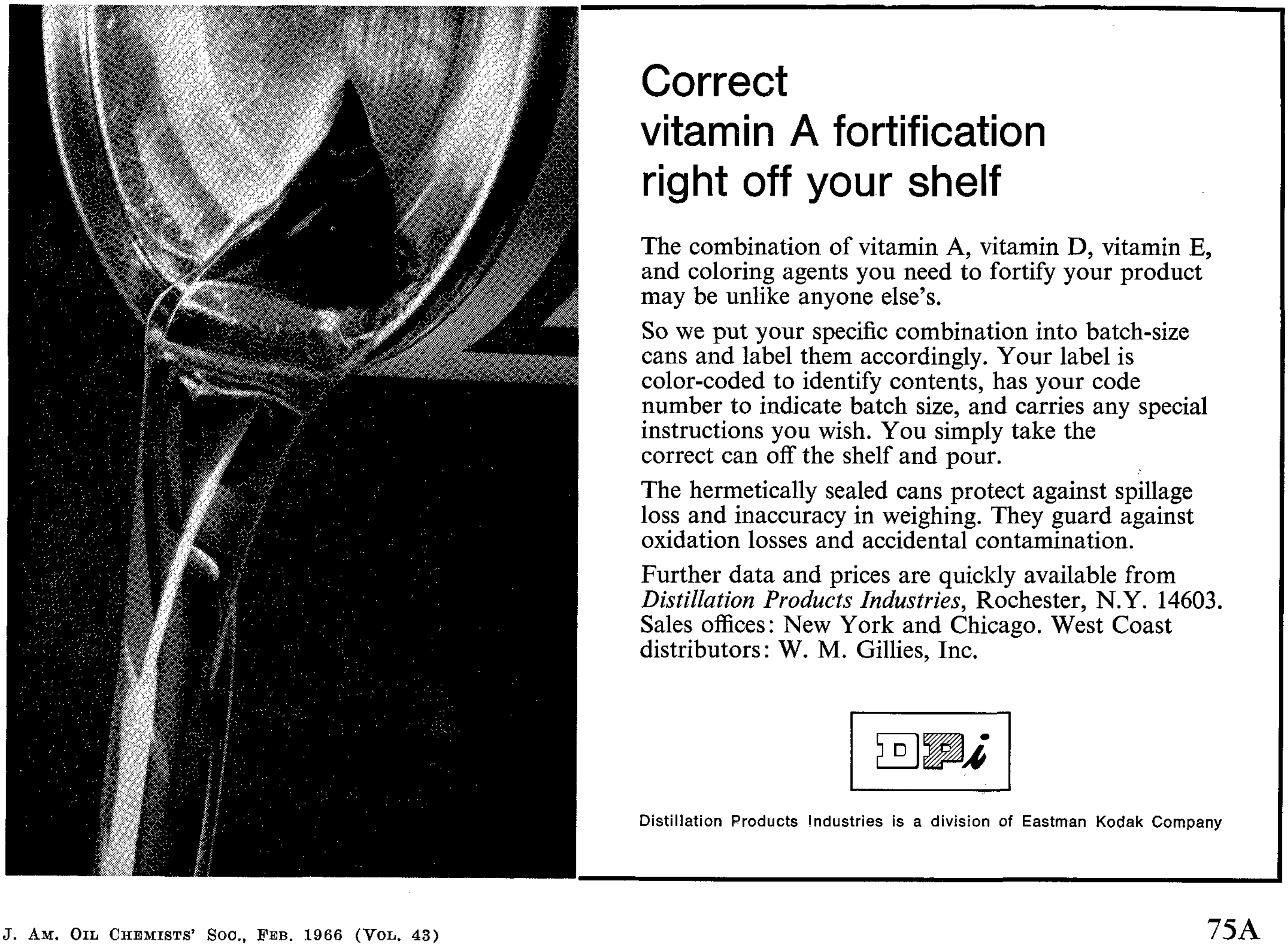
DETERGENT FOR SOILED FIBERS. D. C. Wood (Whirlpool Corp.). *U.S. 3,213,028.* A cleaning composition for soiled fibers consists of 1–10 parts by weight of a detergent material per 10 parts of a glycerol-propylene oxide adduct containing about 10 mols of propylene oxide per mol of glycerol as a plasticizer for the fibers.

LOW FOAMING DETERGENT. R. A. Grifo (General Aniline & Film Corp.). *U.S. 3,215,633.* A composition which has reduced foaming characteristics and is substantially neutral in aqueous systems consists of a cationic quaternary ammonium halide surface active agent and from 1–50% of an alkylated monohydric phenol having from 8–18 carbon atoms in the alkyl radical.

CLEANING AND DETERGENT COMPOSITION. L. P. Curtin and L. V. Curtin. *U.S. 3,216,946.* A free-flowing and substantially dustless cleaning composition consists of sodium carbonate in the form of porous granules having absorbed chiefly within their capillary structures from 5 to 50 parts by weight of a 40% aqueous solution of sodium hydroxide per 100 parts by weight of untreated granules. The cleaning composition, when dissolved in water, has a higher alkalinity than a sodium carbonate solution and is an efficient cleaner.

SURFACE ACTIVE AGENTS AND INTERFACIAL TRANSFER IN GAS-LIQUID CHROMATOGRAPHY. A NEW TOOL FOR MEASURING INTERFACIAL RESISTANCE. M. R. James, J. C. Giddings andH. Eyring (Dept. of Chem., Univ. of Utah, Salt Lake City, Utah). *J. Phys. Chem.* **69**, 2351 (1965). It is found that the addition of cetyl alcohol to a chromatographic column, in which water is the liquid phase, greatly increases the width of a number of solute zones. By using a glass bead column where the major effects can be described by independent chromatographic theory (as shown here), one can isolate the influence of interfacial resistance. This provides a new means for measuring the latter. The advantages and disadvantages of this technique are discussed.

THE INFLUENCE OF ELECTRICAL CHARGE ON INTERFACIAL ENERGY. T. Steudel and R. C. Mayrhoffer (Inst. for the Phys. Chem. of Surfaces, Marienthal/Pfalz, Germany). *Tenside* 2, 289-94



(1965). It has long been known that the rate of flow of water through an orifice can be increased by the presence of an electric field and that also the trajectory of a liquid jet can be deflected by electric fields. These experiments, however, do not in themselves lend quantitative support to the theory of a possible effect of electric energy on interfacial tension. A technique is now introduced for photographically observing changes in surface and interfacial tension of liquid droplets on solid bodies having low surface tension (paraffins, plastics) or in immiscible liquids. By measuring the solid/liquid angle of contact it is possible to determine quantitatively the surface tension of the electrically charged liquids, assuming that the liquid surface tension and the contact angle are variable quantities and that the surface tension of the solid body is not appreciably changed by the applied electrical charges. The surface tensions of the liquids examined (water, formamide and some glycols) are lower (by 5–35%) than those of liquids that have not been electrically charged. The relationship between surface tension lowering and electrical charge is discussed and it is shown that larger drops require higher charges to attain the same effect.

THE MANUFACTURE OF HIGHER MOLECULAR WEIGHT ALKYL BENZENES. AN ATTEMPT TO DISCOVER THE REACTION MECHANISMS, I. A. Metzger, R. Buxbaum, C. H. Uhlig and M. Gennert (Kempen/Ndrh., Germany). *Tenside* 2, 36–40 (1965). Phenyl-n-alkanes-(1) sulfonated in the para position should be extremely biodegradable, however they are too sparingly soluble in water to be useful as detergent raw materials. Starting from the consideration that the sulfonates of position isomeric phenyl-n-alkanes-(2) and -(3) are more easily water soluble with only a very slight loss in washing power, experiments were carried out to steer the alkylation of benzenes with alpha-n-alkenes preferentially into the (2)- and (3)- position. When aluminum chloride or bromide were used as catalysts, it was noted that under certain conditions n-alkanes were obtained in varying amounts besides alkyl benzenes, presumably formed by a side reaction, not so far understood, involving the hydration of the alpha-n-alkene used. When sulphuric acid was used as the catalyst, no alkane formation was observed. The boiling ranges and the refractive indices of the reaction products indicate that the distribution of the expected position isomeric alkyl benzenes depends largely upon the parameters of time and temperature.

THE POSSIBILITY OF PREPARING SURFACTANT INTERMEDIATES WITH THE HELP OF ALKYL ALUMINUM COMPOUNDS. H. Reinheckel and D. Jahnke (Germ. Acad. of Sci., Berlin, Germany). *Tenside* 2, 249–53 (1965). Various reactions between organo-aluminum compounds and other types of organic substances, such as reduction of fatty acids, formation of ketones, etc., are discussed, as well as the possibility of using the reaction products as intermediates in surfactant manufacture. Straight chain primary fatty alcohols are obtained by reducing fatty acid esters with dialkyl aluminum hydrides, non-terminal double bonds remaining intact in the reaction. Fatty acid chlorides and dicarboxylic acid semi-ester chlorides or dichlorides, when reacted with ethyl aluminum sesquichloride, for the corresponding ethyl ketones, ketocarboxylic esters or diketones. The different uses of various solvents in these reactions are indicated. Triethyl aluminum and nitriles also produce ethyl ketones. Isocyanates and isothiocyanates, when reacted with triethyl aluminum or ethyl aluminum sesquichloride, produce the corresponding N-substituted carboxylic and thiocarboxylic amides, respectively.

THE EFFECT OF ALKYL SULPHATES ON THE SORPTION OF PIGMENTS ON COTTON. E. F. Wagner (Wash Res. Inst. Krefeld, Germany). *Tenside* 2, 173–80 (1965). The sorption on cotton of carbon black, as a prototype of spherical dirt particles, was examined by varying the chain length of the alkyl sulphates. According to the results, the course of the sorption isotherm is influenced only gradually by the presence of carbon black, since alkyl sulphates themselves adsorb according to the same type of curve on the fibre surface. The rate and absolute value of carbon black desorption from the cotton fabric increase with

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• *New Literature*

Universal Oil Products Company has available the pamphlet, "UOP Processing Guide," containing brief descriptions of a number of the principal UOP refining processes and products. (30 Algonquin Road, Des Plaines, Ill. 60016.)

Chromatography Corporation of America has two new bulletins available: 1) A new 6 page bulletin describes a system of flow connectors, chromatographic columns, reservoirs, needle valves and tubing for column chromatography. 2) A 4-page bulletin describes two new instruments for liquid chromatography: the Auto-Gradient, for creating predictable gradients, and the Model R forced air Refrigerated Fraction Collector. (60B East Main St., Carpentersville, Ill. 60110.)

Ozone Research and Equipment Corporation has issued brochures 102 and 103 describing their expanded line of Laboratory and Process Ozonators. (3840 North 40th Ave., Phoenix, Arizona.)

The Permutit Company, Division of Ritter Pfaudler Corporation, has released information on their new FAVAIR Flotation System, which makes it possible for oil, grease and suspended matter to be separated and reclaimed from plant process waters more efficiently and at lower cost. The name FAVAIR is short for Floc Adjustment, Variable Aeration and Ideal Air Release, which are the major improvements of the new system. (Box 41, Paramus, N. J.)

Skeist Laboratories, Inc., has compiled a bulletin called "Coatings, Prospectus for a Multiple-Client Study," which includes names of companies in the coatings and ink industries, developments abroad, raw materials, and many other aspects of market study on this topic. (89 Lincoln Park, Newark, N. J. 07102.)

Aloe Scientific is distributing, free of charge, a colorful 12-page bulletin issued monthly to describe their newest laboratory equipment and supplies. (Department RK-11, 1831 Olive Street, St. Louis, Mo. 63103.)

Gallard-Schlesinger Chemical Manufacturing Corp. has published a bulletin on furoic acid, covering its properties, uses, complete bibliography and related data. (580 Mineola Avenue, Carle Place, Long Island, New York, 11514.)

Upjohn Company has available for distribution new technical literature describing their carbodiimides, including di-orthoOtolyl, bis (2,6-diethylphenyl) and dicyclohexyl, and a complete bibliography of this group of chemicals. (North Haven, Conn. 06473.)

Consolidated Electrodynamics Corp., subsidiary of Bell & Howell Co., has an 8-page bulletin (21703) describing an advanced isotope-assay and atomic-research mass spectrometer, the Type 21-703A. (360 Sierra Madre Villa, Pasadena, Calif.)

E. H. Sargent & Co., in Bulletin SR-GC-2, describes their basic line of SR Sargent Recorders to complement any and all leading chromatographs. (4647 West Foster Ave., Chicago, Ill. 60630.)

Perkin-Elmer, in a new 8-page booklet, describes the low-cost, compact Model F11 gas chromatograph, designed to place precision gas chromatography results within the reach of every laboratory. (Main Avenue, Norwalk, Conn.)

Pennsalt Chemicals Corporation, Equipment Division, has a 6-page bulletin (No. 2010) describing the 13 basic Sharples centrifuges for virtually every area of separation. (Three Penn Center, Philalelphia, Pa. 19102.)

Lachat Chemicals Incorporated has a 2-page supplement for their Catalog No. 6, listing their stock of chemicals for research and gas chromatography. (10540 S. Western Ave., Chicago, Ill. 60643.)

Klenk Achievements . .

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able previously in isolating the crystalline methylglycoside of neuraminic acid from the same material. The N-acetyl form occurs in blood serum and together with N-glycolyl, N, O -di and tri-acetyl derivatives in all mucins of endodermal origin. In addition to his significant contribution to the elucidation of the structure of this very interesting substance he showed that the primary and one of the most important functions of neuraminic acid is to serve as the determinant group of the acceptorsite for the myxovirus of the mumps-influenza group. He has contributed further to the biochemistry of neuraminic acid by showing that the enzymic action of myxovirus is the same as that of the receptor destroying enzyme from the culture filtrate of various bacteria, by showing the role of neuraminidase in virus hemagglutination and panagglutination reactions, and by showing this acid to be the determinant group of the MN blood group system.

In the 1960's Klenk turned his attention once again to the gangliosides. Purification of the gangliosides and determination of their structures by partial hydrolysis, isolation of the oligosaccharides, permethylation, periodate oxidation and by the treatment with neuraminidase, resulted in the conclusion that the gangliosides are a mixture of substances which are very closely related in their chemical compositions. The difference in the fatty acid and sphingosine moieties are very slight, the main component of the former being stearic acid and that of the latter C_{18}- sphingosine. The C_{18}- sphingosine is replaced by its C_{20}- homologue with increasing age. However, there is extensive variation in the carbohydrate portion of the molecule. The carbohydrate sequence in all hexosamine containing brain gangliosides, is glucose- (4-1) galactose (4-1)-N-acetyl-galactosamine (3-1)-galactose with N-acetyl- neuraminic acid in a (3-2)-linkage at first galactose molecule and the glucose molecule is glycosidically bound to sphingosine. A second type of ganglioside which is devoid of the terminal galactose group exists in only small amounts in the normal brain, but appears in abundance in amaurotic idiocy of Tay-Sachs type. A third ganglioside has two molecules of neuraminic acid, one of which lies in the central galactose molecule and the other (3-2) glycosidically bound to the terminal galactose molecule. Of these two neuraminic acids only the latter can be split off with neuraminidase. A fourth type of ganglioside is composed of the same carbohydrate sequence but having two molecules of N-acetyl-neuraminic acid at the first galactose molecule, linked to each other in (8-2) position. An additional molecule of N-acetyl-neuraminic acid may be attached to the 3-position of the second galactose. The existence in small amounts of a hexosamine-free ganglioside which contains only glucose, galactose and N- acetyl-neuraminic acid, was also demonstrated. The configuration of the neutral sugar moiety corresponds to that of lactose. Another hexosamine-free ganglioside consists of 3 molecules of galactose with an N-acetyl-neuraminic acid in position 3 at the central galactose. (Of the extensive works of Ernst Klenk which have been presented in more than 160 publications, only the events of importance could be cited.)

Most of his work has been conducted at the University of Cologne following his appointment as director of the Institute for Physiological Chemistry in 1936. Here his works have been accomplished in cooperation with nearly 100 associates to which group the author of this biography has the honor to belong.

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increasing chain length of the alkyl sulphates. The deposition of carbon black particles from alkyl sulphate solutions with concentrations corresponding to the c_k values decreases in absolute magnitude with increasing chain length, while the change in adsorption with time remains unaffected. On the other hand, a definite increase in desorption rate was observed at the c_k value of the alkyl sulphates with increasing chain length. The optimum effectiveness of the alkyl sulphates does not, according to these experiments, lie within the range of critical micelle concentration.

Cationic surfactants as levelling agents in dyeing anionic polyacronitrile fibers. R. Rokohl (BASF, Ludwigshafen/Rhein, Germany). *Tenside* 2, 76–83 (1965). Cationic surfactants are effective levelling agents for dyeing anionic polyacronitrile fibers with selected basic dyestuffs. The rate of uptake of the dyestuff is diminished because of the blocking effect of the agent and the ability of the dyestuff to migrate during the process is also increased. This retarding effect is dependent upon the chemical constitution of the cationic surfactant.

Notes on the documentation of surfactant spectra. K. Bey (Düsseldorf, Germany). *Tenside* 2, 105–11 (1965). The reference spectra of a large number of commerical surfactants have been prepared in the form of punched cards. This useful collection of spectra is an excellent aid in interpreting infrared spectra of unknown surfactants, when used in conjunction with a spectrum list similar to the Spec-Finder system by Sadtler.

The determination of perborate content in synthetic detergents. E. Heinerth (Düsseldorf, Germany). *Tenside* 2, 180–1 (1965). The active oxygen content of modern detergent compositions can be determined by reaction with an arsenite solution and iodometric titration of the excess arsenite. This method is effective even in cases where the permanganate and iodine titrations fail.

Spray drying equipment for the production of synthetic detergents and soap-synthetic powders. E. Jury (Lurgi Gmbh, Frankfurt/Main, Germany). *Tenside* 2, 209–16 (1965). The principles of design and construction for a detergent spray drying plant are reviewed, with special regard to slurry preparation and its effect on the end product specifications. Besides a description of the actual spray drying equipment, the after treatment of the powder, storage and transport of the finished product, automatic control equipment and economic considerations on material and labor costs are also discussed.

Odoriferous compounds in polypropylene benzene sulfonate. I. Isolation and separation of volatile oil. W. K. Seifert (Calif. Res. Corp., Richmond, Calif.). *Tenside* 2, 150–6 (1965). Nitrogen blowing of large batches of polypropylene benzene sulfonate slurry and condensation of the gas in cold traps led to the isolation of 0.2% (active basis) of an odoriferous volatile oil, with no indication of decomposition during the blowing step. Separation and qualitative identification of this oil, which contains about 200 compounds were done by preparative GLC and silica gel chromatography combined with instrumental analysis. Olefins and carbonyl compounds were found to be present in the most odoriferous fractions. Isolation and analysis of the volatile oil of unsulfonated polypropylene benzene showed that all the compounds causing the sulfonate odor are produced in the sulfonation process.

II. Identification. *Ibid.*, 182–90. Infrared analysis of the carbonyl compounds and reduction with sodium borohydride combined with odor panel tests showed that saturated ketones (less than 1 ppm) are the largest contributiors to the odor of polypropylene benzene sulfonate slurries. The second largest contributions came from about 50 ppm of substituted terpene-type diolefins, whose structure was investigated by mass spectroscopy, IR, UV, Raman Spectra and NMR before and after selective and total catalytic hydrogenation. The small odor contribution of sulfur compounds and the absence of mercaptans were demonstrated by gas chromatography combined with microcoulometric titration and chemical microreactions combined with odor panel tests. A number of branched chain paraffins and substituted cyclohexanes were directly identified by mass spectroscopy, however the contribution of these compounds to the over-all odor was found to be negligible.

III. Removal of odor by chemical treatment and control of sulfonation conditions. *Ibid.*, 216–20. Removal of the ketone odor from polypropylene benzene sulfonate slurries is

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