the second pressing was only 4 to 5% even though we had no "super-duo" at our disposal.

The pulp oil was used for the manufacture of soap. Kernel oil was mostly refined as edible oils. (This statement is contrary to those reported by Dr. Markley and refers to the period prior to 1952.) The two oils had the following physical and chemical properties which coincide with those mentioned by Dr. Markley.

| | Pulp Oil | Kernel Oil |
|---|---|---|
| Specific gravity | 0.9235 | 0.9235 |
| Free fatty acids | | |
| % oleic | 38.7 | .... |
| % lauric | .... | 0.72 |
| Saponification value | 199.9 | 243.5 |
| Unsaponifiable matter, % | 0.27 | 0.31 |
| Iodine value | 63.9 | 27.2 |
| Reichert-Meissl value | 2.58 | 7.6 |
| Refractive index, 40°C. | 1.4583 | 1.4523 |
| Polenske value | 0.65 | 14.0 |

The average industrial yields may be summarized as follows. Freshly harvested fruit lost about 9% in weight during the first few weeks of bulk storage. Yields from processing then were (as percentage of fresh weight of seed):

| | Total Fraction | Oil | Cake |
|---|---|---|---|
| Hull (epicarp) | 18 | ...... | ...... |
| Pulp (mesocarp) | 28 | 4.97 | 20.18 |
| Shell (endocarp) plus kernel | 54 | ...... | ...... |
| Kernel | 10.9 | 6.04 | 3.99 |

I hope that these data may be of interest.

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# ABSTRACTS . . . . . . . . . . . . . . . .

**R. A. Reiners, Editor**

## • Oils and Fats

S. S. Chang, Abstractor
Sini'tiro Kawamura, Abstractor
Dorothy M. Rathmann, Abstractor

**Synthesis of branched-chain or $\omega$-phenyl fatty acids by desulfurization of thiophene derivatives.** M. Sy, Ng. Ph. Buu-Hoï, and Ng. Dat-Xuong. *Comp. rend.* **239**, 1224–6(1954). Thiophenecarboxylic acids treated with Raney nickel in an alkaline medium give branched-chain or $\omega$-phenyl fatty acids of biochemical interest. The compounds synthesized are: 9,9-dimethylcapric acid, 2,5-dimethyl-3-thiophenebutyric acid, $n\text{-}C_5H_{11}CHBuCOOH$, $Ph(CH_2)_5COOH$, $Ph(CH_2)_8COOH$, and $Ph(CH_2)_9COOH$. (*C. A.* **49**, 13211)

**Component fatty acids and unsaponifiables in shark liver oil.** G. G. Kamath and N. G. Magar(Dept. of Biochem., Inst. of Science, Bombay). *Jour. Indian Chem. Soc.* **32**, 455-62(1955). Waghbeer and Khada mushi liver oil were studied for their component fatty acids by low temperature separations, methyl ester fractionation and alkali isomerization. The nature of the two oils studied is different: in Waghbeer liver oil, $C_{20}$ and $C_{22}$ acids predominate over the $C_{16}$ and $C_{18}$ acids, whereas in Khada mushi liver oil, $C_{18}$ acids constitute the major portion. The unsaponifiables of the two oils were studied chromatographically and spectrophotometrically. Cholesterol and vitamin A are present in both of these samples. Presence of kitol is also confirmed.

**Antioxidant properties of spices in oil-in-water emulsions.** J. R. Chipault, G. R. Mizuno and W. O. Lundberg(The Hormel Inst., Univ. of Minn., Austin, Minn.). *Food Research* **20**, 443–8 (1955). The antioxidant properties of 32 spices have been studied in a simple oil-in-water emulsion system. All spices protected the emulsion against oxygen absorption. In most cases the spices were more effective in the emulsion than in plain lard or baked pie crusts, but the order of effectiveness was different for the different substrates. Cloves were extremely effective in preventing oxidation of the emulsions. Other spices with antioxidant indexes greater than 5.0 were allspice, cardamon, cassia, cinnamon, ginger, mace, nutmeg, oregano, black pepper, white pepper, rosemary, sage, savory, thyme and turmeric.

**Production of synthetic fatty acids by oxidation of soft paraffin.** N. K. Man'kovskaya, G. B. Al'terman and G. I. Moskvina (All-Union Sci. Research Inst. Fats and Combine of Synthetic Fats, Shebekinsk). *Masloboino-Zhirovaya Prom.* **20**(4), 15–18 (1955). The hydrocarbon fraction, boiling point 300–400°, produced in the manufacture of synthetic liquid fuel and containing 16–26 carbon atoms per molecule was treated with 0.1–0.2% $KMnO_4$ in 10% aqueous solution and oxidized by air in a stainless steel column first at 125° and then at 107–105° until the acid number reached 6–8 and 70 mg. of potassium hydroxide, respectively, allowed to settle, filtered, and saponified with sodium hydroxide; the unsaponifiable matter (2/3) was returned to the original paraffin for reprocessing. The free fatty acids obtained in the soap comprised water soluble acids 18, $C_5$–$C_9$ acids 11.2, $C_{10}$–$C_{15}$ acids 20.8, $C_{16}$–$C_{17}$ acids 13.5, $C_{18}$–$C_{19}$ acids 3.5%; the residue was 11.8%. (*C. A.* **49**, 13671)

**Suitable methods to work up slaughterhouse, sewage, and tannery fats.** F. Gawenda and H. Niewiadomski(Zaklad Tluszczów GIPRiS, Gdansk, Poland). *Prace Glownego Inst. Przemyslu Rolnego i Spożywczego* **3**(3), 35–9(1954). A slaughterhouse, a sewage and a tannery fat which analyzed, respectively, water 0.2, 0.1, 0.6; ash 0.43, 0.37, 0.70%; setting point 34.0, 40.0, 42.0°; acid number 33.2, 22.7, 43.2; iodine number (Hanus) 53.8, 53.2, 52.5; saponification number, 188.0, 189.5, 189.5; unsaponifiable, insoluble in ether, 1.2, 2.1, 3.2; unsaponifiable, soluble in ether, 0.3, 0.3, 0.5; nitrogen, 0.3, 0.08, 0.07%; were refined. The experiments led to the following recommendations: filter the fat with some filter aid; and acid refine (2 kg. fat is stirred at 50 r.p.m. and at 60°, add 300 g. sulfuric acid in the course of 2 hours), and steam deodorize with the fat at 180–190°, and the steam at 300–325°, for 2.5–3 hours with 0.5 kg. steam per kg. fat. The refined fat is suitable for making soap. (*C. A.* **49**, 14346)

**Structure of isoacids formed in the process of hydrogenation of vegetable oils.** P. A. Artamonov. *Zhur. Priklad. Khim.* **28**, 775–7(1955). The following m.p., iodine number and principal Raman lines of the isoacids isolated through mercury complexes from hydrogenated oils are given: for sunflower oil 40.2°, 86.7, 1300(0.25), 1441(0.25), 1675(0.5), 3049(1), 3128 (1); cottonseed oil 40.0°, 88.0, 1304(0.25), 1440(0.25), 1670 (0.25), 3130(1); soybean oil 35.2°, 87.8, 1301(0.5), 1440(0.5), 1673((0.5), 3129(2); rapeseed oil 38.4°, 72.4, 1294(0.25), 1440 (0.25), 1669(0.25), 3129(1). These indicate *trans* configurations. (*C. A.* **49**, 14349)

**Synergistic action of $\alpha$-alanine for the inhibition of fat autoxidation of phenolic antioxidants.** W. Heimann, M. Matz, B. Grünewald and H. Holland(Tech. Hochschule, Karlsruhe, Ger.). *Z. Lebensm-Untersuch. u. -Forsch.* **102**, 1–6(1955). When sunflower oil containing 0.03% hydroquinone and 0.12% $\alpha$-alanine rancidified under ultraviolet light, pyroracemic acid, a decomposition product of $\alpha$-alanine could be detected in the mixture. The reaction mechanism begins with an oxidative deamination of the amino acid to yield pyroracemic acid and ammonia, and follows with a reduction of the oxidized phenolic antioxidant. In addition to these reactions there can occur a double decomposition between $\alpha$-alanine and quinones, whereby a red coloring develops. The synergistic action is limited to $\alpha$-amino acids, for $\beta$-alanine shows no synergistic effect. (*C. A.* **49**, 14346)

**Chemical composition of the mesenteric fat of Pimelodus albicans.** R. R. Brenner, W. H. E. Reinke, and P. Cattaneo(Univ. Buenos Aires, Arg.). *Anales asoc. quím. argentina* **43**, 67–77 (1955). The mesenteric fat of the omnivorous fresh-water fish *P. albicans,* representing 2.72% of the body weight, had the following constants: acid no. 0.20; peroxide no. 9.20; saponification no. 195.1; m.p. 31°; iodine no. 78.1; $n_D^{25}$ 1.4681; unsaponifiable matter 4.47%. The fatty acid composition of the mesenteric fat is as follows: $C_{18}$ (—2.4H) 50.46, palmitic 22.65, stearic 8.35, palmitoleic 7.30, $C_{20}$ (—5.5H) 5.89, myristic 3.18, $C_{22}$ (—9.7H) 1.23, arachidic 0.57, and myristoleic 0.37%. (*C. A.* **49**, 14346)

**The quality of margarine. I. The influence of refining and hydrogenation upon the quality of raw fats.** J. Czaplicki, K. Danowski, A. Jakubowski, W. Królikowski, H. Niewiadomski, and I. Uruska(Zaklad Tluszczów, Gdansk, Poland). *Prace Glównego Inst. Prezemyslu Rolnego i Spożywczego* **4**(1), 1–12 (1954). The changes of the analytical values of vegetable oils brought about various methods of refining and hydrogenating were studied, with special attention to rapeseed oil, as this is the main ingredient in the best known brand of Polish margarine, "Ceres." The hydration values for peanut oils show no definite trend, but that for rapeseed oil increases from 17.0 to 28.0% if the temperature rises from 60 to 85°. During refining, it is of importance to wash out the excess sodium hydroxide down to 0.005%. Hydrogenation is done at 180° with 0.3 atm. hydrogen pressure with a catalyst which contains 0.25% nickel; it was found that raising the nickel to 0.45% does not offer any advantages, and changing the temperature in the range from 140 to 210° too does not have much influence; at all these temperatures, peanut oil shows a change in the iodine value from 98.1 to 69.4(highest) and 63.1(lowest). (C. A. **49**, 14221)

**The relation between the consistency of margarine and the composition of margarine fat.** W. Królikowski and H. Niewiadomski(Zaklad Tluszczów GIPRiS, Gdansk, Poland). *Prace Glownego Inst. Przemyslu Rolneglo i Spożywczego* **3**(3), 24–34 (1954). The consistency of mixtures of fatty substances, margarine, butterfat, and butter were examined. Margarine with 15% coconut oil was much softer and simulated butter much better than any other margarine where the 15% was replaced by liquid oils. Such liquid oils, if used, did not cause trouble in margarine production; they did, if actually used in amounts of 30%, lower the titer at least 2–4° and made the margarine twice as hard as butter. The consistency of margarine in these measurements was always proportional to the consistency of the oil mixture. (*C. A.* **49**, 14220)

**Studying changes taking place in fats with the aid of spectral analyses.** Yu. Lyaskovskaya, A. Ivanova, and V. Piul'skaya. *Myasnaya Ind. S.S.S.R.* **26**(3), 49–51(1955). Spectral data have shown that development of an olive tint in stored beef fat can be measured by the adsorption maximum that develops at 460–463 mμ, and addition of ascorbic acid or citric acid has no influence on appearance of the olive tint. The addition of alkaline substances such as potassium carbonate or sodium acetate inhibits changes in β-carotene, bringing about a weakening of absorption at 460–463 mμ and a retention of the yellow color of the fat during storage. (*C. A.* **49**, 14221)

**Oil solutions of carotene and their applications.** K. Ruhowicz and H. Jarmolowicz(Zaklad Olejów i Tluszczów, GIPRiS, Warsaw). *Prace Glównego Inst. Przemyslu Rolnego i Spożywczego* **3**(3), 1–12(1954). Carotene was extracted by beechnut oil, hazelnut oil, peanut oil, and rapeseed oil from the carotene containing albumin sediment which settles in raw carrot juice. These solutions were added to butter and margarine so that 2–3 γ of carotene were present per g. These extractions contained 0.256–1.347 mg. of carotene per ml. The coloration of the margarine and butter made by addition of these extracts was always satisfactory. (*C. A.* **49**, 14221).

**Antioxidant substances applied to fats.** Alberto Yelpi Pulgar (Univ. Chile, Santiago). *Univ. Chile, fac. quím. y farm., Tesis quím. farm.* **5**, 247–64(1953). The best antioxidant for lard is, for 100 g. fat, a mixture of 20 mg. butylhydroxyanisol, 10 mg. nordihydroguaiaretic acid, and 5 mg. citric or phosphoric acid. For olive and sunflower oils, the best combination consists of 10 mg. propyl gallate, 20 mg. butylhydroxyanisol, and 5 mg. citric acid, while for butter and margarine 20 mg. butylhydroxyanisol, 10 mg. propyl gallate, and 5 mg. ascorbic acid are best. (*C. A.* **49**, 14222)

**The properties of stearic acid.** C. C. Tillotson(Procter & Gamble Co., Cincinnati, O.). *Am. Perfumer Essent. Oil Rev.* **66**(2), 23–7(1955). Commercial stearic acid is a mixture of approximately 55% palmitic acid and 45% stearic acid. The grades most frequently used for cosmetics are double-pressed or triple-pressed stearic acid. The commercial stearic acid provides the finished physical properties and performance characteristics desired by the cosmetic manufacturers; it has a well-defined crystalline structure which is related to m.p., shrinkage, hardness, toughness, and texture. The commercial stearic acid has a stable form, a minimum specific volume, and maximum solubility. (*C. A.* **49**, 14265)

**Determination of butterfat content of ice-cream mix and ice cream.** R. W. Brown and D. L. Gibson(Univ. Saskatchewan, Saskatoon). *Can. Dairy Ice Cream J.* **34**(7), 54–60(1955). Comparative tests for fat in ice cream were conducted by using the Mojonnier test, the Minnesota reagent, the Bureau of Dairy Industry test, the acetic-sulfuric acid test, and several types of test bottles. For the Bureau of Dairy Industry procedure all results were within 0.30% of the result with the Mojonnier method, for the Minnesota test, 84.6% of the results are within this limit, and for the acetic-sulfuric test 19.2% of the results are within this limit. (*C. A.* **49**, 14218)

**Determination of unsaturated fatty acids (in blood serum).** G. Bellieni(Univ. Siena, Italy) and R. Biagini. *Giorn biochim.* **3**, 323–36(1954). After a critical review, a method is described involving extraction by Bloor mixture, saponification by potassium hydroxide, scission of the soap by inorganic acid, extraction of the fatty acids by petroleum ether, precipitation of cholesterol by addition of 2% alcoholic solution of digitonin to the petroleum ether extract. (*C. A.* **49**, 14091)

**Expansion of condensed monolayers of normal long chain fatty acids on admixtures of isodextropimaric acid.** H. H. Bruun (Åbo Akad., Abo, Finland). *Acta Chem. Scand.* **9**, 342–4(1955). Area per molecule was measured with a continuously recording surface balance at a surface pressure of 1.5 dynes/cm. on a substrate of dilute hydrochloric acid (pH 3) at 20° of myristic, palmitic, stearic, arachidic, behenic, and lignoceric acid monolayers. All but myristic acid produced condensed monolayers. On admixtures with isodextropimaric acid, which alone forms a condensed monolayer, expanded monolayers were formed with all but lignoceric acid; the effect was most pronounced with palmitic acid, and decreased with increasing chain length of the acid. (*C. A.* **49**, 12916)

**The relation between the absorption of linseed oil by carbon black and its volume change.** K. Watanabe(Tokyo Univ. Educ.) and K. Nakahara. *Tanso* **3**, 42–8(1953). Carbon blacks have their minimum bulk volume when they are saturated with the oil. The absorption decreases and the minimum volume becomes smaller as the pressure increases. (*C. A.* **49**, 12915)

**Continuous countercurrent extraction in a liquid-liquid system: application to the extraction of vitamin A from shark-liver oil.** S. D. Vitali. *Rev. fac. cienc. quím.(Univ. nacl. Eva Peron)* **26**, 85–92(1951). A Pyrex tube filled with Raschig rings proved effective in the extraction of the system of acetic acid, water and chloroform, giving values of K and H.T.U. of 8.10 and 12.53 cm., respectively. However, it was unsatisfactory when applied to the extraction of vitamin A from shark liver oil with methyl alcohol. H.T.U. ranged from 578 cm. to 875 cm. (*C. A.* **49**, 12883)

**The reactions of glycerol with triglycerides.** C. Rossi, D. Bottazzi, and G. Groce(Univ. Genoa, Italy). *Chimica industria (Milan)* **37**, 356–9(1955). Glycerol(45% of oil weight) was treated with triglycerides at 220° under carbon dioxide with vigorous agitation with 0.1% potassium hydroxide as catalyst. Olive, coconut, and linseed oil were used. The reaction had varying induction period, but once started it proceeded at the same rate. Additions of 10 and 20% monoglycerides shortened or eliminated the induction period. No reaction was obtained without the catalyst even when 20% monoglycerides were added. The induction period is not the same for all oils. The action of the catalyst is thought to be one of radical transfer. (*C. A.* **49**, 13668)

**The antioxidation effect of citrates and citraconic acid on oil and fat.** H. Anders. *Deut. Lebensm. Rundschau* **51**, 104–6 (1955). Citric acid, besides its role as an antioxidant in oil and fat manufacture, also adds to the product's nutritional value and fits into the human metabolic scheme(citric acid cycle). Citraconic, a thermal cleavage product of citric acid, shows these same properties. This acid also gives adequate protection against color change, and produces no foam, spray or darkening during exposure to baking temperature. There are no unfavorable metabolic effects since citraconic acid fits into the citric acid cycle. The citraconic acid anhydride and the mesaconic acid that are prepared from citric acid, however are not suited for the stabilization of fats. (*C. A.* **49**, 13667)

**Fixed oil from Elettaria cardamomum seeds.** T. R. Kasturi and B. H. Iyer(India Inst. Sci., Bangalore). *J. India Inst. Sci.* **37A**, 106–12(1955). Removal of volatile oils with steam from the dried seeds followed by carbon tetrachloride extraction of the residue yielded 4% fixed oil which when purified by chromatographing over alumina gave a yellow oil with the following constants: $n_D^{26}$ 1.4710, $d_{25}^{25}$ 0.9376, saponification number 212.20, and iodine number (Wijs) 89.70. The mixed fatty (83%) of the crude fixed oil contained caprylic and caproic 0.3, palmitic 8.4, stearic 18.3, oleic 62.6, and linoleic acids

10.5%. The glyceride-type distribution of the oil, as determined by Kartha's method, was as follows: GS 0.60, GSU 23.42, GSU 43.84 and GU 32.10. (*C. A.* **49**, 13669)

**The determination of hydroxyl groups in organic matter.** Otakar Mlejnek (Vyskumny ústav káblov isolantov, Bratislava, Czech.). *Chem. Zvesti* **9**, 27–35 (1955). Hydroxyl groups present in organic matter can be determined by the acetylation of free alcoholic hydroxyl groups by glacial acetic acid with sulfuric acid as a catalyst and titrating the water of condensation with the Fischer reagent. Good results were obtained in determining mono- and di-glycerides of linseed oil, of hydroxyl groups of ricin oil, and of alkyd resins modified by linseed oil. (*C. A.* **49**, 13834)

**Rate of fat splitting by lipase enzyme.** Gyula Számel. *Yearbook Inst. Agr. Chem. Technol., Univ. Tech. Sci. Budapest, Hung.* **1952 III–1954 VIII**, 49–53. Edible sunflowerseed oil was split by fermentation to determine optimum conditions for enzymic fat splitting. The enzyme was prepared from castor beans after husking, wet grinding, and centrifuging. With 2.5 g. oil, 0.42 g. enzyme at an optimum pH of 4.72 and 20°, and after 5, 10, 20, 30, 40, 60, 80, and 160 min. the percentage of free fatty acids obtained were 6.3, 10.5, 16.2, 21.4, 28.0, 35.5, 42.8, and 60.0. The advantage of the method is the light-colored fatty acids obtained; the disadvantage is the low reaction rate. (*C. A.* **49**, 14069)

**The polymorphism of mono-α-aminoacyl triglycerides.** W. F. Huber, Ruth Davis and E. S. Lutton (Res. & Dev. Dept., The Procter & Gamble Co., Cincinnati, Ohio). *J. Phys. Chem.* **59**, 604–6 (1955). Polymorphic behaviors (x-ray diffraction and melting point) of the following compounds are reported: 2-alanyl-1,3-dilaurin, 2-alanyl-1,3-dipalmitin and its acetate, 2-alanyl-1,3-distearin and its acetate, 2-α-aminobutyryl-1,3-distearin, 2-valyl-1,3-distearin and its acetate, 2-α-aminolauroyl-1,3-distearin and its acetate, 2-N-acetylalanyl-1,3-dipalmitin and 2-N-palmitoylalanyl-1,3-dipalmitin. Substitution of an amino group for a hydrogen atom on an α-carbon of the 2-acyl chain causes little change in the phase behavior. When the α-aminoacyl and 2-acyl groups contained the same number of carbon atoms, the 2-α-aminoacyl triglycerides showed melting point levels and long spacings similar to those of the 2-acyl triglycerides. Polymorphic behaviors of the acetates and N-acylated 2-α-aminoacyl glycerides were similar to those of unsubstituted triglycerides.

**Spontaneous heating and ignition in stored palm kernels. The rate of anaerobic fermentation.** K. N. Palmer (Fire Res. Station, Boreham Wood, Herts.). *J. Sci. Food Agr.* **6**, 495–501 (1955). Moist palm kernels were fermented under aerobic conditions at temperatures of 35, 58 and 70° for periods up to 3 weeks. Flasks were then sealed and anaerobic fermentation allowed to proceed for periods up to 7 weeks. Gas samples were taken periodically. At the end of the anaerobic fermentation period, air was readmitted and the rate of absorption of oxygen was measured. The major constituent of the gas evolved during anaerobic fermentation was carbon dioxide. The concentration of carbon monoxide was variable between 0 and 0.6%. No significant quantities of hydrocarbons were found. Hydrogen was evolved below 50° but not at 58 and 70°. Kernels which had undergone prolonged anaerobic fermentation absorbed oxygen more slowly than did fresh kernels. No evidence was found for the formation of reactive fermentation products able to absorb oxygen rapidly and thereby heat the kernels sufficiently to cause spontaneous ignition. Slow smoldering initiated by an external source is suggested as the cause of outbreaks of fires in bagged palm kernels during storage.

**Fats and oils situation.** G. L. Prichard (Washington Rep., Natl. Soybean Processors Assoc.). *Soybean Digest* **16**(1), 22–3 (1955). The supply and disposition of edible and inedible oils and fats in the United States are reviewed briefly.

**The new plastic margarine.** J. P. Hughes (Mrs. Tucker's Foods, Inc., Sherman, Texas). *Soybean Digest* **15**(12), 8–9 (1955). The problems in the development of margarines having a wide plastic range are reviewed briefly.

**Gel formation by use of lanosterol.** P. Vaterrodt (Botany Mills, Inc.). *U. S. 2,719,782.* Gels are obtained by adding 8 to 15% of lanosterol to petroleum hydrocarbons.

**Method of refining tall oil.** A. M. Thomsen. *U. S. 2,720,515.* Soap skimmings obtained in black liquor recovery are melted, grained and separated from waste lye. A mixture of fatty acids and rosin acids is obtained by acidifying the soap with sulfuric or sulfurous acid. The mixed acids are dissolved in a volatile solvent and treated with an activated silica. The solution is then treated with an activated clay. Solvent is finally removed from the purified acids, and rosin acids are separated by crystallization. Directions are given for the preparation and recovery of the silica and clay.

**Device for making butter.** E. Nanz (Soc. pour l'Equip. des Indus. Laitiéres et Agricoles) and W. J. Sidler. *U. S. 2,721,062.* A churn for making butter in a continuous manner is described.

**Meat-coating composition.** B. M. Shinn and W. H. Childs (Armour & Co.). *U. S. 2,721,142.* A composition for coating meat is prepared from 30–60% of meat-basting fat, 30–60% of water, 2–12% of edible gelatin, and 0.05–3% of cellulose gum.

**Method of blending oils.** W. W. Ginn (Vejin, Inc.). *U. S. 2,721,803.* At least two glycerides which are not mutually soluble are mixed in the presence of 2 to 25% of rapeseed or rice oil. One triglyceride has a relatively high titre and low iodine value; the other has a relatively low titre and high iodine value.

**Stabilization of organic compounds.** R. H. Rosenwald (Universal Oil Products Co.). *U. S. 2,721,804.* Fatty material is stabilized against rancidity by the addition of a mixture of 1 to 20 parts by weight of NDGA and 1 to 20 parts of 2,4,6-trialkylphenol.

**Refining of low grade fats.** M. Mattikow and D. Perlman (B. Clayton, Refining Uninc.). *U. S. 2,721,872.* Fats are converted to esters of a lower aliphatic alcohol. The esters are distilled after coloring matter has been removed with caustic alkali.

**Method and apparatus for deodorizing oils.** S. Faulkner. *U. S. 2,722,505.* A vertical column is described in which a liquid fatty material is deodorized as it flows over rotating plates countercurrently to a stream of hot gas.

**Process for degreasing wool and recovery of wool grease.** D. P. Norman (Pacific Mills). *U. S. 2,723,281.* Raw wool is leached with methylene chloride. Suint is removed from the extract by washing with water.

**Margarine.** P. L. Julian, H. T. Iveson and M. L. McClelland (The Glidden Co.). *U. S. 2,724,649.* Margarine is improved by the addition of about 0.05% of the alcohol-insoluble moiety of whole vegetable lecithin. The resulting margarine is free from spattering and sticky residue and forms a quiescent foam on the surface when heated to frying temperatures.

**Hydrogenation of unsaturated fatty oils.** R. P. Dumire. *U. S. 2,724,689.* A mixture of the unsaturated oil and hydrogen is passed over an electrically conductive hydrogenation catalyst in the form of minute metal fibers. A high frequency electric alternating current is applied to the catalyst to raise the oil temperature 20 to 220°F.

**Vacuum fractional distillation of tall oil and distillation apparatus.** A. Spence. *U. S. 2,724,709.* A multiple unit vacuum fractional distillation apparatus is described.

**Extraction of fatty matter from oily substances.** C. A. T. J. Ransom and J. F. P. Rosello. *Fr. 984,925.* Fatty matter is displaced from oily substances, e.g. palm kernels, arachis, laurel, sunflower, or grape seeds, by treatment with boiling water containing a nonemulsifying wetting agent. Yields are nearly as high as with volatile solvents, separation is easier, the time required is shorter, and the fatty matter is readily obtained free from undesirable mucilage. (*C. A.* **49**, 14353)

**Continuous esterification of fats and oils.** S. Kida and H. Motonaga. *Japan 4932('54).* Coconut oil is heated to 170° and sprayed into the top of a tower at a rate of 700 g. per minute while introducing methyl alcohol vapor superheated to 170° through the bottom of the tower at a rate of 2 kg. per minute. The methyl alcohol and the esters of lower fatty acids are separated by fractionation to give a 30% yield of esters. The unreacted glycerides of higher fatty acids and the methyl alcohol on the bottom are separated by fractionation to give an edible oil. (*C. A.* **49**, 13672)

**Emulsified edible oils.** S. Igarashi, *et al.* (Takemoto Fat and Oils Co.). *Japan 5092('54).* Sesame oil 100, sorbitan monoöleate 20, and sorbitol 5 parts are mixed to make a transparent product which forms an emulsion on dropping in water. Use of other nonionic surfactants, e.g. polyoxyethylenesorbitan monoöleate or polyoxyethylene monoöleate is also specified. (*C. A.* **49**, 13550)

**Quenching oil for high temperatures.** Ryosei Koyama. *Japan 5389('54).* Rice oil (20 kg.) obtained by removing the acid from crude oil with an acid number of 88.4 with methyl alcohol to an acid number of 6 is heated to 250° in 100 minutes, for 6 hours at 250–80°, and for 30 minutes at 300° to give 16.5 kg. of an oil with a flash point of 262°. (*C. A.* **49**, 14353)

**Dibasic acids from unsaturated fatty acids.** T. Kobayashi and S. Miyazaki (Bureau of Ind. Technics). *Japan. 5079('54)* Sperm-oil fatty acid with a neutralization number of 203 and an iodine number of 70.1 is treated with oxygen containing ozone and the oxidized product is then heated for 1 hour at

90–100° with a 1:1 mixture of 0.01 *N* $MnCl_2$ and 0.05 *N* HCl. The product consists of 33% azelaic acid, 20% pelargonic acid, 10% $C_7$–$C_{11}$ fatty acids, and 34% saturated fatty acids. (*C. A.* **49**, 13672)

**Apparatus for estimation of fats and oils.** Keikichi Yamabe (Shimazu Manufg. Co.). *Japan 5600('54).* The sample is exposed to ultraviolet light of definite intensity to give fluorescent light which is passed through a filter to give a visible light of definite wave length. Its intensity is measured by a photoelectric method. (*C. A.* **49**, 14353)

## FATTY ACID DERIVATIVES

**Fatty acid derivatives of ethanolamine.** J. R. Trowbridge, R. A. Falk and I. J. Krems(Colgate-Palmolive Co., Jersey City, N. J.). *J. Org. Chem.* **20**, 990–995(1955). Lauric, myristic, palmitic and stearic diethanolamine have been prepared from fatty acid chlorides and excess diethanolamine. The preparation of other acylated derivatives of diethanolamine is described. These include bis-(2-lauroxyethyl)amine hydrochloride, (2-lauroxyethyl)-(2-hydroxyethyl)amine hydrochloride, lauric bis-(2-lauroxyethyl)amide and lauric(2-lauroxyethyl)-(α-hydroxyethyl)amine. The ester amine hydrochlorides have been converted to the free bases which are unstable solids at room temperature, the monoester derivative being less stable than the diester derivative.

**Rates of reaction of diphenylidiazomethane with aliphatic carboxylic acids in toluene.** A. B. Hoefelmeyer and C. K. Hancock (A. and M. College of Texas). *J. Am. Chem. Soc.* **77**, 4746–4748(1955). Rate constants at 25° have been determined for the reaction of diphenylidiazomethane with 28 carboxylic acids in toluene.

**Long-chain vinyl esters and ethers.** L. E. Craig, R. F. Kleinschmidt, E. S. Miller, J. M. Wilkinson, Jr.(Central Research Lab., General Aniline & Film Corp., Easton, Pa.), R. W. Davis, C. F. Montross and W. S. Port. *Ind. Eng. Chem.* **47**, 1702–1706(1955). Nearly all monomers of commercial interest have been, until now, compounds of low molecular weight. Recently, considerable attention has been directed toward the preparation and polymerization of monomers derived from long-chain fatty acids and alcohols, particularly vinyl esters and ethers. Polymers and copolymers of these materials were of potential commercial interest because the monomers could be prepared from inexpensive and readily available raw materials—acetylene and tallow, for example.

**Cost estimate on technical grade vinyl stearate.** C. S. Redfield, W. S. Port, D. Swern (Eastern Reg. Res. Lab., Philadelphia 18, Pa.). *Ind. Eng. Chem.* **47**, 1707–1710(1955). Cost estimates based on preliminary laboratory data indicated that a plant producing 5,000,000 pounds of vinyl stearate per year should realize a profit, after taxes, from a selling price of about 43 cents per pound; at an annual production rate of 10,000,000 pounds, the selling price could be as low as 31 to 34 cents per pound. A return of 12% on the investment, after taxes, is assumed.

**Preparation of dibasic acids from fatty oils. V. Oxidation of oleic and capric acids with nitric acid under pressure.** Masaru Kobayashi(Osaka City Ind. Research Inst.). *Science and Ind.* (Japan) **29**, 40–2(1955). From oleic acid oxidized 8 hours with 30% nitric acid at 170–5° in a sealed tube were obtained the following dibasic acids: succinic, glutaric, pimelic and suberic acids; and the following monobasic acids: acetic, propionic, butyric, and valeric acids. Similarly oxidized capric acid yielded all the above acids except suberic acid. (*C. A.* **49**, 14349)

**Preparation of long chain carboxylic acids. VII. The Michael addition to 1-alkyl-2,6-cyclohexanedione.** H. Stetter and Marianne Coenen(Univ. Bonn, Ger.). *Chem. Ber.* **87**, 990–3(1954). γ-Methyl-azelaic acid and γ-allyl-azelaic acid were synthesized. The di-methyl ester of the former has a boiling point of 158° at 16 mm. and that of the latter 174° at 13 mm. (*C. A.* **49**, 13127)

**Determination of iodine numbers in mixtures of saturated and unsaturated amines prepared from acids derived from stearin.** O. K. Smirnov and V. M. Bezhentseva. *Zavodskaya Lab.* **21**, 414(1955). The usual determination of iodine number in unsaturated amines is unsatisfactory since replacement of H atoms on N by halogen occurs. To avoid this, the sample is treated with 8–10% hydrochloric acid in ethyl alcohol-chloroform solution to convert the amines into their hydrochloride salts, after which the usual analysis is run. The salts are not subject to the halogen error mentioned above. Analyses of stearyl amine samples were satisfactory in this way. (*C. A.* **49**, 13024)

**High pressure hydrogenation of some inedible oils and fats.** J. G. Kane and K. B. Kulkarni(Univ. Bombay). *J. Sci. Ind. Research(India)* **13B**, 890(1954). Unrefined pongam*(Pongamia glabra)* and margosa*(Azadirachta indica)* oils and unrefined kokum *(Garcinia indica)*, mahua *(Madhuca latifolia)*, white damar *(Vateria indica)* and *Actinodaphne hookeri* fats were hydrogenated at 325°F. with 5% cobalt stabilized copper chromite catalyst and pressure of hydrogenation at room temperature to 2500 lb./sq. in. Kokum, mahua, white damar, and *A. hookeri* fats were converted into fatty alcohols to the extent of 45–70%, pongam oil to not more than 15%, and margosa oil was not converted. Coconut oil under the same conditions was hydrogenated to more than 70%. High contents of unsaponifiable matter (2–5%) in the inedible oils and fats may be responsible for the poisoning of the catalyst. The products of hydrogenation of the oils and fats were found to have low iodine value (2–10) thus showing the nonselective nature of the catalyst. (*C. A.* **49**, 14345)

**Nitrogen derivatives of fatty acids.** M. K. Schwitzer. *Ind. Chemist* **31**, 340–6(1955). A review of the production of nitriles, amides, amines, and cationic, nonionic, and ampholytic surface active agent. (*C. A.* **49**, 14346)

**Reaction rates of the formation of fatty amides.** J. Holló and I. Gál. *Yearbook Inst. Agr. Chem. Technol., Univ. Tech. Sci. Budapest, Hung.* **1952 III–1954 VIII**, 18–31. The rate of decomposition of ammonium palmitate and of the simultaneous formation of palmitamide were determined to obtain data for the design of a suitable reaction vessel for the continuous manufacture of fatty amides. The reaction rates of the decomposition of ammonium palmitate with the formation of palmitamide, palmitic acid, ammonia and water indicates that the decomposition of ammonium palmitate and the formation of palmitamide are reactions of the first order. The logarithm of the constant plotted as a function of 1/T gives a straight line. This permits extrapolation of the constant for higher reaction temperatures. (*C. A.* **49**, 14348)

**High molecular weight alcohols.** E. F. Hill(Ethyl Corp.). *U. S. 2,719,858.* A mixture of higher molecular weight alcohols is obtained by the reduction of sugar cane oil with an alkali metal and alcohol, followed by hydrolysis of the products.

**Neutralization of sulfonic acids.** Ruhrchemie A.-G. *Brit. 727,669.* Alkyl aryl sulfonic acids are neutralized by alkali metal carbonates. Streams of the acids and aqueous solutions of the carbonates are sprayed towards each other in the upper part of a tower such that contact and reaction take place in a very short time. Carbon dioxide formed escapes into the tower atmosphere. The neutralized product collects in the bottom of the tower as an aqueous solution and is pumped into a second vessel where the pH is adjusted if necessary. The aqueous solutions of neutralized acids are used in the preparation of detergents. (*C. A.* **49**, 14354)

## • Biology and Nutrition

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

**Quantitative determination of the different higher saturated fatty acids in fat from blood, chyle and feces, by means of partition chromatography on rubber.** J. H. van de Kamer, N. A. Pikaar, A. Bolssens-Frankena, C. Couvee-Ploeg and L. van Ginkel(Central Institute of Nutrition Res. T.N.O. Utrecht, The Netherlands). *Biochem. J.* **61**, 180–186(1955). The extraction, purification and quantitative determinations of the saturated fatty acids in blood, chyle and feces are described. In order to carry out the quantitative determination, it is necessary to remove the unsaturated fatty acids by oxidation with $KMnO_4$ in an alkaline medium. The quantitative determination of the saturated fatty acids (hexanoic acid, octanoic acid, and decanoic acid) and of the unsaturated $\Delta^{13}$-docosanoic acid before oxidation, and of the saturated fatty acids (dodecanoic acid, tetradecanoic acid, hexadecanoic acid, octadecanoic acid, eicosanoic acid and docosanoic acid) after oxidation, is carried out by means of reversed-phase partition chromatography according to Boldingh.

**The effect of heparin injection on alimentary lipaemia and on the plasma esterases.** D. K. Myers, Anna Schotte and B. Mendel(Pharmaco-therapeutic Laboratory, Univ. of Amsterdam, Holland). *Biochem. J.* **60**, 481–486(1955). The effect of heparin injections on alimentary lipaemia and on the plasma esterases has been investigated in six species of animals. In all cases the post-heparin plasma contained a factor capable of clearing lipaemic plasma. The injection of heparin in man, dog and rat liberates a tributyrinase into the plasma which is not inhibited *in vitro* by low concentrations of eserine or di*iso*propyl *p*-nitrophenyl phosphate(DINP). The DINP-resistant tributyrinase activity of rabbit, mouse and guinea pig plasma does not increase markedly after the injection of heparin. It is concluded that the clearing factor and the DINP-resistant tributyrinase are different enzymes, both of which may be liberated from the tissues into the blood stream by the injection of heparin.

**Chromatographic separation of phospholipids.** C. H. Lea, D. N. Rhodes and R. D. Stoll(Low Temperature Station for Res. in Biochem. and Biophysics, Univ. of Cambridge). *Biochem. J.* **60**, 353–363(1955). Egg lecithins prepared by chromatographic separation on alumina columns were found to possess low fatty acid/phosphorus ratios. Rechromatographed on silicic acid they separated into lecithin of correct fatty acid/phosphorus ratio and lysolecithin. The chromatographic behavior of a series of glycerophospholipids, both natural and synthetic, on silica-impregnated paper has been investigated and good separations obtained.

**Optimum ratio of saturated to mono-unsaturated fatty acids in rat diets.** C. Y. Hopkins, T. K. Murray, and J. A. Campbell (Division of Pure Chemistry, National Research Council, Ottawa, Canada). *Can. J. Biochem. & Physiol.* **33**, 1047–1054 (1955). Fat mixtures were prepared in which the content of linoleic acid was held constant at approximately 10% of the total fatty acids, but the ratio of saturated to mono-unsaturated acids was varied from 3.5:1 to 1:8. These mixtures were added to a low-fat fox chow diet at the rate of 20 parts fat to 80 parts fox chow and the resulting mixtures were fed to weanling rats in one experiment and to semiadult rats in another. The feeding period was nine weeks. In both experiments the male rats showed significant differences in final weight between the diets. Female rats did not show significant differences in weight gain on the various fat mixtures. Excretion of lipid in the feces showed a tendency to increase with increasing ratios of unsaturated to saturated fatty acids in the diet.

**On body fat and body water in rats.** Louis-Marie Babineau and E. Page(Department de Physiologie de la Nutrition, Universite Laval, Quebec). *Can. J. Biochem. & Physiol.* **33**, 970-979(1955). Under the experimental conditions used, water represented 72% of the fat-free body mass. This constant was found to be completely independent of the magnitude of the fat depots. Consideration of the composition of various samples of adipose tissue suggests that the water to fat-free dry matter ratio is the same as in the body as a whole or that any "excess" water contributed by adipose tissue is so small in absolute amounts as to leave the global ratio essentially undisturbed. Rats exposed to cold had to draw on their fat stores during the first month of exposure but later replenished their energy reserves. The water to fat-free dry matter ratio was not affected.

**Inactivation of gossypol by treatment with phloroglucinol.** C. R. Grau, T. L. Lau, and C. L. Woronick(Univ. Calif., Davis, Calif.). *J. Agr. Food Chem.* **3**, 864–865(1955). During conventional processing much of the gossypol of cottonseed becomes bound in an unavailable form. Not enough is bound, however, to eliminate the possibility of gossypol-caused discoloration of yolks of eggs laid by hens fed cottonseed meal. Cottonseed meal was treated by a modification of an analytical procedure that utilized phloroglucinol, hydrochloric acid, and ethyl alcohol as the reagents, and diets containing the treated meal were fed to hens. A sensitive biological test detected no available gossypol in the meal preparation, as measured by the gossypol-cephalin content of eggs from hens fed the meal.

**Essential fatty acids, diabetes, and cholesterol.** J. J. Peifer and R. T. Holman(The Hormel Institute, Austin, Minnesota). *Arch. Biochem. Biophys.* **57**, 520(1955). Results were reported which the authors feel support the assumption that the diabetic rat is more rapidly depleted of his essential fatty acids, because both growth differences and dermal symptoms are those usually found in essential fatty acid deficient rats only after 3 months' depletion. Dietary cholesterol does not significantly influence the development of the deficiency in the diabetic animal. Essential fatty acid deficiency in the diabetic animal and essential fatty acid deficiency intensified by dietary cholesterol in the nondiabetic animal are similar.

**The effect of low-fat diet and atherosclerosis on the polyunsaturated fatty acids of human blood plasma.** E. G. Hammond and W. O. Lundberg(Univ. of Minn., St. Paul, Minn.). *Arch. Biochem. Biophys.* **57**, 517–519(1955). Preliminary experiments on the levels of polyunsaturated fatty acids in human blood plasma have shown some differences between a group of atherosclerotic subjects and a group of blood bank donors. When compared on a percentage of fatty acid the atherosclerotic subjects had lower levels of di- and tetraenoate, but a level of trienoate that was probably higher. However, on the basis of milligrams of fatty acid per volume of plasma, the amounts of di- and tetraenoate were not different from those of the blood bank donors, but the amount of tri- and hexaenoate and probably of pentaenoate was higher in the atherosclerotic subjects.

**Immediate effects of epinephrine on phospholipides turnover and lipids partition in plasma, liver and aorta.** A. Dury(Dorn Lab. for Med. Res., Bradford Hospital, Bradford, Pa.). *Proc. Soc. Exp. Biol. Med.* **89**, 508–511(1955). The lipides partition and phospholipides turnover in plasma, liver, and aorta of intact rabbits was determined 6 hrs. after the subcutaneous injection of 1 mg./kg. epinephrine in oil. Significant changes were found in certain lipide fractions of liver and plasma. Specific activities of the plasma, liver and aortic phospholipides were significantly elevated in the rabbits given epinephrine; a particularly large change was found in the rate of aortic phospholipides formation.

**Biotin as a growth requirement for Blastomyces dermatiditis.** W. J. Halliday and Elizabeth McCoy(Dept. Bacteriol., Univ. Wisconsin, Madison). *J. Bacteriol.* **70**, 464–8(1955). Biotin requirements were determined for six strains of *Blastomyces dermatitidis*. In all cases, degree of growth was proportional to biotin concentration. A number of possible replacements for biotin were tested, including oleic, pimelic and aspartic acids and Tween 80. Only DL-desthiobiotin could replace biotin although Tween 80 had a biotin-sparing action.

**Effect of dietary fatty acids and protein intake on experimental tuberculosis.** L. W. Hedgecock(Res. Lab., Vet. Admin. Hospital, Kansas City, Mo., and Dept. of Med. Microbiol., Univ. Kansas Med. Center). *J. Bacteriol.* **70**, 415–19(1955). Infected mice were fed a synthetic basal ration containing various levels of casein. To this diet was added lard, methyl linoleate or a mixture of methyl laurate, myristate, palmitate, stearate, oleate and linoleate in proportions simulating coconut oil. An increase in resistance to tuberculosis was observed when the fat acid ester mixture was fed but not when lard or methyl linoleate, alone, was fed. The effect of the ester mixture was greatest when the animals received a 20% protein ration.

**Studies on the growth of Histoplasma capsulatum. II. Growth of the yeast phase on agar media.** L. Pine(Lab. of Infectious Diseases, Natl. Microbiol. Inst., Bethesda, Md.). *J. Bacteriol.* **70**, 375–81(1955). Fatty acids present in agar inhibit the growth of small inocula of *Histoplasma capsulatum*. Whole blood in the media promotes good growth, presumably by supplying a constant source of SH groups and by maintaining a nontoxic source of fatty acids. Problems in using solid media for growing this organism are discussed.

**Fat-absorption studies in premature infants: influence of heat treatment of milk on fat retention.** Lars Söderhjelm(Univ. Hosp., Uppsala, Sweden). *Proc. 10th Northern Pediat. Congr. Stockholm 1951; Acta Paediat.* **40**, *Suppl. 83*, 172, 175(1951). About 100 fat-balance studies, mostly of 4–6 days' duration, were made on more than 30 premature infants. The fat of the diet was supplied from breast milk, raw, frozen, or heated at various temperatures for different time intervals, or from cow milk, pasteurized or subjected to heating at various temperatures for different periods. The nature of the treatment of the milk did not influence the degree of fat retention in these experiments. (*C. A.* **49**, 14127)

**Lowering of serum cholesterol by ultraviolet radiation.** R. Altschul. *Geriatrics* **10**, 208–12(1955). Ultraviolet irradiation of cholesterol-fed rabbits inhibited a rise in serum cholesterol and atheromatous lesions. A significant number of patients with vascular disease showed a decrease in serum cholesterol after ultraviolet treatment. In patients with hypertension, there was a lowering of blood pressure following irradiations. (*C. A.* **49**, 14051)

**Ultraviolet irradiation and cholesterol metabolism.** R. Altschul (Univ. Saskatchewan, Saskatoon, Can.). *Arch. Phys. Med. and Rehabil.* **36**, 394–8(1955). Ultraviolet irradiation of humans caused an average decrease of 8.9% in serum cholesterol. The results may have been due to *in vivo* oxidation of cholesterol. (*C. A.* **49**, 13335)

**The fat metabolism and its relation to arteriosclerosis.** F. Depisch. *Wien Z. inn. Med.* **34**, 89–104(1953). Investigations showed that an increase in the total lipid value of the blood is not necessarily associated with an increase in the total cholesterol value and vice versa. A moderate increase in total lipide value was demonstrable in about 50% of cases of arteriosclerosis without diabetes; the cholesterol value, however, was increased in only 20%. Also of importance is the effect of vitamin on the lipide metabolism. In animal experiments, administration of vitamin A increased serum cholesterol and the neutral fat level. Large doses of vitamin $D_2$ also increased serum cholesterol values. (*C. A.* **49**, 13388)

# • Drying Oils and Paints

Raymond Paschke, Abstractor

**The chemistry of plastics. Part 3: Elastomers; polyester, polyamide, polyether, silicone resins; summary.** Anon. *Paint Oil Chem. Rev.* **118**(22), 8(1955).

**The structure of paint films.** S. H. Bell(Paint Res. Sta., Teddington, Eng.). *Oil Colour Chemists' Assoc. J.* **38**, 595(1955). The chemical and physical effect of both medium and pigment are discussed. The changes that occur as the film dries, ages, and weathers are followed. Latex films are mentioned briefly. 12 references.

**The linear visco-elastic behavior of paint films as a function of time and temperature.** N. A. Brunt(Central Lab., T. N. O., Delft, Holland). *Oil Colour Chemists' Assoc. J.* **38**, 624(1955). Two varnishes, one composed of pure bodied linseed oil and the other of the same oil cooked with rosin, have been investigated extensively according to the method of mechanical spectroscopy, which is essentially an analysis of the time-dependent elastic behavior of a material. The shape and the temperature-dependence of the approximate retardation spectra are calculated from creep-rate measurements on the one hand and from damping experiments on the other. It is shown that these two different experimental approaches are equivalent, as can be predicted from theory. The spectrum of retardation times is determined by the molecular rate processes and gives the relation between the sizes and the relative frequency of the molecular aggregates participating in the Brownian movement. From the measurements it can be concluded that the cooking of the oil with rosin results in the building up of much bigger aggregates. If the elastic spectrum of the paint material and the changes effected by irradiation and leaching by water are known, it is possible to make a prediction about the performance in practice. This hypothesis has been tested on two varnishes and on four selected paints and has been fully confirmed. It may be specially noted that the effect of rosin in decreasing considerably the resistance to weathering can be ascribed entirely to the water-sensitivity it induces.

**Solubility parameters for film formers.** Harry Burrell(Interchemical Corp., Cincinnati 7, Ohio). *Off. Dig. Federation Paint Varnish Production Clubs* **27**, 726(1955). The use of combined cohesive energy density and hydrogen bonding parameters provides a dependable guide to everyday solubility problems encountered in the coatings field. Besides the practical value of predicting solubilities and compatibilities, the theory explains the known solubility behavior of polymers including precipitation by strong dilution and the toleration of nonsolvents. The function of latent solvents and the reason why a mixture of two nonsolvents may sometimes dissolve a polymer are explained.

**Pentaerythritol. Part I. General physical and chemical properties.** H. W. Chatfield. *Paint Oil Colour J.* **128**, 824(1955).

**Fundamental paint calculations for the inexperienced formulator.** C. H. Pund. *Paint Ind. Mag.* **70**(10), 16(1955).

**Atoms for paint—How radioisotopes and nuclear energy can further paint progress.** P. Heiberger(Nat. Lead Co., Philadelphia) *et al.* *Paint Varnish Production* **45**(11), 37–68(1955). The convention issue covers the following topics: (1) background of nuclear program, (2) an isotope primer, (3) equipping a radioisotope laboratory, (4) sources of radiation measurement, (5) radioisotopes as tracers, (6) radiation energy—its application and technology, and (7) future possibilities.

**Diatomaceous earth in paint formulation.** A. H. Meier. *Paint Oil Colour J.* **128**, 767(1955). Advantages and typical formulations are given.

**Conjugation in drying oils.** J. D. von Mikusch(F. Thörl's Vereinigte Harburger Oelfabriken). *Paint Manuf.* **25**, 386 (1955). A review of the chemical history of conjugated fatty acids including the author's extensive work. The effect of conjugation on film properties is discussed.

**New developments in paint.** L. B. Odell(James Bute Co.). *Paint Ind. Mag.* **70**(10), 13(1955). The advantages and disadvantages of acrylic resins, alkyds, epoxy resins, halogenated resins, and vinyls are given. New pigments, luminescent paints, and painting on Plexiglas are discussed.

**Infrared spectroscopy in the qualitative analysis of paint and varnish materials.** N. M. Peacock and A. W. Pross(Canadian Industries, Ltd., Masterville, P. A., Can.). Vehicles are air dried on rock salt plates. Several typical curves are given. Advantages of the method are discussed.

**The adhesion of amphipathic molecules to metal surfaces.** R. B. Waterhouse and J. H. Schulman(Dept. of Colloidal Science, Cambridge, Eng.). *Oil Colour Chemist Assoc. J.* **38**, 646(1955). The adsorption may be of three types, physical adsorption, chemisorption, and "precipitated" sorption. The last two types are highly selective both as to the nature of the polar groups in the adsorbing molecule and the type and availability of the metal ions on the solid surface. The mechanical properties of these types of adsorbed film are very different.

**Vinyl resin solutions and dispersions for industrial metal protection.** F. A. Rideout(Bakelite Co.). *Off. Dig. Federation Paint Varnish Production Clubs* **27**(365), 322(1955).

**Word on the latest fatty acids.** R. Rowe(Victor Wolf Ltd.). *Can. Paint Varnish Mag.* 29(9), 24(1955). A review of the production and use of dehydrated castor oil fatty acids. 27 references.

**Method of destroying catalyst residues.** R. F. Leary(Esso Res. Eng. Co., Cranford, New Jersey). *U. S. 2,714,620.* This patent covers a process for the preparation of drying oils wherein 60 to 95 parts of butadiene are copolymerized with 40 to 5 parts of styrene at a temperature of 20–100° in the presence of 1.5 to 10 parts of finely divided metallic sodium and 50 to 100 parts of an inert hydrocarbon diluent boiling between 20° and 200°, and wherein residual catalyst is removed upon completion of the reaction, the improvement which comprises the reaction product with 2 to 3 molar equivalents of at least 85% acetic acid to destroy the catalyst and provide an easily filterable product.

**Drying oil composition.** J. A. Chenicek and R. H. Rosenwald (Universal Oil Products Co., Chicago). *U. S. 2,715,072.* This patent covers a coating composition comprising a drying oil normally tending to form skin, a metallic drier and a retarder of skin formation comprising a 2-tertiary-alkyl-4-alkoxyphenol.

**Unsaturated fatty acid esters of alloxy hydroxybutenes.** D. Swern(U. S. Dept. Agriculture). *U. S. 2,715,132.* These polymerizable monomers may be used for preparing plastics, drying oils and synthetic resins.

**Improvements in the production of polymerized products.** Chemische Werke Huls G.m.b.H. *British 722,835.* The polymerization of drying oils or condensation products thereof with aromatic vinyls (styrene, vinylnaphthalene) is carried out in the presence of alkyl benzenes with 8–20 C atoms in the side chain, and at temperatures of 140–200°. The polymers obtained are noted for their clarity. For example, 1000 parts of styrene is slowly (during 10 hours) added with stirring to a solution of 1000 parts of castor oil (medium-viscosity stand oil) in 1000 parts of undecylbenzene at 140–160°. After the addition of all the styrene, the temperature is raised slowly (during 26 hours) to 200°. A homogeneous, clear, viscous solution is obtained containing only very small amounts of monomeric styrene (*C. A.* **49**, 12017)

**Copolymers of vinyl aromatic compounds.** L. Berger & Sons Ltd. *British 727,423.* A process is described for the preparation of styrene copolymers from preformed copolymers. Such copolymers having up to 60% styrene are suitable for producing clear, nonbrittle, fast, through-drying varnishes. For example, a mixture of 250 g. of copolymer (20% styrene, 80% alkyd resin modified with 55% linseed oil) and 250 grams of another copolymer (40% styrene, 30% varnish linseed oil, 30% dehydrated castor oil) is further copolymerized with 200 grams styrene at 200°. A 100% yield of a clear polymer is obtained. (C. A. **49**, 12017)

**Drying oil type compounds.** M. Neber. *Ger. 919,423.* Aliphatic, aromatic, or hydroaromatic diisocyanates treated with water or compounds having reactive H atoms at >100° give polymerization products of the drying-oil type useful as adhesives, impregnation agents, etc. (*C. A.* **49**, 12856)

**Drying oils forming hard protective films.** N. V. de Bataafsche. Petroleum Maatschappij. *Dutch 76,773.* A 2-aryl-1-alkene having less than 5 C atoms in the alkene group and no more than 12 C atoms in the aryl group is interpolymerized with an olefinically unsaturated fatty acid having from 12 to 22 C atoms and an iodine value between 110 and 400. (*C. A.* **49**, 12016)

# • Detergents

Lenore Petschaft Africk, Abstractor

**Wetting agents and their functions.** O. M. Morgan(Allied Chemical and Dye Corp., New York). *Sanit. Maintenance* **13** (10), 30–2(1955). The various types of detergents, anionic, nonionic, cationic, and ampholytic are reviewed.

**The foaming of sodium laurate solutions—factors, influencing foam stability.** M. Camp and K. Durham(Unilever Ltd., Port

Sunlight, Cheshire, Engl.). *J. Phys. Chem.* **59**, 993–7(1955). The effects of addition of electrolytes on the foam stability, surface tension and surface viscosity of 0.1% solutions of sodium laurate adjusted to pH 10 have been studied. The electrolytes employed had no significant effect on surface viscosity, but produced a progressive lowering in surface tension, which is a function of cation concentration. The size and concentration of the hydrated cations were found to influence foam stability. Anions were also found to increase foam stability. In addition $Na_2HPO_4$, $Na_4P_2O_7$ and $Na_5P_2O_{10}$ are found to have a marked stabilizing effect on foams from sodium laurate solutions adjusted to pH 10. Factors influencing foam stability are enumerated and discussed, and it is concluded that, although surface viscosity may not be very important, the rate of attainment of equilibrium surface tension is important in determining the stability of thin films.

**Use of sodium alkyl sulfate in the finishing industry.** A. G. Emelyanov. *Tekstil. prom.* **15**(3), 38–40(1955). The detergent sodium alkyl sulfate can be used in finishing cotton fabrics: (a) by adding 1–3 g./l. to increase the capillarity of the fabric during boiling, (b) by substituting part of the soap (4 g./l. soap per 1 g./l. detergent or 3 g./l. soap per 2 g./l. detergent) during washing of printed and dyed fabrics to increase the brightness of the colors, (c) by adding 3–5 g. of the preparation per 1 kg. dye to increase the fastness of cold printing dyes from Diazol Red K and Diazol Orange (and related diazo amine dyes). The preparation can also be used for softening spun rayon fabric during washing or during finishing followed by air drying.

**Measuring the whitening effects of fluorescent dyes and perborate bleaches on cotton.** Margaret S. Furry and Phyllis L. Bensing(U. S. Dept. of Agri., Washington, D. C.). *Am. Dyestuff Reptr.* **44**, 786–90(1955). A laboratory technique has been developed for measuring fluorescent and nonfluorescent whitening effects in fabrics. In a series of experiments, by means of two different reflectometers modified either to include or to exclude ultraviolet from the light source, measurements were made indicating the whiteness of undyed cotton test fabrics laundered repeatedly with different detergent solutions containing fluorescent dyes and perborate bleaches. Results showed that the whitening effects produced by the various washing instruments were comparable and conformed well with visual observations.

**Sulfonation with sulfur trioxide—anhydride formation with detergent alkylate.** E. E. Gilbert and B. Veldhuis(General Chemical Div., Allied Chem. & Dye Corp., Morris Township, N. J.). *Ind. Eng. Chem.* **47**, 2300–3(1955). Freshly prepared aqueous slurries of the sodium salt of dodecylbenzenesulfonic acid, using sulfur trioxide vapor as sulfonating agent, tend to become acid on standing (''acid drift''). This study was undertaken to determine the cause of this undesirable situation and remedy it. The causative agent was isolated and identified as the sulfonic acid anhydride. A study of the relationship between anhydride content of the product and the conditions used during sulfonation showed that anhydride could be removed from the slurry by several procedures, the most practical comprising addition of 1% by weight of water to the crude sulfonic acid.

**Light scattering and micelle structure in the system sodium dodecyl sulfate-sodium chloride-water.** L. M. Kushner and W. D. Hubbard(National Bureau of Standards, Washington, D. C.). *J. Colloid Sci.* **10**, 428–35(1955). Light-scattering measurements have been made on solutions of the detergent, sodium dodecyl sulfate, in water and in sodium chloride solutions up to 0.20 *M*. The micelle weights calculated from the data increase from 11,400 in water to 24,000–27,000 in presence of 0.06 to 0.20 *M* sodium chloride. A discussion of the dependence of the micelle weight on sodium chloride concentration is presented.

**Improvements in wetting agents.** Durand & Guguenin A.G. *Brit. 730,461.* The wetting power of various types of surface-active agents is improved by the addition of a trialkyl phosphate or trialkoxyalkyl phosphate.

**Volumetric determination of soluble silicates in detergents.** A. M. Lauson, L. A. Jones and O. T. Aepli(Penn. Salt Manuf. Co., Wyandotte, Mich.). *Anal. Chem.*, **27**, 1810–11(1955). A rapid volumetric method has been developed for the determination of soluble silica in alkaline detergents containing various compositions of the soluble silicates. Sodium oxide can also be determined on the same portion of the sample. Modifications necessary for the accurate volumetric determination of the soluble silica in the presence of carbonates, phosphates, and wetting agents are described and discussed. The results obtained are in agreement with the gravimetric values to within ±0.05% of silicon dioxide.

**Characteristic properties of ethylene oxide polyaddition products.** C. Schooler. *Melliand Textilber.* **36**, 603–7(1955). In this review (sixteen references), S. discusses the reaction mechanism, advantages in the preparation of water-soluble products by successive reaction with ethylene oxide (as compared with the production of anionic compound), their solubility, lathering power and compatibility with polyvalent cations, addition compounds, variation possibilities, effect of the raw material on the properties of the polyethers obtained and preparation of pure polyglycolethers. Also discussed are their solubility state and molecular structure, wetting action of nonionic and anionic fatty alcohol derivatives, variation of the properties by mixing, addition of electrolytes, etc., and uses as antistatic agents, anticlogging agents (for spinning nozzles in the manufacture of rayon), and leveling and stripping agents (in dyeing).

**Improved detergent composition.** H. F. Johnston. *Brit. 734,982, 735,418.* An improved detergent composition for use in salt or cold water is prepared by heating a sulfonated fatty oil, a non-ionic surface-active detergent compound, caustic soda, and/or potash, sodium or potassium silicate, a commercial stearic acid, and water, with or without a sulfated fatty alcohol, in a jacketed pan, the several ingredients being added in the order given, in such proportions as to keep the fatty acid content within the range of 4 to 19%, and the temperature of the mass brought up to, but not exceeding, 195°F.

**Surface active compositions containing imides.** J. D. Malkemus(Colgate-Palmolive Co.). *U. S. 2,717,878.* It has been found that the incorporation of a small proportion of surface-active aliphatic imide such as lauric acetic imide with a water-soluble, nonsoap detergent of the type of sulfated or sulfonated organic material provides a composition which possesses greatly improved sudsing and foaming properties.

**Synthetic detergent composition.** A. R. Gebhart and I. J. Krems (Colgate-Palmolive Co.). *U. S. 2,721,847.* A detergent composition consisting essentially of a water-soluble higher alkyl benzene sulfonate detergent and a dodecyl benzene N-ethanol sulfonamide in an amount from about 1 to about 15% by weight of the detergent results in a synergistic enhancement in detergency and foaming properties.

**Liquid detergent compositions.** Unilever Ltd. *Brit. 729,531.* It has been found that when acid cellulose sulfates are incorporated in liquid organic anionic soapless detergent compositions, highly concentrated compositions may be produced which will remain clear at temperatures as low as 7°, and which also possess good dirt suspending properties.

**Process and apparatus for cooling and solidifying soap.** R. Pisoni. *Brit. 729,833.* A continuous process for cooling, solidifying and forming a laundry soap bar comprises the displacement of the liquid and hot soap coming from the boiler through a conduit, having cooled walls for refrigeration, compressing the soap and forcing it to travel under pressure through an extrusion conduit from which it emerges in the form of a solid, compact bar.

**Abrasive detergent compositions in particulate form.** Colgate-Palmolive-Peet Co. *Brit. 732,791.* An abrasive detergent composition in particulate form is prepared by admixing a major proportion of a water-insoluble powdered siliceous abrasive material which is inert to sulfonic acids and salts thereof, a minor proportion of an organic sulfonic acid which can be neutralized to form a water-soluble salt having cleansing and foaming properties in aqueous solution, and a minor proportion of a neutralizing agent which is in particulate form and which is capable of neutralizing all the organic sulfonic acid present to form a water-soluble salt.

**Improvements in or relation to soap powders.** L. V. Cocks and B. J. Thomas(Unilever Ltd.). *Brit. 734,090.* It is possible to make a soap powder which gives an immediate and stable lather when agitated with warm, hard water by addition to the soap powder of a minor proportion of a water-soluble partial ester of glycerol and a fatty acid, the partial ester being present in the final powder in such a condition that it dissolves rapidly compared with the soap. In order to be rapidly soluble, the partial ester must be distinct from the soap—must be external to the soap—as a coating on the surface of the soap or as separate particles.

**Improvements in detergent compositions.** Unilever Ltd. *Brit. 736,100.* A detergent composition contains a product made by the reaction of dicyandiamide with a monocarboxylic acid of 2 to 26 carbon atoms or a dicarboxylic acid of 3 to 12 carbon atoms such as hendecyl guanide, a calcium-sequestering condensed phosphate, and an anionic detergent, to produce a detergent which is nontarnishing to silverware and has improved lathering and detergent properties.