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## ABSTRACTS . . . . .

E. S. Lutton, Editor

### • Oils and Fats

Ralph W. Planck, Abstractor  
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**Lecithin in food processing.** F. Aylward. *Food Manuf.* 27, 285-7, 311-4, 355-7, 395-7, 411(1952). Commercial lecithin, which is obtained from soybean, corn, peanut, and rapeseed oils, is a mixture of phosphatides. The properties of pure lecithin are described. The use of commercial lecithin in the manufacture of bread, flour, confectionery, biscuits, prepared mixes, food pastes, cake icings, fillings, and tin-greasing agents is reviewed. The applications of phosphatides in the production of other foods, such as chocolate and sugar confectionery, ice cream, and edible fats, are outlined. (*Food Sci. Abs.* 25, No. 3196[1953])

**Esterified and interesterified fats.** A. E. Bailey. *Proc. Research Conf., Council on Research, Am. Meat Institute, Univ. Chicago* 5, 11-17(1953). The inability of lard shortening to retain air is corrected by interesterification, making it comparable to hydrogenated vegetable-oil shortenings. Means of interesterification are discussed. (*C. A.* 48, 901)

**The role of surface phenomena in the butter-formation process.** A. Belousov. *Molochnaya Prom.* 14 (9), 28-34(1953). Rahn's foam theory, its Zaikovskii version and the flotation theory, proposed for the formation of butter from cream during churning, are discussed together with some of the contributing factors, namely, the physical chemical properties of the fat-globule-stabilizing membrane, the breakdown of the membrane, the air dispersion, and the influence of the surface-active agents. Evidence supports the flotation theory, according to which, during churning, the fat globules are drawn into the air-liquid interface and concentrated on the surface of the air bubbles. Albumin, lecithin, and saponin prolong, while isoamyl alcohol hastens, the churning process. (*C. A.* 48, 900)

**So-called vitamin F-active fatty acids.** Karl Bernhard and Urs Gloor (Univ. Basel, Switzerland). *Helv. Physiol. et Pharmacol. Acta* 11, 323-8(1953) (in German). Addition of stearolic, 9,10-dihydroxystearic, or 9,10-diketostearic acid to a diet devoid of essential fatty acids given to lactating rats had a curative effect on the growth and the life expectancy of the offspring. A possible formation of linoleic acid from these compounds is discussed. (*C. A.* 48, 827)

**Effect of cooking upon the vitamin A content of ghee.** I. S. Bhatia. *Bull. cent. Food Tech. Research Inst., Mysore* 2, 72-4 (1952). All processes of cooking applied to ghee caused a loss of vitamin A. When ghee was used for frying, all vitamin A was destroyed after 15 minutes. (*Food Sci. Abs.* 25, 3194)

**Vitamin A content of cow's butter fat.** I. S. Bhatia. *Bull. C. F. R. I. (Mysore)* 2 (7), 178(1953). The content of vitamin A of cow's butter fat in the Punjab varies between 17.5 and 61.0 I.U./g. This content decreases during the lactation period. (*Oléagineux* 8, 899[1953])

**The deodorization of edible oils.** J. L. Boyle. *Food* 21, 372-6 (1952). The deodorization of oils is accelerated by low pressures, high temperatures (up to 250°), and a large area of contact between the steam and the oil. Designs and flow diagrams for several commercial deodorizers are given.

**A new index for butter analysis.** Bruno Cadrobbi and Franco De Francesco. *Boll. lab. chim. provinciali (Bologna)* 3, 7-10

(1952). The critical temperature of solubility in nitrobenzene of the nonvolatile fatty acids (T.S.N.) can be used to reveal adulteration of butter. One ml. of the nonvolatile fraction of the extracted fatty acids is added, in a test tube of 16 mm. diameter, to 2 ml. commercial nitrobenzene. A thermometer is immersed in the mixture and the test tube is heated over a flame until the solution becomes clear (30°-40°). Then the solution is allowed to cool while being shaken. The temperature at which the solution starts to become turbid is considered the T.S.N. index. For genuine butter the index is 27.2°-28.2°; for margarine, made from coconut fat, below 16°; for lard, below 28°; for the official stearic acid, 46.8°. (*C. A.* 48, 899-900)

**Preparation of linolenic acid by the bromination-debromination method.** Georges N. Catrivas. *Compt. rend.* 257, 1250-2(1953). Purified, powdered hexabromide was suspended in acetone and the solution refluxed with frequent additions of powdered Zn and conc. HCl. When the hexabromide had disappeared, the solution was diluted with a large amount of water and the linolenic acid extracted with petroleum ether. The petroleum ether solution was washed with water, dried over Na<sub>2</sub>SO<sub>4</sub>, and the solvent removed under CO<sub>2</sub>. Yields and purity were higher than when alcohol was used as solvent, for there was less formation of trans-isomers of linolenic acid during the debromination process.

**The antibiotic action of polyunsaturated fatty acids in sterilized milk.** H. Cornelissen, M. Loucin, and D. Jacquemain. *Proc. 13th Intern. Dairy Congr. (The Hague)* 3, 1098-1101(1953). Total soaps of linseed oil showed a partial inhibition by 100 p.p.m. and practically complete at 1000 p.p.m., the action being due to linolenic acid in the oil. Unsaturated acids with 4 or 5 unsaturated bonds gave more activity. The inhibition is nearly the same in broth and skimmed milk and less in whole milk. Because of the taste this method of preservation is not practical. (*C. A.* 48, 296)

**Synthesis of phospholipides during absorption of different fats.** P. Favarger (Univ. Geneva, Switzerland). *Helv. Physiol. et Pharmacol. Acta* 11, C14-16(1953) (in French). Chiefly discussion. (*C. A.* 48, 244)

**Feeding experiment on young calves with flaxseed residues which split off hydrogen cyanide.** A. Orth and F. Mohr (Landwirtschaft. Hochschule, Hohenheim, Germany). *Arch. Tierernähr.* 3, 31-9(1953). The danger involved in the splitting of the flaxseed glycoside into HCN, grape sugar, and acetone was studied in young calves. Although HCN is an extremely toxic material, flaxseed and flaxseed products such as flaxseed cakes and extraction residues are used as nutrient materials in animal nutrition. Four kg./day of flaxseed cakes, and extraction salvage were fed to cattle in doses which theoretically exceeded the lethal doses of HCN with no toxic effects other than retarded appetites. A basic difference was demonstrated between animals with a simple digestive tract and those animals with a thick forestomach. In the former the activity of the flaxseed enzymes is destroyed by the gastric acidity, preventing the breakdown of the glycoside, whereas in ruminants the HCN is split off in 6-8 hr., quickly resorbed from the mucus of the forestomach and taken care of through detoxification by the liver and expiration. No evidence of accumulation of HCN has been presented. (*C. A.* 48, 824)

**Method for retention stability of margarine in vacuum.** Ya. I. Pali (N. I. Pirogov Medical Inst., Odessa). *Mastoboi-no-Zhironaya Prom.* 18 (9), 9-10(1953). Milk or cream and nonmilk varieties of margarine which were held in a vacuum chamber

(40-50 mm. Hg.) at 15-28° retained their original qualities for 4 months and longer, whereas samples stored in hermetically sealed and leaky chambers at 15-24° and 15-26° underwent both oxidative and mold-caused deterioration during the first and second months of storage, resp. (*C. A.* 48, 901)

**Deterioration in frozen pork as related to fat composition, storage temperature, length of storage, and packaging treatment.** A. Z. Palmer, D. E. Brady, H. D. Naumann, and L. N. Tucker. *Univ. Missouri Coll. Agr. Expt. Sta. Research Bull.* 492, 67 pp. (1952). Pigs fed a ration containing corn and tankage (10%), grew faster and utilized their ration more efficiently than pigs fed a diet containing ground soybeans (25%). The fat of the pigs raised on the soybean ration was softer, more unsaturated, and became rancid quicker than the fat of the pigs on the corn-tankage diet. Alternate freezing and thawing of pork accelerated deterioration. Pork chops and roasts stored at -18° for 1 year showed no rancidity and no effect of degree of unsaturation. Peroxide values did not correlate with organoleptic determinations of rancidity.

**Oil-extracting solvents. II. Linseed and palm kernel.** C. Paquet and C. Galletaud. *J. recherches centr. natl. recherche sci.* (Labs. Bellevue [Paris]) No. 22, 40-2 (1953). The efficiency of petroleum ether (I), CHCl<sub>3</sub>:CCl<sub>4</sub> (II), and 1,2-dichloroethane (III) was evaluated for the extraction of linseed and palm kernel oils. The rate of extraction and yield were highest for III and lowest for I. The color of the extracted oil was about the same for I and III, darkest for II. The acid value and unsaponifiable were highest with II, lowest with I. The rate of evaporation is highest for I and lowest for III. III (1,2-dichloroethane) is preferred. (*C. A.* 48, 306)

**Solvent extraction plant at Vartej (Saurashtra).** H. V. Parekh (Bhavnagar Chemical Works, Ltd., India). *Bombay Technologist* 2, 18-22 (1952). Description of a semicontinuous solvent extraction plant for processing peanut oil from 55 tons of press-cake per day. The oil is edible and the extracted meal can be used as fertilizer. (*C. A.* 48, 306)

**The determination of arachidonic, linolenic, and linoleic (vitamin F) acids in milk and blood. I. Study of the unsaturated fatty acids of milk.** Walter Pasquali (Univ. Bologna, Italy). *Acta Vitaminol.* 5, 193-8 (1951) (English summary). The method was developed for clinical use in the study of exudative diathesis in nursing infants. Mother's milk was refluxed for 30 min. with ethanolic NaOH, the unsaponifiable residue extracted with ligroine, and the alkaline layer evaporated to a small volume. From this, fatty acids were precipitated with mineral acid, extracted with ligroine and heated with KOH and ethylene glycol at 180°. This caused isomerization of the double bonds in the unsaturated acids to conjugated systems that absorb light in the ultraviolet region. Readings were made at 234, 268 and 316 mμ. (*C. A.* 48, 788)

**Dielectric constants of fatty acids. IV. Dipole moments of cis and trans forms of monocarboxylic acids.** R. S. Phadke (Indian Inst. Sci., Bangalore). *J. Indian Inst. Sci.* 35A, 123-9 (1953). By use of the solution method dipole moments  $\mu$  were determined at 25° and 40° for oleic, elaidic, ricinoleic, and ricinelaidic acids in dioxane. Because  $\mu$  is independent of temperature, the values obtained (1.74, 1.72, 1.94 and 1.99 D., resp.) are assumed to refer to the unassociated monomeric forms. Earlier investigations gave lower values in other solvents or in the pure liquid acids, presumably because of association. (*C. A.* 48, 417)

**Structure of oleic acid.** A. K. Plisov and E. G. Maleeva (Odessa Inst. Food Ind.). *Zhur. Obshchei Khim.* 23, 72-6 (1953). Saponification of Me oleate  $b_{15}$  213-13.5°,  $d_{15}$  0.8780. N alcoholic KOH was examined at 25°, the reaction being followed by determination of the electroconductance of the reaction mixture; under identical conditions Me elaidate,  $b_{15}$  210,  $d_{15}$  0.8790, was also saponified with alcoholic KOH. The results given in terms of relative changes of conductance indicate that Me elaidate saponifies more rapidly than the oleate. Hydrogenation of the esters over Pt-BaSO<sub>4</sub> in EtOH showed that the rate of hydrogenation of the elaidate is smaller than that of the oleate by a 1:1.14 factor; the free acids show a similar ratio (1:1.15). Oxidation by aq. KMnO<sub>4</sub> followed conductimetrically show that both elaidic acid and its Me ester oxidize significantly more slowly than the corresponding oleic acid and its Me ester. The results confirm the cis structure of oleic and trans structure of elaidic acids. (*C. A.* 48, 573)

**The utilization of volatile wastes in the manufacture of hydroxypolymerized drying oil from vegetable oils.** A. A. Ponomarev (N. G. Chernyshevskii State Univ., Saratov). *Masloboino-Zhirovaya Prom.* 18 (7), 24 (1953). A process is described for the fractionation of distillates into aldehydes, alco-

hols, fatty acids, etc., by means of steam and fractional vacuum distillation. A hydrogenation process is described. (*C. A.* 48, 387)

**Fat oxidation in milk.** E. G. Pont. *Proc. 13th Intern. Dairy Congr.* (The Hague) 3, 1049-51 (1953). Fat oxidation is shown to be the cause of oxidative degradation whether caused by exposure to light or by the action of Cu. Insensitive methods have caused others to disagree. Phosphate-free fat oxidized and emulsified in skim milk give an oily-metallic flavor but lacked the cardboard flavor of oxidized whole milk. Butterfat oxidized to a peroxide value of 0.3 and emulsified in skim milk with a cardboard flavor gave a milk with the oxidized flavor of whole milk. (*C. A.* 48, 297)

**Influence of high vegetable-fat diet on blood cholesterol of the rabbit.** T. Putignano (Univ. Bari). *Boll. soc. ital. biol. sper.* 28, 1154-6 (1952). Rabbits weighing 1500 g. were fed 8 g. olive oil per day for 75 days. A slight increase in blood cholesterol and some liver and kidney steatosis was found. When rancid oil was used the effects were accentuated. (*C. A.* 48, 236)

**Dietary factor for hair growth in rats.** Torgeir Rokkones (Veterinary Coll., Oslo, Norway). *Intern. Z. Vitaminforsch.* 25, 86-98 (1953). Linseed oil contains a factor or factors essential for normal growth of the hair in rats; a distinct effect in promotion of hair growth is produced by doses of linseed oil as small as 20 mg. daily. Linoleic acid and possibly linolenic acid possess this property. The effect apparently is not due to microbial synthesis in the digestive tract. (*C. A.* 48, 828)

**The question of deodorization of fats and oils.** A. G. Sergeev. *Masloboino-Zhirovaya Prom.* 18 (8), 29-30 (1953). Suggestions are made and diagrams are presented for refining of fats and oils before deodorization and for the quality of the steam and the temperature for deodorization. (*C. A.* 48, 387)

**The classification of methods for refining of fats.** A. A. Smits. *Masloboino-Zhirovaya Prom.* 18 (8), 10-12 (1953). A review of the physicochemical techniques. (*C. A.* 48, 387)

**Fatty acid composition of fish oils. II. Herring oil.** L. A. Swain. *Fisheries Research Board Canada, Report. Pacific Coast Stas.* No. 94, 24-26 (1953). A report is given of analyses of the fatty acid composition of herring oils, by molecular distillation of the methyl esters. Results for January-caught herring from northern British Columbia, and for summer-caught herring from southern British Columbia, were similar, but differed from those for English herring of a different species. Nearly half the fatty acids in the British Columbia herring oil contained 20 or more carbon atoms per molecule. (*Food Sci. Abs.* 25, 3011 [1953])

**Oxidative fat rancidity in food products. I. Linoleate oxidation catalyzed by hemin, hemoglobin, and cytochrome C.** A. L. Tappel (Univ. California, Davis). *Food Research* 18, 560-73 (1953). Hemin, hemoglobin, and cytochrome c were shown to catalyze strongly the oxidation of ammonium linoleate at 0° in phosphate buffers at pH 7. The rate of oxidation of pork adipose tissue can be accounted for on the basis of its content of hematin compounds but not as a simple autooxidation process. Linoleate oxidation catalyzed by hematin compounds has a low activation energy of 3.3 kcal./mole. Polyphenolic antioxidants (propyl gallate,  $\alpha$ -tocopherol, N.D.G.A.) inhibit this oxidation. Hemin was co-oxidized and iron released during linoleate oxidation.

**Biological standardization of essential fatty acids (a new method).** H. J. Thomasson (Unilever Research Lab./Zwijndrecht, Holland). *Intern. Z. Vitaminforsch.* 25, 62-82 (1953). Rats (21 days old) receive a vitamin F-deficient ration with or without fat, and the supply of drinking water per rat is limited to 14 cc. daily. The preparatory period is 5 weeks, the test period 4 weeks. Response is measured by gain in body weight; as a unit of vitamin F activity that due to 10 mg. linoleic acid is proposed. The activity (units per g.) was: 9,12-linoleic acid (90-93%) 93.3-102.3; 9,12,15-linolenic acid (98%) 8.7; 5,8,11,14-arachidonic acid (17%) 33.2; isolinolenic acid (100%) very slight; linolenic acid (100%) inactive. Activity depends apparently upon a double bond at the 6,7 or the 9,10 position measured from the terminal Me group of the fatty acid. Acids of this type had activities: linoleic 100; 10,13-nonadecadienoic 9; 11,14-eicosadienoic 43; linolenic 9;  $\gamma$ -linolenic 100; arachidonic 131. Oleic, erucic, ricinoleic, and a 50-50 mixture of 11- and 12-octadecenoic acids were inactive. The units g. were determined for 27 natural fats and oils. Butter and beef suet were least active (1-1.5 units), fish oils and lard were slightly better (4-10 units), vegetable fats and oils had a wide range from 1.1 unit for coconut oil to 64.2

for soybean oil and 78.8 for safflower oil. 35 references. (*C. A.* 48, 828)

**Investigations into the oxidative defects of butter.** K. E. Thomé and S. Mattsson. *Proc. 13th Intern. Dairy Congr.* (The Hague) 3, 1056-60(1953). The content of dienoic and trienoic acids in butter can be determined spectrophotometrically. Unlike other fats, butter contains an unsaturated fatty acid with 2 bonds in conjugation. The content of dienoic and trienoic acids changes with time of year and so do oxidative defects, such as off flavors. They are also affected by feed. The oxidation of butterfat is similar to the oxidation of unsaturated fatty acids. The induction period is long and is attributed to natural antioxidants. Physical structure influences these defects. The development of the off-flavors is not only connected with the formation of peroxides but their degradation. The flavors are very closely connected with the formation of unsaturated carbonyl compounds. (*C. A.* 48, 299)

**An apparatus for determination of unsaponifiable matter in synthetic fatty acids.** V. K. Tsyskovskii. *Masloboino-Zhirovaya Prom.* 18 (8), 19-21(1953). The unsaponifiable matter is separated from a water solution of Na salts of the synthetic fatty acids by ether extraction in a continuous extraction apparatus. (*C. A.* 48, 387)

**New research on tocopherols: their interdependence and ability to be substituted with progesterone, their organotropic action in inanition, and effect on fat deposition.** F. Uselli, G. Piana, M. Carbonini, and A. D'Agostino Barbaro (Univ. Milan, Italy). *Boll. soc. ital. biol. sper.* 28, 1674-7(1952). Diets of rabbits low in vitamin E are unfavorable for reproduction. Animals ovariectomized on the 7th to 20th day of pregnancy were arrested in gestation even at high I dosage, but with a single dose of progesterone gestation continued. Vitamin E is important in lutein insufficiency. In young castrated chickens exposed to a fattening diet, addition of vitamin E or methionine leads to deposition of subcutaneous fat, but does not modify the fat in meat. (*C. A.* 48, 236)

**Selectively hydrogenated butter oil for preventing development of oxidized flavor in recombined frozen milks.** H. D. Weihe and T. J. Mucha. *Proc. 13th Intern. Dairy Congr.* (The Hague) 3, 1067-71(1953). Selectively hydrogenated butter oil prevents the development of oxidized flavor in recombined milk stored at  $-17^{\circ}$  for 83 days. Butter oil was hydrogenated with 2% Raney Ni catalyst at  $96-130^{\circ}$  at slightly above atmospheric pressure. The reaction was stopped when somewhat more than 1/3 of the double bonds were hydrogenated. Catalyst and off odors were removed and the fat combined in fresh skim milk followed by storage at  $-17^{\circ}$ . Butter oil treated with H without catalyst and N with catalyst resulted in recombined milk which developed oxidized flavor by the 15th day. A butter oil heated to  $125^{\circ}$  before being hydrogenated resulted in a milk of quality superior to those previously described. (*C. A.* 48, 299)

**Vitaminization and coloring of margarine.** W. Wodsak. *Deut. Lebensmittel-Rundschau* 48, 208-11(1952). There are at present no laws in Germany concerning vitamin enrichment of foods in general, and in particular of margarine. The conditions required for the enrichment of margarine with vitamin A, and the addition of suitable coloring materials such as carotene or lactoflavin, are outlined. (*Food Sci. Abs.* 25(6), 3163 [1953]).

**Experiment on refining and hydrogenation of rape oil on Khar-kov fat-combine.** A. M. Zharskii, T. M. Novikova, T. E. Romanova, S. D. Kopylenko, P. I. Kaminskaya, A. Ya. Zak, and T. I. Gladkaya. *Masloboino-Zhirovaya Prom.* 18(7), 16-7(1953). The oil was washed with  $H_2SO_4$  (d. 1.82), neutralized with 30-40% lye, boiled with 1-1.95% solution NaCl, and settled 8-10 hrs. The fat is bleached at  $160-170^{\circ}$  with active C and fullers' earth (0.7-1 and 3-3.3 kg./ton, resp.) and in an atmosphere of H. Hydrogenation is with Ni formate catalyst and at  $215-230^{\circ}$  to a m.p. of  $32-6^{\circ}$  (4-6 hrs.). (*C. A.* 48, 388)

**Application of impulse rendering to the animal-fat industry.** I. H. Chayen and D. R. Ashworth (British Glues & Chemicals, Ltd.). *J. Applied Chem.* 3, 529-37 (1953). The impulse rendering process consists in mechanical rupturing of fat-containing cells by high-speed impulses transmitted through a liquid and has been developed for degreasing animal by-products in such a way as to preserve the quality of both fat and protein. Experiments with other types of fatty tissues indicate that the process is most successful when (1) relatively large fat cells are covered by weak protective membranes, (2) fat and water contents are high to transmit impulses effectively, and (3) non-fat products have low solubility in water. Problems in impulse rendering of oilseeds have not been solved.

**Soy products must stay competitive.** Kent Pellett. *Soybean Digest* 14, No. 3, 10-11(1954). Soybean oil has won consumer acceptance but future market depends more on competitive price position than on solution of remaining technical problems. The use of various grades and modifications of the oil in protective coatings, foods and other markets is briefly discussed.

**Improvements in soybean processing—their effect on farm income.** Martin S. Simon and John M. Brewster. *Soybean Digest* 14, No. 3, 14-15(1954). Chart relating quantities of soybeans crushed to methods of processing in past 20 years. The effect of the shift to solvent extraction on the value of soybeans and cottonseed is discussed briefly.

**A method for the detection of foreign fats in dairy products.** V. R. Bhalariao and F. A. Kummerow (Univ. Illinois, Urbana). *J. Dairy Sci.* 37, 156-161(1954). The suspected sample is first separated into alcohol soluble and insoluble triglycerides in order to increase the concentration of the adulterant in one of these fractions and cause enough shift in the refractive index for the adulterant to be detected. The average refractive index of the alcohol insoluble fraction of 20 different samples of authentic butterfat was found to be  $1.4542 \pm 0.00002$  (S.E.M.) and was significantly different from  $1.4550 \pm 0.00003$  (S.E.M.), the average value of the samples containing 10% of substitute fat other than coconut oil. The addition of 10% coconut oil significantly lowered the refractive index of the alcohol soluble fraction of pure butterfat from  $1.4540 \pm 0.00002$  to  $1.4532 \pm 0.00005$ .

**Addition of formic acid to olefinic compounds. I. Monoolefinic compounds.** H. B. Knight, R. E. Koos and Daniel Swern (Eastern Regional Research Lab.). *J. Am. Chem. Soc.* 75, 6212-15 (1953). Formic acid at its boiling point at atmospheric pressure adds readily to the double bonds of oleic, elaidic and 10-hendecenoic (undecylenic) acids, methyl oleate, oleyl alcohol, cyclohexene, 1-hexene and the unreacted olefinic material separated from the hydrolyzed reaction product of oleic acid with formic acid, to yield the corresponding formate esters which are readily hydrolyzed. Acetic acid, catalyzed by perchloric acid, also adds to the double bond but at a lower rate and less completely than formic acid.

**Fat rancidity, recent studies on mechanism of fat oxidation in its relation to rancidity.** S. G. Morris (Eastern Reg. Research Lab., Philadelphia, Pa.). *J. Agr. and Food Chem.* 2, 126-131(1954). The autoxidation mechanism, as now generally accepted, is a chain reaction involving radicals formed at the  $\alpha$ -methylene groups adjacent to the double bonds. The radicals consume oxygen and then react with another olefin to give hydroperoxide and another free radical. Each free radical is a resonance hybrid compound of three equivalent structures. The displacement of double bonds occurring in oxidation can be accounted for by this free radical mechanism. By the use of new or improved techniques, evidence has been attained to support the fundamental concepts. Chromatography and counter-current distribution methods have been applied to the isolation and identification of oxidation products. Polarographic methods have been developed for the determination of hydroperoxides, and in the presence of oxidation decomposition products may be more specific than the chemical method. Ultraviolet spectrophotometric analyses have aided in the identification of oxidation products and in revealing double bond shifts which take place in polyunsaturated fatty acids. Infrared spectrophotometry was useful in determining changes in geometrical configuration of fatty materials and in detecting functional groups. Data obtained by these techniques by numerous workers are discussed in relation to the mechanism of oxidation of mono-, di-, and triethenoic fatty acids.

**On the thermal dissociation of organic compounds. V. The effect of the solvent (fatty acids) on the thermal dissociation of urea.** Teruaki Mukaiyama and Takao Matsunaga (Tokyo Institute of Technology). *J. Am. Chem. Soc.* 75, 6209-12 (1953). On heating, a urea dissociates into an isocyanic acid and ammonia. The rate of dissociation, which is first order in urea, increases as the acidity of the solvent acid increases. In a large excess of *n*-caproic acid as solvent, the rate is accelerated by the presence of less than one mole of strong acid and is retarded by more than 1.5 moles of strong acid per mole of urea. The behavior of urea and monochloroacetic acid in cumene, tetralin or anisole was also studied.

**Candlenut oil from Malaya.** W. D. Raymond and J. A. Squires (Colonial Products Research Council, Malaya). *Colonial Plant and Animal Products* 3, 229-230(1953). The oil has been utilized commercially in Australia as a satisfactory alternative to linseed oil. The kernels of the candlenut contain

usually 62 to 67% of oil as compared with only 36 to 40% in linseed. The residual cake from candlenut, owing to its toxic nature, must seek an outlet as a fertilizer, whereas linseed cake is extensively used as a cattle feed and thus would command a higher price than candlenut cake.

**A modified peroxide test for detection of lipid oxidation in dairy products.** C. M. Stine, H. A. Harland, S. T. Coulter, and R. Jenness (Univ. Minnesota, St. Paul). *J. Dairy Sci.* 37, 202-207(1954). The use of a nonionic detergent (BDI reagent) for breaking the emulsion has been found a satisfactory means of obtaining fat for estimation of peroxide value by the ferric thiocyanate method. The procedure is applicable to milk, cream, and condensed and dried milk products. It appears to be very satisfactory for routine control purposes. Its reproducibility and sensitivity are excellent.

**Nitrosation method of determining d-gamma-tocopherol.** Barbara Hinderer Polster (School of Medicine, Univ. of California at Los Angeles). *Anal. Chem.* 26, No. 2, 407-408(1954). A method for determination of d-gamma-tocopherol in aqueous emulsions of methyl linoleate, before and after irradiation, was developed which uses nitrous acid and an inert medium of freshly distilled and peroxide-free dimethoxyethane.

**Separation and estimation of organic acids on paper chromatograms.** F. A. Isherwood and C. S. Hanes. (Univ. of Cambridge, England). *Biochem. J.* 55, 824-830(1953). Qualitative examination of a number of common aliphatic acids on a paper chromatogram using *n*-propanol: concentrated aqueous ammonia as solvent, has shown that many of them can be readily separated. In the present paper  $R_F$  values are given and the results are also expressed in terms of  $\log_{10} (1/R_F - 1)$  plotted against the number of carbon atoms in the molecule in order to throw light on relationships in the chromatographic behavior of the acids. A quantitative method for the ammonium salts of the acids, after separation, is described. It is based on the effect of the ammonium salt on a thymol blue-glycine reagent which is insensitive to free ammonia. The change in color of the thymol blue is inversely proportional to the conc. of the salt from about 80% to about 20% neutralization of the reagent. The accuracy of the method (single detn.) is about  $\pm 10\%$  when 50 micrograms of organic acid are present.

**Present status of sesame breeding in the United States.** Murray L. Kinman and J. A. Martin (Div. of Tobacco, Medicinal and Special Crops, B.P.I.S.A.E., U.S. Dept. of Agr.). *Agronomy J.* 46, 24(1954). A discussion of sesame as an important oilseed crop. The authors point out that satisfactory indehiscent (non-shattering) varieties will be needed for mechanized harvesting and also discuss sesame genetics from the viewpoint of techniques and theories.

**Baking behavior and oxidation requirements of soy flour.** I. Commercial full-fat soy flours. C. W. Ofelt, A. K. Smith and Robert E. Derges. *Cereal Chem.* 31, 15(1954). A survey of the baking behavior of presently available full-fat soy flours, when used at a 5% level based on the wheat flour, was made to determine their effect on dough and bread properties. The results show that when potassium bromate is used in the range, 1.0 to 3.0 mg. % on wheat flour basis, the deleterious effects usually attributed to soy flour are almost entirely absent. Dough properties are satisfactory and loaf volume nearly equivalent to that of the basic loaf; some changes in crumb color is detectable. The best grades of soy flour have a nitrogen solubility in water in the range of 35 to 45%. Water absorption of the dough was increased 0.8% for each % of soy flour added.

**A method for the determination of small quantities of petroleum hydrocarbons in oils and press cakes.** M. Cas. *Oleagineux* 9, 7-12(1954). A narrow-necked "Pyrex" Florence flask with a total effective volume of one liter is placed in an oven for 20 minutes at 100°C. or 120°C., depending on whether a press cake or an oil, respectively, is to be analyzed, in order to heat the air in the flask to the chosen temperature. The sample (40-100 grams for a press cake but not more than 25 grams for an oil) is added to the flask which is corked immediately, returned to the oven and agitated from time to time. After a heating period of 10 minutes for the press cake or 20 minutes for the oil, the flask is removed from the oven, opened immediately and the aspiration tube of the detection apparatus (Explosimeter M S A Model 2 used in the petroleum industry) is plunged into the middle of the flask in order to measure the quantity of hydrocarbons in a liter of the gaseous mixture. The hydrocarbons thus found represent the total present in the weighed sample and from this value, the solvent content of 100 grams of cake or oil can be calculated readily. Particular attention is drawn to the danger of explosions that may arise

from the storage of deoiled press cake containing traces of hydrocarbon solvents.

**Chromatography and its applications for the separation of fatty acids.** G. N. Catravas. *Oleagineux* 9, 21-27(1954). The various chromatographic procedures that have been used to separate fatty acids are reviewed. 74 references.

**A method for determining the moisture distribution in butter, and a review of its applications.** L. L. Muller. *Aust. J. Dairy Tech.* 7, 44-51(1952). In the method described 4 smears, 30  $\mu$  thick, are examined microscopically, and droplets with a diameter greater than 30  $\mu$  are counted in 20 fields in each smear. The method was found to be sufficiently accurate for its purpose. Possible applications of the method are discussed with reference to the examination for texture defects, bacterial multiplication in worked butter, and the keeping quality of butter during storage. (*Food Sci. Abs.* 25 (6), 3075[1953])

**Microbiological synthesis of fat. The formation of fat from sucrose.** Sheila Murray, Malcolm Woodbine, and Thomas K. Walker (Univ. Manchester, England). *J. Exptl. Botany* 4, 251-6(1953). Forty-three strains of molds, selected from 10 species, were examined to determine their capabilities as fat producers, when grown in 4 different solutions of nutrient inorganic salts together with sucrose. The 3 highest yields of fat were given by *Penicillium javanicum*, *P. soppi*, and *Aspergillus nidulans*, in that order. The maximum percentage of fat contents, based on (1) fat weight and (2) sugar utilized were *P. soppi*, 34.8, 11.4; *A. nidulans*, 25.8, 7.9; and *Fusarium lini*, 28.4, 5.6. (*C. A.* 48, 228)

**Vegetable milk. I. Processing and nutritive value.** D. K. Nandi, R. Rajagopalan, and S. S. De (Indian Inst. Sci., Bangalore). *Indian J. Physiol. and Allied Sci.* 7, 1-5(1953). A vegetable milk with a total solids content nearly as high as that of cow milk was prepared from a mixture of 56% soybeans, 24% groundnuts, and 20% ragi malt. After cleaning, the beans and peanuts were allowed to sprout for 24 hrs. After leaching out bitter constituents and color with 0.2%  $\text{NaHCO}_3$ , and washing with water, the beans and nuts were milled to a paste, salted, and boiled 15 min. with dilute ragi malt extract, and filtered. The vegetable milk had 88% of the nutritive value of cow milk when fed to rats. (*C. A.* 48, 904)

**Variations of the peroxide value of butter during cold storage at different temperatures and the relation of these values to the occurrence of fishy flavor.** P. Jamotte, F. Lheureux, and E. Peraux. *Proc. 13th Intern. Dairy Congr.* (The Hague) 3, 1079-85(1953). Peroxide values of 0.5 by Lea's method and 1.0 by the Loftus-Hills method correlate well with the development of a fishy flavor. A no. of accelerated methods for predicting the keeping quality were tried. Storage at 1-4° and frequent determination of peroxide value give a reliable indication of the keeping quality. (*C. A.* 48, 300)

**Spontaneous hydrolysis of glyceride oils, in particular palm oil.** M. Loncin. Couillet Publishing House, Brussels, Belgium. This 62-page report contains a detailed description of the work. During storage and shipping from the Belgian Congo the oil is maintained normally at a temperature of 35-45°C. and increases in the free fatty acid content by 0.1-0.25% (expressed as palmitic acid) a week. The free fatty acids in the oil were found to have the same composition as the combined acids showing that the change is not due to oxidation. The rate of the reaction dropped sharply in partially dehydrated oils where the amount of water was below that required to saturate the oil. This hydrolysis was not due to the action of enzymes or microorganisms since the same changes occurred, so long as water was present, in oil that had been heated at 200°C. for 30 minutes in an atmosphere of  $\text{CO}_2$  or had been treated with bactericides such as dimethyl-dodecyl-benzyl-ammonium chloride or dodecyl-ethanolamine-pyridinium sulfate. The rate approximately doubled for every 10°C. rise in temperature and the reaction was catalyzed by the free acids already present. Oils containing no free fatty acids did not hydrolyze. Short chain acids were more effective catalysts than those of higher molecular weight while unsaturated acids were equally as effective as the corresponding saturated ones. Peanut oil, coconut oil and castor oil underwent similar hydrolysis at comparable rates to those of palm oil under the same conditions described above. Reaction of the free fatty acids in palm oil with glycidol without hydrolysis of the epoxy linkage stabilized the oil to a considerable degree with respect to the glyceride hydrolysis.

**Recent developments in the study of oxidative deterioration of lipids.** C. H. Lea (Univ. of Cambridge). *Chemistry and Industry* 1953, 1303. A review dealing particularly with edible lipids. 60 references.

**Ultraviolet absorption spectrophotometry.** E. J. Rosenbaum (Sun Oil Co., Norwood, Pa.). *Anal. Chem.* 26, 20(1953). An annual review with 226 references of which at least 15 concern fats and oils.

**The spectrophotometric determination of long-chain fatty acids containing ketonic groups.** A. Mendelowitz and J. P. Riley (Univ. of Liverpool). *Analyst* 78, 704(1954). A procedure based on the alkaline 2,4-dinitrophenylhydrazine method of Lapin and Clark (*Anal. Chem.* 23, 541, 1951). The effect of a number of variables has been investigated. Licanic acid can be determined in the presence of eleostearic acid.

**Aluminum electrodeposits made adherent.** W. C. Schickner, *Steel* (Nov. 1953). Aluminum can be plated on copper, iron, nickel, stainless steel and aluminum from an aluminum chloride-lithium hydride-ethyl ether type of bath after treating the metal as for aqueous electroplating, then dipping in alcohol, then in fatty acid or fatty acid solution in ethyl ether, and finally immersing in the plating bath.

#### Sinitiro Kawamura, Abstractor

**Inhibition of the intracellular decomposition of rice bran oil.** Tatsuo Katayama and Takayuki Tamaki (Kyushu Univ., Fukuoka). *J. Oil Chemists' Soc. Japan* 2, 156(1953). Rice bran was stored in a desiccator at room temp. with volatile organic reagent (2% of the weight of bran) for 17-46 days. The bran was taken out intermittently and the acid no. of the extracted oil determined. Fairly effective in inhibiting the increase in acid no. was formalin, while effective in only the first one week were benzyl chloride and thiophenol. Other compounds tested [chloroform, naphthalene, carbon tetrachloride, carbon disulfide, DDT, 2,4,5-trichlorophenol, PCP (pentachlorophenol), 1,2,4-trichlorobenzene, 2,4-dichlorophenol, dichloroethylene, chloral hydrate, *o*-dichlorobenzene, *p*-dichlorobenzene, aniline, phenylhydrazine, phenol, and benzene] were all ineffective.

**A few experiments on the fat of seaweeds and Japan wax.** Tatsuo Katayama and Takayuki Tamaki (Kyushu Univ., Fukuoka). *J. Oil Chemists' Soc. Japan* 2, 155(1953). The fat content, acid no., sapon. no., and I no. were, respectively, *Undaria pinnatifida* 0.59%, 45.5, 196.9, 102.4; *Laminaria japonica* 0.92%, 82.1, 167.9, 87.7; *Hizikia fusiforme* 0.70%, 40.5, 181.5, 83.5; *Sargassum fulvellum* 3.10%, 62.2, 75.5, 80.4; *Eisenia bicyclis* 2.30%, —, 65.5, 91.6; *Ecklonia cava* 2.21%, —, 70.2, 89.2; and *Chondrus ocellatus* 1.47%, —, 82.2. The fruit of *Rhus succedanea* was collected every month in July to November and the fats contained in the fruit coat and kernel (not separately) were analyzed for acid no. and sapon. no. The fat content increased from 2.28 to 31.37% steadily, while the acid no. decreased from 65.75 to 5.52-7.48 during the maturation of the fruit.

**Antioxidant for vitamin A-enriched margarine. II.** Takajiro Mori, Koji Naito, Yasuro Ozawa, and Hiroshi Kembo (Univ. Tokyo). *J. Japan. Soc. Food Nutrition* 5, 180-2(1952-53). Margarine made from hardened whale oil (78.0%), coconut oil (7.5%), and peanut oil (14.5%) emulsified with water was enriched with cod-liver oil concentrate (vitamin A 100,000 i.u. per g.) to make the concentration of vitamin A in the product 1,000 i.u. per g. Various antioxidants and milk constituents were compared as to the antioxidant activity for vitamin A. Milk constituents added instead of water were very effective; especially effective were cream, skim milk, and fermented skim milk. However, butterfat was not effective. The active antioxidant might be present in a non-fat fraction of cream. Among other antioxidants tested N.D.G.A., propyl gallate, was most effective at 0.01%. Less effective were  $\alpha$ -tocopherol were most effective at 0.01%. Less effective were  $\alpha$ -tocopherol plus citric acid and thiodipropionic acid. When the residual vitamin A was similar, the peroxide value was higher in the case with milk component addition than in the case with synthetic antioxidant.

**Whale oil. V. The fatty acid composition of sperm whale oil. 1. Head cavity oil.** Masamichi Saiki and Takajiro Mori (Univ. Tokyo). *J. Agr. Chem. Soc. Japan* 27, 188-90(1953). The sperm whale head cavity oil ( $d_{40}^{20}$  0.8711,  $n_D^{40}$  1.4498, acid no. 0.20, sapon no. 137.8, I no. 50.1, unsapon. 47.92%) contained as glycerides 48.85% saturated acids ( $C_{10}$  6.88,  $C_{12}$  22.66,  $C_{14}$  15.31,  $C_{16}$  3.94,  $C_{18}$  0.26) and 51.15% unsaturated acids ( $C_{12}$  13.79,  $C_{14}$  14.85,  $C_{16}$  13.02,  $C_{18}$  7.12,  $C_{20}$  2.37%, all being monoethenoid).

**Whale oil. VI. The fatty acid composition of sperm whale oil. 2. Bone oil and the large intestine oil.** Masamichi Saiki and Takajiro Mori. *J. Agr. Chem. Soc. Japan* 27, 190-3(1953). The sperm whale bone oil (sapon. no. 151.2, I no. 83.2, unsapon.

28.61%) contained as glycerides saturated fatty acids ( $C_{10}$  0.6,  $C_{12}$  2.5,  $C_{14}$  6.7,  $C_{16}$  9.6, and  $C_{18}$  2.4%) and unsaturated fatty acids ( $C_{12}$  0.8,  $C_{14}$  3.8,  $C_{16}$  23.4,  $C_{18}$  26.3,  $C_{20}$  19.4, and  $C_{22}$  4.4, all including monoethenoid, but  $C_{20}$  and  $C_{22}$  acids with more unsaturation). The sperm whale large intestine oil (acid no. 13.7, sapon. no. 158.2, I no. 80.6, unsapon. 19.2%) contained saturated  $C_{12}$  1.4,  $C_{14}$  5.7,  $C_{16}$  12.0,  $C_{18}$  1.4, and unsaturated  $C_{12}$  0.2,  $C_{14}$  1.5,  $C_{16}$  12.2,  $C_{18}$  33.5,  $C_{20}$  26.6, and  $C_{22}$  5.5% (all monoethenoid with more unsaturation for  $C_{18}$  or higher acids).

**Inhibition of autooxidation of fats and oils. IV. Syntheses of some  $\omega$ -(3,4-dihydroxyphenyl)-alkanoic esters.** Saburo Tamura, Kazuhiko Okuma, and Tadahiko Hayashi (Univ. Tokyo). *J. Agr. Chem. Soc. Japan* 27, 318-22(1953). Seven new compounds of the type formula,  $(HO)_2C_6H_3(CH_2)_nCOOR$ , were synthesized. The name,  $n$ ,  $R$ , and the m.p. were resp., methyl homoprotocatechuate, 1,  $CH_3$ , 34-6°; ethyl  $\gamma$ -(3,4-dihydroxyphenyl)-butyrate, 3,  $C_2H_5$ , 43-5°; methyl  $\delta$ -(3,4-dihydroxyphenyl)-valerate, 4,  $CH_3$ , 38-40°; ethyl  $\delta$ -(3,4-dihydroxyphenyl)-valerate, 4,  $C_2H_5$ , 35-7°; methyl  $\epsilon$ -(3,4-dihydroxyphenyl)-caproate, 5,  $CH_3$ , 66-7°; ethyl  $\epsilon$ -(3,4-dihydroxyphenyl)-caproate, 5,  $C_2H_5$ , 49-50°; and  $n$ -propyl  $\epsilon$ -(3,4-dihydroxyphenyl)-caproate, 5,  $C_3H_7$ , 45.5-47.5°.

**Inhibition of autooxidation of fats and oils. V. Antioxidant activity of some  $\omega$ -(3,4-dihydroxyphenyl)-alkanoic esters.** Saburo Tamura, Kazuhiko Okuma, and Tadahiko Hayashi. *J. Agr. Chem. Soc. Japan* 27, 323-7(1953). When examined by the active oxygen method with lard as the substrate, ethyl protocatechuate was almost ineffective, but the introduction of methylene groups between phenyl and carboalkoxyl groups of protocatechuic ester caused marked enhancement in the activity. The activities of most of these compounds were proved superior to the activity of ethyl gallate.

#### PATENTS

**Hard butter composition.** George Barsky and George Zinzalian (E. F. Drew & Co., Inc.). *U. S.* 2,667,418. This hard butter consists essentially of practically neutral unhydrogenated glyceride esters of a fatty acid mixture having the following composition (per cent): capric and caprylic, 1-2.5; lauric, 44-57; myristic, 16-23; palmitic, 10-13; stearic, 2-4; oleic and linoleic, 7-24.

**Method of processing safflower seed.** Leo M. Christensen (15% to Raymond J. Norton). *U. S.* 2,667,499. Safflower oil is decolorized by heating at about 495°F. for about 5 min.

**Stabilization of edible fats and oils.** Joseph A. Chenicek (Universal Oil Products Co.). *U. S.* 2,668,768. Stabilization against rancidity is obtained by adding a 4-alkoxyphenol having at least one ring H substituted by an alkylthioalkyl group.

**Alcoholysis of lower fatty acid groups in polyhydroxy fatty esters.** Roger L. Logan (Kessler Chemical Co., Inc.). *U. S.* 2,669,572. A  $C_{11}$  to  $C_{22}$  polyhydroxy fatty acid which has been esterified with an aliphatic alcohol at the terminal carboxyl group and with a  $C_1$  to  $C_3$  fatty acid at the hydroxyl group is heated and reacted with a lower aliphatic alcohol in order to replace the lower fatty acid radical with hydrogen without disturbing the terminal ester group.

**Method of refining vegetable oils in miscella.** John A. Ziegler (Canadian Breweries, Ltd.). *U. S.* 2,670,362. Vegetable oil in hexane is refined by decolorizing, treating with sufficient NaOH to neutralize the free fatty acids but leaving phosphatides in the oil, and separating the soaps with brine. There is obtained a refined vegetable oil containing bleached neutral phosphatides.

**Tall-oil emulsions.** Jihoeske papírny, národní podnik. *Austrian* 176,548. Oct. 26, 1953. Tall-oil emulsions, made by emulsifying polymerized or oxidized tall oil in a known manner, optionally in the presence of fats, resins, waxes, or hydrocarbons. Preferably, tall oil is emulsified in the presence of metal salts of fatty acids contained in it, especially such salts having low flow points. The fatty-acid salts may be added either to oxidized or polymerized tall oil before emulsifying it or they may be precipitated in the emulsion itself. Thus, 25 kg. oxidized tall oil is melted with 5 kg. Zn tallate and 10 kg. paraffin. The mixture is emulsified with a small amount of  $NH_3$  at <80°. Water is added to make a total weight of 100 kg. The product, in a 2-10% aq. solution, is useful for waterproofing paper. (*C. A.* 48, 372).

**Refining of glyceride oils.** Sharples Corp. *Brit.* 695,593, Aug. 12, 1953. A stream of aq. NaOH (preferably 22-30° Bé) is added continuously in substantially stoichiometric or greater proportion to a continuously flowing stream of glyceride oil to be refined. Contact between the NaOH and the oil is effected by turbulent flow rather than by the conventional mechanical



mixing. The combined stream is subjected to centrifugal separation with 0.5-5 sec. from time of initial contact. Agglomeration of the soap stock and emulsion formation are held to a minimum. The initially formed soap stock is efficiently separated from the neutral oil. The NaOH reduces the saponification of neutral oil to a minimum. An excess is not required to neutralize the free fatty acids in continuous refining. Gums and color are removed more expeditiously and with less loss of neutral fat if performed as a separate operation (*C. A.* 48, 391)

## • Biology and Nutrition

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

**The stereochemistry of the 3-carboxy-, 3-carboxymethyl- and 3-acetylcholestenes and  $\Delta^5$ -cholestenes.** Elias J. Corey and Richard A. Sneed (Univ. Illinois, Urbana, Ill.). *J. Am. Chem. Soc.* 75, 6234-37 (1953). The carbonation product of cholesterol-magnesium chloride has been shown to be  $3\beta$ -carboxyl- $\Delta^5$ -cholestene. It does not form a lactone in the presence of hydrogen chloride or *p*-toluenesulfonic acid in chloroform, indicating that the 3-carboxyl group is  $\beta$ -oriented. It has been converted to 3-acetylcholestane, without epimerization at C<sub>3</sub>, and thence to cholestane- $3\beta$ -ol with perbenzoic acid, which also indicates  $\beta$ -orientation at C<sub>3</sub>. Configurations at C<sub>3</sub> are also assigned to the epimeric 3-carboxymethyl- $\Delta^5$ -cholestenes and the first unambiguous evidence is presented for the occurrence of a nucleophilic displacement with inversion at C<sub>3</sub> in cholesterol tosylate.

**Metabolism of adipose tissue. I. Incorporation of acetate carbon into lipides by slices of adipose tissue.** D. D. Feller (Univ. Washington School of Medicine, Seattle, Wash.). *J. Biol. Chem.* 206, 171-180 (1954). Slices from adipose tissue and liver were incubated with C<sup>14</sup>-labeled acetate, and the respiratory carbon dioxide, fatty acids, and non-saponifiable lipides were isolated and analyzed for radioactivity. Adipose tissue converted only negligible amounts of acetate into the cholesterol-containing non-saponifiable lipide fraction. Adipose tissue oxidized acetate to carbon dioxide at a rate one-third to one-fourth that of liver tissue. The percentage recovery of C<sup>14</sup> in respiratory C<sup>14</sup>O<sub>2</sub> was greater for acetate-1-C<sup>14</sup> than for acetate-2-C<sup>14</sup>. Recovery of C<sup>14</sup> from C<sup>14</sup>-labeled acetate in fatty acids of adipose tissue was as great or greater than recovery in liver slices when compared on a fat-free wet tissue basis. The possibility that in this tissue separate pathways exist for the metabolism of carbon atoms 1 and 2 of acetate is discussed.

**Suppression of hepatic cholesterol synthesis in the rat by cholesterol feeding.** Ivan D. Frantz, Jr., Henny S. Schneider, and Beverly T. Hinkelman (Massachusetts General Hosp. and Harvard Med. School, Boston, Mass.). *J. Biol. Chem.* 206, 465-9 (1954). Rats fed a diet to which had been added 1% of cholesterol showed a large rise in the concentration of liver cholesterol, but only a minimal rise in the concentration of serum cholesterol. The rate of hepatic cholesterol synthesis appeared to depend on the liver's cholesterol content and to be very sensitive to it. There was no evidence that inhibition of cholesterol synthesis by dietary cholesterol is mediated through the thyroid gland; synthesis was inhibited to at least as great an extent in animals which had received radioactive iodine as in normal rats.

**The incorporation of the carboxyl carbon from acetate into cholesterol by rat liver homogenates.** Ivan D. Frantz, Jr., and Nancy L. R. Bucher (General Hosp. and Harvard Med. School, Boston, Mass.). *J. Biol. Chem.* 206, 471-81 (1954). The effects of altering the comp. of the incubation mixture upon the incorporation of carboxyl carbon from acetate-1-C<sup>14</sup> into cholesterol have been investigated, and it has been found that with approximately 200 mg. of tissue the maximal uptake was obtained in 2.5 ml. of the following: 0.08 M potassium phosphate buffer, pH 7.4, 0.03 M nicotinamide, 0.0048 M MgCl<sub>2</sub>, 0.0008 M DPN, and 0.012 to 0.016 M acetate.

**The metabolism of C<sup>14</sup>-glycerol in the intact rat.** L. I. Gidez and Manfred L. Karnovsky (Harvard Med. School). *J. Biol. Chem.* 206, 229-242 (1954). The metabolism of C<sup>14</sup>-glycerol in the intact rat has been studied with the aid of  $\alpha$ -C<sup>14</sup> and  $\beta$ -C<sup>14</sup>-glycerol. Insignificant differences were found when the glycerol was given intraperitoneally, intragastrically, or intravenously. As a result of 30 to 238 mg. of glycerol administration, there were net syntheses of blood glucose and liver glycogen. Seventy to 100% of the new glucose was derived directly from glycerol,

whereas only 15 to 39% of the glycogen was newly formed from glycerol. The specific activity-time curve of blood lipides paralleled that of liver lipides; however, the C<sup>14</sup> content of the latter lipides was several times as great. Liver triglyceride glycerol rapidly reached a specific activity about 3 times that of phosphatide glycerol, and declined in activity much more rapidly than the latter. Randomization of activity was low. Activity was found in the lipides of most tissues examined. It is of interest that brain lipides were rather active.

**Studies on the fatty acid oxidizing system of animal tissues. III. Butyryl coenzyme A dehydrogenase.** D. E. Green, S. Mii, H. R. Mahler, and Robert M. Bock (Univ. Wisconsin, Madison, Wis.). *J. Biol. Chem.* 206, 1-12 (1954). The enzyme which mediates the first oxidative step in the oxidation of lower fatty acids has been isolated and purified. The enzyme reacts at maximal rate with butyryl CoA and hence the name butyryl CoA dehydrogenase is proposed for the protein. Various oxidizing agents have been used for the oxidation of substrate in the presence of the enzyme, viz. 2,6-dichlorophenolindophenol, pyocyanine, cytochrome *c*, and ferrieyanide. The indophenol reaction is the one routinely employed. It is zero order and proportional to enzyme concentration. The K<sub>m</sub> values for substrate and dye are  $1.4 \times 10^{-5}$  M and  $3.3 \times 10^{-4}$  M, respectively. The product of the reaction has been shown to be butenoyl CoA and the equilibrium constant for the reaction has been found to have a mean value of 10. This corresponds to a value of 0.187 volt for the E<sub>0</sub> of the couple butyryl CoA-butenoyl CoA at pH 7.0 and 25°.

**Enzymatic formation of monopalmitoleyl- and monopalmitoyl- lecithin (lysocleithins).** Donald J. Hanahan, Martin Rodbell, and Leslie D. Turner (Univ. of Washington, Seattle). *J. Biol. Chem.* 206, 431-441 (1954). The action of *Naia naia* and *Crotalus adamanteus* venoms on (dipalmitoleyl)-L- $\alpha$ -lecithin and (dipalmitoyl)-L- $\alpha$ -lecithin in diethyl ether has been studied. In each case the products of the reaction, which have been well characterized, are the corresponding monoacyllecithin and a free fatty acid. An investigation of the kinetics of this system showed that the saturated lecithin is attacked at a much faster rate than the unsaturated lecithin.

**Factors other than choline which affect the deposition of liver fat.** A. E. Harper, W. J. Monson, D. A. Benton, Me. E. Winje, and C. A. Elvehjem (Univ. Wisconsin, Madison, Wis.). *J. Biol. Chem.* 206, 151-158 (1954). Several factors have been shown to influence the effectiveness of additional dietary threonine in lowering fat deposition in the livers of weanling rats receiving low casein diets containing choline. The amounts of tryptophan, protein, glycine, and certain related substances have each been shown to exert significant effects. The implications of these observations have been discussed, and it has been suggested that the balance of amino acids provided in low protein diets as well as other factors which affect the utilization of such diets must be considered in any study of lipotropic activity.

**A study of inositol-containing lipides.** John N. Hawthorne and Erwin Chargaff (Columbia Univ., New York, N. Y.). *J. Biol. Chem.* 206, 27-37 (1954). The inositol phosphatides of soybean and ox brain have been prepared and analyzed. The water-soluble phosphates released from them by brief acid and alkaline hydrolysis have been separated chromatographically and studied. The hydrolysis products of the soybean phosphatide included, in addition to inositol monophosphate the structure of which is discussed, a mixture of phosphoric acid esters not previously described. They are thought to be the galactoside and arabinoside, respectively, of inositol monophosphate. In the brain, lipide hydrolysate, inositol diphosphate and a more complex substance, probably a diester, were found.

**The toxicity of tri-o-cresyl phosphate for rats as related to dietary casein level, vitamin E and vitamin A.** E. L. Hove (Ag. Experiment Station, Alabama Polytechnic Institute, Auburn, Ala.). *J. Nutrition* 51, 609-20 (1953). Liver, brain and carcass lipids from rats fed 0.1% tri-o-cresyl phosphate showed increased conjugated dienes, decreased apparent arachidonic acid and decreased tocopherol levels. Supplements of vitamin E largely prevented the lipid changes. In control rats, increased casein levels resulted in an increased arachidonic acid content of tissues. *In vitro* studies revealed a pro-oxidant effect of tri-o-cresyl phosphate, carbon tetrachloride, pyridine and pentachloronaphthalene in catalyzing the destruction of carotene in the presence of fat-peroxide. Limited data have shown that X-disease in cattle (chloronaphthalene poisoning) is associated with a decrease of plasma tocopherol as well as plasma vitamin A. An hypothesis is advanced relating the toxic mechanism of the fat-soluble toxic chemicals to their generalized oxidative action in unsaturated lipid systems.

**Paper chromatography of lecithins.** F. M. Huennekens, Donald J. Hanahan, and Mayo Uziel (Univ. of Washington, Seattle). *J. Biol. Chem.* 206, 443-7(1954). The separation and identification of a series of compounds, derived from the unsaturated lecithin, (dipalmitoleyl)-L- $\alpha$ -glycerylphosphorylcholine, have been accomplished by means of paper chromatography by using various alcohol-water mixtures as the solvent systems. Spray techniques have been employed to detect phosphate, choline ester, and unsaturated groupings.

**Enzymatic synthesis of the coenzyme A derivatives of long chain fatty acids.** A. Kornberg and W. E. Pricer, Jr. (National Institute of Health) *J. Biol. Chem.* 204, 329(1953). The conversion of higher fatty acids to the corresponding acyl coenzyme-A derivatives has been demonstrated with soluble and insoluble liver enzyme preparations. In the presence of ATP, hydroxylamine, and catalytic amounts of Co A, the hydroxamic acid derivatives were formed according to the equation: Fatty acid + ATP +  $\text{NH}_2\text{OH} \rightarrow$  Hydroxamic acid + adenosine - 5' - P + inorganic pyrophosphate. With stoichiometric amounts of Co A, the formation of the acyl Co A derivatives occurred according to the equation: Fatty acid + ATP + Co A  $\rightleftharpoons$  Acyl Co A + adenosine - 5' - P + inorganic pyrophosphate. Palmityl Co A was isolated from a reaction mixture and shown to be essentially pure on the basis of its Co A and fatty acid content and chromatographic behavior. Straight chain saturated fatty acids ( $\text{C}_6$  to  $\text{C}_{20}$ ) were enzymatically converted (at varying rates) to hydroxamic acid derivatives; acetic propionic, and butyric acids were inactive. The mono-, di-, and trienoic  $\text{C}_{18}$  acids served as substrates; the  $\text{C}_8$ ,  $\text{C}_9$ , and  $\text{C}_{10}$ -dicarboxylic acids were inactive.

**Propionate as a precursor of milk constituents in the intact dairy cow.** M. Kleiber, A. L. Black, M. A. Brown, and B. M. Tolbert (Univ. of California), *J. Biol. Chem.*, 203, 339(1953). Intact normal dairy cows were injected with 1- $\text{C}^{14}$  and 2- $\text{C}^{14}$ -sodium propionate in doses ranging from 9 to 12 c. of  $\text{C}^{14}$  per kilo body weight. The total doses ranged from 3 to 5 m of propionate. Over 7% of the  $\text{C}^{14}$  injected into the cow as part of 2- $\text{C}^{14}$ -propionate appeared in the lactose during 2 days following the injection. About 4% of the  $\text{C}^{14}$  injected in the carboxyl group of propionate appeared in the lactose, about 2% of the 2- $\text{C}^{14}$  and 1% of the carboxyl- $\text{C}^{14}$  appeared in casein, and about the same amount, but in reversed order, were found in butter fat.

**Studies on the fatty acid oxidizing system of animal tissues. IV. The prosthetic group of butyryl coenzyme A dehydrogenase.** H. R. Mahler (Univ. Wisconsin, Madison, Wis.). *J. Biol. Chem.* 206, 13-26(1954). Butyryl Co A dehydrogenase is a cuproflavoprotein containing 1.2 weight per cent riboflavin and 0.345% copper. The mole ratio copper to flavin equals 2. Cupric ion can be removed from the enzyme by means of dialysis against cyanide. The copper-free enzyme is still actively reduced by butyryl Co A, and reoxidized by 2,6-dichlorophenolindophenol, but shows lower rates with ferriocyanide or ferricytochrome c. These rates are enhanced in the presence of cupric ion. The enzyme is inactivated 40% by treatment with  $10^{-4}$  M *p*-chloromercuribenzoate. This inhibition can be completely reversed by glutathione.

**The preparation of 2-(2-naphthoxy)-propionic acid and 2-(6-bromo-2-naphthoxy)-propionic acid as possible chromogenic substrates for fatty acid oxidases.** Morris N. Green, Leonard J. Friedman, and Arnold M. Seligman (Harvard Medical School). *J. Am. Chem. Soc.* 76, 48-50(1954). Of the various methods for the preparation of 2-(2-naphthoxy)-propionic acid which were explored, the best results were obtained with  $\beta$ -propiolactone. The 6-bromo derivative was prepared by bromination. These compounds when fed are oxidized to naphthols which appear in the urine. No consistent oxidation of these substrates could be demonstrated *in vitro* with tissue homogenates, slices or sections. Both 2-(2-naphthoxy)- and 2-phenoxypropionates inhibited oxygen uptake when octanoate was used as the substrate.

**The binding of steroids to protein. I. Solubility determinations.** Dristen Eiknes, John A. Schellman, Rufus Lumry, and Leo T. Samuels (Univ. of Utah College of Med., Salt Lake City, Utah). *J. Biol. Chem.* 206, 411-419(1954). The solubilities of a number of steroids in aqueous buffer solution and in bovine serum albumin solution have been measured. The results indicate that reversible combination occurs between this protein and all the steroids studied except cholesterol. The strength of binding is found to bear an inverse relationship to the number of polar groups. A mechanism of interaction with the protein is suggested which accounts for this inverse relationship.

**The effect on milk and fat production of injections of oxytocin at alternate 14-day periods during lactation.** D. G. Sprain, Vearl R. Smith, W. J. Tyler, and O. T. Fosgate (Univ. Wisconsin, Madison, and Dept. of Ag., Washington, D. C.). *J. Dairy Sci.* 37, 195-200(1954). The effect of an intravenous oxytocin injection at alternate 14-day periods on milk and fat production of seven Holstein-Friesian cows during a lactation was 3.6 lb. higher than during control periods when the transition day was omitted from each period. The per cent of fat in the milk was not significantly different between the experimental and control periods.

**Relationship between fat globule surface area and carotenoid and vitamin A content of milk in successive portions of a milking.** R. F. White, H. D. Eaton (Storrs Ag. Experimental Station, Storrs, Conn.) and Stuart Patton (Pennsylvania Ag. Experimental Station, State College). *J. Dairy Sci.* 37, 147-155(1954). Single-quarter milkings of first-lactation Holsteins were divided into successive portions, and skim milk and whole milk samples were taken from each portion. These samples were analyzed for fat percentage, vitamin A and carotenoid content, and globule size distribution. Skim milk was significantly higher in carotenoids and vitamin A per gram of fat and also in the globule surface-to-volume ratio than was the whole milk from which it was separated. This indicated a possible concentration of carotenoids and vitamin A at the globule surface. Values were advanced for the concentrations of carotenoids and vitamin A in the various portions of the fat globule.

**Studies on the relation of pyridine nucleotides and adenosine-triphosphate to choline oxidation.** J. N. Williams, Jr. (Univ. Wisconsin, Madison). *J. Biol. Chem.* 206, 191-199(1954). The stimulation of the choline oxidase activity of frozen and thawed mitochondria by ATP in manometric experiments has been confirmed. However, when both ATP and DPN are added together to this system, the stimulatory effect of each is reversed. ATP has no effect on the first dehydrogenase step of the choline oxidase system as measured by a spectrophotometric assay. In 1 hour, manometric assays of choline oxidase in which fresh mitochondria are employed, a stimulation by DPN has been observed. In rapid spectrophotometric assays for choline dehydrogenase and betaine aldehyde dehydrogenase in purified systems, no response to DPN can be demonstrated for choline dehydrogenase. However, DPN is absolutely essential for the activity of betaine aldehyde dehydrogenase.

**The possible role of coenzyme A in the biosynthesis of cholesterol in the rat.** G. S. Boyd (Univ. of Edinburgh). *Biochem. J.* 55, 892-895(1953). It has been observed that if rats are maintained on a fat-free diet, the liver ester cholesterol conc. and the plasma ester cholesterol conc. appear to be dependent on dietary pantothenate and hence on the coenzyme-A content of the tissues. Since the presence of neutral fat in the diet can annul these effects a possible explanation of these results is contained in this article.

**Rapid procedure for determination of free serum cholesterol.** Harold H. Brown, Albert Zlatkis, Bennie Zak, and A. J. Boyle (Wayne Univ., Detroit, Mich.). *Anal. Chem.* 26, No. 2, 397-399(1954). A new method for the determination of free serum cholesterol in which aluminum hydroxide is used as a gathering agent for the cholesterolyl digitonide. (*C. A.* 47, 6487)

**The chromatographic separation of free and combined plasma cholesterol.** Lynda M. H. Kerr and W. S. Bauld (Univ. of Edinburgh, Scotland). *Biochem. J.* 55, 872-875(1953). The chromatographic separation of cholesterol from its esters using alumina and a solvent system of light petroleum followed by benzene has been achieved. It has been shown that esters of cholesterol may be estimated directly by the Liebermann-Burchard reaction. On the basis of the above, a method has been developed for the direct determination of free and combined cholesterol in blood plasma.

**Changes with age in the unsaturated fatty acids content of sub-cellular particles of rat livers.** Peter D. Klein and Ralph M. Johnson (Wayne Univ., Detroit, Mich.). *Arch. Biochem. Biophys.* 48, 172-177(1954). The polyunsaturated fatty acid concentration of three cytoplasmic particulate fractions of rat liver have been investigated in rats of different ages. Two groups of rats reared on diets of different unsatd. fatty acid content were used. No changes with age, or differences between the two groups were observed until 11 months of age. Thereafter, the group receiving the diet containing the lower fatty acid content showed increased concentrations of trienoic acid in the cytoplasmic particles which reached levels exceeding those of either the di- or tetraenoic acids in the same particulate fractions. Concurrently there was a decline in the pentaenoic acid concentrations. No such changes occurred in the

animals receiving the diet which contained the higher levels of the unsatd. fatty acids. The results indicate that there is no appreciable change during growth, maturation, or senescence in the level of di-, tri-, tetra-, or pentaenoic acids in liver cytoplasmic particles studied in rats fed adequate levels of these acids. The results suggest that a diet which can support good growth and reproduction in rats may not necessarily be adequate to meet the nutritive requirements of older animals, and may permit some of the symptoms of a fatty acid deficiency to appear.

**Alkaline phosphatase of milk. 2. Purification of the enzyme.** R. K. Morton (Univ. of Cambridge, England). *Biochem. J.* 55, 795-800(1953). An effective method of obtaining the phosphatase in true solution, and one which avoids undesirable exposure of the enzyme to proteolysis, is the treatment of the whole milk or milk product with butanol. Using this procedure to obtain the enzyme in true solution and by further treatments the alkaline phosphatase has been highly purified. The final product is considered to be essentially homogeneous protein. The details of the method are described in this paper. The alkaline phosphatase of milk was purified 5600 times compared to the initial whole milk on a protein nitrogen basis. The yield was 1.5%.

**Alkaline phosphatase of milk. 1. Association of the enzyme with a particulate lipoprotein complex.** R. K. Morton (Univ. of Cambridge, England). *Biochem. J.* 55, 786-795(1953). It has been found that the milk alkaline phosphatase is firmly bound to insoluble particles of lipoprotein nature. A method for almost quantitative separation of the enzyme from these particles, by the controlled use of n-butanol, has been developed. By this means, the milk phosphatase has been obtained in true solution and was purified by the methods described in this article.

**Separation of bile acids by column-partition chromatography.** Erwin H. Mosbach, Claire Zomzely, and Forrest E. Kendall (Research Service, Goldwater Memorial Hospital, New York, N. Y.). *Arch. Biochem. Biophys.* 48, 95-101(1954). The separation of certain biologically significant cholic acids has been achieved by column partition chromatography. Aqueous acetic acid supported on Celite 545 was employed as stationary phase, while petroleum ether-isopropyl ether mixtures served as mobile phase. Lithocholic acid was separated from the higher fatty acids with the solvent system 95% aqueous methanol-n-heptane.

**Use of sulfuric acid in the detection and estimation of steroidal sapogenins.** Henry A. Walens, Arthur Turner, Jr., and Monroe E. Wall (Eastern Regional Research Laboratory). *Anal. Chem.* 26, No. 2, 325-329(1954). Steroidal sapogenins dissolved in 94% sulfuric acid have characteristic ultraviolet absorption spectra in the region 220 to 400 millimicrons, which can be used for the detection and estimation of these substances. Optimum reaction conditions are the use of 0.1 to 5.0 mg. of sapogenin dissolved in 10 ml. of 94% sulfuric acid and warmed at 40°C. for 16 hours. Under these conditions, the determinations are reproducible and follow Beer's law. Constituents of binary mixtures can be spectrophotometrically determined by use of appropriate equations based on previously determined absorptivities. More complex mixtures can be determined after preliminary separation by means of chromatography. A qualitative scheme is suggested for the identification of the 13 most commonly occurring steroidal sapogenins, by means of chromatographic behavior, spectra of the sulfuric acid chromogens, and melting points. The method can be applied only to purified sapogenins, not to crude mixtures.

#### Sinitiro Kawamura, Abstractor

**The nutritive value of lipides. VII. The nutritive value of component fatty acids of hardened sardine oil.** Takashi Kaneda and Seinosuke Ishii (Tokai Regional Fisheries Research Inst., Tokyo). *J. Japan Soc. Food Nutrition* 5, 78-81(1952-53). When judged from feeding experiments with albino rats by the restricted diet method (fatty acid ethyl esters at 15% of the total diet), the ethyl esters of the mixed liquid acids (I no. 123) of the hardened sardine oil (I no. 88) were as nutritive as the control (ethyl oleate); ethyl esters of the saturated acids (I no. 0) were less nutritive than ethyl oleate; the ethyl esters of the solid unsaturated acids (I no. 88) were nearly as nutritive as ethyl oleate. The ethyl esters of highly unsaturated acids (chiefly of C<sub>20</sub> and C<sub>22</sub>) (I no. 365.8) were distinctly inferior, while those of partly hydrogenated acids of this fraction (I no. 174 and 152) were as nutritive as the control, and those with I no. 70 had intermediate nutritive value.

**Highly unsaturated fatty acids in nutrition.** Yuji Sueyoshi (Keio Univ., Tokyo). *J. Japan Soc. Food Nutrition* 6, 88-96(1953-54). A review on linoleic, linolenic, and arachidonic acids in nutrition with 30 references including some unpublished data.

## • Drying Oils

Raymond Paschke, Abstractor

**A review of concrete paints.** Anon. *Can. Paint Varnish* 27, No. 12, 14(1953).

**Vinyltoluene—reacts with all commercially important drying oils.** Anon. *Chemical Processing*, 17, No. 2, 18-19(1954). Vinyltoluene can replace styrene in many reactions. Suggested applications include paints, potting resins, textile coatings, varnishes, printing inks, fabric impregnants and other copolymer products. Boiling point of 170°C. permits higher temperatures than normally used in copolymerization.

**The effect of driers on the properties of alkyd resin finishes. Part 4. Conclusions.** Anon. *Paint Manuf.* 23, 403(1953). Cobalt is most important. Sufficient Co must be used to give an acceptable rate of drying and to prevent gas checking or wrinkling, but not so much as to give blooming or skinning in the can. Usually 0.05 to 0.1% is satisfactory. Including Mn is of little advantage since it promotes gas checking in conjugated oil alkyds and wrinkling in linseed oil alkyds. Zn is relatively inert but is best kept at a minimum since it can help promote gas checking in the presence of Mn. Co-Pb at 1:10 can cause clouding of clear varnishes. Ratios of 5:10 or 10:1 give good results. Ca improves resistance to wrinkling in lead-cobalt mixture but may impair the color of clear varnishes in bulk. Ca may also decrease water resistance.

**The paint industry looks seriously at isocyanates (a staff report).** Anon. *Paint, Oil Chem. Rev.* 116, No. 26, 28(1953). A review with 8 references.

**Apparatus for the laboratory testing of the wash and scrub resistance of water paints.** D. Atherton and W. Peace (Imperial Chemical Industries, Ltd., Manchester 9, Eng.). *Oil & Colour Chemists Assoc. J.*, 37, 44(1954). Four paints can be tested at the same time and six tests can be carried out on each paint. The surface is rubbed at the rate of fifty 6-inch strokes per minute with a 1-inch diameter nylon-coated head under a 2 kg. load. The paint film is kept soaked with a 2% "Lissapol N" soln. Paints showing no failure after 1 hour (3,000 rubs) are judged excellent for wash and scrub resistance and for adhesion to the surface under test.

**Polymerization of drying oils by heat. Part 1.** William Brushwell. *Am. Paint J.* 38, No. 12, 74(1953). **Part II.** *Ibid.* 38, No. 13, 68(1953). A comprehensive review of modern concepts of thermal polymerization. Included is a discussion of the polymerization of relatively simple molecules such as 1,4-pentadiene, methyl sorbate, alpha pinene, hexatriene, and methyl crotonate. The mechanism and rates of polymerization of the linoleates, linolenates, and eleostearates are discussed. The practical applications in the bodying and conjugation of oils and in the production of dimer acids are cited. 37 references.

**Primeval pictures were spray painted.** E. Hindle. *Paint Manuf.* 23, 402(1953). A discussion of materials and techniques used in 20,000-year old cave paintings in south-west France.

**The reaction between styrene and unsaturated fatty acids. Part III (conclusion).** S. Kut (Pearl Varnish Co., Ltd., Pontypridd, S. Wales, Britain). *Paint Varnish Production* 44, No. 1, 34(1954). A study of the reaction between styrene and  $\beta$ -eleostearic acids.

**New drying oils produced by solvent segregation.** F. J. H. le Riche and A. L. Stubbs (Marine Oil Refiners of Africa, Ltd., Simonstown, South Africa). *Oil & Colour Chemists' Assoc. J.* 37, 8(1954). Particular reference is made to the use of liquid propane in the Solxol process. The mechanical, physical, and technical properties of the drying oils so produced are detailed. Oils having improved drying, color retention and uniformity of properties produced from sunflowerseed oil and fish oils are described. The segregation of soybean, tobacco seed, and dehydrated castor oils are briefly discussed.

**Federation research program report.** W. O. Lundberg (Hormel Institute, Univ. of Minn.). *Off. Dig. Federation Paint & Varnish Production Clubs* 1953, No. 347, 957.

**The mechanism of the inhibition by paints, of corrosion, with special reference to basic pigments.** J. E. O. Mayne and D.



van Rooyen. *Paint Oil Colour J.*, 124, 1435(1953). A review of a paper presented at a meeting of the London section. Previous work showed that water became non-corrosive after contact with certain metallic soaps of linseed oil fatty acids. The inhibitive fraction was now found to consist of salts of several dibasic acids and a series of unsaturated hydroxy acids derived from pelargonic and higher acids and was effective at pH 4.6-5.0. The Pb salts were more effective than the Ca salts which in turn were more inhibitive than the Na salts.

**Reasons why paints do not give expected service.** (Lecture XV, third 10-year practical paint course). J. C. Moore (Nat. Paint, Varnish & Lacquer Assoc.). *Am. Paint J.* 38, No. 18, 70(1954). Practical examples of sources of moisture in houses and its deleterious effect.

**Quality control in the paint industry. Part III (conclusion).** L. Shatkin, *Paint Varnish Production*, 44, No. 1, 30(1954).

**Fundamentals of paint, varnish, and lacquer technology. Recent developments in raw materials. Chapter VIII—Oils (Part II).** E. Singer. *Am. Paint J.* 38, No. 13, 84(1953).

**Chapter IX. Formulation (Part I).** *Ibid.* 38, No. 15(1953). A review. No references.

**Latest developments in polyvinyl acetate emulsion paints.** W. E. Smith. *Can. Paint Varnish* 27, No. 12, 10(1953). Second half of review.

**Film formation and deterioration.** J. S. Aggarwal (National Chemical Laboratory, Poona). *Paintindia* 3, No. 9, 61(1953). A discussion of oil films which are formed as a result of oxidative changes of unsaturated esters and their deterioration due to weathering effects such as light, air, temperature and moisture. The picture of the mechanism of the transition from the liquid to solid film and the further changes, both physical and chemical, that continue in the solid film can be divided into four interrelated and overlapping stages as follows: (1) The unsaturated entities, such as linoleic, linolenic, elaeostearic, etc. are oxidized by atmospheric oxygen to yield molecules which by virtue of their oxygroups attract each other. (2) The oxidized polar molecules by aggregation processes reach a stage where, on the basis of kinetic energy calculations, their velocity becomes low and they begin to form micelles. (3) The number of micelles increases and the number of small molecules decreases and the "set-to-touch" state is considered to have been reached. (4) Oxidation continues and various physical properties of the film such as percentage elongation, tensile strength and hardness change accordingly. 30 references.

**Blown oils.** Giorgio Balbi. *Olearia* 6, 335-45(1952). A review of the theory and practice of heat-polymerizing oils while blowing air through them, the properties of blown oils, blown stand oils, and other oxidized oils [ozonized, voltolized (oxidation accompanied by elec. discharge), and uvioletized (ultra-violet irradiation)]. (*C. A.* 47, 12832)

**Preparation of styrenated linseed oils.** C. Boelhouwer, F. A. de Roos and H. I. Waterman (Univ. of Delft). *Chemistry and Industry* 1953, 1287. A method is described for the styrenation of drying oils with gaseous styrene as the reactant. The preparation of clear products of high viscosity is possible in a relatively short time.

**Diabetic acid and its derivatives.** G. Brus, Le-Wan Thoi and H. Francois (Inst. pin. Bordeaux, France). *Peintures, Pigments, Vernis* 29, 36-49(1953). Abietic acid is polymerized in  $C_6H_6$  with concd.  $H_2SO_4$  below  $20^\circ$ . (*C. A.* 47, 12315).

**Twenty years of accelerated aging tests.** F. G. Dunkley. *Ind. Vernice* (Milan) 7, 139-42(1953). The British railroad laboratory at Derby has used more than 6,000 accelerated aging tests in the weatherometer for 20 yrs. (*C. A.* 47, 12829)

**Dimerization of styrene in the presence and absence of solvent.** B. B. Corson, J. Dorsky, J. E. Nickels, W. M. Kutz, and H. I. Thayer (Koppers Co., Inc.). *J. Org. Chem.* 19, 17(1954). In the absence of solvent or in *n*-heptane soln. styrene dimerizes to a mixture of unsaturated dimer (1,3-diphenyl-1-butene) and a saturated dimer (1-methyl-3-phenylindane). The latter was found in two stereoisomeric forms (cis-trans), melting points 9.5 and 25.5. In the presence of benzene or ethyl benzene, aralkylation coproducts are formed.

**Some practical "rules" for factory testing of protective coatings.** D. S. Gaarder (The Sherwin-Williams Co.). *Org. Finishing* 15, No. 1, 6(1954). (1) Test for what you want to know, (2) test for identical properties under identical conditions, (3) appraise the effects of temperature and humidity during testing, and (4) accept and allow for the limitations of the apparatus used.

**Maleic anhydride adducts.** W. H. Gardner (Allied Chemical and Dye Corp., New York). *Paint Varnish Production* 44,

No. 2, 28(1954). A review of chemistry and uses with 105 references.

**Isotopic and chromatographic techniques applied to protective coatings technology.** P. Heiberger (National Lead Co.). *Paint Oil Chem. Rev.* 117, No. 2, 14(1954). Review with 19 references.

**Instrumental methods for testing organic finishes.** J. E. Hyler. *Org. Finishing* 15, No. 1, 9(1954). Review.

**Molecular enlargement in the field of fats. VII. Influence of catalysts on the drying of oils.** H. P. Kaufmann and L. Korfhage (Univ. Munster). *Fette u. Seifen* 55, 281-4(1953). Further expts. have been carried out with org. free radicals as catalysts. Diphenyl (p-biphenylmethyl) and phenyldi-p-biphenylmethyl, prep'd. according to Schlenk (*C. A.* 4, 2122), were as effective as the previously exam'd.  $Ph_3C$ ; in this case, too, the catalysis was appreciable with conjugated unsat'd. oils and slight with linseed oil. Dehydrotetrachloro-p-cresol, prep'd. by the method of Rincke [cf. *Ann.* 328, 286 (1904)], is more effective than  $Ph_3C$  in drying conjugated unsat'd. oils. 9-Chloro-10-phenanthroxyl, prep'd. by the method of Goldschmidt and Steigerwald (*C. A.* 18, 3375), shows a drying action only with raw chinawood oil; the drying of refined chinawood oil is inhibited rather than catalyzed. 1,1-Diphenyl-2-(2,4,6-trinitrophenyl)hydrazyl (I), prep'd. by the method of Goldschmidt and Renn (*C. A.* 16, 2853), also inhibited drying of refined oils. In the course of the expts. it was noted that colored radicals lose their color much more rapidly in raw than in refined oils. This and the fact that the drying of raw oils is catalyzed more strongly suggest that the radicals react with some of the impurities that are present in the oils.  $\alpha$ -Tocopherol (II) reacted almost quantitatively with 0.001M I; II is apparently oxidized to the corresponding quinone. The use of this reaction for the detn. of II in oils is contemplated. The influence of O on drying was reinvestigated. When absolutely O-free N is used to cover the oil, no drying takes place. Under these conditions none of the radicals investigated caused drying. (*C. A.* 47, 12832)

**Rosin derivatives in surface coatings. Part II.** N. R. Kamath and V. Krosnan (Dept. of Chemical Technology, Bombay). *Paintindia* 3, No. 8, 27(1954). Discussion of oxidized rosin, hydrogenated rosin, maleic adducts, rosin salts, ester gum, oil varnishes based on rosin derivatives and cellulose nitrate lacquers. 18 references.

**Dependence of properties of modified alkyd resins on the conditions of glycerolysis. II.** V. S. Kiselev and K. P. Belyaeva. *Zhur. Priklad. Khim.* 26, 1098-1102(1953). The film forming properties of modified glyptals obtained from mono- and dioleins by treatment at  $150^\circ$  with phthalic anhydride, followed by heating at  $250^\circ$ , were exam'd. Best films were obtained from monoolein and from mixed mono- and dioleins with free glycerol present. The presence of free glycerol in the initial formulation is thus quite beneficial. With 50% monoglycerides and 14% (1 mole) excess glycerol, after  $250^\circ$  treatment, the product is sol. in 95% EtOH to the extent of 1:10. A lower content of glycerol causes poorer film formation. The glycerolysis is best run in hermetically closed app. (*C. A.* 48, 1703)

**Ketone solvents in surface coatings.** V. N. Luke (Burman Shell Ltd.). *Paintindia* 3, No. 9, 45(1953). A discussion of factors affecting usage of methyl ethyl ketone and methyl isobutyl ketone by surface coating industries.

**Fatty acids. V. Comparison of the oxidation velocity of unsaturated fatty acids and of their methyl esters.** S. Maruta (Yamanashi Univ. Kofu). *J. Chem. Soc. Japan Ind. Chem. Sect.* 55, 303-4(1952). The oxidation velocity of oleic acid, methyl oleate, linseed-oil fatty acid, and linseed-oil fatty acid methyl ester was det'd. at  $30^\circ$ . The velocity of unsat'd. fatty acids is smaller than that of the methyl esters. (*C. A.* 47, 12840)

**Ethoxyline resins.** G. H. Mirza (Ciba Dyes, Ltd., Bombay). *Paintindia* 3, No. 9, 54(1953). The potential applications are very great. The important characteristics are adhesion to metals, hardness, flexibility and chemical resistance combined in the same coating. The most important facts about these resins are given.

**Tall oil-dehydrated castor oil blends for preparing inexpensive quality varnishes.** T. C. Patton and W. Lindlaw (Baker Castor Oil Co.). *Paint Varnish Production* 44, No. 1, 21(1954). By upgrading tall oil with bodied, dehydrated castor oil, processing times are cut and the product is light in color, has excellent flexibility and hardness and marked water resistance. Processing data and properties are given. Seven references.

**Dimeric acid from drying oils.** G. Petit and J. Cazes. *Peintures-Pigments-Vernis* 29, 363(1953). Various drying oils, colza, linseed and soya bean, have been polymerized at  $360^\circ$

380°C. under 5 kg./cm.<sup>2</sup> pressure and the composition of the component acids determined by saponification of the polymerized oil and converting the isolated fatty acid into the ethyl esters. The esters are then chromatographed on alumina from a hexane solution. Elution is with hexane, benzene, and alcohol in succession. The various fractions are subsequently distilled under vacuum and their characteristics determined. The results show the presence of 3% monomeric acids, 82% dimeric acids and 15% trimeric acids. The monomeric acids consist mainly of C<sub>18</sub> but there is a small proportion with more than 18 but less than 30 carbon atoms. The dimeric acids contain 36 carbon atoms. There is also evidence to show that decarboxylation has occurred and a significant amount of oxyacids is also formed. The possible mechanisms of the various reactions are also discussed. [*Paintindia* 3, No. 8, 21(1953)]

**The utilization of volatile wastes in the manufacture of hydroxy-polymerized drying oil from vegetable oil.** A. A. Ponomarev (N. G. Chernyshevskii State Univ., Saratov). *Masloboino-Zhirovaya Prom.* 18, No. 7, 24(1953). A process is described for the fractionation of distillates into aldehydes, alic., fatty acid, etc., by means of steam and fractional vacuum distn. A hydrogenation procedure is also given (C. A. 48, 387)

**Separation of unsaturated fatty acids by means of extraction and partial neutralization.** R. Rigamonti (Politec. Torino, Italy). *Olearia* 6, 289-92(1952). Expts. on the liquid-liquid segregation of the unsatd. fatty acids from grape-seed oil (mainly oleic acid and linoleic acid) with aq. MeOH (5-10% H<sub>2</sub>O) and benzene (b. 60-70°, freed from olefins and aromatic hydrocarbons) showed no large difference in the distribution coeffs. of the acids. If extn. was accompanied by partial sapon. with NaOH, the enrichment of the more unsatd. acid in the alc. phase was almost twice that attained with extn. alone. (C. A. 47, 12840)

**Testing and research.** F. Scofield (Nat. Paint Varnish Lacquer Assn.). *Am. Paint J.* 38, No. 19, 87(1954). Lecture XVI in the Third 10-year Practical Paint Course. More basic research in the phenomenon of drying of oils is needed by the paint industry. Tests are run to (1) control a product, (2) predict performance, (3) examine competitive products, (4) to satisfy consumer demand for particular specifications.

**Castor oil as a raw material for chemical industries. Part II.** T. V. Subba Rao and B. L. Rao (Tata Oil Mills, Ltd., Bombay). *Paintindia* 3, No. 8, 33(1953). Description of the synthesis of muscone, the thermal treatment and the pyrolysis of castor oil and uses of undecylenic acid and heptaldehyde.

**Improved drying oils.** R. L. Terrill (Spencer Kellogg & Sons, Inc., Buffalo, N. Y.). *Paint Ind. Mag.* 68, No. 12, 15(1953). Review with 11 references.

**The changes in some of the paint properties of oils resulting from the oxidation by air or thermo-thickening.** B. N. Tyutunnikov and K. M. Goldberg (Polytech. Inst. Kharkov). *Masloboino-Zhirovaya Prom.* 18, No. 7, 22-3(1953). This has been investigated in regard to the wetting properties and the rates of drying (at 20 ± 1°, and the relative humidity of air 48) of blown (I) and stand (II) oils which were prepd. from sunflower seed and linseed oils at different temps. The temp. used ranged from 100 to 300° for I and from 250 to 300° for II. The gain in the wetting ability of oils varied with the temp. of processing and ranged from 9 to 30% for I, and was up to 36% for II. Within the temp. range from 100 to 200°, the sample of I, processed at 100°, gained more than the others in this series (17 and 20% for the sunflower and linseed oils, resp.); at 300° I gained 29-30%. Likewise, I and II dried faster than the untreated oil. However, within the temp. range from 150 to 250°, the rate of drying varied inversely with the temp. of processing and the final viscosity of I. The time of drying was reduced to the min. when I was processed at 100°. Drying of II was affected but slightly by the temp. of processing and the viscosity of the oil. Generally, II dried at much faster rate than any other exptl. sample. (C. A. 48, 385)

**How inks dry.** F. A. Varron (Interchemical Corp., New York). *Paint Manuf.* 24, No. 1, 10(1954). Part I of a review.

**Drying oils from saturated fatty acids.** J. Weiss (Kemiska Ingeniorsbyran A.-B. Stockholm, C.). *Paint Manuf.* 24, No. 1, 5(1954). The properties of modified oils obtained from satd. fatty acids are described. The process involves the addition of an organic "catalyst" to solutions of satd. fatty acids. The solutions thicken, their acid values fall and when spread in thin films, the resulting oil is sensitive to oxygen and dries to give a protective film. The author does not reveal the chemical nature of his "catalyst." An editorial (p. 1), however, suggests that isocyanates could lead to the changes described.

## PATENTS

**Varnish composition.** D. Aelony (to General Mills, Inc.). U. S. 2,608,538. The varnish compns. contain a phenol-HCHO resin highly esterified with a drying oil-fatty acid to give a resin having a mol. wt. of 450-900 and a rosin acid ester of a polyhydric alc. Less than 10% rosin acid ester does not modify the original characteristics of the phenol-HCHO resin ester. Some rosin acid esters, such as the ester of 2,2,6,6-tetrakis-(hydroxymethyl)-cyclohexanol, produce extreme brittleness and hardness in the film at a concn. above 40%. The usual varnish solvents and driers are also employed in these formulations. (C. A. 47, 12837)

**Heat-hardening varnishes.** H. Hönel and H. Manzano. U. S. 2,649,433. Similar to U. S. 2,626,249 and 2,613,198. Varnishes are prepared by combining a resol from formaldehyde and phenol with an alkyd resin. (C. A. 48, 1026)

**Synthetic drying oils.** J. F. Nelson and A. H. Gleason (to Standard Oil Development Co.). U. S. 2,650,209. These are prepd. by condensing satd. linear polymers with unsaturated monomers to give compds. having conjugated double bonds. (C. A. 48, 1704)

**Copolymers of styrene and blown oil.** J. H. Sample (to Sherwin-Williams Co.). U. S. 2,650,907. Fast-drying, mineral spirit or gasoline-resistant copolymers are produced by copolymerizing a vinyl aromatic compd. and a partially polymerized, non-conjugated drying oil or semidrying oil at 225-500°F. in the presence of 0.02-0.1% metal drier and 0.5-2.0% metal-free peroxide. Oils, such as soybean, linseed, and safflower, are air-blown to a mineral spirit reduction of 800-2500% and then copolymerized as above with styrene or other vinyl aromatic compd. Examples of metal driers are Pb naphthenate, Co octoate, and Fe resinate. Useful peroxides are H<sub>2</sub>O<sub>2</sub>, cumene hydroperoxide, and Bz<sub>2</sub>O<sub>2</sub>. Films prepd. from such copolymers are 1-4 or more times as gasoline-resistant as films prepd. similarly except without the metal drier. If the peroxide is omitted, the resultant film of the copolymer dries much more slowly. (C. A. 48, 1027)

**Synthetic drying oil and enamel paint and process for making same.** A. H. Gleason (to Standard Oil Development Co.). U. S. 2,652,342. An enamel base comprising an oily sodium copolymer of 75 to 85 parts of 1,3-butadiene, 25 to 15 parts of styrene, and 0.05 to 0.5 parts of maleic anhydride combined therewith, said copolymer having an intrinsic viscosity between about 0.15 to 0.30.

**Epoxide resins heated with vegetable oils in the presence of steam.** Jacobus Rinse (Bernardsville, N. J.). U. S. 2,652,376. The process for producing resinous oil products which comprises reacting a fatty acid ester drying oil with an epoxy resin containing free epoxy groups in the presence of steam at a temperature of at least 150°C.

**Polyester resin compositions and process of preparing same.** J. F. Davis (to American Cyanamide Co.). U. S. 2,652,382. A surface coating composition capable of producing, on curing, a crater-free film, comprising a compatible blend of a polyester resin composition and 0.01% to 5% by weight of a butylated phenol-formaldehyde resin.

**Polyester resin compositions and process of preparing same.** J. F. Davis (to American Cyanamide Co.). U. S. 2,652,383. Similar to U. S. 2,652,382.

**Siloxane resins.** M. J. Hunter and E. J. Smith (to Dow Corning Corp.). U. S. 2,652,385. These are prepared by heating mixtures of methyl and phenyl siloxanes. They may be bodied by heat treatment and dissolved in solvents for use in paint and varnish. (C. A. 48, 1060)

**Preparation of saturated fatty acids of improved color and color stability.** D. E. Terry and D. T. Warner (to General Mills, Inc.). U. S. 2,652,414. A process of treating higher saturated fatty acids which comprises mixing with from 1% to 3% by weight of conc. sulfuric acid with the fatty acid, heating the mixture to a temperature within the approximate range of 150-175°C. for 2 to 6 hours, then washing with water to remove the mineral acid and distilling the fatty acid.

**Interpolymer of vinyl aromatic compounds and conjugated oil fatty acids.** E. W. Kanning and E. G. Hart (to Arco Co.). U. S. 2,652,488. Interpolymers which give tough, glossy films and have good water and alkali resistance are made by polymerization of 30-40% monovinylaromatic compd. with 60-70% conjugated-oil fatty acids at 130-60° in 2-8 hrs. The monovinylaromatic compds. are preferably styrene or substituted styrenes, and the fatty acids have an av. degree of conjugation and unsatn. between that of dehydrated-castor-oil fatty acids and  $\beta$ -eleostearic acid. The interpolymer may be esteri-

fied to improve storage stability and ease of pigmentation. For example, 325 g. conjugated linseed-oil fatty acids, 315 g. styrene, and 9.75 g.  $\text{Bz}_2\text{O}_2$  were heated under reflux at 130-60° for 6 hrs. Films of the product rapidly air-dried to give tough, glossy coatings, especially when metallic driers were added. They had superior water and alkali resistance. (*C. A.* 48, 1027)

**Partial esters of polyhydroxyl polyethers.** S. O. Greenlee (to Devoe & Reynolds Co.). *U. S.* 2,653,141. New partial esters of higher unsaturated fatty acids and polymeric polyether derivatives of dihydric phenols.

**Ester resins for varnishes and inks using monomeric phenolic ethers of aliphatic polyhydroxy alcohols.** W. P. Cody and E. L. Clark (to Alkydol Labs., Inc., Cicero, Ill.). *U. S.* 2,653,142. Ester resins suitable for oleoresinous varnishes and printing inks which are esters of natural resins of at least 75 acid no. with a monomeric monohydric phenolic ether of aliphatic polyhydric alcohols and their epoxides.

**Drying oil compositions.** E. G. Marhofer and J. C. Hillyer (to Phillips Petroleum Company). *U. S.* 2,653,956. A process for producing a drying oil composition, which comprises admixing a polymer consisting essentially of an unsaturated, predominantly open-chain liquid hydrocarbon polymer of an open-chain conjugated diolefin, said polymer having a viscosity of from 20 to 150 poises at 77°F. with an unsaturated glyceride oil in the amount of 2 to 20% by weight of said glyceride oil, and heating the mixture at 550 to 600°F. for 2 to 6 hours.

**Luminescent resins from aryl-substituted allyl halides and alkenyl ethers of a polyhydroxy organic compound.** E. M. Geiser (to Universal Oil Products Co.). *U. S.* 2,654,732. Red and pale yellow fluorescent, viscous, oily resinous materials capable of air drying to tough, hard, tack-free films are made. (*C. A.* 48, 1058)

**Continuous resin processes.** G. A. Coleman, R. B. Greene, J. H. Merriman, S. P. Miller and R. F. Shannon (to Allied Chemical and Dye Corp.). *U. S.* 2,658,054. A process for the production of synthetic resins resulting from the reaction of resin-forming substances selected from the group consisting of a phenol, urea and melamine with an aldehyde induced by heat and the presence of a catalyst.

**Process for preparing carboxylic acids and their anhydrides.** W. Reppe, W. Schweckendiek and H. Kroeper (to Badische Anilin- & Soda-Fabrik Aktiengesellschaft, Ludwigshafen, Germany). *U. S.* 2,658,075. A process for the manufacture of saturated aliphatic carboxylic acids and their anhydrides which comprises heating a monoolefinic aliphatic hydrocarbon together with a saturated aliphatic monocarboxylic acid to temperatures between about 180 and 300°C. in the presence of a nickel salt of said acid which contains in complex combination a tertiary base selected from the group consisting of pyridine and triphenyl phosphine, while maintaining a carbon monoxide pressure of at least 100 atmospheres.

**Treatment of resin acid-fatty acid mixtures.** O. S. Eckhardt, D. F. Cook and I. E. Knapp (to Leach Brothers, Inc., a corporation of Wisconsin). *U. S.* 2,659,718. A method for inhibiting the crystallization of resin acids in mixtures of resin acids and higher molecular weight fatty acids derived from tall oil. It comprises reacting said mixtures with a lower molecular weight alcohol to esterify at least the major portion of the fatty acids and then heating said reaction product with from about 4% to about 12% by weight of formaldehyde, based on the weight of the resin acids.

**Method of preparing adducts.** J. Dazzi (to Monsanto Chemical Co.). *U. S.* 2,661,359. A mixture of maleic anhydride, oleic acid and an aryl ester of phosphorous or hypophosphorous acid is heated to 150-300°C.

**Drying resins from oil-modified alkyds and liquid polybutadiene.** W. W. Crouch (to Phillips Petroleum Co.). *U. S.* 2,662,862.

**Method for manufacturing polymerized fatty acids.** C. G. Goebel (to Emery Industries, Inc.). *U. S.* 2,664,429. A method for removing monomeric fatty acids from polymeric acids which consists essentially of releasing pressure on polymerized fatty acids containing 1 to 5% water above 260°C. and flash distilling the unpolymerized materials.

**Isomerization of unsaturated acids.** (Lever Brothers and Unilever Ltd.). *British* 693,981. Unsaturated fatty acids or esters and vegetable or animal oils can be isomerized or conjugated by heating to a temp. not exceeding 140° (preferably 100-120°) with Ni or Co silicate and S not exceeding 10% of the wt. of the metal catalyst prep. by reduction of the Ni or Co compd. Examples are given for the isomerization of linseed, soybean, sunflower seed, cottonseed, sesame, whale, teaseed, peanut, and palm oils. (*C. A.* 48, 390)

**Styrenated modified alkyd resins.** A. Honig (Kunstharz Industrie N. V.). *Dutch* 72,595. The modified alkyd resin is of the type prep. from drying or semidrying oils and a polyhydric acid which does not add to styrene, such as phthalic anhydride. Esterification and copolymerization take place partly or wholly simultaneously. This is accomplished by mixing the components at room temp. and heating slowly to 240°, or by adding first styrene during several hrs., at 160° and adding after 0.5-2 hrs. the acid or its anhydride. The resins obtained are homogeneous and suitable for use in the manuf. of paints and lacquers. Thus, 440 g. linseed oil is made to react with 79 g. glycerol, mixed with 110 g. tung oil, and heated to 160°. A mixt. of 315 g. styrene and 135 g.  $\alpha$ -methylstyrene is added during 5 hrs. After the first ½ hr. 158 g. of phthalic anhydride is gradually added, and finally the mixt. is heated up to 240°. The alkyd resin is clear, only slightly colored, has an acid no. of 16, a viscosity of 37 centipoises (50% soln. in xylene), and it dries in 10 min. Instead of tung oil, oiticica oil may be used. (*C. A.* 48, 1027)

**Paint for use in moist atmospheres.** E. Meier. *German* 821,982. An ordinary rust-resisting paint is, before use, mixed with an inorg. swelling and dehydrating agent (such as silica gel, bentonite, or similar silicates) impregnated with a water- and oil-sol. irreversible emulsifying agent which can be coated with a thin colloid film. A small amt. of a known stabilizing and antirust agent, such as diphenylamine, may be added to the paint compn. This permits application of rust-preventing paint even to metal wet with dew. (*C. A.* 48, 1704)

**Separation of constituents of fatty oils or their derivatives by dialysis.** J. Boldingh (to Lever Brothers & Unilever N. Y.). *Dutch* 72,285. Separation is through a rubber membrane in the presence of a solvent. Examples include sepn. of phosphatides from soybean oil, free acids from herring oil, catalysts from hydrogenated oils and polymeric glycerides from linseed oil. (*C. A.* 48, 1033)

**Linseed stand oil.** Council of Scientific and Industrial Research. *Indian* 45,840. Linseed stand oil suitable for use in the manuf. of varnishes, paints, enamels, and printing and lithographic inks is prep. by heating alkali or acid-refined linseed oil (50 g.) with activated bauxite (2½ g.) as catalyst to 280-90° for 2 hrs. with stirring. The product is settled and filtered. The viscosity of the product obtained from alkali-refined oil is 150 poises and from acid-refined oil 200 poises. (*C. A.* 48, 1705)

**Isomerization of linseed oil.** Council of Scientific and Industrial Research. *Indian* 45,841. Refined linseed oil (100 g.) and activated bauxite as catalyst (5 g.) is heated to 150-250° for 4 hrs. in a Wood's metal bath while  $\text{CO}_2$  is bubbled through the oil. The isomerized linseed oil is then filtered. It has an I no. of 201.9 by the Woburn method and 153.9 by the Wijs method, and a viscosity of 0.5 poises. Varnish is prep. by addn. of 0.1% Co acetate and 30% turpentine. (*C. A.* 48, 1705)

**Paint for ship bottoms.** Tomekichi Sato. *Japan* 4737('52). Hair or feathers are heated 20 min. at 80° with exclusion of air, ground to a powder and mixed into a suitable coating material. (*C. A.* 48, 386)

## • Waxes

R. L. Broadhead, Abstractor

**Enteric coatings in dispensing pharmacy.** I. The preliminary investigation. Charles W. Bauer and Robert J. Geraughty (Massachusetts Coll. of Pharm., Boston). *J. Am. Pharm. Assoc., Pract. Pharm. Ed.* 14, 504-7(1953). The use of a mixt. of Bu stearate 70 and carnauba wax 30 parts as an enteric coating has the following advantages over salol: physiologically inactive, application not so time-consuming, is suitable for use by the pharmacist, and it may be evaluated by *in vivo* tests.

II. A practical method of extemporaneous enteric coating. Mitchell J. Stoklosa and Leslie M. Omhart. *Ibid.* 507, 514-15. A series of coating mixts. were prep. and evaluated. A practical method of applying the coating to capsules is described and the following coating recommended: Bu stearate 45, carnauba wax 30, and stearic acid 25 parts. (*C. A.* 48, 949)

**Antioxidants for food papers.** R. W. Bentz. *Modern Packaging* 27, No. 1, 141-3(1953). The inhibition of rancidity in fats and fatty foods by application of butylated hydroxyanisole to waxed and nonwaxed packaging papers is discussed. (*C. A.* 48, 295)

**Estimation of cholesterol and triterpenols in unsaponifiable fraction of wool wax.** Heinz Duewell (Commonwealth Sci. Ind. Research Organization, Melbourne). *Anal. Chem.* **25**, 1548-50 (1953). A modification of Lederer and Tehen's colorimetric method is given for the estn. of triterpenols (cf. *C. A.* **40**, 48987) with the Liebermann-Burchard reagent. Since cholesterol gives a somewhat different color with the reagent (cf. *C. A.* **28**, 67528), it is possible to est. both cholesterol and triterpenols in a single sample of absorbancy measurements at 2 wave lengths (460 and 620 m $\mu$ ) with spectrophotometer. Standards should be run along with unknowns to minimize errors due to instability of the reagent and temp. effects. Results are accurate within  $\pm 3\%$ . (*C. A.* **48**, 1030)

**Wool wax. Part IV. The constitution of the aliphatic diols.** D. H. S. Horn and F. W. Hougen. *Journal Chemical Society* **1953**, 3533-3538. Five alkane-1,2-diols were isolated from the unsaponifiable fraction of wool wax by chromatography and distillation at reduced pressure. They were identified from infra-red studies and by degradation to fatty acids of known constitution as n-hexadecane-, 16-methylheptadecane-, 18-methylnonadecane-, 20-methylheicosane-, and 22-methyltricosane-1,2-diol.

**Candles and their raw materials.** E. Kopschitz. *Seifen-Ole-Fette-Wachse* **79**, 693-698(1953); **80**, 15(1954). The uses of the various plant waxes, mineral waxes and animal fats and waxes in candle manufacturing are discussed. Some methods are given for testing these raw materials.

#### PATENTS

**Sisal fiber and wax.** Paul F. Bruins (to Christian Missions Foundation, Inc.). *U. S.* **2,649,624**, August 25, 1953. Sisal leaves are treated with chlorinated hydrocarbon solvents to ext. a wax of enhanced quality. They are immersed in an open tank contg. liquid trichloroethylene, for example, and a heater for vaporizing the solvent. During the 1-2 min. extn. period, the vapor of the solvent condenses on the leaves and exts. the wax. The liquid soln. of wax drops back into the liquid solvent at the bottom of the tank and the wax is subsequently recovered. The light-colored purified wax is suitable for use in shoe polishes, floor polishes, and as a substitute for carnauba wax. The dewaxed sisal leaf is passed to decorticating wheels to remove the fibers. Less mech. working is required in the process, thereby giving fibers of increased tensile strength. (*C. A.* **48**, 391)

## • Detergents

Lenore Petchaft, Abstractor

**Soap in the home clothes washer.** Florence Ehrenkranz, Velma Williams Hyatt and Margaret Beale (Iowa State College, Ames, Iowa). *Soap, Sanitary, Chemicals* **30**, No. 2, 46-7, 97 (1954). A series of washing tests was run to simplify future testing procedures and supply background information for homemakers. The variables tested included soft (0-1 grain) and hard (26-29 grain), 140°F. wash water; soft and hard 100°F. and 140°F. rinse water, one and two rinses, and different concentrations of an all-purpose soap. Three washers were used: the American Home Laundry Manufacturers' Association "Comparator," a household agitator type automatic and a household pulsator type automatic. Tests showed that smaller amounts of soap can be used in soft water than in hard water. The fabric washed in soft water had a soft, pleasant "hand." Tests run on one rinse versus two rinses showed that the hypothesis that one rinse would be as effective as two rinses in laboratory test procedures with any combination of variables was not confirmed. It was also found that one or two 100°F. rinses were as effective as one or two 140°F. rinses. Final conclusions to be drawn are that considerable additional experimental work is needed to establish a testing procedure which will give results that are definitely indicative of results to be anticipated for home washes.

**Interfacial tension of aliphatic esters with surface-active agents. II.** Hemlata I. Lazo and C. M. Desai (M. T. B. Coll., Surate). *J. Indian Chem. Soc.* **30**, 283-7(1953). Measurements of interfacial tension of a series of esters against H<sub>2</sub>O containing Na and K oleates and stearates over a range of concentration show an increase followed by a decrease for Et, iso-Pr, Bu, iso-Bu, iso-Am acetates, Et acetoacetate, and Et isovalerate. With AcOMe and diethyl malonate there is a steady decrease in interfacial tension with increase in soap concentration. No maximum is found when the soaps are replaced by saponin. (*C. A.* **48**, 1108)

**The significance of optical bleaching agents for the production of washing and rinsing agents.** Kurt Lindner. *Seifen-Ole-Fette-Wachse* **79**, 412-13, 438-41 (1953). The structure, effect in products, and the determination of optical brightening are reviewed. An optical bleaching agent is strongly absorbed by fabrics during the first few washing or rinsing processes, less in subsequent operations. Adsorption is favored by closeness of weave and agitation during washing. (*C. A.* **47**, 12822)

**Investigations on the dependence of the scouring action on the pH value of the scouring liquor.** Rudolf Monch and Werner Graupner. *Textile-u. Fasertofftech.* **3**, 269-73(1953). Three scouring agents have been examined. One of them was a soap with 27% fat content. The second was a compound containing a fatty alcohol sulfonate. The third was a polyethylene oxide condensation product. The dependence of their scouring action on the pH value was investigated to demonstrate the formation of the electro-kinetic potential in the washing process. Values were found that conformed well with conditions experienced on a practical commercial scale. The results from the three tests were similar, showing that the amount of the electrical charge has a decisive bearing on the scouring process.

**Ampholytic detergents.** Dr. Richard Neu. *Manuf. Chemist.* **25**, 10-11(1954). Ampholytic detergents are both anion- and cation-active and possess both cleansing and disinfecting properties, and chemically are usually substituted alkyl aminoacetic acids, or poly(aminoethyl)-aminoacetic acids. These ampholytics can be used in combination with soaps without loss of bactericidal activity. They are attracted to negatively charged fibers and hairs and protect them against bacteria and fungi. They are tolerated by persons with skin ailments. These properties make these compounds useful in room disinfection, in dairy and other food industries, and in cosmetic applications.

**Synthesis of dodecylbenzene—synthetic detergent intermediate.** M. L. Sharrah and Geo. C. Feighner (Continental Oil Co., Ponca City, Okla.). *Ind. Eng. Chem.* **46**, 248-54(1954). The specific alkyl aryl hydrocarbon from petroleum sources most widely used as a detergent intermediate is dodecylbenzene, which is produced by alkylation of benzene and propene tetramer. Increasing the mole ratio of benzene to dodecene during alkylation gives higher yields of dodecylbenzene. The optimum temperature is dependent on the catalyst. The results of this work are useful guides to manufacturers of alkyl aryl detergent intermediates to promote maximum production of high quality product.

**Synthetic detergents from petroleum.** Peter W. Sherwood. *Erdol u. Kohle* **6**, 551-3(1953). Dodecyl and keryl benzenes are the more important intermediates for alkylaryl sulfonate production. Alkylating agents for the production of alkyl benzenes can be obtained from (1) a narrow range of paraffinic Pennsylvania or Michigan crude oils, (2) the propylene tetramer formed by polymerization in the presence of H<sub>3</sub>PO<sub>4</sub>, (3) the trimerization of butylene, and (4) certain Fischer-Tropsch synthesis fractions. The technologies of current American and German processes for the production of alkyl benzenes and the sulfonation of dodecyl benzene are reviewed. (*C. A.* **48**, 1032)

#### PATENTS

**Process of preparing amine sulfonates and products obtained thereof.** Milton Kosmin (Monsanto Chemical Co.). *U. S.* **2,658,072**. An isethionic acid compound selected from the class consisting of isethionic acid and 2-methylisethionic acid and the alkali metal, alkaline earth metal, and ammonium salts of such acid is heated with an alkylamine of from 8 to 18 carbon atoms to yield N-alkyltaurines or the corresponding salts in which the alkyl radical has from 8 to 18 carbon atoms. These products are useful as surface active agents.

**Improvements in washing and cleaning agents.** Henkel and Cie. *Brit.* **699,572**. The deposition of ash during the washing of textile materials with hard water is prevented by adding about 2-10% of magnesium hydrosilicate to the washing agent.

**Detergent compositions.** William Baird and Gerald Patrick Crowley (Imperial Chemical Industries, Ltd.). *Can.* **490,237**. An improved detergent composition is prepared by combining the condensation product of phenol with ethylene oxide with the condensation product of a B-monohydroxyethylamide of a fatty acid. The addition of the B-monohydroxyethylamides improved detergent properties especially in the presence of alkali.

**Process for the manufacture of soap.** L. Mannes and W. Pack (Henkel & Cie). *German* **864,594**. Soaps may be prepared by saponification of high molecular weight aldehydes such as lauryl aldehyde, stearyl aldehyde, etc., with alkali or alkaline earth hydroxides with heat and under pressure if necessary.