

TABLE I

| Sample | Polarographically as TiO ₂ ^a | Colorimetrically as TiO ₂ ^a |
|---------|--|---|
| 1..... | 0.062 | 0.062 |
| 2..... | 0.062 | 0.062 |
| 3..... | 0.130 | 0.132 |
| 4..... | 0.187 | 0.187 |
| 5..... | 0.250 | 0.250 |
| 6..... | 0.312 | 0.312 |
| 7..... | 0.365 | 0.365 |
| 8..... | 0.431 | 0.431 |
| 9..... | 0.063 ^a | 0.064 |
| 10..... | 0.124 ^a | 0.125 |
| 11..... | 0.187 ^a | 0.187 |

^a Samples 9, 10, 11 were special pilot samples. These were made using 1,000 g. of soap, and C.P. Titanium Dioxide was added in the following ratio: .625 g., 1.25 g., and 1.875 g., respectively.

stant I serves two purposes. If the previously determined constant I and the factors m and t are known, it is possible to determine the concentration of the titanium without referring to a standard curve (2), and the I gives a means of correlating the diffusion currents, using different capillaries in the same electrolyte and at a known concentration when m and t are known (2).

Letter to the Editor

DEAR EDITOR:

In the paper "The Composition of Coffee Oil and Its Component Fatty Acids" (J. Am. Oil Chemists' Soc., 30, 606, 1953) the statement was made that "... previous work on coffee oil is meager ...".

The following references, dealing with oil of coffee grounds, contain much valuable data and interesting technological information:

R. INTONTI: Rendiconti dell'Ist. di Sanità Pubbl., March 1938.

Conclusion

Titanium dioxide can be determined in soaps polarographically by the method described above. It has been found that no maximum suppressor was necessary and that the diffusion current is directly proportional to the concentration and is well defined. The method is adaptable to soaps.

Acknowledgment

I wish to thank the Allen B. Wrisley Company, and Elmer R. Luckow for the time and consideration given me in working on this project.

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M. TESTONI E G. BIMBI: La Chimica e l'Industria, 3, 137 (1938).

G. B. MARTINENGI: Oli Min., Grassi e Saponi, Col. e Vern., 18(8), 113 (1938).

They may be of interest to your Journal readers.

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March 22, 1954

ABSTRACTS R. A. Reiners, Editor

• Oils and Fats

Ralph W. Planck, Abstractor
Dorothy M. Rathmann, Abstractor

The autoxidation of fats and application of antioxidants. H. Janecke (Univ. Frankfurt a. M., Germany). *Arzneimittel-Forsch.* 3, 574-86, 632-9(1953). A review.

Seed fats of cucurbits. D. K. Chowdhury, M. M. Chakrabarty, and B. K. Mukherji (Univ. Coll. Sci. Technol., Calcutta). *Science and Culture* (India) 19, 163-4(1953). Analysis of seeds and oils of *Cucurbita maxima*, *Benincasa cerifia*, *Lagenaria vulgaris*, and *Citrullus vulgaris* shows respectively: % oil, 48, 48.3, 45.1, 68.4; iodine value, 98.3, 126.8, 126.5, 116.2; component fatty acids as % by weight of the oil are: linoleic, 43.7, 62.3, 64.0, 58.6; oleic, 26.4, 21.9, 18.2, 18.7; saturated, 29.9, 15.8, 17.8, 22.7. (*C. A.* 48, 3708)

Confirming the erucic acid detection in oil mixtures by the oxidation method. H. Hadorn, R. Jungkuz, and K. W. Bieffer (Lab. Verbandes Schweizerische Konsumvereine, Basel, Switzerland). *Z. Lebensm.-Untersuch. u. -Forsch.* 97, 365-73(1953). For detection of cruciferous-seed oils (rape, mustard) in olive, peanut, and other oils, the method of Kaufmann and Fiedler (*C. A.* 33, 419), based on KMnO₄ oxidation and isolation and

identification of dihydroxybehenic acid, was found unsuitable. With a few modifications, principally increase in the KMnO₄ excess, sufficient improvement was obtained so that 10% admixtures of rapeseed oil to olive or peanut oils were detectable. (*C. A.* 48, 2393)

The stability of safflower-seed oil. M. N. Rao and M. Swaminathan (Central Food Technol. Research Inst., Mysore, India). *Bull. Central Food Technol. Research Inst.* 2, 211(1953). The seeds were minced, steamed 1 hr., and the oil expressed at 1.25 tons/sq. in.; the yield was 25%. Stability by the active oxygen method was 14.5 hrs. Safflower-seed oil was less stable than peanut oil in holding tests. The high content of glycerides of linoleic acid accounts for the low stability. (*C. A.* 48, 2393)

Melting and solidification of milk fat. H. Mulder (Agr. Univ., Wageningen, Holland). *Neth. Milk Dairy J.* 7, 149-74(1953). The expansion of solidified cream with 35% fat upon heating from 0 to 51° in van Dam's dilatometer is greatest in the region of 10-20°. The amount of fat which melts at a given temperature varies according to the temperature at which the cream was solidified. The lower the temperature at which the butter fat was caused to solidify the lower is its melting point. The thermal expansion of the liquid and of the solid fat at the same temperature is practically the same. The total expansion

of the cream is the resultant of the thermal expansion of the cream plasma, of the fat and of the melting of the fat. The amount of solidified fat present at a given temperature can be estimated from the difference of the total and the thermal expansion. Direct or rapid cooling causes more fat to solidify than stepwise or slow cooling. If semisolid butterfat undergoes a change of temperature, recrystallization can occur and change the proportions of solid fat, but these changes are slow at low temperatures. Also the degree of dispersion of the fat can affect its solidification. If a butterfat fraction which is completely solid at 29° is heated to 50° and then kept in ice water, the metastable form is transformed within approximately 1 hr. into a stable one which remains unchanged at 29.5°. All observations agree with the hypothesis that the butterfat can crystallize as mixed crystals, but the fat is not always kept long enough at a given temperature to reach absolute equilibrium. (*C. A.* 48, 2280)

Analysis of liquids, particularly fatty oils and salt solutions, by the microdetermination of the critical mixing temperature. R. Fischer and J. Horner (Univ. Graz, Austria). *Mikrochim. Acta* 1953, 386-400. In the simple and rapid microdetermination of the critical mixing temperature, the temperature obtained always corresponds to the maximum of the miscibility diagram. This, determined with liquid ethylenechlorhydrin, is a characteristic of several fatty oils, and the values of like oils are the same for samples of various origins. With this last reagent standard curves are set up for mixtures of oleic acid and paraffin oil. Similarly, mixtures of gourd-seed oil with rapeseed oil and peanut oil can be tested with CHCl₃. (*C. A.* 48, 2393)

Determination of olive fats by the refractometer. P. M. Rousseau. *Olivicoltura* 6(5), 7-11(1951). Olives were minced, weighed, shaken with nonochloronaphthalene, sand and steel beads for one hr., the refractive index of the pure solvent (*n*DS), of the oil-solvent mixture (*n*DSH) and of a little pure sample of the oil (*n*DH) was measured and the percentages of fat calculated by the formula $(nDS - nDSH)/(nDSH - nDH) \times 0.89 \times 100$. Results are within 0.8% of those of the Soxhlet method. (*C. A.* 48, 2391)

The branched-chain fatty acids of butterfat. 4. The isolation of (+)-12-methyltetradecanoic acid and of 13-methyl tetradecanoic acid. R. P. Hansen, F. B. Shorland, and N. June Cooke (Fats Research Lab., Dept. of Scientific and Ind. Res., Wellington, New Zealand). *Biochem. J.* 57, 297-301(1954). Two branched-chain fatty acids, (+)-12-methyl-tetradecanoic acid and 13-methyltetradecanoic, formerly isolated from mutton fat, have been shown to be present in butterfat.

Determination of the iodine value of phospholipids. C. H. Lea and D. N. Rhodes (Univ. of Cambridge and Dept. of Scientific and Ind. Res.). *The Analyst* 79, 304(1954). The Yasuda and Rosenmund-Kuhnemann methods for pure fatty esters and phospholipids were compared with the Wijs method. The authors found that the macro Rosenmund-Kuhnemann method gave results that are perceptibly too low, and that the Yasuda method gave errors considerably greater for methyl oleate, linoleate, and linolenate. It was concluded that there seems no reason why the Yasuda method should be preferred over the Wijs method except perhaps for the examination of crude lipid extracts of tissues containing sterols in quantity. Also, for determination of iodine value of egg phospholipid, it is the same whether the value is determined directly on phospholipids or by calculation from the iodine value of the fatty acids recovered after hydrolysis.

The structure of the naturally occurring phosphoglycerides. 2. Evidence derived from a study of the action of phospholipase C. C. Long and M. F. Maguire (Dept. of Biological Chem., Univ. of Aberdeen, Scotland). *Biochem. J.* 57, 223-226(1954). Alkaline hydrolysis of the phosphatidic acid, prepared from ovolecithin by the action of phospholipase C and phosphorylation of the resulting diglyceride, gave only L- α -glycerophosphate, thus confirming the L- α -configuration of ovolecithin. The presence of an unsaturated fatty acid radical in the lecithin substrate seems to be essential for the activity of *Cl. welchii* phospholipase C.

The phosphatides of the latex of *Hevea brasiliensis*. 2. Purification and analysis. R. H. Smith (The Rubber Research Inst. of Malaya, Kuala Lumpur). *Biochem. J.* 57, 130-139(1954). Evidence is presented which tentatively suggests that purified undegraded latex lipid consists of 51% lecithin containing reducing sugar; 10.5% metal phosphatide containing inositol and reducing sugar; 3% phosphatidyl ethanolamine; 20% triglyceride (representing fatty acid in excess of that attributable to phosphatide); and, 15.5% unsaponifiables.

The regeneration of rancid fats. M. Rae. *Seifen-Ole-Fette-Wachse* 80, 181-184(1954). Rancid fats are regenerated by the classical methods with sodium hydroxide, activated clays and deodorization processes. The deodorization must be carried out with pure steam without interruption of the vacuum. The regenerated products must be stabilized against oxidation and this can be effected by the addition of 0.1% (based on the weight of the fat) of a fat extract of oats along with 0.01% of citric or tartaric acid as the synergist.

Methods of separation of the various fatty acids. R. Rigamonti. *Olii Minerali-Grassi e Saponi-Colori e Vernici* 31, 62-71(1954). The uses of distillation, fractional crystallization, chromatography, selective solvent extraction and urea adduct formation for the isolation of fatty acids of sufficient purity for characterization or determination of the physical or chemical properties are discussed. Fractional distillation continues to be the fundamental method of separation.

Rapid methods for the determination of characteristic values in fat chemistry. S. Wolf. *Seifen-Ole-Fette Wachse* 80, 269-272(1954). Some methods for the determination of the saponification, iodine and hydroxyl numbers of fats are described and their applicability discussed.

Recent developments in the preparation of natural and synthetic straight-chain fatty acids. F. D. Gunstone (Univ. Glasgow, Scotland). *Quart. Rev.* 7, 175-197(1953). Methods of synthesis of normal saturated and unsaturated acids containing not less than 6 carbon atoms are reviewed and recent contributions to the knowledge of naturally occurring fatty acids are discussed.

Report on egg content of noodles. V. E. Munsey (Food & Drug Admin.). *J. Assoc. Offic. Agr. Chemists* 37, 408-13(1954). Collaborative study results of a method based on determination of the sterol content are given.

Report on egg content of bakery products. V. E. Munsey (Food & Drug Admin.). *J. Assoc. Offic. Agr. Chemists* 37, 405-7(1954). Results of collaborative studies of the determination of the egg content in cake mixes and egg breads based on a determination of the sterol content are given.

Volatile acids from oxidation products of cholesterol and phytosterols. A. Lada. *J. Assoc. Offic. Agr. Chemists* 37, 551(1954). Oxidation of purified, crystalline sterols with chromic acid in H₂SO₄ and analysis of the products by the official A.O.A.C. Method for Volatile Acids showed that cholesterol yields acetic and butyric acid and occasionally valeric acid. Phytosterol, in addition, yields propionic acid.

Purification of unsaponifiable material by carbon column chromatography. A. Lada (Food & Drug Admin.). *J. Assoc. Offic. Agr. Chemists* 37, 550(1954). Crude unsaponifiable material from 50-200 g. fat is purified by chromatographing over a 1:2 mixture of Darco G-60 and Celite 545 with alcohol, followed by elution by increasing quantities of CHCl₃ in alcohol. The purified sterol may be characterized as the acetate.

Report on dairy products. W. Horwitz (Food and Drug Admin.). *J. Assoc. Offic. Agr. Chemists* 37, 223-32(1954). Review and recommendations about new methods for the detection of foreign fats in dairy products, further studies of the Babcock test, methods of cheese sampling, and the cryoscopy of milk.

Report on crude fat in baked dog food. H. H. Hoffman (Fla. Dept. Agr.). *J. Assoc. Offic. Agr. Chemists* 37, 250-3(1954). Collaborative study leading to a recommendation for the adoption of this procedure is reported.

Report on fat in dairy products. Standardized procedures for the Babcock test for milk. E. O. Herreid (Ill. Agr. Exptl. Sta.). *J. Assoc. Offic. Agr. Chemists* 37, 235-6(1954). The need for a standardized method is emphasized.

Report on foreign fats in dairy products. J. H. Cannon (Food & Drug Admin.). *J. Assoc. Offic. Agr. Chemists* 37, 239-40(1954). An improvement in a proposed method for the detection of vegetable oils in dairy products consists in purification of the crude sterol fraction over a column of carbon. Physical properties of the sterols, then, indicate the plant sterol content. The method is recommended for collaborative study.

Steroids. Part XI. Isolation of cholegenin and isocholegenin from ox-bile. N. J. Antia, Y. Mazur, R. R. Wilson, and F. S. Spring. *J. Chem. Soc.* 1954, 1218-22. The neutral fraction from ox-bile is shown to contain, in addition to much cholesterol, pregnane-3 α :20 β -diol and two dihydric alcohols, C₂₇H₄₆O₄, named cholegenin and isocholegenin. Cholegenin is converted into isocholegenin by the action of mineral acid.

The chemistry of polymerised oils. Part IV. Thermal polymerisation of some long-chain unsaturated fatty esters. A. L. Cling-

man, D. E. A. Rivett, and D. A. Sutton (National Chemical Research Lab., Pretoria, Africa). *J. Chem. Soc.* 1954, 1088-90. A formal structural proof is given that addition of the Diels-Alder type takes place during thermal dimerisation of methyl β -elaeostearate. The method employed has also been applied to the thermal dimers of some unconjugated fatty esters.

Food coatings, permeability of acetostearin products to water vapor. N. V. Lovegren and R. O. Feuge. *J. Agr. and Food Chem.* 2, 558-563 (1954). The acetostearins are modified fats capable of being formed into waxlike films which are potentially useful as protective coatings. For this use they should be relatively impermeable to moisture. In the present investigation the permeability of such films was investigated using a modification of the standard cup method. Measurements were made at various temperatures and relative humidities using films of different compositions and thicknesses. From these data permeability constants were calculated. The permeability constants for these fat films were not independent of the thickness of the film or the concentration of water vapor. The results obtained were compared with those found in the literature for various plastic films. The permeability of acetostearin films to water vapor is less than that of cellulose acetate and slightly greater than the permeability of nylon, ethylcellulose, and polystyrene. Cellophane and paraffin wax have significantly smaller permeabilities.

Constituents of the lipids of tubercle bacilli. Part II. J. D. Chanley and N. Polgar (Dyson Perrins Lab., Oxford Univ.). *J. Chem. Soc.* 1954, 1003-8. The lipid extracts of tubercle bacilli (human type) have been subjected to a two step hydrolysis, and the resulting dextro- and laevo-rotatory acids studied. The dextrorotatory mixture of acids liberated by a mild hydrolysis is shown to exhibit α, β -unsaturation. The laevorotatory acid resulting from a vigorous hydrolysis of the remaining mixtures of the lipids is found to be saturated. Some preliminary studies pertaining to the structure of these acids are also described.

Constituents of the lipids of tubercle bacilli. Part III. Mycolipenic acid. N. Polgar (Dyson Perrins Lab., Oxford Univ.). *J. Chem. Soc.* 1954, 1008-10. Degradative studies of mycolipenic acid, a dextrorotatory acid from the lipids of tubercle bacilli, are reported which have shown that this acid is (+)-2:4:6-trimethyltetraacos-2-enoic acid.

Constituents of the lipids of tubercle bacilli. Part IV. Mycoceanic acid. N. Polgar (Dyson Perrins Lab., Oxford Univ.). *J. Chem. Soc.* 1954, 1011-12. Degradative studies of a laevorotatory acid isolated from the lipids of tubercle bacilli are reported. It is found that the acid, now termed mycoceanic acid, has the structure $\text{CH}_2 \cdot [\text{CH}_2]_n \cdot \text{CHMe} \cdot \text{CH}_2 \cdot \text{CHMe} \cdot \text{CH}_2 \cdot \text{CHMe} \cdot \text{CO}_2\text{H}$ where n is probably 21.

Antioxidants and enzymes, effect of alpha-tocopherol, propyl gallate, and nordihydroguaiaretic acid on enzymatic reactions. A. L. Tappel and A. G. Marr. *J. Agr. and Food Chem.*, 2, 554-58 (1954). This survey of the effect of α -tocopherol, NDGA, and propyl gallate on fourteen enzyme systems was undertaken in order to determine if phenolic antioxidants will inhibit enzymic reactions typical of those which cause deterioration in refrigerated and frozen foods, determine inhibition of oxidative enzymes by α -tocopherol, and add to knowledge of enzyme inhibition by phenolic compounds. Peroxidase, catalase, and ethyl alcohol dehydrogenase were specifically inhibited by concentrations of $2 \times 10^{-4}\text{M}$ of the antioxidants. Ascorbic acid oxidase, D-amino acid oxidase, the cytochrome system, and urease were inhibited at $2 \times 10^{-3}\text{M}$ because of the general denaturing properties of the phenolic antioxidants. This research shows that the commercial antioxidants, NDGA and propyl gallate widely used for the preservation of foods, can inhibit some enzymes at the concentrations allowed in foods. Most of the enzymes tested were not sensitive to inhibition by these antioxidants. The biologically important antioxidant and vitamin, α -tocopherol, at $3 \times 10^{-6}\text{M}$ inhibited alcohol dehydrogenase in the presence of metal ions.

Organic peroxides. II. Secondary alkyl hydroperoxides. H. R. Williams and H. S. Mosher (Stanford Univ.). *J. Am. Chem. Soc.* 76, 2987-90 (1954). A series of saturated secondary alkyl hydroperoxides has been prepared by the reaction of secondary alkyl methanesulfonates with alkaline hydrogen peroxide in aqueous methanol. Compared with other methods the yields are satisfactory (20-25%) and the application of this method makes potentially available a wide variety of alkyl hydroperoxides previously inaccessible.

Peroxides. I. n-alkyl hydroperoxides. H. R. Williams and H. S. Mosher (Stanford Univ.). *J. Am. Chem. Soc.* 76, 2984-87 (1954). A new and practical synthesis for the pure n-alkyl

hydroperoxides (n-propyl through n-decyl) by the reaction of n-alkyl methane sulfonates with 30% hydrogen peroxide has been developed. These compounds are now readily available as analytically pure materials. These primary alkyl hydroperoxides exhibit the same order of stability as t-butyl hydroperoxide.

Antioxidative properties of cacao and their effect on butteroil. W. S. Mueller (Univ. of Mass.). *J. Dairy Sci.* 37, 754-60 (1954). The antioxidants in cacao shell were partly extracted with water or alcohol, and the concentrated water and alcohol extracts were more potent than cacao shell or cocoa powder. Drying the water and alcohol extracts to a powder did not significantly decrease their protective properties. In general, the dried water extract of cacao shell was more effective in retarding oxidative spoilage than Viobin but was less effective than caffeic acid or tannic acid. The dried water extract of cacao shell nearly equaled NDGA when the antioxidant effect was evaluated by comparing the aeration time to produce the first slight oxidized flavor. The antioxidants in cacao shell and cocoa powder were not extracted with fat solvents. Whether the antioxidative materials derived from cacao are nontoxic has not been determined.

Holdup and residual saturation of hexane in gravity-drained soybean flake beds. B. M. Kocatas and D. Cornell (University of Texas, Austin, Tex.). *Ind. Eng. Chem.* 46, 1219-24 (1954). Soybean oil is extracted from soybean flakes using hexane as the solvent. At the end of the extraction period hexane is allowed to drain from the bed of soybean flakes. The hexane remaining in the bed must be removed by application of heat in a desolventizer. This study was undertaken to determine the effect of the various bed properties on the solvent holdup for conditions of industrial significance. Factors that tend to increase the permeability of the bed were found to decrease the holdup. Increases in bulk density due to flake preparation decreased the holdup, whereas increases in bulk density due to bed settling tended to increase the holdup. Increases in flake thickness and average diameter were accompanied by a decrease in holdup. Large saturation gradients in the column were observed. Although the high saturation at the bottom of the bed is partly due to capillary end effects, the very slow rate of flow of hexane liquid films is believed to be the major factor in determining the saturation gradient for drainage periods of commercial importance. The relationship between the dynamic and capillary effects is shown by comparison of beds of different heights.

PATENTS

Stabilization of organic compounds. R. H. Rosenwald (Universal Oil Products Co.). *U. S.* 2,679,459. Edible fats and oils are stabilized by 2,6-dialkyl-4-alkoxyphenol in which one alkyl group is a branched $\text{C}_3\text{-C}_{10}$ group, the other contains not more than 4 carbons, and the alkoxy group contains not more than 4 carbons.

Extraction of sterols and antioxidants. R. M. Christenson (Pittsburgh Plate Glass Co.). *U. S.* 2,679,503. A concentrate of unsaponifiables is obtained from crude soybean oil (4-30% unsaponifiables and 5-40% free fatty acids) by saponification of the oil with alkali, dilution of the resulting mixture (200 parts) with 277.5-2775 parts water and 92.5-925 parts i-PrOH, extraction of the unsaponifiables with naphtha, and removal of the naphtha.

Preparation of partial glycerides. W. G. Rose and A. K. Balls (U. S. A., Secy. Agric.). *U. S.* 2,680,090. The partial glyceride is obtained by hydrolyzing a glyceride oil with a lipase in the presence of 0.5 to 2.5% water based on the weight of oil.

Color stabilizers for tallow. R. J. Hlavacek (Swift & Co.). *U. S.* 2,680,121. Color reversion in a tallow, which has been decolorized with a liquified normally gaseous hydrocarbon, is retarded by the addition of a small amount of a compound containing as the only S group an activated sulfhydryl group.

Stabilization of fats for soap. H. C. Black and J. H. Johnson (Swift & Co.). *U. S.* 2,680,122. A method for the manufacture of a stabilized soap from low grade fatty materials consists in decolorizing the fat, immediately adding a fat-antioxidant, saponifying, and adding to the soap a small amount of a soap-antioxidant.

Water soluble tocopherol derivatives. J. D. Cawley and M. H. Stern (Eastman Kodak Co.). *U. S.* 2,680,749. The derivative is a vitamin E-active polyethylene glycol ester of a tocopheryl ester of a dicarboxylic acid in which the polyethyleneglycol moiety has a molecular weight of 400-6,000.

Solvent extraction of oils, fats, and waxes from particles of solid matter. J. J. L. Stapelberg (Tiger Oils & National Mill-

ing Co., Ltd.). *U. S. 2,680,754*. In the solvent extraction of fats from particles of biological origin, the solvent to solute ratio is maintained in a range which will yield miscella having a solvent to solute ratio of 1.5:1 and containing at least 40% solute by volume.

Stabilized fatty compounds. N. H. Kuhrt (Eastman Kodak Co.). *U. S. 2,681,281*. Fatty material is stabilized by the addition of a small amount of a solution of glycine and phosphoric acid in a sorbitan fatty acid ester.

Fatty material stabilized against oxidation. N. H. Kuhrt (Eastman Kodak Co.). *U. S. 2,681,282*. A solution of glycine and phosphoric acid in a hydroxy polyalkylene oxide ester of a fatty acid is added to the fat.

Stabilized fatty compounds. N. H. Kuhrt (Eastman Kodak Co.). *U. S. 2,681,283*. The stabilizer consists of a solution of glycine and phosphoric acid in a polyalkylene oxide derivative of a fatty acid partial ester of a polyhydroxy alcohol or anhydride.

• Biology and Nutrition

F. A. Kummerow, Abstractor

Joseph McLaughlin, Jr., Abstractor

On the unequal conversion of the carboxyl and seventh carbons of octanoate to CO₂ by liver slices. G. W. Brown, Jr., I. L. Chaikoff, D. D. Chapman, and N. O. Fansah (Univ. of Calif., School of Med., Berkeley, Calif.). *Arch. Biochem. Biophys.* 50, 221-223 (1954). The evidence presented suggests that the terminal fragment is limited in its ability to condense with oxaloacetate to form citrate for entrance into the oxidative Krebs' tricarboxylic acid cycle. The conversion from octanoate-1-C¹⁴ to C¹⁴O₂ by rat liver slices is about twice that observed with octanoate-7-C¹⁴.

Studies on the labeling of brain phospholipids with radioactive phosphorus. R. M. C. Dawson (Dept. of Biochem., Univ. of Oxford, England). *Biochem. J.* 57, 237-245 (1954). When a guinea pig brain dispersion is actively incorporating labeled phosphate into its lipids, there is no appreciable incorporation of ³²P into phosphotidylethanolamine, phosphatidylserine or spingomyelin, while the renewal of lecithin phosphorus is very slow. Brain dispersions also synthesize uncharacterized material, soluble in fat solvents, which is probably acidic in nature and contains glycerophosphate as part of its molecule. The synthesis of this material is responsible for most of the incorporation of ³²P into the lipids of a brain dispersion.

Dietary fat and body fat: the composition of the back fats of pigs fed on a diet rich in cod-liver oil and lard. G. A. Garton and W. R. H. Duncan (Rowett Research Inst., Bucksburn, Aberdeenshire, England). *Biochem. J.* 57, 120-125 (1954). The inner- and outer-back fats of two pigs fed on a diet containing up to 50% fat (as a mixture of equal parts of lard and cod-liver oil) were found to be dark brown, semi-solid at room temperature, considerably oxidized, and to have an odor of cod-liver oil. It was concluded that the lard and cod-liver oil were absorbed essentially unchanged and deposited additively along with typical "synthesized" pig fat in the depots; it is suggested that depletion of anti-oxidant (vitamin E) then occasioned oxidation of the polyethenoid fatty acids of the cod-liver oil. The findings are of interest in relation to the effects of feeding diets high in unsaturated fatty acids but low or lacking in vitamin E.

Polyethenoid fatty acid metabolism. VII. Effect of oxidized linoleate preparations. R. T. Holman and S. I. Greenberg (Hormel Inst., Austin, Minn.). *Arch. Biochem. Biophys.* 49, 49-57 (1954). Fat-deficient rats were given daily supplements of ethyl linoleate, ethyl linoleate plus benzoyl peroxide, partly oxidized ethyl linoleate, ethyl linoleate peroxide, decomposed linoleate peroxide, reduced linoleate peroxide, and conjugated ethyl linoleate over periods of 4 and 6 weeks. Weight gain, dermal symptoms, and water consumption of the animals were recorded. When the rats were killed, the total fatty acids and arachidonic acid were measured in each. All supplements containing ethyl linoleate, with or without peroxide, cured the deficiency symptoms, reduced water consumption and stimulated arachidonic acid synthesis. Linoleate peroxide, reduced and decomposed linoleate peroxide, and conjugated linoleate were unable to stimulate arachidonate synthesis, dermal symptoms were worsened, growth was decreased, and water con-

sumption remained high. The enzymatic preparation of ethyl linoleate peroxide is described.

The lipoprotein particles in cow's milk. R. K. Morton (Dept. of Biochem., Univ. of Cambridge, England). *Biochem. J.* 57, 231-237 (1954). The lipoprotein particles have properties essentially similar to those of microsomes from lactating mammary gland and other animal tissues and therefore are called "milk microsomes." They are released into milk from the mammary gland during the normal secretory process, and occur partly in association with the fat globules.

Influence of trace amounts of fatty acids on the growth of microorganisms. C. Nieman (Lab. of Physiol. Chem. and Netherlands Inst. of Nutrition and Lab. of Microbiol., Amsterdam, Holland). *Bacteriol. Rev.* 18, 147-163 (1954). This review article is excellent. It covers very thoroughly studies of various amounts of fatty acids upon the different microorganisms from the viewpoint of nutrition, resistance of higher organisms against infectious diseases, and the effect of fatty acids on unicellular organisms as compared to the fatty acid metabolism in the tissues of higher organisms. The bibliography gives 92 references.

The composition of the saponifiable lipides of cultured tissue cells. A microfractionation study of Earle's Strain L. F. L. Schaffer, B. W. Grunfaum, and P. L. Kirk (Dept. of Biochem., Univ. Calif., Berkeley, Calif.). *Arch. Biochem. Biophys.* 50, 188-198 (1954). Methods are described for the extraction of lipides and the simultaneous determination of total fatty acids, unsaturation, and lipide phosphorus in as little as 0.2 mg. of dry tissue. The levels of these constituents were found to be quite constant in batches of Earle's strain L. tissue culture cells grown for 12-18 days under standard conditions.

Dietary protein and fat content of feces. Anon. *Nutrition Revs.* 12, 140-2 (1954). Absorption of ingested fat is dependent, in part, upon the quality and quantity of bile excreted into the intestinal tract. Observations on the effect of dietary protein on fecal fat excretion, point out again the mutual interdependence of various food components. Further studies are needed to determine the optimal dietary protein:fat:carbohydrate ratios, not only for the normal subject, but, more particularly, for patients with nutritional problems.

The paper chromatographic separation and qualitative identification of mixtures of C₁₈O₂ steroids. G. Arroyave and L. R. Axelrod (University of Rochester). *J. Biol. Chem.* 208, 579-89 (1954). The paper chromatographic separation of steroids containing 19 carbons and 3 oxygens is described. Specific color reagents involving alkaline *m*-dinitrobenzene, 2,4-dinitrophenylhydrazine, and concentrated and fuming sulfuric acid were utilized in detecting these compounds on chromatograms. The absorption spectra of both concentrated and fuming sulfuric acid solutions of these C₁₈O₂ steroids were found very helpful for their qualitative characterization in micro quantities.

Fatty acid metabolism and hepatic lipogenesis. I. Lyon and R. P. Geyer (Harvard School of Public Health). *J. Biol. Chem.* 208, 529-35 (1954). The incorporation of octanoate-1-C¹⁴ into respiratory CO₂ (RCO₂), acetoacetate (ACO₂), long and short chain fatty acids (LFA and SFA), and cholesterol (CHOL) was studied in rat liver slices. Changes in the distribution pattern of labeled C₂ units derived from octanoate were noted following supplementation of the incubation medium with pyruvate, succinate, or fumarate alone or in combination with malonate. These changes indicated that long chain fatty acid synthesis was primarily related in an inverse manner to the amount of acetoacetate formed. Short chain fatty acids influenced or were influenced by this relationship secondarily. LFA recoveries were not affected by malonate alone, although RCO₂ was markedly depressed; the C¹⁴ content of ACO₂ and SFA increased. There appeared to be some link between cholesterol synthesis and respiratory activity.

Studies of metabolic turnover with tritium as a tracer. IV. Metabolically inert lipide and protein fractions from the rat. R. C. Thompson and J. E. Ballou. *J. Biol. Chem.* 208, 883-88 (1954). Protein and lipide fractions were separated from various tissues of rats sacrificed 4 months and 8 months after administration of tritium oxide. The concentration of bound tritium in these compound fractions was determined, and the biological half life of the tritium-labeled components of the fraction was estimated from the decrease in tritium content between the two sacrifice periods. Collagen fractions exhibited half lives of 300 days or longer, and lipide fractions were obtained with half lives as long as 300 days. The highest concentration of bound tritium, 4 months after tritium oxide administration, was found in brain lipides.

The effect of alfalfa meal on early growth of chicks. H. S. Wilgus and I. L. Madsen (Colorado Agr. Exper. Station, Ft. Collins, Colo.). *Poultry Sci.* 33, 448-59(1954). The results of chick feeding trials on 100 samples of alfalfa meal, mostly of known history, show that, when each one was incorporated in a high-density starting ration at the 10 percent level, approximately one-fifth of them depressed early growth markedly, one-third demonstrated moderate depression and one-half showed no appreciable effect. Three samples exerted serious depression. Inhibitory samples were found among sun-cured as well as dehydrated meal. No evidence has yet been found to involve production factors.

Free fatty acid content of fresh milk as related to portions of milk drawn. W. R. Thomas, W. J. Harper, I. A. Gould (Ohio State Univ.). *J. Dairy Sci.* 37, 717-23(1954). Various portions of milk as drawn from different cows, representing five breeds and different periods of lactation, were analyzed for free fatty acid content by utilizing an extraction procedure to obtain the fat for titration. Three portions were obtained, with about 85% of the milk drawn being in the second portion. Measurable quantities of free fatty acids were found in all samples analyzed. Generally, the trend was for the first-drawn milk to be the highest and the last-drawn milk to be the lowest in acid degree. However, for individual cows late in lactation there was a tendency for all three portions of milk to exhibit more nearly the same acid degree. When the fat content was nearly that of normal milk, no correlation was noted between fat content of the milk and acid degree of the milk fat. The same portions of milk from individual cows, i.e., first, second, or third, were found to vary widely in acid degree values from day to day. Also, milk from different cows varied daily in free fatty acid content.

Cholesterol and related compounds. I. Structure of a new non-conjugated cholestadienol from 7-bromocholesterol. K. Tsuda, K. Arima, and R. Hayatsu. *J. Am. Chem. Soc.* 76, 2933-38 (1954). Treatment of 7 α - and 7 β -bromocholesteryl acetate (Ia) (benzoate, Ib) with pyridine or other bases gives, as the chief reaction product, $\Delta^{5,8(9)}$ -cholestadienyl acetate (IIa) (benzoate IIb). Nitric acid oxidation of IIa gives methylpyromellitic acid (VI) while hydrogenation of IIa in ethyl acetate in the presence of platinum oxide gives $\Delta^{8(9)}$ -cholestenyl acetate (III). Reduction of III with platinum oxide in acetic acid yields cholestanyl acetate (V). Chromic acid oxidation of IIa gives 7-keto- $\Delta^{5,8(9)}$ -cholestadien-3 β -ol acetate (VIII) which on catalytic hydrogenation with palladium is converted into 7-keto-cholestan-3 β -ol acetate (IX). Dienone-phenol rearrangement of VIII with acetic anhydride and sulfuric acid gives a steroidal phenol (Xb) whose methyl ether (Xc) forms methyl-nitrobenzenetetracarboxylic acid (XI) by oxidation with nitric acid and an anthracene series hydrocarbon, C₂₀H₁₈ (XIIa and b), by dehydration with selenium.

Effect of potassium, sodium or calcium on the growth of young rabbits fed purified diets containing different levels of fat and protein. J. G. Wooley and O. Mickelsen. *J. Nutrition* 53, 591-99(1954). The addition of extra amounts of sodium bicarbonate, potassium acetate or calcium carbonate (over that in the 4% Wesson salt mixture) to a purified diet increased growth and decreased mortality in 3- to 4-week old rabbits. Increasing fat in the diet tended to decrease the growth of rabbits on the 20% casein diets not supplemented with extra minerals. When the added minerals were present, the growth rate on the 30% casein diets increased as the fat levels were raised from 1 to 12%, the increase on the 20% diets was considerably less than on the 30% diets. No explanation was available for these observations other than the suggestion that an animal's requirements for minerals may be more intimately related to the composition of the diet than had been thought heretofore.

Interrelation of fat, carbohydrate and vitamin E in the diet of the growing rat. T. Viswanatha, J. E. Gander and I. E. Liener (Univ. of Minnesota, St. Paul). *J. Nutrition* 53, 613-26(1954). The growth-promoting properties of corn oil and butterfat for the vitamin E-depleted rat have been compared using lactose or sucrose as sources of carbohydrate both in the presence and absence of supplemental vitamin E. In the absence of supplemental vitamin E and with lactose constituting the carbohydrate component of the diet, butterfat supported a rate of growth which exceeded that produced by corn oil. With the administration of vitamin E, however, no demonstrable difference between the two fats was evident on either the lactose- or sucrose-containing rations. The incorporation of sulfathalidine into rations complete with respect to vitamin E resulted in depressed growth which could be partially over-

come by replacing corn oil with butterfat. Whether or not these observations are due to known components of butterfat cannot be decided on the basis of present evidence.

Hepatic necrosis induced by dietary means. VIII. The effect of feeding a diet free from fat at successive intervals to groups of weaning rats. J. R. McLean and J. M. R. Beveridge (Queen's University, Kingston, Canada). *J. Nutrition* 53, 499-505(1954). A diet free from fat was fed to 5 successive groups of male weaning rats over a period of 15 months. In the first experiment none of the rats developed hepatic necrosis in a period of 172 days. In all subsequent groups hepatic necrosis developed with a general trend toward an increasing incidence. It is tentatively suggested that these results might be explained on the basis that intestinal organisms having a strong predisposing influence on the production of the lesion were inhibited in the first case and subsequently became adapted to the altered dietary conditions with the consequent production of liver necrosis.

Composition of intestinal lumen lipides following the feeding of triglycerides, partial glycerides or free fatty acids. F. H. Mattson, J. H. Benedict, and L. W. Beek. *J. Nutrition* 53, 575-80(1954). The quantity and isomeric form of the monoglycerides found in the lumen of the intestinal tract during digestion are similar, regardless of whether the triglyceride fed consisted of fatty acids having a chain length of 18 carbon atoms or one of 10 carbon atoms. The composition of intestinal lipides was only very slightly affected when relatively large amounts of 1- or 2-monoglyceride were fed in admixture with triglyceride. When a mixture of fatty acid and triglyceride was fed, the composition of the intestinal contents, except for relatively smaller amounts of 2-monoglyceride, was unchanged at low levels of fatty acid feeding but exhibited a marked rise in free fatty acid content when higher levels of free fatty acids were administered.

Some properties of the chick growth inhibitor in linseed oil meal. F. H. Kratzer, D. E. Williams, B. Marshall, and P. N. Davis (University of California, Davis). *J. Nutrition* 53, 555-63(1954). Linseed oil meal depressed the growth of chicks when fed at a level of 30% of the diet. Water treatment and autoclaving were effective in destroying the growth depressing factor while dry heat was ineffective. Linseed grits, produced with some steam treatment, were less growth depressing than old process or solvent process meal, but still responded to water treatment or pyridoxine supplementation. Aureomycin did not improve the growth of chicks fed linseed oil meal indicating that there was no stimulation of pyridoxine synthesis by the antibiotic. Pyridoxine, pyridoxal and pyridoxamine were equally effective, on a molar basis, in counteracting the growth inhibitor.

Sequence of histologic changes in skin of dogs in relation to dietary fat. A. E. Hansen, J. G. Sinclair, and H. R. Wiese (University of Texas, Galveston). *J. Nutrition* 53, 541-53 (1954). Periodic histologic examinations of the skin were made on 8 young puppies, 4 of which were developing deficiency symptoms due to lack of dietary fat, and on 4 adult dogs, three of which were recovering from the fat-deficient state after the addition of fat to the diet. The findings suggest that dietary fat supplies a factor necessary for the maturation of epithelial, sebaceous and sudoriparous cells which, when absent from the diet, results in distinct abnormality in the skin demonstrable both microscopically and grossly. The process is readily reversible and changes in an orderly fashion when fat is added to the diet.

The effect of fat level of the diet on general nutrition. XI. The protective effect of varying levels of ethyl linoleate against multiple sublethal doses of x-irradiation in the rat. A. L. S. Cheng, M. Ryan, R. Alfin-Slater, and H. J. Deuel, Jr. (University of Southern California, Los Angeles). *J. Nutrition* 53, 637-43(1954). The protective effect of linoleate against x-irradiation in the rat has been confirmed. On the basis of the average length of survival, and from comparison of the periods required for LD₂₅, LD₅₀, and LD₉₅ to be reached in male rats subjected to x-irradiation, it was demonstrated that the protective effect of ethyl linoleate became greater with increasing dosage. The optimum dosage for protection against x-irradiation injury, in male rats, probably exceeds 100 mg. per day.

Further studies of the unidentified chick growth factors in unsaturated fats. D. S. Carver and E. L. Johnson (Iowa State College, Ames, Iowa). *Poultry Sci.* 33, 543-8(1954). Unidentified growth factors in animal and vegetable fats and in corn, pork liver residue and Biopar C have been studied as supplements to a semi-purified, "fat-free" diet. It was confirmed

that wheat germ oil, corn oil, soybean oil and oleic acid concentrate are sources of growth factors. The unidentified factors in unsaturated fats were distinct from the growth factors present in Biopar C. Biopar C improved growth only slightly. Pork liver residue, which contains 18.8 percent arachidonic acid of its total fatty acids, was a fair source of ether-soluble growth factors.

Stepwise dehydrogenation of the colorless polyenes phytoene and phytofluene with N-bromosuccinimide to carotenoid pigments. L. Zechmeister and B. K. Koe (Calif. Inst. Tech.). *J. Am. Chem. Soc.* **76**, 2923-26(1954). Dehydrogenation of the colorless plant polyenes phytoene and phytofluene can be carried out with N-bromosuccinimide and some other reagents. This stepwise process takes place mainly at the ends of the conjugated system and leads through the following series: phytoene → phytofluene → 8-carotene → neurosporene → lycopene. The artifacts were identified with the corresponding natural products. The exact mechanism of some of the steps mentioned is unknown.

Prevention of cholesterol type of fatty livers in mice by dietary dihydrocholesterol. W. T. Beher and W. L. Anthony. *J. Nutrition* **53**, 519-524(1954). Increasing the cholic acid content of a diet containing cholesterol significantly increased mouse liver cholesterol and β steroids, up to a limiting value. The addition of dihydrocholesterol to diets containing cholic acid and cholesterol significantly decreased mouse liver cholesterol and β steroids. Increasing the cholic acid content of a diet containing constant amounts of dihydrocholesterol and cholesterol significantly decreased mouse liver cholesterol and β steroids. Under all conditions, total liver cholesterol and β steroid concentrations were parallel.

Alfalfa carotenoids, xanthophylls in fresh and dehydrated alfalfa. E. M. Bickoff, A. L. Livingston, Glen F. Bailey, and C. R. Thompson. *J. Agr. and Food Chem.* **2**, 563-67(1954). The carotenoids of fresh and dehydrated alfalfa were separated chromatographically. Five xanthophylls (lutein, violaxanthin, cryptoxanthin, zeaxanthin, and neoxanthin) comprised 99% of the xanthophylls in fresh material. In addition, seven minor bands were present. The same five pigments comprised 87% of the xanthophylls of a dehydrated alfalfa meal. A total of more than 40 xanthophyll bands were shown to be present in dehydrated meal.

Biochemical effects of vitamin B₆ deficiency. Anon. *Nutrition Revs.* **12**, 186-87(1954). The most striking differences were encountered in the gains of total crude fatty acids. Vitamin B₆-fed animals, either pair- or ad libitum-fed, gained approximately ten times the quantity of fatty acids gained by the deficient animals. The difference in body weight gain between the vitamin B₆-deficient rats and the vitamin B₆-pair-fed rats was then due chiefly to the difference in gain of body fat. The results of these experiments indicate that fat metabolism is seriously deranged in the vitamin B₆-deficient rat. Since the basal diet contained adequate quantities of fat and essential fatty acids, the inability of the vitamin B₆-deficient rats to deposit carcass fat cannot be readily ascribed to an impairment in fatty acid synthesis. It would appear that vitamin B₆ is somehow necessary for the deposition of fatty acids in tissue fat.

Squalene, a precursor of cholesterol. Anon. *Nutrition Revs.* **12**, 174-75(1954). The feeding of a diet containing 3 percent natural squalene resulted in a pronounced reduction in the recovery of the added acetate C¹⁴ in cholesterol. The same dietary content of regenerated squalene had no such effect. The recoveries of C¹⁴O₂ and fatty-acid C¹⁴ were unaffected by the ingestion of either type of squalene. The fact that the addition of natural squalene interferes with the incorporation of labeled acetate into cholesterol agrees with the hypothesis that the hydrocarbon dilutes a metabolic pool of a precursor of cholesterol. This theory is confirmed by the fact that the recoveries of C¹⁴O₂ and fatty-acid C¹⁴ are unaffected.

The lipotropic effect of threonine. Anon. *Nutrition Revs.* **12**, 151-2(1954). Dietary factors other than choline are known to exert a lipotropic effect, that is, to prevent the accumulation of fat other than in the normal storage depots of the body. These experiments clearly demonstrate a lipotropic effect for threonine. Also, it is clear that this effect is dependent on the presence of choline in the diet. The mechanism of the threonine effect is not known. It may be related to the synthesis of enzymes which function in phospholipid synthesis or in fatty acid oxidation.

Coenzyme A and the biosynthesis of cholesterol. Anon. *Nutrition Revs.* **12**, 146-8(1954). The coenzyme A activity of liver

from rats on pantothenic acid-deficient diets was reduced to approximately half that of animals in the groups fed adequate quantities of the vitamin. The effect of pantothenic acid deficiency on cholesterol ester synthesis was masked or annulled by the feeding of fat. This concept is dependent on the consideration that fatty acid derivatives with even numbers of carbon atoms may enter pathways of biosynthesis of cholesterol without being previously broken down to acetate fragments.

Sources of variation in the determination of vitamin D by the line test. C. I. Bliss, C. Whitman, F. G. McDonald, and C. E. Bills (Cambridge Univ., Conn. Agr. Sta. & Yale Univ.). *J. Assoc. Offic. Agr. Chemists* **37**, 499-508(1954). Some of the quantitative characteristics of the line test were examined by determining dosage-response curves with six-rat litters and six dilutions of U.S.P. Reference Cod Liver Oil No. 2. Scoring on the Bills scale to 1/4 unit is fully justified. Tibiae proved more sensitive than radii from the same rats. Change in weight during the assay had a negligible effect on the magnitude of error. Variability between litters was significantly greater than within a litter. A daily dose of 1.5-6 mg. cod liver oil and a seven-day assay period results in a straight line dosage response curve when the mean score is plotted against log. dose.

Component fatty acids of bovine mammary gland fat. G. A. Garton (Rowett Research Inst.). *J. Sci. Food Agr.* **5**, 247-51(1954). Component acids in the fats of secretory tissues from udders of a lactating and a nonlactating cow were determined. Fat from the lactating gland contained smaller amounts of butyric and myristic acids than a typical butter fat but proportionally more palmitic and stearic acids; C₁₀ to C₁₄ mono-ethenoic acids occurred to about the same extent as in milk fat but the amount of hexadecenoic acids was considerably higher and a C₁₈ diethenoic acid was detected spectrophotometrically. Oleic acid was the major unsaturated acid of the lactating gland fat. Fat from nonlactating gland contained all the saturated acids found in milk and lactating gland fat, and all the unsaturated acids except the nonconjugated octadecadienoic acid found in the fat of the lactating gland. The composition of the fat from the nonlactating gland was not like depot fat but contained a high proportion (over 40% on a mol basis) of palmitic acid, lower stearic and oleic acid contents, and an unusually high content of C₁₈ unsaturated acids (mainly palmitoleic). The physiological significance of the findings is discussed briefly. It is noted that the carotene content of lactating gland fat was greater than that of milk or colostrum.

Evaluation of two methods for the determination of carotene. E. M. Bickoff, A. L. Livingston, and G. F. Bailey (U. S. Dept. Agr.). *J. Assoc. Offic. Agr. Chemists* **37**, 509-18(1954). Possible sources of errors in the present A.O.A.C. method for carotene in alfalfa meal which are evaluated include isomerization during hot extraction, oxidation during extraction, incomplete extraction, incomplete elution from the chromatographic column, inclusion of impurities with the carotene fraction, variations of activity of the adsorbent, and destruction of carotene on the chromatographic column. The advantages of the W. Regional Research Lab. method over the official method in many respects are indicated. It is advantageous to calibrate the colorimeter indirectly by means of chromatographed carotene extracts rather than with high purity β -carotene. Dichromate colorimeter standards give erratic results.

Black soybean cake meal as a substitute for soybean cake meal in the feeding of dairy cows. M. P. Chen and S. Y. Jen (Taiwan Agr. Research Inst., Taipei, Formosa). *Agr. Research (Formosa)* **3**(2), 59-62(1952). Cows fed black soybean cake meal gave milk identical in quantity and composition with that from cows fed soybean cake meal. (*C. A.* **48**, 3591)

Component fatty acids of the liver-fat of albino rats receiving a high-fat diet. S. M. Bose and V. Subrahmanyam. *Bull. Central Food Technol. Research Inst., Mysore* **2**, 236-7(1953). Freshly weaned albino rats were fed a fat-free rice diet for 4 weeks supplemented with 30% cow ghee. Livers from these rats showed an average fat content of 8.01% as compared with a normal of 3-4% on a fresh weight basis. The composition of the cow ghee and the deposited fatty acids, resp. (as molar percentages) was: butyric 9.24, none; caproic 2.36, none; caprylic 2.40, none; capric 2.19, none; lauric 3.60, 0.82; myristic 9.43, 5.10; palmitic 23.85, 30.76; stearic 9.53, 4.43; arachidic 0.88, 0.25; decenoic 0.43, none; didecenoic 0.36, none; tetradecenoic 1.52, 0.87; hexadecenoic 3.88, 5.50; oleic 25.65, 40.65; linoleic 3.64, 7.69; and arachidonic 1.05, 3.97. Although the dietary ghee contained appreciable amounts of

the lower fatty acids, these were not deposited in the rat livers, while palmitic and oleic acids appeared in the rat livers in larger quantities than in the ghee. (*C. A.* 48, 2193)

The apparent and true utilization of fat from cereals and legumes. L. Kline (Serbian Acad. Sci., Belgrade, Yugoslavia). *Biochem. Z.* 324, 385-96(1953). The utilization of fat is conventionally expressed as $\% = (NF - KF)/NF \times 100$ where NF represents the fat intake and KF the fecal fat. But the results obtained by this method represent the apparent utilization and are unsatisfactory. For the true fat utilization the formulation is $\% = (NF - [KF - SF])/NF \times 100$ where SF is the secreted fraction of KF, the total fecal fat. The true utilization and digestion values are constant and characteristic for each fat. The SF amount was determined by feeding the defatted meal. (*C. A.* 48, 2200)

The intestinal absorption of fat in prematures. L. Soderhjelm. *Proc. Sect. Pediat. School Hyg. Swedish Med. Soc., June 3, 1950; Acta Paediat.* 39, 469(1950). The fat absorption, determined by balance studies in 22 premature infants fed breast milk was very good, with a mean value of 92% of the ingested fat. In 3 cases the absorption fell below 80% during one test for each. The state of the milk (fresh, pasteurized, boiled, or frozen) did not affect the fat absorption. Addition of vegetable lecithins did not improve fat absorption in premature infants, but increased it in the case of celiac disease. Peroral administration of bacteriostatic agents did not influence the excretion or absorption of fat. (*C. A.* 48, 2203)

Molecular distillation of oils rich in vitamin A and vitamin E with a simple laboratory still. L. Kehren (Univ. São Paulo, Brazil). *Anais fac. farm. e odontol. univ. São Paulo* 10, 111-20(1952) (Publ. 1953). A pyrex tube with 2 side arms connected to a high-vacuum pump and an electronic pressure gauge and cooled by a cold finger made of stainless steel is used for the direct molecular distillation of vitamins A and E from shark oil and wheat-germ oil. (*C. A.* 48, 2321)

Serum-cholesterol levels in elderly people living at home. W. Hobson, A. Jordan, and Cissie Roseman (Univ. Sheffield, England). *Lancet* 265, 961-4(1953). The mean serum-cholesterol levels in aged men and women were higher than in control groups of younger people; levels were higher in women than in men in both groups and ranged from 200 to 481 mg./100 ml. in women aged 61-87 and from 176-409 in men aged 66-85. Nondrinkers had a higher level than heavy drinkers. In women (but not in men) there was a significant correlation between the dietary intake of fat and the serum-cholesterol level and also between the thickness of the abdominal skin fold and the serum-cholesterol level; the combined result for the 2 sexes gave a highly significant correlation. (*C. A.* 48, 2208)

• Drying Oils

Raymond Paschke, Abstractor

Paints for high moisture conditions. Anon. *Paint Manufacture* 24, No. 6, 195(1954). A report of German experiments in painting and rust-proofing metal apparatus and structures under conditions of high humidity is given.

Requirements for a perfect outdoor accelerated weather station. N. P. Beckwith and R. Wirshing (Rinshed-Mason Co., Detroit, Mich.). *F.A.T.I.P.E.C.* 1953, 259-62. A discussion of chalking, checking, blistering, and rust spotting is given.

The hexogen driers. B. Berruto. *Ind. Vernice* 7, 295-9(1953). The properties of the 2-ethyl hexoate driers are compared with those of the naphthenate driers. The former are said to be purer, have lower sp. gr., less tendency to discolor, less odor, and to be entirely uniform. (*C. A.* 48, 6141)

Some questions about mastic exterior coatings. F. L. Browne (Forest Products Laboratory, U. S. Dept. Agriculture). *Can. Paint Varnish* 28, No. 6, 30(1954). Strong claims for plastic or mastic exterior coatings produce serious doubts as to the reliability of these claims.

Attempt to separate isomerized fatty acid (linseed oil) esters (methyl) with urea. Comparison of results with those obtained by the chromatographic method. G. N. Catravas (Lab. Chevreul, Bellevue, Seine, France). *Oleagineux* 8, 677-9(1953). From ultraviolet absorption measurements it was concluded that the conjugated ethylenic linkages that make up the dienes in the different fractions are not of the same type, and

that, since some of the triene compounds in the earlier fractions readily form urea complexes while those in later fractions do not, urea could be used to separate different trienes as well as dienes which form in the course of the isomerization of linseed oil. (*C. A.* 48, 5519)

Corrosion prevention of iron. O. Gerhardt. *Seifen-Öle-Fette-Wachse* 79, 557(1953). A review. (*C. A.* 48, 5522)

Application of micromethods in the field of fats. XV. Examination of lacquers for drying and porosity. G. Gorbach and H. Bukowiecki (Tech. Hochschule, Graz, Austria). *Fette u. Seifen* 55, 511-13(1953). A method is described for determining drying rate by allowing a solution of the sample to rise on Schleicher and Schull A2043 filter paper and noting the height reached; the higher the sample rises, the lower is its drying rate. For porosity tests, a film is prepared on S. and S. 595 filter paper, dried, and tested in a small membrane filter under pressure. (*C. A.* 48, 6141)

Accuracy of layer thickness measurements and evaluation of some thickness gages. H. W. Van Der Hoeven (Koninkl Shell Lab., Amsterdam). *F.A.T.I.P.E.C.* 1953, 160-6. For painted cold-rolled steel panels with the CIMO instrument, if carefully calibrated, 12 readings per object are necessary to obtain an accuracy of $\pm 5\%$ and at least 3 readings for an accuracy of $\pm 10\%$; for the Zeiss micrometer these figures are 21 and 5. Precise calibration of the instrument is of primary importance. The CIMO instrument is designed for the measurement of non-ferromagnetic films on ferromagnetic substrates by means of an electromagnet. The range covered by the instrument is about 0-100 μ . The Mareoni instrument, over the whole range, gave figures about 30-50% higher than those measured with the micrometer. (*C. A.* 48, 5517)

Comparison of the hardness of varnish films with different test methods. F. P. Hiron, H. W. Rudd, and J. J. Zonsveld. *F.A.T.I.P.E.C.* 1953, 173-7. The five methods employed distinguish between harder and softer films but there were no systematic relation between tests. Scratch tests made with the British Air Ministry apparatus and the Dantuma apparatus (Dutch) were most satisfactory on practical groups and repeatability. Results using the Sward Rucker compare favorably with the scratch hardness methods but are highly dependent on condition of pencil points and pressure applied, which can vary with the operator. Results based on pencil hardness are good only for rough sorting tests, because much depends upon the operator. Results with the T.N.O. Sapphire Indenter (Dutch) show little or no correlation with other methods. For example: a scratch hardness of 2000 g. or higher was found to be equivalent to pencil hardness of 6H or higher, and 71-79 Sward Rucker values; and 1100-1400 g. scratch hardness values were associated with pencil hardness between B & 4H, and Sward Rucker values of 26-77. Results are affected by film thickness and the substrate. Steel or tinplate is most suitable for substrate, with the former preferable. Aluminum should not be used because of its softness and needle damage by alloying when films are penetrated. Both the Dantuma and Air Ministry apparatus employ a 1-mm. ball-point needle. The needle load is gradually increased and the highest load to which the film is resistant is measured. All films were from epoxy resins. The scratch test measures a combination of different properties of which hardness and adhesion are but two.

Sea water immersion trials for protection coatings. J. H. Greenblatt (Naval Res. Est., Dartmouth, Nova Scotia). *Corrosion* 10, 95-9(1954). Sea-water immersion trials of a variety of types of underwater compositions have shown that vinyl finishes can be used on cathodically protected hulls. Shipboard trials have substantiated this, provided that a controlled cathodic protection system is used and that the hull potential is in the vicinity of 840 mv. (*C. A.* 48, 5523)

Paper chromatography in the field of fats. XV. Examination of natural oils of importance in the surface-coating industry. N. P. Kaufmann, J. Budwig, and C. W. Schmidt (Univ. Münster, Ger.). *Fette u. Seifen*, 55, 85-9(1953). The paper chromatographic methods for separating and identifying fat acids and glycerides have been extended to include castor oil, soybean oil, linseed oil, china-wood oil, oiticica oil, 50% isomerized linseed oil, and dehydrated castor oil. (*C. A.* 48, 6141)

A field method for detecting mildew on paint. P. F. Klens, G. Leitner, and H. D. Snyder (Nuodex Products Co., Elizabeth, N. J.). *Am. Paint J.* 38, No. 39, 76(1954). Mildew stains can be bleached with sodium hypochlorite while ordinary "dirt" is usually not affected.

The position of synthetic resins in India. K. G. Kudva. *Paint-india Annual* 4, No. 1, 67(1954). A review.

Epikote resins. V. N. Luke (Burmah Shell). *Paintindia Annual* 4, No. 1, 79(1954). A review of epoxy resins.

Alkyd resins in the paint and varnish industry. C. Niehaus (Farbenfabriken Bayer A. G., Leverkusen). *Paintindia Annual* 4, No. 1, 73(1954). A review.

Coöperative investigation of drying-time determinations with the Atlas tack tester. H. K. Raaschou Nielsen. *F.A.T.I.P.E.C.* 1953, 128-33. Accurate and reproducible results were obtained using the Atlas tack tester when the apparatus was calibrated by counterbalancing it on a plate-glass panel with a 10-g. wt. instead of the 5-g. wt. specified by the originators of the method. This improvement was especially noticeable when slower-drying varnishes such as spar varnishes were tested. Clean plate-glass panels were rinsed with ether immediately before the varnishes were applied with a doctor type of applicator. After application the panels were placed on 4 nails with the varnished side downward until the films were dust-free. The panels were then turned varnished side up until the drying-time determinations were made. In this way it was possible to prepare varnish films which were practically free from dust particles. Tests were made in an air-conditioned room with temperature at $20 \pm 1^\circ$ and the humidity $60 \pm 2\%$. (*C. A.* 48, 5521)

Preparation of kamala fat and a quick drying paint oil from it. S. V. Puntambekar (Forest Research Institute, India). *Paint-india Annual* 4, No. 1, 85(1954). The seed comprises 29% of the dry kamala fruit. It contains 23% fat with a n_D^{20} of 1.5105 and an iodine value of 183. It air dries four times faster than tung oil.

Fundamentals of paint, varnish, and lacquer technology. Chapter XI. Interior architectural finishes (Part I). E. Singer. *Am. Paint J.* 38, No. 39, 88(1954). A discussion. No references.

Analysis of alkyd resins modified with vinyl chloride-acetate copolymer. M. H. Swann and G. G. Esposito (Paint and Chemical Laboratory, Aberdeen Proving Ground, Md.). *Anal. Chem.* 26, 1054(1954). The vehicle is dissolved in 0.125N alcoholic KOH and the precipitated vinyl copolymer is determined gravimetrically.

Some applications of statistical methods to exposure trials. Part II: Design of exposure tests. H. R. Touchin (Becks, Koller & Co., Ltd., Liverpool). *Oil & Colour Chemists' Assoc. J.* 27, 248(1954). Following a brief discussion of the types and sources of errors inherent in exposure trials, descriptions are given of some standard experimental designs, illustrating how the influence of these errors upon the experimental results may be minimized by their use. The basic designs considered are randomized block, factorial and split plot designs which are all amenable to statistical analysis. Some discussion on the number of replicate panels and the use of controls follows. The combining of data from experiments conducted at different times and at different exposure stations is briefly mentioned. Finally, the general advantages to be obtained by using these procedures are presented.

Mechanical examination of paint films in relation with their performance in practice. H. W. Talen (T. N. O., Rijswijk, Neth.). *F.A.T.I.P.E.C.* 1953, 53-83. Tensile tests on paint films stored indoors can be correlated with the results of exposure tests. (*C. A.* 48, 5517)

PATENTS

Ester-modified polyamide resin. W. B. Winkler (T. F. Washburn Co.). *U. S.* 2,663,649. A description is given for the preparation of vehicles with very pronounced thixotropic properties for paints, varnishes, etc. (*C. A.* 48, 5524)

Interpolymer of cyclodiolfin and an unsaturated ester. R. H. Jakob, R. W. Tess, and T. F. Bradley (Shell Development Co.). *U. S.* 2,667,463. Alkali-resistant film formers are produced by the interpolymerization of cyclopentadiene with drying-oil polyesters of glyceryl polyethers of bisphenol. (*C. A.* 48, 6714)

Process using activated silicate clay in styrene-alkyd reaction. F. Armitage. *U. S.* 2,676,159. A process for producing a styrene-oil copolymer which comprises heating together styrene and a castor oil modified alkyd in proportions substantially equivalent to the following: 875 parts of castor oil modified alkyd and 600 parts of styrene in the presence of 12 parts of Fuller's earth at a temperature from 130°C. to 170°C. for a period of about 1.5 hours.

Interpolymers of vinyl aromatic hydrocarbons and drying oils. H. Brunner (Imperial Chemical Industries, Ltd.). *Brit.* 698,621. Interpolymers are made by treating vinyl aromatic hydrocarbons and 0.1-10.0% by wt. of hydrocarbons of a polyhydric alcohol ester of a fatty acid of a drying oil or a partially oxidized or partially polymerized derivative of a drying oil. The reaction is catalyzed by halide of B. A solvent can be included in the reaction. The resulting product is soluble in white spirits, linseed oil, blown linseed oil, and linseed oil-modified alkyl resins (unthinned) and is used as a coating composition. (*C. A.* 48, 5524)

Mixed esters of phenolic resins. M. M. Renfrew (General Mills, Inc.). *U. S.* 2,676,158. A phenol-formaldehyde resin is claimed with 80% to 100% of the hydroxyl groups esterified by means of a mixture of unsaturated higher fatty acids containing from 8-18 carbon atoms and a benzoic acid selected from the group consisting of benzoic acid and hydrocarbon substituted benzoic acids, from 5% to 20% of the total esterified hydroxyl groups being esterified with a benzoic acid.

Interpolymer from lower alkyl ester of methacrylic acid, fatty acid ester of epoxy resin and ester of alpha, beta unsaturated dicarboxylic acid with Diels-Alder adduct of cyclopentadiene and allyl alcohol. H. Yuska, A. M. Tringali, and J. E. Hanle (Interchemical Corp. N. Y.). *U. S.* 2,677,671.

Polymers having a naphthalene-type nucleus and a plurality of terminal functional groups. C. G. Goebel. *U. S.* 2,678,324. As a composition of matter, the product of a Friedel-Crafts synthesis of naphthalene and chlorostearic acid is claimed wherein each mole of naphthalene is combined with two moles of chlorostearic acid.

Method of making glyceride-fumaric acid reaction products. O. J. Grummitt (Sherwin-Williams Co.). *U. S.* 2,678,934. A process is claimed for effecting the condensation of a member of the class consisting of fumaric acid, fumaric acid anhydride, esters of fumaric acid, half esters of fumaric acid, salts of fumaric acid, salt esters of fumaric acid and amides of fumaric acid with an aliphatic, non-conjugated, polyunsaturated fatty oil which comprises admixing the fumaric acid derivative with the polyunsaturated fatty oil, introducing from 0.1% to about 2% by weight of the mixture of a free halogen, and heating the reaction mass to a temperature of 175° to 300° until the reaction has occurred.

Varnish oils. C. W. A. Mundy and C. R. Malyan. *Brit.* 700,620. Raw linseed oil is converted to varnish oil (I) without refining or dehydrating by first treating with 25% or less cyclopentadiene (II) and heating at atmospheric pressure to 450°F. When this temperature is reached, unchanged II has been distilled off. Then the temperature is raised to 600°F. under an inert atmosphere to polymerize the adduct to I. (*C. A.* 48, 6143)

Varnish oils. C. W. A. Mundy and C. R. Malyan. *Brit.* 700,621. Low-acidity varnish oils (I) that do not react with basic pigments are prepared from alkali-refined linseed or other drying and semidrying oils (II) by heating II under reflux with 20-5% cyclopentadiene (III) with or without a catalyst e.g. Bz_2O_2 , to 450°F. When this temperature is reached, unchanged III has been distilled off. Then the temperature is raised under an inert atmosphere to 600°F. to polymerize the adduct to I. (*C. A.* 48, 6143)

Cyclopentadiene in the preparation of drying oils. C. W. A. Mundy and C. R. Malyan. *Brit.* 700,766. Compounds useful as stand oils (I) are produced by treating 1-400 parts cyclopentadiene (II) with 100 parts drying or semidrying oils (III) at $300\text{-}500^\circ\text{F.}$ II forms a gas phase and III a liquid phase at this reaction temperature, and the reaction is carried out in this manner. The reaction product is then heated to $450\text{-}600^\circ\text{F.}$ to yield I. (*C. A.* 48, 6143)

• Waxes

R. L. Broadhead, Abstractor

Current wax technology. L. Ivanovsky (Bridgend, Glamorgan, Wales). *Erdöl u. Kohle* 6, 787-91(1953). A supplementary survey by C. Zerbe, "Mineralole and verwandte Produkte" (*C. A.* 47, 4070) is presented. Additional information is given on the physics of wax, wax analysis, and the complex questions relative to the definition and classification of wax. (*C. A.* 48, 5482)

Spectrophotometric determination of cholesterol and triterpene alcohols in wool wax. F. E. Luddy, A. Turner, Jr., and J. T.

Scanlan (East. Reg. Res. Lab., Phila., Pa.). *Anal. Chem.* 25, 1497-9(1953). Previous colorimetric determinations of cholesterol and triterpene alcohols in wool wax have been modified in 2 ways. The addition of 1,4-dioxane to the reagent reduces the rate of color development and permits oxidation at room temperature. The substitution of a spectrophotometer and subsequent determination of the triterpenes at the secondary maximum at 550 μ and cholesterol at 630 μ permits the use of a single solution for both analyses. Also, corrections for overlapping absorption bands can be made in both cases. Three distinct methods are described; determination of cholesterol and triterpene alcohols in mixtures of free wool wax alcohols, determination of cholesterol and triterpene alcohols in unsaponified wool wax esters, and determination of cholesterol in wool wax. Correction. *Ibid.* 26, 491(1954). Corrected equations are given for calculating the results in the above determinations. (*C. A.* 48, 5530)

• Detergents

Lenore Petchaft, Abstractor

Relation of molecular structure to detergency of some alkylbenzene sulfonates. F. N. Baumgartner (Standard Oil Development Co., Linden, N. J.). *Ind. Eng. Chem.*, 46, 1349-52(1954). Laboratory washing tests have been conducted on an isomeric series of alkylbenzene sodium sulfonates in which the alkyl group consists of a 21-carbon straight chain. Detergent power reaches a maximum when the benzene ring is located on the third alkyl carbon atom. The critical micelle concentration increases as the benzene ring is moved toward the center of the alkyl chain. The effect of sodium sulfate on the detergency behavior of these compounds depends largely on their solubility behavior, and is most beneficial for the more soluble sulfonates. Detergency tests have also been conducted on two homologous series of alkylbenzene sodium sulfonates in which the benzene ring is located on the third and the fourth carbon atoms, respectively, of a linear alkyl chain. To a certain extent, the effect of molecular weight on detergent power is dependent on the hardness of water. A 12-carbon alkyl chain gives the best average performance, higher molecular weights being more sensitive to water hardness. In contrast with detergent ability, canvas disk wetting tests and measurements of surface tension indicate that wetting power and ability to lower surface tension are greater when the benzene ring is located at the center of the alkyl chain. No direct correlation was noted between measurements of these surface phenomena and detergency measurements.

Alkyl aryl sulfonate synthetic detergents. Anon. *Chem. Eng.* 61, 372-5(1954). A flowsheet of the operations involved in making a synthetic detergent from petroleum is illustrated. The basic step centers around the Friedel-Crafts reaction between benzene and propylene tetramer (dodecene) producing a crude alkyl aryl hydrocarbon. Purification, sulfonation, neutralization, crutching and drying complete the process.

New chromatographic method for identification of synthetic detergents. J. Blandin and R. Desalme (Lab. Chevreul, Paris-Bellevue). *Bull. mens. I.T.E.R.G.* 8, 69-73(1954). Chromatograms produced on strips of filter paper by dividing them in an aqueous solution containing together fluorescein, fuchsin, methylene blue and blue for silk 6B, show characteristic changes of color according to the detergent added to the solution. The succession of shades obtained with 20 different detergents is tabulated. (*C. A.* 48, 6146)

Absorption of detergent in the dyeing process. L. Flett and L. F. Hoyt (National Aniline Division, Allied Chemical & Dye Corp., New York). *Am. Dyestuff Repr.* 43, 335-8(1954). It is known that surface-active agents used for leveling dyestuffs tend to retard the dyeing process. This is explained by several theories, one of which assumes that there is a competition for particular positions with respect to the molecules which make up the fibers. Tests were run to determine quantitatively the amount of synthetic detergent adsorbed on wool at different stages in the dyeing process. Results of this preliminary work indicate that equilibrium is established in the dyeing process and that any effect of the detergent on the dyeing operation must be a result of this equilibrium condition.

Cellulose ethers soluble in water—manufacture, properties, and fields of utilization. Ingvar Jullander (Mooch Domsjo AB, Arnsköldsvik, Sweden). *Chimie & Industrie* 71, 288-99(1954). A comprehensive review of the synthesis, physical properties, and structures of the H₂O-soluble cellulose ethers, and their principal uses as ingredients of detergents and the like. (*C. A.* 48, 6688)

Classifying detergents. J. V. Karabinos, E. G. Kapella and G. E. Bartels (Blockson Chemical Co., Joliet, Ill.). *Soap Sanit. Chemicals* 30, No. 6, 41-3(1954). A series of six qualitative tests are described by which most of the commercial detergents of the anionic and nonionic types can be differentiated into various sub-groups. These tests are run with ceric nitrate, chloroform-aluminum chloride, bromine water, potassium permanganate, alcoholic potassium hydroxide, and acetic anhydride-sulfuric acid. A table of results using these reagents with the various detergents is included.

Surface-activity of potassium soaps of unsaturated acids. H. P. Kaufmann and M. L. Rackers (Univ. Munster, Westfalen, Ger.). *Fette u. Seifen* 55, 497-500(1953). By use of a Traube stalagmometer, the following values were obtained (soap, maximum lowering of surface tension in dynes/cm., optimum temp.): K stearate, 47.0, 69°; K elaidate, 47.0, 51.0°; K stearolate, 47.3, 46°; K behenate, 42.0, 84°; K erucate, 42.4, 54°; K brassidate, 43.2, 65°; K behenolate, 44.1, 55°. The results are discussed. There is a similarity between the optimum temperatures and the m.p.s. of the fat corresponding to the fatty acid moiety of the soaps. (*C. A.* 48, 6146)

Theory of detergency. L. M. Kushner (National Bureau of Standards, Washington, D. C.). *Soap, Sanit. Chemicals* 30, No. 5, 50-3, 195(1954). The outstanding research pertaining to increase in knowledge concerning mechanics involved in detergency is reviewed.

How to prepare and use radioactive soils. J. M. Lambert, J. H. Roecker (General Aniline & Film Corp., Easton, Pa.), J. Pescatore, G. Segura, Jr., and S. Stigman. *Nucleonics* 12, No. 2, 40-2(1954). A synthetic soil may be made radioactive by including a C¹⁴-labeled carbon black in its composition, by stirring it in a mixed fission products solution, and by irradiating a soil sample in a nuclear reactor. The first 2 types particularly were found to be of great usefulness in detergency studies. (*C. A.* 48, 6631)

Colorimetric determination of anionic detergents. F. J. Loomer (Univ. Groningen, Neth.). *Anal. Chim. Acta* 10, 147-50(1954). Many types of anionic detergents can be determined colorimetrically by means of their action on a protein-bromocresol purple complex; within certain limits, the amount of free dye liberated from the complex is proportional to the amount of detergent added. The accuracy of this method, about 4%, is not so good as that of methods based on rosaniline, but the protein-complex method is not restricted to long-chain alkyl sulfates, and it can be applied to many more anionic detergents than can the rosaniline methods. (*C. A.* 48, 6146)

PATENTS

Improved detergent compositions. Colgate-Palmolive-Peet Co. *Brit.* 704,021. Detergents with improved detergent properties are prepared by using as an additive for anionic sulfated or sulfonated detergents a higher alkyl substituted urea compound.

Improvements in detergent compositions. Lever Brothers & Unilever Ltd. *Brit.* 704,257. A detergent composition having a synergistic effect in detergency and lathering comprises between 10 and 20% of a mixture of an alkyl aryl sulfonate and an aliphatic amido alkylene sulfonate, and between 40 and 65% of alkali metal pyrophosphates and/or triphosphates, the remainder being supplemental builders and water.

Detergents. Sandoz Ltd. *Brit.* 704,288. Excellent detergents for washing wool comprise a water-soluble alkyl-benzene-sulfonate, at least one alkyl group having 9-18 carbon atoms; a water-soluble salt of an acidic sulfuric acid ester of a mono-alkyl-ether of an alkylene- or polyalkylene-glycol, whose alkyl radical has 10-22 carbon atoms and whose alkylene radical has 2-4 carbon atoms.

Improvements relating to detergent compositions and wetting agents. B. C. Newbury (Tecalemit Ltd.). *Brit.* 706,407. Free draining of detergents from surfaces washed is improved by the addition of non-ionic detergents.