Extracted Cake Desolventizing

Extracted cake is conveyed from the extractor to the vapor desolventizer. Solvent is vaporized from the granules with heat supplied directly by a recirculating stream of solvent vapor which is continuously super-heated. The solvent vapor so generated flows to the extractor.

The desolventizer is a horizontal vessel approximately 5 ft. in diameter and 22 ft. long. Rotating in it is a ribbon conveyor modified with lifting flights to shower the meal. Super-heated vapor entering the vessel at about the mid-point of its length flows countercurrent to the meal and is recirculated to the vapor heater by the recycle vapor blower. The recycle vapor heater is a shell and tube heat exchanger with the solvent vapor flowing through the tubes. Solvent vapor evaporated from the cake leaves the desolventizer at the point of entry of wet cake.

In the second half of the desolventizer, cake is effectively freed of last traces of solvent by countercurrent steam stripping. The heat input to the recycle vapor heater and the flow of sparge steam are so controlled that most of the steam condenses on the cake in the desolventizer. The additional moisture in the desolventized cake is utilized in the next step where the cake is cooled.

After passing through a rotary discharge lock, the cake from the desolventizer spouts to the cake cooler, which is a rotating drum containing lifting flights welded to the drum. Air flowing countercurrently effectively cools the cake to within 20°F. of the entering air temperature, largely by evaporation of water. Air leaving the cooler contains a small amount of fines and lint particles. This air is blown through cyclone and bag type of collectors in series. The fines recovered from the air stream recombine with the main flow of extracted cake granules leaving the extraction plant.

Solvent vapors from the cake and oil desolventizing flow through the extractor to the reflux condenser, which is mounted directly above the zone of fresh solvent wash. As the vapors flow across the extractor, they are effectively scrubbed free of fines. The condensate from the reflux condenser returns by gravity to the solvent decanter where water is separated and solvent over-flows to the extractor. Water from the decanter flows to the water stripper, where it is heated to boiling before discharging to the drain.

Operating Data

The three-Rotocel system plants serving as a basis for this paper have a nominal operating capacity of 100 tons of press cake per 24-hr. day. All the data presented are based on processing that quantity of cake.

Summary

Advantages of the Rotocel system for cottonseed cake extraction may be summarized in the following manner:

1. Economical conversion to solvent extraction is possible by utilizing existing or reconditioned screw-press equipment.
2. Conditioner and flaking rolls are not required for this process.
3. The electrical power requirements for the cake preparation and extraction are less than the power reduction when converting from straight pressing to a prepress operation. This results in a net savings in power consumption.
4. Vapor scrubbers used in conventional plants are not required in this process.
5. Efficient extraction at low solvent ratios keeps the steam requirement of this process to a minimum.
6. Low residual oil in extracted meal accomplished by this process yields a maximum product value per ton of seed.
7. The low temperature vapor desolventizer eliminates discolorization and protein degradation of the cake granules during the desolventizing step.

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ABSTRACTS . . . . R. A. Reiners, Editor

• Oils and Fats

Ralph W. Planck, Abstractor
Dorothy M. Rathmann, Abstractor
Sin'itiro Kawamura, Abstractor

Antioxidants in edible fats. Jouko Valpola. *Teknillisen Kemian Aikakausilehti* **10**, 461-2(1953). Eleven antioxidants at 0.05% concentration and 6 edible fats were studied at room temperature and boiling-water temperature. The course of autoxidation of fat was measured by the peroxide no. At 100° pyrogallol inhibited oxidation of rapeseed oil. At the same temperature L-ascorbic acid was an excellent inhibitor but not so at room temperature. Although at 100° rapeseed oil was more stable than soybean oil, the reverse was true at room temperature. (*C. A.* **48**, 4143)

Investigations on the unsaturated acids of the liver oil of Galeocedro tigrinus. R. Sen Gupta, A. Grollman, and S. C. Niyogy. *Proc. nat. Inst. Sci. India* **19**, 527-39(1953). A sample of liver oil from *Galeocedro tigrinus* which lowered the blood pressure of animals with experimentally induced hypertension was analyzed. Some of the constituent unsaturated acids were identified by preparation of the *p*-phenyl phenacyl esters, and the constitution of these acids was determined by oxidation with potassium permanganate. These were palmitic, oleic, linoleic, linolenic, gadoleic and tetracos 12:16 dienoic acids. The physiologically active component was not identified. (*Food Sci. Abs.* **26**[3], 278)

The growth and optical properties of stearic acid crystals. Ajit Ram Verma and P. M. Reynolds(Univ. London). *Proc. Phys. Soc.*(London) **66B**, 989(1953). A discussion of 2 types of stearic acid crystals, identified as the B and C polymorphs is given. (*C. A.* **48**, 6769)

The safety of mono- and diglycerides for use as intentional additives in foods. H. E. Longenecker, *et al.* *Natl. Research Council—Natl. Acad. Sci.* (U.S.), No. 251, 14 pp.(1952). Evidence concerning the safety of certain emulsifying agents in processed foods is reviewed. Reference is made to the natural occurrence of mono- and diglycerides in food fats and oils, the formation of monoglycerides during food preparation, and of triglycerides during digestion. Information is presented as to the amount of monoglycerides and diglycerides intentionally added to foods. Reference is made to the nutritive value and also to the surface activity of mono- and diglycerides. The authors find no evidence to question the safety of these as food additives. Extensive bibliography. (*C. A.* **48**, 7213)

The safety of polyoxyethylene stearates for use as intentional additives in foods. H. E. Longenecker, *et al.* *Natl. Research*

Council— Natl. Acad. Sci. (U.S.), No. 280, 19 pp.(1953). Evidence concerning the safety of certain emulsifying agents in processed foods is reviewed. Reference is made to the properties of polyoxyethylene stearates. "Repco" and "Stasoft" are made from polyethylene glycol and commercial stearic acid. "Myrj 45" is a compound of 8 mols. ethylene oxide and 1 mol. stearic acid. Data on the possible dietary consumption and the toxicology of polyoxyethylene stearate are reviewed. Conclusion: polyoxyethylene stearates are not safe additives under all conditions. A comprehensive bibliography is presented. (*C. A.* **48**, 7213)

Use of various solvents for the extraction of oils. C. Paquot and C. Galletaud. *J. Rech., Cent. nat. Rech. sci., Paris,* **1952** (20), 233-4. Dichloroethane was compared with petroleum ether and trichloroethylene as a solvent for soybean oil. Oil was extracted at about the same rate with dichloroethane as with trichloroethylene and rather more slowly with petroleum ether. Dichloroethane is more stable and more easily removed from the oil than trichloroethylene, and gives a lighter colored oil; it is less inflammable than petroleum ether. (*Food Sci. Abs.* **26** [3], 274)

Use of solvents for the extraction of oils. II. Linseed and palm kernels. C. Paquot and C. Galletaud. *Ibid.,* **1953**(22), 40-2. With the solvents under investigation the rates of extraction of oil from linseed and from palm kernels, and the yields of oil, were in order: petroleum ether < trichloroethylene < dichloroethane; the acidities of the oils, and their contents of unsaponifiable matter, were in the order: petroleum ether < dichloroethane < trichloroethylene. Oils extracted with trichloroethylene were deeper in color than those obtained with other solvents, probably because of changes occurring during the slower process of expelling this solvent. (*Food Sci. Abs.* **26**[3], 275)

Use of various solvents for the extraction of oils. III. Peanuts and rapeseed. C. Paquot and C. Galletaud. *Ibid.,* **1953**(24), 120-1. From both peanuts and rapeseed, dichloroethane extracted more oil than trichloroethylene, which in turn extracted more than petroleum ether. The chlorinated solvents, especially dichloroethane, extracted further normal oil from material no longer yielding oil to petroleum ether. (*Food Sci. Abs.* **26**[3], 275).

Studies on natural fats. VIII. Fully saturated glyceride contents of natural fats. A. R. S. Kartha. *J. sci. ind. Research, India* **12A**, 504-9(1953). Published work on the content of fully saturated glycerides in animal tallows is discussed. An improved method for the determination of these glycerides in natural fats by crystallization is described. A simple method of calculating the fully saturated glyceride content from the saturated acid content and the difference in the melting points of the fats and their mixed fatty acids is given. (*Food Sci. Abs.* **26**[3], 277)

Fats from indigenous South African plants. I. The seed fat of camel-thorn (Acacia giraffae). G. S. Harrison and F. Hawke (Univ. Witwatersrand, Johannesburg). *J. S. African Chem. Inst.* **5**, 1-12(1952). The camel-thorn is found in northern Cape Province, the Transvaal, Bechuanaland, and S. W. Africa. The seed fat is a bright orange-colored liquid from which the phosphatides and wax of the testa separate at 25°. The physical characteristics of the fat at 40° are: d_4^{40} 0.9104, n^{40} 1.4683, n^{45} 1.4665, n^{50} 1.4647, temperature coefficient of n —.00036/°C., optical activity negligible, surface tension 32.91 dynes/cm., interfacial tension with water 0.42 dynes/cm., after removal of phosphatides and mucilaginous matter 20 dynes/cm., kinematic viscosity 38.55 centistokes, viscosity 36.14 centipoises. Chemical characteristics are: acid no. 3.69, sapon. no. 184.8, I no. (Wijs) 112.9, hydroxyl value 19.60, unsaponifiable matter 4.48%, Reichert-Meissl value 0.1, Polenske no. 0.5, mean mol. wt. of fatty acids alone 278.1 (calcd.).

Dehydration of castor oil by substituted sulfonic acids and their salts. K. K. Dole and V. R. Keskar(Fergusson Coll., Poona). *Proc. Indian Acad. Sci.* **38A**, 135-42(1953). The mechanism of this catalytic reaction and the effect of groups substituted in the catalysts are discussed. CO_2H groups increase both (a) catalytic activity and (b) decomposition of the oil, Me groups decrease both *a* and *b*, OH groups decrease *b* only, and NH_3 groups greatly decrease *a*. (*C. A.* **48**, 4231)

Lipide separation methods. III. Separation of tri-, di-, 1-mono- and 2-monoglycerides. B. Borgström(Univ. Lund, Sweden). *Acta Physiol. Scand.* **30**, 231-9(1951). Tri-, di-, and monoglycerides can be separated from each other on columns of silicic acid. The 1- and 2-monoglycerides can be separated after oxidation with HIO_4, and these can be separated from tri- or diglycerides by chromatography with heptane and 80% EtOH. (*C. A.* 48, 6919)

Fat enrichment in Rhodotorula gracilis. Marta Blinc and B. Hocevar(Acad. Sci., Lubljana, Yugoslavia). *Monatsh.* **84**, 1127-31(1953). Cultures of *R. gracilis* were incubated 70 hrs. at 22-6° on substrates containing invert sugar and an N compound [urea, $(NH_4)_2SO_4$, uric acid, asparagine, aspartic acid]. Maximum, minimum, and average values are given for each N compound for % fat, % protein, fat coefficient, yeast coefficient, % sugar used up, and g. fat and yeast per liter nutrient solution, with and without aeration. Up to 95% of the sugar was consumed, and concentrations of fat up to 76% and protein up to 14.5% were found. Yeast concentrations were determined nephelometrically; sugar by the Bertrand method; and, total fat by saponifying, H_2O-washing, and Soxhlet extraction of residue with Et_2O. (*C. A.* **48**, 7104)

A new technique for measuring elaidic acid. G. Amat(Fac. sci., Paris) *Arch. sci. physiol.* **7**, 320-3(1953). Infrared spectroscopy of elaidic acid in CS_2 in the region of 10.36 μ is described. (C. A. 48, 7096)

The long and short time interplay between margarine and butter consumption. L. H. Bean. *Soybean Digest* **14**, No. 10, 21 (1954). Brief review is given of U. S. per capita consumption of butter and margarine between 1909 and 1953.

Piecrust mix. R. W. Callaghan and L. H. Dorger(General Mills, Inc.). *U. S. 2,686,721.* A mix containing 25 to 35% shortening based on the total weight of the mix is prepared by thoroughly blending flour with 25 to 35% of a relatively soft shortening until the desired degree of absorption is attained and then adding 3 to 15% of a harder fat in the form of discrete particles.

Candy coloring composition. S. Goldstein(Loft Candy Co.). *U. S. 2,686,722.* A dispersion of an edible fat-insoluble, partially alcohol-soluble dye in a fatty base for use in dyeing fatty foods is prepared by blending at least 30% fat, 0 to 65% sugar and 0 to 35% milk fat or non-fat dried milk solids at temperatures above the melting point of the fat, adding a solution of the dye in a nontoxic, volatile solvent, and evaporating the solvent.

Stabilization of edible materials. J. A. Chenicek(Universal Oil Products Co.). *U. S. 2,686,723.* Edible material containing metallic constituents which catalyze oxidation is stabilized by the addition of 2-*tert.*alkyl-4-alkoxyphenol and a metal deactivator having the structure HO—A—C(R)=N—X in which A is an ortho-substituted aromatic nucleus, R is hydrogen or alkyl, and X is hydroxyl, hydrocarbon or substituted hydrocarbon group.

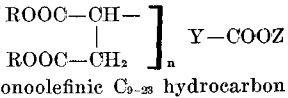
Stabilization of edible fats and oils. J. A. Chenicek(Universal Oil Products Co.). *U. S. 2,686,724.* Edible fats and oils are stabilized by the addition of 0.001 to 0.3% by weight of a disubstituted aminomethyldihydroxybenzene and 0.001 to 0.5% by weight of an inhibitor selected from the following group: 1-hydroxy-4-ethoxy-7-methyl-5,8-dihydronaphthalene, 1,5-diphenyl-1,5-diethyl-thiopentanone-3, nordihydroguaiaretic acid, 1,7-dihydroxynaphthalene, 2-*tert.*butyl-4-methoxyphenol,2,2-dimethyl-6-*tert.*butyl-5-hydroxycoumaran, and propyl gallate.

Ammonia treatment of glyceride oil, and products resulting therefrom. B. Clayton. *U. S. 2,686,794.* In a process for refining crude glyceride oils containing gums and free fatty acids, the oil is mixed with 5 to 20% aqueous ammonia. The resulting ammonium soap stock containing gums is separated and distilled out of contact with the atmosphere under reduced pressure in order to drive off free and combined ammonia and water and yield free fatty acids and gums. A typical product is a deammoniated phosphatidic concentrate containing not more than 30% glyceride oil and at least 7.5% free fatty acids.

Process for alkali-refining crude natural oils. K. S. Markley and R. O. Feuge(U. S. A., Secy. Agric.). *U. S. 2,686,796.* The process for refining crude oils containing color bodies consists in vigorously mixing the oil with strong aqueous alkali (equivalent to 10 to 30% NaOH) at temperatures below 160°F. for 0.5 to 40 min. An emulsion forms quickly. When the exothermic reaction is over, the temperature is raised at a rate of 0.5°F./min. until aqueous and oil phases separate.

Oil extraction press. C. A. Bowman. *U. S. 2,687,084.* Description of a screw press for oil extraction.

Fatty acid condensation products. J. M. Butler(Monsanto Chemical Co.). *U. S. 2,687,421.* The products are viscous compounds having the general formula



$$\left[\begin{array}{l}ROOC-CH- \\ \qquad\quad\ | \\ ROOC-CH_2\end{array}\right]_n Y-COOZ$$

in which Y is a monoolefinic C_{9-23} hydrocarbon group, R is C_{1-8} alkyl group, Z, is H or R, and n is an integer between 2 and 4.

Low temperature lubricating composition. L. S. Echols(Shell Development Co.). *U. S. 2,688,001.* An ash-free, low temperature lubricant is prepared from a major amount of a mineral lubricating oil and 1.5 to 3.5% glyceryl monooleate, 0.3 to 0.5% lecithin and 0.2 to 1.0% of one of the following compounds: 2,6-di-*tert.*butyl-4-methylphenol, 2,4-dimethyl-6-*tert.* butyl-thiophenol, 2,4,6-*tert.*butylphenol, 2,2′-methylene bis (4-methyl-6-*tert.*butylphenol).

Hydroxylation of fatty materials. R. L. Logan(Kessler Chemical Co., Inc.). *U. S. 2,688,031.* In a process for the preparation of polyhydroxy compounds from C_{11-22} unsaturated fatty material, persulfuric acid is obtained by anodic oxidation of 65 to 75% sulfuric acid. The persulfuric acid is immediately mixed with the fatty material at 10 to 50°. At the completion of the reaction, the oxidated fatty material is separated and hydrolyzed, and the spent sulfuric acid is returned to the electrolytic cell.

Method of separating tall oil into a fatty acid product and a rosin acid product. E. F. Sisson, R. F. Cole and J. P. Krumbein(Newport Industries, Inc.). *U. S. 2,688,590.* Refined tall oil consisting of fatty acids, rosin acids and unsaponifiables is preheated in the absence of solvent to temperatures below the decomposition temperature of the rosin acids and is fractionally distilled at pressures about 5 mm. of Hg and temperatures below 260°C. The method yields a product containing at least 95% fatty acids.

Process for the isolation of cholesterol from wool wax alcohols. C. L. Hewett(Organon Laboratories, Ltd.). *U. S. 2,688,623.* Isocholesterol is first separated by crystallization from a solution of the raw product in a mixture of methanol and a lower hydrocarbon of the benzene series. Cholesterol is then separated from wax-like impurities by selective crystallization from acetic or propionic acid under carefully controlled temperature conditions.

Fractionation of fatty materials. R. Miller(The Chemical Foundation, Inc.). *U. S. 2,688,626.* Glyceridic oils are obtained by contacting crude oil with a liquefied, normally gaseous hydrocarbon at temperatures permitting the formation of two liquid phases. The less dense phase contains triglycerides having a higher ratio of saturated to unsaturated groups and a much lower proportion of nonglyceridic materials than the original oil. The more dense phase contains the remainder of the triglycerides and the objectionable nonglyceridic materials. The hydrocarbon is partially removed from the less dense phase and a portion of the concentrate is interesterified in the presence of a catalyst at temperatures permitting the redistribution of acyl groups. This portion is then returned to the bulk of the glyceride concentrate, and the hydrocarbon is completely removed.

Determination of fat in canned cream soup. Report of a committee of the Food Manufacturers' Federation (Food Manufacturers' Federation, 57 Catherine Place, London, S. W. 1). *The Analyst* **79,** 509(1954). The voluntary Code of Practice agreed between the industry and the Ministry of Food lays down a specific minimum fat content to justify the style Cream Soup with the present minimum fat content set at 3.5 per cent. Due to the wide differences found in the fat content when the fat was determined by some of the standard methods it has been necessary to specify a new procedure which is the method drawn up by the Analytical Sub-Committee of the Comité International Permanent de la Conserve. This is based on Methods given in *The Analyst* **68,** 50(1943), and in "Official Methods of Analysis of the Association of Official Agricultural Analysts," 7th Ed. 1950, 13: 96.

Improvement of flour mixing characteristics by a steryl lactylic acid salt. J. B. Thompson and B. D. Buddemeyer(C. J. Patterson Co., Kansas City, Mo.). *Cereal Chem.* **31,** 296(1954). Farinograph and baking tests showed that the inclusion of calcium stearyl-2-lactylate at levels of about 0.5% (flour basis) in doughs increased mixing tolerances without materially altering the optimum mixing times.

Higher fatty alcohols. IX. Higher alcohols from walnut and corn oils by sodium reduction and isolation of pure linoleyl alcohol. Shinroku Masuyama. *J. Agr. Chem. Soc. Japan* **28,** 432-5(1954). Unsaturated higher alcohols were prepared by the reduction of walnut oil and corn oil with Na in ethyleneglycol monoethyl ether (Cellosolve). An effective method was devised for fractionating unsaturated higher alcohols rich in linoleyl alcohol by formation of urea complexes in methanol solution. These alcohols were isomerized by alkali treatment in diethyleneglycol and examined by ultraviolet spectrography. Pure linoleyl alcohol was isolated from corn alcohols by the bromination-debromination method.

Weight changes in the course of autoxidation of linoleic and linolenic acids and their derivatives. Yoshiyuki Toyama and Yoshio Hirabayashi. *J. Oil Chemists' Soc., Japan* **3,** 113-15 (1954). Linoleic acid, methyl linoleate, ethyl linoleate, linoleyl alcohol, linoleyl acetate, and 10,13-nonadecadien-2-one as well as linolenic acid and the corresponding derivatives were examined for weight changes in the room not under direct sunlight and out of the room under direct sunlight. In general at first the weight increased due to oxygen absorption, but then it decreased due to the loss of volatile decomposition products.

Effects of some antioxidants on weight changes in the course of autoxidation of linoleic and linolenic acids and their derivatives. *Ibid.* **3,** 116-18(1954). The 12 compounds described in the preceding abstract were used. When judged from weight changes, pyrogallol, pyrocatechol, and 1-naphthol were the most effective antioxidants. Hydroquinone and then resorcinol followed in the effect. 2-Naphthol was less effective than the 1-isomer. 2-Naphthylamine, diphenylamine, and especially *p*-toluidine were least effective.

The inhibition of the autoxidation of oils and fats. VIII. The antioxidant activity of some ω, ω′-bis-(3,4-dihydroxyphenyl) alkanes. Saburo Tamura and Kazuhiko Okuma(Univ. Tokyo). *J. Agr. Chem. Soc. Japan* **28,** 1-4(1954). The antioxidant activity was examined by the active oxygen method with fresh lard as the substrate. Most of the compounds tested were similar or superior to NDGA in the activities. Among them α,δ-bis-(3,4-dihydroxyphenyl)butane was the most effective.

The inhibition of the autoxidation of oils and fats. IX. The antioxidant activity of some 4-alkyl catechols. Saburo Tamura, Hide Okubo, and Hiroshi Kaneta. *Ibid.* **28,** 4-8(1954). Introduction of an alkyl group into the 4-position of catechol nucleus increased the antioxidant activity. Among ten 4-alkyl catechols tested, ethylcatechol was most active, propylcatechol was next, and others with longer alkyls were less effective.

The inhibition of the autoxidation of oils and fats. X. The antioxidant activity of some catechol derivatives for vitamin A in fish liver oil. Saburo Tamura, Kazuhiko Okuma, and Hide Okubo. *Ibid.* **28,** 24-8(1954). Though ω-(3,4-dihydroxyphenyl)-butyric and caproic acids had remarkable antioxidant activities for lard, they were less effective for vitamin A in fish liver. The activities of most of the ω,ω′-bis-(3,4-dihydroxyphenyl) alkanes were approximately equal or superior to the activity of NDGA. Among 4-alkyl catechols, ethylcatechol was most effective.

The inhibition of the autoxidation of fats and oils. XI. Syntheses of some ω-(2,5-dihydroxy-phenyl)alkanoic esters and ω, ω,-bis-(2,5-dihydroxyphenyl)alkanes. Kazuhiko Okuma and Saburo Tamura. *Ibid.* **28,** 28-33(1954). Methyl α-(2,5-dihydroxyphenyl)butyrate, methyl ε-(2,5-dihydroxyphenyl)caproate, 1,6-bis-(2,5-dihydroxyphenyl)hexane, and 1,10-bis-(2,5-dihydroxyphenyl)decane were synthesized.

The inhibition of the autoxidation of oils and fats. XII. The syntheses of some ω, ω′-bis-(3,4-dihydroxyphenyl)alkanes. Supplement. Saburo Tamura, Saburo Suzuki, Kazuhiko Okuma, and Hide Okubo. *J. Agr. Chem. Soc. Japan* **28,** 490-4(1954). The methods of synthesizing 1,4-bis-(3,4-dihydroxyphenyl)butane and 1,6-bis-(3,4-dihydroxyphenyl)-hexane were improved.

The inhibition of the autoxidation of oils and fats. XIII. Syntheses of some ω, ω′-(2,3,4-trihydroxy phenyl) alkanes and their antioxidant activity. Saburo Tamura, Kazuhiko Okuma, and Hide Okubo. *J. Agr. Chem. Soc. Japan* **28,** 679-82(1954). ω,ω-Bis-(2,3,4-trihydroxyphenyl)-hexane and decane were synthesized. They were active as antioxidant for lard in higher degree than NDGA. They were superior to some ω,ω′-bis-(3,4-dihydroxyphenyl)alkanes hitherto examined.

The constituents and utilization of cuttle-fish oil. III. The fatty acids with conjugated double bonds. Masayasu Takao and

Shin'ichi Tomiyama. *J. Agr. Chem. Soc. Japan* **28**, 244-6 (1954). Ultraviolet absorption spectra showed the presence of small amounts of fatty acids with 2, 3, 4, and 5 conjugated double bonds in cuttle-fish oil. Conjugated tetraenoic and pentaenoic acids disappeared by distillation of methyl esters of the oil. Conjugated eicosadienoic acid was newly isolated from the oil as maleic acid adduct of its methyl ester.

The constituents and utilization of cuttle-fish oil. IV. A new glyceride, myristopalmitostearin. *Ibid.* **28**, 333-5(1954). A saturated glyceride was separated by fractional crystallization from ether and acetone solution of solid fat prepared by wintering from cuttle-fish oil. It was proved to be myristopalmitostearin, m.p. 51.0-51.5°.

The constituents and utilization of cuttle-fish oil. V. Lower fatty acids. *Ibid.* **28**, 335-7(1954). Lower fatty acids were obtained by fractional distillation of ethyl esters of cuttle-fish oil fatty acids. Caprylic and capric acids were found from the part forming water-insoluble Ba salts, while *n*-octenoic acid was newly found from the part forming water-soluble Ba salt.

Maize oil. V. K. Parikh. *Oils and Oilseeds J. (India)* **5**, No. 10/12, 33-4(1953). Indian maize germ contains 38-40% of a yellow oil, d_{15} 0.924-0.926, f.p. —10 to 12°, saponification number 189-90°, iodine number (Wijs) 126-8, free fatty acids 1.2% (as oleic), unsaponifiable matter 1.6-1.65%, Polenske no. 0.38, fatty acid titer 18, smoke point 430-40°F., fire point 675°F., flash point 610-18°F. The high percentage of unsaponifiable matter is caused by the presence of tocopherols; the oil also contains about 2% wax. Oil obtained from germ heated above 150-60° is reddish yellow. The fatty acids consist of palmitic 8.02%, stearic 3.48, arachidic 0.28, oleic 46.20, and linoleic 42.02%. No lignoceric acid could be detected. The oil can be refined for use as a salad oil, hydrogenated, and used as a stabilizer in the manufacture of vanaspati. The soap formed with NaOH or KOH emits an unpleasant odor on storage and the oil should therefore be used in a 1:1 ratio with linseed oil in the soap preparation. (*C. A.* **48**, 9719)

• Biology and Nutrition

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

Identification of the so-called "lard factor" as vitamin A. S. R. Ames and P. L. Harris(Res. Lab., Eastman Kodak Co., Rochester 3, N. Y.). *Science* **120**, 391-93(1954). Discovery of a new vitamin was announced by Kaunitz, Slanetz, and Johnson in 1950. It could be concentrated by molecular distillation of freshly rendered lard and was designated the "lard factor." The results of the investigations have established that the so-called lard factor in molecular distillates of lard was in fact vitamin A.

Simplified procedure for extraction and determination of vitamin A in liver. S. R. Ames, H. A. Risley, and P. L. Harris (Distillation Prods. Inds., Eastman Kodak Co., Rochester, N. Y.). *Anal. Chem.* **26**, 1378-81(1954). A simplified procedure is described which involves drying the liver by grinding with anhydrous sodium sulfate, adding ethyl ether, and determining the vitamin A content of an aliquot by means of the standard Carr-Price (antimony trichloride) reaction.

Metabolism of cholesterol in scorbutic guinea pigs. B. Belavady and S. Banerjee(Dept. of Physiology, Presidency College, Calcutta, India). *J. Biol. Chem.* **209**, 641-45(1954). Blood cholesterol, free and esterified, was determined in normal guinea pigs and also when they were developing scurvy. While blood cholesterol increased during the early period of the experiment, it became normal in the later stages when the animals became scorbutic. The cholesterol content of adrenals, spleen, lungs, small intestine, testes, liver, and kidney was estimated in normal and in chronically scorbutic guinea pigs. While the cholesterol content of adrenals, spleen, and lungs diminished, that of testes and small intestine increased significantly during scurvy. Liver and kidney showed no change in cholesterol content. The disturbed cholesterol metabolism in a vitamin C-deficient animal might be responsible for the hypofunction of the adrenal gland.

The conversion of radioactive acetoacetate to cholesterol by surviving rat liver slices. M. Blecher and S. Gurin(School of Medicine, U. of Penn., Philadelphia). *J. Biol. Chem.* **209**, 953-61 (1954). Ethyl acetoacetate-1-C^{14} has been synthesized from acetone and diethyl carbonate-C^{14}. It has been demonstrated that acetoacetate was not incorporated into a single or limited portion of the cholesterol molecule. The methyl carbon atom of acetoacetate was a source of carbon atoms 17, 18, and 19 of cholesterol, while the carboxyl carbon atom of acetoacetate was a precursor of carbon atom 10. Evidence was presented that the incorporation of singly labeled acetoacetate into cholesterol followed the same pattern exhibited by singly labeled acetate. Evidence has been obtained suggesting that acetoacetate cannot be incorporated into cholesterol as an intact 4-carbon unit without equilibration with 2-carbon fragments at some stage of the biosynthesis.

Nutritional variation in cottonseed, effect of autoclaving in presence and absence of gossypol on solvent extracted cottonseed meal. Marjorie Z. Condon(Southern Regional Res. Lab., U.S.D.A., New Orleans, La.), Edith A. Jensen, A. B. Watts, and C. W. Pope. *J. Agr. and Food Chem.* **2**, 822-26(1954). Before the processing conditions in cottonseed oil mills can be modified to produce meals of consistently high nutritional quality, the individual effects of heat and bound gossypol must be understood. This investigation was undertaken to determine the effect of autoclaving in the presence and absence of gossypol on certain chemical and nutritive properties of a cottonseed meal of initially high quality. Chick feeding experiments indicated a progressive decrease in the protein quality index of the meals as time of autoclaving increased. This reduction was paralleled by similar decreases in solubility of nitrogen of the meals in 0.02*N* sodium hydroxide. There appeared to be no direct relationship between any other property of the meals and their nutritive value to chicks. Samples to which 1% gossypol was bound during autoclaving appeared to be equivalent, chemically and nutritionally, to control samples autoclaved for the same time.

Beneficial effect of low-fat diets on the swimming performance of rats and mice in cold water. B. J. Ershoff (Dept. of Biochem. and Nutrition, U. of Southern Calif., Los Angeles). *J. Nutrition* **53**, 439-49(1954). The swimming performance of rats and mice at a water temperature of 20° was inversely proportional to the fat content of the diet. Animals fed purified fat-free diets or similar diets supplemented with 1% cottonseed oil or 1% hydrogenated coconut oil swam significantly longer than animals fed similar rations supplemented with 10% cottonseed oil or 10% hydrogenated coconut oil. Intermediate results were obtained at a 2.5% level. The protective effect of low fat rations in mice was manifest within three days of feeding. When swimming tests were conducted at a water temperature of 37°C., no significant difference in swimming performance occurred between the various dietary groups.

Histochemical studies of fat metabolism in mammary glands of lactation cows. B. C. Hatziolos, M. L. Yamin-Smith, and J. C. Shaw(Md. Ag. Experiment Station, College Park). *J. Dairy Sci.* **37**, 924-31(1954). From a comparison of the reactions given by the use of various staining methods for fatty substances in sections of bovine mammary gland tissue, with or without lipid material removed, there was no evidence that free fatty acids were present in appreciable amounts in the proximal part of the secretory cells. All fatty droplets, from the largest, located at the free end of the secretory cells, to the smallest, occupying the middle space, appeared to be neutral fat.

Effects of acetylcholine on phospholipides in the pancreas. Mabel R. Hokin and L. E. Hokin(Montreal Gen. Hosp., Montreal, Canada). *J. Biol. Chem.* **209**, 549-57(1954). Acetylcholine stimulated the incorporation of P^{32} into the choline-containing phospholipides of pancreas slices by 400 to 600 per cent and into the non-choline-containing phospholipides by 1000 and 2500%. Acetylcholine stimulated the incorporation of P^{32} into the glycerophosphatides by 850 per cent. Glycerol-1-C^{14} was incorporated into the glycerophosphatides, but this incorporation was not stimulated by acetylcholine, indicating that acetylcholine stimulated the independent turnover of the phosphate-base moiety in preformed phospholipides. It was suggested that acetylcholine acted at the molecular level by splitting phospholipide-protein complexes (lipoproteins), rendering the phosphate-base moiety of the phospholipides accessible to enzymes which catalyze its rapid turnover.

Use of urea-inclusion compound containing essential fatty acid in an experimental diet. R. T. Holman and S. Ener(Hormel Institute, U. of Minn., Austin). *J. Nutrition* **53**, 461-67(1954). Comparison was made between the utilization of essential fatty acid (linoleic acid) in corn oil and the urea-inclusion compound of its ethyl ester. Changes in dermal symptoms and synthesis of arachidonic acid indicated that the essential fatty ester was active when administered in the form of its inclusion compound.

Synthesis of phosphatides in isolated mitochondria. II. Incorporation of choline into lecithin. E. P. Kennedy(Dept. of Biochem., U. of Chicago, Chicago, Ill.). *J. Biol. Chem.* **209**, 525-35(1954). An enzyme system has been found in isolated rat liver mitochondria which is capable of catalyzing the incorporation of radioactive choline into mitochondrial phospholipides. Radioactive lecithin of a high degree of purity has been isolated from the mitochondrial phospholipides by chromatographic procedures and has been shown to be the principal if not the sole labeled product formed. The incorporation of choline is dependent upon the presence of ATP, either generated by oxidative phosphorylation in intact mitochondria or added as such in extracts of acetone-treated mitochondria. The synthesis of radioactive lecithin from labeled choline has also been observed in extracts of acetone-treated or lyophilized mitochondria.

Properties of clearing factor obtained from rat heart acetone powder. E. D. Korn(Nat. Heart Institute, Nat. Institutes of Health, Bethesda, Md.). *Science* **120**, 399-400(1954). The observation by Hahn that injected heparin caused rapid clearing of alimentary lipemia led to the discovery of an enzyme, clearing factor, in the serums of such animals. This ''*in vivo* clearing factor'' will also ''clear'' lipemic serums or coconut oil emulsions *in vitro*, and it has been the general practice to assay for the enzyme by this decrease in the turbidity of fat emulsions.

Factors influencing the growth of chicks and poults fed rations containing rapeseed oil meal. F. H. Kratzer, P. N. Davis, D. E. Williams, and B. J. Marshall(Dept. of Poultry Husbandry, U. of Calif., Davis). *J. Nutrition* **53**, 407-417(1954). Rapeseed oil meal depressed the growth of chicks approximately 25% when substituted for 35% soybean oil meal in the ration. Growth was not improved by water treating the rapeseed oil meal or by supplementing it with pyridoxine. Rapeseed oil meal caused an enlargement of the thyroid gland, which was not counteracted by feeding potassium iodide. Protamone added to the ration containing rapeseed oil meal resulted in a thyroid of normal weight but had little or no effect on the growth of the chicks.

Endogenous cholesterol metabolism in the rat studied with C^{14}-labeled acetate. E. J. Landon and D. M. Greenberg(U. of Calif. School of Med., Berkeley). *J. Biol. Chem.* **209**, 493-502 (1954). The dynamic endogenous metabolism of cholesterol *in vivo* has been studied by measuring the disappearance of previously labeled tissue cholesterol in rats maintained on a diet free of cholesterol. Important sites of cholesterol synthesis were liver, intestine, and perhaps skin. The large scale catabolism of cholesterol must be largely confined to some of the tissues with a maximal turnover rate. These were liver, intestine, and adrenal. Because of its extremely high cholesterol content the skin may also play a significant role. The turnover time of liver cholesterol was calculated to be about 40 hours. Castration resulted in an apparent marked slowing of the turnover time in liver and intestine. The most significant fact obtained in this work was that the endogenous cholesterol metabolism was far greater in scope than heretofore reported.

The influence of undernutrition on experimental atherosclerosis. *Nutrition Reviews* 12, 220-21(1954). The application of these experiments to human atherosclerosis was difficult and caution was needed in their interpretation. There was some clinical evidence that in man atherosclerosis was accelerated in obesity and decreased under conditions of caloric insufficiency. There were certain obvious differences in the experimental and clinical situation. In rabbit experiments, fat and cholesterol intake were maintained at a high level in both the undernourished and control groups. Human subjects on calorically inadequate diets often have low intakes of these substances.

The synthesis of milk fat. *Nutrition Reviews* **12**, 221-22(1954). The individual fatty acids synthesized by cell-free preparations of rat mammary gland were separated by chromatography. The cell-free suspension had been incubated with acetate, oxaloacetate, and ATP. Ninety-one per cent of the newly synthesized fatty acid could be accounted for by caproic, myristic, palmitic, and oleic acids. Myristic, palmitic, and oleic acids comprise more than 80 per cent of the fatty acids found in milk.

Cholesterol synthesis in man. *Nutrition Reviews* **12**, 230(1954). Cholesterol, both free and ester, in the plasma was synthesized in six patients with "limited life expectancy" from orally administered C^{14}-labeled sodium acetate. Approximately 3% of the administered acetate was incorporated in cholesterol.

Low fat diets in lambs, goats and calves. *Nutrition Reviews* **12**, 242-44(1954). Animal nutritionists have questioned in recent years whether the more extensive processing of soybeans, cottonseed and peanuts by the solvent method might result in a tendency toward critically low fat levels in the feed of cattle. In most instances the low-fat diet resulted in decreased blood plasma levels of total fat and unsaturated fatty acids. The results were indicative that fractionation of serum fatty acids may serve as another tool in the evaluation of nutritional status.

Effects of dietary sterols and sterol esters on plasma and liver cholesterol in the chick. D. W. Person, E. A. Shneour and N. F. Peek(Dept. of Poultry Husbandry, U. of Calif., Berkeley). *J. Nutrition* **53**, 451-59(1954). Feeding cholesterol esterified with fatty acids produced lower plasma and liver levels of cholesterol in young male chicks than did the feeding of free cholesterol. With cholesterol acetate this difference was slight but with some saturated fatty acid esters the difference was pronounced and the tissue levels decreased in the following order: caprate, myristate, palmitate, and stearate. With the last two esters plasma and liver cholesterol were approximately the same as those of normal chicks on low cholesterol diets. Cholesteryl oleate produced an effect intermediate between that of acetate and caprate.

Microbiological fat production, effect of fermentation variables on rate of fat formation by Rhodotorula gracilis. M. P. Steinberg and Z. J. Ordal(Dept. of Food Technology, U. of Ill., Urbana, Ill.). *J. Agr. and Food Chem.* **2**, 873-77(1954). A study was made of the effect of experimental variables on the rate of fat formation as distinguished from cell growth. Shake flasks and a fermentor assembly which included an automatic pH recorder-controller were employed. The fat content was expressed as a ratio of fat to nonfat yeast; this ratio increased linearly with time of fattening. The rate of fat formation varied linearly with pH between pH 3.0 and 8.5 and increased from 2.1 to 3.1 grams of fat per 100 grams of nonfat yeast per hour. Decreasing the temperature from 28° to 22°C. lowered the fat rate to less than half the original value. Under the experimental conditions employed, the addition of accessory growth factors, or of the cations calcium, sodium, and iron, to the growth medium appeared to be unnecessary for fattening of the yeast. Neither sugar concentrations up to 16% by weight of medium nor type of hexose had a significant effect on fattening. Acetate was inhibitory at pH 5 and was of no value as an adjunct at pH 8. Ethyl alcohol and glycerol did not give increased fat formation.

Process of grinding frozen vitamin A material. A. Bavley, C. J. Knuth, W. A. Lazier, and A. E. Timreck(Chas. Pfizer & Co., Inc.). *U. S. 2,689,202.* Vitamin A is dispersed in a solution of a water-soluble, gelable colloid. The dispersion is cast in the form of a gelled sheet, dried, frozen and comminuted in an inert atmosphere.

Vitamin A stabilization. N. D. Embree and H. M. Kascher (Eastman Kodak Co.). *U. S. 2,686,751.* Vitamin A is stabilized by mixing with at least 1% by weight of a monoalkyl ester of citric acid and at least 1% of a phenolic antioxidant such as hydroxylated aromatic compounds, *i.e.*, tocopherols, alkyl gallates and butylated hydroxyanisole, or hydroquinone.

Destruction of lipide peroxides by hepatic tissue. P. Dubouloz and J. Fondarai(Univ. Marseille, France). *Compt. rend. soc. biol.* **147**, 1445-6(1953). The salicylic ester of oleyl alcohol peroxide was incubated with a suspension of defatted liver powder (bovine). The peroxide was rapidly destroyed. Boiling the liver preparation decreased the ability to destroy the lipide peroxide to about half, hence the action can hardly be entirely enzymic. (*C. A.* **48**, 7078)

The metabolism of phosphorus during the germination of seeds. R. Weiss(Lycée Garçons, Esch s. Alz, Luxembourg). *Inst. Grand-Ducal Luxembourg, Sec. sci. nat. math. et phys., Arch.* **20**, 129-57(1951-53). Various P compounds were determined in the germination of seeds of *Triticum sativum, Secale cereale, Oryza satiba, Phaseolus vulgaris, Lens esculenta, Pisum sati-*

vum, Vicia faba, Soja hispida, Ricinus communis, Arachis hypogaea, and *Helianthus annuus.* The seeds were germinated in darkness at 27° after treatment with oxyquinoline sulfate to disinfect. The tissues were ground after freezing except the oil seeds which were ground at room temperature. The major part of the P of dormant seeds is in the form of phytin, which is evidently a reserve, increasing during deposition and decreasing during mobilization of reserves. The phospholipide content of all tissues is relatively constant except in the oil seeds in which it is high; it increases rapidly in embryonic tissues, and is lost regularly from the reserves of all seeds except the oil seeds during mobilization. Phospholipides did not function as reserves in these experiments. Phospholipide proportion was roughly constant in tissues and its withdrawal from reserve tissues was in proportion to the mobilization. They evidently participate in lipolysis and are in considerable proportion wherever there is intense physiological activity. Since ester forms of P appear as the phospholipides disappear, it appears that in order to be utilized a transformation into esters is required. A fall in the respiratory quotient accompanies this change. The data show that the phospholipides participate in the utilization of the lipide reserves of the seeds. It is confirmed that embryonic tissue contains much phospholipide. (*C. A.* 48, 7121)

The vitamin D content of tissues of rats given ergocalciferol. E. M. Cruickshank, E. Kodicek, and P. Armitage(Dunn Nutr. Lab., Univ. of Cambridge). *Biochem. J.* 58, 172(1954). On the first day after oral administration of 40,000 i.u. of ergocalciferol to rats the muscle and skin together contained about 20%, the kidneys 220 i.u., and the liver 270 i.u. Gm. On the second day the muscle and skin contained about 40%, the kidneys about 180 i.u., and the liver 200 i.u./gm. Little vitamin D (about 100 i.u./gm.) was found in the lungs, spleen, and adrenals and there was little evidence that organs not examined (bones, etc.) contain appreciable amounts of this vitamin. It was suggested that the kidneys accumulate the vitamin by acting as a barrier to its secretion.

Mode of action of vitamin D. The effect of vitamin D deficiency in the rat on aerobic glycolysis and pyruvate oxidation by epiphyseal cartilage. P. G. Tulpule and V. N. Patwardhan(Nutr. Research Labs., Coonoor, South India). *Biochem. J.* 58, 61 (1954). Using the Warburg manometer to study the anaerobic breakdown of glycogen and phosphorylated hexoses and the oxidation of pyruvate by epiphyseal cartilage of the tibiae of rats kept on rachitogenic diets it was shown that the glycolytic activity of the epiphyseal cartilage was almost the same as in protected rats. In well established rickets the epiphyseal cartilage of rat loses the capacity to oxidize pyruvate. It was thought possible that the effect of Vitamin D deficiency described was restricted to bone.

Studies on ACTH action in perfused bovine adrenals: the site of action of ACTH in corticosteroidogenesis. D. Stone and O. Hechter(Worcester Foundation for Experimental Biology, Shrewsbury, Mass.). *Arch. Biochem. Biophys.* 51, 457(1954). Cow adrenal glands have been perfused with C^{14} labeled acetate, cholesterol, and progesterone in the presence and absence of added ACTH. The data demonstrate that ACTH markedly increases the incorporation of C^{14} into corticoid only when cholesterol —C^{14} was used as a precursor. The combined results strongly indicate that the major *in vitro* effect of ACTH is concerned with a step involved in the conversion of cholesterol to progesterone. The studies with acetate —C^{14} demonstrate a pathway of corticoid biosynthesis which is not significantly influenced by ACTH and which does not involve the formation of cholesterol as an obligatory intermediary.

Extraction procedure and determination of the vitamin B_{12} content of some animal livers. K. G. Shenoy and G. B. Ramasarma(Res. and Control Div. Raptakos, Brett & Co., Ltd., Bombay, India). *Arch. Biochem. Biophys.* 51, 371(1954). By use of the U.S.P. XIV microbiological assay and employing a turbidimetric adaptation a number of procedures were studied for the extraction and stabilization of vitamin B_{12} of liver tissue. Consistently high values were obtained by digesting liver tissue with crude papain at 60° for one hour followed by the addition of sodium metabisulfite (1 mg./ml.) and steaming for 5 min. The following average values for the apparent B_{12} activity (in micrograms per gram) were obtained for the respective liver samples: cow 1.18; buffalo 1.30; sheep 1.33; goat 1.20; pig 0.59; rabbit 0.60; chicken 0.27; rat 0.052; mouse 0.75.

Carotene: Effect of antioxidant on its determination. V. H. Booth(Univ. of Cambridge, England). *The Analyst* 79, 507 (1954). The interference of NN′-diphenyl-*p*-phenylenediamine in carotene determinations which was reported by Beauchene *et al.* was not observed when light petroleum was used for the extractions and aluminium oxide for the chromatographic separations.

• Drying Oils

Raymond Paschke, Abstractor

1,10-phenanthroline promotes the drying of paints. M. E. Stearns(R. T. Vanderbilt Co., Inc.). *Off. Dig. Fed. Paint Varnish Production Clubs* 26(356), 817(1954). 1,10-phenanthroline accelerates, in varying degree, the drying of all films which cure by polymerization, or by oxidative-polymerization. This advanced drying activity remains as a permanent film property of the paint, i.e. the drying rate is stabilized by the presence of 1,10-phenanthroline. An optimum point can be found for each combination of drier metal and 1,10-phenanthroline where drying is most rapid; stabilization appears to be most assured at this optimum point.

Fundamentals of paint, varnish and lacquer technology. Chapter XII. Exterior finishes for houses and buildings. E. Singer (Troy Chemical Co.). *Am. Paint J.* 38(46), 58(1950). A review with no references.

Aluminium alkoxides. J. Rinse(Chemical Res. Associates). *Paint Technology* 18(204), 6(1954). Aluminium alkoxides are new components in the preparation of vehicles for paints. Their multiple reactivity with hydroxy-compounds as well as carboxylic acids makes them a valuable tool for converting readily available raw materials into macromolecular compounds, and for improving existing paint vehicles.

Cashew nut shell liquid. Part I—Analysis. V. V. Kale and N. R. Kamath(Univ. of Bombay). *Paintindia* 4(3), 27(1954). Methods for determining the acid, hydroxyl and iodine values of cashew nut shell liquid have been described. Based on the determination of these chemical constants, the composition of cashew nut shell liquid can be calculated and its performance predicted.

Bhilawan shell liquid. V. M. Bhale and S. L. Bafna(Holkar College, Indore). *Paintindia* 4(3), 35(1954). The main constituents (46%) of the liquid are catechol derivatives differing from one another in the number and position of the double bonds in the 15-carbon side chain. It is a strong vesicant. Uses are discussed.

Recent trends in coatings formulation. Part II—Improvements in established types of synthetic resin paints. W. von Fisher and E. G. Babalek(Case Inst. of Technology). *Finish* 11(9), 97(1954). A review.

Tall oil—its functions in the paint industry. Part I—Economics and chemistry. W. Brushwell, *Am. Paint J.*, 38(48), 72 (1954). Discussed in this part are history, nomenclature, tall oil production, statistics, economics, chemistry, composition, the fatty acids, the rosin acids, the unsaponifiables and tall oil pitch.

Plant for the paint factory. Anon. *Paint Manuf.* 24(9), 295 (1954). Electronic devices for the automatic control of production processes and filling, new heating systems and alternative means of dispersion are recent developments in plant and equipment suitable for paint manufacture and the related industries. The equipment used is discussed and the latest products of the manufacturers reviewed.

Thermal properties of polyester resins. T. E. Bockstahler, G. E. Forsyth, J. J. Gouza, F. R. Shirak, and E. M. Beavers(Rohm & Haas Co., Philadelphia, Pa.). *Ind. Eng. Chem.* 46, 1639-43 (1954). A family of unsaturated polyesters was prepared with regularly varied cross-linking potential (fumarate/succinate ratio). These were copolymerized with various amounts of styrene and the copolymers tested over a range of temperatures for defection under load and torisional (twisting) modulus. The cross-linking potential of the polyester was shown to have a larger influence on the properties tested than the ratio of polyester to styrene in the copolymer. No unusual effects were observed as the 1:1 ratio of fumarate and styrene units was approached.

Catalyst studies in vinyltoluene—drying oil reactions. F. J. Buege (Dow Chemical Co., Midland, Mich.). *Ind. Eng. Chem.* 46, 1695-1700(1954). In the reaction of vinyltoluene with drying oils, products of improved homogeneity were usually obtained when certain peroxide catalysts were added to the reactants. In order to select a catalyst which performs most satisfactorily in this type of reaction, a concerted effort was made to evaluate a number of different organic peroxides in the vinyltoluene—drying oil reactions—and rate them according to their degree of performance.

Polarographic determination of maleate unsaturation in polyesters. E. W. Hobart(Stamford Res. Lab., Amer. Cyanamid Co., Stamford, Conn.). *Anal. Chem.* 26, 1291-97(1954). Unsaturated polyester resins have a polymerization mechanism which utilized maleate and/or fumarate double bonds as the sites through which the linear polyester chains were cross-linked by vinyl-type monomers. The advent of these resins has presented the problem of detecting and determining their maleate and/or fumarate unsaturation. Application of the polarograph to simple solutions of the polymer was practical if the acid number of the material, a measure of its molecular weight, was taken into consideration. A method has been developed for the polarographic determination of the maleate and/or fumarate unsaturation in polyester formulations, expressed as per cent maleic anhydride.

Physical properties of polyester resins. E. E. Parker and E. W. Moffett(Pittsburgh Plate Glass Co., Milwaukee 1, Wis.). *Ind. Eng. Chem.* 46, 1615-18(1954). The ratio of unsaturated to saturated dibasic acid was varied in 10 mole % steps in four series of unsaturated polyesters. One of these was mixed with 20, 30, 40, and 50% styrene, while the others were mixed with 30% styrene. Flexural strength, modulus in flexure, tensile strength, modulus in tension, elongation, water absorption, and heat distortion points were determined on castings prepared from each mixture. The results are discussed.

Linseed and linseed oil. Anon. *Paint Oil Colour J.* 125, 1421 (1954). A survey of world production, 1938 to the present.

House paints, Part I, a staff report. *Paint Oil Chem. Rev.* 117(12), 16(1954). A review covering white, tinted, and colored pigments.

Part II, *Ibid.* 117(13), 11(1954). A review of vehicles including linseed oil, other vegetable oils, dehydrated castor oil, resinous additives, tall oil, emulsion vehicles, and alkyd resins.

Heat treatment of hydrocarbon drying oils. A. H. Gleason and R. F. Leary(Standard Oil Development Co.). *U. S. 2,672,475.* It has been discovered that polymerized 1,3-butadiene (I) or I-styrene (II) copolymer can be heat-treated between 220° and 260° for short periods of time to improve substantially the drying rate without much increase in viscosity. This is a desirable trait of synthetic drying oils and an effect opposite to that of natural drying oils, e.g. linseed oil. Further, it is shown that to obtain a I-II copolymer drying oil of a specified viscosity with greatly increased drying rates, the oil is polymerized to too low a viscosity. Then, after destroying the catalyst and certain promoters, excess solvent, etc., the drying oil is heat-treated to the desired viscosity. For instance, a mixture of 80 parts I and 20 parts II was polymerized at 50° for 10 hours, then with only 100 parts solvent remaining, the mixture was placed on a test panel for drying. It was very sticky after 6 hours but dry after 24 hours. However, heat-treating the same oil for 30 minutes at 250° only raised its viscosity to 1.4, yet in 6 hours it dried to a condition described as "decided tack, but dust free" and was dry after 24 hours.

• Waxes

R. L. Broadhead, Abstractor

Hydrophilic compounds from animal waxes and similar products. L. S. Lopen-Almoguera. *Span. 196,416.* Animal waxes are first purified. Free cerotic acid and related products are then separated by treatment with dilute H_2SO_4 hot filtration, bleaching by sunlight or with solutions containing $KMnO_4$ and H_2SO_4, washing and centrifugation. The free cerotic acid is removed by solution in anhydrous EtOH. The waxes and related products are saponified with caustic alkali, preferably KOH, in alcoholic solution at 1-20 atms. by boiling at least 10 hours and agitating. The saponifiable and unsaponifiable materials are removed. The long-chain hydrocarbons and higher alcohols contained in the latter are separated from each other by mixing with a mixture of equal parts by weight of amyl alcohol solution ($d = 1.18$-1.20), and 1-5% total butanol-isobutanol. The 2 layers formed are separated mechanically and purified. The soaps formed on saponification of the waxes and the fatty acids are purified. (*C. A.* 48, 9086)

Sizing and finishing compounds for yarns and fabrics. Bonta & Co. *Ital. 475,593.* Mixtures of water 85-90, polysaccharides (I) 3-5, resin emulsions (II) 2.5-4. plasticizers (III) 0.5-4, and antiseptic substances (IV) 0.1-1.3% are used for finishing and sizing. Inert materials (V) 3-5% and hygroscopic matter (VI) 3-5% are also added, respectively, to the 2 kinds of materials. I are starch, dextrin, carob meal, gums, etc. II are polyvinyl or acrylic resins. III are waxes, paraffin, stearin, or sulfonated fats. IV are HCHO, salol, or phenol. V are kaolin, bentonite, or talc. VI is inorganic salts or glycerol. (*C. A.* 48, 9074)

Oxidized petroleum wax forms superior grease base, sodium-base grease gives excellent results in high-temperature service. J. C. Kirk and E. W. Nelson(Continental Oil Co., Ponca City, Okla.). *Oil Gas J.* 52(36), 97-8(1953). Air-oxidized petroleum wax is mixed with normal fats and fatty acids prior to the final steps in grease preparation. Na- and Li-base greases thus prepared are most promising. A Li-base grease, prepared from a mixture of oxidized wax 75% and hydrogenated tallow fatty acid 25%, is an excellent multipurpose lubricant. Oxidation catalyst for the petroleum wax is Zn stearate and colloidal MnO_2; the reaction temp. is 275°F. and the reaction time is 4.5 hours. (*C. A.* 48, 7290)

Effectiveness of water-repellent finishes on a home-furnishing fabric. Meta B. Metze(Purdue Univ., Lafayette, Indiana). *J. Home Econ.* 45, 739-40(1953). A typical home-furnishing fabric, vat-dyed yellow sailcloth, was finished commercially with the following finishes: Quaternary nitrogen compounds, silicones, Al-wax emulsions, and Zr-wax emulsions. Some cloth was processed in the laboratory with silicone or aluminium waxed compounds, which could be used by a home-maker. The warp breaking strength, abrasion-resistance, resistance to water penetration, and ease of stain removal for each of the finished fabrics and the unfinished control were determined. The samples were soiled and laundered and soiled and dry cleaned to determine ease of soil removal. A silicone spray was found to be the most effective home-applied finish for water repellency. The application of commercial finishes of silicones and quaternary nitrogen compounds decreased the breaking strength of the fabric. (*C. A.* 48, 7905)

Sugar cane wax. A survey of crude waxes and their bleaching with chromic acid. Studies in waxes. Part 8. G. B. Carter, P. M. Hunter and J. A. Lamberton. *Proc. of the Queensland Society of Sugar Cane Technologists, Twenty-first Conference,* 135-139(1954). Sugar cane waxes obtained by extracting mud from twenty-eight mills were examined with respect to melting point, ash content, acid value, iodine value and color. Each of the crude waxes was demineralized with dilute hydrochloric acid and subsequently bleached with chromic acid to give light colored products. Since most of the bleached waxes were too soft for use in polishes and showed considerable variability in this respect it is concluded that to produce hard products consistently it will be necessary to vacuum refine the demineralized wax.

• Detergents

Lenore Petchaft Africk, Abstractor

Syntheses of cationic surface-active agents with sulfamic acid. Seizaburo Sakakibara, Kazuo Nambu, and Saburo Komori. *J. Oil Chemists' Soc., Japan* 3, 118-20(1954). Lauric, myristic, and palmitic acids were derived to amides, which were reacted with formaldehyde in the presence of NaOH to form methylolamides (m.p.: lauryl, 109-110°; myristyl, 109-110°; and palmityl, 114.4-115.2°). The methylolamides with sulfamic acid and pyridine gave alkylamido-methylpyridinium sulfate $RCONHCH_2NC_5H_5)^+(SO^4H)^-$. These compounds had superior surface activity and were especially good finishing agents for moisture-resistant cloth.

The surface-active agents prepared from polyvinyl alcohol derivatives. Nobuaki Wada and Akira Inami. *J. Oil Chemists' Soc., Japan* 3, 74-6(1954). Vinyl acetate and allyl acetate were reacted to prepare their copolymer, which was then saponified to give polyalcohols No. 1 and No. 2, with average mol. wt. of 450 and 877, respectively. These polyalcohols were insoluble in ether, benzene, and ethanol. They were dissolved in phenol and partially esterified with lauric or stearic acid.

The 4 products were examined for surface tension, foaming power, penetrating property, and emulsification power. The most desirable product as nonionic surface-active agent was the one chiefly consisting of monoesters of lauric acid with polyalcohol No. 1.

Surface-chemical properties of n-dodecylbenzenesulfonic acid. Isao Hirose and Jiro Mikumo. *J. Oil Chemists' Soc., Japan* 3, 107-8(1954). Pure lauric acid was derived with PCl_3 to acid chloride, which was condensed with benzene in the presence of $AlCl_3$ to give laurophenone (m.p. 45.2°), which was reduced with Zn amalgam and HCl to dodecylbenzene (m.p. —3°). This was sulfonated with 10% fuming H_2SO_4 at 5-15° to give pure *n*-dodecylbenzenesulfonic acid. The solubility, surface activity, electric conductivity, and pH of the solution were measured in comparison with its Na salt.

Heterocyclic dithiazine compounds in detergent compositions. I. J. Krems(Colgate-Palmolive Co.). *U. S. 2,687,379.* A detergent composition normally tending in water solution to cause tarnishing of a copper base alloy is improved by adding as an anti-tarnish inhibitor, a dithiazine compound such as thialdine.

Detergent product having milled soap properties. R. H. Ferguson and F. B. Rosevear(Procter & Gamble Co.). *U. S. 2,686,-761.* A detergent having milled soap properties is prepared with high water and salt content by adjusting the salt content of the mixture to from 1-12% and the water content to from 20-40% by weight, subjecting to kneading, shearing and compacting treatment under pressure at a temperature below its solidification temperature and below that at which neat soap can exist in stable equilibrium in the system. The product produced is waxy, translucent and predominantly in the beta phase.

Detergent compositions. Monsanto Chemical Co. *Brit. 713,128.* A low sudsing detergent stable to alkali is prepared from 15-30 parts by weight of a condensation product of ethylene oxide and abietic acid, 20-50 parts by weight of a water-soluble alkali metal polyphosphate, alkali metal orthophosphate or alkali metal hexametaphosphate or a mixture thereof, and starch and/or carboxymethylcellulose.

Laboratory laundering with synthetic detergents and other laundering agents. IV. Effects of polyphosphates on detergency of synthetic detergents. H. Stupel(Seifenfabric, Hochdorf, Switz.). *Fette u. Seifen, Anstrichmittel* 56, 209-13(1954). The building effect of Calgon B_1, K polyphosphate, Na tripolyphosphate, and $Na_2P_4O_7$ with an oleoylmethyltaurine, a dodecyl sulfate, and tridecyl sulfate, a dodecylbenzenesulfonate, a tetrapentadecylsulfonate, and an alkylphenol polyglycol ether was studied. Their effectiveness decreased in the same order as given above. (*C. A.* 48, 9723)

A laboratory apparatus for detergency studies. W. A. Straw (The Hosiery and Allied Trades Research Assoc., Sherwood Rise, Nottingham, Engl.). *J. Soc. Dyers & Colourists* 70, 288-93(1954). An apparatus is described for providing controlled mechanical agitation of chopped fiber in detergent liquors on a laboratory scale, employing relatively low liquor: fiber ratios.

Synthetic fats, soaps and allied products. I. Development and potential. J. Seaman. *Chem. & Process Eng.* 35. 165-8, 175 (1954). Synthetic detergents including soaps, may be obtained from petroleum starting from kerosine range distillates and waxes.

II. Base materials and conversion processes. *Ibid.* 241-4(1954). The nature of the base materials is discussed and also the various processes by which they can be converted into fatty acids for soap manufacture.

Theory of detergency of textiles. M. Rosch. *Textil-Praxis* 8, 879-82(1953). The importance of micelle formation and the relation of electrical charges between textile and anionic, nonionic, and cationic detergents and their mixtures in the detergent bath are discussed. (*C. A.* 48, 9723)

Sulfonation of detergent alkylates. J. E. Kircher, E. L. Miller, and P. E. Geiser (Continental Oil Co., Houston, Tex.). *Ind. Eng. Chem.* 46, 1925-30(1954). Commercial detergent alkylates are reviewed, giving physical properties such as molecular weight, boiling range, and color and their effects on sulfonation and the finished sulfonate. The discussion of the sulfonation procedure gives the strengths of acids used in the sulfonation reaction (from 98% sulfuric acid to sulfur trioxide); physical data for sulfonation with 20% oleum and with 100% sulfuric acid; and heat transfer data, viscosities, and specific gravities of sulfonic acids. Variables are weight ratios of acid to alkylate, temperatures adhered to during sulfonation, and aging times and temperatures of the sulfonation mass. Spent acid separation variables include settling time and temperature and dilution of the reaction mass.

Nonionic detergents. C. F. Jelinek and L. Mayhew(General Aniline & Film Corp., Easton, Pa. *Ind. Eng. Chem.* 46, 1930-4 (1954). The increased consumption of nonionic surfactants is due to their use in detergent formulations. The nonionics most used in detergent formulations are the ethylene oxide products of alkylphenols, the ethylene oxide products of tall oil, and the alkanolamide derivatives of fatty acids. Although unbuilt polyoxyethylated detergents are superior in cotton detergency and redeposition prevention to unbuilt anionics, the latter can be built to give detergent formulations equal in effectiveness to the built nonionics. The built nonionic detergents are obtaining an increasingly large proportion of the household laundry market because low foaming detergents are needed in automatic rotary-drum washing machines. Industrial detergent uses of the nonionics include antistatic action, raw wool scouring in textile operations, germicidal cleaning in restaurants, removing water-soluble soils in dry cleaning operations, metal cleaning, and washing of floors and walls.

Production, properties and uses of fatty alcohols. E. F. Hill, G. R. Wilson and E. C. Steinle, Jr. (Ethyl Corp., Detroit, Mich.). *Ind. Eng. Chem.* 46, 1917-21(1954). Because of their unusual surface active properties, the alcohols produced by reducing fatty acids or esters have achieved wide commercial use. A comparison is made between the two methods of reduction practiced commercially—sodium reduction and hydrogenolysis—with respect to raw materials, material balances, materials of construction, investment costs, labor and utilities costs, and quality of products. Evaluation data indicate that unsaturated sulfates produced from unsaturated tallow alcohols are superior to saturated sulfates from hydrogenated tallow alcohols as detergent raw materials. However, economical production of high quality unsaturated sulfates has not yet been achieved.

Use of adsorption columns in the analysis of soap and detergent-stabilized emulsions. R. P. Harker, J. M. Heaps and J. L. Horner(Wool Inds. Research Assoc., Headingsley, Eng.). *Nature* 173, 634-5(1954). Columns of ZeoKarb 225 (Permutit) mixed with animal charcoal remove all organic matter from soap solutions and emulsions (industrial waste water). Subsequent elution with the proper solvents give the separate components. Fatty acids can be removed with ethanol, lanolin with trichloroethylene, and Na cetyl sulfate with ethylene glycol. The cetyl sulfate may then be hydrolyzed with HCl to cetyl alcohol. (*C. A.* 48, 10361)

Evaluation of germicidal soaps. A. H. Gee and I. L. Seidenberg (Foster D. Snell, Inc., N. Y.). *Soap Chem. Specialties* 30(8), 42-5, 159, 161, 163(1954). An "in use" type of test for evaluation of germicidal soaps has been devised based on a direct sniffing procedure involving standardized organoleptic evaluation techniques.