

• Oils and Fats

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The occurrence of 14-methylpentadecanoic acid (isopalmitic acid) in hydrogenated mutton fat. R. P. Hansen, F. B. Shorland, and N. June Cooke (Fats Research Lab., Dept. of Sci. and Ind. Research, Wellington, New Zealand). *Chem. and Ind.* 1956, 1149. The isolation from external carcass fat of sheep of an even number branched chain acid, 14-methylpentadecanoic, is reported. Although isopalmitic acid has been synthesized and has been identified in wool wax it has not formerly been found in an external carcass fat. It has however been separated from hydrogenated ox fat.

On the antioxidant activity of the flavonols, gossypetin and quercetagenin. C. H. Lea and P. A. T. Swoboda (Low Temp. Stat. for Research in Biochem. and Biophys., Univ. of Cambridge and Dept. of Sci. and Ind. Research). *Chem. and Ind.* 1956, 1426-28. The flavonoids are of considerable interest as potential antioxidants which are already present in some foods and which may be used as additives for others. Quercetagenin appeared to have about the same activity as propyl gallate on a weight basis and gossypetin was about three times as active as the gallate on the weight basis for the autoxidation of methyl linoleate. Gossypetin also showed appreciable metal-deactivating properties under some conditions. The present difficulty is the very low solubility of polyhydroxyflavones in lipids.

New trends in fats research. F. B. Shorland (Dept. of Sci. Ind. Research, Wellington, N.Z.). *Australian J. Sci.* 18(4A), 49-62 (1956). The Liversidge lecture. 170 references. (C. A. 50, 11031)

Analytical methods in fat chemistry. Cl. Franzke. *Seifen-Öle-Fette-Wachse* 82, 79-80, 103 (1956). A review with 57 references. (C. A. 50, 11031)

Losses of oil in cottonseed husk. A. L. Markman. *Masloboino-Zhirovaya Prom.* 21(2), 7-9 (1956). Statistical analyses are presented to show that the losses of oil in cottonseed husks were reduced to the minimum when the moisture content of seeds was brought up to 8.5-9% prior to hulling. (C. A. 50, 11034)

Reaction of unsaturated compounds with water. I. Orientation experiments with linseed and lemon oils. E. Schauenstein, O. Gold, and B. Pibus (Univ. Graz, Austria). *Monatsh.* 87, 144-57 (1956). Water solubility of higher unsaturated fatty acids was re-examined. The fatty acid mixture of a pure linseed oil gave a slightly opalescent aqueous solution, pH 3.5-4.5 free from microscopic oil droplets and showing an ultraviolet spectrum corresponding to a conjugated unsaturated system. Evaporation of the aqueous solution in *vacuo* gave 5-8% of clear, golden-yellow partially crystalline glassy residue which was proved to contain 80% hydroxy fatty acids, assumed to be from the reaction of fatty acids with water by addition at ethylene linkages. A similar reaction between terpene- and sesquiterpene-free lemon oil and 100 parts distilled water gave a solution containing all the citral (20%) in hydrated water soluble form and the free fatty acids as hydroxy fatty acids. The water solubility of the conjugated unsaturated systems may be due to a surface hydroxylation or to the formation of complexes between the hydroxy and the conjugated unsaturated system. Similarly it has been shown that the total lipids of human serum reacts with water with formation of hydroxylated fatty acids important in the resorption and biological oxidation of fat.

II. Reaction with pure 9,12-linoleic acid. E. Schauenstein and H. Biheller. *Ibid.* 158-63. Commercial 9,12-linoleic acid containing 1.78% conjugated dienes and 0.36% trienes, was mixed with doubly distilled water and the aqueous phase was carefully separated from microscopic droplets of linoleic acid. The solution pH 4.6-5.1 was concentrated to 0.1 g. linoleic acid per 100 ml. water, pH 3.5-3.8, pK 4.3, which was further evaporated (until fat droplets became visible) to 4.2 g. per 100 ml. Evaporation to dryness gave a semicrystalline solid containing 10.27 and 1.05% conjugated dienes and trienes respectively.

The solid was a mixture of hydroxy and conjugated fatty acids and may constitute a peroxidized system as postulated by Franke and Frehse. (C. A. 50, 11034)

Chemical examination and glyceride structure of the fixed oil from the seed of calophyllum wightianum. II. K. Vasudevan Nair and N. S. Varier (Central Research Inst., Trivandrum). *Bull. Central Research Inst., Univ. Travancore, Trivandrum*, Ser. A, 4, 19-22 (1955). The glyceride structure of the oil from *C. wightianum* was worked out through an improved method of oxidation. The composition of the oil thus found was as following: GS<sub>2</sub> nil; GS<sub>2</sub>U 3.41; GSU<sub>2</sub> 59.18; GU<sub>2</sub> 37.41%. The unsaturated acids form more than 2/3 of the total fatty acids. (C. A. 50, 11034)

Chromatographic segregation of the component glycerides in the oil of calophyllum wightianum. K. Vasudevan Nair and N. S. Varier (Central Research Inst., Trivandrum). *Bull. Central Research Inst., Univ. Travancore, Trivandrum*, Ser. A., 4, 23-6 (1955). The neutral oil (3.1 g.) from *C. wightianum* was chromatographed over a column of alumina in light petroleum solution (50 ml.) and eluted with 300 ml. of solvent. The more unsaturated fractions were adsorbed at the top of the column and the portions of higher saturation were in the lower zones or completely eluted. The composition of the glyceride structure calculated from the character of the fractions agreed with that obtained by the potassium permanganate oxidation method. (C. A. 50, 11034)

Bazna oil. Md. Miaruddin (Munie, Public Health Lab., Dacca). *Pakistan J. Sci. Research* 7, 56-7 (1955). The seed oil of bazna (*Zanthoxylum badrunga*) has n<sub>D</sub><sup>20</sup> 1.4609-1.4621, acid value 4.1-4.6 (increasing to 8.4 in 3 months), d<sub>4</sub><sup>15-6</sup> 0.919-0.920, unsaponifiable 1.4-1.7%, saponification number 191.2-192.2, iodine number 77.85-80.26, R.-M. value 0.61-0.72, Polenske value 0.34-0.4, solidifies at 3-9°. After refining, it is edible and can be used in place of olive oil. (C. A. 50, 11033)

Extraction of trimyristin from ucuhiba fat. W. S. Coutinho (Univ. Recife, Brazil). *Rev. brasil. farm.* 35, 261-6 (1954). The seeds of *Virola sebifera* yield 50% of a yellow tasteless fat, m. 40-4°. When 75 g. fat is dissolved in 100 ml. boiling acetone and allowed to cool, the trimyristin crystallizes out; 4 recrystallizations give a pure product, m. 53°, yield 27-30%. (C. A. 50, 11032)

Chemical composition of rapeseed oil. J. Budzyńska. *Roczniki Państwowego Zakładu Hig.* 6, 229-43 (1955). Representative and average values for Polish rapeseed oil are: lower fatty acids 0, higher saturated fatty acids 7.00-21.7, erucic acid 44.13-49.16, oleic acid 15.28-23.13, linoleic acid 13.34-18.81, and linolenic acid 4.49-9.81%. (C. A. 50, 11035)

The oil from ramie seeds (*Boehmeria nivea*). A. Popov and St. Ivanov (Bulgar. Acad. Sci., Sofia). *Compt. rend. acad. bulgare sci.* 8(2), 17-20 (1955). The seeds of five succeeding crops were extracted with benzene. The oil contained oleic and linoleic acids but no linolenic acid. It had a high free fatty acid content. (C. A. 50, 11035)

Tobacco-seed oil. I. Production of oil, its physical and chemical properties. M. Tugtepe (Istanbul Univ.). *Rev. fac. sci. univ. Istanbul* 20C, 280-6 (1955). Tobacco seeds contain about 40% oil which is used mostly in mixtures with olive, cottonseed, or linseed oil. The pressed oil has a lighter yellow color, a better smell, a higher iodine value, and a lower acid value than the solvent extracted oil. (C. A. 50, 11035)

II. Stand oils, their physical and chemical properties. *Ibid.* 280-6. Samples of extracted Bafra tobacco-seed oil were heated in flasks in open air at 250, 280, and 310° for various lengths of time. Iodine, viscosity, and n values were determined on each sample during heating. The properties of heated tobacco seed oil which showed the shortest drying time were thus established. (C. A. 50, 11035)

Unsaponifiable matter of the fatty substances of sei whale liver. Tomotaro Tsuchiya and Akio Tanaka (Govt. Chem. Ind. Research Inst. Tokyo). *Repts. Govt. Chem. Ind. Research Inst., Tokyo* 50, 367-9 (1955). The unsaponifiable matter of the fatty substances of *Balaenoptera borealis* liver was separated into two parts by solubility in methanol. The insoluble part was a crystalline solid, apparently cholesterol. The soluble part consisted of a large amount of vitamin A and a small amount of highly unsaturated hydrocarbons. The vitamin A compo-

ment seems to have 6 or more conjugated double bonds. (*C. A.* 50, 11035)

**Semimicro quantitative method for separate determinations of higher fatty acids of normal structure by distillation of their methyl esters.** L. K. Obukhova (Inst. Chem. Phys., Acad. Sci. U.S.S.R., Moscow). *Zhur. Anal. Khim.* 11, 193-7(1956); *J. Anal. Chem. U.S.S.R.* 11, 195-8. The method involves separation of a mixture of acids, methylation of the acids, and separation of the methyl esters by distillation. The separated acids are methylated with diazomethane, mixed with a carrier consisting of 2/3 benzene and 1/3 light kerosene and fractionally distilled. The esters are driven off below their boiling point within a temperature range of 20-25°. The esters in each of the fractions are saponified with an alcoholic alkali solution and titrated with hydrochloric acid. The accuracy of the method was 96-99.5%. (*C. A.* 50, 17478)

**Maximum peroxide values of autoxidizing fats under different conditions.** P. R. Malhan and A. R. S. Kartha (Indian Agr. Inst., New Delhi). *J. Sci. Ind. Research (India)* 15B, 326-7 (1956). Peroxide values of refined peanut and sesame oils, lard and ghee showed maximums, respectively, of 178, 134, 120, and 160 after incubated at 96° and 550, 700, 400, and 450 when aerated at 96°. Maximum peroxide values at specific temperatures are not characteristic of the autoxidizing substances but vary with the available rate of oxygen supply per unit weight of fat. (*C. A.* 50, 17477)

**Mechanism of fat hydrolysis. I. Kinetics of the Twitchell process.** M. M. Ventura (Escola agron. Ceará, Fortaleza, Brazil). *Anais assoc. quim. Brasil.* 11, 187-91(1952). The progress of the hydrolysis was followed by free fatty acid determination. A straight line was obtained when  $\log(100 - \% \text{ FFA})$  was plotted against time in Twitchell hydrolysis of babassu and cottonseed oils. Only near the end of the hydrolysis was a deviation observed. (*C. A.* 50, 17477)

**Study of properties of fat melts by physicochemical analysis.** M. Kh. Gluzman and B. I. Dashevskaya. *Zhur. Priklad. Khim.* 29, 1066-70(1956). Composition-melting point curves are shown for systems: hydrogenated fat-methyl and ethyl stearates, lanolin-methyl and ethyl stearates, paraffin-methyl and ethyl stearates, ethylene glycol stearate-hydrogenated fat-paraffin. The lanolin systems show a maximum slightly above the melting point of lanolin. The ternary system has a triple eutectic at 32.5°, with 60% methyl stearate, 30% hydrogenated fat, and 10% paraffin. (*C. A.* 50, 17476)

**The ultrashort wave method of preparing lard and bone-marrow oil.** Fujio Saito (Natl. Inst. Agr. Sci., Chiba). *Bull. Natl. Inst. Agr. Sci. (Japan)*, Ser. G, No. 4, 69-74(1952). Ultrashort wave of 50 Mc. had a special effect on raising the temperature of fat tissue only in high degree when back portion of pork and bone were irradiated with it. The yield as well as the quality of the fat thus prepared was superior. When the ultrashort wave method was applied, the bone residue was still available for gelatine production, and the gelatine thus obtained was of superior quality. The method was also economical. (*C. A.* 50, 17237)

**The effect of di- and triethanolamine on the autoxidation of oils and fats.** G. V. Kamalyan and S. M. Araksyan (Zoovet. Inst., Erevan). *Biokhimiya* 21, 313-16(1956). Experiments were performed with animal oils and fats. In the process of fat autoxidation, colamine by itself acts as an antioxidant, but in association with copper forms a potent oxidative system. The same is true of di- or triethanolamine. The antioxidant properties of di- or triethanolamine are more potent than those of colamine. In association with copper the oxidative properties of this system are greater than those of copper with either di- or triethanolamine, especially judged by the oxidation of olive or fish oils. Ascorbic acid enhances the antioxidant properties of the amines alone and considerably inhibits the oxidative effects of copper-amine systems in the process of butter and cottonseed oil autoxidation. It is concluded that the antioxidant activity is conditioned by the number of ethanol groups, and the formation of a copper-amine oxidative system depends upon the presence of free amino groups. (*C. A.* 50, 17236)

**Unsaturated fatty acids of butterfat.** R. Backderf (Ohio State Univ., Columbus). *Univ. Microfilms* (Ann Arbor, Mich.), Publ. No. 17375, 103 pp. (microfilm, \$1.50; paper enlargement, \$10.30); *Dissertation Abstr.* 16, 1338-9(1956).

**An emulsion method for the determination of fat in foods.** V. P. Fedotov. *Voprosy Pitaniya* 15(4), 51-2(1956). A rapid method for the determination of fat in foods is described. A fat sample is dissolved in a mixture of trichloroacetic acid and acetone and then precipitated in the form of an emulsion by

the addition of water. The degree of the turbidity is then compared in a turbidometer with a standard fat emulsion. The accuracy of the method is comparable with the accuracy of the ether-extraction method. (*C. A.* 50, 17224)

**Automatic computation of Antoine equation constants: caproic and caprylic acids and methyl esters.** A. Rose, J. A. Acciarri, R. C. Johnson, and W. W. Sanders (Penn. State Univ. University Park, Pa.). *Ind. Eng. Chem.* 49, 104-110(1957). The method of Taylor for expressing vapor pressure-temperature data by obtaining constants for the Antoine equation has been modified to permit automatic computation of these constants. The method may be readily applied to obtain the best constants for any substance for which data are available. New vapor pressure-temperature data were obtained by this method on highly purified samples of *n*-caproic acid, *n*-caprylic acid, methyl caproate, and methyl caprylate in the course of the present work.

**Determination of antioxidants in edible fats.** Constance Anglis, J. H. Mahon, and R. A. Chapman (Dept. Nat. Health and Welfare, Ottawa, Canada). *J. Ag. and Food Chem.* 4, 1018-1022(1956). Methods are presented for determining the antioxidants butylated hydroxytoluene (BHT), butylated hydroxyanisole (BHA), propyl gallate (PG), nordihydroguaiaretic acid (NDGA), and all combinations except those containing both propyl gallate and nordihydroguaiaretic acid. Butylated hydroxyanisole and butylated hydroxytoluene are separated from the fat and the other antioxidants by distillation with superheated steam. The distillate is analyzed for the sum of butylated hydroxyanisole and butylated hydroxytoluene with ferric chloride-2,2'-bipyridine and for butylated hydroxyanisole with 2,6-dichloroquinonechloroimide, thereby permitting butylated hydroxytoluene to be determined by difference. Nordihydroguaiaretic acid and propyl gallate are extracted from a carbon tetrachloride solution of the fat using 50% ethyl alcohol and are determined with ferrous sulfate buffered to an appropriate pH. Butylated hydroxyanisole and butylated hydroxytoluene, although partially extracted with 50% ethyl alcohol, do not react with ferrous sulfate.

**Identification of silver salts of branched-chain fatty acids by x-ray diffraction powder patterns.** D. L. Guertin, S. E. Wiberley, W. H. Bauer, and J. Fisher (Rensselaer Polytechnic Institute, Troy, N. Y.). *Anal. Chem.* 28, 1645-1646(1956). The increasing use of synthetic branched-chain fatty acid mixtures in the preparation of metallic soaps makes the identification of the individual acids important. X-ray diffraction data are presented for 13 silver salt derivatives of hexanoic acid and one derivative of heptanoic acid. In a given isomeric series the long spacing increases as the group is moved further from the carboxylate group.

**Chromatography of phospholipides and related compounds on glass paper impregnated with silicic acid.** Mona Brown, D. A. Yeadon, L. A. Goldblatt, and J. W. Dieckert (Southern Regional Research Lab., New Orleans, La.). *Anal. Chem.* 29, 30-31(1957). Phospholipides and some of their hydrolytic cleavage products can be separated rapidly by chromatography on glass fiber paper impregnated with silicic acid. The developing solvent is composed of ethyl ether, phenol, acetone, and water. Dragendorff reagent, ninhydrin reagent and sulfuric acid are the detecting agents.

**Paper chromatography of phospholipides.** G. Rouser, G. V. Marinetti, R. F. Witter, J. F. Berry, and E. Stotz (School of Medicine and Dentistry, The Univ. of Rochester, Rochester, N. Y.). *J. Biol. Chem.* 223, 485-497(1956). A study of a variety of individual solvents and solvent mixtures showed that polar or ionic solvents were most suitable for the chromatography of phospholipides on non-impregnated filter paper. Mixtures of lutidine and acetic acid with alcohols or with chloroform were found to give satisfactory results. Many lipid separations were accomplished, such as lecithin from sphingomyelin and cephalin; cephalin from sphingomyelin; lysolecithin from lecithin; acetal phospholipide or phosphatidic acid from all other phospholipides; and phospholipide (except phosphatidic acid) from fatty acids, cholesterol, cholesterol palmitate, ceramide, and mono-, di-, and triglycerides.

**Potentiometric titration of hydroperoxides and peracids in anhydrous ethylenediamine.** A. J. Martin (E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.). *Anal. Chem.* 29, 79-81(1957). Peracids, primary and secondary hydroperoxides, and hydrogen peroxide can be titrated potentiometrically as weak acids with sodium aminoethoxide in anhydrous ethylenediamine. Potential at half neutralization can be correlated with acid strength and structure of the peroxides. Accuracy and precision are in the order of 2% relative. Analysis of peroxide

mixtures is possible if acidities are different by a sufficient degree.

**The concentrations of some constituents of egg yolk in its soluble phase.** G. Schmidt, M. J. Bessman, Mary D. Hickey, and S. J. Thannhauser (Tufts Univ. School of Medicine, Boston, Mass.). *J. Biol. Chem.* 223, 1027-1031 (1956). Separation of undiluted hens egg yolk into a virtually clear supernatant fraction and a particulate fraction has been carried out by centrifugation at 20,000  $\times$  g. All of the phosphoproteins and at least 85 per cent of the iron and calcium of yolk were present in the particulate fraction. More than 70 per cent of the phospholipides occurred in the supernatant yolk fraction and hence was not associated with the phosphoproteins. Analyses of the washed particulate fraction of yolk suggested that more than 90 per cent of the yolk phospholipides were present in the supernatant fraction, and that approximately 40 per cent of the yolk proteins were present in the particulate fraction. The correlation of data obtained on the washed particles with that on the genuine distribution of yolk constituents is tentative, inasmuch as such correlation depends on the assumption that major alterations of solubility properties did not occur during washing.

**The separation of sphingolipides by adsorption chromatography.** B. Weiss (College of Physicians and Surgeons, Columbia Univ., New York, N. Y.). *J. Biol. Chem.* 223, 523-534 (1956). A chromatographic method is described for the separation of the sphingolipides of the central nervous system by gradient elution with chloroform and methanol from a silicic acid column. Sphingolipides from monkey brain and beef spinal cord gave similar chromatographic profiles, but there were considerable quantitative differences in the size of the fractions. A carbohydrate-containing fraction, present in monkey brain preparations, was not detected in sphingolipides from beef spinal cord.

**Theory of countercurrent distribution in solvent systems near a critical point.** C. A. Hollingsworth, J. J. Taber (Dept. of Chem., Univ. of Pittsburgh, Pittsburgh, Pa.), and B. F. Daubert. *Anal. Chem.* 28, 1901-1906 (1956). By the use of the theory of regular solutions, equations are obtained expressing the behavior of partition ratios near the critical temperatures of complete miscibility of two-component solvent systems and near the plait point of three-component, symmetric solvent systems. These results are used with a criterion of separation to predict the optimum conditions for separation by countercurrent distribution in these systems. The theory is then applied to experimentally determined partition ratios of some triglycerides to predict the amount of separation that can be obtained. The theory leads to the following conclusions: In systems to which the theory applies, the relative behavior of a pair of solutes can be characterized by a constant,  $\gamma$ , which is independent of the temperature or the third solvent component.

**Use of 2,4-dinitrophenylhydrazones of p-phenylphenacyl esters as second derivatives in identification of organic acids.** H. Ng, A. D. Webb, and R. E. Kepner (Univ. California, Davis, Calif.). *Anal. Chem.* 28, 1975-1977 (1956). The 2,4-dinitrophenylhydrazones of the p-phenylphenacyl esters of 18 fatty acids were prepared. In several cases a greater difference was observed between the melting points of the hydrazones than between the melting points of the corresponding esters. The double derivatives of the straight-chain saturated acids from acetic through octadecanoic were found separable on silicic acid-nitromethane chromatographic columns. The relative rates of travel with respect to that of the hexanoate derivative were determined and should be of assistance in the identification of small amounts of unknown organic acids.

**Nomenclature of enzymes of fatty acid metabolism.** *Biochem. J.* 64, 782-784 (1956). Recommendations made at the Second International Conference on Biochemical Problems of Lipids regarding enzyme nomenclature in the fatty acid field are given.

**New method for checking the refined oils and liquid fatty acids to cold.** II. G. Balestrini, G. B. Martinenghi, and B. M. Samaja. *Olearia* 10, 238-241 (1956). The results of tests made on 24 samples of refined and semi-refined oils, acid oils and fatty acids are given. The rapid method of checking behavior to cold, set forth in the previous note, was used. The tests show that the method: (1) confirms the unreliability of the AOCS cold test; (2) shows the efficiency of the limpidity point ascertained by the new process; and (3) predicts approximately the degree of stable limpidity of neutral oils and liquid fatty acids. Some irregularities of behavior call for further tests.

**The isolation of iso- and (+)-anteiso-fatty acids of the C<sub>18</sub> and C<sub>17</sub> series from shark (Galeorhinus australis, Macleay) liver oil.** Isobel M. Morice and F. B. Shorland (Fats Res. Lab., Dept.

Sci. and Ind. Res., Wellington, New Zealand). *Biochem. J.* 64, 461-464 (1956). The liver oil of the New Zealand school shark (*Galeorhinus australis* Macleay) has been shown to contain traces (0.1-0.2%) of 13-methyltetradecanoic, (+)-12-methyltetradecanoic, 15-methylhexadecanoic, and (+)-14-methylhexadecanoic acids.

**The applications of fatty acids in plastics.** H. Passedouet. *Rev. franc. corps gras* 3, 587-593 (1956). This article discusses the various applications of fatty acids in the major types of plastics and gives two tables with comparisons of several of the plastics. No references are given.

**Studies on the rancidity of lard. II. The thiobarbituric acid test.** A. Vargas Romero and R. Gutierrez Gonzalez-Quijano. *Grasas y Aceites* 7, 229-233 (1956). The 2-thiobarbituric acid test (TBA test) for rancidity is studied in connection with lard. The influence of such factors as temperature, time of stirring and heating, etc., is considered. The test is compared with the peroxide number when lard is treated both under natural conditions and heating on a stove. Known samples of fresh and rancid fat are found to follow the Lambert-Beer law in this test. The results led to the conclusion that the TBA test applies well enough to the determination in lard of the degree of rancidity and that the test is in agreement with the peroxide number and the organoleptic examination.

**Necessary perspectives in lipochemistry.** J. P. Sisley and J. Vallee. *Rev. franc. corps gras* 3, 577-587 (1956). The authors discuss the importance of the availability of extremely pure and well-characterized raw materials, for the production of the many products obtained from fats and oils. They discuss the fact that the required types of fats may be better found by use of standardized fatty acids rather than from the natural fats and oils.

**Stearine and oleine by fractionation with hexane. III. Application on an industrial scale.** M. Viarengo. *Olearia* 10, 233-237 (1956). To supplement the information already given an example is quoted of fractionation at -20°C. of distilled tallow fatty acids by hexane. By this means 45% of stearine (solidification point 54.6°; I.N. 1.46; S.N.-A.N. 0.4) 39% of oleine (solid or immobility point 5°; I.N. 81.2), and 16% of palmitic fraction (solidification point 32.4°) are obtained. A description is given of the plan of the CITIOSOL industrial plant for processing 12 tons every 24 hrs., and its economic features are set forth showing that the CITIOSOL process costs 8 lire per Kg. of processed fatty acids as compared to at least 12 lire when the standard processing by pressure is used.

**Separation, identification and quantitative determination of saturated fatty acids from C<sub>2</sub> to C<sub>6</sub> by partition chromatography.** E. Vioque. *Grasas y Aceites* 7, 234-238 (1956). A simple, rapid, and accurate technique for the separation of saturated fatty acids from C<sub>2</sub> to C<sub>6</sub> by partition chromatography has been established. Silica is used as the fixed bed and water as the stationary phase with the circulating liquid composed of a mixture of CCl<sub>4</sub> and n-butanol (up to 6%). Bromocresol green is used to develop the zones in the column. The acids are titrated with phenolphthalein. Quantitative separations are obtained with acid quantities from centigrams to 0.1 mg. Recoveries are in the range expected with such methods. p-Phenylazophenacyl bromide is used for identification of the acids.

**Trace elements in edible fats. IV. Separation and spectrophotometric determination of zinc.** A. Vioque and M. a del Pilar Villagran. *Grasas y Aceites* 7, 239-242 (1956). A technique is described which permits the determination of traces of Zn in edible fats. From a solution of the ash, free of iron and copper (see paper II of this series) the zinc is extracted with chloroform under the form of "ditimate" (sodium diethylthiocarbamate). It is then recovered as Zn<sup>++</sup> by treatment with 0.05 N HCl. The zinc is then determined photometrically. Quantities in the range of 2 to 50 micrograms can be determined within 15% of error.

**The story of dehulled soybean oil meal.** F. H. Hafner (Soybean Oil Meal Sales, Soybean Div., General Mills, Inc., Minneapolis, Minn.). *Soybean Digest* 17(2), 14-15 (1956). The problems in the production of 50% protein meal are reviewed briefly. Because the fiber content is low (max. 3%), this meal is used in high quality feeds for poultry and, occasionally, livestock.

**Stabilized hexylresorcinol therapeutic agent containing castor oil.** A. Boskamp. *U. S. 2,775,538*. A stable composition for internal administration comprises a solution of hexylresorcinol in castor oil.

**Meal-treating process and apparatus.** N. F. Kruse (Central Soya Co., Inc.). *U. S. 2,776,894*. Solvent extracted oil meal is

passed successively through a series of vertically-spaced kettles countercurrent to the flow of steam.

**Fluidizing lecithin.** E. F. Werly (Pillsbury Mills, Inc.). *U. S. 2,777,817*. A method is described for fluidizing lecithin and controlling its viscosity. The lecithin is mixed with 2 to 6% of a glyceride oil (corn, soybean, lard, peanut, or cottonseed) and 2 to 8% of a liquid monoglyceride (monoolein, monolinolein, or monolinolenin).

**Method of deep fat cooking foods under pressure.** C. Wagner. *U. S. 2,778,736*. A method of deep fat cooking foods in a minimum of time is described. The fat is heated to 310° to 325°F., food is introduced and allowed to cook until brown. The kettle is then closed and cooking is continued at 15 p.s.i. until the food is done.

**Phytic corn.** Corn Products Refining Co. *Brit. 737,279*. A process is described for the production of aqueous (up to 40%) phytic acid solution from calcium phytate press cake by treating an aqueous slurry of the cake with acid-regenerated Dowex-50 cation exchange resin. Recycling part of the resulting cake solution with new calcium phytate permits constant production of a phytic acid solution of low concentration (15%). Phytic acid can be used as a stabilizing agent in vegetable oils, for sequestering ions of heavy metals, and as a starting material for the preparation of pure salts of other derivatives of phytic acid. (*C. A. 50*, 16845)

**Installation of continuous hydrogenation of fats.** A. G. Sergeec, B. N. Tyutyunnikov, A. M. Zharskii, B. Ya. Sterlin, M. K. Yakubov, Z. M. Askinazi, L. V. Porolov, T. M. Novikova, S. D. Kopylenko, G. I. Teslenko, G. V. Zarembo, and I. I. Okrugov. *U.S.S.R. 103,217*. A battery of consecutively joined heated autoclaves is provided with stirrers and arrangements for continuous transfer of the substance and catalyst from one autoclave to the next. The transfer is done by means of a hydrogen-gas lift so that hydrogenation is going on during the transfer. (*C. A. 50*, 16207)

#### FATTY ACID DERIVATIVES

**Fatty acids and their derivatives in cosmetics.** P. Velon. *Rev. franc. corps gras* 3, 593-599 (1956). The author reviews the fatty acids and their derivatives used in cosmetics. He examines the types of fatty acids and alcohols required and gives 26 references concerning the various chemical and physical properties of the compounds discussed.

**Binary freezing point diagrams for palmitic acid with a series of substituted 2-aminopyridines.** R. R. Mod, F. C. Magne, and E. L. Skau (Southern Regional Research Lab., New Orleans, La.). *J. Phys. Chem.* 60, 1651-4 (1956). Binary freezing point data are reported for palmitic acid with each of the following: 2-amino-3-methylpyridine, 2-amino-4-methylpyridine, 2-amino-5-methylpyridine, 2-amino-6-methylpyridine, 2-amino-4,6-dimethylpyridine, and 2,2-dipyridylamine. Each amine forms an equimolecular compound with palmitic acid. In addition, 2-amino-3-methylpyridine forms a compound with 2 moles of acid.

**In situ epoxidation of oleic acid using formic acid.** F. P. Greenspan and R. J. Gall (Food Machinery and Chemical Corp.). *U. S. 2,774,774*. Epoxidation of oleic acid is achieved by heating a solution of oleic and formic acids to 50° to 80°, adding aqueous hydrogen peroxide, and maintaining the temperature of the mixture at 50° to 80° for not more than 5 hours. For each mole of ethylenic unsaturation to be epoxidized, there is used 0.25 to 1.0 mole of formic acid and about 1 mole of hydrogen peroxide.

**Method of stabilizing lauryl pyridinium hydrochloride.** F. X. Russo (Vitogen Products, Inc.). *U. S. 2,776,291*. A cloudy aqueous solution of crude lauryl pyridinium chloride, containing lauryl alcohol, lauryl chloride and pyridinium chloride, is clarified by agitation with a water-soluble protein. As the protein settles, it removes impurities causing cloudiness.

**Methyl fatty tertiary amines.** J. G. Erickson (General Mills, Inc.). *U. S. 2,776,314*. A process is described for the production of  $R_nN(CH_3)_{3-n}$  in which R is a  $C_6$  to  $C_{22}$  alkyl group, n is a positive integer not greater than 2. One mol of  $R_nNH_{3-n}$  is reacted with at least three moles of formaldehyde and formic acid in the presence of at least one equivalent of sulfuric acid for each mole of amine.

**Higher fatty alcohols.** W. G. Toland and I. E. Levine (California Research Corp.). *U. S. 2,776,323*. In a continuous process, fat and a higher fatty alcohol are reacted under transesterifying conditions in a distillation zone. An overhead fraction containing fatty alcohol and glycerine is withdrawn. The bottoms fraction, containing higher fatty alcohol esters of fatty

acids, is hydrogenated in the presence of catalyst. The crude hydrogenation product is returned to the distillation zone together with further quantities of fat.

**Composition of matter containing polyvinylpyrrolidone and a fatty carrier.** J. R. L. Martin (Coty, Inc.). *U. S. 2,776,924*. A homogeneous solution is prepared containing polyvinylpyrrolidone, a fatty carrier, and a compound selected from a group consisting of water-insoluble, fat-soluble fatty acids and fatty alcohols.

**Oxidation of fatty acids.** R. L. Logan (Kessler Chem. Co., Inc.). *U. S. 2,777,865*. Dibasic and monobasic carboxylic acids are produced from monohydroxy aliphatic acids by the action of molten caustic at temperatures below 475°.

## • Biology and Nutrition

F. A. Kummerow, Abstractor  
Joseph McLaughlin, Jr., Abstractor

**The secretion of body fat into the intestinal lumen.** K. Bernhard, Esther Seelig, and H. Wagner (Univ. Basel, Switz.). *Hoppe-Seyler's Z. physiol. Chem.* 304, 138-47 (1956). Rats were fed daily with rapeseed oil to enrich the body fat with erucic acid, and then subsequently returned to a normal fat-free diet. The feces of such animals contained an average of 2.6% total fatty acids, of which 9.6% was erucic acid and 17.6% stearic acid. Animals with biliary fistulae, under similar conditions, excreted feces containing 14% total fatty acids, of which 10% was erucic acid and 37.6% stearic. Body fats of the animals contained 6.5% stearic, 68.3% palmitic and oleic, 19.9% linoleic, and 5% erucic acid. The authors suggest that under normal dietary conditions the body fat is secreted into the lumen of the intestine and is then partially absorbed. Absorption is decreased in the absence of bile. (*C. A. 50*, 17077)

**The transformation of glucides and lipides during intestinal absorption on rabbits.** Th. Cahn and J. Houget. *Compt. rend.* 243, 407-10 (1956). The authors' hypothesis that the increase in respiratory quotient in rabbits after feeding with carbohydrate is due to the conversion in the intestine of carbohydrate to lipides is supported by analysis of the intestine at various periods after feeding with a low fat ration. The transformation proceeds by way of phospholipides. (*C. A. 50*, 17090)

**Transformation of alimentary glucides to lipides.** Th. Cahn and J. Houget (Inst. Biol. physio-chim., Paris). *J. physiol. (Paris)* 48, 427-30 (1956). Synthesis of lipide from alimentary glucides by the rabbit occurs in the liver, adipose tissue, and small intestine during the digestive period. (*C. A. 50*, 17090)

**The origin of fecal fats. I. Experiments on rats on fat-free diets.** A. Holasek (Univ. Graz, Austria). *Hoppe, Seyler's Z. physiol. Chem.* 298, 55-64 (1954). The content of higher fatty acids in feces is fairly constant for a given diet. However, if the cellulose content of the diet is increased so that the dry weight of the feces increases four times, the higher fatty acid content is decreased to one half. This is attributed to inhibition of action of intestinal flora owing to accelerated emptying of the large intestine. Simultaneous administration of cellulose and Terramycin produces feces practically free of higher fatty acids, indicating these are almost completely of bacterial origin rather than excreted through the intestinal wall. (*C. A. 50*, 17027)

**Function of essential fatty acids.** R. T. Holman (Univ. of Minn., Austin). *Svensk. Kem. Tidskr.* 63, 282-90 (1956). A review. Linoleic, linolenic, and arachidonic acid are usually referred to as the essential fatty acids. Only linoleic and arachidonic acids perform all the functions of essential fatty acids, and the term should be restricted to these two substances. The symptoms of essential fatty acid deficiency include impairment of the function of the outer cover of the animal, dry, scaly skin, and excessive loss of hair. There are indications that the polyunsaturated fatty acids play a role in the initial stage of reproduction. The connection between atherosclerosis and saturated to unsaturated fatty acid ratio is discussed. The possible function of polyunsaturated acids as reversibly oxidizable prosthetic groups of a series of enzymic reactions is mentioned. (*C. A. 50*, 17021)

**The effect of fumarate and of p-nitrophenol on the synthesis of fatty acids in homogenates of the mammary gland.** C. Ternier (Worcester Foundation for Exptl. Biology, Shrewsbury, Mass.). *Biochem. J.* 64, 532-539 (1956). The aerobic and anaerobic synthesis of fatty acids in cell-free homogenates of

mammary gland has been studied. In respiring homogenates the addition of fumarate in increasing amounts (0.00125–0.005M) resulted in progressive stimulation of fatty acid synthesis accompanied by a progressive decline in the radioactivity of the respiratory carbon dioxide. The addition of glucose resulted in further stimulation of lipogenesis. Fluoride and *p*-nitrophenol act as inhibitors of fatty acid synthesis. Under anaerobic conditions, fatty acid synthesis from [carboxy- $C^{14}$ ]-acetate was demonstrated in mammary homogenates showing rapid glycolysis to which either oxaloacetate or citrate had been added.

**Studies of fatty acid oxidation. 4. The effects of fatty acids on the oxidation of other metabolites.** P. G. Scholefield (McGill-Montreal Gen. Hosp. Res. Inst., 3619 Univ. St., Montreal, Quebec). *Can. J. Biochem. Biophys.* 34, 1211–1225 (1956). Fatty acids inhibit the oxidation of pyruvate by rat-kidney mitochondria but the extent of inhibition depends upon the nature and amount of agent added to stimulate the oxidation. The longer fatty acid chains are more effective inhibitors and, in general, the even-numbered fatty acids show greater inhibitory effects than the adjacent odd-numbered fatty acids. The effect of the inhibitors: 2,4-dinitrophenol (DNOP) and the fatty acids were studied with pyruvate as a substrate. The effect of concentration of the fatty acid was studied and different inhibitory results shown at various levels. Under conditions specified it was possible to show effects of Nembutal and decanoate in which inhibition could be produced or prevented for fumarate- and DNOP-stimulated oxidation of pyruvate.

**5. Effect of decanoic acid on oxidative phosphorylation.** P. G. Scholefield. *Ibid.* 1227–1232 (1956). The effect of potassium decanoate on the phosphorylation associated with the oxidation of pyruvate by rat-kidney and rat-brain mitochondria have been investigated. The suggestion that these two processes may be uncoupled from each other in the presence of decanoate has been confirmed. Further, it has been shown that the decanoate-insensitive oxidation of pyruvate by rat-brain mitochondria, occurring in the absence of such stimulating agents as fumarate, is not associated with ATP synthesis. The fumarate-stimulated oxidation of pyruvate by rat-brain mitochondria, which is inhibited by decanoate, is associated with a phosphorylation process which is uncoupled by decanoate. When pyruvate oxidation by rat-kidney or by rat-brain mitochondria is uncoupled from phosphorylation, the extent of uncoupling is proportional to the amount of decanoate added.

**The metabolism of propionic acid.** A. T. Hill, G. Peeters and M. Laurysens (National Inst. Med. Res., Mill Hill, London, N.W. 7). *Biochem. J.* 64, 726–730 (1956). The relative radioactivities of odd- and even-numbered fatty acids obtained from goat milk after injection of [1- $C^{14}$ ] acetate have been determined after separation of the compounds by gas-liquid chromatography. Perceptible activity was demonstrated in the odd-numbered acids. It is concluded that the naturally occurring odd-numbered fatty acids are synthesized by condensation of acetate with propionate by a mechanism similar to that obtaining for the even-numbered fatty acids. Acetate, *n*-butyrate and *n*-caproate isolated from the udder after perfusion with [1- $C^{14}$ ] propionate were found to be radioactive. No scheme of degradation yet put forward can account for this. An analogous conversion of [1- $C^{14}$ ] acetate into [1- $C^{14}$ ] formate in the rabbit is known to occur.

**Concentration and composition of serum lipoproteins of cholesterol-fed and stilbestrol-injected birds.** L. A. Hillyard, C. Entenman, and I. L. Chaikoff (Univ. Calif. School of Med., Berkeley, Calif.). *J. Biol. Chem.* 223, 359–368 (1956). Birds were either fed a high cholesterol diet for 2 months or injected with stilbestrol for 6 months. Both procedures produce arteriosclerosis. The serum lipoproteins were fractionated into five parts by a procedure that allowed determination of the amounts of each in serum and the lipide and protein composition of each fraction. The lipides in the highest density Fraction D were increased greatly in the stilbestrol-treated bird. The nature of this fraction is discussed.

**Effects of some dietary factors on the metabolism of fatty acids in liver preparations.** C. Artom (Wake Forest College, Winston-Salem, North Carolina). *J. Biol. Chem.* 223, 389–398 (1956). The oxidation of isotopic long chain fatty acids and fatty acid synthesis from  $C^{14}$ -acetate have been studied in liver homogenates, or slices, from rats previously maintained on various diets low in S-containing amino acids. Both processes are enhanced by supplementing the deficient diets with either cystine or tocopherol. On the other hand, choline, injected terminally in the rats, stimulated oxidation, but not the synthesis of fatty acids in the liver preparations.

**Effect of some antioxidants on the utilization of carotene by Holstein calves.** J. E. Roussear, Jr., H. D. Eaton, R. Teichman, C. F. Helmboldt, E. L. Jungheer, E. L. Bacon, and K. L. Dolge (Storrs Ag. Ex. Station, Storrs, Conn.), G. Beall, and L. A. Moore. *J. Dairy Sci.* 39, 1671–1682 (1956). Calves fed antioxidants during the comparison period, when carotene from alfalfa was included in the ration, had higher concentrations of carotenoids in the plasma than did the control calves. Calves fed antioxidants during only the comparison period and calves fed antioxidants during both the comparison and final depletion periods had longer vitamin A depletion times than the control calves. This finding indicated greater vitamin A storage at the end of the carotene feeding period and thus greater utilization of carotene.

**Fat metabolism in higher plants. VIII. Saturated long chain fatty acid peroxidase.** P. K. Stumpf (Univ. of Calif., Berkeley, Calif.). *J. Biol. Chem.* 223, 643–649 (1956). In extracts of cotyledons of germinating peanut seedlings, there occurs a specific long chain fatty acid peroxidase which peroxidizes stearic, palmitic, and myristic acids with a loss of the carboxyl carbon as  $CO_2$  and the accumulation of a long chain fatty aldehyde. The enzyme is inhibited by cyanide and azide but not by catalase. The role of glycolic acid, previously reported to be required as a cofactor, is that of serving as a substrate for glycolic oxidase which occurs in the enzyme preparations. In the oxidation of glycolic acid,  $H_2O_2$  is formed, which then couples into the peroxidase system.

**Further studies on a factor obtained from condensed fish solubles which enhances vitamin A storage in chick livers.** R. H. Harms, B. L. Reid, and J. R. Couch (Texas A. and M. College System, College Station, Texas). *Poultry Sci.* 35, 1254–1258 (1956). Fractions of condensed fish solubles have been evaluated as to the effects of vitamin A storage in chick livers. A factor contained in fish solubles previously reported to enhance liver storage of vitamin A has been found to be partially destroyed upon autoclaving for two hours at 120° (15 pounds) at a pH of either 3, 7, or 9. Refluxing for six hours in 6N HCl or at the naturally occurring pH (4.5) failed to destroy a portion of the activity. Extraction with nitromethane did not appear to remove the factor. A portion of the factor can be extracted by the use of ethyl ether. The factor was found to be adsorbed on IRA 400 (anion) exchange resin, and to a lesser extent on Dowex 50 (cation) exchange resin. The effluent from both resins failed to produce an increase in the vitamin A content of chick livers over that obtained in chicks fed the basal diet.

**Further studies on tocopherol content and stability of carcass fat of chickens and turkeys.** E. P. Mecchi, M. F. Pool, M. Nonaka, and A. A. Klose (Western Utilization Research Branch, U. S. Dept. of Ag., Albany 10, Calif.), and S. J. Marsden and R. J. Lillie. *Poultry Sci.* 35, 1246–1251 (1956). Results for the crude fat extracts of the muscle tissue showed good agreement in fatty acid composition between chickens and turkeys, but very little evidence of the consistent relations for tocopherol content and stability found for the depot fat. The data for the two species, together with additional tests of mixtures of depot fats with pure tocopherol, suggest that there are factors in addition to contents of crude tocopherol and the commonly-occurring fatty acids that contribute to differences in stability of chicken and turkey fat.

**Isotopic tracer studies on the effect of vitamin D on calcium metabolism in the chick.** K. W. Keane, R. A. Collins, and M. B. Gillis (General Research Lab., International Minerals and Chemical Corp., Skokie, Illinois). *Poultry Sci.* 35, 1216–1222 (1956). Chicks receiving vitamin D absorb calcium from the intestine into the blood-stream at a much more rapid rate and to a greater total extent than chicks which are deficient in this vitamin. This increase in absorption is apparently the primary effect of vitamin D on calcium metabolism. Segments of intestine from vitamin D-dosed chicks absorbed much more calcium into the mucosal cells than did similar tissue from vitamin D-deficient birds. Young chicks made rachitic by vitamin D-deficiency respond dramatically when dosed with the vitamin. They deposit bone rapidly and absorb calcium from the intestine at a faster than normal rate.

**Nutritional studies on rats on diets containing high levels of partial ester emulsifiers. II. Reproduction and lactation.** B. L. Oser and Mona Oser (Food Research Lab., Inc., Long Island City, N. Y.). *J. Nutrition* 60, 489–505 (1956). Breeding studies were undertaken in successive generations of rats on diets containing partial ester emulsifiers (Myrj 45 and 52, Span 60, and Tween 60, 65, and 80) to determine whether their chronic ingestion at levels up to 20% might induce cumulative or subtle effects manifested only under the conditions of physio-

logical stress thus imposed. The reproduction and lactation responses in all emulsifier groups at the 5% level were no different from those of the controls. Probably because of maternal neglect, survival of newborn litters was somewhat diminished in several of the emulsifier groups at the 10% level (Myrj 45, Span 60, and Tween 65) and in all of them at 20%. At the highest level some impairment in lactation efficiency was evidenced in most groups by the lower weaning weights; and in the Myrj 45, Tween 65, and mixed emulsifier groups also by greater mortality of the nurslings.

**Occurrence and nature of a fecal phosphorus-containing lipide.** L. Swell, E. C. Trout, Jr., H. Field, Jr., and C. R. Treadwell (Veterans Administration Center, Martinsburg, West Virginia). *J. Biol. Chem.* 223, 743-750 (1956). Rats fed a 25 per cent oleic acid diet excreted large amounts of phosphorus-containing lipide in their feces. The lipide resembled phospholipide in that it contained phosphorus and could be precipitated from chloroform solutions by acetone. Characterization of the lipide revealed that it was a salt with the following composition: 2 atoms of  $\text{Ca}^{++}$ , 1 mole of  $\text{HPO}_4^{=}$ , and 2 moles of oleic acid. The administration of  $\text{P}^{32}$  indicated that the lipide formed in the gut from dietary phosphorus, calcium, and oleic acid. There was no phosphorus turnover in the compound. The formation of this lipide greatly impaired the absorption of oleic acid.

**Serum cholesterol levels of young and elderly women consuming an institution diet.** Georgianna R. Walker, Ellen H. Morse, and Martha Potgieter (School of Home Ec. and Storrs Ag. Ex. Station, University of Conn., Storrs, Conn.). *J. Nutrition* 60, 517-525 (1956). The mean serum cholesterol level for the older women was  $230 \pm 9$  mg. per 100 ml. of serum and for the younger,  $172 \pm 8$  mg. The correlation between age of subjects and serum cholesterol level was positive and significant at the 1% level. Calculations from the 16-day food records showed that the two groups consumed very nearly the same amounts of all nutrients. Results of this study indicate that the higher serum cholesterol levels found in older women were related to age rather than to diet.

**The role of tocopherol content in the comparative stability of chicken and turkey fat.** E. P. Mecchi, M. F. Pool, G. A. Behman, M. Hamachi, and A. A. Klose (Western Utilization Research Branch, U. S. Dept. of Ag., Albany 10, Calif.). *Poultry Sci.* 35, 1238-1246 (1956). There was no appreciable difference in the fatty acid composition of depot fats between chickens and turkeys fed the same diet. It was concluded that tocopherols play a major role in establishing the stability of poultry fat. Additional measurements of induction periods of turkey fat before and after removal of tocopherol confirmed this conclusion.

**The isolation of n-stearyl- and n-palmitylsphingosines from beef spleen.** G. V. Marinetti and E. Stone (Dept. of Biochem., University of Rochester School of Medicine and Dentistry). *J. Am. Chem. Soc.* 79, 145-146 (1957). After crystallization of N-lignocerylsphingosine from chloroform-methanol extract of beef spleen, it has been possible to isolate a ceramide fraction containing N-stearyl- and N-palmitylsphingosines. Elementary analyses of this fraction before and after reduction are given. Identification of the amides was made on the basis of elementary analysis, and by chromatographic identification and infrared spectroscopy of the fatty acids obtained after hydrolysis.

**The metabolism of glyceride-glycerol.** L. I. Gidez and M. L. Karnovsky (Division of Biochem. Medical Dept., Brookhaven National Lab., Upton, N. Y.). *J. Biol. Chem.* 223, 293-306 (1956). The metabolism of glyceride-glycerol has been studied after oral administration of tributyrin or triolein labeled with  $\text{C}^{14}$  in the glycerol moiety. After 1 or 2 hours the absorption of the triolein was approximately the same, i.e.,  $74 \pm 2$  per cent had been absorbed, while  $95 \pm 4$  per cent was absorbed by the end of 4 hours. Absorption of tributyrin was nearly complete at this time. At the end of 4 hours approximately one-quarter of the absorbed glyceride-glycerol of triolein had been oxidized. During the first hour lipolysis appeared to be considerable, amounting to about 12 per cent of lipide absorbed. After 2 and 4 hours the indices of lipolysis had risen to approximately 14 and 52 per cent, respectively. During the second hour after lipide administration a plateau was reached with respect to absorption, lipolysis, and disappearance of labeled lipide from the intestinal wall. In the third and fourth hours these activities were greatly increased. Free  $\text{C}^{14}$ -glycerol was isolated from the contents of the lumen of a rat sacrificed 2 hours after administering glycerol-labeled triolein. Also found in the lumen of rats killed after 1 and 2 hours were

phosphatides whose relatively high specific activity suggested that they were formed from glycerides.

**The value of rapeseed oil meal and sunflower seed oil meal in chick starter rations.** G. J. Klain, D. C. Hill, H. D. Branion and Jean Gray (Dept. of Nutrition, Ontario Ag. College, Guelph, Ontario, Canada). *Poultry Sci.* 35, 1315-1326 (1956). Investigations were conducted on the value of commercial rapeseed oil meal and sunflower seed oil meal as replacements for soybean oil meal in chick broiler rations.

**Vitamin A and carotene stability in feeds containing antioxidant-treated animal fats.** A. J. Siedler, E. Enzer and B. S. Schweigert (American Meat Institute, Univ. of Chicago, Chicago, Ill.), and R. W. Riemenschneider. *J. Ag. and Food Chem.* 4, 1023-1029 (1956). Experimental storage tests were conducted on the effect of antioxidant-treated animal fat in increasing the stability of vitamin A, carotene, and the fat in commercial poultry feeds. Antioxidants tested were 2-(and 3-) *tert*-butyl-4-hydroxyanisole (BHA); 6-ethoxy-2,2,4-trimethyl-1,2-dihydroquinoline (Santoquin); BHA plus 2,5-di-*tert*-amylhydroquinone (DAH); 2,6-di-*tert*-butyl-p-cresol (BHT); BHA plus BHT; and N,N'-diphenyl-p-phenylenediamine (DPPD). All the antioxidant treatments were effective in increasing the vitamin A, carotene, and fat stability over that observed when non-stabilized fat or no fat was added. Santoquin was shown to be the most effective of the antioxidants tested at the 0.02% level, followed closely by DPPD, BHT, and BHA plus BHT.

**The influence of dietary carotene on the mortality pattern of fowl with some observations on the influence of condensed fish solubles.** R. Coles (Ministry of Agr., Fisheries and Food, Horseferry Rd., London, S.W. 1), R. F. Gordon, L. G. Chubb and F. Cumber. *J. Sci. Food Agr.* 7, 692-9 (1956). An investigation is reported on the incidence of mortality from avitaminosis-A and the depression in egg production consequent upon feeding laying stock with vitamin A-deficient rations. This stock was particularly susceptible to fowl paralysis and avian leucosis. No consistent correlation was found between deficiency of vitamin A and the incidence of paralysis and avian leucosis. Low levels of carotene (500 I. U. vitamin A per lb. of feed) delayed but could not prevent mortality and depression in egg production. Supplementation of a vitamin-A deficient diet with fish solubles increased mortality from avitaminosis-A and further depressed egg production. Fish solubles caused similar effects when the diet contained higher levels of vitamin A. The undesirable effect of the fish solubles is ascribed to destruction of carotene by a factor occurring in the water-soluble part of the protein.

**Method of fortifying grain products.** M. Mateles and P. F. Widmer (Hoffmann-LaRoche, Inc.). *U. S. 2,775,521*. A method for fortifying grain products is described. The grain is dusted with a mixture of vitamin C and an edible higher fatty acid. The vitamin-enriched particles are then covered with an edible, water-repellant coating.

**Vitamin products.** M. Hochberg and M. J. MacMillan (Nopco Chemical Co.). *U. S. 2,777,797*. Preparation is described of a highly stable fat-soluble vitamin product consisting essentially of small solid spheroidal particles containing (a) normally solid wax-like material having a melting point of at least  $45^\circ$ , (b) vitamin A or D, (c) vegetable flour, and (d) antioxidant. These ingredients are mixed, melted, and formed into droplets in which a, b, and d form a solid solution in which particles of c are suspended. The final product passes through a 10-mesh screen and is retained on 100.

**Stable fat-soluble vitamin containing composition.** M. Hochberg and M. J. MacMillan (Nopco Chemical Co.). *U. S. 2,777,798*. Similar to U. S. 2,777,797 except that in this case (c) is an edible surface active material.

## • Drying Oils and Paints

Raymond Paschke, Abstractor

**The evaluation of some fungistats for paint.** M. H. M. Arnold and H. J. Clarke (S. Dryup & Co., Copenhagen). *Oil Colour Chemists' Assoc. J.* 39, 900 (1956). The source of mould growths on painted surfaces is discussed. Although moulds can grow on paint films, most occurrences arise either from growth on a nutrient substrate deposited on the film or from growth through the paint film from a colony underneath. The former situation is relatively rare and does not strictly concern the paint technologist. In the latter situation the physical substrate is nearly always some type of masonry. A method

of evaluation is described which involves the growth of mould through a paint film from an infected masonry substrate. It requires no special equipment nor mycological training. Fifteen compounds were examined in emulsion paint by the technique. Tri-n-butyltin hydroxide was outstanding, giving complete inhibition of mould for 138 days at 1 part in 4,000, and substantial inhibition at 1 part in 64,000. Zinc chloride had good activity, but four chlorinated phenols and three organic mercurials were greatly inferior. Organic mercurials appear to have little to commend them. Long-chain quaternary ammonium salts deserve further study.

**A method of determining brush ability by instrumentation.** E. Berberian *et al.* (Carpenter-Morton Co.). *Off. Dig.* 26(382), 1037(1956).

**Water-soluble polycarboxylic acids from oxidation of coal-tar pitch.** G. R. Boreham and R. H. J. Hammett (North Thames Gas Board, London). *J. Appl. Chem.* 6, 329(1956). A medium soft pitch has been oxidized in oxygen at elevated temperature and pressure in the presence of strong alkali to yield a complex mixture of water-soluble aliphatic acids and aromatic polycarboxylic acids in about 30% yield based on carbon. By chromatography of the methylated hydrocarbons obtained from the acids and from infra-red spectra, it is concluded that these acids have mainly polynuclear structures.

**Some answers to industry's questions on fast-drying coatings.** W. O. Bracken, F. E. Piech, and H. G. Philips (Hercules Powder Co., Wilmington, Pa.). *Off. Dig.* 28(280), 794(1956).

**Precondensation of epoxy resins.** P. Bruin (Shell Lab., Amsterdam). *Kunststoffe* 45, 383-6(1955). A method is described to improve the flow and film-forming characteristics of some surface-coatings based on epoxy resins in which the final hardening reaction takes place partially during the manufacturing of the coating. The process, termed "precondensation," and the reactions involved are discussed. The process can also be used to improve the compatibility of epoxy and phenol-HCHO resins. (*C. A.* 50, 5306)

**The blistering of paintwork on telescopic gasholders.** J. W. Chilver (North Thames Gas Board, Fulham, Eng.). *Oil Colour Chemists' Assoc. J.* 39, 912(1956). Certain pigments, in particular calcium plumbate, when incorporated in linseed-oil-based undercoats, were found to mitigate the formation of blisters in multi-coat paint systems immersed in water. The nature of the pigment in the finishing coat was also found to influence blister-formation. Experiments are described which demonstrate these properties. The work has indicated more suitable paint systems for gas-holder steelwork subject to water immersion.

**New developments in chemicals for emulsion paints.** H. D. Cogan (Mellon Inst.) and D. F. Clarke. *Off. Dig.* 28(280), 764(1956).

**Studies in fire-retardant paints III. Chlorinated alkyd paint systems.** R. C. Crippen *et al.* (Crippen and Erlich Labs., Baltimore). *Off. Dig.* 28(382), 942(1956). The present paper encompasses primarily chlorinated alkyd systems with various pigment modifications as tested by the Stick and Wick method. Chlorinated alkyds were prepared using tetrachlorophthalic acid and linseed oil. Excellent paint systems were prepared using varying amounts of antimony oxide, titanium dioxide, and magnesium silicate. As found in previous investigations, the higher the antimony oxide/organic chloride ratio, the better the fire retardant properties of the paint. Additional tests were conducted to measure the effects of organic nitrogen, zinc borate, and barium sulfate. The best fire retardant paint (Burn Index 14) contained antimony oxide/barium sulfate: 1/1 in a chlorinated alkyd vehicle. The poorest paint (Burn Index 75) contained titanium dioxide in an urea-formaldehyde vehicle.

**Catalysts. XI. The role of autoxidation processes in the formation of films of drying oils.** Z. Csuros, Z. Hajócs, and G. Deák (Tech. Univ., Budapest). *Acta Chim. Acad. Sci. Hung.* 2, 213-30(1952) (in English). (*C. A.* 50, 5305)

**Unsaturated polyester resins in surface coatings.** L. W. J. Damen (Novadel Ltd.). *Paint Manuf.* 26, 407(1956). As a basis for surface coatings unsaturated polyester resins have the advantage that the solvent, styrene, is also a film-former, so that thick coats can be obtained in one application. In this paper the author discusses the formulation of such surface coatings and in particular considers the difficulties arising from the limited pot-life of the prepared finish.

**The adhesive properties of epoxy resins.** N. A. de Bruyne (Aero Res. Ltd., Cambridge, Eng.). *J. Appl. Chem.* 6, 303(1956). Epoxy resins derived from bisphenol and resorcinol have been examined as to their adhesive properties in the presence of

phthalic anhydride as hardener. From studies of their dielectric behavior, the effect of hydroxyl-group content and molecular weight in their monomolecular properties and their adsorption on to aluminium foil, it is concluded that the hydroxyl groups play a decisive part in anchoring the molecules to a (polar) surface. There was very good correlation (significant at the 1% level) between hydroxyl content and nominal breaking strength of joints on an aluminium alloy, and it was shown that the shrinkage of resin mixtures on cooling decreased with hydroxyl content.

**Testing paints by outdoor exposure. 2. Assessment of film deterioration.** C. R. Edwards (Ministry of Supply, Eng.). *Paint Manuf.*, 26, 411(1956).

**Principles of paint testing.** A. C. Elm (New Jersey Zinc Co., Palmerton, Pa.). *Off. Dig.* 28(380), 752(1956).

**Exposure characteristics of clear finishes for exterior wood surfaces.** N. Estrada *et al.* (Reichhold Chemicals, Inc., San Francisco). *Off. Dig.* 26(382), 1001(1956). Twenty-six resins, including oil, varnishes, alkyds, modified oils, and latexes, were formulated into clear finishes for exterior wood surfaces. Selected resins of the series were further modified to show the effect of fungicides, light stabilizing additive, colloidal iron oxide stain-pigmented first coat, silicone resin and type of wood substrate, resulting in 79 different combinations being exposed. The majority of panels were redwood, with red cedar and white pine being secondary. Two-coat and three-coat systems were exposed, all self-primed. Results are reported for 12 months' exposure.

**The search for an incompatibility test.** R. Evans *et al.* (Cleveland). *Off. Dig.* 26(382), 985(1956). This paper is the first of a series on the subject of the effects of compatibility on film properties. It concerns itself with quantitative evaluation of degrees of incompatibility. Compatibilities of chlorinated rubber-alkyd and alkyd-alkyd systems were evaluated by solution transmittance, film transmittance—both densitometry and by viewing with direct and scattered light—and by low magnification photomicroscopy.

**New titanate coatings.** R. J. Fabian. *Materials and Methods* 43(6), 120-2(1956). Aluminum-pigmented titanate paints can be used continuously at temperatures up to 1100°F. Zn-pigmented titanates have good resistance to atmosphere and salt-water corrosion and to marine atmosphere. Titanate-modified, cellulose acetate butyrate lacquer coatings with improved heat and solvent resistance are available. (*C. A.* 50, 11027)

**Development of emulsion gloss paints.** A. C. Fletcher and J. E. O. Mayne (Vinyl Products Ltd., Carsholton, Surrey, Eng.). *Oil Colour Chemists' Assoc. J.* 39, 923(1956). The paper describes development work on gloss paints based on polyvinyl acetate emulsions.

**The improvement of drying oils by silent electric discharge. I. Under the medium of hydrogen gas.** M. Gotoda (Japan Railway Tech. Research Inst., Tokyo). *J. Electrochem. Soc. Japan* 23, 641-6(1955). Linseed and calamary oils are ameliorated by high-frequency silent discharge under a low-pressure H atmosphere with or without Ni catalyst. In this process, a glass Siemens-Ozonizer is used under 500 or 1,000 cycles, and 6 or 11 kilovolt current. The viscosity of these oils increases rapidly in the later stage of the reaction, saponification and acid value change slightly, and I value decreases linearly with reference to reaction time. Change of diene value shows that isomerization of oils develops in the earlier period and weakens in the later period of the reaction; it becomes stronger with Ni catalyst than without it. The film properties of electropolymerized linseed oils are superior to heat-bodied oils, especially in the waterproofness and alkali resistance. The films of high-viscosity calamary oil are free from yellowing and after-tack. (*C. A.* 50, 11029)

**Notes on non-yellowing oils, especially tobaccoseed oil.** J. H. Greaves (Youngusband, Barnes & Co., Ltd., London). *Oil Colour Chemists' Assoc. J.* 39, 934(1956).

**A new look at tung oil.** J. Greenfield (Tung Oil Cooperates, Poplarville, Mississippi). *Paint Ind. Mag.* 71(12), 16(1956). A discussion is given of new treatments for tung oil including hydroxylation, reaction with isocyanates, epoxidation, diene synthesis, and beta and gamma irradiation.

**A new film thickness measuring instrument.** H. A. Harriman (General Electric Co.). *Am. Paint J.* 41(9), 80 (1956).

**A new method for assessing the resistance of paint films to fungal growth.** W. R. Hindson and J. R. Rischbieth (Maribyrnong, Victoria). *Australia, Dept. Supply, Defence Standards Labs.*, Rept. No. 219, 1-9(1955). (*C. A.* 50, 11027)

**Rosin derivatives in surface coatings IV. Modification of rosin with phenol and phenol-formaldehyde condensates.** N. R. Kamath and G. D. Shetye (Univ. of Bombay). *Paint India* 6(7), 23(1956). The reactions between rosin and phenols, such as *m*-cresol, resorcinol, *o*- and *p*-methylol phenol, phenol-formalin and phenol paraform, have been systematically investigated. Methods are described of obtaining pale colored glyceryl esters, with melting points ranging from 118° to 125°, suitable for use in oil varnishes.

**Microbiological factors in paint preservation.** P. F. Kleins and J. F. Lang (Heyden Chem. Corp.). *Oil Colour Chemists' Assoc. J.* 39, 887(1956). Attention is drawn to the increasing awareness of mould growth as a factor in paint deterioration. Reference is made to the numerous organisms found on painted surfaces, the widely differing conditions under which they flourish, and the several ways in which they affect the paint film, varying from a surface discoloration capable of temporary removal by washing or wiping to severe disintegration of the whole film. Unless a paint is soundly formulated, even costly high percentages of fungicide will not render it wholly mould-resistant. Various laboratory and field methods are described for evaluating paint fungicides, and test results reviewed in the light of the characteristics of the ideal fungicide. In exterior finishes mercurials are particularly effective while for interior work both mercurials and copper quinolinolate show good performance.

**Extender pigments in blister-resistant house paints.** J. Knutson et al. (Frost Paint and Oil Corp.). *Off. Dig.* 26(382), 1078(1956).

**Terephthalic-glycerol polyesters as film formers.** A. I. Kogan and M. M. Kitaigorodskii (Communications Inst., Odessa). *Zhur. Priklad. Khim.* 29, 628-32(1956). Condensation of terephthalic acid with glycerol in 1:2 to 1:10 weight ratios gave solutions of polyesters in excess glycerol, which, on dilution with H<sub>2</sub>O, precipitated the polyesters proper. Direct condensation of 1:18 mixtures gave similar polyesters. Formulation of terephthalic acid, glycerol, and fatty acids of sunflower or linseed oils gave resins of alkyd type. Films of such resins, especially formulated with sunflower acids, show a high order of hardness and elasticity. (*C. A.* 50, 11031)

**A wide-range thin-film recording viscometer.** C. C. Mell (Blundell, Spruce and Co., Ltd., Hull, Eng.). *Oil Colour Chemists' Assoc. J.* 39, 832 (1956).

**Grapeseed oil and its transformation into a drying oil.** J. M. Marines Moreno, J. Huesa Lopez, A. Fernandez Lissen, and J. M. Martinex Suarez. *10th Congr. intern. ind. agr. y. aliment. Madrid, 1954*, 1045-52 (English summary). The drying properties of grapeseed oil can be improved by oxidizing the oil with moist air in the presence of MnO<sub>2</sub>, then dehydrating to give a product with higher I no.; oxidation and dehydration are carried out in the presence of a small amount of *m*-dinitrobenzene to prevent polymerization. Transesterification of the original oil with a polyalcohol such as pentaerythritol also gives a product with greater drying properties. (*C. A.* 50, 16130)

**Exposure characteristics of latex stucco paints.** R. Minucciani (W. P. Fuller Co., South San Francisco). *Off. Dig.* 28(280), 816(1956). Commercial development of the various competitive latex types has been so rapid that no general background of experience on their use in stucco-type paints is available to the average paint formulator. This is especially true as regards exposure data on typical stucco surfaces. To provide unbiased data of this type, the recommended formulations of the various latex manufacturers were made up and exposed. Paints were applied to: (1) a stucco surface, (2) a "Bondex"-coated surface, and (3) wooden panels primed with an oil-base primer. Results are reported after 16 months' exposure.

**Formulating industrial finishes. 2. Melamine resins.** C. H. Morris (B. I. P. Chemicals Ltd., Eng.). *Paint Manuf.* 26, 422 (1956).

**Chemical and spectroscopic studies of epoxy resin reactions in the surface coating field.** L. A. O'Neill and C. P. Cole (Paint Res. Sta., Teddington, Eng.). *J. Appl. Chem.* 6, 356(1956). Esterification of epoxy resins with fatty acids at 260° occurs in two stages (1) addition of one fatty acid molecule to an epoxy group to form a hydroxy-ester, (2) esterification of the original and of the so-formed hydroxy groups. The curing process of epoxy resins with amines has been studied by infrared spectroscopy, and by measurement of the material produced which is non-extractable by solvents. The combined data provide some indication of the curing mechanism.

**Deterioration of protective coatings due to molds and bacteria.** R. R. Pfohl et al. (Armstrong Paint and Varnish Works, Chi-

cago). *Off. Dig.* 28(382), 954(1956). A bibliographic study. **Statistical methods in the coating industry.** J. W. Prane (National Lead Co., Philadelphia). *Paint & Varnish Production* 45(11), 39(1956). A review covering (1) statistical procedures, (2) fundamentals and tools, (3) interpretation and analysis and (4) application and development.

**The history, manufacture and uses of lithopone.** J. G. Rigg (Imp. Smelting Corp. Ltd., Avonmouth, Eng.). *Oil Colour Chemists' Assoc. J.* 39, 809(1956).

**The most recent experiences with butyl titanate.** G. Sachs (Titanges, m.b.H., Leverkusen, Ger.). *Verf. kroniek* 29, 140-4 (1956). The preparation and physical properties of monomeric and polymeric butyl titanates are described. The former is recommended mainly as chemical agent, the latter as binding agent for paints up to 650°, also in corrosion-preventing layers. The best results are obtained with priming colors containing fine zinc dust as pigment and body colors with fine aluminum powder. The importance of thorough treatment of the support is emphasized. 30 references. (*C. A.* 50, 16134)

**Factors affecting freeze-thaw stability tests of latex paints.** E. F. Schumacher et al. (Devoo and Reynolds, Louisville). *Off. Dig.* 26(382), 1021(1956).

**Comparative evaporation rates of paint solvents: II.** E. G. Shur et al. (New York). *Off. Dig.* 26(382), 1060(1956).

**The thermal polymerization of drying oils with non-conjugated double bonds.** P. Sigwalt (Ecole Super. phys. chim. ind., Paris). *Bull. soc. chim., France* 1955, 1643-50. The evidence for and against the Scheiber (*C. A.* 24, 978) and Kappelmeier mechanism (*C. A.* 27, 4425) (isomerization to conjugated double bonds form followed by Diels-Alder addition) for the thermal polymerization of nonconjugated drying oils is reviewed. The evidence against the mechanism is ascribed to inaccuracies in the analytical methods used. (*C. A.* 50, 5305)

**The chemistry of organic pigments.** A. Siegel and W. S. Struve (duPont Co.). *Am. Paint J.* 41(10), 90(1956).

**Blackening effect of hydrogen sulfide on exterior white house paints.** G. B. Ward et al. (Pittsburgh). *Off. Dig.* 26(382), 1089(1956). Results show that blackening can be avoided only by eliminating all lead pigments. Other factors affecting blackening are stated.

**An evaluation of anti-skimming agents in clear vehicles.** P. J. Whiteway, Jr. et al. (Philadelphia). *Off. Dig.* 26(382), 1083(1956).

**Esters of titanium and their use in paints. I. Preparation of polymeric butyl titanates.** G. Winter (Maribyrnong, Victoria). *Australia Dept. Supply, Defence Standards Labs., Rept. No.* 191, 1-9(1953). **II. Hydrolysis and film formation.** *Ibid.* 10-19. **III. Formulation and performance of butyl titanate paints.** *Ibid.* 20-32. (*C. A.* 50, 11028)

**Wrinkle drying oil siccative.** F. E. Drummond (Commonwealth Eng. Co., Dayton, Ohio). *U. S.* 2,744,832. This patent covers a wrinkle drying fatty oil siccative consisting of a mixture of fatty drying oil and conjugated mixed glycerides of keto polyethenoid C<sub>15</sub> fatty acids and isomeric eleostearic acids, the mixed glycerides constituting about 70% by weight of the siccative.

**Wrinkle drying oil siccative.** F. E. Drummond (Commonwealth Eng. Co., Dayton, Ohio). *U. S.* 2,744,833. This patent covers a wrinkle drying fatty oil siccative consisting of a mixture of fatty drying oil and conjugated fatty acid glycerides of hydroxy isomeric eleostearic acids, the latter fatty acid glycerides constituting about 60% to about 75% by weight of the siccative.

**Composition and method of extending drying oils.** M. W. Pickell (Kerr-McGee Oil Industries, Oklahoma City, Okla.). *U. S.* 2,748,011. This patent covers a composition comprising a fatty drying oil and from 20 to 60 per cent by weight of an essentially asphaltene-free resin-oil fraction of a bituminous material.

**Modified alkyd resin and process of preparing same.** J. H. Daniel, Jr., and R. T. Corkum (American Cyanamid Co.). *U. S.* 2,748,092.

**Screen vehicle comprising diphenyl, unmodified hydrogenated rosin, and its glycol esters.** W. C. Morris (Harshaw Chem. Co., Cleveland). *U. S.* 2,748,093.

**Direct esterification of glycosides with fatty acids.** J. P. Gibbons (Corn Products Refining Co., Argo, Ill.). *U. S.* 2,759,922. This patent covers a process for the production of fatty acid esters of glycosides, which comprises reacting a glycoside from the group consisting of methyl glycoside, ethyl glycoside, beta-



ethoxyethyl-beta-D-glucoside, allyl glucoside, methyl galactoside, methyl arabinoside with a free fatty acid containing 60 to 20 carbon atoms in the aliphatic chain at a temperature within the range of about 160° to about 300° until the desired degree of esterification is attained.

**Catalytic esterification of glycosides with fatty acids.** J. P. Gibbons (Corn Products Refining Co., Argo, Ill.). *U. S. 2,759,923*. This patent covers a process for the production of fatty acid esters of glycosides by the direct esterification of glycosides with free fatty acids, comprising heating a mixture of a glycoside, from the group consisting of methyl glycoside and allyl glycoside, and free fatty acid containing about 6 to about 22 carbon atoms in the aliphatic chain in the presence of an alkaline catalyst at a temperature within the range of about 160° to about 300° until the desired degree of esterification has been attained, and catalyst being from the group consisting of alkali metal hydroxides, alkaline earth oxides, alkali salts of weak acids, and alkaline earth salts of weak acids.

**Amino-amide-epoxy compositions.** S. O. Greenlee (Devoe-Raynold Co., Louisville, Ky.). *U. S. 2,760,944*.

**Epoxy resin coating composition.** H. A. Hampton and R. Hurd (Imp. Chem. Ind. Ltd.). *Brit. 747,607*. A finish of good flexibility, adhesion, and resistance to abrasion or chemicals is made by blending an epoxy resin, an alkyd containing more than 1% OH groups, and organic polyisocyanate. (*C. A.* 50, 12504)

**Drying-oil polymers.** W. Gumlich, W. Klein, and R. Hilpert (Chem. Werke Huls G.m.b.H.). *Ger. 912,150*. Drying oils or their derivatives containing reactive double bonds are copolymerized with arylefins in the presence of alkylbenzenes containing at least 8 C atoms in the alkyl radical to give clear copolymerizates suitable as starting materials in lacquer and printing-ink manufactured. Thus, styrene(1,000 parts) was added in about 10 hours into a solution of ricinine stand oil (1,000 parts), and technical undecylbenzene(1,000 parts) at 140-60°. The temperature of the mixture was raised in 26 hours to 200°. A clear, homogeneous, viscous solution containing only a small amount of monomer was obtained. Styrene was similarly copolymerized with a solution of isomerized linseed oil in undecylbenzene to give a homogeneous, clear, viscous liquid. (*C. A.* 50, 12503)

**Increasing the molecular weight of unsaturated compounds, especially drying oils.** H. P. Kaufmann. *Ger. 920,666*. Enlarging the molecules of unsaturated organic compounds, preferably drying oils or their mixtures with unsaturated compounds, by polymerization, condensation, or diene synthesis in the presence of complex metal salts takes place in the absence of water and in the presence of a suitable solvent and a small amount of a basic substance, e.g. aniline or toluidine. (*C. A.* 50, 11685)

## • Detergents

Lenore Petschaft Africk, Abstractor

**Continuous detergent sulfonation.** Anon. *Soap & Chem. Specialties* 33(1), 119, 121, 123(1957). Detergents of high uniformity and excellent color can be manufactured by treating alkanes in a continuous sulfonating plant by the "Sulfan" process. This "Sulfan" process overcomes two of the main problems found in batch sulfonation: localized overheating of the reaction mass and consequent charring of the final detergent and violent changes in viscosity and pH. This new process uses a principle by which small quantities of the reactant materials are reacted, diluted, or dispersed before they become part of the bulk reactant mass. In the continuous system, sulfonation itself is performed in two steps, the sulfonation reaction followed by further treatment in a homogenizer, and then the material is diluted, separated and neutralized. A diagrammatic outline of the process is included.

**The effect of synthetic detergents on the biological stabilization of sewage.** L. Barden and P. C. G. Isaac (Univ. of Durham, Newcastle, Engl.). *Manuf. Chemist.* 27, 509(1956). In British sewage plants, it was found that in the practical concentration range, synthetic detergents cause impaired filter performance by the strain thrown on the biological system by overloading it with material chiefly of a carbonaceous nature. Of the properties peculiar to synthetic detergents, suppression of oxygen-transfer rates is likely to impair filtration. It appears likely that the activated-sludge process is more sensitive to synthetic detergents and critical concentrations may be lower.

**Hydrolytic degradation of polyphosphates in liquid detergent formulations.** W. B. Bennet and T. L. Liss (Monsanto Chemical Co., Everett, Mass.). *Soap & Chem. Specialties* 33(1), 44-7, 177(1957). The properties of the various commercial polyphosphates with respect to hydrolytic degradation in typical liquid all-purpose detergent formulations are discussed. Factors involved in the degradation include the chain length of the polyphosphate, the concentration, the pH of the medium, the temperature, and the presence of other salts or substances in the system. It was found that the lowering of the pH increases the rate of hydrolytic cleavage while an increase in temperature accelerates the reaction.

**Skin-washing agents.** W. Blaiich and U. Gerlach. *Fette, Seifen, Anstrichmittel* 57, 33-6(1955). The cleansing action of skin-washing agents, such as fine soaps and wetting agents, was studied in much the same way as textile cleaners are studied, none of the methods hitherto used for testing skin cleansing agents having been sufficiently reproducible. The method includes a uniform procedure for soiling the skin and special washing apparatus for standardizing the washing step. (*C. A.* 51, 743)

**Transparent soap manufacture in India (free from animal fat).** T. K. Das (Banaras Hindu Univ., India). *Indian Soap J.* 22, 78-85(1956). The nature and preparation of transparent soaps are reviewed. It has been shown that coconut oil and sugar solution should be used in limited quantities, otherwise the quality of transparent soaps will deteriorate. It is now necessary to add extra glycerine in a charge, as the glycerine produced from the fatty materials during the process of soap making is sufficient to impart emollient property to the soap. Inclusion of castor oil in a fat charge imparts glossiness and brilliance to the soap, and can be used effectively in limited quantity. Alcohol should not be excluded completely from a charge by using extra amounts of castor oil, sugar solution, and/or glycerine. Refined mahua oil can replace stearic acid (or tallow) successfully without deteriorating the quality of the soap.

**Setting of the gels of sodium oleate and stearate in some organic solvents. I. Time and temperature of setting.** K. B. Deshpande and K. P. Buch (Inst. Sci., Bombay). *J. Indian Chem. Soc.* 33, 321-2(1956). Study of the time and temperature of setting of gels of Na oleate in Nujol, pinene, xylene and of Na stearate in Nujol and benzyl alcohol showed that the time of setting for any concentration depends on the rate of cooling and that the setting temperature of a given system is constant and independent of the rate of cooling, but increases with increase in the concentration of the soap in the system. II. *Ibid.* 346-50. The cooling curves of the solutions of Na oleate and Na stearate in Nujol show that heat is evolved during gelation. The heat of gelation was calculated for gels of different concentrations under various rates of cooling. The values of the ratio of the heat of gelation per g. mol. of soap to the temperature of setting in absolute units are very nearly constant, independent of the rate of cooling and the concentration of the soap. (*C. A.* 51, 45)

**Formulating liquid detergents from alkyl benzene sulfonates.** J. Payne and I. W. Preston (Monsanto Chemical Ltd., Fulmer, Bucks, Engl.). *Manuf. Chemist* 27, 500-502(1956). The use of liquid instead of solid detergents is favored in a number of applications in industry because of its advantages in measuring quantities and ease of solution. Many domestic users would prefer liquid detergents for their instant solubility in cold or slightly warmed water. It has been shown that a number of methods can be used to obtain concentrated liquid detergents based on tetrapropylene benzene, and other alkyl benzene sulfonates. Various formulations for 12%, 25% and 40% active compounds are given.

**The role of the detergent-active substance in the washing process.** H. Schwerdtner. *Textil-u. Faserstofftech.* 6, 371-5(1956). The author discusses the problem of free and bound portions of the detergent-active substances at pH 7 and 11 in the absence or presence of soil, the effect of polyphosphate addition, and the quantitative desorption and concentration relationships in the rinsing processes. The values obtained for the changes in the concentration of an alkyl sulfate solution give valuable information as to the adsorption processes taking place.

**Evaluation of the mechanical efficiency of washing methods.** S. V. Vaecck, A. van Nuffel, and G. Wouters-Vanlook. *Teintex* 21, 605-33(1956). The influence of mechanical agitation on soil removal was studied on four standard soiled test fabrics in an industrial machine carrying a normal load of lightly soiled whites and in a Launderometer with 50 steel balls per

container in order to reach an agitation comparable with practice. At a given level of agitation, the soil removal in both machines obeys the Bacon-Smith law—log (concentration of soil in fabric) varies inversely with log(washing time) in a single wash, or with log(number of washes) for a multiple treatment. The law does not hold for the first few minutes of washing, during which period the intensity of agitation plays an important part. After 5 minutes, this factor ceases to exert much influence.

**Methods of analysis for synthetic detergents.** J. Ruiz Cruz. *Grasas y Aceites* 7, 243-250(1956). A summary of the more frequent methods of analysis for synthetic detergents. Quantitative and qualitative methods for the three types of detergents, both for single substances and for mixtures are reviewed. Only the analyses of active products are considered.

**Chemical bleachers in laundry products. II.** L. Mauri. *Grasas y Aceites* 7, 251-254(1956). Continuing a previous article on this subject, the author describes the actions of such chemicals as hydrogen peroxide, sodium perborates, percarbonates, etc. Several formulations for commercial products containing these substances are given.

**Non-caking alkyl aryl sulfonate detergent compositions.** A. H. Lewis and R. D. Stayner (California Research Corp.). *U. S.* 2,773,833. A substantially non-caking, solid, particulate detergent composition consists of a mixture of a detergent material such as the sodium salt of a monoalkyl benzene sulfonic acid having from 9 to 18 carbon atoms in the alkyl chain, inorganic sodium salt builder and from about 0.5 to about 10% by weight of a sulfonate material such as sodium benzene monosulfonate and sodium toluene monosulfonate which prevents caking of the mixture.

**Shampoo compositions containing monomethylol dimethyl hydantoin.** H. Henkin (Colgate-Palmolive Co.). *U. S.* 2,773,834. The incorporation of small amounts of monomethylol dimethyl hydantoin in shampoo compositions which contain water-soluble anionic sulfate and sulfonate salts prevents the darkening of the shampoo caused by bacterial decomposition. The composition has excellent stability, is non-irritating to the skin and has good foaming properties.

**Liquid shampoo composition.** A. F. Anderson (Colgate-Palmolive Co.). *U. S.* 2,773,835. A liquid shampoo composition having improved resistance to phase separation on standing comprises about 5 to 45% of a water-soluble salt of a sulfated monoglyceride of higher fatty acids as a detergent, from about 0.5 to 25% of urea, and the balance being water, the composition having a pH of between 5.5 to 7.0.

**Manufacture of alkyl aryl sulfonates.** J. W. Putt. *U. S.* 2,773,896. An economical method of producing anionic surface-active compounds comprises simultaneously alkylating and sulfonating a mixture of aromatic hydrocarbons with an olefin in the presence of sulfuric acid in a single reaction zone, agitating until alkylation and sulfonation are completed, adding water in amounts and under conditions to effect layer separation of free sulfuric acid, unsulfonated oil and alkyl aryl sulfonic acid, separating the layers, recovering the alkyl aryl sulfonic acid and neutralizing the sulfonic with basic material to form the corresponding alkyl aryl sulfonates.

**Detergent bars.** P. Becher (Colgate-Palmolive Co.). *U. S.* 2,774,735. A detergent bar with improved processing properties and reduced tendency to slough consists of about 50% by weight of higher fatty acid water soluble soap, about 5 to 12% by weight moisture, about 5 to 30% of water soluble

salt of higher fatty acid monoglyceride monosulfate, about 3 to 7% of non-ionic detergent comprising hydrophobic polyoxypropylene glycol of molecular weight at least 900 condensed with sufficient ethylene oxide to prepare a water soluble product, and about 0.5 to 3% of a polymeric material prepared by adding propylene oxide to ethylene diamine and then adding ethylene oxide.

**Enhancing the solubility of anion-active compounds.** Bohme *Fettschemie. Brit.* 757,937. The solubility in cold water of organic anionic surface-active compounds is increased by mixing them with an organic electro neutral salt obtained by treating an anionic surface-active compound containing an aliphatic radical of  $>5C$  and a sulfonic acid ester or sulfonic acid group with an organic cationic surface-active onium compound containing an aliphatic radical of  $>3C$ . Thus the solubility of alkyl sodium sulfate is increased by addition of a little dodecyl pyridinium chloride.

**Improvements in the production of detergent compositions.** L. L. F. Deadman (Ashe Laboratories, Ltd.). *Brit.* 758,020. A foamed detergent composition is prepared by adding to a concentrated aqueous solution of a synthetic detergent having foaming characteristics and free acid, a powdered carbonate or bicarbonate which, in the presence of water, will liberate carbon dioxide on contact with the acid.

**Cleansing means for the human body and method for its manufacture.** E. E. Olsson (Liljeholmens Stearinfabriks Aktiebolag). *Brit.* 758,215. A cleansing composition which will not dry out hair and hands consists of the isopropylamine salt of a  $C_{12}$  alkyl sulfuric acid, preferably in the form of an aqueous solution containing 10 to 25 per cent of the salt.

**Improvements in detergent composition.** L. McDonald. *Brit.* 759,136. The addition of not more than 2% by weight of a water insoluble ethyl cellulose ether affects the physico-chemical properties of water-soluble soaps and organic non-soap detergents. A composition consisting of the ether dispersed in a high molecular weight synthetic non-soap detergent, an alkali metal soap of a high molecular weight fatty acid and a Ca or Mg soap disperser may be used to impregnate materials for use as metal cleaning tissues.

**Improved detergent compositions.** Margaret A. A. Wilson (Monsanto Chemicals, Ltd.). *Brit.* 759,143. An improved detergent composition especially effective for washing wool consists of an ionic detergent and an alkyl monoamine having only one alkyl group containing 7 or more carbon atoms which forms a molecular complex with the ionic detergent.

**Improvements in the manufacture of floating toilet soaps.** J. Rouget and L. Rouget. *Brit.* 759,161. Bars of soap with longitudinal perforations useful in the production of floating soap are manufactured continuously by extrusion through a device by which the ends of the cake are closed without excessive pressure on the central portion, thus avoiding crushing and collapsing the perforations.

**Improvements in liquid detergent compositions.** Atlas Powder Co. *Brit.* 759,877. An improved dishwashing detergent consists of mixtures of nonionic and anionic detergents. For example, mixtures of from 25 to 75% by weight of polyethylene glycol ethers of alkyl phenols or plurally branched tridecyl alcohols and from 75 to 25% by weight of an amine salt of an alkyl aryl sulfonate are used in typical formulations.

**Antiseptic detergent compositions.** Monsanto Chemical Co. *Brit.* 760,210. An antiseptic detergent composition consists of a major proportion of a detergent either in solid or liquid form and a minor proportion of a 4,5-dihalogenosalicylanilide.