indicate such a large difference between their molecular weights. The melting range for the carnauba wax acids was 70 to 74°C. while that of the sorghum wax acids was 71 to 77°C.

The amount of ester was estimated by assuming that the average value for the molecular weight of the esters of natural waxes is 620, making the percentage of ester in the wax roughly equal to 1.1 times the ester value (11). On the basis of this calculation Westland wax would contain 7% while carnauba wax would contain 78% of ester.

The fractions obtained by the Zweig-Taub system of analysis are in agreement with the wax constants for carnauba and Westland sorghum waxes (Table II). The large ester number obtained for carnauba wax is consistent with the high percentages of acids and alcohols in the Zweig-Taub separations. Westland sorghum wax had a small ester number consistent with the low percentage of acids and alcohols and the large "hydrocarbon" fraction. Carbon and hydrogen analysis of this fraction gave C 83.8%, H 13.8%. It is possible therefore that some oxygen-bearing substance, e.g., a ketone having a molecular weight of about 670, may be the principal constituent of the unsaponifiable fraction. This point is being investigated further.

The method of Koonce and Brown, while satisfactory for carnauba wax, gave erratic results when applied to sorghum wax. Carnauba wax yielded 55% while sorghum wax yielded only 33% of unsaponifiable material (Table III). The apparently large acid fraction thus obtained is inconsistent with both the saponification number and the Zweig-Taub separations. This acid fraction had a molecular weight (Rast) of 600, but its neutral equivalent was 1,800. A small sample of unsaponified sorghum wax was extracted with di-ethyl ether in a Soxhlet extractor for 27 days. Approximately 30% of the sample remained undissolved. It is possible that in the Koonce-Brown procedure some non-acid material may remain insoluble even after saponification and serve as a diluent of the acid fraction. The separation of unsaponifiable substances of sorghum grain wax from Ca salts by extraction with hot benzene gave an unsaponifiable fraction of 64%, agreeing with the value of 67% obtained by the Zweig-Taub procedure.

The most satisfactory method found for separating the acids from the unsaponifiable substances of sorghum wax involved some features of both the Chibnall and the Koonce-Brown procedures. Conversion of potassium soaps to calcium soaps eliminated the necessity of carrying out the extraction under anhydrous conditions. The length of this extraction period was shortened from one month to eight hours by substituting a higher-boiling solvent, di-isopropyl ether, for di-ethyl ether. A test extraction (Soxhlet) of unsaponified sorghum wax with isopropyl ether showed it to be completely soluble within eight hours. Calcium stearate was extracted for 11 hours with this solvent and found to be insoluble.

Summary

The characteristics of carnauba and four varieties of sorghum grain waxes were compared. The results indicated that sorghum grain wax had higher acetyl, acid, and iodine numbers and a lower saponification number than carnauba wax. Sorghum grain wax also contained a lower percentage of esters and nonsaponifiable material than carnauba wax, and a hydrocarbon fraction which was absent in the latter.

Of four methods tested for the quantitative separation of saponifiable and unsaponifiable components, the best separation was obtained by an extraction of the calcium soaps with di-isopropyl ether.

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ABSTRACTS . . . . Don Whyte, Editor

• Oils and Fats

R. A. Reiners, Abstractor

Unsaturated fat acid content of the serum of normal human adults. A. Chevallier, S. Manuel, C. Burg and J. Rouillard (Univ., Strasbourg, France). *Compt. rend. soc. biol.* 144, 577-8(1950). Fat extracted from the serum of 40 fasting subjects was examined by a modification of the method of Beadle and Kraybill. It contained 250-950 mg./g. of oleic acid, 15-115 mg./g. of diene acids, 5-35 mg./g. of triene acids, and 35-65 mg./g. of tetraene acids. (*Chem. Abs.* 45, 238)

Separation of fat acids by selective adsorption. II. Use of silica gel as the adsorbent. J. Gracian and A. Viogue. *Anales fis y quim. (Madrid)* 46, 375-384(1950). A systematic study of the separation of fat acids using silica gel was made. The effect of chain length, double bonds and the selective capacity of the column used was investigated.

Investigation of the ability of some esters of gallic acid and of a few other substances to prevent rancidification of different fats. P. Kring (Ferrosan Lab., Malmo, Sweden). *Dansk Tids. Farm.* 24, 211-27(1950). Investigations have been made on the antioxidizing effect of the following phenolic antioxidants: esters of gallic acid, hydroquinone, N.D.G.A., 2,6-di-*tert*-butyl-*p*-cresol and butylated hydroxyanisole (3-*tert*-butyl-4-hydroxyanisole). Experiments were carried out with the antioxidants in lard, peanut oil, soybean oil, cod-liver oil, and peanut oil fortified with vitamin A concentrate. The products were stored in open containers at 35° and the effect of the antioxidants was measured by their ability to prevent formation of peroxide. The effect of the lower esters of gallic acid seems to be somewhat superior to that of the other compounds tested. The effect was enhanced by addition of citric acid and phosphoric acid, which acids also proved to possess a slight effect when used alone. (*Chem. Abs.* 45, 369)

Sulfurous acid as a catalyst in the fat industry. E. A. M. F. Dahmen, H. I. Waterman and P. M. Heertjes. *Chimie & Industrie* 64, 557(1950). The advantages of hardening edible fats and oils by elaidinizing them with a sulfur dioxide catalyst instead of hydrogenation is discussed.

The action of sulfur dioxide on oils. H. I. Waterman and E. A. M. F. Dahmen. *Chimie & Industrie* **64**, 558-559(1950). The effect of a sulfur dioxide catalyst on the heat polymerization of linseed oil was studied. The presence of an elaidinization catalyst speeds up the polymerization. The effect on semi-drying oils also was studied.

Studies on the hardening process using sulfur dioxide. E. A. M. F. Dahmen, P. M. Heertjes and H. I. Waterman. *Chimie & Industrie* **64**, 560-562(1950). The effect of sulfur dioxide on the iodine number, acid number, refractive index and density of sesame, soya-bean and perillas oil was studied.

National olive oils. I. Composition of fatty acids. P. Cattaneo (Oficina quim. munic., Buenos Aires). *Anales asoc. quim. argentina* **38**, 83-97(1950). Nine samples of olive oil from different provinces obtained by cold pressing or solvent extraction were assayed for fatty acids by fractional distillation of the methyl esters. The following results were obtained (in %): oleic acid 51.3-76.3; saturated acids 13.0-23.2; linoleic 6.4-19.6; palmitic 9.8-20.0; hexadecenoic 1.6-3.4; unsaturated acids higher than C_{18} (as eicosenoic) 0.2-3.4; and saturated acids higher than C_{18} (as arachidic) 0.2-1.3. (*Chem. Abs.* **45**, 369)

The spontaneous ignition of fat oils. K. Fossan (Univ. Kjem. Inst., Avdeling B, Oslo). *Tids. Kjemi, Bergvesen Met.* **7**, 12-15 (1947). The increase in spontaneous ignition temperature of cod-liver oil, "sild" oil, linoleic acid, olive oil, and liquid paraffin with various proportions of hydroquinone as an antioxidant was studied with a Mackay apparatus. (*Chem. Abs.* **45**, 369)

The basic constants for dehydrated castor oil. V. A. Bianchi (Univ. nacl., La Plata, Argentina). *Rev. facultad. cienc. quim.* (Univ. nacl. La Plata) **22**, 131-41(1947). A comparison was made of the physical and chemical constants of dehydrated castor oil from foreign and domestic sources with the object of establishing minimum standards for domestic oils. (*Chem. Abs.* **45**, 369)

Indian edible oils. Coconut oil. K. Ramamurti and B. N. Banerjee (Indian Inst. Sci., Bangalore). *Indian J. Med. Research* **38**, 49-58(1950). Market samples of coconut oil were analyzed for free fatty acid, peroxide value, Kreiss value, iodine no., and unsaponifiable fraction. Samples with iodine no. greater than 12 were rejected as adulterated (25%). Similar analyses were conducted on oils obtained by several extraction procedures applied to coconut kernels of various qualities. The quality of the oil was adversely affected by high temperatures during rendering of the oil and by the use of poor quality copra. Steaming the oil after rendering tended to remove peroxides and improve keeping qualities. Ethyl gallate at low concentrations and nordihydroguaiaretic acid at higher concentrations afforded marked protection from the development of oxidative rancidity. (*Chem. Abs.* **45**, 369)

Chemical composition of an Argentine corn-germ oil. A. D. Fortunato. *Industria y quimica* (Buenos Aires) **11**, 132-4 (1949). Study of composition of a refined corn-germ oil d^{25} 0.9151, n^{20} 1.4735, and total fatty acid 94.15% gave the following expressed as acid percent of total acids: myristic 0.2; palmitic 13.0; stearic 0.9; archidic 1.5; behenic 0.2; palmitolic 0.2; oleic 41.9; linoleic 40.6; and eicosenoic 1.5. Saturated acids of more than 18 C atoms are expressed as arachidic and behenic while unsaturated acids of more than 18 C atoms as eicosenoic. (*Chem. Abs.* **45**, 370)

Studies on Indian edible oils, sesame oil. K. Ramamurti and B. N. Banerjee (Indian Inst. Sci., Bangalore). *Indian J. Med. Research* **37**, 433-40(1949). Analysis of sesame oil from all over India showed differences in acidity, color, and peroxide value. Neutralized oil was more stable than oil with high free fatty acids. 0.05% Dihydronorguaiaretic acid was found to be a better protective agent than either 0.03% ethyl or propyl gallate for raw or refined oil. Acidity in raw sesame oil ranges from 0.7 to 7.0%. (*Chem. Abs.* **45**, 370)

A defense of pataua oil. R. Bernstein. *Rev. brasil farm.* **31**, 311-17(1949). Oil extracted from the fruit of *Oenocarpus pataua* (a palm of the Amazon region) compares favorably with olive oil in all physical properties, in taste and digestibility, and in the quality of its sulfonation products. (*Chem. Abs.* **45**, 370)

Tomato-seed oil. Irma E. Pareja. *Farm. Chilena* **24**, 397-9(1950). A study on production and economic value. (*Chem. Abs.* **45**, 371)

Composition of Philippine singkamas oil from the seeds of Pachyrrhizus erosus (Linn.) Urb. A. O. Cruz (Inst. Sci., Manila). *Philippine J. Sci.* **78**, 145-7(1949). Singkamas seeds, like soybeans, have a high (29.5%) protein content. The oil from these seeds consists principally of glycerides of oleic (32.9%), linoleic (26.4%), and saturated (38.5%) acids. There is 2.2% unsaponifiable matter present. The oil was obtained from the seeds by ether extraction, and purified by treatment with 2% activated carbon (*Chem. Abs.* **45**, 370)

Trans-8:9-epoxy-11-ketoheptadecane-1-carboxylic acid and cis-10:11-diketoheptadec-8-ene-1-carboxylic acid, with some observations on the ultra-violet absorption spectra of these and related compounds. G. King (St. Mary's Hospital Med. School, London). *J. Chem. Soc.* **1950**, 2897. *trans*-8:9-Epoxy-11-ketoheptadecane-1-carboxylic acid, m.p. 84°, has been prepared by chromic acid oxidation of a mixture of diastereoisomeric ricinelaidic acid oxides, and its properties have been studied. The compound, m.p. 112.5°, resulting from the autoxidation of λ-keto-oleic acid has been identified as *cis*-10:11-diketoheptadec-8-ene-1-carboxylic acid. The absorption spectra of these and certain related compounds are reported.

Solvent extraction of oil seed. E. P. Colfield, Jr. (Scripto, Inc.). *Chem. Eng.* **58**, 127(1951). A comprehensive review of the methods of extracting oil seeds.

Determination of copper and iron in oils by amperometric titration. T. D. Parks and L. Lykken (Shell Dev. Co., Emeryville, Calif.). *Anal. Chem.* **22**, 1503(1950). A method is described for the determination of copper and iron in inorganic residues, such as that obtained from oils, by reduction in a silver reductor and amperometric titration with dichromate ion at a rotating-platinum electrode. When copper is determined in the absence of iron, the reduced solution is placed under ferric alum solution and the ferrous ion produced is titrated. When both iron and copper are being determined, the reducing value of the mixture is determined as above, iron is determined by titrating a separate reduced aliquot after selective oxidation of copper by aeration and the copper is calculated by difference. The method is sensitive to 0.02 mg. of iron and copper.

Conducting a taste panel to evaluate edible oils. Helen A. Moser, H. J. Dutton, C. D. Evans and J. C. Cowan (Northern Regional Research Labs.). *Soybean Digest* **11**(3), 16(1950). The procedure used at the Northern Regional Research Laboratory for organoleptic evaluation of oils is given. A precise evaluation of oil quality can be obtained with the use of an experienced taste panel.

The effect of citric acid upon the oxidation of peanut oil and of the methyl esters derived from peanut oil. H. W. Lemon, Ruth M. Knapp and A. H. Allman (Ontario Res. Foundation, Toronto, Ontario). *Can. J. Res.* **28F**, 453(1950). Addition of 0.005-0.5% citric acid to refined peanut oil caused marked retardation of the oxygen absorption by the oil at 100°. When iron and citric acid were added together, the accelerating effect of iron was overcome when the molar ratio of citric acid to iron was about 23:1; with higher concentrations of citric acid, oxidation was retarded further. Citric acid had little effect on the oxidation stability of purified peanut oil methyl esters. The combination of hydroquinone and citric acid was better than either alone. It was concluded that citric acid is both a metal deactivator and a synergist, but does not function as an antioxidant.

Antioxidant properties of an ethylene dichloride extract of cottonseed meal. H. P. Lips (National Research Labs., Ottawa, Canada). *Can. J. Res.* **28F**, 451(1950). The ethylene dichloride extract of hot pressed cottonseed meal (6% of meal) increased the Swift stability of lard by 120 min. when used in 0.1% concentration. Evidence is presented to show that the antioxidant effect is due largely to the phosphatides present (5% of extract).

A study of the stabilization of fats incorporated in candy. Helen M. Robinson (Southern Regional Research Labs.). *Food Tech.* **5**, 20(1951). The method of accelerating fat oxidation by the addition of copper stearate has been used to determine the stability of fats in candies at 30°. Hardened vegetable oils had excellent stability but butter creams became rancid shortly. N.D.G.A. or a mixture of propyl gallate, lecithin, tocopherols and citric acid greatly prolonged the life of butter creams.

Survey of literature on insect lipids. J. K. Scoggin and O. E. Tauber (Iowa State Coll.). *Iowa State Coll. J. Sci.* **25**, 99 (1950). A comprehensive review of the literature on insect lipids is given. Specific information on the lipid content of the various insects has been arranged by order.

The component fatty acids of elephant seal oil. The distribution in the body. G. Winter and W. J. Nunn (Defence Research Labs., Maribyrnong, Victoria, Australia). *J. Sci. Food Agri.* **1**, 311(1950). The component fatty acids of back fat from a mature male elephant seal were found to be myristic 4.8, palmitic 10.5, stearic 2.6, arachidic 0.2, unsaturated C_{14} 1.9, unsaturated C_{16} 11.8, unsaturated C_{18} 40.0, unsaturated C_{20} 16.0, and unsaturated C_{22} 12.2 mole per cent. No significant differences in the compositions of back, belly and neck fats were found but variations from animal to animal were large.

The composition of leopard seal blubber fat. *Ibid.*, 314. The fat of a mature male leopard seal was examined and its fatty acid composition found to be similar to that of elephant seals.

The application of the Arndt-Eistert reaction to the synthesis of fatty acids of high molecular weight. F. A. Vandenheuvel and P. Yates (Atlantic Fisheries Experimental Station, Halifax, N. S.). *Can. J. Res.* **28B**, 556(1950). An efficient method for adding a carbon atom to a fatty acid is described in which the fatty acid chloride is reacted with diazomethane and the resulting diazoketone rearranged to the next higher acid.

Cis-trans isomerization of linseed oil. J. S. Gourlay (Imperial Chemical Industries). *Nature* **4**, 40(1951). Heating linseed oil at temperatures above 200° causes *cis-trans* isomerization. This change follows a zero order reaction law and is accompanied by an increase in the viscosity of the oil. Polymerization is a slower reaction than *cis-trans* isomerization and is generally subsequent to it.

Oxidation of fatty acids by Neisseria catarrhalis. C. I. Randles (Ohio State Univ.). *J. Bact.* **60**, 627(1950). *N. catarrhalis* rapidly oxidizes straight chain fatty acids from acetate through laurate (C_9 and C_{11} not tested). Propionate was oxidized at a much lower rate than average and formate was not oxidized. It is probable that the fatty acids are oxidized in accord with the theory of β-oxidation.

PATENTS

Antioxidant. L. A. Hall (Griffith Labs., Inc.). *U. S. Reissue 23,329.* Esters of ascorbic and gallic acid which are soluble in propylene glycol are claimed as antioxidants for fatty substances containing an important percentage of water distributed substantially uniformly therethrough.

Recovery of sterols from wool fat by liquid propane extraction. H. H. Young and E. F. Christopher (Swift & Co.). *U.S. 2,528,482.* Wool grease recovered from wool-scouring waters is refined as follows: The crude emulsion is mixed with 5 volumes of liquid propane at 125°F. and 250 lb. per sq. in. and separated from the propane-insoluble matter by settling. The propane solution is diluted to 15 to 1 and heated to 165°F. at 525-550 lb. per sq. in. A heavy phase separates, containing a small amount of solvent and the dark odoriferous impurities which amount to about 3.5% of the crude fat. The lighter phase is further diluted with propane to 35 to 1 and heated to 192-200° F. at 625-650 lb. per sq. in. Under these conditions two phases form, an overhead fraction containing sterols and sterol esters (cholesterol, isocholesterol, and their esters) amounting to 22% of the crude fat, and a lower phase containing free straight-chain alcohols, esters, and glycerides. Propane is the preferred solvent although other normally gaseous hydrocarbons may be used (ethane, propylene, isobutane, butylene, etc.). (*Chem. Abs.* **45**, 372)

Refining apparatus. R. H. Fash (Anderson, Clayton & Co.). *U. S. 2,534,253.* Apparatus for refining glyceride oils is described consisting of a tube, against the interior surface of which a mixture of oil and alkaline refining agent is sprayed. The tube is heated so that as the mixture flows down, the emulsion is broken.

Glyceride compositions containing betaine derivatives. S. Shappirio. *U. S. 2,536,100.* The reaction product of a betaine, a sugar and an acid is disclosed as an antioxidant for glycerides.

Chlorination of rubber-fatty acid mixtures. C. H. Sommer. *U. S. 2,536,579.* A homogeneous stable resin is prepared by heating a mixture of rubber and a higher fatty acid containing material at 230-250° until the weight of the mixture has decreased 3-35%. The resulting product is dissolved in a chlorine containing solvent and is chlorinated by passing chlorine through the solution.

Hydrogenation reactor. C. F. Holmboe (De Nordiske Fabriker, De-No-Fa, Aktieselskap, Oslo, Norway). *U. S. 2,536,603.* A reactor is described in which a portion of the liquid fat is sprayed through a hydrogen atmosphere.

Recovery and purification of sterols. H. W. Knol (N. V. Veenendaalsche Sajet-en Vijfschachtfabriek Voorheen Wed. D. S. Van Schuppen & Zoon, Veenendaal, Netherlands). *U. S. 2,536,753.* Material containing sterols is mixed with zinc chloride (2-8 moles/mole sterol) and the zinc chloride-sterol addition compound separated from the mixture. Sterols are recovered by decomposing the addition compound.

Recovery of organic acids from dilute aqueous solution. C. C. Hale (Standard Oil Dev. Co.). *U. S. 2,537,133.* A dilute aqueous solution of C_2-C_{12} fatty acid is reacted with bismuth oxide to form a colloidal suspension of a bismuth salt of the fatty acid. This colloidal suspension is coagulated with an electrolyte and the fatty acid recovered by treating the coagulated bismuth salt with sulfuric acid.

Alkylol amides of dimerized fatty acids. J. T. Thurston and Ruth B. Warner (American Cyanamid Co.). *U. S. 2,537,493.* Bis-alkylolamides of dimerized fatty acids are claimed of the formula $HO\text{-}C_nH_{2n}\text{-}N(R')\text{-}OCRCON(R')\text{-}C_nH_{2n}OH$ where R is the residue of dimerized polyunsaturated fatty acids of about 18 carbon atoms, n is 2, 3 or 4, R′ is a member of the group consisting of hydrogen and $-C_nH_{2n}OH$.

Selective oxidation process for producing fatty acids and alcohols. E. V. Fasce (Standard Oil Dev. Co.). *U. S. 2,537,577.* The organic mixture derived from the oxo process is oxidized with an oxygen-containing gas at 80-200°F. in the presence of a small amount of metallic soap oxidation catalyst whereby some of the aldehydes, olefins and alcohols are converted to acidic bodies. The mixture is saponified, the non-saponifiables extracted and the soaps acidified to recover the free acids.

Method of producing a glycidyl ester. Phyllis Edwards (American Cyanamid Co.). *U. S. 2,537,981.* An alkali metal salt of an unsaturated monocarboxylic acid is reacted with epichlorohydrin in the presence of a quaternary ammonium salt as a catalyst.

Method of separating fatty acids from rosin acids of tall oil. S. D. Koonce and E. S. Perry (Eastman Kodak Co.). *U. S. 2,538,103.* The rosin acids in tall oil are converted into high boiling compounds by reaction with a dienophile at a temperature not higher than 210°. The fatty acids are then distilled from this mixture.

Separatory funnel for analysis of oils, fats, soaps and like substances. M. J. H. E. Hustinx. *U. S. 2,539,082.* A separatory funnel is described which consists of a bottle having a gradually sloping upper portion uniting into a central tubular outlet fitted with a 2-way stopcock. The tube between the bottle and the stopcock is graduated. On the bottle to one side of the central tube is an opening fitted with a stopper, on the other side there is a glass tube fitted with a stopcock. The glass tube extends to the bottom of the bottle.

Extraction of castor oil. G. Sly. *Australian 137,130.* Castor-bean solids are leached with a solvent, e.g., heptane, at a temperature above the critical miscibility temperature for the solvent and castor oil, and the mixture is then cooled to produce an oil-rich phase and an oil-poor phase, the latter being reused in a further extraction. (*Chem. Abs.* **45**, 375)

Inhibiting oxidation of fats, carotene, fat-soluble vitamins, and other lipophilic substances. J. E. Nyrop. *Danish 71,108.* An oxidation inhibitor for fats, fat-soluble vitamins, and the like, consists of cysteine or cystine in which the carboxyl group is esterified to introduce a lipophilic group, e.g., a mixed glyceride of butyric acid and cysteine or cystine containing 1 or 2 moles of butyric acid. (*Chem. Abs.* **45**, 372)

• Biology and Nutrition

R. A. Reiners, Abstractor

The determination of vitamin A. G. Baalsrud (E. & O. Collett & Co., Oslo). *Tids. Kjemi, Bergvesen Met.* **8**, 163-7(1948). A review of the bioassay, spectrophotometric, and Carr-Price ($SbCl_3$ in $CHCl_3$ gives a blue color) methods for the determination of vitamin A. (*Chem. Abs.* **45**, 205)

Supplements for cottonseed meal in diets for chickens. B. W. Heywang and H. R. Bird (Agr. Research Admin., Glendale, Ariz.). *Poultry Sci.* **29**, 486-95(1950). The low hatchability of eggs from hens on a ration containing 30% cottonseed meal was not improved by adding 5% dried cow manure as a source of vitamin B_{12}. Addition of 0.8% *dl*-lysine to the ration alone and with the dried cow manure improved the hatchability but it remained subnormal. Hatchability was limited by the lack of lysine and vitamin B_{12} and by the detrimental effects of gossypol and gland pigments which offset the otherwise beneficial effects of added vitamin B_{12} and lysine. Cottonseed meal is greatly inferior to sardine meal in a ration for growing chicks. However, the slower growth on a ration containing 30% cottonseed meal was due to deficiencies of lysine and vitamin B_{12} and not to the toxic components of the pigment glands. (*Chem. Abs.* **45**, 227)

Radioactive iodized fat. I. Preparation of radioactive fat with observations on the absorption of fat following subcutaneous and intraperitoneal injection in dogs. A. M. Ruttenberg, A. M. Seligman and J. Fine (Beth Israel Hosp., Boston, Mass.). *J. Clin. Invest.* **28**, 1105-9(1949). A modified method for preparing radioactive iodized oil is described, using $I^{131}Cl$. By using an excess of oil, 0.46 atom of I was incorporated into each mole of soybean oil. Following subcutaneous or intraperitoneal injection of this oil, absorption was slow, nearly all of it remaining at the site of injection. Hyaluronidase did not increase the rate of absorption of tagged fat from the subcutaneous or intraperitoneal space. (*Chem. Abs.* **45**, 206)

The effect of a low-fat diet on the spontaneously occurring arteriosclerosis of the chicken. L. Horlick, L. N. Katz and J. Stamler (Michael Reese Hosp., Chicago). *Am. Heart J.* **36**, 472(1948). Sixteen white leghorn cockerels were fed a diet of chick starter mash containing 5% crude fat. Fourteen cockerels were fed an isocaloric mash with fat content reduced to 0.3% by alcohol-ether extraction, supplemented with vitamins A, B, D, and E. Gross arteriosclerotic lesions occurred in 63% of the birds on the 5% fat diet and in 35% of those on the fat-free diet. Plasma cholesterol, fatty acids and lipid P were higher in the group fed the fat-free diet. (*Chem. Abs.* **45**, 235)

Vitamin A content of gamoose butter fat, and its variation with the method of preparation of "Samna." M. A. M. Abul-Fadl, A. M. Ismail and M. S. El-Ridi (Fouad I Univ., Cairo, Egypt). *J. Roy. Egypt. Med. Assoc.* **33**, 521-6(1950). Samna, the butter from milk of the Egyptian buffalo, is prepared by heating until all water has evaporated. The clarified fat is decanted from the sediment of curd and salt. Samna is clear, almost snow white, with a greenish tint when melted. Vitamin A was determined according to the method of the British Pharmacopeia, carotene being present only in negligible amounts. Samna contains 1.2-2.5 mg. vitamin A per 100 g., twice as much as ordinary cow butter. During the manufacture of Samna, losses of 12 to 40% of vitamin A occur owing to the variable acidity of samna. (*Chem. Abs.* **45**, 278)

Estimation of the extent of hydrolysis of fats during intestinal absorption. P. Favarger and R. A. Collet (Univ., Geneva, Switz.). *Helv. Physiol. Pharmacol. Acta* **8**, C15-16(1950). From the rat intestine fat was absorbed to the extent of more than 90% as tri-, di-, and monoglycerides. Not more than one-third of the total fat acids was split off during digestion and absorption. (*Chem. Abs.* **45**, 238)

Report on vitamin A in animal foods. H. C. Schaefer (Ralston Purina Co.). *J. Assoc. Off. Agr. Chem.* **33**, 615(1950). A chemical method for the determination of vitamin A in feeds was subjected to collaborative assay and the results show a fair degree of agreement. Several possible leads for the improvement of the method were indicated.

Report on fat by acid hydrolysis in eggs. L. C. Mitchell (U. S. Food and Drug Admin., Minneapolis, Minn.). *J. Assoc. Off. Agr. Chem.* **33**, 699(1950). Data from collaborative experiments indicate that the tentative method of the A.O.A.C. (**23.8** and **23.9**) gives excellent results.

Nutritional value of peanut protein. E. A. Murphy and M. S. Dunn (Univ. Calif.). *Food Research* **15**, 498(1950). Supplementation of peanut protein with lysine and methionine increased its relative value to that of beef and tuna for the growth, reproduction and lactation of female A-strain mice.

Oxidative changes in estrogen-stimulated fat and the influence of natural tocopherols on stability of fats in normal chickens. Maude P. Hood, R. S. Wheeler and Josephine B. McGlamery (Univ. Georgia). *Poultry Sci.* **29**, 824(1950). Birds receiving diethylstilbestrol deposited significantly higher percentages of fat and the fat was a little more stable than the fat from normal birds. The addition of 5% crude peanut oil to the diet increased the stability of the deposited fat only slightly.

Vitamin A utilization studies. IV. Relative utilization of vitamin A alcohol, vitamin A acetate and vitamin A natural esters as affected by variations in dosage level, quantity and character of diluent and quantity of dietary fat. E. F. Week and F. J. Sevigne (Collett-Week-Nibecker, Inc.). *J. Nutrition* **42**, 525(1950). Increasing the fat content of the diet fed rats did not significantly affect the utilization of vitamin A acetate and vitamin A natural esters.

Vitamin A stores of sucklings following administration to the dams of vitamin A in oily and aqueous media. A. E. Sobel and A. A. Rosenberg (Jewish Hospital of Brooklyn). *J. Nutrition* **42**, 557(1950). Vitamin A stores of suckling rats whose dams were given vitamin A in an aqueous dispersion were about 4 times as great as the stores of suckling rats whose dams received the same amount of vitamin A dissolved in oil. It was concluded that orally injested vitamin A in an aqueous dispersion is more effectively transferred to milk and stored in the suckling than vitamin A in an oily solution.

Cholesterol. Ruth Woods. *Borden's Rev. Nutrition Res.* **11**, 79(1950). Cholesterol metabolism and its relation to arteriosclerosis are discussed.

The metabolism of raw versus heated soybeans in birds with colostomies. R. J. Bouthilet, W. L. Hunter, C. A. Luhman, D. Ambrose and S. Lepkovsky (Univ. Calif.). *Poultry Sci.* **29**, 837(1950). Chickens only poorly digest raw soybeans. A methionine-rich complex was detected in the feces of the chickens. A heat-liable diuretic is also present in raw soybeans.

The deposition of linolenic acid in chickens fed linseed oil. T. K. Chu and F. A. Kummerow (Kansas Agricultural Experiment Station). *Poultry Sci.* **29**, 846(1950). The fat extracted from the skin tissue of chickens fed rations containing 6, 12 and 25% linseed oil contained 25-29% linolenic acid regardless of the dietary level of the linseed oil. The linolenic acid was present almost entirely as neutral fat. The addition of linseed oil to the diet caused no increase in the unsaturation of the liver fats.

PATENTS

Stabilization of brown rice. E. B. Kester (U. S. A.) *U. S. 2,538,007.* A stabilized brown rice is produced by extracting with a fat solvent the free oil from whole brown rice, leaving the major amount of the original total oil in the rice.

• Waxes

E. H. McMullen, Abstractor

Effect of composition on the specific gravity of binary wax mixtures. John R. Koch and Sister M. Concetta (Marquette Univ., Milwaukee, Wis.). *Trans. Kentucky Acad. Sci.* **13**, 104-10 (1950). Various waxes exert different effects upon the expansion of any individual wax. The greatest amount of expansion occurs just before the melting point of the wax mixture. Paraffin wax mixtures give the most normal set of curves. Carnauba wax exerts the most marked effect in expansion values. The 50-50 mixtures show the greatest deviations. Candelilla wax mixtures tend to shrink most in the neighborhood of 30°. Hard, microcrystalline, high-melting waxes show less expansion in the 80° range. Chinese insect wax which is a fairly hard, crystalline, high-melting wax shows the least expansion. Mixtures of soft low-melting waxes with each other or with other waxes, at temperatures higher than 40°, expand more than do the original wax components. When hard high-melting waxes are mixed together, or are mixed with high-melting crystalline waxes their curves show marked abnormalities; examples: carnauba-montan, carnauba-Chinese insect wax. Care should be taken in calculating the specific gravity of a wax mixture unless the specific gravity vs. composition curve at the desired temperature is known to be a straight line. (*Chem. Abs.* **45**, 371)

Raw montan wax deresinification. Herbert Thieberger and Vladimir Vcelak (Coal Research Inst., Prague). *Paliva* **30**, 47-55(1950). The deresinification by benzene extraction is described. Depending upon the evaporation during crystallization, waxes with a given amount of resin can be obtained. Graphs and tables are included for a number of solvents and mixtures. (*Chem. Abs.* **45**, 371)

PATENTS

Synthetic wax of carnauba type. S. P. Lovell and H. H. Straw (Lovell Chemical Co.). *U. S. 2,523,705.* A white synthetic wax is made by heating paraffin to 320°F., adding solid frangible polyethylene with the temperature kept constant, maintaining slight agitation until the polyethylene loses its natural translucence. At this point agitation is greatly increased and maintained until no polyethylene crystals are found in cooled samples. (*Chem. Abs.* **45**, 375)

Wax composition. A. A. Schaerer and K. Arabian (Shell Development Co.). *U. S. 2,523,848.* A water-wettable emulsifiable wax composition having a single-phase structure may be formed by blending 75 to 98% of a hydrocarbon wax with 25 to 2% of a strongly polar hetero-organic substance having the general formula of a long-chain carboxylate ester, a long-chain amine, a long-chain amine carboxylate salt or mixtures of these, in which the number of C atoms is not more than 6 different from the hydrocarbon wax. (*Chem. Abs.* **45**, 375)

• Drying Oils

Stuart A. Harrison, Abstractor

Effect of polyol variation in tall oil ester coatings. R. W. Tess and C. A. May. *Federation Paint and Varnish Production Clubs*, **No.** 311, 1114(1950). A tall oil containing 37% rosin acids was esterified with glycerol, pentaerythritol, sorbitol-pentaerythritol (80-20), poly-allyl alcohol and Epon 1004. The Epon ester had the best film properties. Bodying of the other esters lead to darkening and except in the case of pentaerythritol to excessive acidity. With increasing rosin content (5 to 64%) the Epon esters showed a trend toward faster surface drying, greater hardness, less flexibility, and poorer boiling water resistance.

The chemical analysis of styrenated drying oils and alkyds. C. P. A. Kappelmeier, W. R. van Goar, J. H. van der Neut, and G. H. Kist. *Paint Technol.* **15**, No. 179, 477(1950). Procedures are described for the determination of the amount of polymerized styrene in styrenated oils and alkyds. The method of isolating styrenated fatty acids is outlined. Analytical results on a styrenated oil containing 50% styrene show that 12% of the fatty acids are definitely combined with styrene. It has not been established that the material contains no fatty acid-free polystyrene but observations and theoretical considerations indicate that the product contains little neutral polystyrene.

Styrene copolymers. E. A. Bevan. *Paint Technol.* **15**, No. 179, 485(1951). A review of the development and properties of styrenated oils, etc., which are used for surface coatings. A brief discussion of whether the styrene is really copolymerized and if it is, just how it is combined with fatty acids is given.

Lithographic drying oil based on polydienes. A. I. Yurzhenko, N. I. Marchenko, and O. L. Glushkina. *Poligraf. Proizvodstvo* **1950**, No. 9, 29-30. The use of a synthetic substitute for linseed oil is described. The substance is polydiene, a low molecular weight diene polymer from the by-products of synthetic rubber production. Films with drier, dry tack free in 10-13 hrs. (*Chem. Abs.* **45**, 365)

The gel state in the formation of organic coating. M. Kronstein. *N. Y. Univ. Coll. Eng. 2nd Symposium on Varnish and Paint Chem.*, **1949**, 17. The oil gel is described as an intermediate non-dispersable but swelling and increasingly coherent state between the sol. oil and the non-coherent solid oil. Infrared, ultraviolet, and x-ray spectra give evidence of mol. rearrangement and reduction in unsaturation. Spectra of the dried films indicate that while the pregelled oil serves as a seeding medium for growth there is no evidence of crystal structure. (*Chem. Abs.* **45**, 366)

Gain in weight of clear films prepared from vehicles. F. Scofield. *Official Digest Federation Paint and Varnish Production Clubs*, **No.** 311, 1012(1950). When an oil film is exposed to air three reactions take place more or less concurrently. The first is the absorption of oxygen to form oxygenated high molecular weight materials, the second is the formation of oxygenated volatile materials, and the third is a polymerization reaction. The first reaction results in an increase, the second a decrease and the third no change in weight of film. Keeping such variables as film thickness, temperature, humidity, light, and rate of air circulation constant the rate of gain in weight of an oil film is generally directly proportional to the degree of unsaturation.

Absorption spectroscopy in paint research—a survey. N. H. E. Ahlers. *J. Oil and Colour Chemists' Assoc.* 33, No. 364, 421 (1950). A very complete discussion of the theory, apparatus, and application of ultraviolet and infrared absorption spectroscopy to the study of the constitution of drying oils, etc., is given. (43 references)

PATENTS

Copolymerization of maleic anhydride and allyl esters of long chain monocarboxylic acids. J. L. Jones. *U. S. 2,533,376.* A mixture of maleic anhydride (1 mol.), allyl caproate (1 mol.) and diacetyl peroxide (0.5% of total mixture) is held at 70° for 24 hours. The product is a hard, clear, fusible solid. If 31.2 g. of this copolymer is heated to 85° with 42.4 g. of diethylene glycol, and 50 g. of methyl ethyl ketone for two hours, the product is a viscous straw colored liquid. Baking at 325°F. for 45 minutes gives a hard, colorless film. Other fatty acids may be used in place of caproic to make the copolymer.

Ketene-aldehyde modified oils. L. Shechter and J. M. Wheland Jr. *U. S. 2,534,306.* Oils are modified by incorporating the additional product of equimolar amounts of ketene and an unsaturated aldehyde such as acrolein, crotonaldehyde, 2,4-hexadienal, etc.

Allyl esters of fatty acids. M. A. Pollack. *U. S. 2,536,568.* Modified drying oils having valuable film forming and drying properties are obtained by heating a drying oil or semi-drying oil to 300° for sufficient time to cause partial polymerization of the unsaturated esters. The polymerized esters are alcoholized with an unsaturated alcohol having from 3 to 10 carbon atoms. The unsaturated ester is then bodied at 300° to the desired viscosity.

Interpolymers of styrene with oil-modified alkyd resins. L. E. Wakeford, W. T. C. Hammond, and L. Berger and Sons. *British 640,832.* Resins useful for baking enamels and air drying varnishes are prepared by treating an oil modified alkyd resin with styrene in the presence of 0.5-5% sulfur based on the oil content of the modified alkyd resin. Thus, pentaerythritol 250, phthalic anhydride 310, and linseed oil fatty acids 560 were heated at 260° for 1 hr. The resulting resin 250, styrene 125, and sulfur 1.75 were refluxed at 175° for 3 hrs. With drier the films became touch-dry in 1 hr. (*Chem. Abs.* **45**, 368)

Interpolymers of styrene with unsaturated fatty acids and derivatives thereof. L. E. Wakeford, J. J. Sleightholme, W. T. C. Hammond, and L. Berger and Sons. *British 640,836.* Styrene is polymerized with unsaturated fatty acids and esters or partial esters of polyhydric alcohols in the presence of sulfur (.5-5% by wt.). The products are useful in preparing baking enamels and varnishes. (*Chem. Abs.* **45**, 368)

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• Detergents

Lenore Petchaft, Abstractor

Surface-active agents. W. Nixon and Mary W. Cheetham. *Pharm. J.* **165**, 46(1950). Visual incompatibilities of the following anionic, surface-active agents, sodium lauryl sulfate, British Pharmacopoeia Sulfasal, Teepol, and the cationics Cetavlon and Bradosol with 64 chemical substances and solutions likely to be incorporated in creams, lotions, etc., are tabulated. (*Chem. Abs.* **45**, 307)

Soap progress since 1900. John W. McCutcheon. *Soap Sanit. Chemicals* **27**, No. 1, 27-30, 119(1951). Review of technological changes in soap industry for the last 50 years including improvements in fatty raw materials, improvement in control methods, changes in equipment design and plant instrumentation, development of continuous methods and growth of synthetic detergents.

Deodorant soaps. Anon. *Soap Sanit. Chemicals* **27**, No. 1, 34-7 (1951). Review of development of deodorant soaps containing the germicidal agent hexachlorophene, including preparation, activity and cost of hexachlorophene, incorporation in liquid and bar soaps, and listing of various deodorant soaps on the market.

Transitions in soap-oil systems by dielectric absorption. T. M. Doscher and S. Davis. (University of So. Cal., Los Angeles). *J. Phys. Colloid Chem.* **55**, 53-61(1951). It may be concluded from the results of this test that the role played by water in stabilizing sodium stearate-acetone systems is related to the ability of water both to peptize the liquid crystalline aggregates above 117° and to promote the transition from the liquid crystalline phase to an intermeshed network of crystalline soap on cooling the systems below this temperature. Neither the presence of cetane nor small quantities of water appear to change the characteristic transitions of the solvent-free sodium stearate.

Isobaric and isothermal studies in the system soap-water. I. W. O. Milligan, G. L. Bushey and A. L. Draper (Rice Institute, Houston, Tex.). *J. Phys. Colloid Chem.* **55**, 44-53 (1951). Precision dehydration isobars have been obtained for the alpha, beta, delta, and omega crystalline phases of both sodium palmitate and sodium stearate, and for calcium palmitate monohydrate. The existence of calcium palmitate monohydrate as a definite chemical individual has been confirmed. The isobars demonstrate that α-sodium palmitate and α-sodium stearate exist as hemihydrate. The beta, delta, and omega crystalline phases of both sodium palmitate and sodium stearate are not definite hydrates, the water content being desorbed continuously.

Processing fibers with synthetic detergents. I. Mudzhiri. *Tekstil. Prom.* **10**, No. 7, 26-8(1950). Comparison is made between soap and the synthetic detergents, sulfonol and sulfonate 93, with regard to emulsifying power in various types of water. These detergents are recommended for use in dyeing viscose fiber and wool. (*Chem. Abs.* **45**, 362)

The sorption of anionic detergents by wool. Kathleen Swanston and R. C. Palmer. *J. Soc. Dyers Colourists* **66**, 632-8 (1950). The rates of sorption of sodium cetyl sulphate by wool at 50° under varying conditions of salt concentration and pH have been measured. It is found that when solution is thoroughly stirred sorption takes place rapidly at first and then more slowly. It is also found that when neutral wool containing some detergent is stirred in an alkaline solution containing detergents, the detergent initially in the wool comes out into the solution, and after about six minutes detergent starts to go back into the wool and continues to do so till the wool contains more than its initial amount. This effect can be explained qualitatively by means of the high affinity of the detergent anions for wool and the known acid-base combining properties of wool.

Spray drying of santomerse. Ju Chin Chu, L. E. Stout, and R. M. Busche (Washington University, St. Louis, Mo.). *Chem. Eng. Progress* **47**, 29-38(1951). Spray drying of Santomerse No. 1 was investigated in a laboratory spray dryer. The study covers the effects of operating variables upon bulk density and moisture content of the dried product. Operating characteristics investigated were (1) the addition of organic solvents (acetone and methanol); (2) temperature of the feed; (3) concentration of the feed; (4) atomizing pressure; and (6) temperature of the drying medium.

Antiseptic soap. Ralph B. Trusler. (Davies-Young Soap Co., Dayton, Ohio). *Modern Sanitation* **3**, No. 1, 27, 64(1951). The effectiveness of liquid soaps and hand lotions containing hexachlorophene to prevent and reduce industrial dermatitis is described.

Methods of evaluating detergents. C. T. Snell. *Brit. Rayon Silk J.* **27**, No. 314, 60-1(1950). It seems desirable first to use DuNuoy tensiometer for screening out poor surface-active compounds; then a Parr-type turbidometer for dispersing ability. A photoelectric colorimeter or a Hunter reflectometer is then used. The values obtained can be considered relative values. The rate of wetting is obtained by the Draves-canvas duck test. The question of artificial soil is evaluated by a form of Tergometer agitator. All the methods are somewhat empirical and possess some degree of human equation with the results therefore somewhat relative, but they embody sound physical-chemical principles. (*Chem. Abs.* **45**, 371)

Agents for improving the laundering process. O. Uhl (Nurnberg, Ger.). *Fette u. Seifen* **52**, 226-9(1950). The action of the following was tested in a laundering solution containing 0.5 g. fatty acids and 3 g. NaOH per liter and made with water of 12° (German) hardness; increase in soap concentration (I), addition of $Na_4P_2O_7$ (II), addition of $NaBO_3 \cdot 4H_2O$ (III), addition of synthetic detergent (IV), and addition of Blancophor (V). I and particularly (II) increased cleaning action; (III) had no effect. III was very effective in removing ink and fruit stains but slightly hindered the removal of cocoa stains. I and II aided removal of cocoa stains but had no appreciable effect on fruit stains. Slight IV increased detergency but large IV decreased it. V was effective in 0.01-0.02 g./l. concentrations when used on clothes that were not too gray; clothes that were too gray turned even grayer. (*Chem. Abs.* **44**, 10325)

The estimation of anionic detergents in solution by Hartley titrations. Kathleen Swanston and R. C. Palmer. *J. Soc. Dyers Colourists* **66**, 630-2(1950). A method is described for the estimation of anionic detergents by titration with a cationic detergent without an indicator using maximum flocculation as the end-point. In this way an anionic can be titrated against a cationic in 0.001 M. concentration to an accuracy of at least 1 part in 300 which seems as accurate as other methods using indicators.

PATENTS

Germicidally active deionizing agents for alkaline pH solutions. F. C. Bersworth. *U. S. 2,524,219.* Preparation of a germicidally active-deionizing agent for use in the laundering of clothes during rinsing, consisting of a mixture of water soluble soap compounds and the mono- to tetra-quaternary ammonium salts of ethylene diamine tetraacetic acid.

Alkylene polyamine derivatives. F. C. Bersworth. *U. S. 2,530,-147.* Preparation of alkylene polyamine carboxylic and hydrocarbon derivatives which are detergents, wetting agents, sequestering agents and are compatible with soap by reacting (e.g.) lauryl chloride with ethylene diamine and then with chloroacetic acid.

Esters of higher aliphatic alcohols. H. M. Guinot and M. Mention (Usines de Melle). *French 942,075.* Sulfuric acid (60-6° Bé.) is slowly added to a boiling mixture of a higher aliphatic alcohol, e.g. ethylhexanol or dodecyl alcohol, with an inert solvent insoluble in water, e.g. benzene or cyclohexane. The water formed in the reaction distils off in the form of an azeotropic mixture with the inert solvent; the condensed vapors form two layers, the inert solvent being returned to the reaction vessel. The reaction mixture is neutralized with NaOH or $HOCH_2CH_2NH_2$, and the upper solvent layer is removed; the aqueous lower layer containing the Na salts may be used directly as a wetting agent or detergent. (*Chem. Abs.* **44**, 11134)