ABSTRACTS . . . . R. A. Reiners, Editor

• Oils and Fats

S. S. Chang, Abstractor
Sini'tiro Kawamura, Abstractor
Dorothy M. Rathmann, Abstractor

The effect of sunlight on crude lipids extracted from fresh and frozen vegetables. F. A. Lee(N. J. Agr. Exp. Stn., Rutgers Univ., New Brunswick, N. J.). *Food Research*, 21, 254–63 (1956). The effect of sunlight at 10,000 foot candles intensity on the extracted crude lipids prepared from certain vegetables was investigated. After varying periods of exposure to sunlight, the crude lipids from raw vegetables gave a more rapid increase in peroxide number than those crude lipids which had been extracted from the corresponding blanched samples, except in lima beans. The peroxide values usually reached higher peaks for unblanched material as contrasted with corresponding blanched material similarly exposed. However, in the case of the crude lipid extracted from lima beans, the reverse seems to be true. It seems that delayed chain reactions are not involved. The data suggest that the effective wavelengths are in the visible range.

The antioxidant properties of spices in foods. J. R. Chipault, G. R. Mizuno, and W. O. Lundberg(The Hormel Inst., Univ. Minn., Austin, Minn.). *Food Technol.* 10, 209–11(1956). The antioxidant properties of spices have been studied in ground pork, two types of mayonnaise and a French dressing. Allspice, cloves, sage, oregano, rosemary, and thyme increased the stability of all the fat substrates in which they were tested, but the relative effectiveness of the spices varied with the different substrates. Sage and rosemary have previously been found to be much more effective than the other spices in lard alone. Cloves were a powerful antioxidant in simple oil-water emulsions and in ground pork. Oregano was most effective in mayonnaise and French dressing.

Effect of different fats and oils and their modification on changes during frying. Marion Bennion and Flora Hanning (Univ. Wis., Madison, Wis.). *Food Technol.* 10, 229–32(1956). The addition of monoglycerides to continuous process lard to be used in frying French-fried potatoes immediately lowered the smoke point, which tended to increase somewhat as frying proceeded. Fat absorption was evidently not influenced by the added monoglycerides. A continuous process lard, as compared to a steam rendered lard, maintained a higher smoke point and lower free fatty acid content with the frying of potatoes or fritters. The presence of an antioxidant exerted some effect on peroxide values, but none on smoke point or free fatty acid content. In a comparison of the changes produced in different fats and oils by frying fritters, the trends of increased acidity and lowered smoke point and peroxide values were found to be similar for all fats tested under these small scale conditions. Palatability tests by panel judges did not consistently distinguish between the flavor and odor of fritter balls fried in fresh or greatly used fats. Neither were preferences for fritters fried in one fat above another apparent from the flavor and odor scores.

Infra-red studies of sterculic acid and some related compounds. J. P. Verma, Sharda Das Gupta, Bhola Nath, and J. S. Aggarwal. *Jour. Indian Chem. Soc.* 33, 111–18(1956). Methyl esters of four carboxylic acids related to sterculic acid were synthetically prepared. Their infra-red absorption spectra along with those of sterculic and dihydrosterculic acids were examined. All afforded absorption bands in the 9.9 μ region, characteristic of the *cyclo*propane ring. The presence of bands due to unsaturation in sterculic acid and their absence in the two synthetic *cyclo*propene acids indicate that the constitution of sterculic acid as ω-(2-*n*-octyl*cyclo*prop-I-enyl)-octanoic acid is most probably not correct. The iodine and diene values of sterculic acid and the above compounds also lead to similar conclusions.

Milk to butter or fat in uninterrupted flow. H. Davis and D. C. Roahen(The Creamery Package Mfg. Co., Fort Atkinson, Wis.). *Food Engineering* 28, 50–2(1956). Flexible, continuous line at Wisconsin plant makes uniform quality butter or long-keeping anhydrous fat directly from fresh whole milk. Carefully engineered system minimizes labor, makes sanitizing easy.

Application of crystalline urea adducts to the realm of fat chemistry. VII. The abnormal character of diglyceride adducts. J. M. Martinez Moreno, F. Mazuelos Vela, and C. Janer. *Fette-Seifen-Anstrichmittel* 57, 652–6(1955). Crystalline urea adducts of the diglycol esters of butyric, caproic, caprylic, capric, lauric, myristic, palmitic, and stearic acids (except butyric and caproic which could not be made) were prepared and their composition determined. The relation between chain length and the mole ratio of urea to ester is normal for the glycol esters and the monoglycerides but is abnormal for the diglycerides. This is explained by assuming that the diglyceride crystallizes in the urea lattice in a folded form; thus its chain length is halved. (*C. A.* **50**, 5308)

Recent analytical methods for investigating the composition of oils and fats. M. Filajdic(Univ. Zagreb). *Kemija u Industriji*(Zagreb) 4, 41–50(1955). A review with 16 references. (*C. A.* **50**, 5308)

The role of oxidized compounds in the determination of acid and saponification values of tall oil. P. Kirjakka and Viljo Tammela(Finland Inst. Technol., Helsinki). *Paperija Puu* 36, 497–500(1954). The oxidized compounds originally present or formed during the analysis were the principal cause of variations in acid and saponification values of isolated tall oil fatty acids. Presence of air in drying the samples caused changes in saponification values, but reliable results were obtained by drying *in vacuo* or in an inert gas. Analytical differences occur because of the different alkali consumption caused by absorption on the surface of glass of new *vs.* used apparatus. (*C. A.* **50**, 5307)

Behavior of branched fatty acids at the lipide-water interface. Hedwig Kromphardt(Univ. Kiel, Ger.). *Biochem. Z.* 327, 20–31(1955). The *dl* 2- to 11-methyllauric acids, lauric acid, and tridecanoic acid were compared for their effects on interfacial tension in a water-liquid paraffin system. The side chain reduced the surface effect of the acid. With an acidic or neutral aqueous phase the effect of a substituent was greatest at position 2 and this effect diminished with removal of the substituent further from the carboxyl group. This effect was attributed to a change in hydration of the molecule. With an alkaline aqueous phase a side chain at position 2 increased the effectiveness of the fatty acid. The pH dependence of this effect showed that the side chain at position 2 did not influence the dissociation of the carboxyl group. (*C. A.* **50**, 5050)

Compound formation in binary fatty-acid mixtures. M. Fieldes and L. Hartman(Dept. Sci. Ind. Research, Wellington, N.Z.). *Proc. Roy. Soc.*(London) **A233**, 195–202(1955). Long crystal spacings and short spacings of C_{12}–C_{14}, C_{14}–C_{16}, and C_{16}–C_{18} fatty acid mixtures were determined in a high-resolution x-ray diffractometer. Spacings changed significantly in relation to the composition of the mixtures. Changes in spacings are attributed to limited intersolubility of the component fatty acids and partial compound formation. Numerical correlation seems to indicate a shortening of the distance between alternate C atoms of the higher-melting component in mixtures containing 30 to 70 molecular % of this component. X-ray data do not seem to support a complete intersolubility of fatty acids, but are consistent with some degree of compound formation that could explain the inflection in the solidification piont curves. (*C. A.* **50**, 4580)

Separation of synthetic normal and iso-fatty acids. N. K. Man'kovskaya. *Masloboino-Zhirovaya Prom.* **21**(8), 25–8 (1955). Synthetic C_{15}–C_{21} fatty acids distilled from oxidized paraffins contain 31% paste-like iso-acids with an unpleasant odor. There are 1.6 times more of Me groups in the iso-acids than are in the normal acids of the same molecular weight. This mixture separates into solid and liquid fractions when it is slowly cooled from 60 to 28° at the rate of 2° per hour. (*C. A.* **50**, 5309)

Composition of pili-pulp and pili-pulp oil from the fruit of Canarium ovatum. Lilia T. Maranon, Aurelio O. Cruz, and Angelita M. Tuason(Inst. Sci. Technol., Manila). *Philippine J. Sci.*, 83, 359–63(1954). Pili-pulp is very similar in composition to avocado and very nutritious on account of the oil, carbohydrates, and protein it contains. The pili-pulp oil is very similar to that of pili-nut (kernel) oil and American cottonseed oil and it is suitable for the manufacture of edible products, soap, and other purposes for which cottonseed oil may be employed. (*C. A.* **50**, 5309)

Determination of the iodine number of vegetable oils. Ubaldini and F. Capizzi-Maitan(Politecnico, Milan). *Chimica e indus-*

tria **37**, 943–5(1955). In this work the iodine number of vegetable oils is determined by a new method with a simple reagent, iodine in CCl_4 plus $Hg(OAc)_2$. Approximately 0.2 g. oil (for iodine number below 120) or approximately 0.1 g. for oils of higher iodine number are dissolved in 15–20 ml. CCl_4 in a 300-ml. glass-stoppered flask. Thirty ml. of $0.1N$ iodine in CCl_4 and 15 ml. of 3% $Hg(OAc)_2$ in glacial AcOH are added, and the flask is let stand in darkness 10 minutes at room temperature. For linseed and castor oils this period is extended to 1 hour. At the end of this period 75 ml. of 7.5% aqueous KI is added, the flask is agitated, and excess iodine is titrated with $0.1N$ $Na_2S_2O_3$, a blank being run simultaneously. (*C. A.* **50**, 5310)

Studies concerning the processing of whale liver oil by the use of liquid ammonia (I, II). Extraction of whale liver oil by means of liquid ammonia and its reaction (I). Ichiro Itai. *Reports Res. Lab. Nippon, Suisan Co., Ltd.*, **7**, 102–8(1956). The possibility of vitamin A liver oil concentration through extraction of whale liver oil and its unsaponifiable matter with liquid ammonia was examined. The effectiveness is small when direct extraction is made; but through the extraction of unsaponifiable matter, vitamin A can be concentrated without any production of fatty acid amide.

The oxidation mechanism of abietic acid and its salts with oxygen. M. M. Pavlyuchenko. *Uchenye Zapiski Beloruss. Univ.* **1953**(14), 29–37; *Referat. Zhur. Khim.* **1954**, No. 47839. The rate of oxidation of crystalline abietic acid passed through 2 maximums of which the first corresponded to 4%, and the second to 15%, of reacted oxygen. Temperature coefficient of the first maximum was 1.75. In the oxidation of amorphous abietic acid no maximums were observed, and the temperature coefficient of this reaction was 5.8. The amount of oxygen combined with amorphous abietic acid is half the amount for crystalline abietic acid, and the oxidation product contained one double bond. The oxidation of Mg abietate had an induction period, after which the rate of reaction passed through a maximum. The rate of oxidation was proportional to the oxygen pressure to the exponent 0.45. Diluting the oxygen 2–3 times with nitrogen did not affect the rate of reaction. When the water of crystallization was removed, the rate of reaction increased 6.3-fold. At 70° and higher the reaction was characterized by evolution of heat. The oxidation of Ca, Ba, Pb, Li, Na, K, and Ag abietates was similar but at a lower rate. Of the salts of the metals of Group I, Ag abietate was oxidized fastest, while K abietate was not oxidized below 100°. (*C. A.* **50**, 5379)

Spoilage of fat and antioxidants. H. Raeithel(Inst. Lebensmitteltech., Munich, Ger.). *Fette-Seifen-Anstrichmittel* **57**, 799–806(1955). A review with 36 references. (*C. A.* **50**, 6071)

The changes of frying oil by cooking. I. Kovo Higuchi. *J. Home Econ.*(Japan) **5**(4), 14–15(1955). Iodine number, acid number, and refractive indices of a variety of frying oils of animal and vegetable origin before and after cooking are studied. It is shown that on cooking a decrease of Iodine number in an early stage is followed by an increase in Iodine number and an increase of acid number is followed by decrease in acid number. (*C. A.* **50**, 5932)

Glyceride structure of the fixed oil from the seeds of Gnetum scandens. K. V. Nair and N. S. Varier(Central Research Inst., Trivandrum). *Bull. Central Research Inst., Univ. Travancore*, Trivandrum. Ser. **A**, **4**, 13–17(1955). The glyceride structure of the nonvolatile oil from the seeds of *G. scandens* is reported. The oil extracted with light petroleum ether (b.p. 30–80°) from the air-dried, powdered seed-kernel had the following constants: specific gravity (30°) 0.911; *n* 1,4694; acid value 13.98; saponification value 190.8; iodine value 83.9; acetyl value 28.0; palmitic acid 12%; stearic acid 54.66%; oleic acid 30%; linoleic 3.33%. The glyceride structure of the oil is as follows: tristearin 2.81; distearoölein 56.3; oleostearopalmitin 38.8; dioleopalmitin 0.5; dioleostearin 1.6; triolein 0.0%. (*C. A.* **50**, 6073)

Determination of residual gasoline in extracted oils and extract cakes. A. Purr and A. Hettich(Inst. Lebensmittel-tech., Munich, Ger.). *Fette-Seifen-Anstrichmittel* **57**, 782–9(1956). The method has been improved by using glacial or dilute acetic acid to aid in removal of gasoline from extracted oils and hull cakes. A Perlick apparatus is recommended for the determination of the gasoline in preference to adsorption on activated charcoal. (*C. A.* **50**, 6073)

Calorimetric studies on melting behavior of fats and oils. L. Riedel(Inst. Lebensmittelfrischhalt., Karlsruhe, Ger.). *Fette-Seifen-Anstrichmittel* **57**, 771–82(1955). An adiabatic calorimeter is described which is used to determine the dependency of specific heat on temperature for 27 different fats in the range —50 to 40°. (*C. A.* **50**, 6073)

Adsorption isotherms of unsaturated fatty acids. I. G. Di Modica and S. Tira(Univ. Turin, Italy). *Ann. chim.*(Rome) **45**, 343–53(1955). Adsorption isotherms of the acids oleic, linoleic, and linolenic from acetone solutions on alumina are given at +20°, 0°, and —40°. Plots of log (molecules adsorbed by 1 g. alumina) vs. log (initial concentration of acid) were parallel straight lines with slightly greater distances at lower temperatures. Linolenic acid at —40° was an exception by exhibiting an increased slope and crossing the oleic acid and linoleic acid functions below $0.1M$; this is ascribed to insolubility of linolenic acids. In accord with previous postulates, the order of increasing adsorption is linolenic, linoleic, oleic (except for precipitation of linolenic at —40°). Chromatographic separation is preferable at lower temperatures and higher concentrations. (*C. A.* **50**, 5363)

β-Sitosterol from the unsaponifiables of the fatty oil from the seeds of Mucuna pruriens. K. S. Madhavan Pillai and R. Anantaraman(Central Research Inst., Trivandrum). *Bull. Central Research Inst., Univ. Travancore, Trivandrum*, Ser. A, **4**, 41(1955). The unsaponifiable portion of the fatty oil from the seeds of *M. pruriens* contained β-sitosterol, m. 140–1°, $[\alpha]_D^{28} = -35.5°$ ($CHCl_3$). The acetate melted 128–9° and had $[\alpha]_D^{28} = -42°$ ($CHCl_3$). (*C. A.* **50**, 6073)

Studies on the fixed oil of Calophyllum inophyllum. I. K. G. Das and P. P. Pillay(Central Research Inst., Trivandrum). *Bull. Central Research Inst., Univ. Travancore, Trivandrum*, Ser. A, **4**, 1–8(1955). The oil has the following constants: specific gravity at 28°, 0.9174; solidifying point 4°; melting point 8°; index of refraction (28°) 1.4659; saponification value 212; iodine value 86; Reicher-Meissl value 0.18. The unsaponified portion formed 0.25% and was identified as sitosterol.

II. *Ibid.* 9–11. The total acid resin obtained in the purification of the oil of *C. inophyllum* was investigated for free fatty acids. It was found to contain oleic acid, palmitic acid, stearic acid, and linoleic acid. (*C. A.* **50**, 6073)

Tortoise oil. N. Aval. *Revue Francaise des Corps Gras* **3**, 105–107(1956). The author discusses the use of tortoise oil as a constituent of certain cosmetic preparations. It is pointed out that with care the extraction of oil from the tortoise gives a product suitable for preparations for the face and scalp.

Use of micro-organisms for the production of fatty acids. R. Garcia, M. A. S. Lafont, and J. M. Garrido. *Revista de Ciencia Aplicada* **48**, 13–21(1956). The authors give the results of experiments of 22 different species of *Penicillium* with the nutritional systems used to grow the micro-organisms, and the values for both the growth as a surface and as a submerged culture. The authors report that they intend to give further study to the following species: *P. purpurogenum*, *P. spiculisporum*, *P. oxalicum*, *P. delae*, and *P. charlesii* and also special studies on *P. lanosum*.

Gas-liquid chromatography: separation and identification of the methyl esters of saturated and unsaturated acids from formic acid to n-octadecanoic acid. A. T. James and A. J. P. Martin(National Inst. for Medical Research, The Ridgeway, Mill Hill, London, N.W. 7). *Biochem. J.* **63**, 144–152(1956). Separation of micro amounts of methyl esters of saturated fatty acids from C_1 to C[illegible] at 78.7° or 100° and of esters of saturated and unsaturated acids from C_5 to C_{18} at 197° have been carried out by gas-liquid chromatography. Good separation of normal and *iso-* or *anteiso*-saturated acids is obtained, and mono- and di-unsaturated acids can be resolved from the corresponding saturated acids on 4 ft. columns. Methods are presented for distinguishing between saturated and unsaturated acids by chromatographic behavior before and after chemical modification. Application of the technique to some natural fats is described, showing the existence of odd-numbered saturated acids and odd- and even-numbered unsaturated acids from C_5 to C_{19}.

A comparative study of acetone-water solvents as compared with various other solvents for extraction of peanut oil. M. Loury. *Rev. Francaise des Corps Gras* **3**, 93–104(1956). Results are given for peanut oils after extraction from various solvents. The 12 tables and 8 figures provide exact values for the various solvents and the author shows the effect of the different percentages of water in the acetone upon the amount and quality of peanut oil extracted.

Polarographic study of alkyl hydroperoxides. D. A. Skoog and A. B. Lauwzecha(Dept. of Chem., Stanford University, Stanford, Calif.). *Anal. Chem.* **28**, 825–828(1956). The polarographic behavior of alkyl hydroperoxides was investigated systematically in order to define the most suitable conditions for their determination. Seventeen examples of these compounds varying from four to nine carbon atoms in chain length were investigated. Aqueous alcohol solutions of various compositions were used as solvents in this work. Several supporting electrolytes were investigated, and, of these, sulfuric acid was found to be the most satisfactory. The best polarographic waves were obtained with the compounds of higher molecular weight.

Partition chromatography of aliphatic acids. Quantitative resolution of normal chain even acids from C_{12} to C_{24}. F. A. Vandenheuvel and D. R. Vatcher (Fisheries Research Board of Canada, Halifax, Nova Scotia, Can.). *Anal. Chem.* **28**, 838–845 (1956). Reversed-phase chromatography on a silane-treated silicic acid column, with 2,2,4-trimethylpentane (iso-octane) as stationary phase and aqueous methanol as eluting solvent, allows the quantitative resolution of mixtures of even-numbered, normal-chain saturated fatty acids in the range C_{12} to C_{24}. Less than 50 mg. of mixed acids are needed. The elution and titration of the seven acids require about 5 hours. Individual components representing 10% or more of the mixture are determined with an error not exceeding 2.5%. An almost comparable degree of accuracy is attainable for minor components (1 to 3% of the total mixture), when a procedure involving a complementary analysis is followed.

On the thermal dissociation of organic compounds. X. The effects of the solvents (amines and fatty acids) on the thermal dissociation of urethans. T. Mukaiyama and Y. Hoshino (Dept. of Physics and Chem., Gakushuin Univ. Tokyo, Japan). *J. Am. Chem. Soc.* **78**, 1946–1948 (1956). The rate constants of the thermal dissociation of urethans in amine and fatty acid solvents have been measured. The dissociation of urethan proceeds through the double transfer of a proton under the influence of both a basic and an acidic medium. The mechanisms of dissociation of urea and urethan are similar to those of carbonyl addition compounds, i.e., the carbonyl-forming elimination reaction. It can be shown that these amphoteric compounds dissociate in the presence of either basic or acidic catalysts.

Use of periodic acid for detecting and locating ethylenic unsaturation. A. Chatterjee and S. G. Majumdar (University College of Science and Technology, Calcutta, India). *Anal. Chem.* **28**, 878–879 (1956). Periodic acid has proved to be a promising reagent in the detection and location of both terminal and exocyclic double bonds in organic molecules. Like ozone, this per acid oxidizes unsaturated compounds by splitting the —C=C— grouping. The resulting products are carbonyl derivatives which can be readily characterized and estimated as their 2,4-dinitrophenylhydrazones or dimethones. The yield of the aldehydic or ketonic fragments thus obtained corresponds to that calculated from the number of double bonds present.

A quantitative study of the autoxidation of methyl elaidate and methyl oleate by infra-red spectroscopy. J. Gold (Acton Technical College, London W. 3). *Research Correspondence* **9**, S19–S20 (1956). The course of the autoxidation of methyl elaidate and methyl oleate at 120° by gaseous oxygen in the presence of uranium catalyst was investigated by infra-red spectroscopy. The results show that the initial step is the formation of an unsaturated hydroperoxide whose concentration increases to a maximum and then decreases. The production of unsaturated ketone, epoxide and acid occurs at a slightly later stage and is followed by the appearance of hydroxyl groups. The unsaturated ketone and epoxide concentrations reach a maximum and then decrease, whereas the hydroxyl concentration increases steadily to a limiting value. These data are discussed briefly in terms of molecular structure and mechanism of reactions.

Report on foreign fats in dairy products. The Reichert-Meissl and Polenske determinations. T. J. Klayder and S. D. Fine (Food & Drug Admin., Dept. Health, Educ., & Welfare, Denver, Colo.). *J. Assoc. Off. Agr. Chemists* **39**, 355–8 (1956). Directions in the Official Method have been revised to include the specification of the use of a round-bottom distilling flask. Preliminary data on the effect of pressure on Reichert-Meissl and Polenske values indicate the need for further study.

Report on dairy products. W. Horwitz (Food & Drug Admin., Dept. Health, Educ., & Welfare, Washington 25, D. C.). *J. Assoc. Off. Agr. Chemists* **39**, 343–5 (1956). The advantages and limitations of the sterol acetate method for detecting the presence of vegetable fats in butterfat are reviewed briefly. The probable correlation between Reichert-Meissl and Keeney chromatographic methods for the determination of butyric acid in butterfat is indicated. Various recommendations concerning methods for dairy products are made.

Report on foreign fats in dairy products. Sterol acetate test. J. H. Cannon (Food & Drug Admin., Dept. Health, Educ., & Welfare, St. Louis 1, Mo.). *J. Assoc. Off. Agr. Chemists* **39**, 359–65 (1956). A collaborative study was made of the sterol acetate test with samples of 100% butterfat, 80% butterfat-20% hydrogenated coconut oil, and 90% butterfat-10% hydrogenated cottonseed oil. The method can be relied upon to detect the presence of 10% cottonseed oil with a high degree of certainty. Coconut oil adulteration, even as high as 20%, may sometimes escape detection perhaps because some grades of coconut oil contain very little phytosterol. However, the test will often detect coconut oil in amounts of 10%. Further study is needed on the determination of melting points of cholesterol-sitosterol mixtures over a range of concentrations, and variations in melting points due to varying concentrations of vegetable fat in butterfat.

Report on chromatographic procedures for foreign fats in dairy products. Determination of the mole per cent of butyric acid in fat. Constance Anglin and J. H. Mahon (Food & Drug Directorate, Dept. Natl. Health & Welfare, Ottawa, Ontario, Canada). *J. Assoc. Off. Agr. Chemists* **39**, 365–71 (1956). Directions are given for a modified chromatographic determination of the mole per cent of butyric acid in butterfat. A collaborative study of several grades of silicic acid showed excellent correlation of results. The procedure is recommended for adoption as first action.

The effect of farm practices on cream quality in the manufacture of butter. F. Hillig and R. C. Jordan (Food & Drug Admin., Dept. Health, Educ., & Welfare, Washington 25, D. C. and St. Louis, Mo.). *J. Assoc. Off. Agr. Chemists* **39**, 454–68 (1956). Individual cans of cream coming to a creamery often originate on farms where the practice is to make daily additions of new cream to cream being stored until a sufficient quantity accumulates for economical delivery to the creamery. The purpose of this investigation was to study at eight different farms the effects of this practice on the condition of the cream and on the development of water-insoluble fatty acids (WIA). Data show that the organoleptic characteristics of decomposition in stored cream can be masked by the addition of new cream. Stirring or not stirring when new cream was added made little difference in the development of decomposition in held cream. WIA due to decomposition, although reduced by the addition of new cream low in WIA, in some instances remained relatively high even though the dilution masked organoleptic signs of decomposition.

A hydroxamate method for characterizing milk fat. R. Bassette and M. Keeney (Dairy Dept., Univ. Maryland, College Park, Md.). *J. Assoc. Off. Agr. Chemists* **39**, 469–75 (1956). A procedure for determining the hydroxamic acid index of milk fat is described. The fatty acids resulting from the hydrolysis of the fat are converted to hydroxamates which are then partitioned between acetone-chloroform and aqueous isopropyl alcohol. Hydroxamic acids in the aqueous layer are reacted with ferric chloride and their concentration measured colorimetrically at 525 mμ. The hydroxamic acid index showed a high degree of correlation with the mole per cent of butyric acid in the milk fat. Use of the method for detecting adulteration of milk fat with corn and coconut oils is suggested.

Report on oils, fats and waxes. G. Kirsten (Food & Drug Admin., Dept. Health, Educ., & Welfare, New York 14, N. Y.) *J. Assoc. Off. Agr. Chemists* **39**, 290 (1956). It is recommended that the studies on spectrophotometric methods, on the determination of color in margarine and antioxidants in fats and oils, and on quantitative methods for peanut oil be continued.

Report on gossypol in feeds. Interference of feed constituents in the determination of free gossypol. C. L. Hoffpauir and W. A. Pons, Jr. (Southern Regional Research Lab., New Orleans, La.). *J. Assoc. Off. Agr. Chemists* **39**, 300–5 (1956). The recovery of free gossypol from cottonseed meal added to a typical mixed chick feed was investigated. The use of 70% acetone for the extraction of gossypol was unsatisfactory because of interference from other soluble constituents of the feed. Substantially higher gossypol recoveries were obtained with 90% methyl ethyl ketone in the presence of chelating agents which eliminate interference by metal ions. However, less than 90% of the added gossypol was recovered. In view of the known disappearance of free gossypol from mixed feeds, the low recoveries may indicate that some of the gossypol is bound, degraded or otherwise reacted with the feed constituents and rendered non-extractable.

Report on crude fat in feeds. H. H. Hoffman(Florida Dept. Agr., Tallahassee, Fla.). *J. Assoc. Off. Agr. Chemists* 39, 294–7(1956). Because large quantities of soluble carbohydrates in feeds are believed to interfere with complete extraction of the fat, a collaborative study was made of methods for a preliminary extraction of water. Further work is needed to determine whether the preliminary water extractino should be retained or deleted from the method for crude fat. No satisfactory means is known for deciding which feed samples should be given such a preliminary washing.

Process of packaging dried fruit. J. E. Snyder and R. J. Swartz (The Goodyear Tire & Rubber Co.). *U. S. 2,744,019.* Dried fruit to be packaged in a heat-sealable thermoplastic film is coated with a 0.05 to 5.0% by wt. solution of phosphate in water, and then dried.

Isolation of fatty acids from guayule resin. J. W. Meeks and T. F. Banigan, Jr.(U. S. A., Secy. Agr.). *U. S. 2,744,125.* The resin is saponified with aqueous alkali at 20 to 100°. The nonsaponifiable substances are removed by extraction with a water-immiscible fat solvent. Fatty acids are then recovered by acidification of the soap solution.

Glyceridic mixtures exhibiting unique properties and process for their production. R. O. Feuge, E. J. Vicknair and K. S. Markley(U. S. A., Secy. Agr.). *U. S. 2,745,749.* A mixture containing at least 50% of monoglycerides (glyceryl monostearate, monopalmitate and mixtures thereof) is acylated with an unsubstituted saturated alkanoic acid containing 2 to 4 carbons. The reaction is continued until the product has a hydroxyl value of 15 to 200, and a residual monoglyceride content of 0.1 to 30%.

Method of making margarine. S. I. Shafer, A. R. Gudheim and W. H. Schmidt(Lever Brothers Co.). *U. S. 2,745,750.* The initial fat stock is mildly cooled and agitated so as to precrystallize the higher melting glycerides. The mixture is then supercooled by rapid chilling. Finally, at least part of the aqueous ingredients are blended with the supercooled material.

Oleomargarine mixing package. R. S. Steinbock(Hammock Package Ltd.). *U. S. 2,745,754.* A flexible, translucent mixing package for coloring margarine is described.

Method of making stabilized tall oil. M. G. Bestul(West Virginia Pulp & Paper Co.). *U. S. 2,745,827.* A tall oil stabilized against crystallization is obtained by treating the tall oil with a soap-forming alkali and heating the mixture so as to reduce the moisture content below 1% without reducing the acid number below 100.

Method of rendering animal fats. W. R. Dayen and K. M. Christensen(Hygrade Food Products Corp.). *U. S. 2,745,856.* A method of continuously rendering fats consists in successively grinding the tissue coarsely, heating it to a temperature sufficiently high to melt the fat but not to coagulate the tissue, coagulating the proteins by heating the mixture under pressure, grinding the mixture finely, and separating the fat.

Detoxified cottonseed oil foots. F. C. Pack and L. A. Goldblatt (U. S. A., Secy. Agr.). *U. S. 2,746,864.* Cottonseed oil foots containing less than 0.02% free gossypol are detoxified by heating in a closed vessel at 210 to 220° for 1 to 3 min.

Soybean oil refining process. E. F. Werly(Pillsbury Mills, Inc.). *U. S. 2,746,867.* A process for the production of a nonreverting edible soy oil is described. Crude soybean oil containing soluble phosphatides and free fatty acids is hydrated, and precipitated phosphatides are removed. The resulting oil, having a phosphatide content of 0.023 to 0.3% is steam-deodorized at temperatures between 200 and 400°F. and a pressure of 5 mm.

Condiment composition. Grace Ellis. *U. S. 2,746,869.* A condiment and food preparation consists of a mixture of pulverized spices, coconut juice, and peanut oil.

Antioxidant composition. H. R. Kraybill(trustees of American Meat Institute Foundation). *U. S. 2,746,870.* Lard is stabilized by the addition of not over 0.01% of a mixture of 2-*tert*-butyl-4-hydroxyanisole and 3-*tert*-butyl-4-hydroxyanisole.

Activated fatty oil composition for use in tin plating. L. Rosenstein and M. H. Gorin. *U. S. 2,746,884.* Plates as they emerge from the molten tin pass through a surface layer of a fatty non-drying oil containing 1 to 20% of a resinous substance such as rosin, wood rosin, hydrogenated rosin, rosin esters, the rosin fraction of tall oil, and rosin treated with paraformaldehyde.

Recovery of water-soluble inositol compounds and sterol glycosides. D. Perlman and M. Mattikow(B. Clayton; Refining, Uninc.). *U. S. 2,746,957.* A process is described for the recovery of water-soluble inositol compounds from vegetable oil phosphatides containing bound inositol and sterol glycosides. The crude phosphatide is treated with a solution of alkali in a lower (not over C_5) aliphatic alcohol. The insoluble materials containing the water-soluble inositol compounds are separated from the hydrolyzate, and the inositol compounds are isolated by extraction with water.

Unsaturated fatty acids. E. Nebe(Badische Anilin- & Soda-Fabrik Akt. Gesellschaft). *Ger. 851,184.* The known process of preparing unsaturated fatty acids by splitting off H halide from halo-substituted fatty acids with excess alkali or alkaline earth-metal hyroxides or carbonates at elevated temperature and pressure is improved by working in the presence of liquid water. Thus, chlorinated fatty acid 250 from the paraffin oxidation (Cl 16.4%, D_{50} 1.05), with water 200, and $Ca(OH)_2$ 125 parts pressure-heated 5 hrs. at 150°, the mixture acidified with aqueous HCl, and the separated fatty acids steam-distilled give a mixture of unsaturated fatty acids, acid number 243, iodine number 85, particularly suitable as olein substitute in soap manufacture. Treating similarly chlorinated stearic acid (Cl 13.2%) with 33% aqueous NaOH 5 hrs. at 200° gives a mixture of unsaturated fatty acids, acid number 191, iodine number 69. (*C. A.* 50, 4198)

Unsaturated fatty acids by oxidation of hydrocarbons. A. Imhausen and K. H. Imhausen(Märkische Seifen-Industrie and Karl Heinz Imhausen). *Ger. 871,008.* Hydrocarbon mixtures, such as paraffin, hydrogenation products of CO, etc., are oxidized until at least 25% HO acids are formed and water is then split off from HO acids at elevated temperatures and pressure in the presence of metal compounds to give unsaturated fatty acids. The hydrogenation product, b. 300–430°, (100 kg.) from the Fischer-Tropsch synthesis treated with air at 140° in the absence of catalysts, until a saponification number of 200 is reached, the product mixed with 2% $ZnCl_2$ pressure-heated (5 atm.) at 250°, saponified, and the unsaponifiable constituents removed by extraction gives 48 kg. fatty acid, iodine numberr 70. (*C. A.* 50, 4199)

Fatty acids and their esters having conjugated double bonds. H. P. Kaufmann and J. Baltes. *Ger. 905,976.* Esters of fatty acids having an isolated system of double bonds are converted to those having a conjugated system of double bonds by treating with mono- or dichlorourea in the presence or absence of inert solvents and splitting off HCl from the chlorine containing reaction products by heating in vacuo, optionally in the presence of silica gel. (*C. A.* 50, 4199)

Surface films of β-hydroxy fatty acids. H. v. Hahn and F. Grün(Univ. Basel, Switz.). *Helv. Chim. Acta.* 38, 1803–9 (1955). Unimolecular films of β-hydroxypalmitic acid, β-hydroxystearic acid, and β-hydroxyarachidic acid were studied with a film balance. The limiting areas of these compounds are 85, 72, and 41 square Angström units per molecule. The force-area curves of substituted fatty acids are discussed. (*C. A.* 50, 5366)

Esters of cinnamic alcohol with fatty acids. Maria Teresa Gonella and F. G. Abbattista(University of Turin). *Gazz. chim. ital.*, 85, 561–8(1955). The esterification reaction of $PhCH{:}CHCH_2OH$ with the acid chlorides of higher fatty acids was studied either in aqueous alkali or in pyridine. Also studied were the ultraviolet spectra of the esters and their di-Br derivatives. $PhCH{:}CHCH_2OH$ esters and their m.ps. are cinnamyl palmitate, 47° (dibromo ester, 83°); cinnamyl myristate, 39–40° (dibromo ester, 72–3°); cinnamyl laurate (dibromo ester, 63°). *C. A.* 50, 4845)

Monoglycerides. I. Effect of the monoglycerides on the interfacial tension of oil. S. Tsuda and N. Wada. *Repts. Ind. Research Inst., Osaka Prefect,* (7/2), 45–6(1955). The interfacial tension of cottonseed oil containing monoglyceride was determined. Monolaurin and monomyristin were found the most surface active. Monoölein showed better results than saturated monoglyceride, especially in lower concentration. There were no significant differences among coconut oil, methyl oleate, and cottonseed oil as the oil phase.

II. Relation between the effect of monoglycerides in lowering the interfacial tension of oil-water interface and the kind of oils. *Ibid.* 47–8. The effectiveness of monoglyceride in lowering the interfacial tension of ester-water interface was mainly influenced by the length of C chain of the fat acid which composed the ester; the shorter the C chain of the methyl ester of the fat acid was, the less effective was the monoglyceride. Tests on methyl laurate, glycol dilaurate, and glyceryl trilaurate *indicated that the type of alcohol had no significant influence upon the activity of monoglyceride.*

III. Effect of the monoglycerides on the interfacial tension of various oils. *Ibid.* 49–51. Interfacial tension of various organic substances (cetane, dodecylbenzene, C_6H_6, Tetralin, Decalin, octyl caprylate, Bu laurate, and nonylphenol) containing monopalmitin were measured. Addition of the monopalmitin lowered the interfacial tension more markedly the greater the interfacial tension of the media. The surface area of a molecule of monopalmitin at the interface of oil and water was smaller the larger the interfacial tension of the media.

IV. Note on the emulsifying power of monoglycerides. *Ibid.* 52–3. A mixture of 8 volumes cottonseed oil containing 0.5% of water and 2 volumes of water was emulsified by shaking and the separation of water was observed; the activities of monoglyceride was weak and the water was separated perfectly on standing for 24 hrs. The monoölein was more active than the saturated monoglyceride, and their were no appreciable differences between the saturated monoglycerides.

V. Note on the viscosity of aceto-olein. S. Tsuda, B. Wada, and K. Tanaka. *Ibid.* 54–5. The viscosities of several acetoöleins were measured and the viscosity indices were calculated. Diacetoölein had low cloud and solidifying points and its viscosity index was smaller than that of neat's foot olein. The cloud and solidifying points of monoacetodiolein were low and its viscosity index was as high as that of neat's foot olein. Acetoöleins can be used as watch oil or for similar lubrications, alone or blended, and its stability may be superior to that of neat's foot olein.

VI. Hydroxylation of allyl stearate. S. Tsuda and N. Wada. *Ibid.* 56–8. Allyl stearate was easily converted into monostearin in 60% yield by heating it for 4–6 hrs. at 95° with glacial acetic acid 5 and 30% H_2O_2 1 part. Acetylation of hydroxylated allyl stearate gave diacetostearin. (*C. A.* **50**, 6073)

Metal complexes of higher fatty hydroxamic acids. I. Ferric complexes of higher fatty hydroxamic acids. 1. Goichi Kurono and Takeshi Sakai(Kanazawa Univ.). *J. Pharm. Soc. Japan* **75**, 576–9(1955). In order to examine the reaction of the hydroxamic acids of higher fatty acids and Fe^{3+} and other metals, the color reaction between the higher fatty hydroxamic acids of oleic acid and Fe^{3+} was studied. When absolute EtOH is used as the solvent, the complex with a 1:1 molar ratio of Fe^{3+} and fatty hydroxamic acids has an absorption maximum at 5250 Angström units, that with a 1:6 molar ratio has an absorption maximum at 4900 Angström units. Petroleum ether as a solvent does not yield the 1:1 complex. The color reaction of the fatty hydroxamic acids of oleic acid with Fe^{3+} can be utilized for the colorimetric determination of the fatty hydroxamic acids.

II. Ferric complexes of higher fatty hydroxamic acids. 2. *Ibid.* 580–2. Abstorption spectra were measured of the Fe^{3+} complex of the fatty hydroxamic acids of oleic, petroselenic, petroselaidic, and erucic acids, in molar ratios of Fe^{3+} to fatty hydroxamic acids of 1:1 and 1:6. Calculation of the energy difference between the fundamental state and the excited state indicated that the 1:1 complex was more unstable than the 1:6 complex.

III. Action of some organic reagents on the color of ferric complexes of higher fatty hydroxamic acids. *Ibid.* 583–5. The addition of acids, compounds having a coordinatively unsaturated oxygen atom, and compounds having highly negative groups in absolute EtOH solutions to mixtures of Fe^{3+} and the higher fatty hydroxamic acids of oleic acid in the molar ratios 1:1 and 1:6 effected disappearance or fading of the color of such solutions. Experiments were carried out with AcOH, lactic acid, Et_2O, Me_2CO, H_2O, and C_5H_5N as representative of the foregoing groups of compounds. The 1:1 complex was more easily affected by various substances than the 1:6 complex. This agrees with the previously reported fact that the 1:1 complex is more labile than the 1:6 complex. The change of the former into the latter before undergoing further change indicates that the bond in the 1:1 complex is severed. (*C. A.* **50**, 5522)

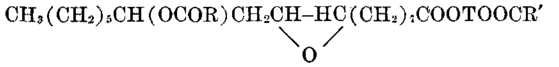
Process for preparing fatty acid partial esters of polyhydric alcohols. W. G. Alsop(Colgate-Palmolive Co.). *U. S. 2,744,124.* In a continuous process for the preparation of a product having a high monoester content, a polyester of a polyhydric alcohol is mixed with a polyhydric alcohol and passed through a reaction zone maintained at 200° to 350°and having a holdup time of no more than 7 min. The mixture is cooled immediately after removal from the reaction zone.

Acyl lactylic acid products. J. B. Thompson and B. D. Buddemeyer(C. J. Patterson Co.). *U. S. 2,744,825.* The apparent staling of yeast-leavened baked products is retarded by incorporating in the dough prior to baking from 0.1 to 1.0% (by wt. of flour) of a fatty acid lactylate composition of the general formula $RCO(OCHCH_3CO)_nOX$ in which RCO is the acyl radical of a C_{16-22} fatty acid, X is a cation, and n is 1 to 8.5.

Flour composition. J. B. Thompson and B. D. Buddemeyer (C. J. Patterson Co.). *U. S. 2,744,826.* Flour is intimately mixed with a fatty acid lactylate composition of the general formula $RCO(OCHCH_3CO)_nOX$ in which RCO is the acyl radical of a C_{16-24} fatty acid, n is 1 to 4, and X is a nontoxic cation.

Ester-acids from higher fatty acids and resin acids. F. H. Gayer. *U. S. 2,744,889.* Synthetic resin acids are prepared by the reaction of fatty acids containing at least 10 carbon atoms in the molecule with methylolated natural resin acids. The acid number of the product is close to that calculated for complete esterification and is not changed appreciably by heating at 225° for 1 hour.

Epoxidized acyl ricinoleates. J. Dazzi(Monsanto Chemical Co.). *U. S. 2,745,846.* The epoxidized acyl ricinoleates have the general formula



$$CH_3(CH_2)_5CH(OCOR)CH_2\underbrace{CH\text{–}HC}_{O}(CH_2)_7COOTOOCR'$$

in which R and R′ are C_{1-5} alkyl radicals, T is a C_{2-6} alkylene radical or a C_{4-8} alkyleneoxyalkylene radical. These products are obtained by reacting acylated ricinoleates with a mixture of hydrogen peroxide or perbenzoic acid and a C_{1-4} fatty acid.

Dehydrated castor oil fatty acids. W. A. Jordan(General Mills, Inc.). *U. S. 2,745,854.* A higher fatty acid is added to the castor oil fatty acids and the mixture is heated at 150 to 250° in order to form the estolides of the castor fatty acids. Heating the estolides at 250 to 300° then yields a mixture of dehydrated castor fatty acids and the added higher fatty acid, which may be separated by distillation.

Alkylene oxide condensate of discard palm oil. E. N. Case (Sinclair Oil & Gas Co.). *U. S. 2,745,855.* Discard palm oil is condensed with a C_2 or C_3 alkylene oxide to give a product having a weight ratio of alkylene oxide to oil of 0.2 to 2.5.

Fluid shortening composition. S. T. Cross and W. C. Griffin (Atlas Powder Co.). *U. S. 2,746,868.* The fluid shortening consists of an edible vegetable oil containing in suspension 2 to 10% of a baking improver selected from the group comprising polyoxyethylene ethers of solid fatty acid partial esters of hexitans and mixtures of these ethers with solid fatty acid partial esters of hexitans. The preferred ethers contain 2 to 20 oxyethylene groups per mol. The baking improver contains 55 to 70% by wt. of combined acyl radicals and at least 3% by wt. of combined oxyethylene radicals.

Process for isomerizing unsaturated fatty acids or derivatives. J. D. von Mikusch-Buchberg(Lever Brothers Co.). *U. S. 2,746,979.* Unsaturated fatty acids, their esters or glycerides are isomerized by heating at 80 to 220° for 5 min. to 10 hrs. in the presence of a supported nickel catalyst containing small amounts of selenium and tellurium.

Ketones. N. V. de Bataafsche Petroleum Maatschappij. *Brit. 723,280.* In preparing higher ketones by treating aliphatic alcohols and ketones in the presence of a dehydrogenation-dehydration catalyst, improved conversions are obtained over a period of time by a process comprising passing a mixture of an aliphatic or cycloaliphatic secondary alcohol containing 3–7 C atoms and an aliphatic ketone containing 3–7 C atoms in the vapor phase over an alumina-Cu catalyst at 240–300° and at a pressure above 175 lb./sq. in. gage. Under these conditions, conversions of at least 40% are obtained during continuous operating periods in excess of 100 hrs. without regenerating the catalyst. (*C. A.* **50**, 4198)

Functional derivatives of carboxylic acids. W. Reppe(Badische Anilin- and Soda-Fabrik Akt.-Ges.). *Ger. 869,203.* Olefins are treated with carbon monoxide and compounds having replaceable hydrogen atoms at elevated temperature and pressure in the presence of catalysts which consist of complex salts of metal carbonyl hydrogen acids containing complex cations, such as $[Fe(NH_3)_6]^{++}$, $[Fe(NH_3)_6]^{+++}$, $[Co(NH_3)_6]^{++}$, etc. Procedure for the preparation of the catalyst is given. $C_2H_5CONH_2$ is prepared from ethylene, $C_8H_{17}CONH_2$ from octylene, and a mixture of $C_2H_5COOCH_3$ and $(C_2H_5)_2CO$ from ethylene by this method. (*C. A.* **50**, 4200)

Monocarboxylic acids terminally substituted by halogen or the hydroxyl radical. G. Nischk and E. Müller(Farbenfabriken Bayer A.-G.). *Ger. 887,645.* Monocarboxylic acids terminally substituted by halogen or hydroxyl are obtained by treating monocyclic compounds containing one or several CONH radicals with nitrosating agents in a mineral acid at —10° to 60°. The products are suitable intermediates in the manufacture of linear polycondensation products, branched chain fatty acids, perfumes, and in the synthesis of polynuclear ring systems. (*C. A.* 50, 4198)

◆

• Biology and Nutrition

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

Vitamin A and sesame oil in vanaspati (edible hydrogenated oil). Lal Bahadur Mathur, K. S. Tilara, and Rajeshwar Sahai (Amrit Banaspati Co., Ltd., Ghaziafad, U. P.). *J. Indian Chem. Soc., Ind. & News Ed.,* 18, 123–5(1955). Vanaspati samples with and without added vitamin A were stored at 40°, and Baudouin test for sesamolin was applied periodically. The sesamolin in samples without vitamin is stable for 8 months and over; in vitamin-A fortified samples a trend towards deterioration appears from the first month. (*C. A.* 50, 5309)

Lipide metabolism. F. Lynen(Deut. Forschungsanst. Psychiat., Munich. Ger.). *Ann. Rev. Biochem.* 24, 653–88(1955). A review of 2 years' work. 237 references. (*C. A.* 50, 5879)

Metabolism of complex lipides. D. B. Zilversmit(Univ. of Tennessee, Memphis). *Ann. Rev. Biochem.* 24, 157–80(1955). A review of recent work on the absorption of phosphatides and on the phosphatides of blood, liver, and other tissues. 225 references. (*C. A.* 50, 5879)

Laboratory tests in the study of atherosclerosis. O. J. Pollak (Kent General Hosp., Dover). *Delaware State Med. J.* 24, 323–7(1952). A brief review and evaluation are given of the following methods: blood cholesterol, cholesterol tolerance, cholesterolysis and cholesterol saturation, cholesterol-phospholipide ratio, lipogram, chylomicron index and curve, lipoprotein molecules, cholesterol partition from lipoproteins, clearing of Na, and electrophoresis. (*C. A.* 50, 5818)

The use of fat in a weight-reducing diet. A. W. Pennington. *Delaware State Med. J.* 23, 79–86(1951). A review of the intermediate metabolism of carbohydrate and fat, as determined by biochemical investigations with tracer elements, indicates that carbohydrate should be severely restricted in weight-reduction diets. Energy production should be maintained by a liberal intake of dietary fat in conjunction with protein. (*C. A.* 50, 5109)

Blood fat in normal sucklings. C. Cipolloni(Univ. Pisa, Italy) and A. Paci. *Riv. clin. pediat.* 56, 366–77(1955). The following average values were found in 35 children 3–12 months old: total fat 515, phosphatide 188, glyceride 104, total steroids 128 (fraction *a* 39, *b* 114 (free 45), b_1 89, b_2 25) mg. %. No considerable differences were observed between naturally or artificially fed children (*C. A.* 50, 5129)

Lipoproteins of the cerebrospinal fluid; lipoprotein component of the rapid fraction X and the rapid protein of plasma. A. Baudouin, J. Lewin, and P. Hillion(Acad. méd., Paris). *Compt. rend. soc. biol.* 149, 1093–7(1955). Electrophoretic studies show normal human spinal fluid to contain a lipoprotein α and a lipoprotein X which migrates more rapidly than serum albumin. Some pathological spinal fluids also contain a β lipoprotein and a lipoprotein which migrates with the same velocity as serum albumin. There is some evidence that the rapid lipoprotein X contains both a lipoprotein and a glycoprotein component. (*C. A.* 50, 5117)

The spoilage of food fats and its inhibition. C. Franzke(Humboldt Univ., Berlin). *Urania*(Germany) 18, 392–4(1955). The biochemical mechanism of fat spoilage and its inhibition with alkyl-substituted hydroxyanisoles, nordihydroguaiaretic acid, and gallic acid esters are discussed. (*C. A.* 50, 5187)

The fate of ingested polyoxyethylene (20) sorbitan monostearate in rats. A. N. Wick(The Scripps Metabolic Clinic, La Jolla, California) and L. Joseph. *Food Research,* 21, 250–3 (1956). A method has been described for preparing in small quantities polyol labelled (C^{14}) polyoxyethylene (20) sorbitan monostearate. The oral administration of the above substance to rats showed that 6 to 10% of the polyol moiety is excreted in the urine and 2 to 7% recovered in the expired CO_2. The remainder of the polyol moiety was recovered in the feces. Negligible amounts of the C^{14} were recovered in the lymph fluid indicating that the amount of polyol moiety recovered in the feces has passed through the intestinal tract without absorption into the vascular system.

Studies on the nutritive value of whale oil (IV). Comparison of nutritive values of glycerides and methyl esters. Hisashi Fujii, Shunichi Okura and Mikio Mori. *Report Res. Lab. Nippon Suisan Co., Ltd.,* 7, 18–22 (1956). The nutritive values of whale oil, hydrogenated whale oil, and the methyl esters thereof were compared. The nutritive values of the glycerides did not agree with those of the methyl ester.

Studies on the nutritive value of whale oil (V). Seborrhea caused by sperm whale oil and oxidized soya oil. Hisashi Fujii and Shunichi Okura. *Ibid.,* 23–7. The occurrence of seborrhea in rats fed on sperm whale oil is already known. The authors found that the rats fed on oxidized soya oil have the same symptoms which were especially notable when fed on a diet of 20% oil content. The daily feeding of 10 gamma of biotin brought about no relief.

The importance of phytic acid and phytase in nutritional chemistry. S. O. Laurent(Univ. Helsinki). *Finska Kemistramfundets Medd.* 64, 12–22 (1955). The importance of phytic acid and phytase in human nutrition is discussed. The anticalcifying action of cereals is described as well as the methods for prevention of rickets with emphasis on the dietary habits among the Finns. 18 references. (*C. A.* 50, 5873)

Radioiodine recovery in feces, following an iodine-131 labeled fat test meal. A. P. Sanders, J. K. Isley, Kathryn Sharpe, G. J. Baylin, W. W. Shingleton, Jacqueline C. Hymans, J. M. Ruffin, and R. J. Reeves. *Am. J. Roentgenol., Radium Therapy, Nuclear Med.* 75, 386–9(1955). A comparatively simple procedure for determining fecal radioiodine recovery after ingestion of an I^{131}-labeled fat test meal is described. The average recovery for normal controls was 0.6%, but for clinically abnormal patients it was much higher (66.5% for sprue). The results of the fecal radioiodine recoveries, as a percentage of an ingested I^{131} labeled fat test meal, are very similar to chemical fecal fat recoveries as reported by other investigators. The technique described may serve as a new clinical test for steatorrhea. (*C. A.* 50, 5818)

Use of emulsifiers in the bread and pastry industry. L. Ya. Auerman. *Nauch. Chteniya* 1952(Moscow: Gizlegpishcheprom), *Sbornik* 1953, 134–42; *Referat. Zhur., Khim.* 1955, No. 1460. Use of 0.5–2.0% of phosphatide concentrates as emulsifier increased the volume of bread, greatly improved its structure porosity, aroma and appearance, and retarded staleness. (*C. A.* 50, 5933)

Phospholipid metabolism in liver slices. Labeling of phospholipids with acetate-1-C^{14}. Dorothy L. Kline and H. A. Deluca (Univ. of Western Ontario). *Can. J. Biochem. & Physiol.* 34, 429–440(1956). A study has been made of the labelling of the phospholipides, the fatty acids from the acetone-soluble lipid, and the non-esterified cholesterol in slices of rat and guinea pig liver respiring in a suitably buffered Krebs-Ringer medium containing acetate-1-C^{14}. The time course of the reactions and the effects of the concentrations of potassium ion and the pH of the incubating medium have been defined. Good labelling of phospholipids was observed with glycerine-2-C^{14}, glycerol-1-C^{14}, and fructose-C^{14}, but not with formate-C^{14} lactate-1-C^{14}, or glucose-C^{14}. Cholesterol was not significantly labelled from any precursor other than acetate-1-C^{14}.

Lipid and water levels in the kidneys of albino rats bearing Walker carcinoma 256. E. M. Boyd and A. O. Tikkala(Queen's Univ., Kingston, Ontario). *Can. J. Biochem. & Physiol.* 34, 259–264(1956). The kidneys of 54 pairs of twin albino rats, one inoculated and one not inoculated with Walker carcinoma 256, were analyzed for water, total lipid, neutral fat, total fatty acids, total cholesterol, ester cholesterol, free cholesterol, and phospholipid. Compared with the kidneys of their non-tumor-bearing littermates, the kidneys of tumor-bearing rats exhibited no significant change in wet weight and in concentration of total lipid, neutral fat, total fatty acids, and ester cholesterol. There was a significant increase in concentration of water, total cholesterol, free cholesterol, and phospholipid. The changes became evident in animals bearing tumors weighing 20 to 40% of host weight.

Dietary factors affecting the level of plasma cholesterol in humans: the role of fat. J. M. R. Beveridge, W. F. Connell, and G. A. Mayer(Queen's Univ., Kingston, Ontario). *Can. J. Biochem. & Physiol.* 34, 441–455(1956). Three dietary experiments have been performad in which 36, 37, and 49 male medical students and staff members participated as experimental subjects. Results are given in regard to type of fats in the diet and the response. In addition to other conclusions that may be drawn from this work, these studies reveal that (1) there is a factor(s) in certain animal fats that acts to elevate plasma cholesterol levels, and (2) there is a factor in corn oils that acts to depress plasma cholesterol levels.

Symposium on the chemistry and physiology of phospholipids. *Can. J. Biochem. & Physiol.* **34**, 288–379(1956). This symposium was sponsored by the Biochemistry Subject Division of the Chem. Inst. of Canada and was held at the Univ. of Western Ontario. The following speakers and topics are reported in this issue of the above mentioned journal: The synthesis of glycerolphosphatides by E. Baer; The chemistry of the phosphoinositides by J. Folch and F. N. LeBaron; Chemistry of the sphingolipides by H. E. Carter, D. S. Galanos, and Y. Fujino; The biological synthesis of phospholipids by E. P. Kennedy; Metabolism of phospholipids in vitro by L. E. Hokin and Mabel R. Hokin; The function of phospholipids by J. M. R. Beveridge. These articles include both the results of research by the above mentioned authors and also critical evaluation of work reported in the literature upon topics covered during this symposium.

Need for research on soybean oil meal. Part II. L. L. McKinney and J. C. Cowan (Northern Utilization Research Branch, Agr. Res. Service, U. S. Dept. Agr., Peoria, Ill.). *Soybean Digest* **16**(7), 14–16, 18(1956). The present state of knowledge and the need for further research on soybean oil meal are discussed in terms of the amino acid contents and the nutritive value of the protein, particularly for chicks and swine.

Quantitative estimation of vitamins D_2 and D_3 in pure solution. D. H. Laughland, and W. E. J. Phillips (Division of Chemistry, Science Service, Dept. of Ag., Ottawa, Ont., Can.). *Anal. Chem.* **28**, 817–819(1956). A method which has been developed for the estimation of vitamin D_2, D_3, or a mixture of the two forms in pure solution is based upon the formation of a colored reaction product when the vitamins are treated with furfural and sulfuric acid under carefully controlled conditions. Distinctive absorption curves are obtained for the two forms of the vitamin, and spectrophotometric techniques can be applied in the analysis of binary mixtures. The method is applicable to samples containing as little as 15 γ of total vitamin D, regardless of the relative abundance of each form.

New color reaction for vitamins D. W. I. Lyness and F. W. Quackenbush (Dept. of Biochem., Purdue Univ., Lafayette, Ind.). *Anal. Chem.* **27**, 1978–1980(1955). Vitamins D_2 and D_3 were found to react with an iodine-ethylene dichloride reagent to produce a strong yellow color which showed maximal absorption at 450 mμ. The intensity of the color was enhanced by mercuric *p*-chlorobenzoate and certain other compounds. The reagent showed high specificity for the D vitamins, no other compound having been found to give rise to a similar color. Various sterols produced no color; vitamin A produced a weak violet color which showed some absorption at 450 mμ. While the reagent showed greater sensitivity as well as greater specificity than the glycerol dichlorohydrin reagent, it was less sensitive than the antimony trichloride reagent. It is easy to prepare and its use is not complicated by the formation of films or corrosive volatiles.

Effect of added fats and oils on carotene stability in dehydrated alfalfa meal during storage. R. L. Ogden (Univ. of Nebraska, Lincoln, Neb.). *J. Agr. and Food Chem.* **4**, 428–431 (1956). A number of animal fats and vegetable oils, added to dehydrated alfalfa meal, were studied for their effect on carotene during storage. Animal fats in general caused a marked increase in carotene-stabilizing action over that exhibited by vegetable oils. Lower grades of animal fats may cause increased carotene degradation in some meals but this may, in part, be overcome by refining with alkali or vacuum distillation. The amount of stabilizing action exhibited by both animal fats and vegetable oils varies with different lots of alfalfa meal. The effect of animal fats on alfalfa meal in increasing carotene retention during storage may be due to a natural antioxidant in the fat in addition to their effect in bringing carotene and naturally occurring antioxidants of the meal into mutual solution. Addition of animal fats does not change β-carotene isomerization.

Comparison of carotenoids of Valencia orange peel and pulp. A. L. Curl and G. F. Bailey (Western Utilization Research Branch, U. S. Dept. of Ag., Albany 10, Calif.). *J. Agr. and Food Chem.* **4**, 156–161(1956). A comparison of the peel and pulp of early-season Valencia oranges showed over 60% of the total carotenoids but less free diols and polyols in the peel. Qualitatively the components were nearly identical; quantitatively peel carotenoids contained much more violaxanthin. One constituent not previously found in late-season juices—apparently cryptoxanthin furanoxide—was found in both pulp and peel carotenoids; the corresponding epoxide was present in peel carotenoids. Countercurrent distribution studies of the carotenoids of aged canned Valencia orange juice, stored for 3 years at room temperature, showed no significant hydrolysis of xanthophyll esters or changes in composition of non-ether carotenoids. The xanthophyll epoxides, about half of the total carotenoids of fresh orange juice had entirely disappeared: the corresponding isomeric furanoxides were present in greater proportions than in fresh juice. Only auroxanthin was identified in the diether fraction. On chromatography trollein, valenciachrome, and a trollichromelike substance were obtained as well separated pairs of bands with practically identical spectral absorption curves. Trollein is apparently a non-ether polyol.

An enzymatic cleavage of the cholesterol side chain. E. Staple, W. S. Lynn, Jr., and S. Gurin (School of Medicine,, Univ. of Penn., Philadelphia, Penn.). *J. Biol. Chem.* **219**, 845–851(1956). An enzyme system, found predominantly in adrenal glands, capable of cleaving cholesterol to pregnenolone and isocaproic acid is described.

Carotene utilization as influenced by the addition of vitamin B_{12} to diets containing yeast or a synthetic vitamin mixture. Helen L. Mayfield and R. R. Roehm (Montana State College Ag. Experiment Station, Bozeman). *J. Nutrition* **58**, 483–493(1956). The results of this investigation indicate that some factor (or factors) in addition to vitamin B_{12} influenced the utilization of carotene.

Effect of choline, methionine and ethionine on fat absorption. H. C. Tidwell (Univ. of Texas Southwestern Medical School, Dallas). *J. Nutrition* **58**, 569–578(1956). In agreement with an earlier report, the rate of fat absorption was found by two methods to be accelerated when fat was supplemented with choline. The inability of the injected choline to aid emulsification as well as the failure of various hydrotropic substances to affect the rate of fat absorption suggests that lecithin as well as choline are otherwise involved in the absorptive process.

Effect of intravenously administered fat on the serum lipoproteins. F. S. Herbst (Dept. of Dermatology, Harvard Medical School). W. F. Lever and W. R. Waddell. *Science* **123**, 843–844(1956). It has been shown that daily intravenous infusions of a fat emulsion cause a significant decrease in the elevated serum lipid values of patients with idiopathic hyperlipemia or primary hypercholesteremic xanthomatosis.

Exchange of free fatty acids and glyceride fatty acids during fat digestion in the human intestine. E. H. Ahrens, Jr., and B. Borgstrom (Hospital of The Rockefeller Institute for Medical Research, New York, N. Y.). *J. Biol. Chem.* **219**, 665–675 (1956). 1-C^{13} Palmitic and 1-C^{13}-oleic acids, dissolved in triolein and homogenized with milk protein and sugar, have been fed orally to two patients with normal gastrointestinal function. In each patient aspirations were made at two known loci in the duodenum and upper jejunum. Free fatty acids, mono-, di-, and triglycerides were quantitatively isolated from the intestinal contents, and the C^{13} excess of the fatty acids of each fraction was measured. Labeled acids were found in all glyceride classes in all aspirations, in di->tri->monoglycerides. This exchange of labeled with unlabeled acids is most likely due to synthesis of new ester bonds occurring simultaneously with hydrolysis. Evidence that transesterification also may occur is presented. However, since the breakdown of monoglycerides is irreversible, the over-all direction of the combined reactions is toward hydrolysis. Data are presented which indicate that hydrolysis proceeds at a faster rate than absorption, with the result that fatty acids accumulate in the digestion mixture, but that fatty acids are absorbed more rapidly than glycerides.

Metabolism of essential fatty acids. III. Isolation of 5,8,11-eicosatrienoic acid from fat-deficient rats. J. F. Mead and W. H. Slaton, Jr. (Atomic Energy Project, Univ. of Calif., Los Angeles, Calif.). *J. Biol. Chem.* **219**, 705–709(1956). An unsaturated fatty acid which accumulates in male fat-deficient rats has been shown to be 5,8,11-eicosatrienoic acid, which is presumably a reduction product of arachidonic acid rather than an intermediate in the conversion of linoleic to arachidonic acid.

On the mechanism of dehydrogenation of fatty acyl derivatives of coenzyme A. III. Palmityl COA dehydrogenase. J. G. Hauge, F. L. Crane, and H. Beinert (Institute for Enzyme Research, Univ. of Wisconsin, Madison, Wis.) *J. Biol. Chem.* **219**, 727–733(1956). The purification and properties of a new flavoprotein from pig liver, which carries out the α,β-dehydrogenation of fatty acyl derivatives of CoA, are described. After the isolation of the green butyryl CoA dehydrogenase (1) and a yellow fatty acyl CoA dehydrogenase of a broader range of specificity (2), the enzyme described here is the third flavoprotein of this class. It displays its highest activity with lauryl CoA. Palmityl CoA is attacked at about 70 per cent of this maximal rate. It is therefore likely that the specificity range of this enzyme extends up to substrates of even longer carbon chain. Evidence is presented that FAD is the prosthetic group of the enzyme. No significant amounts of iron were found in the enzyme. The electron-transferring flavoprotein (3) is required for the catalytic turnover of the enzyme with most acceptors.

Protein intake and liver cholesterol: effects of age and growth of the test animal. Ruth Okey and Marian M. Lyman (Univ. of Calif., Berkeley). *J. Nutrition* 58, 471–482 (1956). Rats were fed, from weaning, isocaloric control and cholesterol-rich diets containing, respectively, percentages of protein (casein and egg albumin) varying from 10 to 30. Control rats on cholesterol-free diets showed some decrease in liver cholesterol with increased percentages of dietary protein. Cholesterol-fed rats placed on a 15%-protein diet at weaning had the highest observed concentrations of liver cholesterol at about 7 to 8 weeks thereafter. At 10 weeks, liver cholesterols were much lowered.

Rapid estimation of vitamin A using a surface active agent. E. T. Gade and J. D. Kadlec (The Borden Co., Special Products Division, Elgin, Ill.). *J. Agr. and Food Chem.* 4, 426–427 (1956). An improved procedure employs a single-step extraction for determining naturally occurring vitamin A in chicken livers, synthetic vitamin A in fortified powdered formulas for infants, and stabilized vitamin A in animal feed supplements. Stabilized vitamin A is determined in the presence of N,N'-diphenyl-p-phenylenediamine by a simple modification of the procedure. The vitamin A is solubilized in the test material with the surfactant and extracted with a mixed solvent. Twenty-five minutes are required for one extraction and several may be run simultaneously. The procedure gives good recovery replication, and results comparable to those obtained by saponification.

Serum cholesterol in men in basal and nonbasal states. A. Keys, J. T. Anderson, and O. Mickelsen (Lab. of Physiological Hygiene, School of Public Health, Univ. of Minn.). *Science* 123, 29 (1956). The difference in cholesterol concentration between basal and nonbasal blood drawn in the morning is so small that it may be neglected in most comparative studies, particularly if the nonbasal subjects are engaged in physical work.

Slope-ratio liver-storage bioassay for vitamin A. S. R. Ames and P. L. Harris (Research Lab., Distillation Products Ind., Division of Eastman Kodak Co., Rochester, N. Y.). *Anal. Chem.* 28, 874–878 (1956). A slope-ratio liver-storage bioassay for vitamin A has been developed employing a "5-point common-zero" statistical design. Five groups of depleted rats are supplemented as follows: two levels of the reference standard (1000 and 2000 units), two similar levels of the test materials, and a negative-control group. The relative potency is determined by the ratio of the slopes of the two linear dose-response lines. The liver-storage of vitamin A showed an essentially linear response over a dose range from 500 to 10,000 units. When the USP vitamin A reference standard was fed, 67% of the ingested dose was found stored in the liver. Direct comparison of the results obtained by either the slope-ratio liver-storage or growth procedure showed no significant difference. The slope-ratio liver-storage bioassay for vitamin A is both rapid and precise and is recommended for general application.

Studies in the sphingolipids series. IV. Determination of the configuration of the amino carbon atom in sphingosine. M. Prostenik, M. Munk-weinert, and D. E. Sunko (Dept. of Chem., Medical Faculty, Univ. of Zagreb, Salata, Yugoslavia). *J. Organic Chem.* 21, 406–409 (1956). The configuration of the amino carbon atom in sphingosine (I) has been determined by a direct chemical method. On the basis of these results the D-configuration is assigned to the carbon atom 2 in sphingosine, which is in full agreement with that obtained by other workers. In connection with recent statements concerning the spatial structure of the ethylenic double bond and the *erythro* relation of the C_2-NH_2 to C_3-OH, this investigation represents the final proof that natural sphingosine has the structure of *trans, erythro*-D-1, 3-dihydroxy-2-aminooctadecene-4.

The biological utilization of various fat-soluble esters of pyridoxine and 4-desoxypyridoxine by rats. T. Sakurago and F. A. Kummerow (Dept. of Food Tech., Univ. of Illinois, Urbana). *J. Nutrition* 58, 557–568 (1956). The biological activity of various esters of pyridoxine for the growth of rats has been tested. Pyridoxine triacetate, tripalmitate and trilinoleate were biologically utilized by rats as a source of vitamin B_6, and the activity was equal to that of pyridoxine hydrochloride. The results of the feeding experiments on diets supplemented with a suboptimal level of pyridoxine tripalmitate or pyridoxine hydrochloride appeared to indicate that the ester was less susceptible to destruction by the intestinal flora. The data appeared to indicate that at least a part of the long-chain fatty acid ester of vitamin B_6 could be stored in the body without complete hydrolysis.

The effect of lecithin, choline, and methionine on the vitamin A and carotene plasma levels and liver stores of young dairy calves. C. L. Davis (Dept. of Dairy Science, University of Illinois, Urbana), R. F. Elliott, and C. A. Lassiter. *J. Dairy Sci.* 39, 440–447 (1956). Fifty-four 2-day-old male Jersey calves were used to study the effect of three lipotrophic agents, DL-methionine, choline chloride, and vegetable lecithin, on the absorption and utilization of vitamin A and carotene. The feeding of these three agents plus vitamin A did not materially increase the plasma levels or liver stores of vitamin A above those of a group receiving vitamin A alone.

The lipides of rat liver cell fractions. Mary Jane Spiro and J. M. McKibbin (Dept. of Biochem., State Univ. of New York College of Medicine, Syracuse, N. Y.). *J. Biol. Chem.* 219, 643–651 (1956). Analyses of the lipides of rat liver cell fractions demonstrate that the fractions vary with respect to the amount and type of lipide present, but the phospholipide pattern is quite similar from one fraction to another. The lipide content of the nuclei, mitochondria, and microsomes increases in that order and is composed chiefly of phospholipide with some cholesterol. The supernatant fraction has very little lipide, and that is mainly neutral fat. Fatty infiltration of the liver incident to choline deficiency was produced in several groups of rats. No changes in the phospholipide content or pattern of any fraction were observed. Neutral fat accumulation was found in the particulate cell fractions of deficient livers as well as in the supernatant fraction and was also found associated with a lipoprotein material extracted from deficient microsomes.

The preparative isolation of cerebrosides. N. S. Radin, J. R. Brown, and F. B. Lavin (Radioisotope Unit, Veterans Administration Research Hospital). *J. Biol. Chem.* 219, 977–983 (1956). A method is described for the preparative isolation of nearly pure cerebrosides, starting with a commercially available lipide concentrate. The lipides are extracted with ether and alcohol, passed through a Florisil column, then through a column of mixed ion exchange resins, precipitated as a barium derivative, and crystallized. A method for galactose determination in cerebrosides is presented, and the copper chelate of phrenosinic acid is described.

The specificity of pancreatic lipase for the primary hydroxyl groups of glycerides. F. H. Mattson and L. W. Beck (Procter and Gamble Co., Cincinnati, Ohio). *J. Biol. Chem.* 219, 735–740 (1956). 2-Oleoyl dipalmitin, 2-oleoyl distearin, 2-palmitoyl diolein, and 1-oleoyl dipalmitin were hydrolyzed *in vitro* with pancreatic lipase. The digestion products were isolated and characterized. Identification of the hydrolysis products of these triglycerides shows the hydrolysis to be a series of directed stepwise reactions from triglyceride to 1,2-diglyceride to 2-monoglyceride. This course of hydrolysis is followed regardless of the location of the fatty acids in triglycerides consisting of saturated fatty acids containing 16 or 18 carbon atoms, or unsaturated fatty acid of 18 carbon atoms. Characterization of the digestion products of 1-oleoyl dipalmitin, lard, and randomly rearranged lard demonstrated that hydrolysis at the primary hydroxyl groups of glycerol is not influenced by the nature of the fatty acid but proceeds in a random manner. These results show pancreatic lipase to be specific for the hydrolysis of long chain fatty acids esterified with the primary hydroxyl groups of glycerol. The use of pancreatic lipase digestion of glycerides as a tool for detremining the position of fatty acids on a glyceride molecule is suggested.

• Drying Oils and Paints

Raymond Paschke, Abstractor

Isomerization of linseed oil. O. Prakash, A. Ram, V. D. Athewale, and S. C. Pandey (Butler Technol. Inst., Kampur). *Paintindia* 5(12), 21 (1956). An isomerized linseed oil can be obtained conveniently by heating linseed oil at 250° for half an hour in the presence of 5% of anthraquinone as catalyst under an inert atmosphere. The presence of conjugation is established by increase in refractive index, lowering of iodine value and substantial diene value. This is also confirmed by spectrophotometric examination. The isomerized oil obtained has a beautiful greenish yellow appearance, the catalyst is recoverable completely, and the varnish made from the isomerized oil shows better drying properties and gives films with increased resistance to water, acid, and alkali than raw linseed oil.

A fancy formula for finer finishes. W. D. McMaster(Gen. Motors Corp.). *Paint Varnish Production* **46**(2), 27(1956). The High Film Build Thinner is briefly reviewed, the advantages discussed, and certain techniques applicable to its use described. Typical formulae are furnished for use with lacquers and enamels.

Instrumentation and automatic control. H. T. Bone. *Paint Manuf.* **26**, 170(1956).

Fundamentals of colour. J. M. Adams. *Paint Manuf.* **26**, 105 (1956). The measurement and standardization of colour, in spite of diversity of influences, is considerable and the principles used are outlined.

The trend in drying oil trade. Anon. *Paint Manuf.* **26**, 122 (1956). A review based on a report of the Food and Agricultural Organization of the United Nations.

Anti-fouling paints progress. J. C. Kingcome(Royal Naval Scientific Service). *Paint Manuf.* **26**, 947(1956). The formulation of anti-fouling paint is complicated by the diversity of the requirements of the product. The author outlines the types of materials in use at present, the experience gained in the past, and indicates the lines along which present research is progressing.

Cashew nut shell liquid. M. C. Menon and J. S. Aggarwal(National Chemical Laboratory, Poona). *Paintindia* **5**(11), 22 (1956). The characteristics of liquid extracted by various methods are given.

Self-polymerizing paint systems. W. S. Mitchell(General Mills, Inc.). *Can. Paint Varnish Mag.* **30**(4), 33(1956). Polyamide-epoxy formulations are discussed.

Industrial applications of vinyl resin finishes. F. A. Rideout (The Bakelite Company, New York). *Org. Finishing* **17**(5), 15(1956).

Modified drying oils. Research on maleic anhydride adducts. P. Slansky. *Paint Manuf.* **26**, 166(1956). Synthetic film-forming media have in many cases successfully competed with and replaced natural drying oils. Drying oil derivatives are, however, being developed which are considered to have superior properties to those of the natural oil. Details of work on maleic anhydride adducts of drying oils are given, and other developments in this field are reviewed.

Insulating varnishes. S. Szafranski(National Electrical Ind. Ltd.). *Paintindia* **5**(11), 29(1956). A brief review.

Thixotropic alkyds. A. Tremain(St. Mary Cray, Kent). *Paintindia* **5**(11), 25(1956).

Polyepoxide resins. 1. The chemical aspects. J. H. W. Turner (British Resin Products Ltd.). *Paint Manuf.* **26**, 157(1956). Diverse properties can be obtained in surface coatings, by using epoxy resins of different types and by applying them in various ways. The author reviews the fundamental chemistry of this range of compounds with particular reference to polyepoxide resins and points out the differences between diepoxide and polyepoxide resins.

Modification of drying oils. II. Synthesis and polymerization of vinyl esters of linseed-oil fatty acids. Toshio Takeshita (Kagoshima Univ.). *J. Japan Oil Chemists' Soc.* **5**, 11–14 (1956). Vinyl esters were synthesized from linseed-oil fatty acids and acetylene under atmospheric pressure with 3% ZnO catalyst (diluted with linseed oil) at 210°. Polymerized oil obtained by reacting the vinyl esters with 2% benzoyl peroxide catalyst at 250° and viscosity 172 poises and dried completely in 4 hrs. at 20° and 75% humidity in the presence of ordinary driers. The film formed was harder than that from linseed oil.

Production of terephthalic and isophthalic acids. A. C. McKinnis(Union Oil Company). *U. S. 2,734,914.* This patent covers a method for decarboxylating trimellitic acid to form isophthalic acid and terephthalic acid which comprises heating trimellitic acid at a temperature between about 150° and 400° in the presence of a substantially neutral reagent which is essentially water.

Silicone-alkyd coating composition. B. H. Kress(Allied Chemical and Dye Corp.). *U. S. 2,735,825.* This patent covers a coating composition that produces coatings of superior weather and chemical resistance, comprising an aliphatic hydrocarbon solution of the product of the heat-condensation of (1) an oil-modified alkyd rsein with (2) a completely hydrolyzed acidic siloxanol having a molecular weight below 4500, an acid number above 5 and containing alkyl and aryl groups directly attached to different silicon atoms, said siloxanol containing from two to three alkyl and aryl groups for every two silicon atoms, and containing from one to twenty-eight alkyl groups for every eight aryl groups, and the weight of said siloxanol, on a fully condensed basis, constituting from 15 to 50 per cent of said condensation product.

Furan resin-tall oil reaction product. R. M. Frey(McGraw Electric Co.). *U. S. 2,735,826.*

• Detergents

Lenore Petschaft Africk, Abstractor

Glycerol purification by ion exclusion. D. R. Asher and D. W. Simpson(Dow Chemical Co., Midland, Mich.). *J. Phys. Chem.* **60**, 518-21(1956). Purification of glycerol by ion exclusion has been evaluated on a laboratory scale. Many advantages can be gained using this newer method of solute separation for removing ionic impurities from crude glycerol solutions. By a method of recycle, it is possible to obtain a glycerol product of near feed concentration while reducing the ionic content to a low value. It was found that separations were improved by the use of elevated temperatures and that the optimum feed volume for this method of operation was 30–35% of the bulk resin bed volume. For maximum product concentration the feed should contain 30–35% glycerol. The salt concentration does not greatly affect the separating capacity of the resin, although higher salt concentrations will tend to improve the product concentration. For best results, the copolymer matrix should contain 40 to 12% cross-linking agent. Under these conditions it is possible to obtain a separating capacity greater than 4 lb. of glycerol/ft.^{3} or resin/hour, with a product concentration of 20% or more. The application of ion exclusion to large scale purification of non-ionic materials is becoming more attractive because of the inherent low cost, simplicity of operation, and ease of unit scale-up.

Relations between constitution and properties of alkylbenzenesulfonates with straight or branched alkyl chains up to 18 carbon atoms. III. W. Griess(Sunlicht Gesellschaft A.-G., Mannheim, Ger.). *Fette-Seifen-Anstrichmittel* **57**, 236–40(1955). Alkyl benzenesulfonates (I) with straight-chain alkyls were preferable to those with branched chains for use in hot solution, e.g. in washing compounds. I above C_{18}-alkyl would probably have poor solubility and low foam formation in the presence of electrolytes. As wetting agents the branched-chain compounds seem best. I with alkyl C_{12}–C_{14} display optimum properties. Various tests were made on the sulfonates, including surface tension lowering, wetting properties, washing properties, micelle-forming concentration, and solubility in various solvents. (*C. A.* **50**, 4868)

Critical micelle concentrations of polyoxyethylated non-ionic detergents. L. Hsiao, H. N. Dunning and P. B. Lorenz(Bureau of Mines, Bartlesville, Okla.). *J. Phys. Chem.* **60**, 657–60 (1956). The critical micelle concentrations of non-ionic detergents composed of nonylphenol and various ethylene oxide chain lengths have been determined by the surface tension method. Critical micelle concentrations increase with ethylene oxide chain length and decrease with increasing electrolyte concentration. The effect of chain length on critical micelle concentration may be represented by the expression, $\ln(\mathrm{CMC}) = 0.056R + k$, where CMC is expressed in molarity, R is the average number of ethylene oxide units in the chain, and k is a constant depending on the type and concentration of electrolyte. Comparison of the critical micelle concentration depressions with the lyotropic numbers of the anionic indicates that these detergents form hydrophilic micelles that have associated weak positive charges.

Water-soluble surface-active compounds under the electron microscope. I. Investigative methods and preliminary results on sodium soaps. W. Kling and H. Mahl(Henkel & Cie. G.m.b.H., Dusseldorf, Ger.). *Fette-Seifen-Anstrichmittel.* **57**, 643–7 (1955). Dried residues of aqueous or alcoholic solutions of the following pure soaps were investigated by an electron microscope: Na caprate, laurate, myristate, palmitate, stearate, and oleate. The effect of solvent, concentration, pH, and previous history of the solution was compared. From aqueous solutions containing no additives all soaps except Na oleate exhibit crystalline platelets; from solutions containing NH_4OH or NaOH fibrillar residues are obtained, the nature of the fibers depending on the soap concentration. Aqueous or alcoholic gels always exhibit the fibrillar structure; morphologic differences observed in the fibers from, e.g., amyl alcohol gels, could be used for analysis. 28 electron photomicrographs. (*C. A.* 50, 5311)

Use of ionic dyes in the analysis of ionic surfactants and other ionic organic compounds. P. Mukerjee (Univ. of Southern Calif., Los Angeles 7, Calif.). *Anal. Chem.* 28, 870–3 (1956). On the basis of previous investigations on the interaction between ionic dyes and ionic surfactants of opposite charge, a partition technique for the analysis of all classes of ionic surfactants and similar organic compounds has been presented. Experimental results with cationic and anionic surfactants of various kinds support the theoretical expectations; sensitivity of the new method is high. The qualitative detection limit in favorable cases is of the order of 1 to 2 p.p.b., while quantitative estimations of concentrations of the order of 0.1 to 1 p.p.m. and amounts of the order of 0.001 to 0.01 mg. are found to be possible. Hydrolyzable and nonhydrolyzable surfactants in mixtures can be determined.

How much free alkali is safe in soap? P. I. Smith. *Am. Perfumer & Aromatics.* 67(4), 50 (1956). The various factors which should be considered in determining the amount of free alkali allowable in various types of soap are discussed. The most important factor is that the optimum percentage of free alkali present should be sufficient to bring the pH of the soap solution up to the most favorable figure for washing and this may vary from about 10 to 12.

Utilization of substituted starch derivatives in detergents. J. Vallee. *Rev. franc. corps gras* 3, 112–14 (1956). Detergency tests were made with solutions of K oleate (I), Na lauryl sulfate (II), and alkylaryl sulfonates (III) to which commercially prepared starch derivatives (IV) (carboxymethyl, ethyl, benzyl, etc., -amylopectins) were added. In solutions containing ½ g./l. of I-III the height and stability of foams were but little altered by the addition of 10% IV, calculated on the bases of active detergent. In a dish-washing test the number of artificially soiled dishes washed increased from 12 to 15-17 in distilled water and from 15-24 in hard water when 0.18 g. of IV was used with 1.8 g. of I or III dissolved in 6 l. of water, as compared to without IV. Pieces of artificially soiled cloth washed with II or III in the presence of 5 different IV showed photovolt-apparatus detergency values between 16.7 and 22.6% and redeposition values between 29.4 and 9.3 against 15.4 and 31.9 respectively, without IV. Substitution of IV by carboxymethylcellulose (V) gave, respectively, 22.1 and 9.1, and it is concluded that IV can advantageously compete with V. (*C. A.* 50, 6816)

Method of making a disposable scouring pad. B. S. Rafferty. *U. S. 2,735,721.* A pad suitable for one-time use is made by placing a covering such as butcher paper over a soap-filled pad of metal wool, applying heat and pressure to the outside of the covering, such heat being regulated to melt the soap adjacent the covering and said pressure serving to force the melted soap against the protective covering.

Cleaning compositions. W. E. Combs. *U. S. 2,739,130.* An improved detergent composition consists of a detergent composition, either natural or synthetic, having incorporated into it, nicotine, water and blue indigo to provide unique cleansing properties.

Manufacture of hard odorless soap from low grade fats and oils. K. Appuhn (Compania Industrial). *U. S. 2,739,163.* A continuous process for the manufacture of hard, odorless soap from highly unsaturated long chain fatty acids produced from low grade or marine animal fats and oils obtained by splitting with a Twitchell reagent, said process comprising reacting the fatty acids with bleaching earth, then treating the fatty acids with activated carbon, separating the fatty acids from the treating substances and anhydrously saponifying the acids with an excess of molten alkali at atmospheric pressure.

Disinfectant washing powders. H. Wallrath (Dr. Med Josef Ellendorff & Co.). *Brit. 744,433.* Washing agents for laundry with disinfectant properties consist of a detergent, sodium carbonate and at least 0.02 but not more than 0.10% of a halogenated 2,2′-dihydroxydiphenylmethane.

Germicidal soap composition. M. E. Chiddix and S. H. Hesse (General Aniline & Film Corp.). *U. S. 2,739,941.* A germicidal soap composition contains as an active germicide, certain halogenated alkylidenebis nitrophenols which do not react with soap constituents, are not rendered ineffective by the free alkali of the soap in water, are not volatile, have no disagreeable odor, and are relatively non-toxic.

Detergent compositions. E. W. Eckey (Procter & Gamble Co.). *U. S. 2,739,942.* A heavy-duty cleansing composition consists essentially of a water-soluble non-soap anionic synthetic organic detergent, and a building amount, in the range of about 0.8 parts to about 5 parts, of a water-soluble phytate.

Detergent composition. H. W. McCune (Procter & Gamble Co.). *U. S. 2,739,943.* A liquid heavy-duty synthetic detergent consists of a specially chosen anionic sulfuric reaction product having high detergency built with sodium phytate, which is not very active as a "salting out" ingredient and has high activity as a detergency builder, rendered non-corrosive toward aluminum with sodium silicate, and brought to the proper viscosity with solubilizers.

Cleaner-sanitizer. M. Kopp (General Aniline & Film). *U. S. 2,742,434.* A free-flowing powder composition containing a water-soluble nonionic detergent, a water-soluble quaternary detergent germicide and a water-soluble brightening agent of the stilbene sulfonate type is stable and has good shelf life. Dilute aqueous laundering solutions made up from this composition clean, disinfect and brighten soiled clothing.

Detergent compositions. E. A. Fike and W. H. Seaton (Monsanto Chem. Co.). *U. S. 2,744,874.* A class of polyalkylene ethers has been discovered which in combination with anionic detergent having a sulfur-acid group in the molecule provide composiitons having strong foaming properties, improved solubility in aqueous solution and reduced dustiness in dry particulate form.

Ethenoxy N-monoethanolamides of tall oil. J. J. Carnes, W. T. Booth, Jr. (American Cyanamid Co.). *U. S. 2,744,888.* By preparing monoethanolamides of acids from crude tall oil and refined tall oil, and condensing these monoethanolamides with ethylene oxide, it has been found that the resulting ethenoxy N-monoethanolamides having from 4 to 50 mols of combined ethylene oxide per mol of monoethanolamide possess good softening, wetting and detergent properties and can be used commercially as nonionic surface-active agents for these purposes.