ABSTRACTS . . . . Don Whyte, Editor

• Oils and Fats

R. A. Reiners, Abstractor

Soybean alcohol extraction. II. Depression of ethanol vapor absorption in wash liquids. M. Iguchi and M. Sato (Chem. Inst., S.M.E.B.G., Dairen, Manchuria). *J. Soc. Chem. Ind., Japan* **46**, Suppl. binding, 199-200(1943). The absorption capacity of alcohol vapor in tetralin, castor oil, oleic acid, glycerol, and water is determined.

III. Influence of lecithin and sucrose on the solubility of soybean oil in ethanol. *Ibid.* 222. Lecithin and sucrose increase strongly the critical solubility temperature and the critical solubility concentration, especially in the presence of water. (*Chem. Abs.* **44**, 8139)

Factors influencing alkali refining of groundnut oil. S. A. Saletore, M. D. Patil, and M. S. Telang (Laxminarayan Inst. Technol., Nagpur). *Trans. Indian Inst. Chem. Engrs.* **1**, 1-11(1947-48). Indian expeller-pressed groundnut oil is refined by neutralization of the free fatty acids with a maximum of 10% theoretical excess NaOH without heating and with rapid stirring. Higher NaOH concentrations improve refining efficiency. Most-rapid settling is obtained at 70° with addition of 10-15% hot water or a 5% salt solution. (*Chem. Abs.* **44**, 8139)

n-butyl oleate from *n*-butyl alcohol and oleic acid. D. F. Othmer and S. A. Rao. *Ind. Eng. Chem.* **42**, 1912(1950). This reaction was shown to be a second order reaction and an empirical equation for the reaction rate developed. The equilibrium constant and heat of reaction were also determined.

Enzymic oxidation of fatty acids. A. L. Lehninger (Univ. of Chicago). *Record Chem. Progress* **11**, 75-82(1950). A review of 14 references. (*Chem. Abs.* **44**, 7907)

A comparison between oil palms and coconuts. P. J. S. Cramer. *Landbouwk. Tijdschr.* **62**, 427-48(1950). After detailed discussion of the yield, yield in oil, diseases, cost, etc., the conclusion is that the oil palm is the best answer to the world's fat demand. The only drawback is the heavy capital outlay. (*Chem. Abs.* **44**, 8138)

More oil from cottonseed. N. H. Moore. *Chem. Eng.* **57**, No. 6, 106(1950). The recovery of oil from cottonseed by a combination of expelling and solvent extraction is described.

The solvent extraction of oilseed. E. P. Colfield, Jr. *Georgia Inst. Technol. State Eng. Expt. Sta., Circ. No.* **28**, 103 pp.(1950). 88 references. (*Chem. Abs.* **44**, 7569)

Determinations of fats in oil seeds and meals. H. A. Boekenoogen (Unilever Lab., Zwijndrecht, Netherlands). *VII° Congr. intern. inds. agr., Paris* **1948**, Q2 M1-7. To determine fat, dry 3-5 g. milled seeds for 3/4 hr. at 103-5°; extract with low boiling petroleum ether for 2.5 hrs.; dry the residue at 103-105°; mix with 5 g. fine preheated sand and again extract for 2.5 hrs. Distill the extract and dry the residue at 103-5°. Repeat the extraction until no more than 10-15 mg. is found after extraction during 1.5 hrs. (*Chem. Abs.* **44**, 8135)

Molecular dimensions of fatty acid esters by viscosity studies. S. Iwai (Tokyo Prefectural Ind. Inst.). *J. Soc. Chem. Ind., Japan* **44**, Suppl. binding 222-223(1941). The viscosities of methyl stearate, ethyl stearate, and methyl oleate in benzene were measured at various concentrations. The ratio of molecular length to diameter was calculated from the data. Methyl and ethyl stearates have a straight-chain structure in benzene, but methyl oleate has a bent structure. (*Chem. Abs.* **44**, 7625)

Chemistry of the spoilage of fats. XXIII. Hindrance of autoxidation by nitro compounds and quinones. K. Taufel and E. Arens. *Fette u. Seifen* **51**, 307-9(1944). Whale oil was treated with a variety of quinones and nitro compounds. Among the most effective antioxidants were quinhydrone, 2-nitrophenanthrenequinone, 4-nitrophenanthrenequinone, and 2,7-dinitrophenanthrenequinone. (*Chem. Abs.* **44**, 7567)

Prevention of rancidity of oleic acid from rice oil. S. Naito and T. Tsuchiya (Tokyo Ind. Research Inst. Lab.). *J. Nippon Oil Technol. Soc.* **3**, No. 1/2 134-40(1950). The MacKey test on samples with 0.5% α-naphthol or pyrocatechol indicated that those kept in a sealed container with N did not change while those left in contact with air lost their antioxidant properties within one month. (*Chem. Abs.* **44**, 7568)

Stability of olive oil. H. A. Schweigart and Ruth Baer (Univ., Berlin). *Fette u. Seifen* **51**, 351-5(1944). Storage tests on olive oil showed an increase in acidity at 30° but no increase at 2° or room temperature over nine months. There was no difference between samples stored in glass and samples stored in metal cans. Peroxides in glass increased slowly at 2° and room temperature and rapidly at 30°. There was no relation between peroxides and temperature in metal cans. Peroxides in metal cans reached very high values once the cans were opened. (*Chem. Abs.* **44**, 7569)

Some effects of salt and moisture on rancidity in fats. I. Chang and B. M. Watts (Syracuse Univ.). *Food Res.* **15**, 313(1950). Dry sodium chloride and concentrated sodium chloride solutions behaved as prooxidants in fat oxidation. Partial or complete dehydration of salt solutions in contact with fat greatly increased rancidity. Sodium chloride did not specifically affect the activity of solutions containing unsaturated fat oxidase.

The preparation of azelaic acid by noncatalytic oxidation of ricinoleic acid. K-C. Kao and K-Y. Cha. *Bull. Chungking Inst. Ind. Research* No. **24**, 8 pp.(1949). Azelaic acid is prepared from crude ricinoleic acid with concentrated HNO_3 as the oxidizing agent. A 75.8% yield was obtained when HNO_3 in a ratio of 1:3 was allowed to react for 20 hrs. (*Chem. Abs.* **44**, 8869)

Highly unsaturated acids. I. Isolation of hexadecatrienoic acid, $C_{16}H_{26}O_2$, in bonito oil and determination of its constitution. S. Matsuda (Osaka Imp. Univ.). *J. Soc. Chem. Ind., Japan* **45**, Suppl. binding 3-4(1942). Repeated fractional distillation of the mixed methyl esters of the fatty acids from bonito oil gave $C_{16}H_{26}O_2$, b_{15} 186-9° C., saponification no. 213.1, and iodine no. 283.4. It was shown by ozonolysis of the methyl ester to be 6,10,14-hexadecatrienoic acid.

II. The isolation of octadecatetraenoic acid, $C_{18}H_{28}O_2$, from bonito oil and determination of its constitution. *Ibid.* 4-6. Ozonolysis of the methyl ester, b_{15} 208-12° C., saponification no. 193.2, iodine no. 343.5, of the acid $C_{18}H_{28}O_2$ and of the methyl ester of its partially hydrogenated derivative proved the acid is 4,8,12,15-octadecatetraenoic acid, identical with moroctic acid.

III. The separation of highly unsaturated C_{20} acids from bonito oil. *Ibid.* 6-7. Repeated fractional distillation of the methyl esters and precipitation of the Na salts from acetone of the fatty acids from bonito oil gave an eicosatetraenoic acid, $C_{20}H_{32}O_2$, neutralization no. 184.2, and iodine no. 331.0 and an eicosapentaenoic acid, $C_{20}H_{30}O_2$, neutralization no. 186.0, and iodine no. 423.0.

IV. The constitution of the eicosatetraenoic acid $C_{20}H_{22}O_2$. *Ibid.* 8. Ozonolysis of the methyl ester of this acid showed the acid is 4,8,12,16-eicosatetraenoic acid, identical with that isolated from sardine oil. (*Chem. Abs.* **44**, 8857)

Highly unsaturated acids. VII. Constitution of docosapentaenoic acid $C_{22}H_{34}O_2$, in bonito oil. VIII. Mechanism of the hydrogenation of the highly unsaturated acids with Raney nickel. S. Matsuda (Osaka Imperial Univ.). *J. Soc. Chem. Ind. Japan* **45**, Suppl. binding, 134-6, 316-7(1942). The structure was shown to be

$$CH_3CH_2CH:CH(CH_2)_2CH:CHCH_2$$
$$-CH:CH(CH_2)_2CH:CH(CH_2)_2CH:CH(CH_2)_2CO_2H.$$

(*Chem. Abs.* **44**, 8858)

Preparation of unsaturated higher alcohols. X. S. Komori (Osaka Imperial Univ.). *J. Soc. Chem. Ind., Japan* **45**, Suppl. binding, 414-2(1942). Al oxide was used as a promoter for the Fe oxide catalyst used for hydrogenating unsaturated fatty esters to the corresponding unsaturated alcohols. (*Chem. Abs.* **44**, 8854)

Pyrolysis of the calcium salts of fatty acids. H-L. Hsu, J. O. Osburn, and C. S. Grove Jr. (State Univ. of Iowa). *Ind. Eng. Chem.* **42**, 2141(1950). Thermal cracking of the calcium salts of tung oil fatty acids leads to a high yield (49%) of coke and a low yield (42%) of cracked distillate which contained 26% aromatic compounds. Similarly, cracking of calcium stearate leads to a low yield (17%) of coke and a high yield (76%) of cracked distillate which contained only 4% aromatic compounds.

The partial hydrogenation of triolein. J. H. Benedict and B. F. Daubert (Univ. of Pittsburgh). *J. Am. Chem. Soc.* **72**, 4356(1950). Triolein was hydrogenated at 180-200° and 70 psi. for three hours with a Raney nickel catalyst (0.05%). The yield of iso-oleic acids was 35%; *trans*-8-octadecenoic and elaidic acids were isolated.

The chemical nature of a unique fatty acid. K. Hofmann and R. A. Lucas (Univ. of Pitts.). *J. Am. Chem. Soc.* **72**, 4328(1950). A new fatty acid isolated from *Lactobacillus* *arabinosus* is believed to contain 19 carbon atoms and a cyclopropane ring.

CHEMISTRY OF EPOXY COMPOUNDS. XII. COOXIDATION OF ALDEHYDES AND OLEIC ACID, METHYL OLEATE,, AND OLEYL ALCOHOL. D. Swern and T. W. Findley (Eastern Regional Res. Lab.). *J. Am. Chem. Soc.* **72**, 4315(1950). The oxidation of the double bond to form the corresponding epoxy compound is described in which an aldehyde, oleic acid or derivative, and oxygen are reacted in the presence of ultraviolet light.

SYNTHESIS OF MONO- AND DIGLYCERIDES. I. REACTION VELOCITY OF THE FORMATION OF MONOGLYCERIDES. S. Ueno and T. Yamamura (Imperial Univ. of Osaka). *J. Soc. Chem. Ind., Japan* **46**, Suppl. Binding, 19(1943). The reaction velocity of the formation of monoglycerides by heating a fatty acid with glycerol can be expressed by the equation governing first-order reactions. (*Chem. Abs.* **44**, 8213)

THE ACTION OF FATTY ACID SALTS ON THE MONOCHLOROHYDRINS OF GLYCOL AND GLYCEROL. EFFECT OF TEMPERATURE ON THE YIELD OF MONOESTERS. P. Savary (Faculte sci., Marseilles). *Bull. soc. chim. France* **1950**, 218-22. When equimolar amounts of K stearate and laurate react with $CH_2(OH)CH_2Cl$, $CH_2(OH)CH(OH)CH_2Cl$, or $(BrCH_2)_2C(CH_2OH)_2$ in sealed tubes at 100° or over, mixtures of monoesters with diesters and free glycols resulting from disproportionation of the monoesters are formed. The yield of monoester usually shows a maximum with time. Higher temperatures decrease the yield of monoester; addition of excess halohydrin increases it. (*Chem. Abs.* **44**, 8325)

CLARIFICATION OF THE STRUCTURE OF LINOLEIC ACID BY RAMAN SPECTRA. G. V. Pigulevskii and I. N. Naidenova. *Doklady Akad. Nauk S.S.S.R.* **72**, 717-19(1950). The Raman spectrum of the methyl esters of the acids of natural sunflower oil, containing 50% linoleic acid, shows only one double-bond frequency 1657 $cm.^{-1}$, and no line at 1643 which however does appear in methyl linoleate synthesized from the tetrabromide according to Rollett. Evidently Rollett's debromination procedure results in partial isomerization which is responsible for the 1643 line. If the debromination of the linoleic acid tetrabromide is effected in pyridine solution under mild conditions, the 1643 $cm.^{-1}$, frequency does not appear in the spectrum of the methyl ester. Natural linoleic acid is a cis-cis isomer, with only one double-bond Raman frequency at 1657 $cm.^{-1}$. The second frequency 1639 $cm.^{-1}$ (close to 1643) found by McCutcheon *et al.* is undoubtedly due to partial isomerization. (*Chem. Abs.* **44**, 8187)

USE OF PAPER PARTITION CHROMATOGRAPHY IN THE IDENTIFICATION OF THE VOLATILE FATTY ACIDS. E. R. Hiscox and N. J. Berridge (Univ. of Reading). *Nature* **166**, 522(1950). A roughly quantitative method for the identification of volatile fatty acids is described. The ammonia or ethylamine salts of fatty acids are separated in a system in which water is the stationary phase, butanol is the mobile phase, and bromcresol-green is the indicator. Using ammonium salts, acids up to C_{12} were separated; using ethylamine salts, acids up to C_8 were separated. The latter salt gives more durable and clearly defined spots.

THE DETERMINATION OF THE IODINE NUMBER OF THE CRACKING PRODUCTS OF VEGETABLE OILS WITH ABSOLUTE ALCOHOL AS SOLVENT. A. B. K. Penn and T.-S. Wen. *Bull. Chungking Inst. Ind. Research* No. 2, 6 pp.(1947). Hubl's method for iodine no. is modified by using ethyl alcohol instead of chloroform, the iodine no. being slightly smaller than that by the original method. The improved method cannot be applied to natural vegetable oils. (*Chem. Abs.* **44**, 8680)

REPORT ON DETERMINATION OF FAT IN FISH MEAL. M. E. Stansby (U. S. Fish and Wildlife Service, Seattle, Wash.). *J. Assoc. Offic. Agr. Chemists* **33**, 146-9(1950). An attempt was made to improve the precision of a method previously studied collaboratively. (*Chem. Abs.* **44**, 8560)

A NEW METHOD FOR THE DETERMINATION OF FAT IN CORN PRODUCTS. G. Hampel (Reichsanst. Getreideverarbeitung, Detmold, Ger.). *Getreide, Mehl Brot.* **2**, 69-70(1948); *Chem. Zentr.* (Russian Zone Ed.) **1948 II**, 669. The finely ground sample is placed in a tube and petroleum ether percolated through the tube at a low rate for four hours. The amount of oil extracted is determined by evaporation of the solvent. Agreement with the Soxhlet method is within 0.1%. (*Chem. Abs.* **44**, 8135)

THE ESTIMATION OF OIL PERCENTAGE IN SAFFLOWER SEED AND THE ASSOCIATION OF OIL PERCENTAGE WITH HULL AND NITROGEN PERCENTAGES, SEED SIZE, AND DEGREE OF SPININESS OF THE PLANT. C. E. Claassen, W. G. Ekdahl, and G. M. Severson. *Agronomy J.* **42**, 478(1950). The oil content of safflower seeds was found to be directly proportional to the spininess of the plant and inversely proportional to the hull content and the nitrogen content. Seed size was of little use in breeding for high oil content.

CONSTITUENTS OF TURTLE OIL. II. A. Ogata and A. Minato. *J. Pharm. Soc.* **61**, 213-16(1941); *Complete Abstracts Japan Chem. Lit.* **15**, 905-6(1941). The sterol-free unsaponifiable matter from turtle oil was analyzed chromatographically (Al_2O_3) and a small amount of yellow oil separated which had an iodine no. 358.5, molecular weight 573.3, m.p. —5° C., b.p. 280° C. Elemental analysis gave the formula $C_{42}H_{70}$. The remainder of the unsaponifiable matter was thought to consist largely of octadecanol. (*Chem. Abs.* **44**, 8681)

STUDIES ON THE COMPOSITION OF HORSE OIL. I. COMPOSITION OF HORSE OIL IN RELATION TO THE DEPOT FATS OF OTHER PASTURE FED ANIMALS. E. G. Brooker and F. B. Shorland (Dept. of Sci. and Inds. Res. Wellington, New Zealand). *Biochem. J.* **46**, 80 (1950). The fatty acids from horse oils were analyzed and found to consist of 25% palmitic acid with minor proportions (<5%) of stearic and myristic acids. The C_{18} unsaturated acids comprised 57% of the total and consisted of 60% oleic acid, 10% linoleic, and 30% linolenic acid. About 8-10% of the acid was palmitoleic acid, and there was a small portion of C_{20} unsaturated acids. Horse-hoof oil contained less palmitic acid and more palmitoleic acid.

CALOPHYLLUM OIL PRODUCED IN KAINEN ISLAND. T. Tokunaga and S. Ueno. (Osaka Imperial Univ.). *J. Soc. Chem. Ind., Japan* **46**, Suppl. binding, 19-20(1943). Crude calophyllum oil produced in Kainen Island had m. 16.9° C., acid no. 56.9, saponification no. 195.8, iodine no. (Wijs) 95.0, and acetyl value 29.4; after hydrogenation m. 52.2-55.1° C., acid no. 65.7, saponification no. 190, iodine no. 4.1, and acetyl value 23.0. The crude oil was partially hydrogenated, fractionally distilled, and fatty acids present were converted to methyl esters and distilled. The mixture contained 32% C_{16}, 67% C_{18}, and traces of C_{14}, C_{20}, and C_{22} acids. The crude oil extracted three times with 95% ethyl alcohol gave 39.2% alcohol-soluble material, acetyl no. 114.7; and 60.8% alcohol insoluble material, acid no. 16.7, acetyl value 10.0. The alcohol-soluble mixture was neutralized with 0.5 N alcoholic KOH to give 27% acidic portion, acetyl value 39.0, acid no. 178.7; and 12.2% neutral part, acid no. 2.5, acetyl value 99.11, ester value 172.8, saponification no. 175.3, and iodine no. 81.6. (*Chem. Abs.* **44**, 8681)

NICANDRA PHYSALOIDES, A NEW OIL-PRODUCING PLANT. K. Moldenhaver. *Przemysl Rolny i Spozywczy* **4**, 50(1950). *Nicandra physaloides* planted in Poland yields from 1 ha. 800-1000 kg. of seeds containing 18% oil which is a valuable raw material for the varnish industry. (*Chem. Abs.* **44**, 8081)

ADULTERATION OF GROUNDNUT (PEANUT) OIL WITH SPECIAL REFERENCE TO ITS USE IN HYDROGENATION. N. G. Chatterjee. *Indian Soap J.* **15**, 253-5(1950). A discussion of "unintentional" impurities and intentionally added adulterants. (*Chem. Abs.* **44**, 8680)

VEGETABLE OILS AND FATS OF SOUTH-EASTERN ASIA. S. Kawamura. *J. Agr. Chem. Soc. Japan* **18A**, 135-46, 157-76(1942); **19A**, 31-49, 65-72, 97-106, 115-22, 133-54(1943). A collection of data compiled according to botanical classification of oil-bearing plants, with references. An index in English, Dutch, and Latin is given. (*Chem. Abs.* **44**, 8679)

NOW—A PRECISE GAGE FOR ENROBING FATS. H. Crooks and W. F. Carriero (Cocoline Products, Inc.). *Food Industries* **22** (10), 54(1950). Apparatus and method are described for accurately determining the softening point of the fats used as summer coatings in the confectionery and biscuit industries.

TWO EDIBLE OILS SEEN LICKING PROBLEMS. Anon. *Food Industries* **22** (10), 55(1950). The use of sunflower seed oil in edible products is suggested due to its flavor reversion stability. A stabilized refined corn oil is now being marketed which imparts increased stability to potato chips.

THE PREPARATION OF FATTY ACID METHYL ESTERS. G. C. Willis Jr. (W. C. Hardesty Co.). *The Chemist Analyst* **39**, 62 (1950). One volume of fatty acid is mixed with three volumes of methanol, and 2% H_2SO_4 (fatty acid basis) is added. The excess methanol is removed on the steam bath and the H_2SO_4 and water is drained off. The unesterified fatty acids (usually less than 1%) are removed as the soaps by the addition of the theoretical amount of 20° caustic.

BOUVEAULT REDUCTION OF CERTAIN NATURAL GLYCERIDES. II. G. Jacini. *Chimica e industria* (Milan) **30**, 199-200(1948). The reduction with just over stoichiometric quantities of Na and butyl alcohol at 120° of oils and methyl esters was investigated. The yields were: castor 41.2, linseed 67.5, peanut 81.2, sunflower 58, almond 69, and babassu oils 85.7, and methyl ricinoleate 61, linoleate 88, and oleate 84.7%. The alcohols contain a small proportion of acid, which in most cases is difficult to remove by extraction with alkali because of the formation of stable emulsions. The reduction of the methyl esters gives a much higher yield of alcohol than does that of the corresponding natural glyceride. (*Chem. Abs.* **44**, 8678)

Products of polymerization of oleic acid. A. V. Topchiev and T. P. Vishnyakova. *Doklady Akad. Nauk S.S.S.R.* **71**, 685-8(1950). Polymerization of methyl oleate in the presence of BF_3-H_3PO_4, followed by extraction with absolute methanol, yielded the polymerization product $(C_{19}H_{36}O_2)_2$, Br no. 27.8. Saponification yielded $(C_{18}H_{34}O_2)_2$, Br no. 29.8. The structure of the oleic acid dimer may be:

$Me(CH_2)_7CH:C[(CH_2)_7CO_2H]CH[(CH_2)_8Me](CH_2)_7CO_2H$. (*Chem. Abs.* **44**, 8323)

Elaidinization of derivatives of unsaturated acids. J. J. A. Blekkingh. *Bull. soc. chim. France* **1950**, 278-82. In a linear chain of an unsaturated acid with one double bond the possible geometrical isomers are trans A I, trans A II, trans B I, trans B II, and cis. The cis form can be changed with elaidinization catalysts into trans B forms, but not trans A forms, because of steric hindrance. The catalyst must be a compound with variable valence. Two atoms of catalyst unite in trans positions on the double bond, H atoms shift, the catalyst is removed, and a rotation of 180° on the bond results in formation of the new isomer. (*Chem. Abs.* **44**, 8316)

Stabilization of edible fats by condiments or spices. S. C. Sethi and J. S. Aggarwal (National Chem. Lab. of India, Poona). *Nature* **166**, 518(1950). Peanut oil was heated with spices to 275-280°, cooled, and filtered. Stability tests at 100° indicated that the resultant oil was a little more stable than the original oil. Cinnamon leaves and red chillies were most effective.

Carotenoids and vitamin A. R. F. Hunter (Bakelite, Ltd.). *Research* **3**, 453(1950). An excellent review.

Two non-flammable solvent plants in Minnesota. Anon. *The Soybean Digest* **10** (12), 18(1950). Two new soybean extraction plants using trichloroethylene are described.

Solvent extraction plant for rice bran pays for self in one year. Anon. *Food Processing* **11** (10), 48(1950). The continuous extraction of oil from rice bran is described. The plant has a rated capacity of 50 tons per day and produces a stable crude oil containing 3-6% free fatty acids.

PATENTS

Production of dehydrated castor oil. C. A. Coffey and W. T. Walton (Sherwin-Williams Co.). *U. S. 2,517,765.* A process is described for dehydrating castor oil in which the catalyst is added in increments during the dehydration. The catalyst is a sulfuric acid solution containing a diluant.

Synergistic antioxidants containing amino acids. L. A. Hall (Griffith Labs., Inc.), *U. S. 2,518,233.* Mixtures of a gallic acid ester, an organic acid such as benzoic, fumaric, tartaric, or citric and an amino acid such as glycine, threonine, phenylalanine, arginine, methionine, tryptophane, tyrosine, butyl tyrosine, or alanine are claimed as antioxidants for fatty acid glycerides.

Isolation of stigmasterol. E. B. Hershberg (Schering Corp.). *U. S. 2,520,143.* A method of isolating stigmasterol from a mixture of sterols is claimed which consists of acylating the hydroxyl groups of the mixed sterols, saturating the double bonds with halogen, oxidizing the mixture with an oxidizing agent capable of oxidizing the unhalogenated sterol side chain, dehalogenating the oxidation product, and separating the acid ester of stigmasterol from the dehalogenated mixture.

Partial hydrogenation of unsaturated glyceride oils in solvents. J. H. Sanders (The Procter and Gamble Co.). *U. S. 2,520,440.* A continuous process for the partial hydrogenation of vegetable oils of iodine number 90-140 is described, which consists of dissolving the oil in 0.5 to 15 parts of solvent and hydrogenating it in the presence of a nickel catalyst at a temperature between 60° and 125° and at a pressure of 20-200 psi. More than half of the polyethylenic acid radicals are claimed to be converted to normal oleic acid radicals, and materially less than half are converted to saturated and isooleic acid radicals.

Continuous hydrogenation of unsaturated fatty acids and fatty esters. V. Mills, J. H. Sanders, and H. K. Hawley (The Procter and Gamble Co.). *U. S. 2,520,422-5.* Unsaturated fatty material is hydrogenated, using a nickel catalyst at 500 psi and a temperature between 60° and 250°. The apparatus and conditions are fairly completely described.

Process of treating fatty acids. L. D. Myers (Emery Industries Inc.). *U. S. 2,520,470.* Tar still distillate, containing less than 10% unsaponifiables, is treated with an alcohol, acid, or ketone of less than three carbon atoms to form a solution containing at least 10% fatty acids. The insoluble residue is filtered off and the fatty acids recovered from the solution.

Process for preparing suspensions of solid triglyceride and liquid oil. G. W. Holman and O. T. Quimby (The Procter and Gamble Co.). *U. S. 2,521,219.* A suspension of solid triglycerides in a liquid fatty ester which has a flowable consistency in the temperature range 70-100°F. and a viscosity of not more than 300,000 centipoises was obtained by crystallizing at least 70% of a high melting triglyceride in the beta crystalline form, mixing this fat with a liquid fatty ester (10-60% suspension) and, at any stage in the process, subdividing the solid triglyceride to a particle size from about 60-mesh to 350-mesh.

Solvent fractionation of fatty material. W. M. Leaders and F. A. Norris (Swift & Co.). *U. S. 2,521,234.* A nonreverting soybean oil of improved flavor and color characteristics can be produced by extracting crude soybean oil three times with liquid propane.

Permanently pumpable oleaginous suspension. P. J. Mitchell Jr. (The Procter and Gamble Co.). *U. S. 2,521,242.* A composition of pumpable and flowable consistency in the temperature range of 70-100° F. was obtained by suspending 15-60% of a solid triglyceride (70% beta form) in a liquid fatty acid ester.

Fatty acid production in hydrocarbon synthesis. C. H. Worsham and C. H. Holder (Standard Oil Dev. Co.). *U. S. 2,521,436.* Fatty acids are produced by reacting CO and H_2 (1.0-1.3 volumes of H_2 per volume of CO) at 600-700° F., and 500-700 psi over a dense fluidized bed of finely divided K_2CO_3 promoted sintered reduced red iron oxide catalyst.

Hydrogenating and deodorizing edible oils. R. H. Potts and C. E. Morris (Armour & Co.). *U. S. 2,521,602.* An oil is hydrogenated at a pressure in excess of that required for hydrogenation so that considerable amounts of free hydrogen are absorbed into the oil. The oil is then passed into a zone in which the pressure is below atmospheric and the absorbed hydrogen and odoriferous material are carried from the oil.

Method of treating low-grade fatty materials. W. J. Paterson (Lever Bros. Co.). *U. S. 2,521,742.* Lower alkyl esters of fatty acids are prepared by treating a fatty stock containing free fatty acids with the vapor of a lower alkanol at a temperature above 150° in the presence of an insoluble inorganic oxygenated material as a catalyst.

Method of and apparatus for distillation of stock containing fatty acids and the like. F. B. White and M. Strawn (Foster-Wheeler Corp.). *U. S. 2,521,766.* A system for efficiently stripping and distilling fatty acids from a fatty acid containing material is described.

Antioxidant. H. R. Kraybill and B. W. Beadle (A. W. Brickman, V. Conquest, F. J. Madden, W. B. Oleson, and E. T. Filbey as trustees). *U. S. 2,521,856.* Fat containing materials are stabilized against oxidative rancidity by the addition of a) from 0.01 to 0.02% (based on fat present) tertiary butylated hydroquinone monoalkyl ether in which the alkyl group contains 1-4 carbon atoms; b) from 0.002 to 0.005% hydroquinone; c) from 0.002 to 0.005% acidic material from the group citric acid, ascorbic acid, oxalic acid, phosphoric acid, ethyl acid phosphate, and triethyl phosphate.

Method for making methoxyethyl stearate. W. M. Gearhart and M. Broyles (Eastman Kodak Co.). *U. S. 2,521,906.* An alkoxyalkanol and a fatty acid are reacted in the presence of an acid catalyst at 70-120°. The catalyst is neutralized, the unreacted alcohol distilled off, the unreacted fatty acid precipitated as an alkaline earth salt, and the ester separated by filtration.

Method of breaking emulsions to recover wool fat. R. Shawcross. *U. S. 2,522,140.* Wool grease is recovered from wool wash water by contacting the emulsion with a sulfonated phenolic cation exchange resin in its acid form. This breaks the emulsion while the fat is deposited on the resin particles.

Composition containing and process for preparing stabilized unsaturated fatty oils. J. I. Wasson (Standard Oil Dev. Co.). *U. S. 2,522,476.* The long chain fatty acid partial esters of a polyhydric alcohol are stabilized against oxidation and are improved as rust inhibitors by reacting them with an alkyl mercaptan of 6-20 carbon atoms in the presence of a Friedel-Crafts catalyst.

Antioxidant. W. O. Lundberg (Regents of the Univ. of Minn.). *U. S. 2,523,127.* Animal fat is claimed to be stabilized by the addition of from 0.01% to 1.0% of a phenolic antioxidant and from 0.01% to 1.0% of an amino acid. The phenolic compound may be a tocopherol, hydroquinone, or nordihydroguaiaretic acid; the amino acid may be methionine, threonine, leucine, norvaline, phenylalanine, cysteine, tryptophane, isoleucine, proline, alanine, glutamic acid, valine, asparagine, arginine, or norleucine.

Process for the uninterrupted recirculation of unrefined alcoholic fatty acid solvent. A. C. Beckel, J. C. Cowan, and P. A. Belter (U.S.A.). *U. S. 2,524,037.* A process is disclosed in which hot 95% ethanol is used to extract soybean flakes of less than 3% moisture. The miscella is cooled to separate the oil from the solvent and the supernatent liquor recycled to the extraction column. The recycling can continue without the addition of solvent other than that recovered from the extracted flakes for a substantially unlimited number of times.

Process for bleaching compounds of fatty acids or the like. V. Jespersen (Copenhagen, Denmark). *U. S. 2,524,056.* A method of bleaching fats is claimed in which 0.1 to 0.5% hydrogen peroxide, based on the weight of fat, is added to a layer of water underlying the fat and the water is boiled until the fat is sufficiently bleached.

Treatment of glyceride oils. S. W. Gloyer (Pittsburgh Plate Glass Co.). *U. S. 2,524,103.* A furfural extract of glyceride oils containing a relatively high proportion of free fatty acids, sterols, and tocopherols is extracted with a water-saturated furfural solution at about 70° F. in order selectively to extract the free fatty acids, sterols, and tocopherols.

Treatment of glyceride oils. K. F. Mattil (Swift & Co.). *U. S. 2,524,732.* It is claimed that the cold test of vegetable oil is improved by the addition of 0.005 to 0.2% of a phthalyl acetylated tetraparaffin alkylated naphthalene.

Stabilized fat composition. P. Gyorgy (Wyeth, Inc.). *U. S. 2,526,865.* Fats are stabilized by the addition of an antioxidant mixture consisting of a hydroxychroman and rice bran extract in amount from 2-10% of the entire composition, the hydroxychroman constituting from 0.02-0.3% of the mixture.

Fat rendering process. P. Halmbacher (Paul-Lewis Labs., Inc.). *U. S. 2,527,305.* Fats may be rendered in the presence of a mixture consisting of a proteolytic enzyme of plant, mold, or bacterial origin, a water-3 carbon chain polyhydric alcohol solvent, and an enzyme activator selected from the group consisting of cysteine, methionine, and bisulfites.

• Biology and Nutrition

R. A. Reiners, Abstractor

Seasonal variations in the vitamin A content of Victorian butterfat. K. T. H. Farrer, W. M. Balding, H. S. Warren, and R. G. Miller (Kraft Walker Cheese Co., Melbourne). *Australian J. Sci. Research* **B2**, 355-67(1949). The total vitamin A potency of butterfat, derived from butter or cheese was determined on samples from four districts in 1945 and 1947-48. Victorian butters had a normal vitamin A potency of the order of 18,000 I.U./lb. A minimum vitamin A potency of the order of 11,000 I.U./lb., was observed in late summer when pastures dried off and a maximum vitamin A potency, up to 29,000 I.U./lb., in early spring following new growth. Wide variations which were found in the vitamin A potency of butterfats from the same area at the same period in different years were related to the prosperity of the seasons and the availability of green feed. (*Chem. Abs.* **44**, 8552)

The critical temperature of solution as a rapid test to distinguish oleomargarine from butter. H. A. Felman and H. A. Lepper (U. S. Food and Drug Adm., Washington, D. C.). *J. Assoc. Offic. Agr. Chemists* **33**, 492-8(1950). A simple method for determining the critical temperature of solution for oils in an ethyl alcohol-isoamyl alcohol mixture (1:2 by volume) is given. The critical temperature of solution for all butter oils tested was 42-53°; for all oleomargarine oils tested, 66-75°. (*Chem. Abs.* **44**, 8552)

Effect of the dietary level of tocopherols on their metabolism in swine. J. W. Bratzler, J. K. Loosli, V. N. Krukovsky and L. A. Maynard (Cornell Univ.). *J. Nutrition* **42**, 59(1950). The total fat of barrows maintained on a vitamin E-low, purified ration for 75 days had an oleic acid content of about 64% contrasted with an average value of 72% for animals fed on mixed tocopherol supplemented diet.

Report on fat in milk chocolate and refractory chocolate products. C. B. Stone (U. S. Food & Drug Admin., Cincinnati, O.). *J. Assoc. Offic. Agr. Chemists* **33**, 342-7(1950). A collaborative study indicates that the modified Hillig method is superior to both the Ferris method and the A.O.A.C. method. (*Chem. Abs.* **44**, 8558)

The combination of fatty acid anions with proteins. J. M. Luck (Stanford Univ., Calif.). *Discussions Faraday Soc.* **1949**, No. 6, 44-52. A review of the recent work on the interaction of ions with proteins, particularly fatty acid ions with serum albumin. The author proposes the hypothesis that the binding capacity of serum albumin for fatty acids is a dual function of the large number of positively charged groups and the proximity of some of these to nonpolar side chains of certain amino acids. (*Chem. Abs.* **44**, 8395)

Fat production by mold. I. T. Kaibara. *J. Agr. Chem. Soc. Japan* **22**, 89-90(1948). *Penicillium javanicum* was cultured in the juice of sweet potatoes saccharified with malt, containing 0.2% urea, 0.025% $MgSO_4$, and 0.03% K phosphate, at 30° for 20-25 days. After culture the dried mycelia contained about 18% crude fat. The fat had m. 14-17°, n_D^{20} 1.4681, acid value 9.02, saponification value 190.1, and iodine value (Hubl) 86.62. The optimal pH for the growth of the mold was 5.4. Fat production was good in the range of slightly acidic to slightly alkaline. Both growth and fat production were better on glucose medium when the glucose concentration was increased from 5 to 20%. Results were equally good with glucose, sucrose, starch, and lactose. (*Chem. Abs.* **44**, 8418)

Desirable fat levels in the diet. *Nutrition Reviews* **8**, 232(1950). Evidence is presented which shows that the amount of fat needed in the diet for optimum growth may depend to a great extent on the source of the fat.

Peanut meal, mixtures of soybean and cottonseed, and mixtures of soybean and peanut meals as sources of protein for baby chicks. L. G. Blaylock and L. R. Richardson (Texas Agri. Exp. Station). *Poultry Science* **29**, 656(1950). The addition of 0.1% L lysine to feeds in which mixtures of soybean and cottonseed meal were the chief sources of protein increased the rate of growth in every case. Peanut meal was a satisfactory source of protein for growth of chicks to six weeks of age when it was supplemented with APF concentrate, 0.3% DL methionine, and 0.2% L lysine. Chicks fed mixtures of soybean and peanut meals showed greater gains when the ration was supplemented with methionine and an APF concentrate.

• Waxes

E. H. McMullen, Abstractor

The composition of solid paraffins from mineral oils and low-temperature tars (from brown coal). Ernst Terres, Karl Fischer, and Ernst Sasse (Edeleanu-Gesellschaft m.b.H., Berlin-Schöneberg). *Brennstoff-Chem.* **31**, 193-207(1950). The paraffin fraction of oils and tars is generally considered to have a very complex nature, containing many thousands of compounds. Methods were worked out for separating such mixtures into their individual compounds by using fractional crystallization from selective solvents. This method of separation was applied to a homogeneous paraffin from the low-temperature distillation of brown coal tar. The brown-coal paraffin consists of straight-chain paraffins and the homologs of one isoparaffin type. (*Chem. Abs.* **44**, 9142)

Determination of the extent of branching of synthetic and natural solid paraffins by hydrogenating-cracking on a cobalt catalyst. Herbert Koch and Eckart Titzenthaler (Max-Planck-Inst. Kohlenforschung, Mülheim-Ruhr, Ger.). *Brennstoff-Chem.* **31**, 212-21(1950). Various synthetic and natural solid paraffins were subjected to hydrogenating-cracking at 180-230° on a Co catalyst used for Fischer-Tropsch synthesis. The principal product was CH_4; the accompanying liquid hydrocarbons were analyzed by precise fractionation over the boiling range 30-170°. Branched locations are preferentially maintained in a demethylating cracking, and the fraction of iso-compounds in the cracked material gives a quantitative measure of the iso-compounds in it before cracking. (*Chem. Abs.* **44**, 9335)

Evaluation of quality of paraffin wax. F. H. MacLaren (Standard Oil Co., Ind.). *Ind. Eng. Chem.* **42**, 2134(1950). A new breaking strength test for paraffin wax has been developed, which is simple in operation and yields closely reproducible values. Because of the close relationship between the breaking strength of paraffin wax and its quality as a paper-coating agent, results of this test are expressed in values called Indiana coating index. Data on paraffin waxes by this test are shown to give excellent correlation with data obtained by laboratory tests for sealing strength and blocking (sticking). The relationship of index values to tensile strength values of paraffin waxes by several currently used methods is also known. Blocking resistance, sealing strength, and tensile strength (by various methods) of paraffin waxes are shown to vary inversely with the apparent oil content of paraffin wax as measured by the new method.

WAXES: TYPES, PRODUCTION, PROPERTIES, USES. Charles J. Marsel (N. Y. Univ.). *Chemical Industries* 67, 563(1950). The sources, means of production, properties, applications, and current technology of natural and synthetic waxes are reviewed. A reference list of waxes on the market is included.

• Detergents

Lenore Petchaft, Abstractor

STRUCTURE OF ALUMINUM SOAPS. G. A. Parry and A. J. Taylor. *Trans. Faraday Soc.* 46, 305-10(1950). The Karl Fischer reagent for determining moisture in commercial Al soaps is complicated by the reaction between OH groups, and that between basic soaps and free acid to yield further free water. For dried Al soaps made by the metathetic method, the moisture obtained was considerably less than that expected. The reaction between Al alcoholate and water showed that one molecule of the alcoholate reacted with two molecules of water, and not with three. (*Chem. Abs.* 44, 9169)

THE EFFECT OF COLLOIDAL ELECTROLYTES ON THE SWELLING OF ISOLATED EPIDERMIS. Ernst K. Goette (Univ. of Cincinnati, Cincinnati, O.). *Kolloid-Z.* 117, 42-7(1950). Isolated epidermis, free of hair and other foreign substances, was swollen in solutions of Na soaps of 8C to 16C fat acids and of Na alkyl sulfates with 8-16C atoms. At low concentrations all four layers of the epidermis undergo the same swelling, but at high concentrations the basal layers are swollen more. The concentration at which the transition from one type of swelling to the other was observed agreed within experimental accuracy with the critical concentration for micelle formation as given in the literature. This relation was also observed in the presence of neutral or alkaline electrolytes. These results can be correlated with the effects of soaps and soap additives in skin irritation, which may be related to the swelling of the basal layers of the epidermis by soap micelles. (*Chem. Abs.* 44, 8981)

KARL FISCHER TITRATION OF SOLID SOAPS AND DETERGENTS. Arthur L. Draper and W. O. Milligan (Rice Inst., Houston, Tex.). *Texas J. Sci.* 2, 209-12(1950). The water content of 16 pure solid soaps and detergents was determined by three different methods: heating in air at constant temperature to constant weight, vacuum drying at low temperature, and Karl Fischer titration. In the heating method constant temperatures of 110, 120, 130, 140, and 150° were used. A higher weight percentage loss was found at a higher temperature for each sample. Many of the samples discolored from white to tan and decomposed at intermediate temperatures. The vacuum method consisted of putting a weighed sample in a platinum bucket suspended from a sensitive silica spring in the vacuum of about 10^{-6} mm. at low temperature and running sorption-disorption isotherms or isobars. This method gave consistent results. The isobar for calcium palmitate agreed exactly with that calculated for the monohydrate. In the Karl Fischer titration several alcohols, acetone, and dioxane were tried as anhydrous inert solvents for samples in order to use sensitive back titration, but these were unsuccessful. Other solvents should be tried to avoid the necessity of titrating the solid materials. This method gave consistent results and can determine small amounts of water present in soaps and detergents within about 0.2%. The results from the air heating method are neither accurate nor absolute but may be useful for comparative purposes if carefully applied. The results from vacuum drying at low temperature are believed to be reasonably accurrate and agree closely with the results from the Karl Fischer method. (*Chem. Abs.* 44, 9169)

THE ANALYSIS OF FREE SODIUM HYDROXIDE AND SODIUM CARBONATE IN SOAPS. J. P. Wolff. *Oleagineux* 4, 662-4(1949). The analysis for free NaOH can be made in either hot or cold solution. For the titration in the cold, dissolve under reflux 2 g. of the soap in 100 cc. alc. neutralized with 0.1 N alc. KOH or NaOH with thymol blue. Allow to cool and titrate with alc. 0.01 N or 0.1 N HCl. It is necessary to determine a blank. For the hot titration, reflux 10 g. of the soap with 100 cc. neutralized alc., titrate while hot with 0.1 N alc. HCl (0.1 cc. of 0.1 N HCl-0.4 mg. NaOH). The cold titration method is better than the hot method if the sample is a liquid when cold. For the Na_2CO_3 determination, dilute the alc. solution after the NaOH analysis, with an equal volume of H_2O (the color will be blue). Titrate with aqueous 0.1 N HCl (or in 50-50 H_2O-alc. solution) to a yellow color. The limit of analysis for free NaOH in soap is 0.01%. (*Chem. Abs.* 44, 8683)

FLAKE FORM NONIONIC DETERGENTS. Carl R. Pacifico, Lester G. Lundsted, and Thomas H. Vaughn (Wyandotte Chemicals Corp., Wyandotte, Mich.). *Soap Sanit. Chemicals.* 26, No. 10, 40-3, 73, 90(1950). An investigation of some typical chemical and physical properties of a new series of nonionic surface active agents, the Pluronics, demonstrated that the properties of these products, like all nonionic surface active agents, are directly related to the hydrophilic-hydrophobic ratio and the molecular weight. The hygroscopicity, rate of solution, solubility, and foaming ability all increase as the hydrophilic-hydrophobic ratio increases. The ability to lower the surface and interfacial tension of water decreases as this ratio increases. In the case of wetting ability, the wetting speed decreased with increasing percentage of hydrophilic agent at the lower temperatures, but increases at higher temperatures. For carbon soil removal, an intermediate hydrophilic-hydrophobic ratio gives best results. An increase in the hydrophilic-hydrophobic ratio also increases the melting point. In this series it is possible to raise the melting point and lathering ability. All the Pluronics are stable to precipitation by metal ions under a standard set of test conditions and all possess good whiteness retention properties.

MAKING TRANSPARENT SOAP. Anon. *Soap Sanit. Chemicals* 26, No. 10, 69, 71(1950). Transparent soaps may be manufactured without alcohol by using substances which prevent crystallization of the soap such as glycerine, sugar, as well as solutions of crystal soda, potassium chloride, etc. The fats selected for the soap are important in determining the quality of the transparent soap. Soaps made from lower fatty acids such as coconut oil and palm kernel oil produce the best transparency. Factors to be considered however, include the irritating effect of these soaps on the skin. Detailed directions for manufacture included.

PATENTS

NON-CORROSIVE DETERGENT COMPOSITIONS. Jay C. Harris (Monsanto Chemical Co.). *U. S. 2,522,446.* Preparation of non-corrosive detergent composition for use in automatic washing machines by mixing the condensation product of a tertiary mercaptan with from 6-20 carbon atoms with from 5-20 moles of ethylene oxide per mole, and phosphates such as sodium tripolyphosphate, silicates, starch, and CMC. *U. S. 2,522,447.* Use of tertiary alkyl phenol having from 8-9 carbon atoms in place of the tertiary mercaptan.

SEQUESTERING WASHING COMPOSITION. F. C. Bosworth. *U. S. 2,524,218.* Preparation of a detergent composition compatible with soap and with the ability to sequester metal ions, by mixing an alkylene polyamine derivative containing substituent groups of seven carbon atoms or more with a fatty acid soap.

STABILIZATION OF SOAP. G. D. Martin (Monsanto Chemical Co.). *British 642,596.* A method of soap stabilization in which an alkali metal, ammonium, mercury, alkyl, aralkyl, alkylene or guanidine thiocyanate, or an aryl mustard oil has been added.

IMPROVEMENTS IN MANUFACTURING OF MILLED SOAP. J. Garvey, A. Garvey, and J. Garvey. *British 642,712.* A noncracking toilet soap prepared by extrusion of a soap bar having a helically coiled grain extending longitudinally to prevent wet cracking along the usual grain.

PREPARATION OF SULFONATED AMIDE WITH SURFACE-ACTIVE PROPERTIES. Nopco Chemical Co. *British 642,836.* Process for producing a surface-active sulfonated amide which is stable to hydrolysis by reacting an organic halide with ammonia or a primary amino compound and sulfonating the product after acylating with a fatty acid or derivative capable of condensing with the amine.

BUILDERS FOR SOAPLESS DETERGENTS. Oscar T. Quimby (Procter & Gamble Co.). *British 642,921.* Method of improving cleaning power of anionic soapless detergents by adding as builder an alkali metal acid triphosphate.

PURIFYING SOAP. Societe des savons Francais. *French 941,884.* In a continuous process, impure soap passes up a tower in counter-current to a weak salt solution. At the top of the tower boiling water is added and the mixture is led to a large vat. Purified soap is decanted from the top of the vat and impurities are removed at the bottom. (*Chem. Abs.* 44, 9172)

• Drying Oils

Stuart Harrison, Abstractor

THE ISOLATION OF A CONJUGATED UNSATURATED ACID FROM THE OIL FROM *Ximenia caffra* KERNELS. S. P. Lighthelm and H. M. Schwartz. *J. Am. Chem. Soc.* 72, 1868(1950). The acids from *X. caffra* oil on low temperature crystallization gave white plates m.p. 40-41°, Sp. ext. at 229 mμ. 58.3, neutr. equiv. 281.2, and Woburn iodine of 142.9. It took up 3.07 moles of hydrogen on catalytic hydrogenation to give stearic acid. It is postulated to be a C_{18} acid with one double bond and one triple bond conjugated with one another or conjugated with the carboxyl group.

CANDLENUT OIL (*Aleurites molucanna*) AND ITS DRYING PROPERTIES. L. Kehren. *Oleagineaux* 5, 359(1950). Candlenut oil is a yellow to orange oil obtained from the seed (oil content 48%) by solvent extraction or pressing. It has the following fatty acid composition: linolenic 21.7%, linoleic 40%, oleic 29.4%, and sat. acids 8.9%. The drying time of the oil with different catalysts and after treatment are given. (*Chem. Abs.* 44, 8674)

UNIT CELL AND OPTICAL PROPERTIES OF t,t,$\Delta^{9,11}$ LINOLEIC ACID. L. P. Witnauer and F. R. Senti. *J. Am. Chem. Soc.* 72, 2803 (1950). Optical and x-ray diffraction data for single crystals are given for the acid. The crystals are monoclinic with a monoclinic angle of nearly 90°.

ANALYSIS OF CRUDE TALL OIL. V. D. Klendovekov and M. V. Kartseva. *Zhur. Priklad Khim.* (J. Applied Chem.) 23, 428 (1950). Use of commonly applied methods for tall oil analysis without determination of petroleum ether insoluble matter leads to erroneous interpretations since the specimen may contain varying amounts of oxidized substances insoluble in pet. ether. The amount of rosin in all specimens examined was variable and was always larger when the determination was made by volumetric method without separation of petroleum ether insolubles than when it was made gravimetrically. Evidence shows the insoluble materials are oxidation products of rosin. (*Chem. Abs.* 44, 9160)

TWO YEARS OF STYRENATED ALKYD RESINS FOR SURFACE COATINGS. W. H. Patrick and E. H. Trussell. *Official Digest Federation Paint and Varnish Production Clubs*, No. 309, 767 (1950). The evaluation tests on two styrenated alkyd resins and two commercial resins are compared. The results show that pigmented films have the same order of durability and that failure is due frequently to adhesion and checking. The solvent sensitivity and lifting of pigmented films are compared. The use of styrenated alkyds for baking undercoats is discussed.

THE USE OF STYRENE IN PROTECTIVE COATINGS. *Paint and Varnish Production* 30, No. 9, 14(1950). *Am. Paint J.* 34, No. 49, 60(1950). The styrenation of oils was described. The commercial styrenated oils are based largely on soya and dehydrated castor oils, with the latter having the better properties. Good properties of styrenated oils are: rapid dry, high gloss, hardness, and antisettling. Fair to bad properties are: marrability, poor solvent resistance, fair chemical resistance, and fair durability. Styrenated alkyds can be prepared by styrenating the fatty acids or oils before they are used in making the alkyds or by styrenating the oil modified alkyd directly. In general, the properties are somewhat better than those of the styrenated oils. Other monomers which can be copolymerized with drying oils are mentioned.

STYRENE OILS. J. Rinse. *Chem. Weekblad* 22, 373(1950). Disagrees with the theory of copolymerization of styrene and drying oils proposed by Hewitt and Armitage, which states that free radicals coming from active methylene groups in the fatty acid chain act as chain starters. Reports that benzoyl peroxide, aluminum chloride, toluenesulfonic acid, and other polymerization catalysts have little or no effect on the course of the reaction. Picric acid retards styrene polymerization but has no effect on oil-styrene copolymerization. The theory that there is a proton transfer from the active methylene group in the fatty acid chain is favored because the reaction is promoted by keto derivatives, e.g., anthraquinone, benzophenone, etc. The energies of dissociation also favor this concept since they are lower for proton production (*Chem. Abs.* 44, 8675)

STYRENATION OF FATTY ACIDS. P. O. Powers. *Ind. Eng. Chem.* 42, 2096(1950). A study was made of the products obtained by refluxing styrene with oleic, dehydrated castor, and linseed fatty acids at 160°, 225°, 250°, and 275°. Fractionation of the products and examination showed that all of the acids combine with styrene and that no polystyrene was formed. The solubility of the styrenated acids increased with the reaction temperature.

ALKALI ISOMERIZATION IN THE PREPARATION OF CONJUGATED UNSATURATED COMPOUNDS AND OF QUICK-DRYING OILS. J. D. v. Mikusch. *Farben, Lacke, Anstrichstoffe* 4, 149(1950). A review is given of the alkali isomerization of oils and fatty acids and the determination of conjugation. The results of isomerization of linseed, sunflower seed, soybean, and dehydrated castor oils with dilute sodium hydroxide at a variety of temperatures are given. The rate of isomerization increased with increasing temperature. The properties and uses of the isomerized fatty acids, the pro and con of the process and the importance of conjugation for oil drying are discussed. (*Chem. Abs.* 44, 8132)

HAZING IN ALKYD ENAMELS. F. Kamp. *Chim. peintures* 13, 298 (1950). Loss of gloss of alkyd enamels pigmented with 95% rutile TiO_2 and 5% colloidal ZnO is least with a linseed alkyd and greatest with a soy alkyd; dehydrated castor oil is intermediate. Maximum hazing is attained after one month. Alcohols having more hydroxyl groups impart better gloss and maintain advantage on aging. Antioxidants and driers have no effect. Maintenance of gloss in ZnO containing enamels is proportional to reactivity of the ZnO. (*Chem. Abs.* 44, 8675)

THE DEVELOPMENT OF POLYESTERS FOR THE LACQUER AND PAINT FIELD. K. Hamann. *Angew. Chem.* 62A, 325(1950). A review covering the raw materials and their processing, reaction schemes, some data, and over 80 references. (*Chem. Abs.* 44, 8674)

THE PROPERTIES OF SOME VARNISHES BASED ON PURE ALKYL PHENOLIC THERMOSETTING RESIN AND TUNG OIL. K. van Lerberghe, J. Loomans, O. Buisseret, and F. Kok. *Chim. peintures* 13,(1950). Alkylphenolic resin-tung oil varnishes were prepared by cold blending (6.25-37.5 gal. length) and cooking at 240-5° (25-37.5 gal. length) and driers added. On baking at 190° the shorter varnishes hardened more quickly and the cooked varnishes hardened more quickly than the corresponding cold blended ones. Resistance to H_2O and 0.1 N H_2SO_4 was excellent at room temperature; resistance to boiling water and 3% alkali was better for the shorter oil length varnishes and the cold blended varnishes. (*Chem. Abs.* 44, 8673)

THE MODIFICATION OF ALKYD RESINS. R. S. Robinson. *J. Oil & Colour Chemists Assoc.* 33, No. 362, 353(1950). Review paper. Glyceryl phthalate may be considered the starting point of all modern alkyds. Glycerine can be replaced by dihydric or monohydric alcohols to give plasticizing resins and esters. The only alcohol of commercial importance with more than three hydroxyls is pentaerythritol. This gives films with good toughness and drying rate. The styrenation of alkyd resins and properties of styrenated products are discussed. The use of maleic acid, fatty acids, and di-isocyanates in resins is discussed. (Twenty references)

PATENTS

UNSATURATED FATTY ACID MODIFIED ROSIN ESTERS AND PROCESS OF PREPARING SAME. J. B. Rust. *U. S. 2,518,497.* Glycerol is esterified with linseed fatty acids 100 and rosin 22.7 by heating to 200-220° for six hours and collecting 9.0 cc. of water. Monoallyl maleate 28 is then added and heating continued at 200-250° for 6¼ hours. The resulting varnish with 0.005% cobalt as the naphthenate bakes to a hard film in one-half hour at 120°. The Sward rocker hardness is 87. The film air dries tack-free in 6 hours. Other polyhydric alcohols can be used as well as other unsaturated fatty acids and monoalkenyl esters of dibasic acids to give a variety of varnishes.

HYDROGENATION OF ALKYD RESINS. R. Morgan. *U. S. 2,519,492.* A 43% soya bean oil modified phthalic glyceride resin is partially (10-40%) hydrogenated. The alkyd makes an enamel which after baking has better color and better resistance to discoloration than the unhydrogenated alkyd. Other unsaturated oil modified alkyds can be treated in the same manner.

ALKYD RESINS PREPARED FROM TRICARBOXYLIC ACID HAVING THE STRUCTURAL FORMULA OF THE ADDITION PRODUCT OF *l*-PIMARIC ACID AND FUMARIC ACID. R. P. Silver. *U. S. 2,522,586.* The tricarboxylic acid resulting from the Diels-Alder addition product of *l*-pimaric acid and maleic anhydride is reacted with a polyhydric alcohol and fatty acids to give an alkyd. The acids consist of 30 to 70% of the total reactants.

COBODIED DRYING OILS. H. S. Bloch and A. E. Hoffman. *U. S. 2,523,609.* A drying oil composition is prepared by heating an oil, e.g., soya bean oil, linseed oil, etc. to 235-350° with a hydrocarbon fraction obtained from treating petroleum hydrocarbons with catalysts such as HF. Such hydrocarbons have a high degree of conjugated unsaturation (bromine number 140 and 40 to 70% conjugated). A copolymerization is brought about resulting in an increase in viscosity of the mixture.

DRYING OILS FROM TARS. S. B. A. Eckberg. *Swedish 127,752.* The water insoluble portion of wood or peat is extracted with mineral spirits. The extract is treated with an aldehyde e.g. HCHO and a polyhydric alcohol e.g. glycerol to give the drying oil. (*Chem. Abs.* 44, 8136)

DRYING OILS. *Danish 70,749.* Drying oils are made by heating triglycerides to 150-400° *in vacuo* while simultaneously introducing air and partially distilling the material. The residue may be further polymerized if necessary. Example: linseed oil is heated to 300°/160 mm. while introducing air for one hour after which 10% of the oil is distilled at 200° leaving a light drying oil suitable for paint making. (*Chem. Abs.* 44, 8136)