TABLE IV

Comparison of the Isolation Method with the Spectral Method for Analyses of Oils[a]

Sample	Saturated		Oleic		Linoleic		Linolenic	
	I[b]	S[c]	I	S	I	S	I	S
	%	%	%	%	%	%	%	%
Soybean Oil A.........	9.4	16.4	28.2	27.6	48.1	46.8	5.6	4.8
Soybean Oil B.........	10.6	14.7	17.7	18.4	57.3	57.0	6.8	5.5
Soybean Oil C.........	10.5	14.4	20.4	19.1	56.3	54.8	7.1	7.3
Soybean Oil D[d].......	9.3	12.6	37.3	40.0	41.6	37.0	5.9	6.0
Soybean Oil E[d].......	7.5	13.4	41.0	40.0	34.5	36.5	5.7	5.7
Corn Oil[e]................	6.3	17.5	27.3	22.3	59.0	56.8		
Olive Oil[f]................	8.0	10.0	69.5	74.0	13.0	11.6		
Linseed Oil[g]...........	5.9	9.0	20.9	22.3	18.5	15.5	49.4	48.8
Hyd. Shortening[h]...	15.8	20.8	56.2	62.5	20.5	12.3		
Av. Std. Dev...........	1.23		1.70		1.32		1.05	

[a] All values expressed as percentages are based on 100 mg. of oil (assuming oil contains 95.6 mg. of fatty acids).

[b] Isolation method developed in this paper. Values for soybean oils A-C and olive oil represent average of quadruplicate. Other values are averages of duplicate samples.

[c] Spectral method as modified by Brice *et al.* (10).

[d] Immature soybeans.

[e] "Mazola" brand.

[f] Pure olive oil U.S.P. supplied by Magnus, Malice, and Renard Inc., N. Y.

[g] Spencer Kellogg and Sons Inc., Buffalo, N. Y.

[h] "Primex" hydrogenated shortening supplied by Procter and Gamble Company, Cincinnati, O.

tinct bands were formed when the columns containing mixtures of these derivatives were developed slowly under hydrostatic pressure of the solvent. This agreed with the results reported by Kharasch and Buess (9), who indicated that two compounds were formed by addition of the reagent to unsymmetrical olefins. Gram (12) also noted that two compounds were obtained by the addition of the reagent to *cis* or *trans* compounds.

Other adsorbents and solvents did not prove satisfactory for separating the derivatives. Silicic acid,[7] used with hexane and ethyl acetate (97:3), separated the derivatives of oleic and linoleic, but the derivatives of linolenic could be separated from the extraneous materials remaining at the top of the column. Magnesium phosphate, calcium sulfate, aluminum oxide, magnesium oxide, and sucrose were also tried as adsorbents with ethyl ether, hexane, benzene, and dioxane, alone and in mixtures; none proved satisfactory.

Analysis of Fats. Nine different samples of common fats were analyzed by this method as well as by the spectral absorption method (Table IV). The results compared favorably for the unsaturated acids in most cases, but those for the saturated acids were consistently lower when analyzed by the new procedure than when analyzed by the spectral method.

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[7] Analytical Reagent, Chromatographic Grade, Mallinckrodt Chemical Company, St. Louis, Mo.

Summary

Oleic, linoleic, and linolenic acids were found to react with 2,4-dinitrobenzenesulfenyl chloride to form addition products of constant composition. Saturated acids did not react. The derivatives of mixed acids were separable into well defined bands on $MgSO_4$ columns and recoverable as individual compounds in the eluate, with yields above 95% in each case.

This technique provided the basis for a new method of analysis, which we have called the "isolation" method. Results obtained in the analysis of 100-mg. samples of common vegetable oils compared favorably with those obtained by the spectral absorption method except that isolation values for saturated acids were lower.

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ABSTRACTS . . . . **E. S. Lutton, Editor**

• Oils and Fats

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Pigeon-egg fat. J. W. Airan and G. D. Kalyankar (Wilson Coll., Bombay). *J. Univ. Bombay*, Sect. A, 20, Pt. 5 (*Science No.*, No. 31), 31-4(1952). Dried egg yolks from eggs of the pigeon, *Columbiformes*, contained 40.4% fat and 2.32% phosphatides. It had a d^{26} 0.9291, n^{26} 1.467, acid no. 15.43, sapon. no. 207.1, I no. 78.32, Reichert-Meissl no. 3.03, Polenske No. 1.41, and unsapon. 5.03%. Analytical data are also reported for insoluble, mixed, saturated and unsaturated fatty acids. (*C. A.* 47, 9636).

Refining of oils and fats for edible purposes. A. J. C. Anderson. New York, Academic press, 1953, 204 pp.

The unsaponifiable substances of the oils of crucifer seeds. Émile André and Monique Maille. *Compt. rend.* 235, 665-7 (1952). Use of pet. ether (b.p. 40-60°) rather than ethyl ether to extract unsapon. fraction of rapeseed oil gave 0.5% of the oil as unsapon. material compared with 1.1% for ethyl ether. The ethyl ether extract was colored and amorphous, whereas the pet. ether extract was colorless and crystalline. Rapeseed oil was separated into 3 fractions: (a) substances extracted by alc. KOH from pet. ether extract; (b) substances extracted by pet. ether but not by ethyl ether; (c) substances forming soaps with Ba. The substances were not identified. (*C. A.* 47, 9636).

The study of the unsaponifiable substances of oils of crucifer seeds. II. Émile André, Marie Carbouères, and Monique Maille. *Compt. rend.* 236, 1695-7(1953). The method adopted by the International Commission for the study of fatty materials gives different results depending upon the solvent choice (pet. ether or ethyl ether). Unsapon. fractions designated A, B, and C were obtained from crucifer-seed oil as well as from other common oils. Fraction A consisted of those substances extracted by ordinary ether, B those by pet. ether, and C those resistant to either solvent. Fraction C was greater in crucifer oil than in the other oils examined. It is necessary, therefore, to bear in mind the method of extraction in making a study of fractions obtained in oil studies. (*C. A.* 47, 9636).

The monoöxo- and monohydroxyoctadecanoic acids. Preparation and characterization by thermal and x-ray methods. Sune Bergström, Gunhild Aulin-Erdtman, Brita Rolander, Einar Stenhagen, and Sven Östling (Univ. Lund, Sweden). *Acta Chem. Scand.* 6, 1157-74 (1952) (in English). Complete series of the monoöxoöctadecanoic acids and of the monohydroxyoctadecanoic acids and their methyl esters were prepared and their thermal and x-ray characteristics studied. Positions of substitution and remelting points (°C.) reported for the oxo-acid, oxo-ester, hydroxy-acid, and hydroxy-ester were as follows: 2, 74.6, 54.1, 91.1, 65.9; 3, 99 (decomposition), 49.2, 89.6, 51.4; 4, 96.5, 48.0, 87.4, 56.4; 5, 87.3, 54.5, 82.1, 52.1; 6, 86.8, 46.8, 82.4, 58.5; 7, 83.0, 48.8, 77.8, 51.0; 8, 83.8, 46.9, 81.7, 55.6; 9, 81.9, 48.0, 75.9, 50.6; 10, 82.6, 46.1, 79.5, 45 (unstable); 11, 81.9, 46.9, 77.5, 49.8; 12, 81.9, 45.7, 76.9, 53.6; 13, 82.3, 47.7, 77.5, 53.5; 14, 81.9, 49.0, 76.8, 64.8; 15, 83.2, 53.7, 75.5, 58.9; 16, 93.5, 54.5, 78.6, 61.5; 17, 87.7, 56.5, 76.6, 64.3; 18, ..., ..., 99.5, 62.6. Many of the hydroxy compounds showed polymorphism. (*C. A.* 47, 8645-7).

An investigation of the relationship of the oleophobic properties to the arrangement of the molecules in fatty acid films adsorbed from solution. Wilbur C. Bigelow (Univ. of Michigan, Ann Arbor). *Univ. Microfilms* (Ann Arbor, Mich.), *Publ. No. 5013; Dissertation Abstracts* 13, 295-6(1953).

Composition of the depot fat of Prochilotus lineatus (Sabalo). I. Dorsal pannicle. Rodolfo R. Brenner. *Anales asoc. quím. argentina* 41, 61-74(1953). The dorsal pannicle of the fish known as sábalo produces a major portion of the total fat which is used for industrial purposes in the Argentine. This fat was extracted with dry ether, saponified with alcoholic KOH, separated by difference of solubility of its Li salts in acetone and of its Pb salts in EtOH, its liquid acids separated from the solid after hydrolysis, and further purified by fractional distillation of the methyl esters in vacuum under an atmosphere of N. Sapon. nos., iodine nos., and physical constants were recorded for each acid. The major components reported are palmitic, hexadecenoic, and polyunsaturated C_{18} acids; with smaller amounts of stearic, arachidic, hexadecatrienoic, low-mol. wt. C_{20} and C_{22} acids. (*C. A.* 47, 9637-8).

Anitoxygen powers of oil-soluble acid phosphates and sulfates. P. Desnuelle, R. Massoni, and O. Benoit-Micaelli (Lab. natl. matières grasses, Marseilles). *Bull. soc. chim. France* **1953**, 595-9. A mixture of 2 g. Me esters of sunflower-seed oil and 0.02-0.05% by wt. of the test substance was illuminated by a 100-w. bulb at a distance of 20 cm. and a temperature of 40° for several hours; the peroxide content was then determined by an iodometric technique. Total phosphatides of soybean, corn, and peanut oils (prepared by dehydrating the oils and purifying the residues by several acetone precipitations) are antioxygens; they do not show any synergism with 1,4-$(HO)_2C_6H_4$, tocopherol, or Et gallate. The phosphatidyl cholines (from egg yolks) are not antioxygens, but the corresponding phosphatidic acids (prepared by action of carrot phophatidase under mild conditions) are antioxy- and are not synergistic with 1,4-$(HO)_2C_6H_4$. Dodecyl and hexadecyl acid sulfates (prepared by strongly acidifying concentrated aqueous solutions of the purified Na salts with HCl, continuously extracting with Et_2O for 12 hrs., evaporating the Et_2O, and drying the residues) are antioxygens. Dodecansulfonic acid and dodecylbenzenesulfonic acid are weak antioxygens. It is concluded that certain oil-soluble acidic substances possess antioxygen powers than can be manifested directly by a mechanism not involving polyphenols. (*C. A.* 47, 9637)

The nonglyceride constitutents of the oil from olive pulp. Robert Fuhrmann. *Compt. rend.* 235, 722-4(1952). The dark-green residual oil extracted from olive pulp with CS_2 or Cl_2C:CHCl after expression amounts to 10-15% of the pulp and is usually higher in unsaponifiable matter and acids. A press-cake oil from Tunisia extracted by Cl_2C:CHCl had acid no. 22.4, sapon. no. 193, I no. 86, unsapon. matter 1.5%, and insoluble in petroleum ether 2.7%. With a Beckman DU spectrophotometer with $(CH_2)_2O$ as the solvent, the green-pigment content of the oil expressed as α- and β-chlorophyll amounted to 32 ± 3.5 mg. % oil. Another oil gave a color equiv. of 34 ± 3.5 mg. % oil. The unsaponifiable fraction contained 4 colored carotenoids (α-carotene preponderant) by chromatographic absorption on activated Al_2O_3. The total carotene content was 0.56 mg. % oil. The unsapon. fraction had an I no. (Wijs) 109, OH no. 111, hydrocarbon content 32 ± 1.5%, phytosterols (white crystals, m. 128-131°) 18.5 ± 1%, and high molecular weight aliphatic alcohols (C_{22} and C_{24}) 50 ± 2% (2 fractions [a] m. 74.5-75° and [b] 72.8-74° white crystals). The analytical methods are described. (*C. A.* 47, 9636-7)

Recent developments in the preparation of natural and synthetic straight chain fatty acids. F. D. Gunstone (Univ. Glasgow, Scotland). *Quart. Rev.* (London) 7, 175-97(1953). A review with 147 references.

Comparative toxicity of synthetic and natural glycerin. C. H. Hine, H. H. Anderson, H. D. Moon, M. K. Dunlap, and M. S. Morse. *Arch. Ind. Hyg. and Occupational Med.* 7, 282-91 (1953). The chief pharmacologic effect of either natural or synthetic glycerin was stimulation of the central nervous system. Chronic toxicity studies showed that after rats had been fed 20% natural or synthetic glycerine for one year there were no significant differences between experimental and control subjects. After rats had been fed 5 or 10% natural or synthetic glycerin for a period of 2 years, there were no significant differences as regards % of wt. gain, results of urinalysis and hemoglobin determinations, or percentage of mortality. There was no evidence of organ stress at any level of either glycerin, and there were no gross or microscopic lesions attributable to the glycerin feeding. (*Food Technol.* 7[10], 18[1953])

Oat lipase. H. F. Martin and F. G. Peers (Research Assoc. of British Flour-Millers, Cereals Research Sta., St. Albans, Herts). *Biochem. J.* 55, 523-9(1953). The lipase causing lipolysis in oatmeals is a true cereal lipase. After purification it contained 6.7% N and 0.5% P, had an optimum pH of 7.4, an optimum temperature of 37-8°C., and a Michaelis-Menten constant (K_m) of 0.006 M when tributyrin was the substrate. This lipase splits off one butyric radical only from tributyrin and does not hydrolyze the polyoxyethylene derivative of sorbitan laurate. It is not activated by materials reported to activate pancreatic lipase.

Possibilities in Spanish oils of marine animals. Ricardo Montequi Díaz-Plaza. Madrid. Consejo Superior Invest. Cient. 1951. 152 pp.

Determination of vitamin E in alfalfa and hay. Caro C. Moreno (Univ. Chile, Santiago). *Tesis quím. Univ. Chile* 3, 12-16 (1951). The Emmerie-Engel tocopherol method modified by Wall and Kelly (*C. A.* 40, 4217) was applied to alfalfa and 10 g. alfalfa hay. The tocopherol content and range were: alfalfa 2.12 (3.39-0.74); alfalfa hay 4.67 (6.40-3.60) mg./100 g. All of the tocopherol could be eluted from a 3.4-cm. column of Hyflo Supercel-magnesia (3:1) with 50 ml. of a mixture of Skellysolve B-acetone (9:1). Concentration and evaporation of the eluate could be done without N blanketing. The red reaction product was transferred from the $CHCl_3$ to H_2O and color reading made after 12 hrs. The color was stable for 24 hrs. (*C. A.* 47, 9446)

Peanut butter. IV. Determination of color of peanut butter by a spectral reflectance method. N. J. Morris, I. W. Lohmann, R. T. O'Connor, and A. F. Freeman (Southern Regional Research Lab., New Orleans, La.). *Food Technol.* 7(10), 393-6 (1953). A method is presented for the objective measurement of color in peanut butter. The method consists of recording the spectral reflectance of peanut butter directly by use of an automatic recording spectrophotometer equipped with a diffuse reflectance attachment, and expressing the spectral data numerically in terms of the C.I.E. system of color notation. C. I. E. designations are also converted into Munsell renotations and Hunter values. For comparative purposes a series of peanut butters produced from peanuts roasted to various extents were evaluated by this method. In general, the redness factor was found to increase with the extent of roasting accorded the peanuts, and this can be expressed by the *x*-coordinate, dominant wave length, Hunter *a*-coordinate, or Munsell *hue*.

Toxicity of butyl stearate, dibutyl sebacate, dibutyl phthalate, and methoxyethyl oleate. C. C. Smith. *Arch. Ind. Hyg. and Occupational Med.* 7, 310-18(1953). The plasticizers were examined for acute and chronic toxicity in rats. The finding suggests that these plasticizers are metabolized in the body in much the same way as the fat normally ingested in the diet. Based on these data in rats, butyl stearate and dibutyl sebacate when incorporated in films for wrapping foods appear to possess little, if any, potential hazard for humans, the calculated safety factor being in excess of 1,400.

Thermal polymerization of methyl linoleate and methyl linolenate. C. Boelhouwer, Liem Tjing Tien and H. I. Waterman (The University, Delft). *Research Correspondence* 6, 55S (1953). Methyl linoleate and methyl linolenate samples were polymerized at 290-300°C. under nitrogen. Nonpolymerized esters were removed from the polymers by distillation at 1 mm. Hg. Products were transformed into saturated hydrocarbons by reaction with hydrogen at 300-350°C., 200-250° atm. pressure, with 20-100% Ni-Cu on guhr catalyst. The average number of rings per mole in the hydrocarbons was determined by ring analysis and calculated from the molecular weight and ultimate analysis. Polymerization of methyl linolenate and linoleate leads chiefly to dimer formation. In the case of methyl linolenate these dimers have approximately two rings/molecule, whereas the dimers from methyl linoleate are less cyclic and contain about 1.3 rings/mole.

The effect of water on the interaction between stearic acid and fine powders. 2. Aluminum, chromium, cobalt, and oxides of cadmium, iron, lead and nickel. J. K. Lancaster (Assoc. Electrical Indus. Ltd., Aldermaston, Berks). *Trans. Faraday Soc.* **49**, 1090-6(1953). The amount of stearic acid removed from benzene solution by metal or metal oxide powders was determined under dry conditions and in the presence of varying quantities of H_2O. Four general classes of behavior were found. On the unreactive powders, Cr and Fe, H_2O is displaced from the surface by stearic acid, whereas on Al, NiO and TiO_2, H_2O is only partially displaced. A continuous chemical reaction occurs with the reactive powders, Co, Fe_2O_3, CuO and Fe_3O_4, only when H_2O is initially present on the powder surface prior to the adsorption of acid, whereas PbO, Cu_2O, Zn and CdO react when H_2O is present irrespective of its initial location within the powder-solution system. The results are discussed briefly in relation to the lubrication of metals.

Many unheralded uses for soybean fatty acids. Kent Pellett. *Soybean Digest* **13**, No. 12, 8-10(1953). Review, including a list of firms producing soybean fatty acids, the characteristics of the acids, and their present and potential applications.

Non-toxic stabilizers for animal fats. L. Hartman (Fats Research Labs., Wellington, New Zealand). *J. Sci. Food Agric.* **4**, 430-3(1953). Because phenolic antioxidants are not yet permissible additives to fats in British and Western European countries, a study of polybasic acids as the sole antioxidants for animal fats was undertaken. The effect of the addition of 0.01% of citric and tartaric acids and their sodium salts (incorporated as aqueous solutions) on the induction periods of beef and mutton fats and lard were determined at 100°C. The free acids were most effective. Citric acid is most conveniently incorporated as a mixed glyceride which is prepared by reacting powdered citric acid with a monoglyceride or a mixture of mono-, di-, and triglycerides at 130°C. for about 1 hour. The glyceride must be free from glycerol which yields an oil-insoluble citrate. The mixed glyceryl esters of citric and fatty acids can be prepared containing up to 20% citric acid and having acid values in the range of 40 to 100. They are glassy, have an acid taste, are readily soluble in alcohol and petroleum ether, and are soluble to the extent of 1 to 2% in fats. They are effective stabilizers both in the presence and absence of an aqueous phase as is shown by induction periods and peroxide values. Tartaric acid reacted with monoglycerides with difficulty and formed esters containing no more than 5% tartaric acid and having acid values below 20.

The composition of the blubber fat of crabeater seal. G. Winter and W. Nunn (Defence Research Labs., Dept. of Supply, Melbourne, Australia). *J. Sci. Food Agric.* **4**, 439-42(1953). Blubber oil from a single young male crabeater seal, *Lobodon carcinophagus*, had an iodine value of 165.3, saponification value of 190.4, acid value of 1.7, and contained 0.4% of unsaponifiable matter. The oil was converted to methyl esters which were separated by fractional crystallization and then analyzed by fractional distillation in a rotating strip column. The composition of the oil was in general similar to that of most other seal blubber fats except for the presence of a somewhat larger proportion of C_{16} acids. Fatty acid contents were (percentage by weight): myristic 4.7, palmitic 10.1, stearic 2.1, and unsaturated acids C_{14} 3.2, C_{16} 19.8, C_{18} 30.3, C_{20} 19.2, and C_{22} 10.6.

The component fatty acids of elephant-seal oil: variations and relationship to blubber fats of other seals. G. Winter and W. Nunn. *J. Sci. Food Agric.* **4**, 442-8(1953). Chemical constants were determined for belly blubber fat from 21 specimens of elephant seals and for blubber fat from various portions of the bodies of 2 seals. The belly blubber fats were analyzed by a method which involved methanolysis, preliminary separation of the esters by low temperature crystallization and finally fractional distillation through a rotating strip column. It was found that the fat composition of blubber fat from various parts of the body of one animal is substantially constant, but there is considerable difference between individuals. The iodine values varied between 98 and 153. The low-iodine value fats have a relatively low content of saturated acids (15%) compared to high-iodine value oils (up to 22%) and contain substantial amounts of C_{20} to C_{24} acids having a low degree of unsaturation. Although there appears to be a tendency for the iodine value to be higher during the winter months, the results of detailed analysis failed to show any correlation of the fat composition with seasonal changes or the physiological state of the animal. Saturation and desaturation processes during the depot fat metabolism are in the main confined to acids of chain length greater than C_{18}. Blubber fats from various species of seals have similar compositions. The distribution of unsaturated fatty acids in seal blubber fats is similar to that in whale blubber fats.

Attempted separation of the esters of isomerized fatty acids by urea. G. N. Catravas. *Oleagineux* **8**, 677-679(1953). Methyl esters of catalytic isomerized linseed oil were fractionated by means of urea from anhydrous methanol solutions. Ultra-violet absorption curves of the fractions showed that it should be possible to separate the various trienes and dienes by this method.

The churning time of milk fat at different temperatures. R. F. Holland and B. L. Herrington (Cornell University). *J. Dairy Sci.* **36**, 850(1953). There is little difference in the time required to churn milk or cream having a fat content within the range 4.1 to 40.0 percent at a given temperature. There is an optimum relationship between the amounts of liquid and solid fat for churning to take place. If the amount of either is increased from this value, the churning time is lengthened. When the fat becomes completely liquid or solid, there is no churning.

Production of water-insoluble acids and butyric acid in butter by defect-producing bacteria. L. T. Kester, F. E. Nelson, and I. I. Peters (Iowa Agricultural Experiment Station, Ames). *J. Dairy Sci.*, **36**, 794(1953). Butter made from good cream may develop high water-insoluble acid and butyric acid values, if lipolytic bacteria are permitted to grow in the product. When lipolysis due to bacterial action occurred in butter, the ratio of water-insoluble acids to butyric acid decreased. Salt retarded the development of lipolysis caused by these organisms.

Free fatty acid content of ice cream with certain observations on flavor relationship. T. C. Shotwell, W. J. Harper, and I. A. Gould (Ohio State University). *J. Dairy Sci.* **36**, 948(1953). The rancid flavor was detected in vanilla and chocolate ice cream at an acid degree of more than twice the threshold value of 2.0 established for milk and cream. Free fatty acid content of fresh ice cream was higher than the free fatty acid content of the fresh milk and cream constituents. There was a wide variation in the free fatty acid content ranging from 1.33 to 6.24 for vanilla and from 1.26 to 5.83 for chocolate ice cream obtained commercially at different periods of the year.

Direct chromatographic determination of acetic, propionic and butyric acids in cheese. W. H. Harper (Ohio State University). *J. Dairy Sci.* **36**, 808(1953). A direct chromatographic method for the separation and measurement of acetic, propionic and butyric acid in cheese was described. The values obtained by this method compare favorably well with the method requiring distillation prior to analysis. The method permits the separation of pyruvic acid. Acetic, propionic, and butyric acids added to cheese as sodium salts were recovered quantitatively and the titration results were reproducible for all acids within ± 5 percent of the mean. The method was found applicable to both young and aged cheese.

Production of water-insoluble and butyric acids during cream deterioration. I. I. Peters, L. T. Kester, and F. E. Nelson (Iowa Agricultural Experiment Station, Ames). *J. Dairy Sci.* **36**, 799(1953). Prolonged holding of cream at temperatures below 60°F. favored development of water-insoluble acids. Holding at high temperatures especially at 85°F. favored development of butyric acid and only occasionally high levels of water-insoluble acids. Although butyric acid may be freed by lipolysis, much of that found in some samples apparently originated from sources other than direct fat hydrolysis. Milk lipase and microbial lipases contributed to fat hydrolysis in raw cream, when holding conditions minimized development of acidity.

Anodic syntheses, Part IX. Unsaturated and hydroxy acids. A direct stereochemical connection of oleic and elaidic with erucic and brassidic acids. D. G. Borends, R. P. Linstead, and B. C. L. Weedon. *J. Chem. Soc.*, 2393(1953). Undec-10-enoic, oleic, elaidic, and threo and erythro-9:10 dihydroxy stearic acid undergo the Kobbe reaction to give the expected products in 20-50 per cent yields. Anodic cross-coupling of these acids with adipic half ester occurs readily and illustrates a convenient method for the synthesis of unsaturated long chain fatty acids and their dihydroxy derivatives.

PATENTS

Processes of refining and purifying fats and higher fatty acids. Illona Taussky. *U. S. 2,654,766.* The fats and fatty acids are hydrogenated in the presence of a nickel catalyst and lignin. The catalyst and lignin are removed from the highly hydrogenated product by filtration.

Process of alcoholysis. James V. Hunn (The Sherwin-Williams Co.). *U. S. 2,654,767.* Low molecular weight monohydric alcohol esters of high molecular weight fatty acids are obtained by the reaction of a glyceride oil with a molar excess of methyl, ethyl, propyl or isopropyl alcohol in the presence of 0.2 to 1 per cent (based on the weights of alkaline earth base and oil) of the glycerine addition product of calcium oxide, calcium hydroxide or strontium oxide at temperatures below 300°F. for 10 minutes to 8 hours.

Production of fatty acid concentrates. George H. Palmer (The W. M. Kellogg Co.). *U. S. 2,654,768.* Glycerides are subjected to hydrolysis until the product contains about 25% glycerides. This partial hydrolysis product is extracted countercurrently with a solvent having a critical temperature below 450°F. under conditions of temperature, pressure, and reflux such that the fatty acids are obtained essentially free from glycerides and there are also obtained a raffinate of the least soluble hydrolysis products and an intermediate fraction of glycerides.

Process of producing monoesters of polyhydric alcohols. John David Makemus. *U. S. 2,655,522.* Continuous process for the production of monoesters of di- or trihydric alcohols having at least 6 carbons per mole. The alcohol and acid are introduced into the reaction zone at a molar ratio of 4:1. Reaction occurs at 200-300°C. and under pressures sufficient to maintain the alcohol liquid. The crude product is dehydrated by flash distillation and the unreacted fatty acid and alcohol are removed.

Process for production, concentration and stabilization of fat-soluble valuable substances from carrots and the resulting product. Friedrich Tiedt and Roderich Dewald. *U. S. 2,656,274.* Description of a process for the isolation of provitamin A, vitamin E, antioxidants and like fat-soluble substances from carrots with maintenance of their mutual synergistic relations and for increasing their stability and physiological value. Fresh carrots are disintegrated, mixed with a fatty emulsifying agent, and pressed to separate a liquid containing the desired substances.

Refining of fatty oils, especially vegetable oils. Svante F. N. Bierke (Aktiebolaget Separator, Stockholm). *U. S. 2,657,224.* In a continuous process, crude oil is deslimed by mixing with water and centrifuging at 70°C. or above. The deaerated oil phase is mixed under pressure with alkali. The soapstock is removed by centrifugation from the refined oil within 40 secs. of the time of mixing with alkali.

Purified glycerol. N. V. Octrooien Maatschappij "Activit." *Brit. 690,008,* Apr. 8, 1953. Purified glycerol is prepared from glycerol-containing solutions by treatment with an alkaline-reacting substance followed by filtration and successive passage through cation and anion exchangers. Treatment with NH_3 or NaOH obviates production of undesirable reducing substances ordinarily resulting from the use of ion-exchange resins and permits removal of coloring matter. (*C. A.* **47**, 9639)

• Biology and Nutrition

F. A. Kummerow, Abstractor

Codliver oil therapy in silicotuberculosis. Karl Bisa. *Tuberkuloseaerzt.* **6**, 220-3(1952). The effect of codliver oil is not to be sought alone in its vitamin content. The active agents are also the unsaturated fatty acids (mid-chain length) which exert a growth-retarding effect toward acid-fast bacteria, especially tubercle bacilli, *in vitro.* The activity of the liver cell is tempered by the fatty acid content. The therapeutic mechanism is accentuated by egg-yolk lecithin which as a P-containing lipide plays an important part in liver metabolism. In 100 cases of silicotuberculosis, the disease course was favorably influenced. (*C. A.* **47**, 9439)

Occurrence of two valeric acids (β-methyl butyric acid and α-methyl butyric acid) in the hair grease of the dog. E. Brouwer and H. J. Nijkamp (Lab. of Animal Physiol. of Agr. Univ. Col., Wageningen, The Netherlands). *Biochem. J.* **55**, 444-7(1953). Volatile fatty acids in the hair grease of dogs consist mainly of valeric acids (chiefly β-methylbutyric, 5% of [+] α-methylbutyric) with small quantities of acetic, propionic, and caprylic acids. It is suggested that leucine and isoleucine may be the precursors of these acids.

Influence of phospholipides on the nutritive value of sunflower-seed oil. N. D. Buckman (Sanitation-Hyg. Inst., Leningrad). *Masloboina Zhirovaya Prom.* **18**(4), 9-10(1953). Male rats weighing 45-50 g. were fed a synthetic diet, plus sunflower-seed oil containing 0.65% phospholipides or refined phospholipide-free oil as the only fat intake in the diet. After 3 months 6-7 rats in each group were sacrificed and the bodies analyzed for their lipide and protein contents. The remaining rats were placed on the fat-free diet, and their total caloric intake was lowered. When the sunflower-seed oil containing phospholipides was fed, the rats gained an average of 140 g. (as compared with 117 g. for those fed on phospholipide-free oil) and gained more in depot fat. Likewise, after 5 and 10 days on the fat-free diet, the rats utilized 13.2-52.2% of the depot fat gained on oil containing phospholipides and 42.9-90.5% of the depot fat gained on phospholipide-free oil. It was concluded that phospholipides play an important part in the assimilation and utilization of sunflower-seed oil by the animal body. (*C. A.* **47**, 8853-4)

Some observations of effects of intravenous fat emulsions on erythrocyte fragility. M. C. Creditor. *Proc. Soc. Exptl. Biol. Med.* **82**, 83-7(1953). Intravenous infusion of fat emulsions causes increased mechanical fragility of dog and human red blood cells. Spontaneous intravascular hemolysis has been seen in humans who have received these emulsions. The possible causes of this phenomenon and its possible relationship to the "pyrogenic" effects on intravenous fat are discussed.

The incorporation of labelled phosphate into the lipids of a brain dispersion. R. M. C. Dawson (Univ. of Oxford, England). *Biochem. J.* **55**, 507-17(1953). For optimum incorporation the process requires oxidizable substrate, oxygen, phosphate acceptor, magnesium ions, and cytochrome c. It is accelerated by fluoride ions and inhibited by hypertonic media and low concentrations of Ca and glucose. It is concluded that P^{32} is initially esterified into high-energy phosphate compounds which then phosphorylate phospholipide precursors.

Fat in the diet in relation to nutrition of the dog. I. Characteristic appearance and gross changes of animals fed diets with and without fat. Arild E. Hansen and Hilda F. Wiese (Univ. of Texas Med. Branch, Galveston). *Texas Repts. Biol. Med.* **9**, 491-515(1951). Observations on 53 young dogs for 1-6 yrs. indicate that fat is essential in their diet. Although death may not occur as a result of its lack, abnormalities in the appearance of skin and hair occur, chiefly dryness, desquamation, loss of hair, and increased susceptibility to infection. Improvement was produced when the fat level was increased from the basal level of 1%, to 6, 11, 16, or 30% of the calories, but complete cures were not observed at less than 16%. When 1% of the calories was furnished by linoleic or arachidonic esters definite improvement but incomplete cure, occurred.

II. Lipide composition of tissues from animals fed diets with and without fat. Hilda F. Wiese and Arild E. Hansen. *Ibid.* 516-44. The amount of cholesterol and cholesterol ester, and the amount of I no. of the fatty acids of phospholipides, and cholesterol esters (but not of triglycerides) were lower in the serum of dogs reared on a diet containing 1% of the calories as fat than in animals receiving 30% as fat. The saturation of the fatty acids of the other tissues also varied with the dietary fat, but to a lesser extent than those of the serum.

III. Spectral analysis for unsaturated fatty acid content of tissues from animals fed diets with and without fat. *Ibid.* 545-54. The total fatty acids of serum, skin, liver, and heart showed the highest diene fatty acid content when fat containing linoleic acid was fed. The total fatty acids of serum, liver, and kidney showed more tetraene fatty acid on diets containing linoleic or arachidonic acid than on the low-fat diet. The total fatty acids of the heart of animals receiving fat or linoleic acid ester showed more tetraene fatty acid than the hearts of animals receiving the low-fat diet or ethyl arachidonate. The amount of diene fatty acid in serum, skin, and liver of dogs on butterfat or on lard reflected the lower diene content of the former fat. Serum fatty acids showed the effect of diet more than did those of other tissues. Dienoic acids were measured at 2350 A., tetraenoic acids at 3000 A.; absorption at 2700, 3475, and 3750 A. indicated the presence of 3, 5, and 6 double-bond fatty acids, but their significance was not established.

IV. Histologic features of skin from animals fed diets with and without fat. Arild E. Hansen, Grant Holmes, and Hilda F. Wiese. *Ibid.* 555-70. (*C. A.* **47**, 9447-8)

The cytochemical demonstration of lipides in blood and bone marrow cells. F. G. J. Hayloe (Univ. Cambridge, England). *J. Pathol. Bacteriol.* **65,** 413-21(1953). A description of staining characteristics of cells and tissues. (*C. A.* **47,** 9395)

Reproductive failure of rats on glyceryl trilaurate-containing diets and its prevention by certain natural fats. Kenneth W. Keane (Univ. of Illinois, Urbana). *Univ. Microfilms* (Ann Arbor, Mich.). *Publ.* No. **5231,** 62 pp.; *Dissertation Abstracts* **13,** 278(1953).

Dietary modification of serum cholesterol and phospholipide levels. Laurance W. Kinsell, John Partridge, Lenore Boling, Sheldon Margen, and George Michaels (Highland Alameda, County Hosp., Oakland, Calif.). *J. Clin. Endocrinol. and Metabolism* **12,** 909-13(1952). The ingestion of synthetic diets containing large amounts of vegetable fat consistently resulted in a signficant fall in the level of serum cholesterol and phospholipides. (*C. A.* **47,** 9454)

Fat and lipide metabolism in tissue cultures. W. Knoth (Justus Liebig Hochschule, Giessen, Germany). *Naunyn-Schmiedebergs Arch. exptl. pathol. pharmakol.* **218,** 199-214. Cultures of guinea-pig spleens and chick embryos were investigated by staining methods. The estimation of free fatty acids, lipides, and acetal phosphatides is reported and discussed. (*C. A.* **47,** 9460)

The use of oral high-fat, high-calorie emulsion for total feeding. W. James Kuhl Jr., Morton I. Grossman, and C. Frank Consolazio. *J. Clin. Nutrition* **1,** 218-23(1953). An emulsion consisting of peanut oil 400, carbohydrate 122, protein 70 g., vitamins, and minerals was used in feeding patients with fracture of the mandible. The daily intake of this emulsion was 1000 ml. The av. wt. gain was 7.6 lb. in 18.8 days. (*C. A.* **47,** 8848)

Effects of a fat-free diet on growing female rats, with special reference to the endocrine system. Theodore C. Panos and John C. Finerty (Univ. of Texas Med. Branch, Galveston). *J. Nutrition* **49,** 397-423(1953). Characteristics of fat-deficiency in female rats are described. (*C. A.* **47,** 9439)

Effects of fats and cholesterol on the eye and cellular metabolism. H. Pichette. *Arch. Ophthalmol.* (Chicago) **43,** 191-2 (1950). Young adult rabbits on a diet high in fats and cholesterol developed hyperemia, edema, and other pathological changes in the eyes. Similar pathological conditions in man due to an inability to metabolize fats are discussed. (*C. A.* **47,** 9454)

Biochemical and Biophysical methods in cardiovascular research. Robert F. Redmond, Lawrence J. Milch, William W. Calhoun, Herman I. Chinn, Onan W. Bolmar, Clarence W. Johnson, Richard A. Yarnell, Robert L. Olson, and Grace Paul (USAF School of Aviation Med., Randolph Field, Texas). *Texas Repts. Biol. Med.* **11,** 83-109(1953). A description of the methods of ultracentrifugal analysis (with the Spinco models L and E) and of electrophoresis; determinations of serum protein, cholesterol, and phospholipide, and of aortal cholesterol, phospholipide, and total fat; and calculation of serum-colloid osmotic pressure. (*C. A.* **47,** 9395)

Intravenous infusions into human subjects of fractionated coconut oil emulsions. B. G. P. Shafiroff, J. H. Mulholland, and H. C. Baron. *Proc. Soc. Exptl. Biol. Med.* **79,** 721-3(1952). Emulsions of the glycerides of the short chain fatty acids were toxic when injected intravenously into human subjects. The glycerides of the high mol. wt. fatty acids, lauric, myristic, palmitic, and stearic acids were non-toxic when injected in emulsion form. Inclusion with the latter of small concentrations of the fatty acid esters of the type of oleic and linoleic acids did not affect the toxicity of the emulsions.

The effect of fat level of the diet on nitrogen and energy metabolism in the rat. Osman Shehata (Univ. of Illinois, Urbana). *Univ. Microfilms* (Ann Arbor, Mich.) *Publ.* No. **5245,** 229 pp.; *Dissertation Abstracts* **13,** 278-9(1953).

Growth and articular changes in slowly and rapidly developing mice fed a high-fat diet. Ruth Silberberg and Martin Silberberg (Washington Univ., St. Louis). *Growth* **14,** 213-30(1950). In mice, skeletal growth and aging were only slightly hastened, and the incidence of articular lesions was unaffected by feeding a fat-enriched diet throughout life. (*C. A.* **47,** 8862-3)

Liver storage of synthetic vitamin A given orally and subcutaneously. Absence of calciferol intoxication. H. Teulon, C. Marnay, and H. Gounelle (Hopital Foch, Paris). *Compt. rend. soc. biol.* **146,** 1546-8(1952). Deposition in the liver was 10 times as great when the vitamin (in oil) was given to rats orally as when injected subcutaneously. Toxic doses of vitamin D_2 had no influence on liver deposition of vitamin A. (*C. A.* **47,** 8849)

Hydrolysis of conjugates of urinary corticoids with β-Glucuronidase. I. Neutral reducing lipides. R. A. Kinsella Jr. and J. H. Glick, Jr. (St. Louis University School of Medicine). *J. Biol. Chem.* **203,** 1003(1953). A modification of the method of Heard and his associates has been described for the extraction and measurement of neutral reducing lipides. Treatment of urine with β-glucuronidase of bacterial origin makes possible the extraction of much larger amounts of neutral reducing lipides than may be obtained by hand extraction of acidified urine. As shown by the response to administered ACTH by normal males, these larger values may be related to adrenal secretory activity.

Carcinogens and oxidized fatty acids in the skin. M. L. C. Bernheim, F. Bernheim, and K. M. Wilbur (Duke University). *Nature* **172,** 306(1953). Carcingenic hydrocarbons; 3,4,benzpyrene, 20-methyl cholanthrene, crysene, 2-aminofluorene, and 2-nitrofluorene; applied to the skin of mice inhibited the autoxidation of unsaturated fatty acids. Thiobarbituric acid which produces a characteristic red color with oxidized fatty acids was used as a measure of inhibition. All of the carcinogens tested were active to approximately the same extent.

Cholesterol synthesis by liver. IV. Suppression by steroid administration. G. M. Tomkins, H. Sheppard, and I. L. Chaikoff (University of California). *J. Biol. Chem.* **203,** 781(1953). The following compounds, cholestenone, dehydroisoandrosterone, 7-dehydrocholesterol, and Δ^7-cholestenol, were fed to rats, either as a single intubation or for 3 to 7 days, and the rat livers were subsequently examined for their ability to incorporate acetate-C^{14} into cholesterol. The feeding of these cholesterol-like steroids resulted in a pronounced reduction in the recoveries of cholesterol-C^{14} without, however, affecting the value for $C^{14}O_2$. Some possible explanations for the reduced cholesterol-C^{14} recoveries are presented.

Enzyme secretion and the incorporation of P^{32} into phospholipides of pancreas slices. M. R. Hokin and L. E. Hokin (Montreal General Hospital). *J. Biol. Chem.* **203,** 967(1953). When enzyme secretion was stimulated by carbamylcholine or acetylcholine (with eserine) in slices of pigeon pancreas, the incorporation of P^{32} into the phospholipide fraction of the stimulated slices was, after 2 hours, 4.8 to 8.7 times greater than the incorporation of P^{32} into the phospholipides of control slices. Neither respiration nor the incorporation of P^{32} into acid-soluble phosphate esters was increased. The stimulatory effects of carbamylcholine on both enzyme secretion and the incorporation of P^{32} into phospholipides were abolished by atropine. The specific activity of the phospholipides from slices incubated anaerobically was less than 5 per cent of that observed aerobically. Cholinergic drugs had little or no effect on the incorporation of P^{32} into the phospholipides of the following tissue slices; pigeon and guinea pig liver, guinea pig heart ventricle, pigeon gizzard (smooth muscle), and guinea pig kidney cortex. A relatively slight stimulation of P^{32} uptake into phospholipides was observed in slices of pigeon brain (65%) and guinea pig brain cortex (40%).

Changes in the vascular and lipoid pattern of the adrenal cortex of the rat following hypophysectomy. J. D. Lever, D. B. Coter, M. P. Stack-Dunne. *Nature* **172,** 33(1953). The outer half of the zona glomerulose sometimes became free from lipid while the inner half was still heavily laden. After 16 weeks the lipid containing zonal fasciculata and reticularis were very narrow or completely absent. From 5 weeks onward after hypophysectomy, a few cords or lipid containing cells from the zona glomerulosa were sometimes found invading the sudanophobe area.

Effect of various dietary lipids on the blood plasma lipids of dairy calves. N. L. Jacobson, J. H. Zaletel, and R. S. Allen (Iowa Agricultural Experiment Station, Ames). *J. Dairy Sci.* **36,** 832(1953). The dietary lipids, namely, butter oil and soybean oil, hydrogenated soybean oil and lard were reconstituted in milk and fed to different groups of newborn calves and their effect on the various blood plasma lipid fractions was studied. One group received whole milk. Weekly determinations of blood plasma lipids revealed major dietary effects. The values for total lipids, free cholesterol, ester cholesterol, ester fatty acids and Allen fat were highest for the groups fed whole milk and crude soybean oil and lowest for hydrogenated soybean oil. Trends in phospholipid values in general corresponded to those for total lipids. The changes in neutral fat and free fatty acids were not so marked. The relative proportions of the plasma lipid fractions observed were not altered markedly by the various dietaries.

The enzymatic transformation of liproproteins. R. K. Brown, E. Boyle, and C. B. Anfinsen (National Institute of Health). *J. Biol. Chem.* 204, 423(1953). The properties and methods for the purification of clearing factor and coprotein are discussed. The rate of clearing is proportional to the coprotein concentration if the concentration of clearing factor is held constant. Clearing is inhibited at salt concentrations greater than 0.2 M and by Triton and by heparin concentrations greater than 4×10^{-6} M, lipoproteins of S_f 20 to 100 also inhibit clearing. The turbidity increase occurring after clearing is probably due to formation of calcium soaps. In the presence of EDTA no such turbidity increase occurs. Evidence that plasma esterases are responsible for the fatty acid formation occurring during clearing is presented.

Studies on fatty acid oxidation. I. Enzymatic activation of fatty acids. H. R. Hahler, S. J. Wakil, and R. M. Bock (University of Wisconsin). *J. Biol. Chem.* 204, 453(1953). The fatty acid activation enzyme (FAAE), which catalyzes the formation of acyl Co A from a wide variety of fatty acids in the presence of Co A and ATP, has been obtained in highly purified form from beef liver. Evidence for the formation of inorganic pyrophosphate and AMP in stoichiometric amounts has been presented. The reaction is reversible, with an equilibrium constant close to unity, thus demonstrating that the acyl Co A derivatives formed are "high energy" compounds. An appropriate assay for reactions of this kind involving the disappearance of free sulfhydryl groups on Co A has been described.

Further studies on cholesterol in liver cell fractions of normal and cholesterol-fed rats. M. C. Schotz, L. I. Rice, and R. B. Alfin-Slater (University of Southern California). *J. Biol. Chem.* 204, 19(1953). The quantitative distribution of free and esterified cholesterol has been determined in five ultracentrifugal fractions (nuclear, mitochondrial, submicroscopic particulate, supernatant and floating) of the livers of normal and cholesterol fed rats. In normal rat liver, over 60 per cent of the free cholesterol is localized in the submicroscopic particles, while the major part of the esterified cholesterol is associated with a centripetally migrating fraction. A marked increase in esterified cholesterol content of the centripetally migrating fraction is observed after 7 days of cholesterol feeding, while only small increases occur in the other cellular components.

Effect of cations on cholesterol synthesis by surviving rat liver. G. L. Curran and O. L. Clute (Mary Imogene Bassett Hospital). *J. Biol. Chem.* 204, 215(1953). Salt solutions employed as incubating media for surviving rat liver preparations must contain sufficient K^+ and Mg^{++} to prevent loss of these cations by the liver if marked variations in the rate of cholesterol synthesis are to be avoided. The effect of pH on the rate of cholesterol synthesis persists in the absence of K^+ and Mg^{++} in the incubating medium and is independent of the loss of intracellular K^+. The incorporation of C_{14} from CH_3-$C^{14}OONa$ into cholesterol by surviving rat liver at pH 6.5 is increased by the presence of 0.0001 M $MnSO_4$ in the incubating buffer. The Mn^{++} effect occurs in the presence of an optimal buffer concentration of Mg^{++}. Under similar conditions Zn^{++}, Co^{++}, Cu^{++}, and Cd^{++} produce no increase in cholesterol synthesis.

• Drying Oils

Raymond Paschke, Abstractor

The continuous polymerization of linseed oil with sulfur dioxide as a catalyst. C. Boelhouwer. *Chem. Weekblad* 49, 197-203 (1953). Linseed oil was polymerized continuously at 2.5 l./hr. in a lab-scale app. (I) by preheating, mixing with SO_2, and heating the resulting foamlike mixt. at 350-60° for 6-7 min. in a tube furnace. Poor results were obtained with a larger app. (II) designed to process 10-15 l./hr. As air could mix with the reaction mixt. in I but not in II, the addn. of air was investigated in batch expts. An optimum air-SO_2 ratio was found which was strongly dependent on the reaction conditions. When air was completely excluded, the products showed little increase in viscosity but had a relatively high specific refraction and a relatively high diene no. Conclusion: SO_2 catalyzes conjugation, while O activates double bonds prior to polymerization; very little O is necessary for this. Thus the addn. of air in II did not improve its performance. The poor performance of II proved to be due to poor contact between gas and liquid. A Dowtherm-jacketed column furnace, 100 cm. long and 2.5 cm. in diam., filled with Al turnings, proved satisfactory; the oil and an SO_2 mixt. flowed concurrently upward. The capacity at 290-300° was 300 ml./hr. and the reaction time 50 min.; higher temps. resulted in high acid nos. 17 references. (*C. A.* 47, 9628)

Temperature indicating paints. J. E. Cowling, Peter King, and Allen L. Alexander. *Ind. Eng. Chem.* 45, 2317-20(1953). The temperature range covered is 50° to 270°C. Ten references.

Phosphatides as drying inhibitors for linseed oil. P. Desnuelle and R. Massoni (Lab. natl. matieres grasses, Marseille, France). *Peintures, pigments, vernis* 29, 390-2(1953). The cause of the abnormally long drying time of a sample of linseed oil was traced down to the presence of 0.84% of an acetone-insol. compd. contg. 4.9% P and 0.13% N. Soybean and egg phosphatides were found to exhibit a similar, if less marked, effect; removal of the choline increased the inhibiting action to the level observed in the abnormal linseed oil. This suggests that the inhibitor in question is an acid phosphatide. The mechanism appears to involve antioxidant action as well as direct inhibition of the polymerization. (*C. A.* 47, 9628)

Analysis of drying oils by ultraviolet spectrophotometry. P. Desnuelle and R. Massoni (Lab. natl. matieres grasses, Marseille, France). *Peintures, pigments, vernis* 28, 372-6(1952). See *C. A.* 46, 6847; 47, 5133; and 47, 9628.

Drying of chinawood oil in the light of the arc. Felix Fritz. *Farbe u. Lacke* 59, 228(1953). A film of raw chinawood oil (I) on vertically suspended black oil cloth, was exposed to the light of a C-arc lamp (without its glass bell) at a distance of 16 cm. from the arc. I dried to a smooth film where it had been heated to about 40°, but the film was frosted where the temp. was high. Cold-blown I contg. Co linoleate acted the same way. The drying of I in ultraviolet light is reviewed. (*C. A.* 47, 9629)

Industrial finishes—present status and future prospects. M. A. Glaser (Midland Industrial Finishes Co., Waukegan, Ill.). *Am. Paint J.* 38, No. 5, 74-112(1953). Lecture XII in the Third Ten-Year Practical Paint Course. An extensive review.

Glass measurement. The design of glossometers. V. G. W. Harrison (Printing and Allied Tracks Research Assoc., Leatherhead, England). *Oil and Colour Chemists' Assoc. J.* 36, 569-88(1953).

The use of cross-linked polyurethans in varnish formulation. R. Hebermehl (Farbenfabriken Bayer, Leverkusen, Ger.). *Schweiz. Ver. Lack- u. Farben-Chem. u. Tech. Bull.* No. 21, 1-21(1953). An evaluation of varnishes made from Desmodur/Desmophen polyrethans is presented. The addn. of phenols, malonates, acetates, and other compds. to Desmodur/Desmophen products results in formation of temp.—sensitive addn. compds. with the polyisocyanate components. This prevents objectionable viscosity increases by inhibiting cross-linking during processing. The addn. compds. are decompd. at specific temps. *Desmodur AP stabil*, a com. polyisocyanate of this type, is unreactive at temps. below 140°. Data are given on the stability of polyurethans with various solvents and diluents and in the presence of water. Tabulations of abrasion resistance, elasticity as function of per cent cross-linking, hardness, and gloss of numerous test films are included. 16 references. (*C. A.* 47, 10241)

Experimental study of blistering paints on wood. C. Y. Hopkins and B. C. Smart (Nat. Res. Council of Canada, Ottawa). *Am. Paint J.* 38, No. 3, 66-78(1953). The second half of an article; see *Ibid.* 38, No. 1, 72(1953). The experiments did not reveal any simple way to prevent blistering of paint on buildings. The tendency was reduced by back-priming, by use of aluminum-varnish primer under exterior paint, by heavily pigmented paints, and by enamel or varnish instead of oil paint. Every possible effort in building construction and maintenance should be taken to prevent the entrance and accumulation of moisture in the sidewalls. 19 references.

New thoughts on paint blistering. C. Y. Hopkins and B. C. Smart. *Can. Paint Varnish* 27, No. 9, 32(1953). The same as *Am. Paint J.* 38, No. 3, 66-78(1953).

Composition of industrial paints. E. Johnson. *Product Finishing* (London) 6, No. 1, 45-7, No. 2, 60-2(1953). A review of the use of resins, oils, and pigments in industrial paints. (*C. A.* 47, 9625)

New additional controls paint flow. Fred D. Johnson. *Can. Paint Varnish* 27, No. 9, 15(1953). Bentonite-amine compounds retard evaporation of paint and varnish removers, minimize sagging and teardrop formation, control penetration into porous surfaces and improve water and chemical resistance of dried films.

Calculating the perturbation of the spectral background in complex cases: the case of polyenic fatty acids. Pierre May. *J. chim. phys.* 49, 464-9(1952). A math. method is described for eliminating the effect of the background in the analysis of a mixt. by means of ultraviolet absorption bands; it is successful even when the disturbing bands are very close to the ones being used. The method is applied to the detn. of α- and β-eleostearic acids in biol. mixts. Linoleic, linolenic, and arachidonic acids can be detd. in mixts. after isomerizing with KOH. (*C. A.* **47**, 10247)

Selective hydrolysis of fats by castor-bean lipase. Hasan Nizamuddin and B. S. Kulkarni (Osmania Univ., Hyderabad). *Paintindia* 3, No. 1, 75-8(1953). Catalytic enzyme hydrolysis of three typical oils (groundnut, safflower, and linseed) was studied in relation to unsatn. of the hydrolyzed and unhydrolyzed portions of the oil at various stages of the reaction. At the 50% stage of hydrolysis the following I nos. were found for the free fatty acids and the unsplit residue: groundnut 119.7, 75.0; safflower 171.8, 121.0; linseed 203.2, 135. See *C. A.* **47**, 9628 for details.

Latex paints. H. F. Payne (American Cyanamid Co.). *Paint Oil Chem. Rev.* **116**, No. 22, 14(1953). A discussion with a comparison with oleoresinous paints.

Many unheralded uses for soybean fatty acids. Kent Pellett (editor), *Soybean Digest* 13, No. 12, 8-10(1953). A discussion with a list of producers of fatty acids.

PATENTS

Interpolymers of monovinyl aromatic compounds with drying-oil fatty acids. G. A. Griess and Arthur S. Teot (to Dow Chemical Co.). *U. S. 2,639,772.* Mixts. of monovinyl aromatic compds., such as styrene and α-methylstyrene, can be interpolymerized in all proportions with drying-oil fatty acids contg. conjugated or nonconjugated olefinic linkages, to form polymers which are sol. in toluene and other usual varnish solvents. Any drying-oil fatty acid, or mixt. of these acids, which is free of functional groups other than the carboxylic acid group, may be employed. Examples describe the prepn. of clear polymers from mixts. of 8-72% styrene, 2-27% α-methylstyrene, and 10-90% fatty acids from linseed, dehydrated castor, soybean, and tung oils. (*C. A.* **47**, 9670)

Quick-drying fatty oil. Forest Research Institute and Colleges. *Indian 46,216.* Kamala oil is mixed with raw linseed oil in the proportion of not less than 1:4 or not exceeding 2:3 by wt., and the mixt. is heated to 140-70° for 4-7 hrs. to attain a viscosity not exceeding 37 centipoises at 33°. (*C. A.* **47**, 9634)

Synthetic drying oils. E. M. Velikovskaya, D. S. Velikovskii, A. A. Peganov, L. I. Dobryakova, Z. V. Kurochkina, and I. I. Lisovskii. *U.S.S.R. 77,050.* For the production of synthetic drying oils, kerosene is oxidized in retorts in 5-hr. cycles. The film-forming products are removed after each cycle. The vol. is made up with weakly oxidized kerosene, and the cycle is resumed. (*C. A.* **47**, 10244)

Thermoreactive varnish. A. A. Berlin and V. N. Baranova. *U.S.S.R. 77,731.* The varnishes are obtained by copolymerization of glycol monomethacrylate or glycol monoacrylate and an ester of methacrylic or acrylic acid. The copolymerization product is dissolved in a suitable solvent, and to it is added a di- or polyfunctional monomer. (*C. A.* **47**, 10244)

• Waxes

R. L. Broadhead, Abstractor

Fatty substances in perfumery. G. Brats. *Oleagineux* **8**, 663-669(1953). The uses of oils, fats, waxes and petroleum products in cosmetics are reviewed.

Sugar-cane wax. Council of Scientific and Industrial Research. *Indian* 47, 179, May 7, 1953. Crude sugar-cane wax recovered from the press cake of sulfitation sugar factories (100 g.) is melted on the water bath and bleached by adding 180 cc. of 30% chromic acid soln., over a period of 3 hrs. while the mass is stirred. The reaction is continued for a further period of 1 hr. and cooled when the bleached wax floats. The chrome liquor is decanted off, and the process is repeated twice. The wax is washed several times with H_2O and once with 40% H_2SO_4; a colorless product is obtained. The bleached wax (100 g.) is esterified with 5-6 g. ethylene glycol in the presence of a few drops of H_2SO_4 by heating the mixture for 10 hrs. The resulting wax is washed, dried, and the remaining acidity is neutralized by stirring the molten wax with 5 g. $Ca(OH)_2$. The resulting wax is pale yellow and has a much better solvent take-up and retention than the crude wax. The wax may be used in leather polishes, floor polishes, printing ink, C papers, and in emulsifying compns. (*C. A.* **47**, 9648d)

Solvent extraction of crude rice-bran wax. Junichi Kawai and Harue Ukiya. *J. Chem. Soc. Japan*, Ind. Chem. Sect., **54**, 735-7(1951). Rice bran wax was subjected to extn. by various solvents or solvents mixts. and the sapon. values of the sol. and insol. parts were tabulated. (*C. A.* **47**, 9034h)

Determination of hard waxes in wax mixtures. F. J. Lauer (Inst. Kolloidkunde, Poppenhausen a. d. Wasserkuppe, Ger.). *Fette u. Seifen* **55**, 170-3(1953). Thermal capillary analysis is suggested for the detn. of carnauba wax and other hard waxes in mixts. A filter paper strip (Schleicher and Schull No. 0860) is immersed in a container of the wax mixt. in an oven at 110°. Sepn. of the components is possible under these conditions. (*C. A.* **47**, 9034h)

Petrography of American lignites. B. C. Parks (U. S. Bur. Mines, Pittsburgh, Pa.). *Econ. Geol.* **46**, 23-50(1951). Lignitic coals were investigated with a view toward detg. the components contributing to the solvent extn. products and the phyteral source of waxy, resinous, and asphaltic elements in the exts. Results showed that the wax is derived mainly from cuticular remains, resin from lump-type resin and round resinous bodies, and asphalt probably from dark "resinous" bodies. (*C. A.* **47**, 8987g)

Effects of skin coatings on the behavior of apples in storage. I. Physiological and general investigations. S. A. Trout, E. G. Hall, and S. M. Sykes (Food Preservation Research Lab., Homebush). *Australian J. Agr. Research* **4**, 57-81(1953). Skin coatings consisting of mixts. of various oils and waxes, with or without shellac, were applied to apples by dipping in alc. solns. or aq. emulsions (cf. *C. A.* **36**, 4617). The coatings increased the resistance of the skin to gaseous diffusion and thus greatly reduced the internal O concn., increased the internal CO_2 concn., reduced the respiration rate, and retarded ripening changes, such as yellowing of the skin. The magnitude of the effects depended greatly on storage temp., thickness and type of coating, and variety and condition of the fruit. Heavy coatings and high storage temps. produced very low O concns. within the fruit and induced anaerobic respiration, which led to accumulation of EtOH and AcH and finally to alc. poisoning of the tissues. (*C. A.* **47**, 8924a)

II. Common storage investigations. E. G. Hall, S. M. Sykes, and S. A. Trout. *Australian J. Agr. Research* **4**, 264-82(1953). Skin coatings increased by about 50% the life in unrefrigerated storage of several varieties of apples, particularly Granny Smith, when picked at the optimum maturity for cool storage. Fruit picked before or after this stage developed disorders in storage. Temps. above 70°F., even for short periods, led to fermentation and alc. breakdown. The best coating (I) tested was an 8-10% alc. soln. of 2 parts of castor oil and 1 part of wax-free shellac. Emulsions of medicinal paraffin oil, alone or mixed with castor oil, were satisfactory on those varieties, e.g. Granny Smith, which had a heavy natural waxy coating. Waxes were also applied as emulsions and the best was a mixt. of 2 or 3 parts of paraffin wax with 1 part of carnauba or lac wax. Emulsion coatings were improved by adding to 2 parts of oil or wax 1 part of wax-free shellac dissolved in 3% ammonia. I was more effective than oil coatings and both were better than waxes in retarding ripening and controlling disorders of senescence; but waxes were best in reducing shriveling. All coatings controlled Jonathan spot and greatly reduced bitter pit. Mold was reduced by alc. solutions but often increased by emulsions. (*C. A.* **47**, 8294c)

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Nonsweating, stabilized wax coatings. Rodney L. Lehman (to Brogdex Co.). *U. S. 2,640,040.* May 1953. Stability against sepn. and increased m.p. in coatings for fruits and vegetables are obtained by the addn. of polyethylene resins (av. mol. wt. of 3,000-10,000). The coatings are composed of 50-90% paraffin and 50-10% mineral oil with 0.2-2.0% polyethylene resin. (Cf. *C. A.* **44**, 6114d; *C. A.* **47**, 9038c)

Nonsticking wax article. Norman Thompson (to Sun Oil Co.). *U. S. 2,643,973*, June 30, 1953. The objectionable tendency of com. petroleum wax articles to adhere to one another can be prevented by applying a thin film of a hydrocarbon distillate oil (viscosity 40-7000 Saybolt Universal sec. at 100°F.). Foreign impurities are precluded by specifying the same oil as that from which the wax was originally sepd. (*C. A.* 47, 9002d)

• Detergents

Lenore Petchaft, Abstractor

Dependence of viscosity of concentrated soap solutions on temperature. A. V. Dumanskii, P. A. Demchenko, and L. G. Demchenko. *Masloboino Zhirovaya Prom.* No. 3, 14-16(1953). Viscosity (in poises) of 20% Na stearate is: 0.16 at 98°, 0.21 at 95°, 0.33 at 90°, 0.62 at 85°, 1.31 at 80°, 2.45 at 75°, 4.9 at 70°, 10.4 at 65° and the material becomes solid at 60°. Solutions of typical samples of household soaps containing 40-60% fatty acid give similar results, the 40% soap having the steepest, and 60% soap having the most shallow temperature-viscosity curve. This is apparently caused by different concentrations of electrolytes in these samples (0.22-0.92%). (*C. A.* 47, 9036)

Effect of caustic soda on the viscosity of concentrated soap solutions. P. A. Demchenko and L. G. Demchenko. *Masloboino-Zhirovaya Prom.* 18, No. 5, 16-17 (1953). A study by viscosity measurements was made on the action of 0.03-1.74% and 0.08-2.66% caustic soda on a 20% solution of Na stearate and technical soap at 98° and 90°, respectively. The technical soap was made from the hydrogenated fatty acids of sunflower-seed oil 68, fatty acids of sunflower-seed oil 13, rosin oil 10, and naphthenic acids 9%. The data are graphically presented. The viscosity of the Na stearate solution increased sharply with the addition of up to 0.8% of caustic soda and then decreased. The maximum increase for technical soap solution was reached at the point when 1.5% of the alkali was added. Caustic soda increased the viscosity of stearate to a much greater extent than it did that of technical soap. (*C. A.* 47, 10251)

A dynamic test for detergency of hard surfaces. Manuel N. Fineman (Rohm & Haas, Brideburg, Pa.). *ASTM Bull.* No. 192, 49-55 (1953). A sample new test method for determining the efficiency of detergents in cleaning a wide variety of surfaces has been developed. It involves agitation of clean and soiled substrates in a Launderometer and in a single operation, permits rating of detersive efficiency, soil redeposition, and soil suspending action of the detergent. Statistical data are reported describing the reproducibility of the test method, and the effects of variations in the temperature of the test and in soil composition are also considered.

Evaluation of the toxicity of surface-active agents by their bactericidal activity. Dr. Roland Fischer (General Hospital, Regina, Canada). Manuf. Chemist 24, 382(1953). It has been shown that the bactericidal activity of a surface active agent is related to its affinity for the protein part of the bacterial membrane. Thus the noted similarity in activity ratios between the toxicity of compounds to eye mucosa and their bactericidal activity can be explained as being the result of their affinity for the protein of the eye mucosa as well as for the protein of the bacterial membrane respectively. Therefore it can be concluded that direct toxicity tests are not necessary. The lower the bactericidal activity of a compound, the less is its haemolytic activity, its oral toxicity to rats, its intraperitoneal toxicity to mice or its toxicity against eye mucosa of rabbits. 15 references.

Analysis of hard water soap: the direct determination of active sulfonate in mixtures of soap and Nacconol RB 85. L. F. Hoyt and J. E. Walter (National Aniline Div., Allied Chemical & Dye Corp., Buffalo, N. Y.). *ASTM Bull.* No. 192, 56-7(1953). It has been found that organic detergent content in mixtures of commercially important detergents of the alkyl aryl sulfonate type, or of the higher alkyl ester types, with soaps may be determined quickly directly in the presence of soap by a single titration with a standardized cationic detergent solution. The titration is carried out in very little dilute solution with bromphenol blue as a transition indicator in a two-phase system of water and chloroform.

The effects of detergents on sewage treatment processes—a review. Raymond Manganelli (Rutgers Univ., New Brunswick, N. J.). *ASTM Bull.* No. 192, 57-9(1953). The action of detergents depends on the concentration and type present in sewage. In general, replacement of soap by detergents will reduce the strength of sewage. Settling devices may be affected, producing a poorer effluent and projecting an increased load to the secondary units. Anionic and nonionic detergents interfere with chemical coagulation of sewage in terms of purification attained and modification of the floc formed, but an increase in dosage of coagulant can alleviate some of these adverse effects. Repeated additions of Nacconol and Ceepryn cause a decrease in oxidizing, purifying and nitrifying capacities of activated sludge accompanied by a general deterioration of its physical and biological properties. Interaction of anionic and cationic detergents tends to diminish the inhibitive action of these agents on oxidation by the activated sludge organisms. The cationic detergent produces an added effect on the bactericidal activity of chlorine, whereas the anionic and nonionic types exhibit no measurable beneficial effect.

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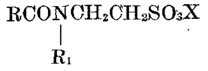
Plodded high moisture soap and method of making same. Russell Edward Compa (Colgate-Palmolive-Peet Co.). *U. S. 2,649,417.* Dense high moisture plodded soap cakes are made by rapidly chilling a molten soap mixture having a moisture content of about 20 to 40% to form a film of solid soap at a temperature of about 70 to 120°F. and while maintaining substantially said moisture content, shredding the film into ribbons, forcing the ribbons under pressure through a foraminous plate into a plodder. These bars have the characteristic texture of milled soap although they are framed and have high resistance to warping and distortion.

Method and apparatus utilizing compressional wave energy in the upper sonic and super-sonic range for washing textiles. Seymore Goldwasser (Lever Brothers Co.). *U. S. 2,650,872.* A method and apparatus are described in which highly effective washing effects can be obtained with a relatively low power compressional wave energy source. The soiled textile article is immersed in a cleaning liquid with all portions lying along and in line with a straight path, providing a vibrating zone for producing compressional wave energy of low intensity and of a frequency lying in the upper audible and supersonic range, propagating compressional wave energy from said zone in line with and parallel to said path in the liquid and along the soiled article.

Surface active agents. James M. Cross (General Aniline & Film Corp.). *U. S. 2,651,645.* A surface active agent of maximum surface activity consists of the following structural formula:



$$\underset{\displaystyle R_1}{RCO\underset{|}{N}}CH_2CH_2SO_3X$$

where R is an alkyl radical, R_1 is a saturated aliphatic hydrocarbon radical, and X is selected from the class consisting of hydrogen and salt forming groups, the sum of the carbon atoms in RCO and R_1 being at least 16 but not greater than 19, the number of carbon atoms in RCO being at least 8 but not greater than 14 and the number of carbon atoms in R_1 being at least 5 but not greater than 8.

Improvements in the preparation of detergent compositions. British Oxygen Co., Ltd. *Brit. 696,031.* Detergents suitable for all purpose washing are prepared by mixing a synthetic detergent made by condensing with ethylene oxide a phenol, cresol or xylenol substituted in the nucleus by one or two higher alkyl groups of at least 8 carbon atoms until the condensation product contains 8 to 16 oxyethylene groups, with a builder comprising disodium dihydrogen pyrophosphate and/or tetrasodium pyrophosphate in an amount of 25-300% by weight, and if necessary with an inorganic buffer.

Improved manufacture of odorless soaps from low grade oils. Compania Industrial. *Brit. 696,050.* Odorless soap of good quality is produced from low grade animal or vegetable fatty material containing or consisting of unsaturated oils or fats by splitting fatty acids obtained from said unsaturated oils or fats or at least one of the unsaturated bonds and simultaneously saponifying the products of such splitting by heating the fatty acids with molten alkali at about 300°C. in the absence of water and at approximately atmospheric pressure.

Synthetic detergent cakes. Willem J. D. vanDijck and Bradford P. Geyer (Shell Development Co.). *U. S. 2,653,913.* A hard water detergent bar is prepared consisting essentially of a member of the group consisting of water-soluble anionic synthetic organic sulfonated and sulfated detergents, a paraffin wax binder which has a melting point of at least 130°F., and as an emollient a member of the group consisting of alkali metal and ammonium pectates, tannates, humates and alginates.