ABSTRACTS . . . . Don Whyte, Editor

• Oils and Fats

R. A. Reiners, Abstractor

Moisture determination; a comparison of various methods. G. Bigoni (Lab. S. A. Gaslini, Genoa, Italy). *Olii minerali, grassi e saponi, colori e vernici* **27**, 38-9(1950). The sand-bath method at 105° of the International Committee for Fat Products is more accurate than the xylene distillation method. (*Chem. Abs.* **45**, 2235)

Apparatus for oil neutralizers. T. L. Pepe. *Olearia* **4**, 297-8 (1950). A simple glass apparatus to be fitted to the neutralizer in the oil mill permits the rapid determination of the acidity of the oil during processing. (*Chem. Abs.* **45**, 911)

A new type of installation for oil extraction by solvents with a rotary extractor. G. B. Martinenghi. *Olearia* **4**, 285-93(1950). The requirements of a rotary extractor for a small oil mill are defined, and a description and diagram of a new and simple installation already in use on industrial scale are given. (*Chem. Abs.* **45**, 911)

Further notes on "whole oils." G. Loew (Gobecia S. A., Buenos Aires, Arg.). *Olearia* **4**, 294-6(1950). For the production of "whole oils," i.e. edible oils refined without removal of the vitamins, provitamins, sterols, hydrocarbons, etc., the author recommends treatment under vacuum to "explode" the oil-bearing cells, or preliminary extraction of the proteins and solubilization of the cellulose. (*Chem. Abs.* **45**, 2237)

Vegetable oils and fats of Java. I, II, III. Th. M. Meijer (Lab. Scheikundig Onderzoek Bogor, Java, Indonesia). *Lab. Scheikundig Onderzoek, Bogor, Buitenzorg, Java, Indonesia, Communs.* **115** and **119**; *Olein, Vetten en Oliezaden* **30**, 187-90, 198-200, 210-14(1946). The fat contents of a number of tropical seeds are given and also the constants of the fat. Species dealt with are: *Nephelium lappaceum, N. mutabile; Areca catechu; Palaquium sp.; Astrocaryum vulgare; Madhuca macrophylla; Jatropha curcas; Calophyllum inophyllum; Sterculia foetida; Monocordia charantia; Salvia hispanica; Hevea brasiliensis; Palaquium rostratum; P. sumatranum; P. obtusifolium; Annona muricata; Impatiens balsamina; Maesopsis emini; Cyperus esculentus; Northia fasciculata; Carapa guianensis; Azadirachta indica.* (*Chem. Abs.* **45**, 2236)

Estimation of cholesterol by suppressing the polarographic maximum. E. Talafant (Masaryk Univ., Brno). Collection Czechoslov. Chem. Communs. **15**, 232-5(1950). Cholesterol is precipitated by excess digitonin and the excess of digitonin is determined by the decrease in the polarographic maximum of a Co solution prepared by dissolving 0.27 g. $CoCl_2$ in 1 l. of a solution 0.1 N in NH_4OH and 0.1 N in NH_4Cl. A sample containing up to 300 γ of cholesterol is added to an excess of 0.7 g. per l. digitonin in 1:4 water acetone. After filtration an aliquot of the filtrate is added to 10 ml. of Co solution and a polarogram is taken. A calibration curve is necessary and experimental conditions must be controlled. (*Chem. Abs.* **45**, 2053)

The fatty acids formed from egg yolk by snake poison. N. Komatsu (Univ., Tokyo). *J. Japan. Biochem. Soc.* **22**, 96-102 (1950). The fatty acids, isolated from egg yolk by the action of snake poison, were fractionated by the Pb salt-ethanol procedure and distillation in vacuo. Palmitic, stearic, oleic, linoleic, and an unsaturated C_{22} acid were obtained. This C_{22} acid appeared to have the formula $C_{22}H_{42}O_2$. Hemolytic action of unsaturated fatty acids was far stronger than saturated fatty acids. The unsaturated fatty acids inactivated diphtheria and tetanus toxins, but inactivated diphtheria toxin still retained antitoxin-producing ability. The saturated fatty acids had only a small effect on the inactivation of toxins and antitoxin-producing ability. (*Chem. Abs.* **45**, 1179)

A mathematical theory for the extraction of natural products by solvents. I. Vegetable oil extraction from seed meal. C. Machline and P. G. W. Bethencourt (Univ., Brasil, Rio de Janerio). *Quimica* (Rio de Janeiro) **5**, No. 3, 58-64(1949). A theory is developed for the batchwise countercurrent extraction of a soluble constituent from a solid by a solvent, neglecting diffusion resistance inside the solid. It is shown that log $[wC_L - (dX/d\theta)]$ should increase linearly with X, where w=solvent flow rate, C_L = solubility ratio of solute to solvent, and X = total oil extracted in time θ. This equation holds for the extraction of the oil from coarsely ground unpressed chaulmoogra seeds. (*Chem. Abs.* **45**, 931)

Introduction of aryl groups into linoleic acid. G. Jacini. *Chim. e industria* (Milan) **30**, 236-8(1948). Phenol or resorcinol react with linoleic acid and its ethyl ester in the presence of acidic condensing agents, giving (from phenol) a hydroxyphenyl derivative and (from resorcinol) a hydroxyphenoxy derivative of oleic acid. Phenol (3 mols.) and 1 mol. linoleic acid is CS_2 with $AlCl_3$ below 35°, followed by esterification (ethanol-HCl) and distillation gives a substance, b. 180-195° at 0.05 mm., with iodine no. 94 (*Chem. Abs.* **45**, 1542)

Rice-bran oil and its applications. XV. Molecular distillation of rice-bran oil. S. Ueno, S. Komori and T. Agawa. *J. Chem. Soc. Japan*, Ind. Chem. Sect., **52**, 90-1(1949). Rice-bran oil was molecularly distilled in a cyclic still at 10^{-4} mm. Free fatty acid is distilled out at 100-150°. An odorless light-colored glyceride mixture is obtained at 210-230°. (*Chem. Abs.* **45**, 1790)

Difference between normal olive oil and unisexual olive oil. A. Liso (Lab. chim. provinciale, Bari, Italy). *Olivicoltura* **5**, No. 1, 8-10(1950). Unisexual olives are very little fruits because of no fecundation of their blossom. The oil has essentially the same characteristics as normal olive oil. (*Chem. Abs.* **45**, 1790)

Degeneration of hydrogenated oils and fats during storage. I. S. Ueno and Y. Sigeno. *J. Chem. Soc. Japan*, Ind. Chem. Sect., **52**, 155-7(1949). Generally, hydrogenated fish oil deepens in color considerably during storage, while stearic acid obtained from hydrogenated vegetable oils and tallow does not. (*Chem. Abs.* **45**, 1788)

Trial use of dodecylphenol sulfonic acid and its halogen derivatives as fat-splitting agents. K. Fukuzumi and S. Ozaki. *J. Chem. Soc. Japan*, Ind. Chem. Sect., **52**, 154-5(1949). The splitting powers of $C_{12}H_{25}C_6H_3OHSO_3H$, $ClC_{12}H_{25}C_6H_2OHSO_3H$, and $C_{12}H_{25}C_6H_4SO_3H$ were found to be superior to those of a German commercial reagent named "Kontakt." (*Chem. Abs.* **45**, 1787)

Catalytic preparation of higher fatty alcohols at low pressure. S. Ueno. *J. Chem. Soc. Japan*, Ind. Chem. Sect., **52**, 53-4(1949). Hydrogenation of palm oil or the alkyl esters of its fatty acids has been carried out with Cu-Cr catalyst containing Ba. In the best case, 73% alcohol yield has been obtained at 70 atm. pressure. (*Chem. Abs.* **45**, 1787)

Fat determination in milk by a new volumetric salt method without centrifuge. L. Gentilini (Staz. sper. viticolt. e enol., Conegliano, Italy). *Latte* **24**, 219-20(1950). The following method is suggested to determine fat in milk: Put into the Gerber butyrometer 11 cc. 60% sodium salicylate, 1 cc. isoamyl alcohol, and 10 cc. milk. Shake vigorously, let stand vertically 5 min. in a water bath at 65°, centrifuge for 5 min., replace in water bath for 3 min., and read. Comparison (40 samples) with the Gerber H_2SO_4 method gave 0.0-0.05% difference in the results. (*Chem. Abs.* **45**, 1697)

Condensation of fat acid esters with oxalic acid ester. M. Asano, Y. Arata, and S. Ban. *J. Pharm. Soc. Japan* **61**, 220-8(1941); *Complete Abstracts Japan Chem. Lit.* **15**, 878-80 (1941). $RCH_2CO_2C_2H_5$ and diethyl oxylate are condensed in the presence of sodium ethoxide and anhydrous ether by boiling 15-17 hrs., acidified with dilute sulfuric acid, the ether layer separated, and the portion soluble in 5% sodium carbonate acidified, giving a large amount of $C_2H_5O_2CCHRCOCO_2H$. The chemical properties of these compounds are discussed. (*Chem. Abs.* **45**, 1518)

Highly unsaturated acids. V. Constitution of the eicosapentaenoic acid, $C_{20}H_{30}O_2$, in bonito oil. S. Matsuda (Imperial Univ., Osaka). *J. Soc. Chem. Ind., Japan* **45**, *Suppl. binding*, 49-51 (1942). By ozonolysis the constitution of eicosapentaenoic acid was shown to be $CH_3CH:CHCH_2CH:CHCH_2CH:CH(CH_2)_2CH:CH(CH_2)_2CH:CH(CH_2)_2CO_2H$. (*Chem. Abs.* **45**, 1511)

A rapid method of determining ether extracts. J. C. Dickinson and R. C. Palmer (Wool Industries Res. Assoc., Leeds). *J. Textile Inst.* **42**, T6(1951). A method for determining the ether extractable content of wool is described in which the wool is placed in a column and ether poured over it.

Chemical examination of the fixed oil derived from the seeds of Vicia faba. I. R. Gambhir and S. Dutt (Delhi Univ.). *Indian Soap J.* 16, 13-16(1950). The dry crushed seeds give a clear brownish-yellow oil in 8.06% yield. The oil was found to belong to the semidrying class. After preliminary purification the oil had the following characteristics: solidifying point —4°, d_{15} 0.9385, n_{20} 1.484, saponification equivalent 294, iodine no. (Wijs) 118, acetyl no. 9.6, acid no. 18.2, Hehner value 91.0, and Reichert-Meissl value 0.57. The oil contained the following fatty acids in the form of glycerides: palmitic 1.83, stearic 7.46, arachidic 1.00, behenic 0.11, linolenic 11.61, linoleic 27.29, and oleic 41.70%. The unsaponifiable matter (1.98%) was chiefly sitosterol. (*Chem. Abs.* 45, 1790)

BHA ups shelf life of salted nuts. S. R. Cecil and J. G. Woodroff (Georgia Agricultural Exp. Station, Experiment). *Food Industries* 23(2), 81(1951). The addition of synergized butylated hydroxyanisole was shown to increase the Schaal Oven Life of salted peanuts, peanut butter, coconut oil and peanut oil.

A study of Canadian margarine with particular reference to its vitamin A content. T. K. Murray, J. H. Mahon, A. Wright, R. A. Chapman and J. A. Campbell (Dept. Nat. Health and Welfare, Ottawa). *Can. J. Tech.* 29, 147(1951). The average composition of Canadian margarine (30 samples from 15 manufacturers) was: moisture 15.11, fat 80.70, curd 1.42, ash 2.96 and salt 2.91%. The average vitamin A content was found to be 4026 I. U. per 100 g.

Canadian erucic acid oils. VI. Blowing of rapeseed, mustard seed, and weed seed oils. N. H. Grace and A. Zuckerman (National Res. Labs., Ottawa). *Can. J. Tech.* 29, 71(1951). Crude solvent extracted weed seed oil could be air blown at 266°F. without preliminary treatment, whereas crude, hot pressed mustard or rapeseed oils frothed excessively unless the lecithin was removed or destroyed by pretreatment. The changes in physical characteristics of these oils which occur on blowing are described.

Fat production in deeper layers of a nutrient medium with Oospora. L. Eberlein. *Forschungsdienst Sonderheft* 16, 743 (1942). The presence of silica gel in nutrient solution used for the cultivation of *Oospora* races doubled the fat production. (*Biol. Abs.* 24C, 1893)

The determination of fat and sugar in chocolate. E. E. Wood (Consumers Res. Labs. Ltd., Toronto). *Can. J. Tech.* 29, 66 (1951). Methods for the estimation of total fat and total sugar content of chocolate are briefly reviewed. A method is presented for the rapid determination of both constituents from a single sample which is based on solvent extraction of the fat and determination of sugar on the defatted residue.

The determination of linoleic acid in milk fat. P. S. Schaffer and G. E. Holm (U.S.D.A., Washington, D. C.). *J. Dairy Sci.* 33, 865(1950). The spectrophotometric method for the determination of linoleic acid has been applied to milk fat. An average of 2.2% linoleic acid and 1.1% octadecatrienoic acid calculated as linolenic acid was found in milk fat.

A comparison of the Allen volumetric blood fat procedure with an extraction procedure. A. C. Chung, P. Saarinen and J. C. Shaw (Maryland Agricultural Exp. Station, College Park). *J. Dairy Sci.* 33, 918(1950). The Allen procedure for the determination of plasma lipids is shown to give a value which corresponds to all the lipids in the plasma except the phospholipids.

The validity of the Allen volumetric procedure for the determination of blood lipids of cows on different feeding regimes. H. K. Lo, P. Saarinen and J. C. Shaw (Maryland Agricultural Exp. Station, College Park). *J. Dairy Sci.* 33, 922(1950). Determination of the blood plasma lipids on 155 samples showed that the Allen volumetric method gave values which correlated well with the amount of non-phospholipid lipids as determined by extraction.

Use of propyl gallate to defer development of oxidized flavor in market milk. W. H. Chilson, W. H. Martin and C. H. Whitnah (Kansas Agricultural Exp. Station, Manhattan). *J. Dairy Sci.* 33, 925(1950). The addition of propyl gallate to freshly pasteurized milk at the rate of 20 mg. per 1. was found to prevent the development of oxidized flavor effectively for a 14-day storage period at 35°F. The addition of 0.5 p.p.m. copper did not decrease the effectiveness of the propyl gallate.

The spectrographic determination of linoleic and linolenic acids. T. P. Hilditch, C. B. Patel and J. P. Riley (Univ., Liverpool). *Analyst* 76, 81(1951). Linoleic acid prepared either by physical or chemical methods gave on isomerization with alkali at 180° for 60 min. an $E^{1\%}_{1\,cm.}$ value at 234 mμ of 908. Linolenic acid prepared by debromination gave extinction coefficients in good agreement with the values obtained previously. The linolenic acid separated by physical methods gave somewhat different values: on isomerization at 170° for 15 min., $E^{1\%}_{1\,cm.}$ at 268 mμ = 555; on isomerization at 180° for 60 min., $E^{1\%}_{1\,cm.}$ at 234 mμ = 575. It is suggested that these values be used in place of the earlier values of 532 (268 mμ) and 569 (234 mμ).

Chromatography of the carboxylic acids. H. G. Cassidy and F. H. Nestler (Yale Univ.). *Discussions Faraday Soc.* **1949**, No. 7, 259-64. The principles and chief methods of application of chromatography as used in the separation of fatty acids are discussed. The application of elution analysis, frontal analysis, displacement analysis and partition chromatography are reviewed. 29 references. (*Chem. Abs.* 45, 1840)

Production of ethyl esters of fatty acids. H. Pardun (Ölfabriken Noblee & Thörl, G.m.b.H., Hamburg-Harburg, Ger.). *Seifen-Öle-Fette-Wachse* 76, 377-80, 397-400, 417-19, 440-3 (1950). The preparation of ethyl esters of fatty acids of less than 18 C atoms for the purpose of adding them to oleomargarine in amounts of 5% was studied. The esters are prepared by heating distilled fatty acids with 135% of the calculated amount of 95% ethanol in the presence of 1% of an aliphatic-aromatic sulfonic acid, esterifying the fatty acids remaining unesterified (8-9%) with glycerol, deacidifying, and bleaching. 10 references. (*Chem. Abs.* 45, 1953)

The fat of Panicum crusgalli var. Frumentaceum. I. Free fatty acids. 1. T. Obara (Coll. Agr. Education, Tokyo). *J. Agr. Chem. Soc. Japan* 18, 397-401(1942). The grain of *Panicum crusgalli* var. *frumentaceum* contained 5.0-6.5% of oil, d^{20} 0.904, n^{15} 1.475, acid value 16, saponification value 194, iodine value 122, Hehner value 93, Reichert-Meissl value 1.45, Polenske value 0.79, and acetyl value 17.

II. Free fatty acids. 2. *Ibid.* 451-62. About 18.5% of the oil was soluble in 90% ethanol; 44% of this was free fatty acids which had m.p. 24.5-35.5°, iodine value 124, neutralization value 192, and mean molecular weight 290. By the Pb salt-ethanol method, fractional crystallization with ethanol, bromination, and oxidation, the composition of the free fatty acids was calculated: oleic 60, linoleic 23, palmitic 9, and stearic 1% with little arachidic acid. (*Chem. Abs.* 45, 2235)

Studies on rancidity of butterfat. Part II. The use of l-ascorbyl esters of fatty acids as antioxidants. S. Mukherjee, S. Ray and M. Goswami (University College of Science, Calcutta). *Jour. Indian Chem. Soc.* 27, 539-544(1950). A method for the preparation of *l*-ascorbyl esters of fatty acids in good yield is described. The antioxidant activity of these esters have been tested with butterfat both by storage experiments and by Swift's stability test. The biological availability of these esters has also been tested by carrying out assays with guinea-pigs. The loss of *l*-ascorbyl esters within the induction period has been determined.

Part III. Use of ethyl gallate in combination with other antioxidants. *Ibid.* 545-547. Ethyl gallate in combination with *l*-ascorbyl esters of fatty acids possesses a very strong antioxidant activity. Destruction of carotene and vitamin-A within the induction period is not appreciable but beyond it they are readily destroyed; the various antioxidants tried afford only very slight protection beyond the induction period.

Part IV. Preliminary investigations on factors influencing rancidity. S. Mukherjee. *Ibid.* 557-562. A detailed study of the different factors influencing rancidity of butterfat has been carried out. The primary agent responsible for the development of rancidity is oxygen; the effect of light, moisture, and microorganisms are merely catalytic.

Part V. The effect of temperature. *Ibid.* 586-588. The induction period of the fat depends on the temperature, while the peroxide value increases with time. At high temperatures such as 105 and 120°, the decomposition of the peroxides is increased.

Part VI. The action of light. *Ibid.* 589-598. Butterfat exposed to diffused light, light from a tungsten filament lamp, ultraviolet light, and X-rays develops rancidity in the presence of oxygen, the rate of development of rancidity being proportional to the intensity of the exciting source. In the complete absence of oxygen even X-rays and ultraviolet light are ineffective in producing off-flavor. Only the lower saturated acids, C_4 and C_6, are oxidized by the action of light while the higher members remain unaffected.

Part VII. The influence of water and humidity on rancidity. *Ibid.* 607-609. The effect of increased humidity is to enhance the hydrolytic rancidity of the fat. It has been found that oxidative rancidity is retarded at very high humidities (90-100%).

Part VIII. Chemical accelerators of rancidity. The effect of peroxides and volatile products of fat oxidation on rancidity. *Ibid.* 613-614. The addition of a very small amount of rancid fat greatly reduces the induction period of fresh fats, while volatile products of oxidation of fats have no effect on the development of rancidity of fresh fat. The fraction of the rancid fat containing the peroxides shortens the induction period.

Soyabean oil in U. S. A. P. H. Mensin. *Oleagineux* **6**, 82-89 (1951). Reviews the development of soybean growing and oil extraction in the U.S.A. during the past 25 years.

Esterification-alcoholysis of acid vegetable oils. Jean Poré. *Oleagineux* **6**, 90-93 (1951). The rates of esterification of palmitic acid, palm oil acids, and oleic acid with methanol and ethanol and the rates of alcoholysis of neutral palm oil with methanol or ethanol were studied. The esterification-alcoholysis of a palm oil containing 20% free acids was studied using a *p*-toluenesulfonic acid catalyst and from 1-5 times the theoretical quantity of methanol or ethanol.

Oils from marine animals, a Spanish raw material. R. Montequi. *Anales de fis. y quim. (Madrid)* **57B**, 76-99 (1951). A review of the fish oils, their properties, structure, oxidation, and supply are given.

The chemistry of cork. VII. The floionic and floionolic acids. E. Seoane and I. Ribas. *Anales de fis. y quim (Madrid)* **47B**, 61-66 (1951). Reviews the extraction of floionic acid from cork and the methods for its synthesis. The use of the soluble calcium salt process gives a mixture of floionic and floionolic acids which cannot be separated by recrystallization. The use of insoluble lead salts to separate the acids was developed. The percentages of floionic and floionolic acids in different kinds of cork were determined. Floionic acid can be used in the synthesis of civetone and azelaic acid.

Turkish laurel fat. T. Yazicioglu (Univ., Ankara, Turkey). *Fette u. Seifen* **52**, 593-5 (1950). The whole Turkish laurel fruits contained water 28.1, fat 26.2, protein 3.3, N-free extract 27.9, crude fiber 3.2, and ash 1.1; the shells contained water 15.7, fat 8.3, protein 3.5, N-free extract 33.6, crude fiber 32.6, and ash 4.2; the flesh contained water 32.1, fat 37.7, protein 2.4, N-free extract 16.1, crude fiber 9.6, and ash 2.4; the kernels contained water 30.1, fat 18.1, protein 5.2, N-free extract 44.4, crude fiber 1.3, and ash 0.8%. The fats extracted from whole fruits, flesh, and kernels had the following chacteristics, respectively: d^{20} 0.9214, 0.9111, 0.9368; n^{30} 1.4642, 1.4628, 1.4662; solidification point 19.6°, 12.6°, 26.6°; acid no. 33.5, 44.7, 1.6; saponification no. 209.8, 195.3, 222.9; iodine no. 83.3, 87.0, 77.3; thiocyanogen no. 55.8, 68.4, 42.5; unsaponifiable 1.25, 0.82, 1.98%; saturated fatty acids 35.4, 20.7, 50.8%; oleic acid 32.9, 57.8, 8.9%; linoleic acid 31.7, 21.5, 42.2%. (*Chem. Abs.* **45**, 2115)

Determination of fat in water/oil emulsions. A. Stoy (Zentr. Anst. Getreideverarb. Detmold, Ger.). *Deut. Lebensm. Rundschau* **46**, 261 (1950). Water/oil emulsions are very stable, causing erratic results in the fat extraction with trichloroethylene. The following modification is used: Treat 10 g. of the emulsion with 5 cc. 38% HCl and 50 cc. 96% ethanol, add material to prevent bumping, and heat 30 min. under reflux condenser with a small flame. Cool and add 50 cc. distilled water and 100. cc trichloroethylene, reflux 15 min. Cool while still connected, then transfer to a separatory funnel and separate the layers. Dry the trichloroethylene solution over anhydrous Na_2SO_4, and transfer 25 cc. of the solution to a dry and weighed flask, and distill off the solvent. Dry at 98° for 3 hrs. and weigh the fat, using the following formula in which a equals the dry substance of the fat sloution used. $[100\ a/25-(a/0.92)]=(100/\text{wt. of substance})$. (*Chem. Abs.* **45**, 2235)

Examination of Icelandic sheep fat. I. O. B. Bjarnason. *Atvinnudeild Haskol. Rit Idnadardenildar* **1950**, No. 1/3, 3-6 (1950). The average figures for the samples tested were as follows: saponification values of the fat and the corresponding fatty acids 280 and 265, respectively, iodine nos. of abdominal and body fat 38 and 45, respectively. The high unsaponifiable content (0.9-2%) and the low saponification values are compared with those of foreign sheep tallow. The iodine nos. of the unsaponifiable fraction of intestine and back fat were 58.8 and 63.2, respectively. (*Chem. Abs.* **45**, 2235)

Hydrocarbon content of egg yolk oils. H. Hadorn, R. Jungkunz and K. W. Biefer (Verbandes schweiz. Konsumvereine, Basel, Switz.). *Helv. Chim. Acta* **33**, 1934-6 (1950). The results of Frankel and Mathis who reported 12% cholesterol-free unsaponifiable fraction in egg yolk oil could not be confirmed. A value of 0.2% was obtained. (*Chem. Abs.* **45**, 2114)

The effectiveness of nordihydroguaiaretic acid as an antioxidant for fats. G. A. Ulex and E. P. Kroger (Hyg. Inst., Hamburg, Ger.). *Deut. Lebensm. Rundschau* **46**, 256-60 (1950). The results confirmed the fact that not every antioxidant has the same effectiveness on all fats. It seems that their effectiveness fails in cases where there is a possible deterioration due to bacterial decomposition. Results are extensively tabulated. (*Chem. Abs.* **45**, 2235)

Identification by electrometric measurements of oxidant and antioxidant impurities in fats. W. Wachs (Insti., Ernährung Verpflegungswiss., Berlin-Dahlem). *Fette u. Seifen* **52**, 466-70 (1950). Antioxidant properties of tocopherols are dependent on a definite range of potential and they are related to the oxidative degradation of the molecule. Measurements with β-carotene showed a stepwise oxidation in the dark, while several oxidation processes occurred simultaneously in the presence of light. Potential curves are given. (*Chem. Abs.* **45**, 2235)

Alternating behavior of homologous fatty acids. W. Wachs, H. Umstätter and J. Reitstötter (Inst. Ernährung Verpflegungswiss., Berlin-Dahlem). *Fette u. Seifen* **52**, 456-8 (1950). The surface tensions of homologous fatty acids from C_{10} to C_{19} were determined in (dynes/cm.) and ranged from 25 for a C_{10} to 29.6 for a C_{19}. The thermal vibration frequencies calculated from the surface tensions are of the same order of magnitude as those calculated from the m.ps. and also decrease with increasing molecular weight but they alternate more strongly, particularly above C_{15}. (*Chem. Abs.* **45**, 2236)

The foam test in paper chromatography. H. P. Kaufmann and J. Budwig (Chem. Landesuntersuchungsamt Nordrhein-Westfalen, Ger.). *Fette u. Seifen* **52**, 555-6 (1950). The foam test for the detection of fatty acids and soaps has been adapted to paper chromatography. A solution of 0.2 mg. fatty acid (in petroleum ether) or 0.2 mg. soap (in water) is placed on a Schleicher and Schull No. 598G filter paper previously impregnated with Cu acetate solution and dried. A reagent consisting of equal parts of 30% H_2O_2 and 30% NH_4OH is then added drop by drop. The O liberated causes the ammonia soap to foam. As little as 10 γ oleic acid could be detected. (*Chem. Abs.* **45**, 2236)

The reaction of sodium hypochlorite with unsaturated oils and fatty acids. J. M. G. Marquina (Analisis quim. y quim. ind. org. escuela superior trabjo, Madrid). *Rev. real. acad. cienc. exact., fis. y. nat., Madrid* **34**, 124-60 (1940). It has been found that NaOCl reacts with the double bond of unsaturated fatty acids to give compounds containing the group $\overset{|}{\underset{|}{\mathrm{C}}}\mathrm{Cl}-\overset{|}{\underset{|}{\mathrm{C}}}\mathrm{OH}$. With fatty acids containing 1 or 2 double bonds the results agree with the iodine no., but with acids of 3 double bonds the results, while reproducible, are lower than equivalent to iodine no. (Hanus). In experiments with oleic acid it was found possible to control the reaction so that addition of HOCl took place with no substitution or addition of Cl–Cl to the double bond. The reaction depends on the presence of HOCl, which is furnished by reaction of fatty acid with NaOCl, and has not been successful with unsaturated oils, even with added acid, owing to mutual insolubility. Where the proportion of –COOH groups to double bonds is less than 1:1, adjustments must be made, such as addition of acetic acid and a buffer (sodium acetate). When the ratio is greater than 1:1, side reactions are prevented by conditions giving rapid reaction. (*Chem. Abs.* **45**, 2236)

Soy Oil. I. The mechanism of formation of soy oil. I. T. Kubo. *J. Agr. Chem. Soc. Japan* **23**, 335-42 (1950). Soy oil is an odorous oil of low viscosity easily separated by pressing soy mash during the manufacture of soy sauce from soybeans, wheat, and NaCl by fermentation. The pressed crude oil had d^{15} 0.9350, acid value 1.36, free acid 0.77%, saponification value 192, iodine value (Wijs) 132, Reichert-Meissl value 1.10, unsaponifiable matter 1.35%. The fat in the raw materials was largely decomposed to form about 60% free fatty acids before fermentation, ethyl esters of fatty acids were synthesized (from ethanol and free fatty acids formed) in the course of fermentation. (*Chem. Abs.* **45**, 2237)

Study of ternary mixtures of fatty acids. IV. Freezing points of mixtures of myristic, palmitic, and stearic acids. C. Paquot and Mme. L. Durrenberger (Lab. C.N.R.S., Bellevue, France). *Bull. soc. chim. France* **1950**, 837-9. Freezing points of some ternary mixtures containing the fatty acids C_{14}, C_{16}, and C_{18} are given. The ternary eutectic occurs at 42.2° and contains 64, 22, and 14% (by weight) of C_{14}, C_{16}, and C_{18}, respectively. (*Chem. Abs.* **45**, 2235)

The utilization of chrysalis oil. G. Serchi and G. Mazzoni (Univ., Florence, Italy). *Chimica* (Milan) **5**, 290-5(1950). Solvent extraction gives a yield of about 27% oil, while extraction by pressing gives lower yields (about 17.6%). The oil has: d. 0.9353, n. 1.4726, iodine no. 132, saponification no. 193. The fatty acids are about 25% saturated and 75% unsaturated. The residue of the extraction contains: H_2O 3.75, total N 13.8, P_2O_5 2.17, K_2O 1.22, ash 6.4%, and may be utilized as a fertilizer. To decolorize the oil, the best results are obtained with the oxidants ($K_2Cr_2O_7$ + acid). No useful method was found to deodorize the oil. When the oil is heated at 225-50° the iodine no. decreases to 101. The drying power of the oil is less than that of linseed oil, even in the presence of Co, Mn, and Pb driers. (*Chem. Abs.* **45**, 2237)

Additional studies on the determination of the squalene number. IV. H. Hadorn and R. Jungkunz (Basel, Switz.). *Mitt. Lebensm. Hyg.* **41**, 435-43(1950). A procedure similar to Fitelson's was used in which the unsaponified portion of the oil was separated into 2 fractions by chromatography on Al_2O_3 and the iodine no. (Hanus) of the eluate was determined. Fitelson's method gives slightly lower results. (*Chem. Abs.* **45**, 2237)

Kinetics of the Twitchell hydrolysis. L. Hartman (Dept. Sci. Ind. Res., Wellington, New Zealand). *Nature* **167**, 199(1951). Hydrolysis of fat in the presenec of Twitchell catalyst and sulfuric acid is a first order reaction. This supports the view that hydrolysis is a homogeneous reaction occurring in the fat phase.

Distribution of the fatty acids in the liver lipids of the horse. L. W. Bruce and F. B. Shorland (Dept. Sci. Ind. Res., Wellington, New Zealand). *Nature* **167**, 236(1951). Linolenic acid is present in much greater proportions in the glycerides of the horse liver than in the phospholipids of the horse liver. Linoleic acid is present in much greater proportions in the phospholipids, its concentration exceeding many times that found in the pasture lipids or in the depot fats of the horse.

Studies on the development of the boll, and on the formation of oil in the developing seed in some varieties of Egyptian cotton. M. Kamel (Fouad I Univ. Cairo). *Nature* **167**, 357 (1951). Most of the oil in the cotton boll was formed from the twenty-first to thirty-third day of the boll's age. Oil formation before and after this active period was insignificant.

Spontaneous heating and ignition in stored palm kernels. II. Reactions between palm-kernel bag fat and gaseous oxygen. J. H. Burgoyne and A. Thomas (Imperial College). *J. Sci. Food Agr.* **2**, 8(1951). Reaction of oxygen at atmospheric pressure with the fat in used palm-kernel bags was studied in the temperature range 50-160° (principally 80°). Oxygen attacks the linoleate more rapidly than oleate (which is in greater concentration). Consequently, the linoleate becomes exhausted first and the reaction rate is modified. The heat of initial reaction is about 59 kg-cal./mole.

III. Steady-state temperature distribution in a uniform mass of material subject to atmospheric oxidation: a uni-dimensional treatment. *Ibid.* 20. The steady-state temperature distribution in uniform columns of palm-kernels due to atmospheric oxidation was determined theoretically. Temperature rise may be controlled by conduction loss, oxygen deficiency and convection loss. From these data column lengths, external temperatures and ventilation rates at which the column is certainly safe from spontaneous ignition can be calculated but the margin of safety cannot be determined by this simplified method.

IV. Observations of temperature, humidity, and air composition in palm-kernel stacks. P. C. Bowes and A. Thomas. *Ibid.*, 2, 65(1951). Measurements of temperatures and humidity have been made in a steel sheeted stack of bagged palm-kernels during a period of 1 year and it was concluded that ventilation in the stack was sufficient to carry away the heat produced by the slow absorption of oxygen that takes place. The importance of including only dry bags of kernels in the stacks is emphasized.

V. A study of the self-heating of the palm-kernels and the jute bags in the presence of moisture. P. C. Bowes. *Ibid.* 2, 79(1951). Heating of moist palm-kernel stacks under aerobic conditions was due mainly to respiration of micro-flora developing on the materials. No evidence has been found of a reaction consequential to the biological reactions, which could continue the heating above the lethal temperature for the mirco-flora present in the palm-kernels or in the jute bags contaminated with palm-kernel fat.

Refractive indices for the methyl esters of the C_{12}-C_{28} saturated n-aliphatic acids. C. F. Krewson (Eastern Reg. Res. Lab.). *J. Am. Chem. Soc.* **73**, 1365(1951). The melting point and refractive index are given.

Displacement analysis of lipids. IV. Carrier displacement separation of saturated fatty acids. R. T. Holman (Texas Agricultural Exp. Station, College Station). *J. Am. Chem. Soc.* **73**, 1261(1951). Separation of lauric, myristic, palmitic, and stearic acids was accomplished on a column of charcoal and diatomaceous earth using a 1% solution of methyl stearate as a displacer. The recoveries approached 100%.

Some factors affecting the antioxidant behavior of ascorbic acid with unsaturated fats. Betty M. Watts and Ruby Wong (Syracuse Univ., Syracuse, N. Y.). *Arch. Biochem.* **30**, 110 (1951). At 5° the rate of oxidation of pure oleic acid in contact with buffer solutions (pH 5.6) was almost as rapid as that of linoleic and linolenic acids. Both hemoglobin and ascorbic acid catalyzed the oxidation of linoleic and linolenic acids but not of oleic acid. The addition of ethylenediaminetetraacetic acid to ascorbic acid solutions eliminated any prooxidant effect of ascorbic acid. The combination had strong antioxidant properties with natural fats and pure fatty acids under all conditions of temperature (5°-45°), tocopherol and hemoglobin levels tried. Ethylenediamenetetraacetic acid did not act by protecting reduced ascorbic acid although it did eliminate the catalytic effect of added copper on ascorbic acid oxidation.

The chemical and physiological properties of sesame oil. P. Budowski and K. S. Markley (Southern Reg. Res. Lab., New Orleans, La.). *Chem. Rev.* **48**, 125(1951). An excellent review.

A spinning-band column for vacuum fractionation of fatty-acid esters. L. J. Williamson (Paint Res. Station, Teddington, Middlesex). *J. Appl. Chem.* **1**, 33(1951). A spinning-band column is described in which plate-efficiency tests show that the H.E.T.P. is 2.64 cm. at atmospheric pressure. Distillation curves for fatty acid ester mixtures show that the column is suitable for analytical ester fractionation at about 1 mm. pressure.

[Preparation and properties of] sterile human lipoma fat. C. Stich. *Pharm. Ztg.* **86**, 626(1950). The preparation and sterilization of fat from human lipoma is described. This fat m. 23-34° has an acid no. of 0.66, saponification no. 202, iodine no. 64. Polenske no. 0.60, and Reichert-Meissl no. 0.17. (*Chem. Abs.* **45**, 1182)

Solubility of fat emboli. I. Gy. Fazekas. *Orvosi Hetilap* **90**, 345-9(1949). Femur bone marrow of middle-aged persons (died of suicide or accidents) was treated for 3-4 hrs. at 37° to remove fat. After filtering through absorbing cotton this fat was an oily, orange-colored substance which separated after some days at room temperature to a more solid lower portion with an oily phase above it. The latter had d. 0.865, m.p. 20°, solidification point 16°, acid no. 0.28, saponification no. 198, iodine no. 76, fatty acids 95.88%, cholesterol 0.42%, lipophosphoric acid none. In rabbits the lethal dose of this oil was 0.6-8 cc./kg. of body weight if dosed at once. (*Chem. Abs.* **45**, 1226)

Fat production from the mass culture of green algae. F. Gummert (Kohlenstoffbiol. Forschungsstation, Essen, Ger.). *Fette u Seifen* **52**, 453-4(1950). German work in this field is reviewed. (*Chem. Abs.* **45**, 1209)

Photometric determination of milk fat contained in an aqueous dispersion. E. Goiffon. *Lait* **29**, 357-73(1949). The possibility of the turbidimetric determination of fat by adding an acetone solution of the fat to water is discussed. It was found that a strict relation existed between the optical density of an emulsion prepared under the same conditions and the quantity of fat dispersed. Factors that must be controlled in the quantitative procedure are methods of mixing, use of surface tension modifier in the water (0.5% Na oleate), age, and temperature of the solution. The proportion between acetone and water has considerable importance and the limits have been defined. The pH must be closely controlled. A curve is given showing the relation between fat content and optical density. This method is rapid and allows the use of a very small quantity of milk fat. (*Chem. Abs.* **45**, 1264)

Causes of margarine oxidation. E. Becker. *Fette u. Seifen* **52**, 546-9(1950). Various possible causes of oxidation are discussed on the basis of control of raw materials, apparatus used, packaging, etc., and detection of rancidity by peroxide and Lea numbers. (*Chem. Abs.* **45**, 1265)

PATENTS

Unsaturated esters of 10-hendecenoic acid. D. Swern and E. F. Jordan, Jr. (U.S.A.) *U. S. 2,541,126.* A copolymer of vinyl acetate and 2-chlorallyl 10-hendecenoate is disclosed which contains about from 1 to 50%, by weight, of said 2-chlorallyl 10-hendecenoate.

Castor oil ortho silicate gels. H. F. Miller and R. G. Flowers (General Electric Co.). *U. S. 2,544,342.* The method of preparing gel-like compositions is disclosed which comprises effecting reaction at temperatures within the range of 125° to 175° between ingredients comprising a lower alkyl ester of ortho silicic acid and an oil selected from the class consisting of castor oil and hydrogenated castor oil in the ratio of one mole of ester to 1.5 to 2.5 moles of oil while removing alcohol formed during the reaction.

Method of refining glyceride oils. T. H. Rider and S. D. Gershon (Lever Bros. Co.). *U. S. 2,544,725.* Glyceride oils are refined by adding 0.5 to 10% of an oil soluble partial higher fatty acid ester of a polyhydroxy aliphatic compound containing at least one free hydroxyl group, mixing with water and separating the aqueous phase which contains the undesirable impurities.

Processing of fatty acids and making grease therefrom. W. B. Whitney (Phillips Petroleum Co.). *U. S. 2,545,126.* A mixture of saturated and unsaturated fatty acids is heated in the presence of an excess of anhydrous alkali at a temperature between 300° and the scorching temperature of the saturated materials for between 15 and 45 minutes to decompose the unsaturated material. The resulting mixture is acidified, the organic acids extracted, saponified with metal base and incorporated in an oil to form a gel.

Solvent extraction apparatus. C. W. Bilbe (Allis-Chalmers Mfg. Co.). *U. S. 2,545,938.* A countercurrent solvent extractor is described in which the extracted meal is compressed to remove solvent before entering the driers.

Fractionation of oleaginous materials. G. H. Palmer (M. W. Kellogg Co.). *U. S. 2,546,132.* An improved method of fractionating fatty materials using liquid propane is described.

Means for incorporating solid fat in liquid fatty mixtures. B. S. Harrington (Armour and Co.). *U. S. 2,546,502.* A method is disclosed for mixing solid and liquid fats prior to deodorization.

Manufacture of nitriles and amides. R. H. Potts (Armour and Co.). *U. S. 2,546,521.* A continuous method for making nitriles and amides is disclosed in which fatty acids and ammonia are contacted in a column at a temperature which causes amide formation. The lower portion of the column is held at a temperature such that a portion of the amides are converted to nitriles which vaporize and pass up through the column. The nitriles are taken overhead and the amides are withdrawn from the bottom of the column.

Extraction of oil from olive pomace and the like. A. Salino and M. Monti. *Italian 444,223.* A design of a continuous solvent extraction plant on the countercurrent principle is given. (*Chem. Abs.* **45**, 1792)

Separation of fat acids from unsaponifiable matter. G. Kaftal and G. Ballabio (Azienda nazionale idrogenazione combustibili ANIC). *Italian 447,583.* Mixtures of fat acids and other oxygenated compounds obtained by the oxidation of paraffin, petrolatum, etc., are saponified by NH_3 in alcohol solution and treated with gasoline at 60-100° which extracts unsaponifiable compounds. The soap-alcohol solution is then steam distilled at 100-150° with simultaneous separation of ethanol and NH_3 which are recycled. (*Chem. Abs.* **45**, 1792)

• Biology and Nutrition

R. A. Reiners, Abstractor

Vaccenic acid and its relation to the alleged grass-juice factor. D. V. S. Sankar and P. S. Sarma (Univ. Biochem. Lab., Madras). *J. Sci. Ind. Research* (India) **9B**, No. 7, 170-3(1950). It was concluded from feeding experiments that neither butter nor paddy grass contains unidentified nutrients necessary for the rat; that the white rat cannot synthesize vaccenic acid from a diet containing 10% paddy grass; and that vaccenic acid has no growth-promoting properties. (*Chem. Abs.* **45**, 1212)

Feeding and breeding of laboratory animals. XI. Vitamin E deficiency in mice on a diet containing 85% of whole grain cereals, after the addition of 2% cod-liver oil. H. M. Bruce (Nat. Inst. Med. Research, London). *J. Hyg.* **48**, 171-83(1950). Vitamin E deficiency occurred in rats and mice after the addition of 2% of cod-liver oil to a diet containing 85% whole ground cereals. This can be prevented by reducing the cod-liver oil to 1%. (*Chem. Abs.* **45**, 1214)

The decomposition of vitamin A by various factors. II. The influence of inorganic salts. K. Ariga (Nippon Univ., Tokyo). *J. Japan. Biochem. Soc.* **22**, 78-82(1950). Salts, particularly acidic salts, accelerated the rate of decomposition of vitamin A, and among them, cations with higher valencies had greater effect than those with lower valencies. Na_2CO_3 and K_2CO_3 arrested the decomposition of vitamin A, presumably by decomposing the peroxide formed. KI, when added after saponification, prevented the decomposition of vitamin A. From these results, the use of K_2CO_3 or Na_2CO_3 as the dehydrating agents of the ether extract of liver oil after saponification was recommended. (*Chem. Abs.* **45**, 1214)

Phospholipids in foods. I. Phospholipid content of milk and milk products. H. P. Kaufmann, J. Baltes and B. Sibbel (Chem. Landesuntersuchungsamt, Nordrhein-Westfalen, Ger.). *Fette u. Seifen* **52**, 600-9(1950). The colorimetric P determination does not give dependable results with foods containing relatively large amounts of fat. The method of Thaler-Just gives reproducible results. The following average results were obtained (% phospholipids): milk 0.051; skim milk 0.032; buttermilk 0.032; human milk 0.034; butter (dairy churned) 0.246; butter (home churned) 0.312; cheese (20% fat) 0.037%; cheese (30% fat) 0.084%; cheese (40% fat) 0.182%. The increase of phospholipid content with increasing fat content may be due to the solubility of the phospholipids in fat. (*Chem. Abs.* **45**, 2109)

Determination of vitamin A in margarine. J. Boldingh and J. R. Drost. *Proc. Koninkl. Nederland. Akad. Wetenschap.* **53**, No. 9, 1426-7(1950). A spectrophotometric procedure of high reproducibility (2-4% deviation) is described for the determination of vitamin A in margarine (10-g. sample used). Double chromatography gave a vitamin A fraction free of interfering substances so that the determination of 325 mμ gave the no. of international units of vitamin A. (*Chem. Abs.* **45**, 2114)

Determination of vitamin A factors in foods. II. Divergency between biological and physicochemical assays. P. Dubouloz and R. Marville (Univ., Marseille, France). *Bull. soc. chim. biol.* **32**, 815-23(1950). To remove vitamin A completely from a rat diet it is necessary to extract for at least 3 hrs. with boiling ethanol. Some rat diets and their alcohol extracts contain substances which show vitamin A activity in the rat-growth test but give negative tests when examined by spectral absorption methods and the Carr-Price reaction. (*Chem. Abs.* **45**, 2049)

Rat feeding tests with milk obtained from cows fed toxic cottonseed meal. W. R. Ruegamer (U. Colorado Med. Center, Denver) and C. E. Poling (Swift and Co., Chicago). *J. Animal Sci.* 9(2), 201-206(1950). The toxic principles associated with improperly treated cottonseed meal are apparently not transmitted into the milk of the dairy cow consuming toxic cottonseed meal. Evidence for this belief was obtained by feeding "toxic" cottonseed meal to cows, and in turn feeding the milk obtained from these cows to weanling rats. Even though the rat is highly susceptible to cottonseed toxicity, no evidence for toxicity could be detected in rats receiving the suspected milk for a period of 8 weeks. [*Biol. Abs.* **24G**(10), 6]

The comparative value of hydraulic, expeller and solvent processed oil meals for ruminants. W. D. Gallup, H. M. Briggs and E. E. Hatfield (Oklahoma A. and M. Coll., Stillwater).

J. Animal Sci. **9**(2), 194-200(1950). The comparative value of cottonseed meal prepared by hydraulic and solvent processes and soybean oil meal prepared by expeller and solvent processes was determined in digestion and nitrogen balance trials with steers and lambs. Differences among the meals attributed to differences in processing were not evident in the results. [*Biol. Abs.* **24G**(10), 5]

Mechanism of the intestinal fat absorption. S. Bergstrom, B. Borgström, A. Carlsten and M. Rottenberg (Univ., Lund, Sweden). *Acta Chem. Scand.* **4**, 1142-3(1950). Cats were fed C_{14} labeled stearic acid mixed with hydrolyzed corn oil in one case and with unhydrolyzed corn oil in another. Feeding experiments were also conducted using corn oil containing radioactive glycerides. Only 3-12% of the lipids fed were recovered in the lymph. Analyses showed that in all cases 70-80% of the fatty acids recovered were present as glycerides. The phospholipid fatty acids were 4 times as active in the case where hydrolyzed corn oil was fed as in the case where corn oil plus radioactive glycerides was fed. A possible explanation is given. (*Chem. Abs.* **45**, 2081)

Biosynthesis of unsaturated fatty acids in ripening seeds. T. P. Hilditch (Univ., Liverpool). *Nature* **167**, 298(1951). The facts regarding the fatty acid composition of ripening seeds are reviewed. The relative proportions of oleic and linoleic (linolenic) acids may vary considerably in the same species according to the temperature of the locality where the seed ripens. The saturated components, however, vary only slightly indicating that different mechanisms may operate in the biosynthesis of saturated and unsaturated fatty acids.

The effect of organic acids on mammalian tubercle bacilli. R. J. Dubos (Rockefeller Inst. for Med. Research, Princeton, N. J.). *J. Exptl. Med.* **92**, 319-32(1950). Short-chain aliphatic acids such as acetic, propionic, butyric, caproic and capric acids exerted a marked bacteriostatic effect on mammalian tubercle bacilli. Low concentrations of lactic acid also inhibited growth. Keto and dicarboxylic acids did not have this property. Lowering the pH increased the inhibitory effect. Although the organic acids inhibited growth, they did not affect the viability of the cells. Some long-chain fatty acids actually stimulated growth when used in low concentrations and in the presence of enough serum albumin to overcome the toxicity. The mechanism of the inhibitory action is discussed. (*Chem. Abs.* **45**, 1204)

Reasons for the use of antioxidants in the treatment of tuberculosis. M. Bergel. *Med. Rev. Rozario* **40**, 3(1950). A review with references.

• Drying Oils

Stuart A. Harrison, Abstractor

Styrene copolymers. E. A. Bevan. *Official Digest Federation Paint and Varnish Production Clubs.* **No. 314**, 165(1951). Reviews the development, use and potentialities of so-called styrene copolymers with drying oils, blown oils, stand oils, and oil modified alkyds. Discusses the controversy over whether or not styrene and unsaturated fatty acids really copolymerize.

Natural and synthetic drying oils as binders in the linoleum industry. P. Schmidt. *Farben, Lacke, Anstichstoffe* **4**, 373 (1950). The manufacture of linoxyn and linoleum is described in detail. Certain resins from polyhydric alcohols (trimethylol propane, hexanetriol, 1,2,4-butane-triol) and adipic or other acids can successfully replace linoxyn with the main advantage being rapid manufacture. Other products such as styrene-butadiene copolymers and glycol esters of sebacic and 3% maleic acids give good results. (*Chem. Abs.* **45**, 1783)

Comparative bulk oxidation of drying and non-drying oils. P. S. Hess and G. A. O'Hare. *Official Digest Federation Paint and Varnish Production Clubs.* **No. 314**, 144(1951). The variables which influence the speed of reaction of a given vegetable oil on oxidation are: (1) air flow, (2) turbulence (degree and type of agitation) and (3) reaction temperature. The effect of air flow on the oil was shown by blowing raw linseed oil at different rates. A twelvefold increase in blowing rate had no effect on induction time but the viscosity increase after the induction period was proportional to the blowing rate. Increased rate of agitation did not affect induction period but had a direct effect on the viscosity increase thereafter. The higher the blowing temperature the shorter the induction period. The viscosity increase after the induction period is over is nearly constant for all temperatures studied. Composition of oils makes little difference on the initial rate of viscosity increase. As blowing is continued differences do show up. The more unsaturated oils show the greater increase in viscosity.

Copolymers—the new paint vehicles. A. G. Hovey and R. D. Jerabek. *Official Digest Federation Paint and Varnish Production Clubs.* **No. 314**, 171(1951). The properties of styrene-oil copolymers made using boron trifluoride catalyst are compared with those made with peroxide catalyst. The former have excellent color, good clarity, good solubility in mineral spirits, excellent non-yellowing characteristics, good gloss and durability. Bad points are: viscosity retention on reduction with mineral spirits is poor, reaction rates in preparation are very low, films have inferior mar and solvent resistance. The copolymers are relatively incompatible with other film forming materials. They also show poor heat convertibility. The peroxide catalyzed copolymers also have the last two disadvantages and in addition show more yellowing and poorer mar resistance than the boron trifluoride catalyzed copolymers. The peroxide catalyzed copolymers have the advantage of good reaction speed, good working viscosity on reduction with solvents, rapid set-up, good film flexibility and good can stability. The copolymerization of cyclopentadiene with non-conjugated oils in contrast to styrenation can be effected by heating to 400-600°F. without catalyst. The cyclopentadiene-oil copolymers show better clarity, mineral spirits tolerance, compatibility, dry, ultimate hardness, mar resistance, solvent resistance and general film integrity than the styrene copolymers. They are, however, poorer in color and somewhat inferior in durability.

Improved film-forming materials from dehydrated castor oil. R. Wilson. *J. Oil & Colour Chemists' Assoc.* **33**, 503(1950). Though dehydrated castor oil has numerous properties which make it superior to other drying oils, it has one defect that reduces its usefulness by a large degree. This defect is known as aftertack. Aftertack can be reduced to different degrees by several modifications which can be classified into two groups: (a) Those in which the product remains essentially an oil; (b) Those in which the modifying materials are present in such quantities as to produce a new type material. The first group includes esterification with polyhydric alcohols of functionality greater than three, maleinization, and solvent extraction. The second group includes the formation of oleo-resinous varnishes, alkyd resins and styrenation. None of these completely eliminate aftertack with the exception of styrenation at high levels of styrene where a very different product is obtained. From the fundamental standpoint, aftertack may be connected with some or many of the following things: to the presence of small amounts of dihydroxy-stearic acid, to the presence of undehydrated ricinoleic triglyceride, to the double bond structure of the dehydrated fatty acid molecule, and to the lower functionality of the oil.

The determination of acetyl values for use in component fatty acid analyses of castor oils. J. P. Riley. *Analyst* **76**, 40(1951). A comparison of the British Standards Institution (second method) and the Association of Official Agricultural Chemists' Methods for the determination of acetyl values was made. It was concluded that both procedures give similar results. A procedure was developed for the complete analyses of castor oils and tested by application to mixtures of fatty acids of known composition.

Developments in film forming media. J. H. Martin. *Paint Manuf.* **21**, 43(1951). The patent literature and publications on oils, modified oils, cellulose derivatives, allyl compounds, alkyds, polyamides, vinyl resins, hydrocarbon resins, phenolic resins and others are reviewed. (82 references)

Studies of an oil in protective coatings. D. y R. Montequi. *Anales de fis. y quim. (Madrid)* **47B**, 33-42(1951). Fish oil from *sardine pilchardus* was compared with a linseed type oil in paints and varnishes. The sardine-oil films were found to be less resistant to destructive actions, stickier, and showed a greater tendency to yellowing than the linseed oil films. The fish oil films dried faster and were more elastic. Metal resinates or phenolic resins can be added to the fish oil to improve its properties.

PATENTS

Enamel and method of preparing the same. H. A. Bates. *U. S. 2,533,911.* An oleoresinous baking lacquer composition for coating metal is prepared by cooking an oil-soluble varnish resin (100) with a drying oil (100-240) in the presence of zinc oxide 0.5-2.5% of the combined weight of oil and resin. Cooking is continued until viscosity reaches 8-11 seconds with a No. 3 Zahn cup.

Method of modifying drying oils and friction material containing modified drying oil. J. N. Kuzmick. *U. S. 2,539,631.* Linseed oil is blown with air at about 150°F. until the weight has increased by 16-20%. The oil is then bodied at 300°F. until it gels at room temperature but is still soluble in mineral spirits. The semigelled oil is mixed with short asbestos fibers, binders, mineral fillers, rubber, sulfur, and litharge. The intimate mixture is molded in the desired form and cured at 180-400°F. The curd product is suitable for brake linings.

Compositions of phenol-oil condensates and polyepoxides. S. O. Greenlee (Devoe Raynolds). *U. S. 2,542,664.* China-wood oil (291), phenol (200) and 85% phosphoric acid are heated to 190-200°for four hours and the unreacted phenol is removed by vacuum distillation. About 3.3 moles of phenol combine with each mole of China-wood oil. Other oils such as oiticica and linseed may be used in place of China-wood oil. Glycerol and epichlorohydrin are condensed using boron trifluoride catalyst to give a product with about two epoxide groups per mole. About 10% of the above polyepoxide is added to the phenol-oil condensate, plus diethylene triamine catalyst. A film of this mixture spread from solution, bakes in 15 minutes at 150° to a hard tough flexible film.

• Waxes

E. H. McMullen, Abstractor

New process for the extraction of cane wax. V. Merz. *Intern. Sugar J.* **53**, No. 11, 10(1951). Dried filter mud is extracted with petroleum ether at 15-20° to remove the fatty material. The temperature of the solvent is then raised to boiling and the extraction continued at the high temperature to remove the high-melting wax. On cooling the hot extraction solvent a wax melting at 77-78° is obtained. A plant design is given. (*Chem. Abs.* **45**, 2694)

Components of the wax from Rhus trichocarpa. Chotaro Tsukamoto (Kanazawa Med. Univ., Japan). *J. Pharm. Soc. Japan* **62**, 375-7(1942). The ether extract of seeds gives 12% wax, density 0.941, melting at 50-4.5°, acid number 7, saponification number 169, iodine number 5 and glycerol content 10.1%. It contains palmitic and trichocarpinic acid ($C_{18}H_{36}O_3$), melting at 87°, and acetate, melting at 69°. The trichocarpinic acid is a monohydroxystearic acid with properties unlike those of any known isomer. (*Chem. Abs.* **45**, 2238)

Principles of the chemistry and scientific technology of the waxes. Leo Ivanovszky. *Mitt. chem. Forsch.-Inst. Ind. osterr.* **4**, 61-70(1950). Since the usual definition of a wax is considered to be incorrect, the following is proposed: Waxes are a special group of fusible organic masses (thermoplastics), as a rule transparent and similar to beeswax as regards quality and applicability. They differ mainly from other natural and synthetic products, e.g. resins, metallic soaps, and thermoplastics, in that they usually melt between 50 and 90° (sometimes at 200), have a low viscosity, cannot be spun into fibers, and are practically free of ash-forming constituents. They can form pastes or gels and can be used for making candles. Their characteristic constituents are long-chain paraffins and their oxygen-containing derivatives. The chains can be substituted with carboxyl groups (acid waxes), hydroxyl groups (alcohol waxes) or carbonyl groups (keto waxes). Chemically, the waxes are classified according to their characteristic functional groups: I, hydrocarbons; II, fatty and wax acids; III, ketones; IV, fatty and wax alcohols; V, ethers; VI, esters; VII, pseudoester; and VIII, aromatic compounds. Compounds with principal chains of less than 18-22 carbon atoms, are not usually encountered in waxes, or only in small amounts. The principal chain is understood to be the uninterrupted chain of a compound which is responsible for its waxlike character (e.g. the waxy acid in glycol diesters). A diagram shows the melting point of a number of compounds of waxes as function of the number of carbon atoms. The production of natural and synthetic waxes and their fields of application are described at length. The solidification of wax solutions to pastes is considered to be a colloid-chemical process, in which the influence of protective colloids is of special importance, since they prevent crystallization (e.g. ozocerites and high-molecular metal soaps). In the analysis of a wax the determination of the saponification number and the unsaponifiable portions is sufficient as long as the wax is used only for candlemaking, but neither melting point nor freezing point is sufficient to judge hardness and other properties. Freezing point is frequently a better characteristic than melting point. (*Chem. Abs.* **45**, 1791)

Wet milling of grain sorghum. R. L. Zipf, R. A. Anderson, and R. L. Slotter (Northern Regional Research Lab., Peoria, Ill.). *Cereal Chem.* **27**, 463-76(1950). A general laboratory process for the wet milling of sorghums is described which is approximately the same as the industrial process for the wet milling of corn. A carnauba-like wax can be recovered from the hull fraction by solvent extraction with hexane. (*Chem. Abs.* **45**, 2111)

What replacements for carnauba wax. Alred A. Kroner. *Soap and Sanitary Chemicals*, **27**, 110-113, 133(1951). A review of the properties of various natural and synthetic waxes which may be useful in wax polish compositions in place of carnauba.

Colors, lacquers, fats, and waxes in the shoe and leather industry. Hans Hadert. *Fette u. Seifen* **52**, 470-4(1950). A review with many formulations. (*Chem. Abs.* **45**, 1799)

Synthetic esters. H. Wittcoff and J. R. Roach (General Mills, Inc.), *U. S. 2,527,870.* Synthetic drying oils are prepared from polyhydroxy condensation products from glycerol dichlorhydrin (I) and glycerol (II) or pentaerythritol (III) as described in *U. S. 2,477,552* with linseed or soybean fatty acids in the presence of zinc stearate which dry in a few hours and may be used in preparing paints and varnishes. A sirupy product is obtained by treating the condensation product of I and II with 4 parts of acetic anhydride and removing the volatile material under reduced pressure, saponification number 138. A white wax, m. 66°, is prepared from condensation product of I and II suspended in pyridine and pentadecylchloride by adding the product to ice water and precipitating from alcohol. A wax, melting at 65-8°, is prepared from condensation product of I and III with stearic acid by heating in the presence of zinc stearate and removing the water azeotropically with xylene. (*Chem. Abs.* **45**, 1358)

PATENTS

Estimating phlegmatizing properties of waxes applied to high explosives. J. W. Rowen and A. J. Phillips. *U. S. 2,531,471.* Inspection under ultra-violet radiation of explosive particles coated with wax for purposes of reducing friction and shock sensitivity permits the detection and estimation of incompletely coated particles because of the difference in the light coming from coated and uncoated particles. The uncoated particles are purple colored whereas the coated particles have a yellow-white or a blue-white fluorescence. The impact sensitivity decreases as the amount of fluorescence increases. (*Chem. Abs.* **45**, 2670)

Wax refining. R. W. Pressing and B. J. Pettibone (S. C. Johnson & Son, Inc.). *U. S. 2,531,785.* Crude carnauba wax powder (100 parts) was screened to reduce the leafy content ("borra") thoroughly wetted and agitated with water (1,000 parts) for 15 minutes at 20-5° and then fed into a horizontally elongated centrifugal-force separator. Wax was discharged as a slurry (93% water), dewatered in a basket centrifuge, and air-dried. Borra content of dried wax powder was 2.5%. (*Chem. Abs.* **45**, 2242)

• Detergents

Lenore Petchaft, Abstractor

Analysis of detergents containing alkyl aryls. G. Reutenauer (Lab. Chevreul, Paris). *Bull. mens. ITERG* **4**, 557-9(1950). Previously reported investigations of suitable analysis methods for commercial alkyl aryls (I) were extended to detergents containing besides I and their usual admixtures (Na_2SO_4, Na_2CO_3, $NaHCO_3$), phosphates, and carboxymethylcellulose (II). Water was determined by azeotropic distillation with toluene while comparative determinations with $Na_3PO_4 \cdot 12H_2O$ alone showed that there is no perfect concordance with the oven method. Na phosphates were obtained by precipitation with magnesia mixture after elimination of sulfonated I with isoamyl alcohol and of silicates by the classic method. Sulfonated matter was measured by dissolving 10 g. in 100 ml. of water and 50 g. of isopropanol, filtering after several hours from precipitated II, making sure that no more II precipitates, after prolonged standing, washing the precipitate and titrating sulfonated I in the filtrate as usual. The precipitate of the previous operation is dried, redissolved in 100 ml. of H_2O, precipitated with 200 ml. of EtOH, filtered after some hours, washed with 30% EtOH, dried at 110°, weighed, and incinerated. Carboxymethylcellulose is calculated by difference, but if Na_3PO_4 was present the ashes must be wetted and dried at 110° to obtain the same degree of hydration as before incineration. (*Chem. Abs.* **45**, 2240)

Surface-active compounds. Their use as detergents and other applications in the food industry. C. Mieman. *Chem. en Pharm. Tech.* (Dordrecht, Holland) **6**, 67-70(1950). A review with 37 references. (*Chem. Abs.* **45**, 1791)

Preparation and properties of oxyethylated alkylphenols. K. Lindner. *Fette u. Seifen* **52**, 613-18(1950). Methods of synthesis and uses as surface-active agents are reviewed. 15 references. (*Chem. Abs.* **45**, 2241)

Industrial cleaners. A. Davidsohn. *Soap, Perfumery, Cosmetics* **24**, 238-44(1951). General review covering composition and manufacture of various types of industrial cleaners. Properties of the various raw materials—alkalies, solvents and synthetic detergents—are discussed and tables showing these properties are included. Formulations are given for acid cleaning and pickling of metals, alkaline cleaning of metals and metal emulsion cleaners. Formulas are also given for food industry cleaners used in food machinery, dishwashing and fruit cleaning.

Mechanism of hydrolysis in aqueous soap solutions. Melvin A. Cook (University of Utah, Salt Lake City, Utah). *J. Phys. Colloid Chem.* **55**, 383-402(1951). The curves of Powney and Jordan for the degree of hydrolysis against soap concentration are interpreted mathematically in the light of conditions required to obtain maxima and minima along such curves under the assumption that the hydrolysis curves are equilibrium ones. It is suggested that the observed maxima and minima are due to small free acid and anion (submicelle) particles in which, in one case, not the solution but the surface equilibria are involved in determining the concentration above surface saturation. A model is developed to explain the hydrolysis behavior, and the model is applied quantitatively for sodium palmitate, sodium oleate, and sodium myristate. The results are found to be in good agreement with observation, not only in reproducing the experimental hydrolysis curves, but in obtaining their temperature coefficients.

The vapor pressure of aqueous solutions of some detergents. Harriette Huff, J. W. McBain, and A. P. Brady (Stanford Research Institute, Stanford, Calif.). *J. Phys. Colloid Chem.* **55**, 311-21(1951). Vapor pressure lowerings determined by the thermistor method are given in terms of the osmotic coefficient for aqueous solutions of 19 detergents at various concentrations. Ten of these substances were measured at both 30° and 50°. It is pointed out that the critical concentration and the slope of a plot of (osmotic coefficient × molality) vs. molality above the critical concentration together allow the calculation of most of the thermodynamic properties of a given detergent up to approximately 10 times the critical concentration for micelles.

Sanitation-practical cleaning detergents. W. E. Uselman (Galloway West Co., Fond du Lac, Wis.). *Ice Cream Trade J.* **46**, No. 12, 52, 94-6(1950). The place of acid and alkaline cleaners and surface-active materials in the cleaning of dairy equipment is discussed. (*Chem. Abs.* **45**, 2240)

Fatty acids for soap manufacture. Paul I. Smith. *Am. Perfumer Essent. Oil Rev.* **57**, 131-2(1951). The advantages of using fatty acids for manufacture of soap in place of glycerides may be summarized as follows: distilled fatty acids are very light in color, odorless and uniform in quality, varying only slightly from batch to batch; the use of such uniform raw materials results in soap of uniform quality; soap making using fatty acids is easier, quicker and more economical than when using natural fats; apart from saving time and steam, the manufacturer can cut down alkali consumption; and finally, fatty acids have a long storage life and are stable.

Suspending power of detergent solutions. II. Soap-builder solutions. A. S. Weatherburn, G. R. F. Rose, and C. H. Bayley (Natl. Research Labs., Ottawa, Can.). *Can. J. Research* **28F**, 363-75(1950). The S.P. (suspending power) of 10 builders [NaOH, Na_2CO_3, (Na_2CO_3) $(NaHCO_3)$, NaCl, Na metasilicate, Na sesquisilicate, Na orthosilicate, tri-Na phosphate, tetra-Na pyrophosphate, and Na hexametaphosphate] up to 0.1% concentration has been determined separately and with 0.1% Na laurate or oleate at 60° and stearate at 80°. Without soap, the S.P. remains low; with soap, the S.P. decreases with increasing builder concentration (except for NaCl and Na hexametaphosphate which remain high, the latter actually increases the S.P. of Na oleate). Provided a certain minimum of soap is present the S.P. is more dependent on builder concentration. The pH at 70° is given for each builder at 0.01, 0.05 and 0.1% concentration and also with 0.1% Na laurate, oleate, and stearate. When the S.P. of 0.1% soap + 0.1% builder is plotted against its pH, these builders fall into 3 groups (simple electrolytes, silicates, and phosphates). In each group, S.P. for a given soap is apparently higher with that builder which gives it a lower pH. Thus, of the Na silicates, metasilicate shows the highest S.P. and of the Na phosphates, hexametaphosphate is by far the highest. Highly alkaline builders depress the S.P. of soap solutions by decreasing the adsorption of soap ions on the soil particles. In general, Na hexametaphosphate is markedly superior in maintaining a high S.P., whereas NaOH and Na orthosilicate are quite inferior. Suspending action is due not only to electrostatic repulsion of the soil particles with adsorbed ionized detergents but also to the nature of the exposed surfaces, particularly in higher concentrations of ionizing detergents and in all concentrations of nonionizing detergents. The S.P. alone is not necessarily indicative of the over-all efficiency of a builder in detergency. (*Chem. Abs.* **45**, 2239)

Control of the whitening effect of detergents. Arnold Lassieur. *Bull. mens ITERG* **4**, 520-6(1950). Critical review of the usual (gravimetric and colorimetric) methods of measuring the efficiency of a detergent. An economical photometric apparatus is described. The essential parts consist of a device with light source and condenser as used for the enlargement of photographs, a photoelectric cell, and a galvanometer (I) of 18 mv. The sample of tissue to be examined is hit by a pencil of rays and part of the light diffused is directed to the photoelectric cell. The intensity of the so-created current, measured by I, is proportional to the degree of whiteness. Examples are given. (*Chem. Abs.* **45**, 2239)

PATENTS

Ester condensation product useful as wetting agent. Don E. Floyd (General Mills, Inc.). *U. S. 2,523,692.* Production of an alkyl-substituted malonic ester which may be used as a wetting agent, by condensing a fatty acid ester (ethyl myristate) with an ester of oxalic acid (ethyl oxalate) in the presence of an alkali metal alcoholate as catalyst.

Polyalkanolamine condensed with fatty acid mixture. George Zinzalian (E. F. Drew & Co.). *U. S. 2,538,929.* A process of forming wetting agents which have maximum and uniform wetting power, are completely soluble in water, and form clear solutions in great dilutions, by condensing two moles of a polyalkanolamine (diethanolamine) with 1 mole of a fatty acid mixture (lauric, capric and myristic acids).

Capillary-active diamine-fatty acid salts. S. A. Ballard, and V. E. Haury (Shell Development Co.). *U. S. 2,539,685.* Diamine fatty acid salts which possess wetting and foaming properties are prepared by reacting a diamine (trimethylene diamine) with a fatty acid (oleic acid) in the liquid phase.

High-foaming detergent. J. J. Ayo and F. J. Gajewski (General Aniline & Film Corp.). *U. S. 2,542,385.* A detergent composition in liquid form comprising a gel forming synthetic detergent selected from the group consisting of fatty acid taurides, fatty acid sarcosides and fatty acid esters of hydroxy alkyl sulfonic acids, an agent for transforming the micelle structure of the gel formed by said detergent, such as diethylene glycol monoalkyl ether, a small amount of an ion sequestering agent and water.