

unit in one day can produce a week's supply of feed material for the sterol plant.

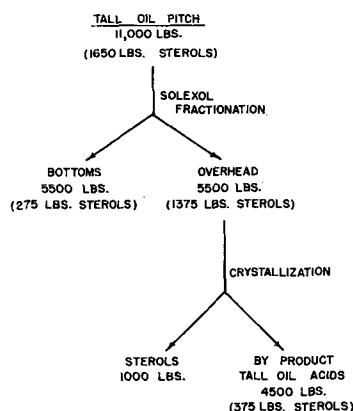


Fig. 5. Material balance.

With few exceptions all processing equipment is stainless steel. The acidulating tank is Monel, and the acid and caustic storage tanks are black iron. Every precaution is taken to remove dirt from the Solexol overhead fraction, methanol, caustic, and water used to charge the saponification reactor. Each of the charge lines for the above four streams is equipped with a filter. Once the overhead fraction and methanol come into contact, some of the sterols drop out of solution. Removal of dirt from this stage on becomes difficult. However magnetic particles are removed by a magnetic separator installed in the slurry line feeding the centrifuge.

The process described above uses a low cost by-product of the tall oil industry and has up-graded its value considerably. From tall oil pitch, pharma-

ceutical-grade sterols have been made. Thus a new commercial product has been added to the long list of products of the tall oil industry. Other large uses for tall oil sterols may develop, resulting in an increased demand for tall oil pitch. Considerable research is being conducted in steroid chemistry, such as cortisone, sex hormones, and many related compounds. The starting material for another medical triumph could be tall oil sterols.

Summary

A process has been developed for producing pharmaceutically-pure sterols from tall oil pitch. The process consists of the propane fractionation of the pitch, saponification of the overhead fraction in methanol, fractional crystallization, centrifuging, washing, and drying. A plant to produce 1,000 lbs. of sterols per day was brought into operation.

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ABSTRACTS R. A. REINERS, Editor

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• Fats and Oils

WAXES, THE NATURAL SURFACE COATINGS. H. H. Hatt (Commonwealth Sci. Ind. Research Organization, Melbourne). *Australian J. Sci.* 21, 31-42 (1958). An address. (C.A. 53,8665)

COMPOSITION OF THE PHOSPHOLIPIDE FRACTION OF BUTTER WITH SPECIAL REGARD TO THE POLYENOIC FATTY ACIDS. A. Deutsch, S. Mattsson, and P. Swartling. *Milk Dairy Research (Alnarp) Rept.* No 54, 9 (1958). Butter is shown to contain 1.7-2.5 g. of phospholipides/kg. The phospholipide fraction consists of about 38 mole % phosphatidyl-choline and 23 mole % sphingomyelin. One or more unidentified nitrogen-containing compounds among these, probably cerebrosides, are admixed with or attached to the phospholipides. The phospholipides contain substantially more unsaturated fatty acids than the corresponding butter triglycerides. Butter phospholipides contain approximately 4.7% dienoic, 2.5% trienoic, 1.2% tetraenoic, and 0.6% pentaenoic acid. (C.A. 53, 8468)

HIGH-ALLYL MUSTARD-RAPE HYBRID. V. I. Shpota. Masloboino-Zhironaya Prom. 25(1), 20-2 (1959). *Brassica juncea* x *B. napus* var. *oleifera* seeds of high-allyl oil content are described. (C.A. 53, 8665)

DEHYDRATION OF CASTOR OIL WITH SUBSTITUTED MONO- AND DISULFONIC ACIDS. A. S. Rajadhyakasha and K. K. Dole (Ferguson Coll., Poona). *Indian J. Appl. Chem.* 21, 95-8

(1958). The efficiency of a number of substituted sulfonic acids as catalysts in the dehydration of castor oil was reported. When a molar concentration of catalyst was used, the order of activity was chloro- > bromo- > iodo- > unsubstituted benzenesulfonic acid. Dark oils were obtained; 2-naphthol-6,8-disulfonic acid produced least color. Dehydration at low pressure improved color. (C.A. 53, 9698)

FRACTIONATION AND PREPARATION OF FATTY ACIDS AND ESTERS FROM NATURAL MIXTURES WITH THE HELP OF UREA COMPLEXES. S. Adhikari and N. A. Khan (Pakistan Council Sci. and Ind. Research, Tejgaon, Dacca). *Pakistan J. Sci. Research* 1, 221-3 (1958). The methyl esters of cottonseed, linseed, and castor oil were fractionated as urea complexes. Acids of sesame and mustard oil gave good separation, but some esterification occurred when methyl alcohol was used as a solvent. (C.A. 53, 9699)

DERIVATIVES AND ISOLATION OF PURE GOSSYPOL. K. Chander and T. R. Seshadri (Univ. Delhi). *J. Sci. Ind. Research (India)* 17B, 279-80 (1958). A simple method of extracting gossypol is based on the extraction of an ethereal extract of cottonseed with an aqueous solution of borax, removal of gossypol in the form of a soluble borate complex, and regeneration by treatment with acid. Pure samples of the hexa- and dimethyl ethers of gossypol can be obtained by methylation with methyl sulfate and potassium carbonate in acetone solu-

tion. Various preparations have yielded products of constant melting point. (*C.A.* 53, 9700)

INTERNAL CHAIN STRUCTURE OF SOME MIXED NATURAL TRIGLYCERIDES. P. Savary and P. Desnuelle (Fac. sci., Marseille, France). *Biochem. et Biophys. Acta* 31, 26-33 (1959) (in French). To study the nature of the fatty acids in the 2-position of natural triglycerides, oils and fats were partially hydrolyzed with pancreatic lipase, 1-monoglycerides were destroyed with HIO₄, and the 2-monoglycerides were recovered chromatographically. The data showed that the 2-position of glycerides of cocoa butter is occupied by unsaturated acids, that of mutton by 80-90% unsaturated acids, and in pork by saturated acids (principally palmitic with some stearic acid). (*C. A.* 53, 9700)

PHYSICO-CHEMICAL PROPERTIES OF THE SEED FAT OF THE MORINGACEAE. K. C. Patel, R. D. Patel and S. A. Patel. *India J. Appl. Chem.* 21, 85-6 (1958). *Moringa concanensis* seed contains 76% kernel. The kernel oil (29.5%) had acid number 3.6, acetyl number 23.0, saponification number 182.9, iodine number 68.08, unsaponified matter 1.28%, R. M. number 0.68, Polenske number 0.27, n_D 1.486; the values for *Moringa oleifera* were very similar. The fatty acids of *Moringa concanensis* contain: myristic 1.33, palmitic 5.98, stearic 5.24, arachidic 2.97, behenic 6.09, lignoceric 3.29, linoleic 0.85, and oleic (by difference) 74.25%. Ben oil (or behen oil) from *Moringaceae* is used as an edible oil, a cosmetic, and a lubricant for precision machinery. It is unusually resistant to the development of rancidity. (*C.A.* 53, 9699)

THE VISCOSITY OF THE OIL OF MORINGA CONCANENSIS. I. K. C. Patel, R. D. Patel, and S. A. Patel. *Indian J. Appl. Chem.* 21, 87-91 (1958). The variation in viscosity on mixtures of oil of *Moringa concanensis* with benzene, toluene, xylene, cyclohexane, butyl alcohol, and heptane was reported. (*C.A.* 53, 9698)

STUDY OF OXIDIZING CHANGES IN FATS BY MEANS OF 2-THIOBARTURIC ACID IN ORGANIC SOLVENTS. J. Dzikowski. *Roczniki Państwowego Zakładu Hig.* 9, 461-8 (1958). With isoamyl acetate as solvent for fat and ethanol for trichloroacetic acid, the extinction coefficients were markedly greater than those obtained with Cerna's method for 1-g. samples, but the values were proportional. (*C.A.* 53, 9693)

NEW ASPECTS OF LIPOCHEMISTRY. C. Paquot. *Rev. fermentations et inds. aliment.* 13, 191-218 (1958). A review with 123 references. (*C.A.* 53, 8217)

THE EFFECT OF DI- AND TRIETHANOLAMINE ON LIPOXIDASE OXIDATION OF LINSEED OIL. S. M. Araksyan. *Trudy Erevan. Zootekh.-Vet. Inst.* 1957(21) 21-3; *Referat. Zhur. Khim. Biol. Khim.* 1958, Abstr. No. 31907. Oxidation of linseed oil by lipoxidase of soya beans was determined using Warburg apparatus at pH 6.5 and 38°. Addition of triethanolamine somewhat enhanced the lipoxidase activity. Preliminary intermixing of amines with the enzyme preparation completely or partially depressed the oxidative process. (*C.A.* 53, 8231)

REFINING OF FAT FROM PIG SKINS. K. K. Akatov, E. P. Vinitzkaya, L. G. Bliner, and Z. M. Askinazi. *Mastoboino-Zhirovaya Prom.* 25(1), 36-8 (1959). Extraction of fat from pig skins and its refining and uses in the manufacture of toilet soap are described in some detail. (*C.A.* 53, 8663)

EXTRACTION OF LOW-MOLECULAR ACIDS C₁-C₆, FROM ACID WASTES IN THE MANUFACTURE OF SYNTHETIC FATTY ACIDS. L. A. Alferova, V. P. Sumarokov, and D. I. El'kin. *Mastoboino-Zhirovaya Prom.* 25(1), 28-31(1959). Description with diagrams of an apparatus. (*C.A.* 53, 8663)

SEPARATION OF OCTADECADIENOIC AND OCTADECATRIENOIC ACIDS IN THE OIL OF CYPRINUS AUREATUS. Toru Takagi, Tsutomu Shimooka, and Yoshiyuki Toyama. *Mem. Fac. Eng., Nagoya Univ.* 9, 353-9 (1958). The oil extracted from viscera and roes of the fresh-water fish, *Cyprinus auratus*, was identified as rich in linoleic and linolenic acids. (*C.A.* 53, 9698)

METHODS OF ANALYSIS OF OILS AND FATS. Brit. Standards Inst., London, S.W. 1. *Brit. Standard* 684, 1958, 100 pp., 15s. Od. The physical and chemical methods of analysis described are: preparation of sample, specific gravity, n_D²⁰, melting point (slip point), flow and drop point, cloud and pour point, titer, viscosity, drying time, flash point, smoke point, water-insoluble matter, volatile matter, moisture (Dean and Stark method and Karl Fischer method), ash, impurities, total fatty matter, soap content, saponification value, unsaponified matter, neutral oil, hydroxyl value, acetyl value, acidity, volatile acids, oxidized fatty acids, iodine value, CNS value, per-

oxide value, polybromide value, copper (colorimetrically with diethyldithiocarbamate), and iron (colorimetrically with thioglycolic acid), with qualitative tests for fish, cottonseed, sesame, and peanut oils, and rancidity. (*C.A.* 53, 8664)

STABILIZATION OF SUNFLOWER OIL UNDER CONDITIONS OF PROLONGED HEATING. A. F. Fan-Yung and E. P. Varnas. *Trudy Odessk. Tekhnol. Inst. Pishchevoi i Kholodil. Prom.* 9(1), 43-56 (1958). Effect of ascorbic acid, tannin, benzoic acid, and vitamin E on properties of sunflower oil subjected to heating at 146-8° for 220-300 hours was studied. Tannin treatment, as compared to control, decreased the specific gravity 1.5, saponification number 2.7, viscosity 46, color indicator 38, and acid number 11.5-42.7% and increased the iodine number of oil 10%. Ascorbic acid produced similar results. Vitamin E decreased the saponification number 3, specific gravity 1, viscosity 60, and color indicator 67%, and increased the iodine number 20-4%. For the best results the following doses are recommended: tannin 50, ascorbic acid 50, and vitamin E 0.0825 mg. %. (*C.A.* 53, 8665)

ISOMERIZATION OF THE DOUBLE BONDS IN UNSATURATED ACIDS OF THE VEGETABLE OILS. M. F. Sorokin and A. N. Shuvalova. *Trudy Moskov. Khim.-Tekhnol. Inst. im. D. I. Mendeleeva* 1956 (23), 79-86. In a study of catalytic isomerization and polymerization of pure linoleic and linolenic acids the catalyst tested, in the order of their relative efficiencies, were: AlCl₃ > "Captax" > silicon material > zinc dust. Changes in chemical and physical characteristics of the acids during treatment at 250° under carbon dioxide are tabulated. (*C.A.* 53, 8665)

EXPERIMENTAL OIL MILL OF THE INSTITUTO DE LA GRASA. REPORT OF THE ORGANIZING COMMITTEE OF THE EXPERIMENTS OF THE FOURTH CAMPAIGN. Anon. *Grasas y aceites* (Seville, Spain) 9, 243-8 (1958). Pectinase treatment of olive pulp before hydraulic pressing improved oil pressing yields 2.7-10%. The pectinase treatment did not affect centrifugal separation of the oil from the liquid emanating from the press. (*C.A.* 53, 8665)

COPPER AND IRON IN RAPE-SEED OIL. Kunio Yonezawa (Tokushima Agr. Improvement Office). *Nōsan Kakō Gijyutsu Kenkyū Kaishi* 3, 82-3 (1956). In crude oil made by solvent extraction copper was 1.5 and iron 20.5 p.p.m.; in crude oil made by press, copper was 1.0-1.2 and iron 12.5-13.1 p.p.m. The amounts of copper and iron in the above two kinds of oil were decreased to a half by alkali treatment. The processes of decoloration and water washing did not decrease copper and iron. (*C.A.* 53, 9504)

A MODIFIED BAUDOIN TEST FOR THE DETECTION OF ADULTERATION OF BUTTER AND GHEE WITH VANASPATI. O. P. Kapur, M. Srinivasan, and V. Subrahmanyam (Central Food Technol. Research Inst., Mysore). *J. Sci. & Ind. Research* (India) 17B, 471-2 (1958). A few drops of alcoholic hydrochloric acid are added to a test tube containing 4-5 mg. of hydrofuramide. A few drops of the product to be tested is added and the mixture shaken. If adulterated, a pink color appears in a few minutes. The test is positive even at 10% adulteration with vanaspati. The application of this technique has been extended by the development of a kit for consumer use. (*C.A.* 53, 9503)

THE DETERMINATION OF FORGERIES OF BUTTER AND OF OLIVE OIL. J. S. Strivek and O. Droppelman B. *Anal. Univ. catolica Valparaiso* 2, 129-47 (1955). Imitations of butter and of olive oil made with margarine, peanut oil, marigold oil, and cottonseed oil can be determined rapidly by spectrophotometry, utilizing the extinction coefficients of the pure materials. (*C.A.* 53, 9503)

DETERMINATION OF ISOOLEIC ACID IN CACAO BUTTER. W. Pelz. *Deut. Lebensm.-Rundschau* 54, 228-30 (1958). Samples of cacao butter of various geographic origin were analyzed for isooleic acid. The results of 61 samples showed 0-0.15%; 51 were below 0.1%. Only 4 showed above 0.2% (0.2-0.22%). The results are discussed. (*C.A.* 53, 9503)

DETECTION OF POLYOXYETHYLENE COMPOUNDS (SOFTENERS) IN BREAD. R. Kliffmüller (Staatl. Chem. Untersuchungsamt, Gießen, Ger.). *Deut. Lebensm.-Rundschau* 54, 59-61 (1958). The method of Jaminet (*C.A.* 49, 142668g), modified by using the solvent mixture butyl alcohol 50, 25% ammonium hydroxide diluted 1:10 25, and ethanol 12 ml., was used. This modification increases the R_f values of polyglycol-400-monostearate, Myrj 52, and Tween 60. Breads containing 0.5-2% polyglycol-400-monostearate were analyzed. The polyglycol-400-monostearate extracted from bread samples had a hemolytic action against fresh blood corpuscles. (*C.A.* 53, 9500)

CARBONYLS IN OXIDIZING FAT. I. SEPARATION OF STEAM VOLATILE MONOCARBONYLS INTO CLASSES. A. M. Gaddis, Rex Ellis,

and G. T. Currie (Eastern Utilization Res. and Development Div., Agr. Res. Ser., U.S.D.A., Beltsville, Md.). *Food Res.* 24, 283-97 (1959). Methods are described for the estimation in fat of total steam volatile carbonyls, and mono- and dicarbonyl fractions thereof, as DNPH derivatives. The application of new paper chromatographic method to the separation and determination of classes of monocarbonyl DNPH's is described. Classes of monocarbonyls changed progressively during oxidation with respect to those present and the proportions thereof. Heating oxidized fat at 165°C. also produced great changes in the classes of monocarbonyls. Types of monocarbonyls found were saturated aldehydes, minor amounts of the two lowest molecular weight saturated methyl ketones, a mixed group which contained as a major constituent a DNPH derivative of unknown class, 2-en-1-als, and 2,4-dien-1-als. In general, with oxidation, the proportion of saturated carbonyls increased in unheated fat, and unsaturated carbonyls (particularly 2,4-dienals) increased when the fat was heated. Resolution of the classes by paper chromatography indicated the probable presence in the saturated aldehyde class of not only hexanal, propanal, ethanal, and methanal, but at least two C₇-C₈ saturated aldehydes, and acetone, methyl ethyl ketone, three carbonyls of unknown class, five 2-en-1-als, and three 2,4-dien-1-als; a total of at least 19 monocarbonyls. The dicarbonyl fraction appeared to be composed principally of α -dicarbonyls, but there was evidence of the presence of other types of dicarbonyls.

HYDROGENATION OF FATS IN A FOAM CONDITION. S. Yu. Elovich, G. M. Zhabrova, P. G. Krivenkova, and T. D. Semenovskaya. *Zhur. Priklad. Khim.* 32, 187-93 (1959). Cottonseed oil was hydrogenated in the presence of a nickel catalyst in a foam condition produced by hydrogen passing through a fritted glass bottom in the reactor. At 200-220° the rate of hydrogenation increased rapidly during the first few minutes. All of the linoleic glycerides were reduced in 5-10 minutes. In the second stage oleate groups were hydrogenated at a slower rate. Both reactions appeared to be of the first order. The hydrogenation rate constants (K₁ and K₂, respectively) ranged from 0.045 to 0.27 for the linoleic and from 0.0018 to 0.0085 for the oleic radicals. The high selectivity of the process was indicated by the constancy of the ratio K₁/K₂ = 0.01-0.04. The electron microscopic examination of the nickel catalyst prepared from (HCO₂)₂ Ni showed that it consisted of particles 0.1-0.2 μ in diameter. (C.A. 53, 9694)

THE SPREADING PROPERTIES OF TABLE MARGARINES. I. GENERAL CONSIDERATIONS AND THE RHEOLOGIC ASPECT OF THE PROBLEM. M. Naudet, E. Sambuc, and P. Desnuelle (Fac. sci., Marseille). *Rev. franc. corps gras.* 6, 4-9 (1959). The work of the "Itegr" on practical methods for the measurement of the plasticity of fats and concrete emulsions is reviewed. Definitions are given for hardness, consistency, etc., and the methods employed for their determinations in the laboratory are reviewed. 17 references.

II. STUDY OF A NEEDLE PENETROMETER AND A CONE PENETROMETER. E. Sambuc and M. Naudet. *Ibid.* 10-17. Twelve margarine samples were tested in the penetrometer of Fryer, et al. and in the A.S.T.M. apparatus (A.S.T.M. D.217, 44T). Instructions are given for the preparation of samples and use of the apparatus.

III. STUDY OF TWO RHEOMETERS. *Ibid.* 18-24. Consistency of margarines is determined, respectively, as the force necessary to extrude it through an orifice and by the sectilometer of Mohr, whereby the force used when cutting the sample with a steel wire is measured. Conditions are determined for obtaining agreement in results. (C.A. 53, 8468)

PEROXIDES OF ETHYL OLEATE IN PRESENCE OF SOME ANTI-OXIDANTS. R. Bottoni and F. Fogliani (Ist. Carlo Erba, Milan). *Farmaco (Pavia) Ed. prat.* 11, 446-51 (1956). The most effective antioxidants at concentrations of 0.05% were dihydro-norguaiaretic acid, propyl gallate, and dodecyl gallate; moderately effective was butylhydroxyanisole, and those weak even at 1% concentrations were *p*-chlorobis(phenol sulfide), *p*-methylbis(phenol sulfide), lecithin, and methyl *p*-hydroxybenzoate. (C.A. 53, 6651)

STABILITY OF HYDROGENATED OILS AND OF VITAMIN A IN PEANUT OILS AND THE PHYSIOLOGICAL SUITABILITY OF ETHYL GALLATE AS AN ANTIOXIDANT. B. R. Roy and B. C. Guha (Univ. Coll. of Sci. & Technol., Calcutta). *Invest. Composition Nutritive Value Varnaspati* (Council Sci. & Ind. Research, New Delhi) 2, 1-24 (1958).

ISOLATION AND IDENTIFICATION OF ISO-OLEIC ACIDS. M. R. Subbaram (Nutrition Research Labs. Coonor). *Ibid.* 25-47.

PROCESSING AND UTILIZATION OF COTTONSEED OIL FOR EDIBLE PURPOSES. COMPOSITION, PROPERTIES, AND NUTRITIVE VALUE OF

PALM OIL. M. Narayana Rao, S. Kuppaswamy, K. Krishnamurthy, D. S. Bhatia, M. Swaminathan, and V. Subrahmanyam. *Ibid.* 48-79. Reviews with references. (C.A. 53, 5536)

ALCOHOLIC EXTRACTION OF OILS. III. WHEAT-BRAN OIL. Y. K. Raghunatha Rao and R. G. Krishnamurthy. *Food Sci. (Mysore)* 7, 147-8 (1958). Three- to six-day-old commercial wheat bran was extracted under pressure with industrial alcohol and with hexane for comparison. For 95% and 93% ethanol and hexane, 4.47, 5.39, 6.0% oil was recovered. The wheat-bran oil extracted was dark brown and contained 6.3-10.8% free fatty acids, compared to 3% free fatty acids in an oil obtained from freshly milled bran by Soxhlet extraction. For the ethanol-extracted and for the hexane-extracted refined oils, respectively, n_D^{20} were 1.478, 1.475; specific gravity 26°, 0.9236, 0.9249; Wijs iodine number, 125, 127-125; saponification value, 185, 184; % unsaponifiables, 6.1, 6.04; titer, 26.5, 26.5; % tocopherol, 0.04-0.25, 0.06; Lovibond color in 1-cm. cell, Y, 30.0, 30.0; R, 4.0, 8.0. The extracted bran kept well in storage for several months without off odor or mold formation. (C.A. 53, 8468)

CHANGES IN THE NONSAPONIFIABLE FRACTION OF OIL IN SUNFLOWER SEEDS AT THE RIPENING STAGE. N. F. Dubinskaya. *Kratkii Otchet v Nauch.-Issledovatel. Rabote Vsesoyuz. Nauch.-Issledovatel. Inst. Maslich. i Efmomaslich. Kul'tur* 1956, (Krasnodar: "Sovet. Kuban"), 129-33 (Pub. 1957); *Referat. Zhur. Khim., Biol. Khim.* 1958, Abstr. No. 32298. The amount of nonsaponifiable substances in ripening sunflower seeds of high oil content was determined at 5-day periods beginning with the 7th day after blooming. Very young seeds contained 20-5% oil, of about 2% unsaponifiable matter. At full maturity the unsaponifiable lipides were 0.8-1.08% of the total oil. As the seeds ripened tocopherol decreased from 76 to 14 mg. % and carotenoids from 0.092 to 0.060 mg. %. Sterols constituted 0.5-0.6% by weight of the total oil and remained at the same level throughout the entire ripening period. During ripening the saturated and oleic acids decreased and linoleic acid increased. The ratio of different fatty-acid glycerides contained in the oil can be used as an oil-quality index. (C.A. 53, 8665)

TOCOPHEROL OXIDATION IN NATURAL FATS. E. N. Frankel, C. D. Evans, and Patricia M. Cooney (Northern Utilization Res. and Development Div., Agr. Res. Ser., U.S.D.A., Peoria, Ill.). *J. Agr. and Food Chem.* 7, 438-41 (1959). Destruction of tocopherols during autooxidation of fats was studied to gain more information about the mechanism of their antioxidant action. Tocopherol loss during autooxidation was much smaller in the highly unsaturated vegetable oils than in cottonseed oil and lard. Metal contaminants increase appreciably the extent of tocopherol oxidation. Their effect is eliminated by the addition of 0.01% citric acid. The work suggests that the hydroperoxides formed in the highly unsaturated vegetable oils decompose rapidly before they react with tocopherol. Antioxidants that react more rapidly than tocopherol with polyunsaturated fat hydroperoxides are needed to stabilize highly unsaturated vegetable oils.

CHANGES IN FATS IN THE PRESENCE OF VITAMINS. II. A. K. Plisov, O. S. Stepanova, and Z. D. Bogatskaya. *Trudy Odessk. Gosudarst. Univ. im. I. I. Mechnikova, Ser. Khim. Nauk* 146 (5), 97-100 (1956); cf. *Trudy Odessk. Gosudarst. Univ.* 3, 5 (1953). The effect of vitamin A, B, and C, and K pyrophosphate on the changes occurring in sunflower oil on standing in the dark and in daylight (with additional irradiation with ultraviolet light) was investigated. An addition of 0.01% of vitamin to the oil retarded formation of peroxides, and this effect was greater when the oil was kept in the dark. The best effect, in the dark as well as in daylight, was with vitamin B₁ and a mixture of A and B₁. The vitamins also inhibited formation of free acids. The iodine numbers of the vitamin-treated oil samples were higher than the corresponding controls. (C.A. 53, 9694)

CHARACTERISTIC NUMBERS AND COEFFICIENTS APPLIED IN FAT ANALYSIS. I. V. Molchanov. *Trudy Krasnodar. Inst. Pishchevoi Prom.* 1955(12), 109-14; *Referat. Zhur., Khim.* 1956, Abstr. No. 79845. An explanation is given of the significance of the common analytical determinations used in fat chemistry. (C.A. 53, 9695)

PALMITIC AND STEARIC ACIDS AS STABILIZERS OF EMULSIONS. N. I. Kozin and T. K. Klyueva. *Sbornik Nauch. Rabot Moskov. Inst. Narod. Khoz.* 1953(3), 65-70; *Referat. Zhur., Khim.* 1956, Abstr. No. 79488. Emulsions of 70% fat (on the water basis), containing 4-5% of free fatty acids, have the highest stability. Emulsions of palmitic acid have a higher stability, owing to a different crystalline structure of the protective

films around the dispersed water droplets. The emulsifier T-1 (a mixture of mono- and diglycerides) does not guarantee stable emulsions of liquid oil. (C.A. 53, 9696)

OIL CAKES AND THEIR PROTEINS. P. Blaizot and J. Poliakoff. *Oleagineux* 14, 39-46 (1959). A review with 24 references. (C.A. 53, 9697)

THE FOUR-TEMPERATURE TEST FOR THE PURITY OF OILS. G. B. Martinenghi. *Olearia* 12, 195-200 (1958). The turbid, freezing, fluid, and limpid temperatures of 41 oils are plotted on the ordinate against time interval on the abscissa. Lines drawn connecting the four points form characteristic polygons. The position of each figure with respect to 0° line, its general shape, its surface, the inclination of its sides with respect to the perpendicular to the 0° line, especially the side connecting the turbid and limpid points, and the distance from the horizontal parallels passing through these 2 points are noted. The various olive oils have the same general characteristic configuration which is different than that of other oils. These polygons are an indication of the triglyceride structure common to olive oils. (C.A. 53, 9697)

LINSEED IN MEXICO. L. Sanchez R. *Rev. soc. quim. Mex.* 2, 207-18 (1958). Producing areas, production, and processing in Mexico are reviewed. (C.A. 53, 9697)

COMPONENT ACIDS AND GLYCERIDES OF MYRISTICA BEDDOMEI SEED FAT. A. R. S. Kartha and R. Narayanan (Maharajás Coll., Ernakulam). *J. Sci. Ind. Research* (India) 17B, 283-4 (1958). Analysis of the seed fat of *Myristica beddomei* shows that stearic acid is the predominant saturated acid and myristic acid, if at all present, occurs only in traces. (C.A. 53, 9696)

MINOR CONSTITUENTS OF ITALIAN OLIVE OILS. M. Vitagliano and E. Turri (Univ. Naples). *Olearia* 12(7-8), 145-56 (1958). An unsuccessful attempt was made to find a means of detecting adulterations or substitutions in Italian olive oils by studying their minor constituents. (C.A. 53, 9697)

THE PAPER CHROMATOGRAPHY OF FATS. XXIX. ANALYSIS OF MIXTURES OF FATTY ACIDS BY MEANS OF THE COPPER-MERCURY METHOD. H. P. Kaufmann and H. Schnurbusch. *Fette, Seifen, Anstrichmittel* 60, 1046-50 (1958). Chromatographic separation of a mixture of fatty acids is described. The members are separately identified as copper and mercury soaps and as mercury addition compounds of unsaturated acids by determining the areas colored by mercuric sulfide and cupric acetate, respectively. Since each carboxyl corresponds to ½ copper or mercury, but each double bond 1 atom, the compound can be calculated. The analysis of a synthetic fatty-acid mixture and of soya and linseed fatty acids are given as examples with calculations. (C.A. 53, 8663)

THE QUALITATIVE ANALYSIS OF ANTIOXIDANTS. A. Seher. *Fette, Seifen, Anstrichmittel* 60, 1144-53 (1958). The lack of specific identification reactions for many commonly used antioxidants in fats is discussed. The fat or oil (20 g.) in hexane (40 ml.) is extracted twice with 30 ml. of 75% aqueous methanol, the lower methanol layer separated, evaporated, and dissolved in methanol. Characteristic maximum for antioxidants were at the following wave lengths: 2-*tert*-butyl-4-hydroxyanisole 291; 3-*tert*-butyl-4-hydroxytoluene 290; dihydronorguaiaretic acid 283, propyl gallate 275, trimethylhydroquinone 255, *a*-naphthoquinone 245, N-palmitoyl-*p*-phenetidine, 249, ascorbyl palmitate 245, *a*-tocopherol and its acetate 292 μ . 2-*Tert*-butyl-4-hydroxyanisole, dihydronorguaiaretic acid, and propyl gallate were fed to rabbits for 50 days in 0.1-g. daily doses. The fat from the animals showed less tendency for autoxidation than the control, but detection of 2-*tert*-butyl-4-hydroxyanisole, dihydronorguaiaretic acid, and propyl gallate in the fats was unsuccessful. (C.A. 53, 9693)

PHOTOMETRIC COLOR DETERMINATIONS OF COTTONSEED OIL. U. Kh. Khalimova and A. L. Markman. *Izvest. Akad. Nauk Uzbe. S.S.R., Ser. Khim. Nauk* 1957(2), 77-86. A F-6 Moskip photocolormeter is used for determination of color of cottonseed oils and its acceptance recommended as the State standard. Comparative data and means of calculating adjustment for obtaining comparable results are given for the method, the Lovibond-Wesson tintometer, and the Russian V.N.I.I.S.H. colorimeter. (C.A. 53, 9697)

THE CHEMISTRY OF INDIAN LANTANAS. II. THE FATTY OIL AND THE COMPONENT FATTY ACIDS FROM THE SEEDS. S. K. Nigam and K. N. Kaul (Natl. Botanic Gardens, Lucknow). *J. Sci. & Ind. Research* (India) 17B, 472 (1958). The seeds of Indian lantanas were examined for their lantadene and lancamarone contents, but none could be obtained. The oil obtained (9%) had d_{20}^{25} 0.9788; n_D^{40} , 1.3508; acid number,

22.16; saponification number, 192.6; iodine number, 108.5, and unsaponifiable matter 3.5%. The unsaturated acids contained *a*-linolenic 5.9, linoleic 45.8, and oleic acids 47.3%. The saturated acids (10%) were stearic and palmitic acids. (C.A. 53, 9697)

EDIBLE OILS. A. Schwarcman. *Chim. & Ind.* (Paris) 80, 587-92 (1958). Edible fats, oils and waxes, with emphasis on olive and soy oil production, refining, and hydrogenation, are reviewed. (C.A. 53, 9698)

INDIGENOUS COTTONSEED. II. STORAGE OF COTTONSEED. W. R. Harwalkar, V. V. R. Subrahmanyam, and S. A. Salefore (Regional Research Lab., Hyderabad-Deccan). *Indian J. Appl. Chem.* 21, 61-8 (1958). The moisture content of cottonseed grown and stored in India, irrespective of variety, varies directly with the external humidity. 20 references.

III. STORAGE AND STABILITY OF COTTONSEED OIL. V. R. Harwalkar and S. A. Salefore. *Ibid.* 69-73. Storage and stability conditions for Indian cottonseed oil are similar to those obtained for other cottonseed oils. 10 references. (C.A. 53, 9698)

GREEN PIGMENTATION OF OLIVE OILS. F. De Francesco. *Boll. lab. chim. provinciali* (Bologna) 9(1), 90-5(1958). The nature of yellowish green pigments in olive oils from Garda and meridional zones of Italy is used as a possible means of distinguishing these oils from others having similar color but not of the same quality. The spectrophotofluorimeter detects traces of chlorophyll present in the oils tested, the spectrophotometer detects it only in pure oil that has not been treated in any manner, and chromatography separates out pigments other than chlorophyll. Thus, in one group the chlorophyll shows a fluorescence peak at 690 $m\mu$, an absorption band at 531-610 with a maximum at 665 $m\mu$, and forms a very dark green ring at the top of the chromatographic column. The virgin oils show a band at 430-500 $m\mu$ and yellow rings on the chromatographic column indicating carotenoids. Oils that have been refined and esterified do not show any of these characteristics. Only the spectrofluorimeter indicates with certainty the presence of chlorophyll in sulfuric acid-treated oils. (C.A. 53, 8467)

ESSENTIAL FATTY ACIDS AS FOOD SUPPLEMENTS. E. Aaes-Jorgensen (Dept. Biochem. & Nutrition Polytechnic Inst., Copenhagen, Denmark). *J. Agr. Food Chem.* 7, 246-9 (1959). A review.

A METHOD FOR DETECTING THE INITIATION OF AUTOXIDATION. W. Kern and L. Dulog (Inst. Organic Chem. Univ. Mainz). *Die Makromolekulare Chemie* 29, 199-207 (1959). A method is described which measures manometrically the onset of autoxidation of substances of low vapor pressure (methyl linoleate). The reaction vessels are fitted with an equipment to break ampoules, so that the material can be brought into oxygen at a fixed time. Thus it is possible to measure the solubility of oxygen in the substance.

TESTING AND EVALUATING HEATED FATS. J. Wurziger and E. Lindemann. (Health Inst. Hamburg). *Fette Seifen Anstrichmittel* 61, 257-264 (1959). In case of fats which are heated at 160-180° for a long time, the acid value, as compared to the peroxide value, rises rather slowly. The author points out that such fats can hardly be evaluated through their acid and peroxide values. The lowering of the aniline point can, in a very simple manner, be utilized to evaluate the quality of heated fats and to test their stability analytically. The lowering of the aniline point in the case of fats is primarily brought about by the free fatty acids, peroxides, polyketones, and epoxides. The total aniline point lowering is calculated with the aid of an empirical equation.

THE FATTY ACID COMPOSITION OF MILK PHOSPHATIDES. H. P. Kaufmann and E. Mohr (Inst. for Pharmacy and Food Chemistry, Univ. Munster, Westf.). *Fette Seifen Anstrichmittel* 61, 285-287 (1959). The milk phosphatides from butter serum were concentrated, isolated and dissolved in isopropanol-benzene mixture and saponified in the cold. The mixed fatty acids thus obtained were examined with the help of paper chromatography. The authors confirm the reported results that the milk fat phosphatides do not contain fatty acids lower than C₈. The percentage of oleic acid is low. Behenic and tetraoctatrienoic acid are found to be present.

STUDIES IN THE INVESTIGATION OF FATS THROUGH PAPER CHROMATOGRAPHY. M. Jaky (Research Inst. for Plant Fats, Budapest). *Fette Seifen Anstrichmittel* 61, 6-10 (1959). With the help of chromatography model mixtures of fatty acids were separated and their R_f values determined. The qualitative determination of separated fatty acids was carried out by microtitrating the eluted acids. Monoglycerides sep-

arated are determined with the aid of Rhodamin B. Triglycerides were separated and fatty acids from the glyceride fractions were examined qualitatively. Sterols and tocopherols in the unsaponifiable matter can be identified by comparison with substances of the same R_f values.

INVESTIGATION OF SOME HALOGENATED FATTY ACIDS FORMED DURING I. V. DETERMINATIONS. W. Awe and B. Grote (Inst. of Pharmacy, Technischen Hochschule, Braunschweig). *Fette Seifen Anstrichmittel* 61, 1-5 (1959). Halogenated fatty acids which were formed during the I. V. determination of oleic, linoleic, and ricinoleic acid, were examined. Halogens were determined potentiometrically and paper chromatography was used for the qualitative examination of the respective halogens. As the difference in the R_f values was low, they were decomposed on paper in an ammonia atmosphere and the halogens identified. For identifying bromide and iodide ions phenol red, chloramine, and palladium (II) chloride are used. New trends in ultraviolet spectroscopy of halogenated fatty acids are referred to.

SKIN FATS AND THEIR CHARACTERISTICS. E. Walter (Mannheim-Rheinau). *Fette Seifen Anstrichmittel* 61, 188-193 (1959). The skin fats which are excreted by the human body along with the sweat were extracted with ether from soiled clothing and examined. They have been found to cause yellow spots on the clothes. These fats unless they are thoroughly removed by detergents are absorbed by the calcium soaps and nullify the effect of optical brightness subsequently used, so that these spots remain yellowish. As the calcium soaps and iron salts go into solution in the presence of sodium pyrophosphate, an addition of this salt results in rendering the washing agents effective.

ESTIMATION OF EPOXIDES IN OILS AND FATS. L. Krull (Margarine Union AG, Hamburg-Bahrenfeld). *Fette Seifen Anstrichmittel* 61, 223-227 (1959). A new method based on argentometry has been developed for the estimation of epoxides and is compared with that of Swern and Durbetaki. The author studied the effect on epoxide estimation of various reaction products which are formed as a result of the oxidation of fats. 9,10-Epoxystearic acid and epoxidized oils were taken as the standard materials and the effect of the disturbing materials studied. Experiments on the thermostability of epoxystearic acid were carried out. The studies of the influence of epoxides on the other characteristic values of oils showed that the hydroxyl value was considerably affected, the carbonyl value yielded negative results and the peroxide value was not affected.

POTENTIOMETRIC DETERMINATIONS OF FATTY ACIDS POSSESSING HIGH MOLECULAR WEIGHTS AND THEIR MIXTURES. Christine Sass (Chemische Fabrik GmbH., Steinau Krs. Schluchtern). *Fette Seifen Anstrichmittel* 61, 93-95 (1959). The potentiometric precipitation titrations with silver nitrate are proposed for the identification and quantitative determination of fatty acids and their mixtures from caprylic to stearic acids. The results are illustrated with titration curves.

DETERMINATION OF FOREIGN FATS IN CACAO PRODUCTS. A. Purr (Inst. of Food Technology, Munich). *Fette Seifen Anstrichmittel* 61, 119-126 (1959). The author combines low temperature crystallization and chromatographic analysis to determine the presence of foreign fats in cacao butter. The adulterated and unadulterated cacao butter is first hydrogenated. The method is based on the estimation of the nonhydrogenated fatty acids which were obtained by low temperature crystallization and the subsequent saponification of the acetone soluble fractions. The separation of the fatty acids obtained in this manner is carried out chromatographically.

HYDROGENATION OF MONTAN WAXES. D. Runge (Farbwerke Hoechst AG., Werk Gersthofen). *Fette Seifen Anstrichmittel* 61, 31-33 (1959). Catalytic hydrogenation was applied to the manufacture of wax alcohols from esters of montanic acid. The reaction conditions are illustrated with the help of esters of montan wax acids and different alcohols and the results are compared with those obtained during hydrogenation of natural wax esters. The hydrogenation of raw wax is commented upon.

DETERMINATION OF FAT RANCIDITY THROUGH COLORIMETRIC METHODS WITH DIPHENYL CARBAZIDE. B. A. J. Sedlacek and R. Rybin (Div. of Food Hygiene, Health Inst., Prag). *Fette Seifen Anstrichmittel* 61, 134-138 (1959). Rancid fats react with diphenyl carbazide suspended in CCl_4 to give a red color which can be examined spectrophotometrically. Experimental conditions must be followed since the color intensity is affected by light and is also affected by time lapse. The results are discussed and compared with those obtained by others.

INTERESTERIFICATION OF FATS. II. THE COLORIMETRIC TESTING OF INTERESTERIFICATION WITH THE HELP OF DIFFERENTIAL-THERMO-ANALYSIS. H. P. Kaufmann and H. Schnurbusch (German Inst. for Fat Research, Munster). *Fette Seifen Anstrichmittel* 61, 177-181 (1959). A differential colorimeter is described which is suitable for the differential thermal analysis of fats. The curves drawn on the basis of the results obtained by this method correspond to those obtained by the melting point method in the region of -60° to $+60^\circ$. This method also offers a qualitative test for the interesterification as well as means for evaluating the activity of various catalysts used for interesterification.

SYNTHESIS OF PURE GLYCERIDES OF ELAEOSTEARIC ACID AND THEIR BEHAVIOR DURING AUTOXIDATION. H. P. Kaufmann and H. H. Thomas [German Inst. for Fat Research, Munster (Westf.)]. *Fette Seifen Anstrichmittel* 61, 211-218 (1959). The following unsaturated glycerides were synthesized: 1-stearo-2,3-di- α -elaeostearin, tri- α -elaeostearin, 1,2-dioleo-3- α -elaeostearin, 1-oleo-2,3-di- α -elaeostearin, 1,2-dilinolo-3- α -elaeostearin, and 1-linoleo-2,3-di- α -elaeostearin. The synthesis was achieved through the reaction of the 1-monoglycerides with the relevant fatty acid chlorides. These synthetic glycerides were subsequently subjected to autoxidation. The amount of oxygen required for their oxidation was followed with the help of a filmograph and the curves obtained thereby are discussed. The film forming properties of these pure glycerides were investigated.

GRAVIMETRIC, BROMOMETRIC DETERMINATION OF IODINE NUMBER AND SOME QUANTITATIVE DETERMINATIONS OF SUBSTITUTION. W. Heidbrink (Analytical Lab., Godecke & Co.). *Fette Seifen Anstrichmittel* 61, 194-199 (1959). A method for determining the iodine value in bromine atmosphere with the help of a simple weighing glass is given. It can also be employed for the quantitative control of special bromine substitution reactions in the aromatic nucleus. The method is considered to be specially suitable for emulsions containing water. The advantage of determining the iodine value and water content on a single sample is illustrated.

HYDROGENATION OF CASTOR OIL. II. J. van Loon (Delft, Holland). *Fette Seifen Anstrichmittel* 61, 201-205 (1959). The hydrogenation of castor oil and the ethyl esters of its total mixed fatty acids has been studied under the influence of Pd catalysts by varying the reaction temperature, hydrogen pressure, catalyst oil ratio, and the activity of the catalyst. The results prove that the main center of hydrogenation activity is the double bonds. Reduction of the hydroxyl group is only a subsidiary reaction under these conditions. The reaction mechanism of castor oil hydrogenation is discussed.

THE CONTROLLED INTERESTERIFICATION OF LARD. C. Placek and G. W. Holman (Procter and Gamble Co.). *Chim et ind.* 81, 526-534 (1959). Shortenings are hardened and granulation of lard reduced by controlled rearrangement of the glyceride molecules; consistency and resistance to oxidation are also improved. The controlled interesterification process, developed by Procter and Gamble, consists of displacing the chemical equilibrium by initiating the crystallization of glycerides as soon as they are formed. A highly reactive sodium-potassium catalyst is used. A continuous process is described.

SOME FACTORS INVOLVED IN THE DEVELOPMENT OF OXIDIZED FLAVOR IN MILK. L. W. Aurand, A. E. Woods, and W. M. Roberts (Dept. of Animal Industry, N. Carolina State College, Raleigh). *J. Dairy Sci.* 42, 961-68 (1959). Some factors involved in the development of oxidized flavor were considered. Spontaneous and susceptible milks were used in the study. The milks were subjected to three treatments: raw, pasteurized ($63^\circ C$. for 30 min.), and heated ($76^\circ C$. for 30 min.). The factors considered were: the effect of heat, the effect of copper, the effect of hydrogen peroxide, the effect of sulfhydryls, and the role of oxidizing enzymes in oxidized flavor development. The results of the study indicate that an enzyme mechanism is involved in spontaneously oxidized flavor; whereas, a chemical oxidation is involved in induced oxidized flavor. Spontaneously oxidized flavor was prevented either by the use of heat or by an enzyme inhibitor (*p*-chloromercuribenzoate). In contrast, these treatments had no effect upon copper-induced oxidized flavor. The copper-induced flavor was inhibited by the use of a copper chelating agent (2,9-dimethyl-1,10-phenanthroline) and by cysteine. Cysteine was effective in reactivating the enzyme-inhibited milk, thus giving rise to the belief that an enzyme is involved in producing the spontaneously oxidized flavor and that a sulfhydryl group is essential at the active site of the enzyme for enzymatic activity.

QUANTITATIVE DETERMINATION OF NICKEL IN OILS BY X-RAY SPECTROGRAPHY. C. W. Dwiggin, Jr., and H. N. Dunning (U. S. Dept. of the Interior, Bartlesville, Okla.). *Anal. Chem.* 31, 1040 (1959). A rapid x-ray spectrographic method, using a cobalt internal standard, is developed for determining nickel in oils. Variables found in other procedures are controlled by use of the internal standard. The method compares favorably with other procedures.

FATTY ACIDS OF SORGHUM LEAF AND STEM. M. C. Burnett and R. L. Lohmar (Northern Utilization Res. and Dev. Div., U. S. Dept. of Agr., Peoria, Illinois). *J. Agr. and Food Chem.* 7, 436-7 (1959). Lipides of sorghum leaf and stem were solvent-partitioned into three fractions representing 37, 40, and 23% of the lipide extract. Fatty acid composition was determined by gas chromatography. The major unsaturated acid was linolenic and most was present in the 80% ethyl alcohol fraction. The major saturated acid was palmitic, relatively evenly distributed among the fractions. Fatty acid composition differs markedly from that of sorghum grain, but resembles that of other grasses and nonseed plant lipides.

COMPOSITION OF OIL OF THE SUNFLOWER SEED SHELL. G. M. Pavlov. *Trudy Krasnodar. Inst. Pishchevoi Prom.* 1955 (11), 17-22; *Referat. Zhur., Khim.* 1956, Abstr. No. 45217. Ether extracted sunflower seed shell oil (yield 12.87%, dry basis) was a yellow-greenish liquid (n_{20}^{D} 1.4780, n_{40}^{D} 1.4708, acid number 64.42, saponification number 184.33, iodine number 108.72) which deposited considerable amounts of white residue. The oil contained: unsaponified material 3.05, liquid fatty acids insoluble in water 88.11, and volatile fatty acids soluble in water 2.01%. The unsaponified material, melting at 78°, had iodine number 64.79, and main components were high-molecular alcohols and sterols. Hydrocarbons were present in small amounts. Water-insoluble fatty acids contained oxy acids (dark-brown viscous substances with iodine number 58.3) 5.38, and saturated and unsaturated fatty acids, respectively, 10.04 and 84.58%. The water-soluble volatile fatty acids had average molecular weight of 77.46-82.34. (*C.A.* 53, 6655)

CHROMATOGRAPHIC METHOD OF SEPARATING AND DETERMINING FATTY ACIDS OF COTTONSEED OIL. R. M. Mirzakarimov and A. M. Yakubov. *Doklady Akad. Nauk Uzbek. S.S.R.*, 1958 (3), 29-33. The best separation and determination of linoleic, oleic, stearic, and palmitic acids was made by using paper from Leningrad Factory No. 2, by wetting it with solvent mixtures of water-saturated butyl alcohol with 10% formic acid or mixtures of butyl alcohol-formic acid (2:1 or 5:1) for 10-12 hours, air drying, then drying at 90-100°, and by spraying with bromocresol blue and heating for 3-5 minutes at 90-100°. (*C.A.* 53, 3738)

EXTRACTION OF VEGETABLE OIL FROM OIL CAKES. V. V. Beloborodov. *Zhur. Priklad. Khim.* 31, 1565-72 (1958). The process of extraction of oils from oil cakes is considered as a non-stationary diffusional process from solid bodies. (*C.A.* 53, 3738)

INVERSION ACTION OF FAT ANTIOXYGENS. I. COMPARISON BETWEEN THE BEHAVIOR OF ANIMAL AND VEGETABLE FAT TOWARD ANTIOXYGENS. W. Heimann and H. von Pezold (Tech. Hochschule Karlsruhe, Ger.). *Z. Lebensm.-Untersuch. u.-Forsch.* 108, 317-22 (1958). Additions of phenolic antioxidants (tocopherol, hydroquinone, and dodecylgallate) to animal fats show an inversion action, i.e. the antioxidant action increases with increasing amounts of phenolic antioxidants until a maximum effect is obtained after which additional amounts lower the antioxidant effect. With vegetable fats, additions of phenolic antioxidants show practically no antioxidant action; and at dosages that are very effective in animal fat there occurs a definite prooxidant effect in the vegetable fats. These observations are discussed with regard to the effect of the combined natural and added antioxidants in vegetable fats. When total amount of antioxidants (natural plus added) is taken into account, the difference in behavior of animal and vegetable fat does not exist. (*C.A.* 53, 2646)

ESTIMATION OF THE LIPID FRACTIONS OF TOBACCO. D. N. Hellier (Research Dept., Carreras Ltd., 221 Stanhope Street, London, N.W.1). *Chemistry and Industry* 1959, 260-1. Tobacco was extracted with ethanol and the extract was separated by chromatography into Soft Resin, Hard Resins "A" and Hard Resins "B". This method was used in the routine analysis of the tobacco leaf quality. The Soft Resin fraction contains the lipids common to most plants. The Hard Resin "A" fraction was found to contain 41.0% resin acids; the remainder of the material from this fraction, and all the Hard Resin "B" fraction was neutral.

INFRARED ANISOTROPY AND STRUCTURE OF CRYSTALLINE FORM C STEARIC ACID AND VACCENIC ACID. H. Susi (Eastern Utilization Res. and Development Division, Agricultural Research Service U.S. Department of Agriculture). *J. Am. Chem. Soc.* 81, 1535-40 (1959). The infrared spectra of highly oriented crystalline films of form C stearic acid and of vaccenic acid have been obtained using polarized radiation with the plane of polarization perpendicular and at 45° angles to the principal crystal planes. The anisotropy of stearic acid is discussed in relation to its known structure. The data obtained on vaccenic acid indicate that the substance crystallizes in the orthorhombic system. The factor group of the space group is probably isomorphous with D_{2h} . The main portions of the hydrocarbon chains are packed into an orthorhombic substructure similar to polyethylene and form C saturated acids, but the chains seem twisted near the double bonds, which appear to be nearly parallel in the projection along the C-axis.

SEPARATION OF LIPIDES BY GAS-LIQUID CHROMATOGRAPHY. S. R. Lipsky, R. A. Landowne, and J. E. Lovelock (Yale Univ. School of Medicine, New Haven, Conn.). *Anal. Chem.* 31, 852-56 (1959). A modified ionization detection system and high efficiency capillary columns are employed in a gas-liquid chromatographic method. It is applicable to the analysis of mixtures of long-chain saturated and unsaturated acid esters. The ionization detection system is not sensitive to changes in pressure and temperature. The optimum sample load is in the region of 1 gamma or less.

POTENTIAL MARKETS FOR U. S. EDIBLE OILS AND PROTEINS. E. M. Deck (Anderson, Clayton & Co., Dallas, Texas). *Soybean Digest* 19(7), 12-15 (1959). Potential markets for proteins and edible oils, chiefly soybean oil, in the countries of Southeast Asia are reviewed.

THE OXIDATION OF MONOETHENOIC FATTY ACIDS AND ESTERS. THE PREPARATION AND CATALYTIC AUTOXIDATION OF RICINOLEIC ACID. E. V. Gulbekian and J. H. Skellon (Dept. Chem., Brunel College of Technol., London, W.3). *J. Applied Chem.* 9, 224-31 (1959). The preparation of pure ricinoleic acid from castor oil is described. The acid was reacted with gaseous oxygen at 120° in the absence of catalyst or with cobalt ricinoleate or uranium ricinoleate. Analysis of the products showed that during catalytic oxidation of ricinoleic acid there was considerable dehydration and self-esterification followed by oxidative rupture of the molecule and recombination of the scission products to form polymers. Apparently there was hydroperoxide formation followed by scission as well as direct oxidative scission of the ethenoid link. In the absence of oxygen, there was esterification but no dehydration.

THE FATTY ACID COMPOSITION AND GLYCERIDE STRUCTURE OF INDIAN WILD-BOAR FAT. S. P. Pathak, S. K. Roy, and B. N. Trivedi (Banaras Hindu Univ., Varanasi, India). *Biochem. J.* 71, 593-6 (1959). Depot fat from a wild-boar was analyzed by the lead salt-ethanol and ester-fractionation procedures. As per cent by wt., fatty acid composition was: myristic 1.6, palmitic 29.5, stearic 16.8, tetradecenoic 0.7, hexadecenoic 13.2, oleic 36.3, and octadecadienoic 1.9. The fat contained 1.5% fully saturated glycerides, 39.6% disaturated-monounsaturated glycerides, 58.9% monosaturated-diunsaturated glycerides and no triunsaturated glycerides.

REFINING VEGETABLE OILS. L. P. Hayes and H. Wolff (A. E. Staley Mfg. Co.). *U.S.* 2,881,195. As one stage in the processing of vegetable oils, the degummed oil is washed with an aqueous 0.25 to 5% solution of hexametaphosphate, pyrophosphate, tetraphosphate or metaphosphate.

METHOD OF SEPARATING COMPONENTS OF COTTONSEED OIL BY FRACTIONAL CRYSTALLIZATION OF MISCELLA. G. C. Cavanagh (Ranchers Cotton Oil). *U.S.* 2,883,405. A process is described for winterizing a solution of cottonseed oil in a solvent by slow stepwise cooling.

EMULSIFIED SALAD DRESSING. R. J. Stapf (Kraft Foods Co.). *U.S.* 2,885,292. The storage stability of an emulsified salad dressing is improved by the addition of at least 0.001% of a metal chelating agent.

TINNING OIL COMPOSITION. J. W. Nelson (Sinclair Refining Co.). *U.S.* 2,886,465. A bath for use in hot dip tinning operations is a blend of palm oil and pentatriacontenyl succinic acid anhydride.

TALL OIL FRACTIONATING PROCESS. E. W. Hanson, J. Drew and L. Cagnolatti (Crosby Chemicals, Inc.). *U.S.* 2,886,492. A process is described for the fractional distillation of tall oil.

METHOD AND PLANT FOR THE RECOVERY OF OIL AND PROTEINS FROM ANIMAL MATERIAL. A. E. G. Borek (Akt. Separator). *U.S.* 2,888,449. Oil and proteins are recovered from press water

obtained from animal material by successive centrifugation, partial evaporation, and centrifugation.

SISAL BUFF OIL IMPREGNATION METHOD. J. L. B. Vaughan, T. W. Hislop and D. H. Hanna (Canadian Hanson & Van Winkle Co. Ltd.). *U.S.* 2,890,137. The wear resistance of sisal buff is improved by impregnating it with an aqueous 27.0% emulsion of heavy bodied soya bean oil containing an emulsifying agent, and heating the impregnated buff to about 300°F.

EMULSIFIED OLEAGINOUS SPREAD CONTAINING ESSENTIAL FATTY ACIDS. R. A. Phillips (Allied Labs., Inc.). *U. S.* 2,890,959. The fatty component of the spread comprises 75 to 92% of an edible vegetable oil (corn, soya, safflower, cottouseed, sunflower), 8 to 25% of a hydrogenated vegetable oil having a melting point within the range of 112 to 145°F., and 0.1 to 2.0 parts by wt. of an emulsifier such as glyceryl monostearate and lecithin.

INTERESTERIFICATION OF GLYCERIDES. Thomas Hedley & Co., Ltd. *Brit.* 799,363. A continuous process is described for the directed interesterification of glycerides so as to yield a material containing a high concentration of trisaturated glycerides with an enhanced cloud point. The reaction is carried out at a low temperature. (*C.A.* 53, 6481)

RECOVERY OF ALKYL ETHERS OF GLYCEROL ESTERS, ESPECIALLY ESTERS OF BATYL AND SELACHYL ALCOHOLS FROM LIPIDE MIXTURES. Aktiebolaget Kabi. *Brit.* 801,582. See *Swed.* 160,319. (*C.A.* 52, 6819i). (*C. A.* 53, 5710).

UREA SALTS OF DICARBOXYLIC ACIDS. F. R. Alsberg, F. G. Jeffers, and Imperial Chemical Industries. *Brit.* 805,507. Glutaric acid 41.2 and urea 37.5 in water 79 parts at 80° cooled to 20° yield urea glutarate melting at 130-2° (decomposition). Salts of urea and other aliphatic dicarboxylic acids, e.g. residual acids from adipic acid manufacture, are prepared similarly. (*C.A.* 53, 7996)

SEPARATION OF FATTY ACIDS. L. Loury and M. Frelat (Institut des corps, Centre technique industriel). *Fr.* 1,108,722. Fatty acids from beef fat are separated into stearic and oleic fractions by partial recrystallization from dichloroethane at -20° for 10-20 hours. Examples are given of the separation of a mixture of fatty acids and of acids from tallow. (*C.A.* 53, 8668)

CATALYTIC OXIDATION OF PARAFFIN HYDROCARBONS TO FATTY ACIDS. K. Engelmann. *Ger. (East)* 14,370. Fatty acids are prepared by atmospheric oxidation of higher paraffinic hydrocarbons by using a catalyst containing 1% by weight sodium chloride and 1% boric acid at 160°. (*C.A.* 53, 8668)

ELECTROLYTE-STABLE DISPERSIONS. R. Heyden (Böhme Fettchemie G.m.b.H.). *Ger.* 956,048. A mixture of poly(ethylene oxide) waxes of molecular weight 1,000-10,000 treated with phosphorus pentoxide or phosphorus oxychloride, stearyl alcohol, and octadecyl alcohol with 12 parts ethylene oxide emulsified in white oil gives a good electrolyte-stable emulsion. Sulfonated olein or dodecylbenzene sulfamide can be used instead of stearyl alcohol. The emulsions are useful for paint, treatment of furs, etc. (*C.A.* 53, 8668)

BLEACHING OF WAXES, OILS, AND FATS. R. Schimer and H. Voit (Farbwerke Hoechst Akt.-Ges. vorm. Meister Lucius & Brüning, Werk Lech-Chemie Gersthofen). *Ger.* 957,508. The substances are bleached with chromic sulfuric acid in a continuous procedure. The apparatus consists of several reaction vessels. Between each vessel mechanical defoamers are arranged, which operate with pulsating pressure caused by membranes. (*C.A.* 53, 8667)

LONG-CHAINED ALIPHATIC CARBOXYLIC ACIDS. E. Baronetzky and W. Fuchs. *Ger.* 960,188. $\text{CH}_2\text{O}_2\text{C}(\text{CH}_2)_n\text{CO}_2\text{H}$ (45 g.) and 75 g. palmitic acid in absolute 0.5 N NaOCH_3 solution was electrolyzed 3 hours at 5.6 amperes, the precipitated *n*-tri-acontane filtered off, and the solution poured into ice water to give 41% methyl arachidate and 17% di-methyl sebacate. Similarly methyl behenate was prepared. (*C.A.* 53, 7996)

FATTY ACID RECOVERY FROM VEGETABLE OIL EXTRACTION. C. P. van der Voort (Continue de Smet Soc. anon.). *Ger.* 961,380. Diluted sodium hydroxide is added to a solution of crude vegetable oil in hexane with addition of solvents containing at least 1 polar group and 1-5 C atoms in the aliphatic chain, e.g. isopropyl alcohol. The mixture is allowed to settle; the upper layer is washed with addition of an electrolyte, e.g. citric acid, and freed from solvents by distillation under reduced pressure; the lower layer is washed with a mixture

of hexane and isopropyl alcohol and yields fatty acids upon addition of sulfuric acid. (*C.A.* 53, 9702)

APPARATUS FOR CONTINUOUS EXTRACTION OF OIL-CONTAINING SEEDS. H. Süß (Pintsch-Bamag Akt.-Ges.). *Ger.* 962,011. (*C.A.* 53, 9702)

REFINING OF FATTY OILS. P. Steinacker and O. Möller (Westfalia Separator Akt.-Ges.). *Ger.* 965,733. Free fatty acids in oils are removed in two steps. After neutralization with an alkali or an alkali metal carbonate solution, the soaps are separated and, in a second step, the residual soaps in the oil are removed by centrifugation. (*C.A.* 53, 9702)

CONTINUOUS EXTRACTION OF SEEDS. W. Depmer. *Ger.* 966,724. Oil-containing seeds are extracted in bucket chain extractors and, before steaming, the residue is squeezed out. The oil containing turbid solvent is recycled and filtered through the seeds to be extracted. (*C.A.* 53, 9702)

APPARATUS FOR FRACTIONAL SEPARATION OF FATTY ACIDS FROM STEARIN AND OLEIN. G. B. Martinenghi and M. Viarengo. *Ital.* 550,734. An apparatus is described for separating by fractionation or distillation of mixtures of fatty acids at 0-5° in inert solvents. (*C.A.* 53, 9701)

STABILIZATION OF EMULSIONS OF UNSATURATED ORGANIC COMPOUNDS WITH OZONE. Shigetoshi Mihara, Ichiro Miwa, Kisaburo Ueno, Shugo Morita, and Keizo Tango (Oriental High Pressure Industries Co.). *Japan.* 9220('57). If ozone is absorbed in an emulsion of water-insoluble unsaturated organic compounds and water, the decomposition of latter is prevented effectively. (*C.A.* 53, 8668)

SELECTIVE HYDROGENATION OF FATS AND OILS. Tsutomu Kuwata and Shizuo Takume (Nikki Chemical Industries Co.). *Japan.* 3223('58). Ammonium dichromate (126.1 g.) in 500 ml. water is treated with 150 ml. 28% ammonium hydroxide, 241.6 g. $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$, and 28.7 g. $\text{Mn}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ in 500 ml. water. The precipitate is filtered off, washed with water, and heated at 350° to obtain a catalyst. Whale oil (100 g.) with an iodine number of 125 at 180-200° is hydrogenated with 2 g. iodine and hydrogen to give oil with an iodine number of 77 in 60 minutes and 67 in 120 minutes. There was no further decrease in the iodine number. Thus, the catalyst showed a selective hydrogenation of unsaturated fatty acids with a higher unsaturation than oleic acid. The oleic acid is unattacked. (*C.A.* 53, 8667)

DEODORIZATION OF FISH-LIVER OIL. Masakuni Kanai. *Japan.* 3632('58). Fish-liver oil is placed in a vessel with semipermeable membrane and carbon electrodes 3-5 cm. apart on each side of the membrane, and direct current at 200 volts is applied. Odorous components, such as low-molecular protein hydrolyzate and unsaturated organic compounds, are allowed to move into the cathode chamber, while an odorless fish-liver oil is collected in the anode chamber. (*C.A.* 53, 8668)

• Fatty Acid Derivatives

POLYMERIZATION OF VINYL ESTERS OF FATTY ACIDS. I. POLYMERIZATION OF VINYL N-BUTYRATE, ISOBUTYRATE, N-CAPROATE, AND ISOCAPROATE. C. J. Kurian and M. S. Muthana (Dept. Applied Chem., Indian Inst. of Tech., Kharagpur, India). *Die Makromolekulare Chemie* 29, 1-18 (1959). Kinetics of the polymerization of several vinyl esters of fatty acids are reported.

II. POLYMERIZATION OF VINYL ESTERS OF N- AND ISO-BUTYRIC ACID AND N- AND ISO-CAPROIC ACID IN BENZENE SOLUTION. *Ibid.*, 19-25. Kinetics and benzoyl peroxide initiated polymerization of the fatty acids in benzene were investigated.

III. COPOLYMERIZATION OF VINYL ISO-CAPROATE WITH VINYL ACETATE AND ETHYLENE. *Ibid.*, 26-29. Copolymerization of vinyl isocaproate with vinyl acetate and ethylene have been studied and the reactivity ratios of the monomers in the copolymer reactions computed.

THE ACTION OF LONG-CHAIN CATIONS ON THE NEGATIVE SILVER IODIDE SOL. B. Tamamushi and K. Tamaki (Dept. of Chem., Univ. of Tokyo). *Kolloid Z.* 163, 122-126 (1959). The action of homologous, long-chain electrolytes containing alkylammonium cations on negative silver iodide sol was studied. The coagulation value of the electrolytes was correlated with their chain lengths.

PREPARATION OF PARTIAL GLYCERIDES. R. E. Beal (Secy. Agr., U.S.A.). *U.S.* 2,885,414. Partial glycerides are obtained by

the reaction of a phosphatide with water in the presence of an anion exchange material at 100° to 150°. The isolated partial glycerides are substantially free of phosphorus.

EDIBLE UNSUBSTITUTED MONO-ALKYL-GLUCOSIDE-FATTY ACID ESTER COMPOSITIONS. G. Barsky and V. K. Babayan (E. F. Drew & Co. Inc.). *U.S. 2,886,438*. Fat for use in chocolate mixes, ice cream mixes, shortening and cake mixes is improved by the addition of 0.5 to 5% of a C₁₂ to C₂₂ fatty acid ester of a mono-alkyl-glucoside.

PROCESS OF RETAINING SOFTNESS IN BAKERY PRODUCTS. C. W. Ofelt and J. E. Hodge (U.S.A., Secy. Agr.). *U.S. 2,889,227*. Staling of yeast-raised bakery products is inhibited by the addition of ascorbyl palmitate or hydrogenated ascorbyl palmitate to the dough.

EPOXIDIZED ESTERS. J. Dazzi (Monsanto Chemical Co.). *U.S. 2,889,338*. The desired product is obtained by the epoxidation of a mixture of pentaerythritol benzoate tri- and di-oleates.

PROCESS FOR PREPARING HIGH MOLECULAR WEIGHT ESTERS. C. B. Linn (Universal Oil Products Co.). *U.S. 2,890,229*. Phenylstearic acid is reacted with glucose in the presence of hydrogen fluoride at a temperature between -40 and 150°.

EXCIPIENT. P. L. V. Monot. *U.S. 2,890,983*. An excipient for dermatological use is prepared by the transesterification reaction between polyoxyethylene glycol, natural hydrogenated glycerides and partially hydrogenated triglycerides.

ANHYDROSORBITYL AMIDES. F. E. Boettner and J. L. Rainey (Rohm & Haas Co.). *U.S. 2,891,052*. A method of preparation is described for N-lower alkyl-N-anhydrosorbityl amides of aliphatic C₈ to C₁₈ acids.

DERIVATIVES OF ASPARTAMIDES. A. F. Steinhauer and E. P. Merica (The Dow Chemical Co.). *U.S. 2,891,082*. Aspartamides of C₈ to C₂₂ fatty acids are described.

FUMARATE AND MIXED GLYCERIDE ADDUCT. J. Dazzi (Monsanto Chemical Co.). *U.S. 2,891,083*. An adduct is prepared from an alkyl or alkoxy-alkyl fumarate and a triglyceride in which two of the alkyl groups are short-chain.

C₁₉ ALIPHATIC DICARBOXYLIC ACIDS. R. M. Alm and J. W. Shepard (Standard Oil Co.). *U.S. 2,891,084*. A mixture of oleic and linoleic acids from tall oil is esterified with a C₁ to C₁₂ aliphatic alcohol and reacted with a mixture of carbon monoxide and hydrogen at 300° to 400°F. and a pressure of 2500 to 4000 p.s.i. for 0.5 to 5 hr. in the presence of a cobalt-containing Oxo catalyst. The resultant product can be oxidized to C₁₉ aliphatic dicarboxylic acids.

ESTER NITRILES. F. K. Duxbury and O. B. Edgar (Imperial Chemical Industries Ltd.). *Brit. 805,651*. Ester nitriles are obtained in improved yield, with the formation of smaller amounts of dinitrile, by treating the half-ester of the dibasic acid with ammonia in the vapor phase in the presence of a dehydrating catalyst. Especially good results are obtained when the half-ester is a secondary alkyl half-ester. (*C.A.* 53, 7995)

• Biology and Nutrition

SYNTHESIS OF FATS FROM ACETATE OR GLUCOSE. V. THE INDEPENDENT FORMATION OF PHOSPHOLIPIDS AND TRIGLYCERIDES IN THE RAT IN VIVO. V. Handwerek and P. Favarger (Inst. of Physiol. Chem., Univ. of Geneva). *Helv. Chim. Acta* 42, 494-501 (1959). Rats were sacrificed at 5, 10, and 30 minutes after intravenous injection of acetate-1-C¹⁴. The total tissue lipids were separated into triglycerides and phospholipids by acetone and magnesium chloride fractionation and the total fatty acids of each fraction isolated. In the liver, intestine, mesenteric and carcass fat the ratio of specific activity of the phospholipid to that of the glyceride fatty acids did not vary with the time of injection. In the lungs the ratio increased with time. This confirms that phospholipids are not precursors of triglycerides.

VII. THE INDEPENDENT FORMATION OF SATURATED FATTY ACIDS AND UNSATURATED FATTY ACIDS IN THE MOUSE IN VIVO. *Ibid.*, 501-508. Mice were sacrificed at 3 to 30 minutes after intravenous injection of 1-C¹⁴-acetate and their lipids examined. In total lipids, the intermediate ratio of the specific activity of the saturated acids according to that of the unsaturated acids is 4.84 after 3 minutes and 3.88 after 30 minutes. From this it was deduced that only a part of the monoethylenic acids are formed from the corresponding saturated acids.

VIII. THE MECHANISM OF ELONGATION OF SATURATED FATTY ACIDS STUDIED IN VIVO IN THE RAT. *Ibid.*, 508-513. Under normal conditions of digestion, myristic and palmitic acids are synthesized independently one from the other by a mechanism of condensation, whereas stearic acid results in a good part from elongation of palmitic acid.

ENZYMATIC DEGRADATION OF FATTY ACIDS BY MOLD FUNGUS. W. Franke, W. Heinen, and A. Platzek (Inst. for Fermentation and Enzyme Chemistry, Cologne Univ.). *Fette, Seifen, Anstrichmittel* 61, 264-271 (1959). The degradation of fatty acids of medium molecular weights to the methyl ketones under the influence of enzymes as *Phycomycetes* and *Ascomycetes* is established. The presence of fatty acid dehydrase in the extracts of mold fungi is proved with the help of the Thunberg method. The author indicates that the degradation of enzymes takes place over coenzyme A derivatives. The addition of DPN is considered to be necessary. A highly stable beta-ketocarbonylase has been detected in the extracts of methyl ketone components.

TYPICAL ORGAN AND PHASE SPECIFIC DISTRIBUTION OF UNSATURATED LIPIDS IN THE TAIL OF XENOPUS LAEVIS LARVAE. O. Hess (Inst. of Zoology, Univ. of Bern, Switzerland). *Experientia* 15, 161-162 (1959). Barraliers method for the detection of unsaturated fatty acids on paper chromatograms has been adapted for the cytochemical detection of unsaturated acids in the tails of *Xenopus* larvae.

THE EFFECT OF LIPID EMULSIONS ON THE BLOOD LIPOPROTEINS OF ATHEROMATOUS RABBITS. V. Felt and D. Grafnetter (Inst. for Cardiovascular Research, Praha, Czechoslovakia). *Experientia* 15, 113-115 (1959). The influence of fat emulsion infusions on the serum lipoprotein spectrum of atherosclerotic rabbits was investigated. After administration of the lipid infusion, a fluctuation of the cholesterol and the lipids in the alpha- and beta-globulins was noted.

SPHINGOSINE AND SPHINGOSINE-LIKE COMPOUNDS. E. Jerry and J. Druey (Pharmacy Sect., CIBA Laboratories, Basel). *Helv. Chim. Acta* 42, 402-406 (1959). The synthesis of several unsaturated long-chain compounds of the sphingosine type are described and their physical and biological properties noted.

THE ENZYMATIC DEHYDROGENATION OF STEARIC ACID TO OLEIC ACID. K. Bernhard, J. von Bulow-Kostner, and H. Wagner (Biochem. Inst., Univ. of Basel, Switzerland). *Helv. Chim. Acta* 42, 152-156 (1959). The method of LeBreton and co-workers results in enzyme preparations from rat liver which rapidly decolorize methylene blue but do not convert stearic to oleic acid. After fractionation of liver cell particles in sucrose solutions, the existence of a dehydrogenase in the supernatant which converts C₁₈ stearic acid into oleic acid was proven. The mitochondrial fraction showed no activity.

INCREASED STABILITY OF BUTTER ACHIEVED BY INTRODUCTION OF VITAMINS E AND C. N. V. Novotel'nov and E. R. Stavrova (Technol. Inst. Refrigeration Ind., Leningrad). *Izvest. Vysshikh Ucheb. Zavedniy Pishchevaya Tekhnol.* 1958, No. 4, 64-8. The antibiotic effect of vitamins E and C is explained by blocking of the respiration system of aerobic bacteria. A prolonged preservation of butter is possible since the fermenting process is repressed by these vitamins. Both possess strong reducing properties and serve as antioxidants. (*C.A.* 53, 6466)

DISTRIBUTION OF FATTY ACID CYCLE ENZYMES IN ANIMALS AND HUMANS. O. Wieland, D. Reinwein, and F. Lynen (Univ. Munich, Ger.). *Biochem. Problems Lipids, Proc. Intern. Conf.*, 2nd, Ghent 1955, 155-60 (Pub. 1956). (*C.A.* 53, 8254)

ELECTROCHEMISTRY OF FATTY ACIDS AND IONIC LIPIDES. D. G. Dervichian (Inst. Pasteur, Paris). *Biochem. Problems Lipids, Proc. Intern. Conf.*, 2nd, Ghent 1955, 3-13 (Pub. 1956). (*C.A.* 53, 8253)

LIPIDE METABOLISM IN THE LIVER AND THE EFFECT OF GLUTATHIONE UPON IT WHEN AN EXCESS OF CHOLESTEROL IS ADDED TO THE FOOD. I. B. Fridlyand (Med. Inst., Yaroslavl). *Byull. Eksptl. Biol. i Med.* 46(11), 55-7 (1959). Atherosclerosis was induced in chickens by adding cholesterol to their food. They developed liver hypertrophy with high cholesterol and lipide contents. Another set of chickens was fed cholesterol-enriched food and simultaneously injected with glutathione. Both the cholesterol and lipide content were considerably lower. (*C.A.* 53, 8334)

PHOSPHOLIPIDE METABOLISM. VI. THE RATES OF INCORPORATION OF PHOSPHORUS-32 INTO INDIVIDUAL PHOSPHOLIPIDES IN TISSUE. Toshio Sakagawa, Tadashi Shimojo, and Osamu Minari (Sapporo Med. Coll.). *J. Biochem.* (Tokyo) 46, 51-7 (1959).

Specific radioactivity of Dawson's phospholipides in rat liver was determined 30 minutes after the intraperitoneal injection of P^{32} -phosphate: diphosphoinoside >>> phosphatidylethanolamine \cong phosphatidylserine >> phosphatidylethanolamine. At 12 hours after the P^{32} injection those four fractions showed approximately equal specific activities. Similar results were also demonstrated by mild alkaline hydrolysis, paper chromatography, and autoradiography, successively. (C.A. 53, 9300)

METABOLISM OF LIPIDE PEROXIDES. IV. FIXATION OF PEROXIDIC OXYGEN ON THE DOUBLE BONDS OF TISSUE FATTY ACIDS. P. Dubouloz, J. Chancel-Gandonniere, and R. Marville (Fac. méd., Marseille, France). *Bull. soc. chim. biol.* 40, 1521-31 (1958). During the destruction of oleic alcohol peroxide by liver tissue, peroxidic oxygen is transferred to the fatty acids and an equivalent number of double bonds disappear. This process is totally inhibited by 0.01 molar potassium cyanide; it is partially inhibited by heat and by barbiturates. It may be partly attributed to reduced cytochrome c, which is active *in vitro*. It does not increase considerably the spontaneous disappearance of peroxides, but it brings about total transfer to the double bonds. Oxidized cytochrome c is inactive. *In vitro*, catalase associated with reduced cytochrome c accelerates slightly the destruction of peroxides. (C.A. 53, 9310)

BIOSYNTHESIS OF CHOLESTEROL IN ISOLATED RAT LIVER CELLS. H. J. Albers (Purdue Univ., Lafayette, Indiana). *Univ. Microfilms* (Ann Arbor, Mich.), L.C. Card No. Mic 58-7960, 156 pp.; *Dissertation Abstr.* 19, 1909(1959). (C.A. 53, 9327)

AN ULTRACENTRIFUGAL METHOD FOR THE DETERMINATION OF SERUM LIPOPROTEINS. L. Del Gatto, F. T. Lindgren, and A. V. Nichols (Univ. of California, Berkeley). *U.S. At. Energy Comm. UCRL 8476*, 15 pp. (1958). (C.A. 53, 9348)

EFFECT OF A FATTY DIET ON THE LIPOPROTEIN BALANCE OF NORMAL MAN. G. Copinschi (Hôp. Saint-Pierre, Brussels, Belg.). *Compt. rend. soc. biol.* 152, 1212-14 (1958). Administration of a diet rich in animal fat to 10 normal subjects produced significant increases in serum cholesterol and α -lipoproteins and a decrease in serum albumin. (C.A. 53, 9396)

FATTY ACIDS OF BLOOD AND ATHEROMATOUS PLAQUES AND THEIR RELATION TO ATHEROMA FORMATION. Naip Tuna (Univ. of Minnesota, Minneapolis). *Univ. Microfilms* (Ann Arbor, Mich.), L.C. Card No. Mic 58-7413, 88 pp.; *Dissertation Abstr.* 19, 2066 (1959). (C.A. 53, 9431)

EFFECT OF FAT INTAKE ON THE CALCIUM ABSORPTION. I. VEGETABLE FAT. Shiro Goto (Kanazawa Univ.) *Eiyô to Shokuryô* 7, 180-7 (1954-55). Experiments were carried out with 4 healthy adults. There was no relation between fat intake and calcium absorption, when fat (soybean oil) intake was varied and calcium intake was fixed. There was also no relation between fat intake and phosphorus absorption. The amount of lipides excreted did not depend on fat intake, but was almost constant (about 3 g.). It seemed that the fat absorption was greater when fat intake was greater.

II. ANIMAL FAT. *Ibid.*, 212-15. Similar experiments with lard gave the same conclusion. There was no relation between fat intake and calcium absorption and between fat intake and phosphorus absorption.

III. THE QUANTITY OF SOAP FAT IN FECES OF NORMAL HUMAN SUBJECTS. *Ibid.*, 253-6. Soap fat (calculated from fatty acids present as calcium soap) in the feces in the experiments of Parts I and II was 2.1-7.7% of dry feces. The soap fat content was higher on lard diet than on soybean oil diet; the difference might be attributed to the amount of calcium and fat intakes rather than the kind of fat.

IV. THE CALCIUM ABSORPTION WHEN THE FAT UTILIZATION WAS DISTURBED. *Ibid.*, 8, 25-8 (1955-56). When bile duct was closed in dogs, calcium absorption was lowered, phosphorus absorption was secondarily decreased (presumably owing to lowered calcium absorption), fat absorption was inhibited, more soap fat was excreted in feces, but nitrogen absorption was not influenced.

V. EXPERIMENTS WITH YOUNG CHILDREN. Shiro Goto and Teruyo Ishihara. *Ibid.*, 29-33. Experiments on 4 children of 3-4 years of age with butter gave similar conclusions as in Parts I and II. (C.A. 53, 8333)

UNSATURATED FATTY ACIDS IN HUMAN BLOOD. I. METHOD FOR THE DETERMINATION OF POLYENE-FATTY ACIDS. F. Leopold and D. Eberhagen (Med. Univ., Cologne, Ger.). *Klin. Wochschr.* 36, 484-6 (1958). Details are given of a method that allows accurate determination of the more highly unsaturated fatty acids in 5-10 ml. of serum. (C.A. 53, 9339)

CAN THE STAINING OF SERUM LIPIDES OF FILTER PAPER BE EMPLOYED AS A RAPID MEANS OF DETERMINING TOTAL LIPIDE IN SERUM? F. A. Pezold (Freie Univ., Berlin). *Klin. Wochschr.* 36, 560-3 (1958). The results obtained by using the procedure of Swahn, modified to use Oil Red O as a lipide stain were quite inadequate in accuracy and reliability. (C.A. 53, 9339)

EXPERIMENTAL INVESTIGATIONS OF THE TRIOLEIN TEST OF SWAHN. H. Weller (Freie Univ., Berlin). *Klin. Wochschr.* 36, 563-6(1958). The method of Swahn was examined, various synthetic lipide mixtures being used. Marked differences in the ability of the various lipides to absorb the Oil Red O dye were observed. The method was considered unsuitable for accurate determination of lipide content of serum. (C.A. 53, 9340)

SURFACE-ACTIVE SUBSTANCES IN FOOD PROCESSING: SOME BIOCHEMICAL AND PHARMACOLOGICAL ASPECTS. F. Aylward (Dept. of Chem. and Food Tech., Borough Polytechnic, London S.E.). *Chem. & Ind.* 1959, 524-31. The difficulties in the assessment of the hazards arising from the use of surfactants are reviewed. The polyoxyethylene compounds have been considered in detail. It is suggested that some of the differences in results may have arisen because different batches of materials have been used by different investigators. Fundamental work is needed on the digestion, absorption, and metabolism of new types of substances to supply the background knowledge against which individual substances can be examined.

THE EFFECT OF DIETARY FAT ON THE DEVELOPMENT OF VITAMIN B₆ DEFICIENCY IN THE RAT. Mary Ann Williams, Nina L. Cohen, and B. Hata (Dept. of Nutr. and Home Ec., Univ. of Calif., Berkeley). *J. Nutrition* 68, 25-34 (1959). The effect of the level of dietary fat on the development of vitamin B₆ deficiency and on the body composition of vitamin B₆-deficient and pair-fed control rats was studied with diets in which the ratio of protein/food energy remained constant as the level of fat increased. In both deficient and control animals, the percentage of body fat increased as the percentage of dietary fat increased. Whether vitamin B₆ deficiency reduced body fat depended upon the level of dietary fat: there was no significant difference between the deficient and control groups at 5 or 40% of cottonseed oil, but a significant decrease occurred in the deficient animals fed a 10 or 20% of cottonseed oil diet. Vitamin B₆ deficiency also decreased the storage of liver cholesterol in cholesterol-fed rats.

THE UTILIZATION OF DIETARY PROTEIN AND ENERGY AS AFFECTED BY CARBOHYDRATE. R. W. Swift, G. P. Barron, K. H. Fisher, R. L. Cowan, E. W. Hartsook, T. V. Hershberger, E. Keek, R. P. King, T. A. Long and M. E. Berry. *J. Nutrition* 68, 281-88 (1959). The 24-hour metabolism of two pairs of male subjects, about 23 years of age, was measured by use of the respiration calorimeter. Two diets furnishing equal amounts of protein and energy but differing widely in fat content were compared as to daily nitrogen balance and heat production. One pair of subjects received the low-fat diet first with subsequent assignment to the companion diet high in fat. The reverse order was followed with the other pair. The differences in total daily energy expenditures and nitrogen balances between the two diets were insignificant.

THE INABILITY OF THE CROP TO CONVERT β -CAROTENE TO VITAMIN A WITHIN FOUR HOURS. I. R. Sibbald and Lilian M. Hutcheson (Dept. of Nutr., Ontario Agr. Coll., Guelph, Ontario, Canada). *Poultry Sci.* 38, 698-700 (1959). It would appear that the crop does not possess the ability to convert β -carotene to vitamin A within a four-hour period even though carotene may be absorbed by the crop wall in the presence of bile.

THE CONVERSION OF β -CAROTENE TO VITAMIN A IN THE LIGATED DUODENUM OF THE CHICK. I. R. Sibbald and Lilian M. Hutcheson (Dept. of Nutr., Ontario Agr. Coll., Guelph, Ontario, Canada). *Poultry Sci.* 38, 701-06 (1959). The conversion of β -carotene to vitamin A in a ligatured duodenal loop of a living chick takes place in the duodenal wall. Some factor(s) present in a duodenal loop of a living bird but absent in an excised loop appears to be essential to the absorption of β -carotene by duodenal tissue. The continuity of the alimentary canal is not essential to the successful operation of the carotene converting mechanism. When the blood supply to a duodenal loop is ligated the formation of vitamin A from β -carotene is prevented.

ON THE MECHANISM OF SQUALENE BIOGENESIS FROM MEVALONIC ACID. H. C. Rilling and K. Bloch (Converse Memorial Chem. Lab., Harvard Univ., Cambridge, Mass.). *J. Biol. Chem.* 234, 1424-32 (1959). 2-C¹⁴-5-T-DL-mevalonic acid and 2-C¹⁴-5-D₂-DL-mevalonic acid have been synthesized and converted to

squalene in yeast extracts. The squalene formed from the deuterium-labeled mevalonic acid was chemically degraded and the ratios of D to C¹⁴ in the various products determined. It is concluded that the head to tail condensations of isoprenoid units takes place without loss of hydrogen bound to C-5 of mevalonic acid, but that two hydrogens are removed from C-5 positions when the central carbon-carbon bond of squalene is formed.

BIOCHEMICAL CHANGES IN CARBON TETRACHLORIDE FATTY LIVER: SEPARATION OF FATTY CHANGES FROM MITOCHONDRIAL DEGENERATION. R. O. Recknagel and D. D. Anthony (Dept. of Physiol., School of Med., Western Reserve Univ., Cleveland, Ohio). *J. Biol. Chem.* **234**, 1052-59 (1959). Isotonic sucrose solutions of carbon tetrachloride and other fat solvents produce an extensive transformation in adenosinetriphosphatase properties of rat liver mitochondria *in vitro*. The effectiveness of the fat solvents is related inversely to their water solubilities. Magnesium-activated adenosinetriphosphatase activity was elicited by carbon tetrachloride only in the mitochondrial fraction, and was associated with insoluble mitochondrial material. The effects *in vitro* on adenosine triphosphatase properties produced by carbon tetrachloride were accompanied by loss of pyridine nucleotide dependent oxidative function. Carbon tetrachloride treatment *in vitro* had no effect on three microsomal enzymes. The same signs of mitochondrial degeneration produced by carbon tetrachloride *in vitro* were observed *in vivo* after carbon tetrachloride administration to rats.

THE NUTRITIONAL EFFECT OF POLYMERS ISOLATED FROM THERMALLY OXIDIZED CORN OIL. E. G. Perkins and F. A. Kummerow (Dept. of Food Techn., Univ. of Ill., Urbana, Ill.). *J. Nutrition* **68**, 101-08 (1959). Weanling rats were fed for 21 days a diet composed of 50% glucose, 31% casein, 5% Wesson salt, 2% fresh cottonseed oil, 12% of the test fat of fatty acid fraction, and all of the known required water- and fat-soluble vitamins. Those fed the nondistillable residue from the nonurea-adduct-forming fatty acids of corn oil which had been heated at 200° for 48 hours and represented approximately 30% of the original oil all died within 7 days. Dilution of the nonurea-adduct-forming fatty acids with an equal volume of the fatty acids from fresh corn oil assured survival of the animals for the 21-day test period, but counteracted only partially the growth depressing effect of the nonurea-adduct-forming fatty acids. The major portion of the fatty acids in the thermally oxidized corn oil did not seem to be damaged by the severe heat treatment. Although the fatty acids from thermally oxidized oil depressed growth significantly, the rats fed the urea-adduct-forming fatty acids, which represented 64% of the oil, gained as much weight as those on the fatty acids of fresh corn oil.

EFFECT OF SATURATED FAT UPON ESSENTIAL FATTY ACID METABOLISM OF THE RAT. J. J. Peifer and R. T. Holman (Hormel Inst., Univ. of Minn., Austin, Minn., and Dept. of Physiol. Chem., Univ. of Minn., Minneapolis). *J. Nutrition* **68**, 155-68 (1959). Two different experiments were conducted using male weanling rats fed fat-free diets supplemented with 1 to 25% of fat. When completely hydrogenated coconut oil (HCO) was the only source of fat, the intake of high-fat diets inhibited growth and reduced caloric efficiencies. When fed diets containing EFA, as 1% of corn oil or 0.5% of ethyl linoleate, increased intakes of HCO allowed greater growth and did not alter the caloric efficiencies of the rats. The ability of EFA-supplemented rats to utilize calories was greater than that of EFA-deficient rats at each level of fat intake. These studies demonstrate that essential fatty acids are required for the proper utilization of fat calories. Furthermore, high ratios of saturated fat:EFA promote the onset of EFA-deficiency symptoms in the rat.

DIETARY FAT, SERUM CHOLESTEROL LEVELS AND INCIDENCE OF ATHEROSCLEROSIS IN DELHI. S. Padmavati, S. Gupta, and G. V. A. Pantulu (Dept. Med., Lady Hardinge Med. College Hosp., New Delhi, India). *Circulation* **19**, 849-855 (1959). Very little information is available about the incidence of coronary heart disease in India, or of factors considered responsible for it. In a previous paper, the incidence of atherosclerosis as judged by electrocardiogram, the fat intake, and serum cholesterol levels in 2 low-income groups (industrial and rural) in Delhi were investigated. These data in high-income groups in Delhi have now been studied and the results compared. There were considerable differences in the findings in the 2 groups. The higher income groups had the higher rate of atherosclerosis.

THE ANTITHYROTOXIC FACTOR OF LIVER. II. COMPARATIVE ACTIVITIES OF DEFATTED LIVER RESIDUE AND VARIOUS FATS. L. R. Overby, D. V. Frost, and R. L. Fredrickson (Nutr. Res. Dept., Abbott Labs., North Chicago, Ill.). *J. Nutrition* **68**, 251-63

(1959). Unsaturated vegetable fats promoted growth of thyrotoxic rats, an effect which appeared to be directly related to the linoleic acid supplied by the fats. Hydrogenated coconut oil was ineffective and butterfat was marginal. The fat fraction of liver residue was, however, more active than other fats supplying more linoleic acid. The defatted fraction of liver residue promoted growth over and above all levels of fats. Growth stimulation by defatted liver residue and linoleic acid containing fats, or liver fat, appeared to be additive.

DISTRIBUTION OF CAROTENE AND VITAMIN A IN THE TISSUES OF CHICKS FOLLOWING ADMINISTRATION OF CAROTENE. Ellen M. Olsen, J. D. Harvey, D. C. Hill, and H. D. Branion (Dept. of Nutr., Ontario Agr. Coll., Guelph, Ontario, Canada). *Poultry Sci.* **38**, 688-93 (1959). Beta-carotene, given orally to chicks as an aqueous suspension containing Tween 60, appeared in the intestinal tissue as vitamin A within one-half hour following administration of the dose, and in the liver in about 1 hour. The peak level occurred in the intestinal tissue at approximately 4 hours and in the liver at approximately 8 hours. A very small but definite deposition of carotene occurred in the liver but this disappeared within 24 hours. Beta-carotene administered by cardiac injection in the form of a suspension in chick plasma was apparently not converted to vitamin A by the chick. About one-third of the injected carotene was found in various organs of birds killed during the first 2 hours following injection and this amount decreased to about 3% after 4 days. No carotene was found in the circulating plasma one hour after injection or at any subsequent sampling to 21 days.

SEPARATION OF FATTY ACIDS FROM TUBERCLE BACILLUS BY GAS CHROMATOGRAPHY: IDENTIFICATION OF OLEIC ACID. J. Cason and P. Tavs (Chem. Labs. of Univ. of Calif., Berkeley, Calif.). *J. Biol. Chem.* **234**, 1401-05 (1959). The fraction of esters previously termed the C₁₈, C₁₉ fraction, from four lots of tubercle bacillus, has been examined by use of gas phase chromatography. In each, similar components were found, although in varying ratios. In addition to palmitic, stearic, and tuberculostearic acids, there were also present smaller amounts of three other acids whose esters had retention times between palmitic and stearic esters. These components are probably a branched C₁₇ acid, the normal C₁₇ acid, and a branched C₁₈ acid.

CATALYTIC HYDROGENATION OF 9,10-EPOXYOCTADECANOL AND 9,10-EPOXYOCTADECYL ACETATE. Sara P. Fore and W. G. Bickford (Southern Regional Research Laboratory). *J. Org. Chem.* **24**, 620-22 (1959). *cis*-9,10-Epoxyoctadecanol and *cis*-9,10-epoxyoctadecyl acetate have been hydrogenated in ethanolic solution employing palladium-carbon catalyst. Examination of the reaction products established the fact that nearly equal proportions of the 9- and 10-hydroxy isomers were formed in both cases. These results are in marked contrast to the preferential formation of methyl 10-hydroxyoctadecanoate encountered previously during the catalytic reduction of methyl 9,10-epoxyoctadecanoate. The difference in results obtained with the two esters is attributed to the relative position of the oxirane center with respect to the acyl and alkoxy oxygen atoms of the ester.

THE FRACTIONATION OF CHOLESTEROL ESTERS BY SILICIC ACID CHROMATOGRAPHY. P. D. Klein and E. T. Janssen (Div. of Biol. and Med. Res., Argonne Nat. Lab., Lemont, Ill.). *J. Biol. Chem.* **234**, 1417-20 (1959). A method of separating biological mixtures of cholesterol esters into four fractions, saturated, oleate, linoleate, and arachidonate esters, by silicic acid chromatography has been presented. The method compares favorably with other methods of analysis involving hydrolysis of the esters and provides a means of isolating esters as intact compounds.

SERUM PHOSPHOLIPIDE ANALYSIS BY CHROMATOGRAPHY AND INFRARED SPECTROPHOTOMETRY. G. J. Nelson and N. K. Freeman (Donner Lab. of Biophys. and Med. Phys., Univ. of Calif., Berkeley, Calif.). *J. Biol. Chem.* **234**, 1375-80 (1959). A semi-micro method has been developed for the analysis of serum phospholipides by the use of chromatography and infrared spectrophotometry. The extracted total lipides are separated into five fractions by successive elution from a silicic acid-Celite column with methylene chloride, acetone, 35 per cent methanol-65 per cent methylene chloride (two fractions), and methanol. The phospholipides are contained in the last three fractions. By suitable infrared absorption measurements of these latter three fractions (dissolved in appropriate solvents), the amounts of lecithin, sphingomyelin, and a mixed fraction containing phosphatidylethanolamine and phosphatidylserines can be determined.

RELATIONSHIP OF OXIDATIVE DEGRADATION TO TOXICITY IN CERTAIN FATS. L. J. Machlin, R. S. Gordon, K. A. Meisky, and K. H. Maddy (Lab. of Biochem. and Nutr., Monsanto Chem. Co., St. Louis 4, Missouri). *Poultry Sci.* 38, 579-85 (1959). Mortality and other signs of toxicity, mainly hydropericardium were produced in chickens in as little as 6-7 days after the addition of certain toxic fats to a purified diet. Alpha tocopherol did not prevent the toxicity when fed or injected. A dietary supplement of 0.1 p.p.m. selenium as selenite was also without effect. When toxic fat was subjected to ultraviolet irradiation, heat (80° or 105°) and oxygen, the fat was degraded as evidenced by weight loss and peroxide formation. This treatment increased the toxicity.

INCORPORATION OF THE BUTYRYL UNIT OF BUTYRYL COENZYME A INTO PALMITIC ACID BY THE PIGEON LIVER SYSTEM. R. W. Long and J. W. Porter (Radioisotope Unit, Veterans Admin. Hosp., and the Dept. of Physiol. Chem., University of Wis., Madison, Wis.). *J. Biol. Chem.* 234, 1406-10 (1959). The isotope concentration of the carboxyl carbon, relative to that of the other carbon atoms, of C¹⁴-palmitic acid synthesized from 1-C¹⁴-acetate is three to four times as high as that of C¹⁴-palmitic acid synthesized from 1-C¹⁴-butyrate under anaerobic conditions in the standard assay system supplemented with beef liver fatty acid thiokinase enzyme. This finding is conclusive proof that the majority of butyryl units of butyryl CoA are incorporated intact into palmitic acid by the pigeon liver system. The results reported are suggestive, but not conclusive, that butyryl CoA is a true intermediate in the biosynthesis of fatty acids.

BIOLOGICAL AND CHEMICAL STUDIES ON COMMERCIAL FRYING OILS. K. W. Keane, G. A. Jacobson, and C. H. Krieger (Basic Res. Dept., Campbell Soup Co., Camden, N. J.). *J. Nutrition* 68, 57-74 (1959). Hydrogenated cottonseed oil heated in a commercial deep-fat fryer under actual production conditions for as long as 24 days had no deleterious effects on rats when fed at levels as high as 20% of the diet. The increase in available caloric value of the commercially heated hydrogenated cottonseed oil may be associated with the finding that heating under these conditions apparently causes unsaturation of the fat. A highly significant positive correlation was found to exist between the nutritive value of the fat, as measured by the caloric restriction technique, and the total nonconjugated double bonds present in the fat.

FAT CHANGES DURING ADOLESCENCE. S. M. Garn and Joan Haskell (Phys. Growth Dept., Fels Res. Inst., Yellow Springs, Ohio). *Science* 129, 1615-16 (1959). Lower thoracic fat as measured on serial chest plates of 259 children in Ohio, increased in girls, between ages 6.5 and 14.5 years and, in boys, between ages 6.5 and 11.5 years. No evidence of a marked loss of "baby" fat in adolescence or for "waves" of fattening around the time of puberty was found.

METABOLISM OF ESSENTIAL FATTY ACIDS. VIII. ORIGIN OF 5,8,11-EICOSATRIENOIC ACID IN THE FAT-DEFICIENT RAT. A. J. Fulco and J. F. Mead (Dept. and Lab. of Nuclear Med. and Radiation Biol., School of Med., Univ. of Calif., Los Angeles, Calif.). *J. Biol. Chem.* 234, 1411-1416 (1959). The polyunsaturated fatty acids from male fat-deficient rats given injections of acetate-1-C¹⁴ were concentrated by low temperature crystallization from acetone, and 5,8,11-eicosatrienoic acid was isolated from the concentrate by gas-liquid and liquid-liquid partition chromatography. Part of the triene was oxidized at the double bonds to yield pelargonic, malonic, and glutaric acids. Another sample was hydrogenated and degraded one carbon at a time to margaric acid. By similar methods, oleic acid was isolated and samples were oxidized and degraded one carbon at a time to margaric acid. The oxidation and degradation products from trienoic and oleic acids were purified and counted, and the activities of various portions of the two molecules were compared. The results show that oleic acid is the precursor for 5,8,11-eicosatrienoic acid in the fat-deficient rat.

THE VITAMIN A REQUIREMENT OF THE YOUNG PIG. D. L. Frape, V. C. Speer, V. W. Hays, and D. V. Catron (Dept. of Animal Husbandry, Iowa Agr. and Home Econ. Exp. Station, Ames). *J. Nutrition* 68, 173-87 (1959). Four experiments involving 226 pigs carried out over a period of two years have been described. These pigs were from sows reduced considerably in their vitamin A reserves by previously feeding a ration low in vitamin A. They were weaned at 7 days of age and the requirement for vitamin A was estimated in the first 8 weeks of life. Several criteria of adequacy were investigated and their sensitivity, precision and validity discussed. These criteria were weight gain, feed efficiency, blood plasma and liver vitamin A,

and cerebrospinal fluid pressure. The minimum requirement of the young pig for a stabilized source of vitamin A palmitate on a dry carrier was judged to be 800 I.U./lb. of feed under the conditions which existed. Normality in weight gain occurred at as low as 100 I.U./lb. of feed. Acute paralysis of the hind-quarters was the most striking deficiency symptom.

STERIOD-PROTEIN CONJUGATES. II. PREPARATION AND CHARACTERIZATION OF CONJUGATES OF BOVINE SERUM ALBUMIN WITH PROGESTERONE, DEOXYCORTICOSTERONE, AND ESTRONE. B. F. Erlanger, F. Borek, S. M. Beiser, and S. Lieberman (Depts. of Microbiol., Biochem., and Obstetrics and Gynecology, College of Physicians and Surgeons, Columbia Univ., New York, N. Y.). *J. Biol. Chem.* 234, 1090-94 (1959). In an extension of a program designed to prepare steroidal substances which could elicit antibodies with antihormonal properties, three additional steroid-protein conjugates have been synthesized. They are conjugates in which bovine serum albumin is covalently linked to derivatives of progesterone, deoxycorticosterone, and estrone. These conjugates have been analyzed and characterized by their ultraviolet and infrared spectra, electrophoretic behavior, and by dinitrophenylation studies. It has been estimated that at least 20 steroid residues have been covalently linked to each molecule of bovine serum albumin. Like the previously prepared conjugates (1) these have also been found to be antigenic in rabbits.

STUDIES OF FAT LIPOLYSIS BY POST-HEPARIN HUMAN PLASMA LIPOPROTEIN LIPASE AND BY HUMAN PANCREATIC LIPASE. H. Engelberg (Div. of Laboratories, Cedars of Lebanon Hosp., Los Angeles, Calif.). *Circ.* 19, 884-90 (1959). Many studies indicate that unsaturated fats may lower serum cholesterol whereas saturated fats of animal origin usually increase it. Mechanism of these differing actions is unexplained, however. It has also been demonstrated that alimentary lipemia is cleared largely by an enzymatic lipolytic mechanism in which heparin is involved (heparin lipoprotein lipase). In this paper differences in hydrolysis of saturated and unsaturated fats by the heparin lipolytic factor are studied.

STUDIES ON TOXIC FAT IN THE RATIOS OF LAYING HENS AND PULLETS. W. S. Dunahoo, H. M. Edwards, Jr., S. C. Schmittle, and H. L. Fuller (Poultry Dept. and Poultry Dis. Res. Center, Univ. of Ga., Athens, Ga.). *Poultry Sci.* 38, 663-67 (1959). The effect of a toxic fat feed ingredient on both laying hens and pullets was studied. Hens fed this toxic fat dropped rapidly in production. Egg production had ceased in 55 days. Hatchability was greatly decreased, but body weight was maintained. Sixty-seven per cent of the birds receiving toxic fat for the full growing period died during the growing and laying period of the experiment. Autopsy showed a hydropericardium, hydroperitoneum, and pale swollen kidneys.

CHANGES IN PROTEINS AND LIPOPROTEINS IN DIABETES AND THEIR RELATIONSHIP TO VASCULAR DEGENERATION. J. C. Demant, P. E. Gregoire, and P. A. Bastenie (Dept. Medicine and Lab. of Exper. Medicine, St. Pierre Hospital, Univ. Brussels, Belgium). *Circ.* 19, 863-67 (1959). The cause of atherosclerosis and reason for its high incidence in diabetes are not known. In this study proteins and lipids of serums of patients with diabetes or atherosclerosis are examined by paper electrophoresis to determine whether such changes may be a common factor for both of these conditions.

EFFECT OF THERMAL OXIDATIVE POLYMERIZATION ON THE GROWTH-PROMOTING VALUE OF SOME FRACTIONS OF BUTTERFAT. V. R. Bhalerao, O. C. Johnson, and F. A. Kummerow (Dept. of Food Tech., Univ. of Ill., Urbana). *J. Dairy Sci.* 42, 1057-62 (1959). Butterfat was fractionated into acetone or alcohol-soluble and -insoluble fractions at 0 and 20°, respectively. The butterfat and the four fractions were thermally oxidized at 200° for 24 hr., to study the effect of heat on the growth-promoting value of the fractions when fed to rats at a 20% level, in a diet composed of 31% casein, 44% cerelese, 4% Wesson salts, and supplemented with fat- and water-soluble vitamins. The results indicated that thermally oxidized butterfat or the thermally oxidized acetone-insoluble fraction of butter did not exhibit any differences in the growth of rats when compared with those fed fresh fats. When rats were fed corn oil or hydrogenated soybean oil thermally oxidized at 200° for 24 hr., they gained significantly less weight than did those fed fresh fats. When these oils were mixed with 30% of the acetone-insoluble butterfat and thermally oxidized at 200° for 24 hr. and fed to rats, no differences in growth were noted. These data indicate that butterfat contains triglycerides which are acetone-insoluble and which are able to counteract the effect of toxic products or prevent the formation of toxic products during the thermal polymerization of a fat.

STUDY OF VITAMIN E SUPPLEMENTS IN RELATION TO MUSCULAR DYSTROPHY AND OTHER DISEASES IN AGING RATS. B. N. Berg (Dept. Pathology, Coll. of Physicians and Surgeons, Columbia Univ., N. Y.). *J. Gerontology* 14, 174-80 (1959). Large supplements of alpha-tocopherol failed to prevent the muscular dystrophy of aging rats. Other chronic diseases, longevity, and growth were also unaffected.

THE USE OF HIGH QUALITY FAT AND THE EFFECT OF PROTEIN LEVEL IN BROILER DIETS. R. G. Beilharz and M. W. McDonald (Poultry Exper. Station, Seven Hills, New South Wales, Australia). *Poultry Sci.* 38, 519-26 (1959). Experiments were carried out to determine the value of tallow and the effect of protein level in all mash and broiler diets based on wheat meal. Added fat did not affect growth rate but it improved feed conversion when measured as lbs. of feed consumed /lb. gain. Stabilization of the fat had no effect on body weight or feed efficiency. Birds fed protein levels of 25% to 8 weeks and 19% from 8 to 12 weeks showed considerably better growth rate than birds fed protein levels of 20% and 15%, respectively. The weight increase shown at 8 weeks was not diminished at 12 weeks even when birds were fed at the lower protein level between 8 and 12 weeks. That differences in carcass composition were produced between treatments was suggested by independent variation of shank length and body weight.

EFFECTS OF THE PREVENTION OF COPROPHAGY IN THE RAT. V. ESSENTIAL FATTY ACID DEFICIENCY. R. H. Barnes, Sally Tuthill, Eva Kwong, and Grace Fiala (Grad. School of Nutr., Cornell Univ., Ithaca, N. Y.). *J. Nutrition* 68, 121-30 (1959). Essential fatty acid deficiency in the rat is hastened by complete prevention of coprophagy. This observation does not imply that these fatty acids are synthesized in the large intestine, but does show that the unsaturated fatty acids of the feces are, in part at least, of an essential nature. The serum cholesterol of the essential fatty acid-deficient rat is lower than is obtained by merely feeding a fat-free diet without the development of the deficiency syndrome. Furthermore, it appears that the level of serum cholesterol in the deficient rat may not respond to dietary changes such as the inclusion of saturated fat in the same manner that is observed in the non-deficient animal. Accumulation of liver cholesterol in the non-deficient as well as the deficient rat receiving a fat-free diet has been confirmed.

SYNTHESIS OF L- α -LECITHINS CONTAINING SHORTER CHAIN FATTY ACIDS. WATER-SOLUBLE GLYCEROLPHOSPHATIDES. I. E. Baer and V. Mahadevan (Banting and Best Dept. of Med. Res., Univ. of Toronto). *J. Am. Chem. Soc.* 81, 2494-98 (1959). The didecanoyl-, dioctanoyl- and dihexanoyl-L- α -lecithins have been synthesized from the appropriate D- α , β -diglycerides by the procedure of Baer and Kates for the synthesis of the enantiomeric forms of α -lecithins. The required, but unknown, D- α , β -diglycerides of capric, caprylic and caproic acid were prepared by the method of Sowden and Fischer. The water-soluble L- α -(dihexanoyl)-lecithin should prove to be an excellent substrate for chemical and biochemical studies on homogeneous aqueous systems.

SYNTHESIS OF L- α -GLYCERYLPHOSPHORYL-L-SERINE. E. Baer, D. Buchnea, and H. C. Stancer (Banting and Best Dept. of Med. Res., Univ. of Toronto). *J. Am. Chem. Soc.* 81, 2166-69 (1959). L- α -Glycerolphosphoryl-L-serine is obtained by phosphorylation of D-acetone glycerol with phenylphosphoryl dichloride and quinoline, esterification of the resulting acetone L- α -glycerylphenylphosphoryl chloride with N-carbobenzoxy-L-serine benzyl ester in the presence of pyridine, and removal of the protective groups by two catalytic hydrogenolyses, and acid hydrolysis. The infrared spectra of L- α -glycerylphosphoryl-L-serine, L- α -glycerylphosphorylethanolamine and L- α -glycerylphosphorylcholine, the structural bases of the majority of the glycerolphosphatides, are reported.

ISOLATION OF MILK PHOSPHOLIPIDS AND DETERMINATION OF THEIR POLYUNSATURATED FATTY ACIDS. L. M. Smith and E. L. Jack (Dept. of Dairy Ind., Univ. of Calif., Davis). *J. Dairy Sci.* 42, 767-79 (1959). Several methods were compared for recovery and purification of mixtures of phospholipids from dried buttermilk. The amounts of unsaturated fatty acids were estimated from spectrophotometric data and iodine values. A representative sample of milk phospholipids (3.72% phosphorus, 2.23% nitrogen, iodine value 53.8) contained 26.3% monoene, 1.5% conjugated diene, and 5.8, 2.4, 1.3, and 1.5% nonconjugated diene, triene, tetraene, and pentaene acids, respectively. Percentages of each of these acids in the total fatty acids (with corresponding percentages for milk fat from the same source given in parentheses) were: 39.8 (32.1), 2.3 (1.4), 8.8 (1.6),

3.6 (0.9), 2.0 (0.3), and 2.2 (0.2), respectively. The phospholipids contained 41.3% saturated fatty acids and the milk fat 63.5%. These data show that there was a selective concentration of nonconjugated polyunsaturated acids in milk phospholipids.

THE FATTY ACIDS OF HUMAN MILK FROM MOTHERS ON DIETS TAKEN AD LIBITUM. W. Insull, Jr. and E. H. Ahrens, Jr. (The Rockefeller Institute, New York, N. Y.). *Biochem. J.* 72, 27-33 (1959). Fatty acid compositions of human milk from eleven mothers on diets taken *ad lib.* were determined by gas-liquid chromatography and by ultraviolet spectrophotometry after isomerization of polyenoic acids with alkali. A major proportion (88.4%, calc. as methyl esters) was made up of eight components: oleic 29, palmitic 21, myristic 9, linoleic 7, stearic 7, lauric 7, isooleic 7, and palmitoleic 2. At least 30 other acids were found in minor amounts including odd-numbered and branched-chain acids as well as a wide variety of C₁₉-C₂₅ unsaturated acids. The fatty acid composition of milks of mothers in the early and late post-partum periods were very similar, although the fat concentration of the samples differed greatly.

STEROL METABOLISM. ABSORPTION OF 7-DEHYDROCHOLESTEROL IN THE RAT. J. Glover and D. W. Stainer (Dept. Biochem., Univ. Liverpool, Liverpool 3). *Biochem. J.* 72, 79-82 (1959). The distribution of total sterols, 7-dehydrocholesterol and lathosterol between the various cell fractions of intestinal mucosa of fasting rats and animals dosed with 7-dehydrocholesterol was determined. In both groups of animals about 50% of the total sterols in the tissue was associated with microsomes and mitochondria, 30% with the supernatant and 10% with "cell debris and nuclei" fraction. Since the various sterols were uniformly distributed, dietary sterol apparently exchanges or mixes freely with endogenous sterols of the cell components. A large part of the 7-dehydrocholesterol absorbed from the intestine is reduced within the mucosa to lathosterol.

UPTAKE OF STEROLS BY ORGANELLES OF INTESTINAL MUCOSA AND THE SITE OF THEIR ESTERIFICATION DURING ABSORPTION. J. Glover, C. Green and D. W. Stainer (Dept. Biochem., Univ. Liverpool, Liverpool 3). *Biochem. J.* 72, 82-7 (1959). Studies on the absorption of cholesterol, 7-dehydrocholesterol and vitamin A by guinea pig and rat intestinal mucosa indicate that esterification of single doses of cholesterol occurs mainly in the connective tissue before entry into lymph vessels. The action of esterase, although not obligatory for absorption, greatly accelerates the process.

UNSAAPONIFIABLE FRACTION OF LIPID FROM NORMAL AND DISEASED HUMAN KIDNEY. L. Mervyn and R. A. Morton (Biochem. Dept., Univ. Liverpool, Liverpool 3). *Biochem. J.* 72, 106-14 (1959). Data are reported on the unsaponifiable material from a variety of "normal" and diseased human kidneys. The major component is cholesterol; vitamin A, ubiquinone, tocopherol and an unidentified substance SC are also present.

A LIPOPHOSPHOPROTEIN COMPLEX IN HEN PLASMA ASSOCIATED WITH YOLK PRODUCTION. W. M. McIndoe (Agr. Research Council Poultry Research Centre, West Mains Rd., Edinburgh). *Biochem. J.* 72, 153-9 (1959). Isolation and characteristics are described for a lipophosphoprotein which apparently transports most of the plasma lipid and almost half of the plasma phosphoprotein included in egg yolk.

THE COMPONENT FATTY ACIDS OF PENICILLIUM SPINULOSUM FAT. I. R. Shimi, J. Singh, and T. K. Walker (Manchester College of Science and Technol., Manchester). *Biochem. J.* 72, 184-7 (1959). Component fatty acids of fat produced by *P. spinulosum* grown in aerated deep culture were found to be (% by wt. of total acid): palmitic 18.0, stearic 11.9, arachidic 1.4, hexadecenoic 3.8, oleic 43.4, linoleic 21.1, linolenic 0.3, eicosenoic 0.2.

EXISTENCE OF FATTY ACID PEROXIDES IN NORMAL BLOOD AND TISSUES OF MAN AND ANIMALS. A. C. Kibrick, L. B. Safier, and S. J. Skupp (N. Y. Vet. Admin. Hospital). *Proc. Soc. Exptl. Biol. Med.* 101, 137-9 (1959). A modified ferric chloride-thiobarbituric acid reaction is described for the estimation of fatty acid peroxide contents of blood and tissues. Fatty acid peroxides were found in normal human blood and rat tissues.

ALPHA-2-LIPOPROTEIN IN MAN AND ITS RELATION TO MYOCARDIAL INFARCTION. G. Toro, P. G. Ackermann, W. B. Kountz, and J. Toro (Washington Univ. School of Medicine). *Proc. Soc. Exptl. Biol. Med.* 101, 34-7 (1959). Data are presented which indicate that an abnormal type of cholesterol lipoprotein curve is associated with a history of recovery from a previous myocardial infarction.

METHOD FOR THE PRODUCTION OF CAROTENES. R. F. Anderson (U. S. A., Secy. Agr.). *U.S. 2,890,989*. A method is described for the production of beta-carotene by raising organisms such as *Blakeslea trispora* and *Choanephora conjuncta* in an aqueous nutrient medium containing assimilable lipid material such as a fat, oil or fatty acid, a surface active agent, and beta-ionone.

• Paints and Drying Oils

KAMALA SEED OIL FOR VARNISHES AND PAINTS. J. S. Aggarwal (Regional Research Lab., Hyderabad, India). *Paint Manuf.* 29, 50-2 (1959). The kamlolenic acid molecules do not exist as triglycerides. The main portion of kamlolenic seed oil is composed of complex triglycerides formed by condensation of carboxyl groups of various fatty acids both with a mean molecular weight of the oil of 1758, and about 50% of total oil a value of as much as 2265, with glycerol concentration reduction of 3.6%. The entire quantity of the oil is only extracted with ethyl ether, propionic acid, or benzene. Characteristics of extracted fractions of kamala seed oil are tabulated, and the utilization in oleo-resinous coatings is described. Extreme polymerization and gelation tendencies of the oil prevent its use in varnish and paint preparation. Heated with an equal quantity of amyl alcohol or butyl alcohol containing a few drops of 0.1N alcoholic hydrochloric acid for 1.5 hours with excess of alcohol removed under vacuum yields a product behaving similarly to tung oil in gelation properties. Properties of the alkyd resins are discussed briefly. (*C.A.* 53, 8658)

DRYING PROPERTY OF FISH OIL AND ITS IMPROVEMENT. I. DRYING PROPERTY OF CUTTLE FISH OIL. Hideo Marumo and Shinichi Tomiyama (Lion Fat & Oil Co., Tokyo). *Yushi Kagaku Kyōkaishi* 3, 9-12 (1954). Various destearinated fractions of interesterified cuttle fish oil were compared with linseed oil in drying characteristics. The samples with 10% saturated acids do not dry completely and they polymerize slowly. With < 10% saturated acids polymerization is rapid, the films dry but remain tacky.

II. COMPOSITION OF CUTTLE FISH OIL. *Ibid.*, 67-70. A molecularly distilled mono- and diglyceride fraction (13%) of cuttle fish oil had poor drying characteristics.

III. DIBASIC ACID TREATMENT OF CUTTLE FISH OIL. *Ibid.*, 70-3. Treatment of destearinated cuttle fish oil with malic or phthalic acid improved its drying properties through esterification of free hydroxyl of the mono- and diglycerides.

IV. STYRENEATION OF CUTTLE FISH OIL. Hideo Marumo, Shinichi Tomiyama, and Akira Nakajima. *Ibid.*, 109-12. Styreneation of destearinated cuttle fish oil fractions of < 10% saturated acids improves drying, especially when in combination with esterification with maleic acid. (*C.A.* 53, 9687)

CHEMISTRY OF SURFACE COATING RAW MATERIALS. IV. UNSATURATED POLYESTER POLYURETHANES. L. Erlandsen (Standard Chemical Plant, A/S.). *Fette Seifen Anstrichmittel* 61, 227-230 (1959). The author discusses a few of the known synthetic resins used in the surface coating industry with special reference to their methods of manufacture.

PRODUCTION OF DRYING OILS. K. H. Reisinger (R. Nilsson Akt.). *U.S. 2,885,297*. Film-forming drying oils are prepared by the reaction of an inert hydrocarbon solution of a C₆-C₂₀ saturated or unsaturated fatty acid with an aluminum enolate.

METHOD FOR MANUFACTURING PAINT. DuB. Eastman (The Texas Co.). *U.S. 2,885,298*. A method is described for grinding pigment into a drying oil vehicle.

AIR-DRYING RESINOUS ESTER FROM PARTIAL ALLYL ETHER OF PENTAERYTHRITOL. C. J. Campbell (Hercules Powder Co.). *U.S. 2,885,375*. An air-drying resinous ester is prepared from a partial allyl ether of pentaerythritol having at least two free hydroxyl groups, drying fatty oils or acids, and a dicarboxylic acid such as phthalic, isophthalic, terephthalic, succinic, adipic, azelaic or sebacic.

SEALING COMPOSITION. H. C. Zweifel, D. H. Hull, and W. C. Hart (Richfield Oil Corp.). *U.S. 2,886,457*. The mixture is prepared from 25 to 80% of inorganic fillers, 3 to 30% of a raw drying oil, 10 to 30% of a bodying oil and 5 to 30% of a stabilizing emulsion consisting essentially of water dispersed in a non-drying polymerized fraction from bodied marine oil.

POLYAMIDE RESIN. D. E. Peerman and H. Wittcoff (General Mills, Inc.). *U.S. 2,886,543*. A polyamide resin is prepared by reacting polymeric fatty acids, a saturated dicarboxylic acid, an alkylene diamine and a polyalkylene polyamine.

THERMOPLASTIC COMPOSITION PLASTICIZED WITH A MIXED DIESTER PLASTICIZER OF AN ALIPHATIC DIOL HAVING TWO PRIMARY ALCOHOL GROUPS. P. H. Rhodes and P. L. Imes. *U.S. 2,886,545*. A plasticizer for vinyl polymers is prepared by esterification of an unsubstituted aliphatic diol having two primary alcohol groups with a molecular quantity of a mixture of C₂ to C₆ aliphatic monobasic acid and a monobasic aromatic acid and with a molecular quantity of a mixture of saturated and polyunsaturated fatty acids.

MIXED RESINOUS ESTERS OF OIL-MODIFIED ALKYD RESINS AND PARTIALLY ESTERIFIED EPOXIDE RESINS. R. F. Carmody (Socony Mobil Oil Co.). *U.S. 2,887,459*. The desired mixed resin is prepared from a vegetable oil-modified phthalic alkyd resin and an epoxide resin partially esterified with a vegetable oil fatty acid and/or rosin acid.

COMPOSITION CONTAINING AN ALKYD RESIN AND A POLYAMIDE RESIN DERIVED FROM POLYMERIC FAT ACIDS AND AN ALKYLENE POLYAMINE. D. E. Peerman (General Mills, Inc.). *U.S. 2,889,292*. The active reactants in the composition are (a) an alkyd resin of maleic, fumaric, citraconic, mesaconic, itaconic or aconitic acid and (b) a polyamide derived from polymeric fatty acids and an alkylene polyamine.

MIXTURE OF OIL-MODIFIED ALKYL RESIN WITH ESTERS OF ALKYLENE OXIDE ADDUCTS. W. L. Hensley, A. J. Kirsch, and R. E. Layman, Jr. (American Cyanamid Co.). *U.S. 2,889,293*. An oil-modified alkyd resin is mixed with the reaction product of an aliphatic polycarboxylic acid with a fatty acid and an alkylene oxide-polyhydric alcohol adduct.

COATING COMPOSITIONS. H. M. Teeter, W. J. Schneider, and L. E. Gast (U. S. A., Secy. Agr.). *U.S. 2,889,309*. A protective coating composition consists of a vehicle, a dryer and a film-forming ingredient which consists essentially of homopolymers of vinyl ethers of polyunsaturated fatty alcohols. Oxidative degradation is inhibited by the addition of hydroquinone, phenyl β-naphthylamine or β-naphthylamine.

HARDENING MIXTURES OF EPOXY RESINS AND POLYAMIDE-LIKE CONDENSATION PRODUCTS. W. C. G. Förster (Reichhold Chemicals, Inc.). *U.S. 2,890,184*. Mixtures for use as plastics, lacquers, adhesives, etc., are prepared from (1) an epoxy resin formed by etherification of polyhydric mono- or polynuclear phenols with epichlorhydrin in alkaline solution and (2) a condensation product obtained by epoxidizing an unsaturated vegetable or animal fat or fatty acid ester and reacting the product with a primary or secondary polyamine.

MODIFIED ALKYD RESIN REACTED WITH A VINYL AROMATIC COMPOUND, A VINYL CYANIDE AND AN ACRYLATE. J. H. Sample and C. H. Williams (The Sherwin-Williams Co.). *U.S. 2,890,185*. A composition of matter is obtained by the reaction at 240° to 460° F. in the presence of a catalyst of (1) an oil-modified alkyd having an oil length of 33 to 85%, an acid value of less than 40 and an excess of hydroxyl up to about 50%, and (2) a mixture of a polymerizable monomeric monovinyl aromatic compound, a polymerizable monomeric ester of an unsaturated acid having the formula CH₂=C(R)CO₂R' and a monomeric nitrile.

MODIFIED DIALKYL FUMARATE ALKYD RESIN REACTED WITH A VINYL AROMATIC COMPOUND, A VINYL CYANIDE AND AN ACRYLATE. J. H. Sample (The Sherwin-Williams Co.). *U.S. 2,890,186*. See *U.S. 2,890,185*. The alkyd resin is prepared with dialkyl fumarate.

NEW POLYAMIDE-LIKE CONDENSATION PRODUCTS. W. C. G. Förster (Reichhold Chemicals, Inc.). *U.S. 2,890,228*. New resinous products are obtained from epoxidized animal or vegetable fats or fatty acid esters having an oxirane content of about 4% by condensation with an aliphatic polyamine by heating about 2 hr. at 140° and 1 hr. at about 200°.

• Detergents

PROBLEMS OF WHITENING AND CLEANSING WITH RESPECT TO RECENT PROGRESS IN CHEMISTRY. Kiger. *Rev. corps sante militaire* 14, 5-62 (1958). Chemical types, structures, and properties of soaps and detergents are reviewed. Tests are given for determining surface tension, wetting, foaming, detergency, and pigment redeposition. Recommendations are made for military usage with respect to general hygiene, types of fabrics, and disinfection following chemical, bacterial or atomic warfare. (*C.A.* 53, 8667)

A NEW CONTINUOUS SAPONIFICATION PROCESS. B. Algranati. *Seifen-Ole-Fette-Wachse* 85, 30-1 (1959). Description with flow-diagram. (C.A. 53, 8667)

QUANTITATIVE EVALUATION OF PAPER CHROMATOGRAMS OF CONDENSED PHOSPHATE MIXTURES USING MODIFIED SOLVENTS AND A DENSITOMETER. D. N. Bernhart and W. B. Chess (Victor Chem. Works, Chicago Heights, Ill.). *Anal. Chem.* 31, 1026-8 (1959). A rapid and accurate procedure is used for the separation and determination of phosphates and phosphate detergents. The modified acid solvent and the use of a densitometer greatly enhance the chromatographic procedure.

NEW PETROCHEMICAL INTERMEDIATES FOR DETERGENTS. G. E. Hinds (Continental Oil Co., Houston, Tex.). *Soap Chem. Specialties* 35(5), 57-9, 144-5 (1959). The preparation of "Alfols" based in the Ziegler reaction of aluminum metal, ethylene and hydrogen is described. The uses of these alcohols to prepare products such as sodium lauryl alcohol sulfate, sodium lauryl ether sulfate, sodium dodecylbenzene sulfonate, lauryl trimethyl ammonium chloride and ethoxylated lauryl alcohol which are detergent raw materials are also outlined.

IDENTIFICATION OF ANIONIC SURFACE ACTIVE AGENTS BY INFRARED ABSORPTION OF THE BARIUM SALTS. J. W. Jenkins and K. O. Kellenbach (Colgate-Palmolive Co., Jersey City, N. J.). *Anal. Chem.* 31, 1056-9 (1959). The barium salts of 10 organic sulfates and sulfonates, of the types commonly used as detergents have been prepared. The infrared curves of these water-insoluble salts serve as a means of identification. Details of preparation, ashing of salts, and infrared procedure are presented. The infrared curves are correlated.

SYNTHESIS OF SOME OF THE CATIONIC SURFACE-ACTIVE AGENTS. P. V. Naumenko and B. A. Khaskin. *Maslobitno-Zhirovaya Prom.* 25(1), 33-5 (1959). Known methods for the manufacture of fat-derived quaternary ammonium compounds are reviewed. 9 references. (C.A. 53, 8666)

SURFACE CHEMICAL PROPERTIES IN AQUEOUS SOLUTIONS OF NON-IONIC SURFACTANTS: OCTYL GLYCOL ETHER, α -OCTYL GLYCERYL ETHER AND OCTYL GLUCOSIDE. K. Shinoda, T. Yamanaka and K. Kinoshita (Yokohama Nat. U., Yokohama, Japan). *J. Phys. Chem.* 63, 648-50 (1959). The surface tension, critical micelle concentration (c.m.c.), surface excess, foaming and foam stability of aqueous solutions of octanol, octyl glycol ether, octyl glyceryl ether and octyl glucoside have been determined. The surface activity and/or c.m.c. values of non-ionic surfactants, containing the octyl group as the hydrocarbon chain are similar to those of ionic surfactants containing the undecyl or dodecyl group as the hydrocarbon chain. As the foaming and foam stability of the compounds in the series improved markedly with the increase in the size of the hydrophilic moiety, these properties are probably dependent upon the hydrophilic-lyophilic balance of the molecule.

ANALYSIS OF PHOSPHATE MIXTURES BY PAPER CHROMATOGRAPHY. RECENT IMPROVEMENTS IN TECHNIQUE. M. J. Smith (Ontario Research Foundation, Toronto 5, Can.). *Anal. Chem.* 31, 1023-5 (1959). The paper chromatographic method for determining phosphates in mixtures is modified to increase its accuracy and precision. The downward-flow apparatus is replaced by an ascending solvent system running at 4°. Phosphorus is determined by reaction with ammonium molybdate hexahydrate solution.

DESIGN GUIDE FOR BETTER DETERGENTS FOR COTTON. R. D. Stayner (Oronite Chem. Co., San Francisco, Calif.). *Soap Chem. Specialties* 35(5), 64-5, 264-5 (1959). The ideal cotton detergent should contain both a surfactant and a highly efficient sequesterant for hard water cations. The surfactant should have at least a moderate degree of surface activity as manifested by its wetting and emulsifying properties. The hydrocarbon chain of the surfactant should be as large as possible without sacrificing a moderate degree of wetting and emulsifying activity, and other desirable surface active characteristics; and the surfactant should be anionic.

BACTERIOSTATS IN HOME LAUNDRY DETERGENTS. R. E. Vicklund (Sindar Corp., New York, N. Y.). *Soap Chem. Specialties* 35(4), 56-7, 159 (1959). The use of an appropriate bacteriostat in certain household laundry detergents can result in a sufficient degree of antibacterial activity on the laundered materials to achieve some odor control and sanitizing improvements. Most of the bacteriostats currently used in laundry detergents are the compounds previously proven most effective in antiseptic and deodorant toilet soaps.

ION-EXCHANGERS IN DETERGENT ANALYSIS. P. Vootg. *Rev. trav. chim.* 77, 889-901 (1958). Mixtures of the Na salts of alkylsulfuric or sulfonic acids, fatty acids, and nonionic ma-

terials are passed over a succession of three ion-exchangers [(H⁺), (Ac⁻), (OH⁻)] and are thereby separated into weakly acid, strongly acid, and nonionic fractions; these can be titrated potentiometrically and the contents and molecular weight of the individual acids thus determined. Nonionic constituents are determined gravimetrically. This is a method of approach rather than a general and universal procedure, and modification is essential in many cases, e.g. with compounds that decompose during elution. A procedure is described for the analysis of the alcohol extract of a detergent and there is a diagram of the apparatus.

THE SIGNIFICANCE OF THE 66% RULE IN SOAPMAKING TECHNOLOGY. E. T. Webb. *Soap, Perfumery, Cosmetics* 32, 256-9 (1959). According to Dr. J. H. Wigner, a soap curd may be regarded as consisting of soap hydrate containing 66 per cent of fatty acids and lye identical in composition with that from which it has separated. This has been called the 66 per cent rule and is found to hold good in any conditions that may occur during the course of a normal boil of soap. This was originally concerned with its application to glycerin recovery. The author suggests that this phenomenon explains the causes contributing to the warping, sweating, efflorescing, feathering, and lathering qualities of household soap and to the improvement of toilet soap quality.

METHODS FOR ANALYSIS OF FLUORESCENT BRIGHTENERS. W. E. Weeks, J. C. Harris, and J. T. Lewis (Monsanto Chem. Co., Dayton, Ohio). *Soap Chem. Specialties* 35(5), 66-70, 277 (1959). The relative purity of a brightener is defined as its activity compared with that of a standard brightener. Relative purity can be determined by ultraviolet absorption spectroscopy. A control method for relative brightener content in detergents is based on repeated washing of fabric and evaluating washed fabric in comparison with that washed simultaneously with a standard detergent. Functional properties of brighteners in proprietary detergents are suggested as a means to characterize them.

CONTRIBUTION TO THE COLLOID CHEMISTRY OF THE SYSTEM SOAP-CRESOL-WATER. X. SURFACE TENSION OF THE CRESOL SOLUTIONS OF SOAP MIXTURES. E. Angelescu and Y. Davidescu (Lab. for Colloid Chemistry, Inst. of the Rumanian Academy, Bucharest). *Kolloid Z.* 163, 132-136 (1959). Surface tensions of various mixtures of soaps in a water-cresol system were measured at temperatures ranging from 40-60°.

CONSTITUTION AND PROPERTIES OF INTERFACIALLY ACTIVE MATERIALS. I. MEASUREMENT ON P-N-ALKYL BENZENE SULFONATES. H. Kolbel and P. Kuhn (Inst. for Technical Chemistry, Technical Univ. Berlin-Charlottenburg). *Angew. Chem.* 71, 211 (1959). The surface tension, interfacial tension, wetting power, emulsifying properties, foaming power, foam stability, suspending power and detergent efficiency of p-n-alkylbenzene sulfonates are examined as a function of chain length. Interfacial activity begins with an alkyl chain length of 7-8 C-atoms. The decrease in surface and interfacial tension as well as wetting power, foaming power, and emulsifying properties have a maximum or minimum below 60° at chain lengths of 12-14 C-atoms. Detergent efficiency and suspending power increase up to 18 C-atoms. Resistance of the alkyl benzene sulfonates against acids and bases is good.

CHEMICAL COMPOSITION OF ADSORBED LAYERS OF SOAPS FROM AQUEOUS SOLUTIONS. M. Raison (Central Laboratory of Chemical Services, Inst. Corp. Gras). *Rev. Franc. Corp. Gras.* 6, 207-223 (1959). The chemical composition of adsorbed layers formed by aqueous soap solutions, and the influence of drying on sodium oleate foam composition was studied. It was possible to obtain foams whose chemical composition was independent of the composition of the foam solution. Foams made from potassium oleate, and sodium and potassium laurate were also studied.

DETERGENT. Henkel-Helios AB. *Brit.* 810,151. A detergent whose aqueous solution at <50° has a pH of 7.5-9.5 and after some time at 80-100° rises to 9.4 to 11.0 consists of a nonionic or anionic detergent (but no soap), an alkali metal phosphate and MgO, the latter being present as a powder whose individual particles are coated with a substance melting at 50-60°, such as cetyl alcohol.

PROMOTED DETERGENT COMPOSITIONS. L. R. Bacon, C. E. Smith, and T. H. Vaughn (Wyandotte Chemicals Corp.). *U.S.* 2,886,533. It has been found that a promoter consisting of a water-soluble alkali metal salt of carboxymethylcellulose and a water-soluble hydroxyalkylcellulose within certain prescribed limits greatly enhances the detergent and whiteness retention properties of anionic detergents such as alkylaryl sulfonates, alkyl sulfonates and alkyl sulfates.