ABSTRACTS **R. A. REINERS, Editor.** ABSTRACTORS: **J. G. Endres, J. Iavicoli, F. A. Kummerow, H. S. Liles, C. C. Litchfield, Louise R. Morrow, E. G. Perkins, and T. H. Smouse**

• Fats and Oils

Removal of interfering pigments in determining malonaldehyde by the 2-thiobarbituric acid reaction. T. C. Yu and Russell O. Sinnhuber (Dept. of Food and Dairy Tech., Oregon State Univ., Corvallis, Oregon). *Food Technology* 16, 115–17 (1962). Interfering yellow and orange colors with absorption maxima at 450–460 mμ are frequently observed when the 2-thiobarbituric acid (TBA) method for determining oxidative rancidity is applied to certain foods such as cereals and animal tissues. This results in erroneously high values at 532–535 mμ, the absorption maximum for the TBA-malonaldehyde pigment, because of the overlapping effects of the absorption spectra. The procedure described is an extension of the TBA method of Yu and Sinnhuber (1957) and permits the separation of the yellow interfering color from the red TBA pigment by two alternative methods. A formula may then be derived that permits calculation of a corrected TBA number. The correction factor may be used for future routine determinations on similar material, eliminating the need for purification of the TBA color. Application of this procedure to dried foods, precooked frozen tuna or turkey pies, liver, oysters, etc., is described.

Effect of preheater contamination on gas chromatographic analysis of strongly adsorbed substances. E. D. Smith and A. B. Gosnell (Graduate Inst. of Technology, Univ. of Arkansas, Little Rock, Ark.). *Anal. Chem.* 34, 646–48 (1962). The presence of carbonaceous deposits in the preheater section of a gas chromatographic apparatus may lead to serious complications in the gas chromatographic analysis of polar organic compounds. The main effects of such a deposit are low detector responses and false peaks. Work with fatty acids and amines has shown that these effects may sometimes be of such a magnitude as to invalidate either qualitative or quantitative analyses. These effects can be eliminated by rigorous cleaning of the preheater section, but they gradually return as the carbon deposit again builds up through thermal decomposition of the samples injected.

Proportional counter assay of tritium in gas chromatographic streams. J. K. Lee, E. K. C. Lee, B. Musgrave, Y. Tang, J. W. Root, and F. W. Rowland (Dept. of Chem., Univ. Kansas, Lawrence, Kan.). *Anal. Chem.* 34, 741–47 (1962). The assay of tritium by gas proportional counting of the effluent from a chromatographic column has many advantages. Aside from the precautions common to all gas chromatography practice, the critical point for accurate assay is maintaining constant efficiency of detection for tritium in various molecular forms. The variations in detection efficiency arise especially from coincidence losses at high count rates and from composition changes in the operating counter gas during the passage of a macroscopic peak. The behavior of helium-methane and helium-propane flow mixtures is discussed extensively.

Electron capture spectrometry, an adjunct to gas chromatography. Quantitative study of operating parameters and the qualitative and quantitative distinction between compounds containing the same heteroatom. R. A. Landowne and S. R. Lipsky (Dept. of Internal Med., Yale Univ. School of Med., New Haven, Conn.). *Anal. Chem.* 34, 726–30 (1962). The effect of changes in operating parameters on the sensitivity of the electron capture detector was determined quantitatively for *sec*-butyl bromide, a model monofunctional compound of moderate electron affinity. Using a constant direct current voltage as the source of applied potential, relatively high detector temperatures and low gas flows yielded optimum results. With a pulsed applied potential, low flows could not be used and higher detector temperatures only provided a slight increase in sensitivity. The nature of the pulse was not critical as long as the maximum standing current for the detector used was approached. In addition the sensitivities of isomeric butyl monohalides were determined at near optimum conditions. A comparison of all the data obtained showed that affinity for electrons was also dependent upon the hydrocarbon structure of the molecule in addition to the electronegativity of the heteroatom.

Silica gel structure and chromatographic process. Surface energy and activation procedures. P. D. Klein (Div. of Biol. and Med. Res., Argonne Nat'l Lab., Argonne, Ill.). *Anal. Chem.* 34, 733–36 (1962). The effect of deactivation and activation treatments on chromatographic performance has been studied in three silica gels of known structure. These gels are representative of three different body structures ranging from high surface area, small pore diameter to low surface area and large pore diameter. Chromatographic performance was evaluated by the ratio of elution volume to bandwidth of the adsorbate sample, cholesterol acetate; for each gel it was degraded by activation procedures to an extent which depended on the gel structure. Performance values and water contents of the treated absorbents illustrate the contributions of body structure to the chromatographic process. The basis of this contribution has been discussed in terms of the surface chemistry and local geometry of the silica surface.

Plate height theory of programmed temperature gas chromatography. J. C. Giddings (Dept. of Chem., Univ. of Utah, Salt Lake City, Utah). *Anal. Chem.* 34, 722–25 (1962). It is the purpose of this work to expand the theory of programmed temperature gas chromatography, particularly in relationship to the spreading of peaks as measured by the plate height. The significance of the plate height in programmed temperature operations is examined and is shown to agree with the developments of Habgood and Harris. The close relationship of this with the plate height in isothermal chromatography is discussed. Two phenomena which are unique to the programmed methods are treated theoretically. First is the zone compression at the head of the column which is a result of temperature being initially low, followed by continual heating. Second is the effect of thermal lag which is responsible for a higher zone velocity at the wall than at the center of the column. This effect is treated in terms of the nonequilibrium theory which has been developed for various plate height calculations in chromatography.

Rigid urethane foams derived from crude tall oil. P. G. Gemeinhardt, W. C. Darr, and J. H. Saunders (Mobay Chem. Co., New Martinsville, W. Va.). *I&EC Product Res. and Dev.*, 1, 92–96 (1962). Rigid urethane foams have been prepared from crude diphenylmethane diisocyanate and resin blends containing up to 75% of crude tall oil. These foams have properties close to those obtained from the more familiar rigid foams derived from tolylene diisocyanate and polyethers, but are significantly cheaper. Some variations have been encountered with regard to the closed cell content and shrinkage, which must be overcome before the system is suitable for commercial foaming. Research designed to correct these deficiencies is under way.

Thin layer chromatography in the field of fats. VII. Separation of fatty acids and triglycerides on gypsum plates. H. P. Kaufmann and T. H. Khoe (Deut. Inst. Fettforsch., Münster). *Fette Seifen Anstrichmittel* 64, 81–85 (1962). The preparation of washable thin layer chromatographic plates out of gypsum has been described. By making use of these plates, the chemical reactions and coloring methods employed in paper chromatography may be used. The present paper reports on the use of hydrogenation and bromination reactions to separate and determine critical pairs of fatty acids.

Complexometric estimation of antioxidants. IV. B. A. J. Sedlacek (Inst. Ernaksunpforschung, Prague). *Fette Seifen Anstrichmittel* 63, 1053–56 (1961). A complexometric method, described previously [*Fette Seifen Anstrichmittel* 62, 669 (1960)] which is dependent upon the reduction of silver ion has been modified for the semimicro determination of butylhydroxytoluol, ascorbylpalmitate, and some water insoluble modified gallates. The method has been carried out with success with antioxidants from lard.

The autoxidation of saturated fatty acids. II. Reaction products of autoxidation. H. Thaler and W. Saumweber (Deut. Forschungsanstalt Lebensmittelchemie, Munich). *Fette Seifen Anstrichmittel* 63, 1045–49 (1961). The autoxidation of lauric and stearic acids and their methyl esters, carried out in the absence of catalysts and at 150C, produced aldehydes and aliphatic and mono- and dicarboxylic acids along with other reaction products. Paper chromatographic analysis of the oxidation products indicates that these compounds are formed in a continuous homologous series. Evidence is presented which supports the theory of simultaneous random attack of oxygen on the hydrocarbon chain of fatty acids or esters.

RADIOASSAY OF LOW ACTIVITY FRACTIONS ENCOUNTERED IN GAS LIQUID CHROMATOGRAPHY OF LONG CHAIN FATTY ACIDS. H. Meinertz and V. P. Dole (Rockefeller Inst., 66th St. and York Ave., New York 21, N. Y.). *J. Lipid Research* 3, 140–144 (1962). A method is described for the collection and assay of low activity fractions of long chain fatty acids. Effluent vapors are trapped in a glass column attached to the outlet of the gas chromatograph detector system. In order to ensure more efficient collection of material a loose cotton plug, damp with toluene is packed into the end of the glass tube. In order to assay the radio activity the tubes are eluted into a scintillator and the samples are assayed in a liquid scintillation counter.

ISOLATION OF POLAR LIPIDS FROM TRIGLYCERIDE MIXTURES. D. S. Galanos and V. M. Kapoulas (Laboratory of Food Chemistry, Nat'l Univ. of Athens, Athens, Greece). *J. Lipid Research* 3, 134–136 (1962). A method for the isolation of polar lipids from egg yolk and milk employing countercurrent distribution is described. A binary solvent system consisting of equal volumes of petroleum ether and 87% ethanol is employed. The sample used is first dehydrated and washed with acetone. This residue is extracted with chloroform-methanol mixtures to extract any lipids present. The solvent-free lipid extract is then fractionated by a batch type countercurrent distribution system.

COLLECTION OF GAS LIQUID CHROMATOGRAPHIC EFFLUENTS. Amiya K. Hajra and N. S. Radin (Mental Health Res. Inst., Univ. Mich., Ann Arbor, Mich.). *J. Lipid Research* 3, 131–134 (1962). A device for the collection in a quantitative manner of gas chromatographic effluents is described and consists of a Millipore filter (13 mm diam., 0.8 μ pore size) held in a Swinny hypodermic adapter; modified for attachment to the exit gasket of the chromatograph.

THE ULTRAMICRO DETECTION OF LIPIDS. W. E. M. Lands and Carolyn S. Dean (Dept. of Biol. Chem., Univ. Mich., Ann Arbor, Mich.). *J. Lipid Research* 3, 129–130 (1962). A method for the ultra-micro detection of lipids is described. The relative amounts of lipid in fractions can be observed by drying 0.05 to 0.10 ml aliquots of the lipid solutions on standard photographic ferrotype plates. In this way the material is quickly estimated. The spots are observed in light reflected at an angle of about 60° from the surface of the plate. Amounts varying from 1 to 100 μ g can be detected.

CATALYTIC HYDROGENATION OF FATTY ACID METHYL ESTERS FOR GAS LIQUID CHROMATOGRAPHY. R. Poukka, L. Vasenius, and O. Tropienen (Dept. Physiol. and Biochem., Coll. of Vet. Med., Helsinki, Finland). *J. Lipid Research* 3, 128–129 (1962). The hydrogenation of fatty acid methyl esters in ethanol yields a mixture in the final product of both the methyl and ethyl esters as a result of transesterification which occurred during the reduction. This can be avoided if the esters are hydrogenated in methanol.

STATISTICAL EVALUATION OF THE BOEMER NUMBER OF LARD. J. B. Roos (Reichsuntersuchaanstalt; Molec-prod. and Nuhrungsfette; Leiden, Niederland). *Fette Seifen Anstrichmittel* 64, 6–12 (1962). The removal of ether insoluble glycerides was shown to be of great influence on the melting point of the glycerides of tallow or hardened fat. This can be used for the detection of these fats in lard. Analytical results presented indicated that the Boemer number gives a sensitive index for the detection of tallow in lard.

INVESTIGATIONS ON THE BOEMER VALUE AND A COMPARISON OF THE ETHER AND ACETONE METHODS. F. D. Tollenaar, H. van Gend, and H. Hockman (Zentralinst. Ernährungsforsch., T.N.O., Utrecht). *Fette Seifen Anstrichmittel* 64, 303–308 (1962). The adulteration of fats with pig fat can be detected in many cases with the aid of the Boemer value. The three methods for its determination: the D.G.F.-ether method, the R.Z.S.-ether method, and the AOCS-acetone procedure (Cb 5-40) were compared. All of the methods gave comparable results.

THIN LAYER CHROMATOGRAPHY IN THE FIELD OF FATS. VI. HYDROGENATION AND BROMINATION ON THE PLATE. H. P. Kaufmann, Z. Makus, and T. H. Khoe (Deut. Inst.-Fettforsch., Münster). *Fette Seifen Anstrichmittel* 64, 1–5 (1962). Hydrogenation and bromination employing palladium as catalyst, deposited on the plate, and bromine in the mobile phase are carried out directly on the thin layer chromatographic plates. With the aid of these methods critical pairs of fatty acids were separated and identified. Chromatography of brominated derivatives of triglycerides leads to improved separations.

QUANTITATIVE ESTIMATION OF LECITHIN AND COLAMCEPHALIN IN PHARMACEUTICAL PREPARATIONS USING THIN LAYER CHRO-

MATOGRAPHY. H. Wagner (Inst. Pharm. Argeneimittl., Univ. Munich). *Fette Seifen Anstrichmittel* **63**, 1119–1123 (1961). A procedure for the separation and estimation of lecithin and colamincephalin in different commercial phosphatide extracts based on thin layer chromatography on silica gel is described. The method was applied to phosphatide extracts from soybean oil, egg yolk, heart muscle, and cerelnim. Solvent systems employed were composed of chloroform-methanol-water (65:25:4), and the reagents used to visualize the spots were ninhydrin and ammonium molybdate-perchloric acid.

EICOSAPENTAENOIC- AND DOCOSAHEXAENOIC ACID IN CUTTLEFISH OIL. Y. Toyama and T. Takagi (Dept. Applied Chemistry, Nagoya Univ., Nagoya, Japan). *Fette Seifen Anstrichmittel* **64**, 134–137 (1962). Eicosapentaenoic and docosahexaenoic acid was isolated from cuttlefish oil by separation of the polyenoic acids from the total fatty acids by using urea-complexing and fractional distillation of the polyenoic acid methyl esters. The concentrates containing C_{20} and C_{22} polyeneoic acids were further purified by chromatographic methods. Degradation of the purified fractions by ozonolysis and and identification of the products show that the acids are of the following structures: 5,8,11,14,17-eicosapentaenoic and 4,7,10,13,16,19-docosahexaenoic acid.

EICOSAPENTAENOIC-DOCOSAPENTAENOIC- AND DOCOSAHEXAENOIC ACIDS IN FINBACK WHALE OIL. *Ibid.* **62**, 137–141 (1962). The above mentioned polyenoic acids from finback whale oil were isolated by means of column chromatography and urea complexing methods. By means of oxidative and reductive ozonolysis three acids were identified: 5,8,11,14,17-eicosapentaenoic, 7,10,13,16,19-docosapentaenoic, and 4,7,10,13,16,19-docosahexaenoic acids.

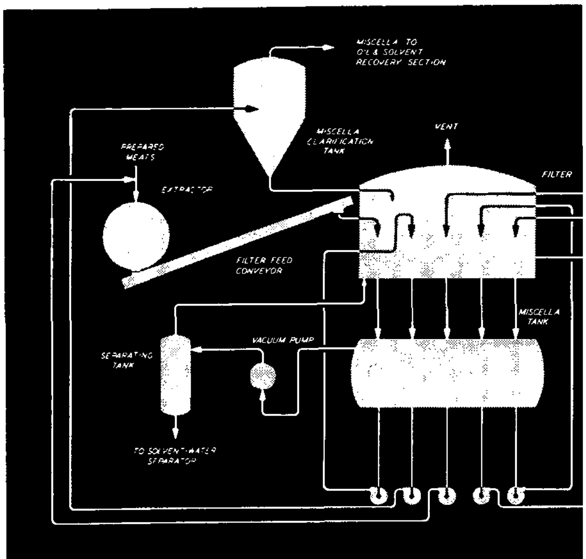
INVESTIGATIONS ON THE DETECTION OF EMULSIFIERS IN MARGARINE. E. Kröller (Pettenkofer Inst., Berlin). *Fette Seifen Anstrichmittel* **64**, 85–92 (1962). The structure of two emulsifiers isolated from margarine and determined paper chromatographically is described. The emulsifiers determined were a) the Diels-Alder reaction product of maleic anhydride and isomerized soybean oil which had been esterified with stearyl alcohol. b) The reaction product maleic anhydride with castor oil triglycerides. Physical and chemical properties of these emulsifiers were determined as were the appropriate I. R. and U. V. spectrophotometric data.

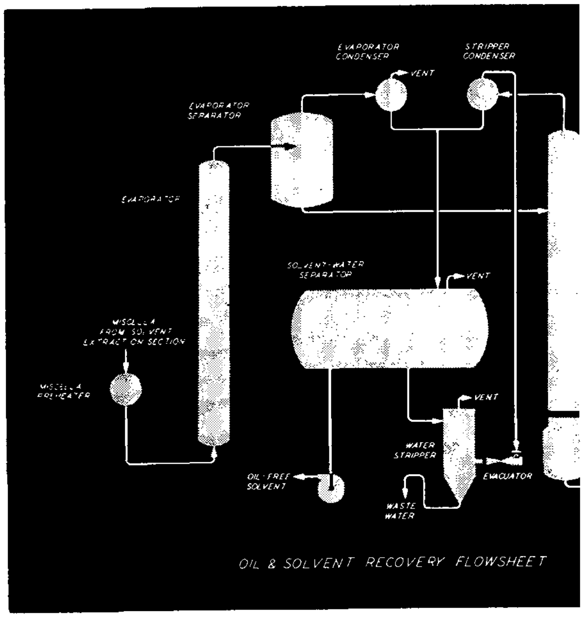
AUTOOXIDATION EXPERIMENTS ON MODEL SUBSTANCES AND THE AUTOOXIDATION OF FATS. A. Rieche, M. Schulz, H. E. Seyfarth, and G. Gottschalls (Inst. Techn. Chem., Univ. Jena). *Fette Seifen Anstrichmittel* **64**, 198–205 (1962). Autoxidation of simple model substances was studied to determine the dependence of the oxidation on the substituents at the active CH-bonding of the molecules under examination. Substrates studied were oleic, elaidic, erucic, brassidic, linoleic, linolenic and ricinoleic acids. The antioxidants employed were various alkyl substituted derivatives of isochromans (methyl, ethyl, n-propyl, isopropyl, and cyclohexyl). Variations of the fatty acids were studied by producing vinylated derivatives and lactones.

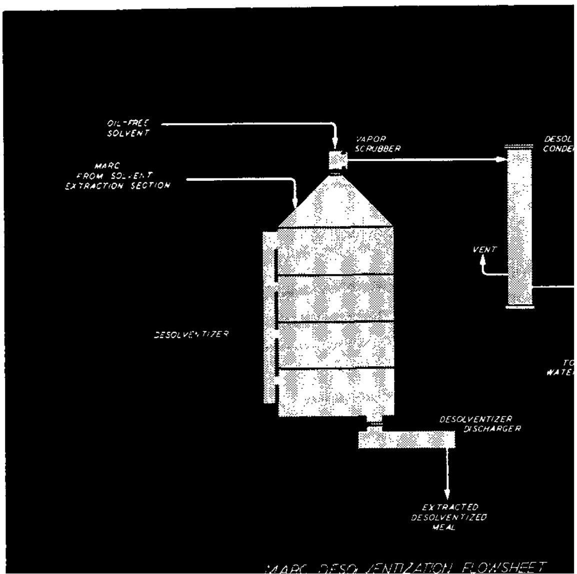
LIPIDS OF COFFEE SEEDS. I. FATTY ACID ESTERS OF CAFESTOL. H. P. Kaufmann and R. S. Hamsago (Deut. Inst. Fettforsch., Münster). *Fette Seifen Anstrichmittel* **64**, 206–213 (1962). The constituents of the oil extracted from coffee seeds—glycerides, diterpenes, phytosterols, and phosphatides—were identified and quantitatively estimated by chromatography. Cafestol occurs in the form of fatty acid esters and there were synthesized for comparison. The fatty acid composition of coffee oil, the triglycerides and diterpene esters are respectively: linoleic 39.0, 41.0, 20.5; oleic 17.2, 18.0, 11.0; palmitic 25.3, 23.5, 42.5; stearic 13.1, 12.5, 17.5; arachidic 4.2, 5.0, 6.0; and behenic 1.0, trace, 2.5 (in percent).

THIN LAYER CHROMATOGRAPHY OF FATS. VIII. TRIGLYCERIDES AND THEIR CRITICAL PARTNERS. H. P. Kaufmann and B. Das (Deut. Inst. Fettforsch; Münster). *Fette Seifen Anstrichmittel* **64**, 214–217 (1962). The thin layer chromatographic separation of critical partners of synthetic and natural triglycerides. Glycerides were separated using plates coated with Kieselgur G impregnated with a high boiling (240C) petroleum fraction. The developing solvent employed was acetone: acetonitrile (8:2), and the spots were visualized with phosphomolybdic acid. Several natural oils, including soybean, corn, and cottonseed were successfully chromatographed.

PRO- AND ANTIOXIDANTS OF FATS: NATURALLY OCCURRING ANTIOXIDANTS. H. P. Kaufmann, H. Garloff, and K. G. Vekundi (Deut. Inst. Fettforsch., Münster). *Fette Seifen Anstrichmittel* **64**, 309–318 (1962). The author has shown that the relative antioxidative activity of tocopherols is dependent on







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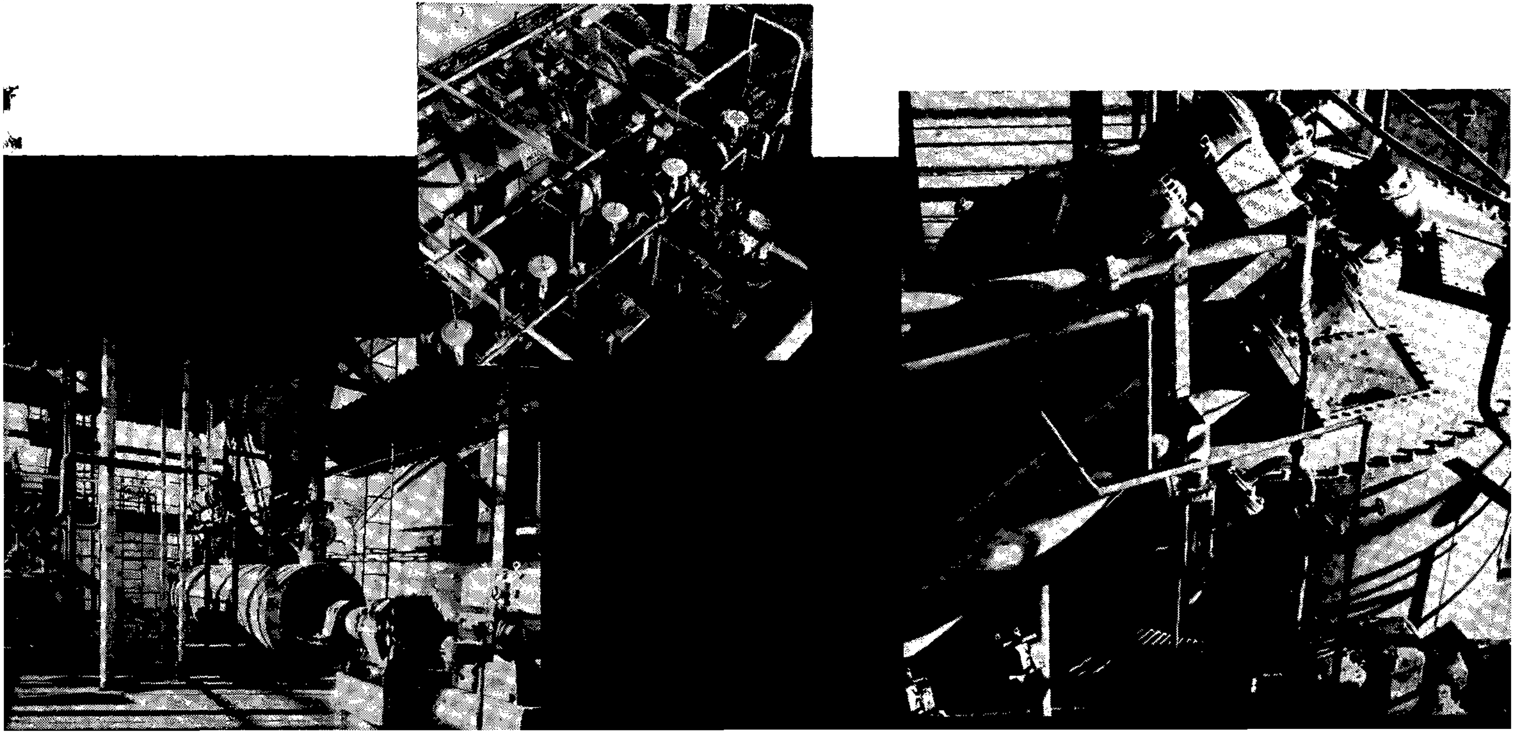


several factors: substrate, temperature, and concentration. Several studies were carried out using linoleate as the substrate and studying the effects of cytochrome C, hemoglobin, and tritriplex III, on the absorption of oxygen with different levels of added tocopherols.

DETERMINATION OF THE HYDROXYL VALUE OF FREE FATTY ACIDS. H. P. Kaufmann and E. Schmülling (Deut. Inst. Fettforsch., Munster). *Fette Seifen Anstrichmittel* **64**, 319–321 (1962). The authors report a modification of the method of Kaufmann and Funke, using acetyl chloride and pyridine for the determination of free hydroxyl groups in free acids. The method was employed on the following compounds and gave results in agreement with those expected: Ricinelaidic acid, 12-hydroxy stearic acid, 9,10-dihydroxy stearic acid, stearyl alcohol, monostearine, cholesterol, castor oil, and glycerol.

METHOD FOR THE DETERMINATION OF DIMERIC ACIDS IN OILS AND FATS. H. E. Rost (Margarine-Union, Hamburg). *Fette Seifen Anstrichmittel* **64**, 427–433 (1962). A new method for the determination of small quantities of polymeric materials in fats and oils is reported. The polymeric materials are estimated as dimeric acids, after concentration from the total acids and glycerides with urea. The dimeric acids are detected paper chromatographically in the range of 0.01 to 1%. The paper used was impregnated with 10% of a high boiling petroleum fraction (190C). The chromatograms were developed in 90% acetic acid, and the spots visualized with the aid of copper acetate-sodium diethyldithiocarbamate solutions.

ANTIOXIDANTS IN FATS AND OILS. MECHANISM OF ACTION AND THEIR EVENTUAL PHYSIOLOGICAL ROLE. P. Brun (Dir. Lab. Inst. of Hygiene, France). *Rev. Franc. Corps Gras* **9**, 192–201 (1962). The author describes the types of antioxidants as used in France. Of the synthetic types, BHA and BHT are generally used. The author then discusses the metabolism of the usual synthetic antioxidants.

THE COLOR OF SOLID FATTY MATERIALS. M. Naudet, E. Sambuc, and S. Biasini (Lab. Nat. of Fatty Materials, Marseille, France). *Rev. Franc. Corps Gras* **9**, 202–12 (1962). The authors briefly discuss the fundamental theory of diffuse reflection and the principle of measuring the color of solid objects. It was shown that the rapid spectrophotometric method for the measurement of color by transmission is applicable to the measurement of color by diffuse reflection. The apparatus consists of a light source, condenser, filter, mirror, and cell. The light is projected on the solid object to be examined at a 45° angle. The light reflected from the object falls at a 90° angle on the cell. The applicability of the apparatus and a comparison of the results is discussed.

ANALYSIS BY A GALVANTIC OSMOPHILE OF THE VOLATILE COMPONENTS OF FATTY MATERIALS. A. Berton (Dir. Res. of C.N.R.S.). *Rev. Franc. Corps Gras* **9**, 187–92 (1962). The author describes a new type apparatus which he has called an "Osmophile." The apparatus consists essentially of a metallic grid simultaneously in contact with the vapor to be analyzed and an electrolyte. The type of electrolyte is chosen so that polarization of the electrolyte will occur when the analyzable components of the vapor come in contact with it. A galvanometer is used to measure the polarization or ionization. The apparatus has been used to measure the presence of fatty acids, aldehydes, and ketones in oxidized oils.

THE COLORIMETRIC DETERMINATION OF LONG-CHAIN FATTY ACIDS IN THE 0.05–0.5 μMOLE RANGE. W. G. Duncombe (Wellcome Res. Labs., Beckenham, Kent). *Biochem. J.* **83**, 6P (1962). A copper nitrate-triethanolamine reagent is shaken with a chloroform solution of the free fatty acids. To a portion of this solution is added 0.1 of its volume of sodium diethyldithiocarbamate (0.1%, w/v, in butanol). After mixing the extinction is measured at 440 mμ in a 1 cm cell against a blank of pure chloroform that has been treated like the fatty acid solutions. A plot of extinction vs. molar concentration for various long-chain acids (undecanoic, myristic, palmitic, stearic, elaidic) gives points lying on a single curve which deviates slightly from linearity. Results are sufficiently reproducible for the curve to be used as a calibration when measuring unknown solution. An extinction of about 0.4 is obtained from a sample of 0.2 μmole of fatty acid in 5 ml of chloroform.

OPHTHALMIC COMPOSITION. C. L. Anderson. *U. S. 3,035,971.* The described nonaqueous composition consists of diethyl ether, camphor gum and linseed oil.

CHEWABLE FATTY COATING OF IRON PARTICLES. L. E. Stoyle, Jr., P. A. Ouellette, and E. J. Hanus (Merck & Co., Inc.). *U. S. 3,035,985.* The described coating is a pharmaceutically and medically acceptable fatty composition having a melting point of at least 45C, being a mixture of saturated fatty acids having from 14 to 18 carbon atoms. The preparation is palatable when chewed.

PROCESS FOR BLEACHING OFF-COLOR COTTONSEED OILS. W. A. Pons, Jr., J. C. Kuck, and V. L. Frampton (Sec'y of Agr., U.S.A.). *U. S. 3,036,102.* The oil is treated at a temperature of about 225C with activated alumina comminuted to pass a 400-mesh screen and containing at least 10% by weight of moisture.

CHEWABLE, PALATABLE VITAMIN B PREPARATIONS. L. E. Stoyle, Jr., P. A. Ouellette, and E. J. Hanus (Merck & Co.). *U. S. 3,037,911.* The described composition consists of an unpleasant tasting, water-soluble vitamin selected from the group consisting of vitamins of the B family, niacinamide and water-soluble derivatives thereof and, as a coating, a pharmaceutically and medically acceptable fatty composition. The coating should have a melting point of at least 45C and should be a mixture of saturated fatty acids having from 14 to 18 carbon atoms.

• Fatty Acid Derivatives

INFRARED DETERMINATION OF ALDEHYDES. AN IMPROVED GROUP TYPE ANALYSIS. E. L. Saier, L. R. Cousins, and M. R. Basila (Gulf Res. & Dev. Co., Pittsburgh 30, Pa.). *Anal. Chem.* **34**, 824–26 (1962). An improved infrared procedure is described for the group type analyses of aldehydes. These analyses are based upon the integrated absorptivity of the aldehydic C–H stretching vibration. The application to both aromatic and aliphatic aldehydes is discussed.

METHOD OF INCREASING THE WATER VAPOR POROSITY OF FAT MATERIALS. G. Weitzel (Wickhen Products, Inc.). *U. S. 3,035,987.* A method of increasing the water vapor porosity of a fat component in a cosmetic product involves combining with the fat 1 to 10% by weight of an alkyl branched aliphatic compound. The branched chain compound may be a monohydroxy alcohol or an acid having from 5 to 20 carbon atoms in the open chain and having at least one alkyl branch chain containing less than 3 carbons with the branch chain spaced at least one carbon from the end carbon atoms in the open chain, or a straight chain ester of such alcohols and acids.

GREASE COMPOSITIONS CONTAINING SOAPS OF ALKOXY AND ALKYL MERCAPTO HYDROXY FATTY ACIDS. A. J. Morway and J. H. Bartlett (Esso Research and Engineering Co.). *U. S. 3,036,970.* A lubricating grease composition consists of (1) a major amount of a lubricating oil; (2) 3–15% of a metal salt of a C_2 to C_{30} fatty acid; and (3) 0.5 to 15 wt %, based on the weight of the total composition of a metal soap of an alkyl mercapto hydroxy fatty acid.

FOAMED POLYURETHANE POLYMER AND MAKING SAME. H. Elkin (Thiokol Chemical Corp.). *U. S. 3,037,947.* A method of making a high modulus polymeric foam consists of reacting a hydroxyl group-containing mixture of 700–1000 parts by weight of castor oil, 150–250 parts of a polyol monoricinoleate (such as propylene glycol or glyceryl monoricinoleate), 60–100 parts of trimethylol propane, and 575–700 parts of a polyethylene glycol having an average molecular weight of about 200, with an aromatic diisocyanate to form a pre-polymer having reactive isocyanato groups. The pre-polymer is concurrently foamed and cross-linked by the addition of water and an amine catalyst.

• Biology and Nutrition

FATTY ACID COMPOSITION OF THE PHOSPHOLIPIDS AND OTHER LIPIDS IN MILK. L. M. Smith and R. R. Lowry (Dept. of Food Sci. and Tech., Univ. of Calif., Davis). *J. Dairy Sci.* **45**, 581–88 (1962). Milk lipids were separated by silicic acid chromatography and identified by infrared spectrometry and paper chromatography. In agreement with our previous results, the major phospholipids were phosphatidyl cholines (PC), phosphatidyl ethanolamines (PE), and sphingomyelins, but cerebrosides, phosphatidyl serines (PS), and phosphatidyl inositols were also present. The various lipids showed marked differences in fatty acid composition as determined by gas-liquid chromatography. Mole percentages of saturated fatty acids were higher from the cerebrosides and sphingomyelins (86 and 87) than from the triglycerides (72), the PC (43), PS (32), and PE (24). Triglycerides contained less of the higher-molecular-weight even and odd C_{20} to C_{24} acids. No appreciable amounts of acids below C_{10} were found in the phospholipids, but traces were present in the cerebrosides. The principal saturated acid was stearic in PE and PS, and palmitic in the other lipids. Since the unsaturated fatty acids of PE, PS, and PC amounted to over 50% of the total acids, they must occur at both the α- and β-positions of the glycerol moiety of these phospholipids.

Depletion and synthesis of fatty acids in chickens fed a diet low in unsaturated fatty acids. L. J. Machlin (Lab. of Biochem. and Nutrition, Monsanto Chem. Co., St. Louis, Mo.). *Proc. Soc. Exp. Biol. Med.* **108**, 819–23 (1961). The proportion of linoleic and arachidonic acid in liver and heart tissue of chickens fed fat-free diets decreased to near minimal values within the first 2 weeks after hatching. Addition of linoleic acid to a fat-free diet at 7 days of age resulted in a significant increase of both linoleic and arachidonic acid in the liver of chicks fed the supplement within 4 days. Chickens fed a diet free of unsaturated fatty acids from 1 to 28 days of age synthesized over 24 g of fatty acids. This consisted mainly of palmitate, palmitoleate, and oleate. During the same period the linoleate and arachidonate content of the entire body decreased, resulting in a reduction in the percent of these acids to less than 1/16 of that originally present in the newly-hatched chick.

Effect of dietary epoxyoleic acid upon rats. A. Chalvardjian, L. J. Morris, and R. T. Holman (Hormel Institute, Univ. of Minnesota). *J. Nutrition* **76**, 52–58 (1962). In a preliminary experiment *Vernonia* oil containing 69% epoxyoleic acid was fed to adult rats as 10% of the diet. After 10 days two rats were killed and the lipids extracted from the viscera minus the gastrointestinal tract. The fatty acids of the lipids therein were converted to methyl esters and examined for epoxy acid content by thin-layer chromatography and near-infrared spectrophotometry. Epoxy acids were observed to be present. Administration of *Vernonia* oil in the diet of rats showed no adverse effect upon gross or microscopic anatomy of the animals. Thus, it is not toxic in the level fed (7% of the diet) for the period of 28 days.

Rapid detection of traces of peroxide in ethers. P. R. Dugan (Microbiol. and Biochem. Center, Syracuse Univ. Res. Corp., Syracuse, N. Y.). *Anal. Chem.* **33**, 1630–31 (1961). A method for detecting microgram quantities of peroxide in diethyl ether, isopropyl ether, dioxane, and tetrahydrofuran is described. A deep red-blue color is developed when an aqueous methanol solution of N,N-dimethyl-p-phenylenediamine sulfate is added to an ether containing solvent.

Gas chromatographic analysis of fatty acids from dialysed lipoproteins. A. V. Nichols, C. S. Rehnborg, and F. T. Lindgen (Lawrence Radiation Lab., Univ. of California, Berkeley, Calif.). *J. Lipid Research* **2**, 203–207 (1961). Dialysis of three major lipoprotein fractions from human serum, S_f 20–10^5, S_f 0–20, and $S_{1.20}$ 0–16, against low concentrations of cupric ion is associated with accelerated chemical alteration of polyunsaturated fatty acids and cholesterol. Less extensive changes in these acids were observed during dialysis against ion free water. Reaction products of these chemical alterations were irreversibly retained on succinic acid diethylene glycol polyester gas chromatographic columns. Present evidence suggests that these reaction products are relatively polar compounds, probably in the class of lipoperoxides.

The biochemistry of plasmalogens. I. Isolation and characterization of phosphatidal choline, a pure native plasmalogen. E. Gottfried and M. Rapport (Albert Einstein College of Med., Yeshiva Univ., and the Bronx Municipal Hosp. Center, N. Y. 61, N. Y.). *J. Biol. Chem.* **237**, 329–333 (1962). A method for the preparation of a pure native plasmalogen, phosphatidal choline, has been developed, based on the selective hydrolysis of the phosphatidyl choline component of beef heart lecithin by *Crotalus atrox* venom. Chemical and physical properties of the plasmalogen molecule are described. Kinetic studies with pure substrates show that both cobra *(N. naja)* and rattlesnake *(C. atrox)* venom hydrolyze phosphatidal choline. With rattlesnake venom, the hydrolysis rate of phosphatidyl choline is much more rapid than that of the plasmalogen, whereas with cobra venom, the difference in rates is small.

Liver necrosis in adult and young rats fed a protein-free diet deficient in vitamin E and the effects of certain supplements and of inanition. Marianne Goettsch (Dept. of Biochem. and Nutrition, Univ. of Puerto Rico, School of Med., San Juan, Puerto Rico). *J. Nutrition* **76**, 30–4 (1962). Dietary protein is not essential for the induction of necrotic liver degeneration in the vitamin E-deficient rat. With a protein-free diet, low in vitamin E, hepatic necrosis and muscular dystrophy appear rapidly not only in young rats, but also in adults that have been protected during the early growth period with cystine or methionine supplements added to low-protein diets, or with increased dietary protein. Addition of supplements to the protein-free diet had the following effects: Alpha-tocopherol prevents the liver and muscle lesions; selenium prevents the liver, but not the muscle lesions; L-cystine and DL-methionine have little or no protective action against liver or muscle lesions; liver necrosis and muscular dystrophy do not occur in young fasting rats that are deficient in vitamin E.

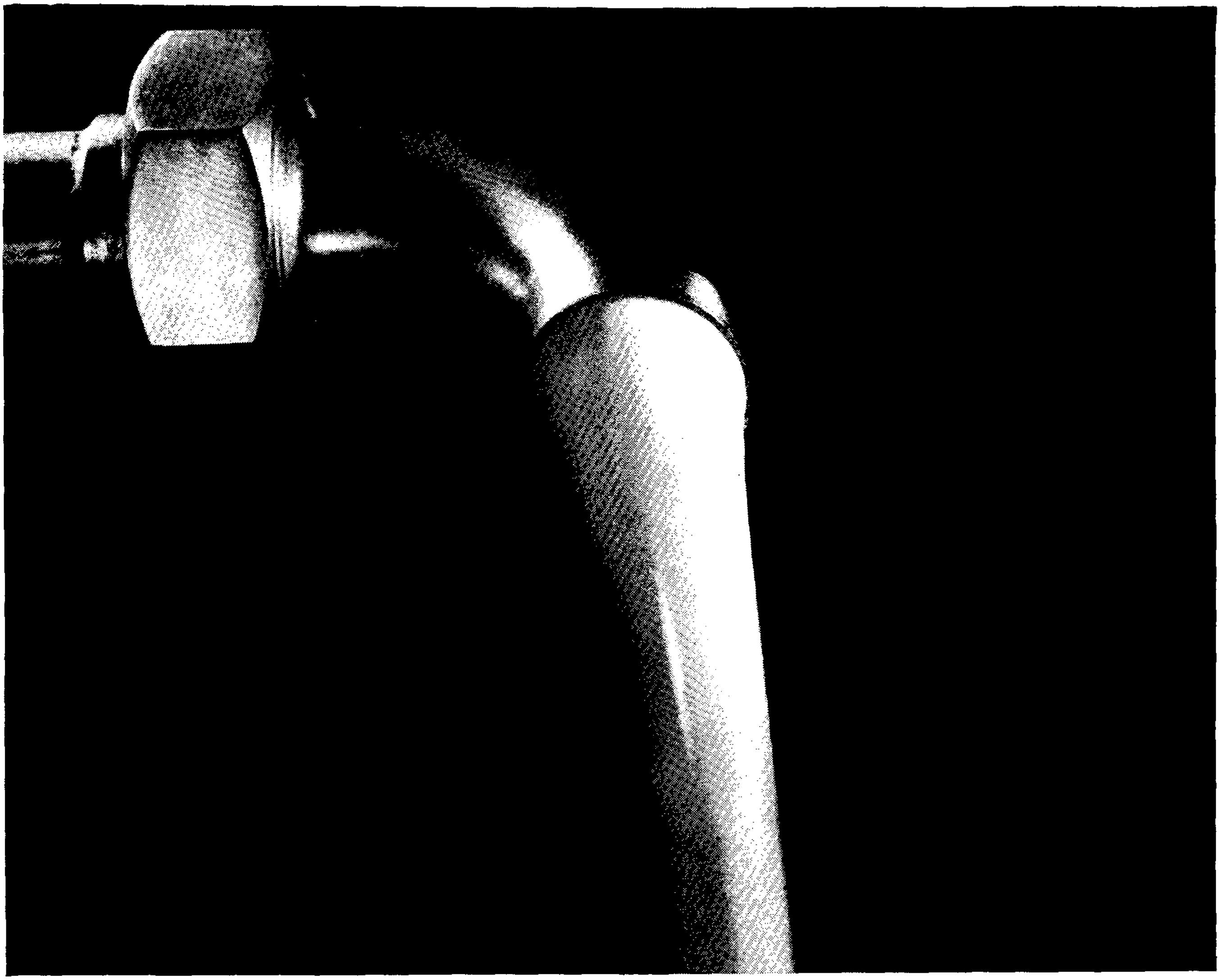
Studies on the mechanism of fatty acid synthesis. XI. The product of the reaction and the role of sulfhydryl groups in the synthesis of fatty acids. R. Bressler and S. J. Wakil (Dept. of Med. and Biochem., Duke Univ. Med. Center, Durham, N. Carolina). *J. Biol. Chem.* **237**, 1441–47 (1962). Fatty acid synthesis by a highly purified preparation from pigeon liver is stimulated by sulfhydryl agents and inhibited by sulfhydryl-binding agents and arsenite. Acetyl coenzyme A (CoA) protects against the inhibition of fatty acid synthesis by sulfhydryl-binding agents, and in this capacity it may be partially substituted for a propionyl-CoA and to a lesser extent, by butyryl-CoA. The final product of fatty acid synthesis has been shown to be free palmitic acid and not palmityl-CoA. The product of the condensation of acetyl-CoA and malonyl-CoA in the absence of reduced triphospyridine nucleotide has been discussed. A mechanism of fatty acid synthesis is proposed and discussed.

Phosphatidylthreonines. I. Synthesis of distearoyl-L-α-glycerylphosphoryl-L-threonine. E. Baer and F. Eckstein (Banting and Best Dept. of Med. Res., Univ. of Toronto, Toronto 5, Ontario, Canada). *J. Biol. Chem.* **237**, 1449–53 (1962). The first synthesis of a member of the recently discovered class of naturally occurring phospholipids containing threonine is reported. The synthetic phospholipid with the structure and configuration of natural phospholipids, namely distearoyl-L-α-glycerylphosphoryl-L-threonine, was obtained by phosphorylation of D-α,β-distearin with phosphorus oxychloride and quinoline, esterification of the distearoyl-L-α-glycerophosphoric acid dichloride with N-carbobenzoxy-L-threonine benzyl ester in the presence of pyridine, and subsequent removal of both protective benzyl groups of the distearoyl-L-α-glycerylphosphoryl-N-carbobenzoxy-L-threonine benzyl ester by catalytic hydrogenolysis.

Studies on the light and dark interconversions of leaf xanthophylls. H. Y. Yamamoto, T. O. M. Nakayama and C. O. Chichester (University of California, Davis). *Arch. Biochem. Biophys.* **97**, 168–73 (1962). Changes in the carotenoid content of spinach and lima bean leaf segments were studied under various conditions. Under intense light in N_2, a decrease in the violaxanthin concentration was accompanied by a nearly stoichiometric increase in zeaxanthin. This light reaction was accompanied by a transient increase and decrease in the antheraxanthin concentration. In spinach when exposure to strong light in N_2 was followed by dark incubation in O_2, there was a decrease of zeaxanthin, an increase in antheraxanthin, and a small increase in violaxanthin. In the case of bean leaf, the decrease in zeaxanthin was accompanied by a nearly stoichiometric increase in antheraxanthin. The concentrations of lutein, neoxanthin, and carotene remained constant or changed only slightly throughout the experiments.

An over-all look at atherosclerosis. W. H. Sebrell, Jr. (Columbia University). *J. Am. Dietet. Assoc.* **40**, 403–6 (1962). The author reviews the current status of knowledge of atherosclerosis with emphasis on blood cholesterol levels. For the reduction of cholesterol levels he recommends: (1) reduction of obesity, (2) limiting the percentage of calories from fat in the range of 25%, and (3), using fats that contain a high percentage of polyunsaturated fatty acids such as corn, safflower, and fish oils. The optimum amount of polyunsaturated fats and the best balance between saturated and unsaturated fatty acids have not yet been determined.

Effect of dietary fat on cholesterol metabolism. R. R. Roehm and H. L. Mayfield (Montana State College). *J. Am. Dietet. Assoc.* **40**, 417–21 (1962). Rats were fed diets containing a medium (approximately 13% fat by weight or 27% of calories from fat) and a high level (approximately 34% fat or 56% of calories from fat) of butter or vegetable fat (margarine and corn oil), with and without additional cholesterol. Females had higher serum cholesterol values than did males receiving similar diets. The two sexes did not always respond in the same manner to the dietary variations. Rats fed the butter-containing diets had higher serum cholesterol and higher liver lipids than did rats fed the vegetable-fat diets. There was no difference in liver cholesterol values due to type of fat fed. Diets with a high level of either fat brought about higher serum cholesterol values and higher liver lipids than did similar diets containing a medium level of fat.



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The addition of 1% cholesterol to the diets caused a marked increase in serum and liver cholesterol and liver lipid values.

NUTRITIONAL VALUE OF FATS IN COOKED MEATS. W. D. Warner, Patricia N. Abell, P. E. Mone, C. E. Poling, and E. E. Rice (Swift & Co.). *J. Am. Dietet. Assoc.* **40**, 422–6 (1962). Fats were extracted from a number of samples of well-done cuts of meat. The biologically available energy of these fats was not changed during cooking. Furthermore, none of these fats showed any tendency to increase the size of the livers when fed to rats, in contrast to the findings when laboratory abused fats were fed. Cooking did not alter the biologic value of the fats of meat.

A PALATABLE DIET HIGH IN UNSATURATED FAT. E. Hiscock S. Dayton (Los Angeles Veterans Administration Center), M. L. Pearce, and S. Hashimoto. *J. Am. Dietet. Assoc.* **40**, 427–31 (1962). This report describes a diet which has a conventional quantity of total fat (40% of calories) but in which vegetable oil is substituted for about ⅔ of the animal fat of the usual diet. The total fat of the altered diet contains 38% linoleic acid as compared with 12% in a conventional diet, and has an iodine value of 100 as compared with 53 for the ordinary diet. The modified diet also includes moderate restriction of cholesterol intake. The design of the diet emphasizes palatability and simulation of the traditional American food pattern. It has been served to relatively non-motivated institutionalized men for as long as 2 years; there has been 20% withdrawal. This study has demonstrated that the diet is capable of depressing the serum cholesterol concentration and of maintaining the lowered levels for as long as 20 months.

PLANT LIPIDS. II. FREE AND COMBINED STEROLS (STEROL ESTERS AND GLYCOSIDES) IN COMMERCIAL PHOSPHOLIPIDS. F. Aylward and B. W. Nichols (Borough Polytechnic, London). *J. Sci. Food Agr.* **13**, 86–91 (1962). An acetone extraction method for the isolation of free and combined sterols has been applied to commercial phospholipid fractions from groundnut, rapeseed and linseed; all 3 lipid samples contained 1–3% sterol glycosides. The glycoside from groundnut phospholipids was composed mainly of beta-sitosterol-D-glucoside, with considerably smaller quantities of glucosides of stigmasterol and a saturated sterol. The non-glycoside sterols from the same source had a very similar composition to those from the glucoside.

PLANT LIPIDS. III. PHOSPHATIDIC ACID AND PHOSPHATIDYLINOSITOL IN CEREAL GRAINS. F. Aylward and A. J. Showler (Borough Polytechnic, London). *J. Sci. Food Agr.* **13**, 92–5 (1962). Phosphatidic acids and phosphatidylinositols have been isolated from the lipids of barley, oats and rye. The fatty acid composition of the fractions has been studied by gas-liquid chromatography. In all cases the major components were palmitic and linoleic acids, but the proportions differed from those of the whole oils. Although a complete resolution of the C_{18} acids was not obtained, it was evident that the proportions of oleic, linoleic and linolenic acids were very different in the phospholipids than in the whole oil. A serine-containing phospholipid with properties similar to those of the phosphatidic acids was found in cereal lipids, but its precise composition has not yet been determined.

PROCESS FOR THE PRODUCTION OF NATURAL PHOSPHOLIPIDS AND SUBSTANCES PRODUCED THEREBY. E. Klenk, Hildegard Debuch, H. Eikermann, and Gertrud Lappe, nee Reuter. *U. S. 3,031,478.* Vegetable crude phosphatide is extracted with acetone to remove oil and leave a residual ester mixture. The ester mixture is then extracted with alcohol and the alcoholic solution is stored for several days to clarify the solution from suspended colloidal particles. The alcohol solution containing a choline ester of diglyceride phosphoric acid as the basic component is diluted with alcohol to a concentration of 2–3% of ester. The solution is then passed through a column containing an alcoholic slurry of substances selected from the group consisting of oxides and carbonates of aluminum, magnesium and silicon, the slurry eluted with alcohol, and the eluate concentrated under vacuum in the presence of an inert gas. All steps are carried out in the absence of oxygen at a temperature of 35C at the highest. The choline ester of diglyceride phosphoric acid is then reacted with an enzyme (snake venom or bee venom) in a solvent medium, the solvent medium is separated by centrifugation, and the solvent is distilled from the choline ester of monoglyceride phosphoric acid.

PREPARATION OF OILSEED MEAL CONTAINING SOYBEAN SOAPSTOCK. N. H. Witte and E. Sipos (Central Soya Co., Inc.). *U. S. 3,033,683.* A process for incorporating soybean soapstock in soybean extracted flakes containing solvent consists

of the following steps: (1) introducing steam into the flakes to remove the solvent, (2) introducing soybean soapstock into the desolventized flakes, (3) introducing live steam into the flakes while they are at a temperature at which the steam will condense, and (4) drying the meal. A somewhat similar process is described for incorporating soapstock in oilseed meal: (1) introducing steam into the meal to remove the solvent, (2) cooking the meal, (3) cooling the meal, (4) more than 10% by weight of water-soluble soapstock, (5) again introducing live steam, and (6) finally drying and cooling the meal to obtain a free-flowing dry product.

THE EFFECT OF HEATED FAT ON THE CARCINOGENIC ACTIVITY OF 2-ACETYLAMINOFLUORENE. M. Sugai, L. A. Witting, H. Tsuchiyama, and F. A. Kummerow (Dept. of Food Tech., Univ. of Ill., Urbana). *Cancer Res.* 22, 510–19 (1962). Fresh or heated vegetable oils from various sources were fed to rats *per se* or with specific levels of 2-acetylaminofluorene (AAF) for periods of from 9 to 30 months. The heated oils were obtained from commercial sources or were prepared under controlled laboratory conditions. A heated oil, similar in properties to a commercial crystallization inhibitor, was subjected to digestion with lipase or divided into urea adduct and nonurea adduct-forming fractions. The results indicated that the lipase-undigestible or the nonurea adduct-forming fraction isolated from heated oil acted in synergism with AAF and enhanced its carcinogenic activity. All the animals fed 0.005% AAF and a mixture of 7.5% fresh corn oil and 2.5% of the lipase-undigestible or 2.5% of the nonurea adduct-forming fraction isolated from heated oil developed malignant tumors, and none survived the 30-month experimental period. None of the animals fed 0.005% AAF and 10% fresh corn oil developed malignant tumors and all survived. Whether heated oil as such enhanced the carcinogenic activity of AAF could not be demonstrated at lower than the 5% error level in the present study.

EVIDENCE OF A SPECIFIC EFFECT OF CYSTINE IN THE PREVENTION OF NUTRITIONAL MUSCULAR DYSTROPHY IN VITAMIN E-DEFICIENT CHICKS. M. L. Scott and C. C. Calvert (Dept. of Poultry Husbandry, Cornell Univ., Ithaca, N. Y.). *J. Nutrition* 77, 105–08 (1962). A number of experiments were conducted using a vitamin E-deficient, purified diet containing approximately ½ of the chick's requirement of methionine and approximately ⅕ of the required level of cystine. Muscular dystrophy occurred in 90 to 100% of the chicks within 5 weeks. Addition of 0.15% of L-cystine completely prevented muscular dystrophy without increasing growth. In contrast, the addition of 0.19% of DL-methionine or 0.15% of L-methionine improved growth but produced no appreciable decrease in the incidence or severity of muscular dystrophy. Evidence was obtained indicating that the effect of arginine upon nutritional muscular dystrophy in chicks is that its addition to the diet decreases the effectiveness of methionine for the prevention of muscular dystrophy. The results indicate: that cystine is essential for prevention of muscular dystrophy; that arginine addition to the diet of chicks causes a demand for methionine for certain metabolic reactions which reduce the amount of methionine available for conversion to cystine; and that since vitamin E was completely effective in prevention of dystrophy even when the diet was very low in cystine and methionine, this vitamin appears to be interrelated with sulfur amino acid metabolism.

EFFECT OF CHROMIUM, CADMIUM, AND LEAD ON SERUM CHOLESTEROL OF RATS. H. A. Schroeder, W. H. Vinton, Jr., and J. J. Balassa (Dartmouth Med. School, Hanover, N. H.). *Proc. Soc. Exp. Biol. Med.* 109, 859–60 (1962). Male rats on a diet and environment controlled as to trace metals were given 5 ppm cadmium, chromium, and lead in drinking water for 10 to 12 months. Lead and cadmium appeared to lower serum cholesterol levels significantly; chromium was without demonstrable effect. Hepatic levels were apparently unchanged.

A STUDY OF THE PURIFICATION AND PROPERTIES OF THE PHOSPHOLIPASE A OF *Crotalus adamanteus* VENOM. Kunihiko Saito and D. J. Hanahan (Dept. of Biochem., Univ. of Washington, Seattle 5, Wash.). *Biochemistry* 1, 521–32 (1962). Two proteins (I and II) with phospholipase A activity have been isolatel from the venom of *Crotalus adamenteus* (Eastern diamond back rattlesnake) by a procedure involving pH change, heat treatment, and subsequent chromatography on diethylaminoethyl-cellulose. Proteins I and II were chromatographically separable and had similar sedimentation constants but differed significantly in their electrophoretic mobility and isoelectric points. Although the specific activity of I and II was not similar, there was no observed difference in the nature of the fatty acids liberated by their action on native ovolecithin. No specificity toward the chain length or unsaturation was evident.

CAROTENE AND VITAMIN A IN PREGNANCY AND THE EARLY PUERPERIUM. R. P. Pulliam, W. N. Dannenburg, R. L. Burt, and N. H. Leake (Dept. of Obstetrics and Gynecology, Bowman Gray School of Med. and the N. Car. Baptist Hosp., Winston-Salem, N. C.). *Proc. Soc. Exp. Biol. Med.* 109, 913–16 (1962). Levels of carotene and vitamin A in pregnant patients were shown to be significantly different from those found in nonpregnant and puerperal patients. Differences in the means of carotene and vitamin A between puerperal and nonpregnant patients were variable and it appeared that changes in carotene and vitamin A following delivery are rapid and not significantly different from those found in the nonpregnant group. No differences were found in carotene and vitamin A between postpartum days. Diet was apparently not a factor influencing carotene and vitamin A levels in this study. Evidence was given supporting the inverse relationship between carotene and vitamin A and it was suggested that the ratio (C/A) of these components may be a better parameter for detecting changes occurring in their metabolism. The possible association of vitamin A and carotene changes with changes in lipids during pregnancy was considered.

ALTERATION OF BILE SALTS BY BACTERIA. O. W. Portman, S. Shah, A. Antonis, and B. Jorgensen (Dept. of Nutrition, Harvard Univ. School of Public Health, Boston, Mass.). *Proc. Soc. Exp. Biol. Med.* 109, 959–65 (1962). The ability of a variety of common intestinal microorganisms to grow in bile salt-containing media and to alter the structure of those bile salts was studied. Strains of *Escherichia coli, Proteus vulgaris,* and *Streptococcus faecalis* were adapted by serial transfer in cholate-containing media to grow more rapidly in high concentrations of cholate and to alter the composition of the cholate more rapidly than unadapted cultures. *E. coli* was also shown to alter the structure of deoxycholate. Low concentrations of linoleic and palmitic acids when added to cholate-containing media partially overcame the inhibition of growth and cholate-altering capacity of *E. coli.* 7-Ketodeoxycholate was the principal metabolite of cholate in continuously aerated cultures of *E. coli.* The conditions used for transfer of mixed cultures and the isolation of one apparently pure culture of organisms from rat cecum which was capable on 2 first transfers, but not subsequently, of converting cholic acid to deoxycholic acid were described.

PROTEIN-ENERGY RELATIONSHIPS IN THE DIET OF THE CHICK. J. B. O'Neil, J. Biely, G. C. Hodgson, J. R. Aitken, and A. R. Robblee (Poultry Dept., Univ. of Saskatchewan, Saskatoon). *Poultry Science* 41, 739–45 (1962). A co-operative test has been carried out to study the growth response of broiler and replacement chicks fed different amounts of protein and varying levels of productive energy. Based on these experiments, the following conclusions can be drawn. I. An excess of productive energy in relation to the amount of protein in the diet depresses the rate of growth and decreases the efficiency of feed utilization. 2. An excess of protein in relation to productive energy, while not adversely affecting either growth or feed efficiency, does indicate a wastage of protein as an energy source. 3. The growth pattern of replacement and broiler stock is similar. The growth rate of the former is from 62–69% of the latter. 4. Feed efficiency of replacement stock is 71–82% of that for broiler strains.

CHANGES IN TISSUE LIPIDS IN RESPONSE TO DIET. II. FATTY ACID COMPOSITION OF LIVER AND PLASMA LIPIDS IN RELATION TO FED AND STORED FAT. Ruth Okey, Rosemarie Ostwald, Angela Shannon, and Joan Tinoco (Dept. of Nutr. Sci., Univ. of Calif., Berkeley, Calif.). *J. Nutrition* 76, 353–64 (1962). Liver and plasma data were reported for young rats at intervals following change from a diet containing 10% of a largely saturated fat (coconut oil) to one containing the same amount of a a linoleate-rich oil (safflower oil) and returned to the saturated fat. Diets were semisynthetic, adequate to support normal growth, and identical except for the kind of fat. All contained 1% of cholesterol. Characteristic sex differences were observed both in the concentration of the different liver and plasma lipids, and in their fatty acid patterns.

LIPOPROTEIN LIPASE IN HUMAN ADIPOSE TISSUE. P. J. Nestel and R. J. Havel (Cardiovascular Res. Inst. and Dept. of Med., Univ. of Calif., San Francisco). *Proc. Soc. Exp. Biol. Med.* 109, 985–87 (1962). Lipoprotein lipase activity was found in adipose tissue of all of 18 samples from 9 human subjects. Activity in omental tissue was 2 to 3 times greater than in subcutaneous tissue. It was similar in men and women. No increase in activity was produced by intravenous infusion of 200 to 300 g glucose during the 12 hours before the tissue was obtained.

EFFECT OF DIETARY FAT ON TISSUE FAT AND PLASMA CHOLES-

TEROL LEVEL IN BROILERS. E. C. Miller, H. Menge, and C. A. Denton (Animal Husbandry Res. Div., Poultry Res. Br., Agricultural Research Center, Beltsville, Md.). *Poultry Science* **41**, 970–74 (1962). The effect of high levels of different types of dietary fat on tissue fat and plasma cholesterol on eight-week-old broilers was studied. The addition of corn oil and lard significantly increased the fat content of breast and thigh muscle. Lard or corn oil did not increase plasma cholesterol levels above the level observed when no fat was added to the diet. Both plasma and liver cholesterol levels were significantly increased when 12% egg yolk was included in the diet.

DEVELOPMENT OF VOLATILE CARBONYLS IN HADDOCK *(Melanogrammus aeglefinus)* FLESH DURING STORAGE AT 2C. J. M. Mendelsohn and M. A. Steinberg (Bureau of Commercial Fisheries, Technological Laboratory, Gloucester, Mass.). *Food Technol.* **16**, 113–15 (1962). Although some carbonyls of relatively low molecular weight were formed during storage of haddock fillets at 2C, by far the largest quantity formed were those of higher molecular weight. The quantity of carbonyls of relatively low molecular weight increased linearly with storage time. The quantity of those of relatively high molecular weight showed an apparent maximum with storage time, the maximum occurring between 8 and 11 days.

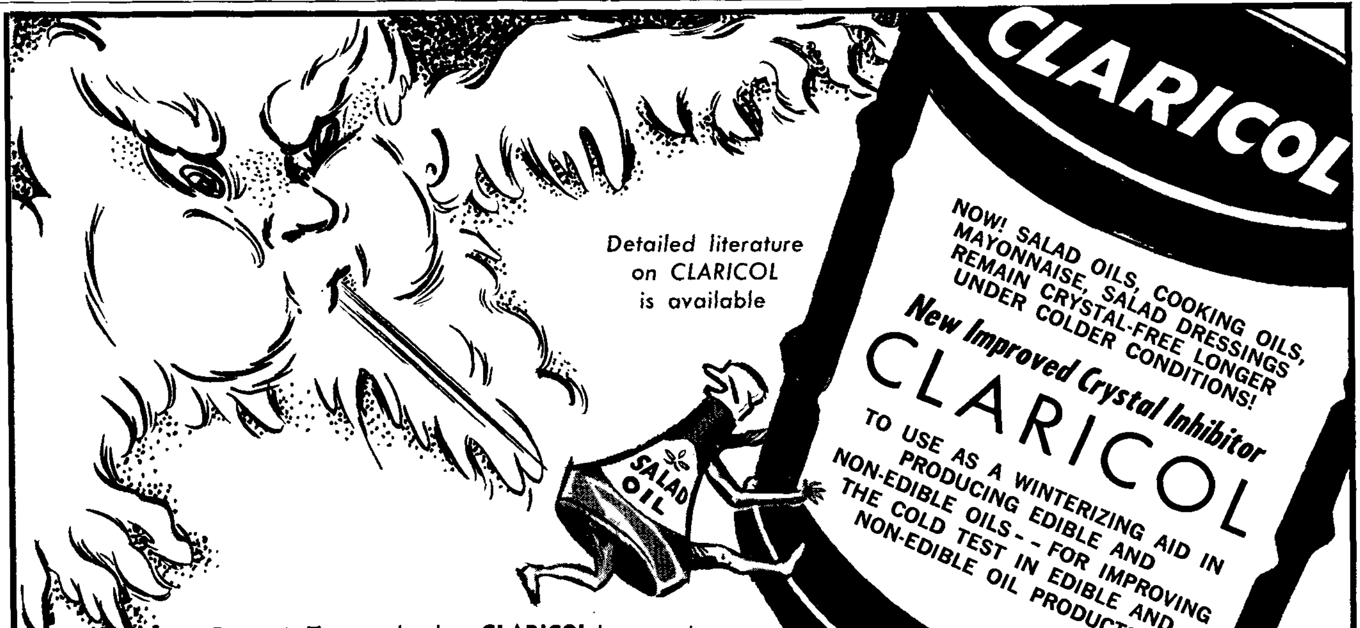
OBSERVATIONS ON SERUM CHOLESTEROL LEVELS IN THE TWIN POPULATION OF EVANS COUNTY, GEORGIA. J. R. McDonough, C. G. Hames, B. G. Greenberg, L. H. Griffin, Jr., and A. J. Edwards, Jr. (Evans County Health Dept., Heart Research Project, Claxton, Georgia). *Circulation* **25**, 962–969 (1962). Important factors affecting the variation in cholesterol were found to be the genotype of the individual, age, and type of residence. The effect of genotype is clearly shown in comparing MZ twins with their matched pairs. The difference between MZ twins and their matched pairs was large and statistically significant, while for DZ and UD twins the difference was so small it could easily have been due to chance. In interpreting the significance of the effect of type of residence, we are also comparing two age groups that are almost nonoverlapping, so that adjustment for age by covariance might be questionable, since it involves extrapolating beyond the limits of the data. Thus, it seems that two important sources of variation of cholesterol have been isolated: type of residence or age which is confounded or entangled, and genotype.

THE MECHANISM OF TRICARBOXYLIC ACID CYCLE REGULATION OF FATTY ACID SYNTHESIS. D. B. Martin and P. Roy Vagelos (Enzyme Sec., Lab. of Cellular Physiology, National Heart Inst., Bethesda 14, Maryland). *J. Biol. Chem.* **237**, 1787–92 (1962). The site of stimulation of fatty acid synthesis by compounds of the tricarboxylic acid cycle has been localized to the acetyl coenzyme A (Acetyl-CoA) carboxylase reaction in a rat adipose tissue preparation in which this reaction is the rate-limiting step in fatty acid synthesis from acetyl-CoA. Citrate, the most stimulatory by far of all the tricarboxylic acids tested, did not take part in the reaction by providing carbon dioxide. Prior incubation of the enzyme with citrate alone caused an activation that could not be explained by the formation of a free activating intermediate derived from citrate. Present evidence suggests that the carboxylase itself is activated during the prior incubation. Propionyl-CoA carboxylase, another biotin enzyme, was not stimulated by citrate.

• Drying Oils and Paints

MOLECULAR WEIGHT DETERMINATION OF FATS AND FAT POLYMERS WITH THE ULTRACENTRIFUGE. H. Lück, E. Richerl, and A. Pavlik (Deut. Forsuch. Lebenametl. Chem., Munich). *Fette Seifen Anstrichmittel* **64**, 239–244 (1962). Molecular weights of several polymerized linseed oils of viscosity 8 to 111 poises were calculated from measurements of sedimentation velocity in the ultracentrifuge with hexane as solvent. The average molecular weight of the most fluid sample was 4700, and that of the most viscous sample was 11,900. The polymers in hexane exhibit association. Using ethyl ether as the solvent, a molecular weight of 7500 was found, for the highly viscous oil (111 poises).

PROCTECTIVE COMPOSITION FOR METALS. L. J. Larrieu (Morris P. Kirk & Son, Inc.). *U. S. 3,035,926.* The described composition consists of (1) 35–85% by weight of oleaginous material such as sulphonated oil, petroleum, lard oil, linseed oil, tung oil, soybean oil; (2) 5–40% of a solid absorptive particulate material such as diatomaceous earth, fuller's earth, activated carbon, or activated clay; (3) 0.5–2.5% of a cor-



rosion inhibitor, a soluble alkali metal chromate or dichromate; (4) sufficient water to dissolve the inhibitor and impregnate the particulate material.

• Detergents

SURFACE ACTIVITY OF FATTY ACID SEMI-ESTERS OF GLYCEROL, THEIR SULFATES AND SULFONATES. I. PREPARATION OF FATTY ACID MONOGLYCERIDES. H. P. Kaufmann, J. Baltes, and G. Alberti (Deut. Inst. Fettforsch; Münster). *Fette Seifen Anstrichmittel* **64**, 245–250 (1962). A survey of known methods of monoglyceride synthesis is presented. The present paper reports the results of investigations concerning the preparation of allyl esters of different fatty acids, their hydroxylation with sodium chlorate and osmium tetroxide as catalysts, and the sulfation of the monoglycerides thus obtained. The synthesis of ester sulfonates by treatment of the 1,2-dihydroxypropane-3-sulfonic acid (formed by sulfonation of the allyl alcohol) with fatty acid chlorides is described.

THE CRITICAL MICELLAR CONCENTRATION (CMC) OF THE SUCROSE MONOESTERS OF FATTY ACIDS AND THEIR RELATION TO THE HYDROPHILIC-LIPOPHILIC-BALANCE. W. Wachs and S. Hayano (Inst. for Food Chem. and Tech., Univ. of Berlin). *Kolloid-Z.* **181**, 139–43 (1962). The micellar concentration of sucrose monoesters of the saturated fatty acids from C_{12} to C_{18} was determined by means of surface and interfacial tension measurements. A direct proportionality between the CMC value and the carbon number of the fatty acid was discovered. By incorporating the CMC value into the Griffin and Davis formulas, a direct relation between CMC and HLB is obtained.

TEMPERATURE DEPENDENCE OF MICELLAR WEIGHT OF NON-IONIC SURFACTANT IN THE PRESENCE OF VARIOUS ADDITIVES. PART 2. ADDITION OF SODIUM CHLORIDE AND CALCIUM CHLORIDE. K. Kuriyama (Shinoogi and Co., Osaka, Japan). *Kolloid-Z*, **181**, 144–49 (1962). By means of the light scattering method, the micellar weights of methoxy-polyoxyethylene dodecyl ether and Triton X-100 in water, sodium chloride solutions and calcium chloride solutions have been measured at several temperatures. At a fixed temperature, the micellar weight increases with the addition of salts, and the effect of salt is larger at higher temperatures. At a fixed salt concentration the micellar weight increases with rising temperature. The clouding formation and phase separation observed in these systems are analyzed in the light of thermodynamics of binary solution. It is pointed out that the increase of the micellar weight with rising temperature is a dominating factor for the clouding formation and phase separation.

SOME EFFECTS OF SURFACE-ACTIVE AGENTS ON WAVES AND RIPPLES. J. T. Davies (The University, Birmingham). *Chem. & Ind. (London)* **1962**, 906–10 (1962). Small amounts of surface-active agents are often effective in damping waves and ripples. This paper reviews published theoretical and practical work on the damping of induced ripples, both without and with added surface-active agents. Some experiments at present being conducted in the author's laboratory are described. The paper also discusses the alterations in the hydrodynamic conditions near the surface of a wind-blown lake when a monomolecular "slick" of hexadecanol is present.

ANALYSIS OF ABS DETERGENTS. E. Jungermann and E. C. Beck (Armour and Co.). *Soap Chem. Specialties* **38** (5), 72–5 (1962). Gas chromatography has been found to be a sensitive qualitative procedure for distinguishing different grades and different average molecular weights of alkylbenzenes and alkylbenzene sulfonates. The technique is particularly useful for the quality control of raw materials and for analyzing competitors' products. Variations in the process for manufacturing alkylbenzenes and in the sulfonation procedure can also be detected by this method.

LIQUID DETERGENTS—IV. R. Getty and W. Stericker (Philadelphia Quartz Co.). *Soap Chem. Specialties* **38** (5), 76–9, 161, 164 (1962). The compatibility and stability of alkyl aryl sulfonates in solutions of mixed polyphosphates and soluble silicates are discussed. Numerous tables of the solutions showing various degrees of stability are presented as guides to preparing products which might be satisfactory commercially.

PHOSPHATE SURFACTANTS—PROPERTIES AND USES. R. L. Mayhew and F. Krupin (Antara Chemicals Div., General Aniline & Film Corp.). *Soap Chem. Specialties* **38** (5), 80–1 167, 169 (1962). Properties directly attributed to the presence of the phosphate radical include: improved electrolyte tolerance, heat and alkali stability, rust inhibition, and good physiological characteristics. The surfactants are employed as detergents in aqueous and non-aqueous media, in emulsion polymerization, as textile fiber antistats and lubricants, as emulsifiers, etc.

CLEAR HIGH-FOAM LIQUID BUILT DETERGENT. W. A. Tidridge and L. E. Cohen (FMC Corp.). *U. S. 3,037,935.* The described composition consists of (1) 7.5–27.5% by weight tetrapotassium pyrophosphate, (2) 0.1–5% sodium metasilicate calculated as anhydrous sodium metasilicate, (3) 0.1–0.6% sodium carboxy methyl cellulose, (4) 5–9% propylene glycol, (5) 43.6–75.9% water, and (6) a surface active mixture consisting of sodium dodecyl benzene sulfonate and a compound selected from the group consisting of sodium xylene sulfonate and sodium toluene sulfonate. The surface active mixture consists of about 90–95% by weight sodium dodecyl benzene sulfonate and is present in amounts of 2.6 to 17.5% by weight.

CREAMY LOW-FOAM LIQUID BUILT DETERGENT COMPOSITION. W. A. Tidridge and W. E. Cohen (FMC Corp.). *U. S. 3,037,936.* The described detergent consists of (1) 12.5–22% by weight tetrapotassium pyrophosphate; (2) 0.1–1.7% sodium silicate calculated as silica in which the ratio of Na_2O/SiO_2 may vary from about 1:1 to 1:3.2: (3) 1.7–20% propylene glycol; (4) 58–80% water; (5) 2.5–13.5% of a surface-active agent such as the condensation product of octyl phenol with from 9 to 10 moles of ethylene oxide, the condensation product of tall oil with about 12 moles of ethylene oxide, or the condensation product of tridecyl alcohol with about 8 moles of ethylene oxide; (6) sodium carboxylmethyl cellulose in amounts up to 3.5% by weight.

DETERGENT COMPOSITIONS. J. C. Harris (Monsanto Chemical Co.). *U. S. 3,037,937.* An anionic or non-ionic detergent which normally tarnishes copper base alloys is combined with an amount of a 1-(beta-hydroxyethyl)-2(gamma-alkylamino)-2-imidazoline in which the alkyl radical has from 4 to 24 carbon atoms sufficient to inhibit tarnishing of the alloy.

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• *New Members*

Active

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Horace P. Andrews, Head, Statistics Division, Research Laboratories, Swift & Company, Chicago, Ill.

Anne Conner Armstrong, Analytical Chemist, Southern Testing Laboratories, Westwego, La.

William T. Bier, Chemist, Best Foods, Div. Corn Products Company, Chicago, Ill.

J. Kenneth Boggs, Engineer, Headquarters Quality-Solvents, Humble Oil & Refining Co., Houston, Tex.

John Frederic Collier, Research Assistant, Division of Neurosurgical Research, University of Vermont, Burlington, Vt.

Biagio Costigliola, Research Chemist, Canada Packers, Ltd., Toronto, Ont., Can.

Raul Dalbadie-Robin, Owner and Chemical Engineer, Dalbadie Hnos y Cia, Ltda., Talca, Chile, South America

John Russell Gahm, Chemist, Bryant & Irwin, Inc., Philadelphia, Pa.

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Malcolm F. Mallery, Analytical Chemist, Procter & Gamble Co., Cincinnati, Ohio

Edward J. Massaro, Research Fellow, University of Texas Medical Branch, Dept. of Biochemistry and Nutrition, Galveston, Tex.

William G. Messer, Department Head, New Detergents, Lever Brothers Ltd., Toronto, Ont., Can.

Sylvia Horton Miles, Chemist, Southern Regional Research & Dev. Div., ARS, New Orleans, La.

Robert B. Mitchell, Manager, Laboratories, Lever Brothers Ltd., Toronto, Ont., Can.

Robert V. Moore, Research Associate, Lipid Metabolism Laboratory, Medical College of South Carolina, Charleston, S.C.

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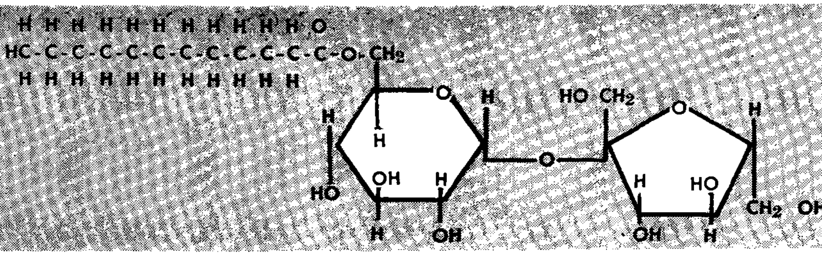

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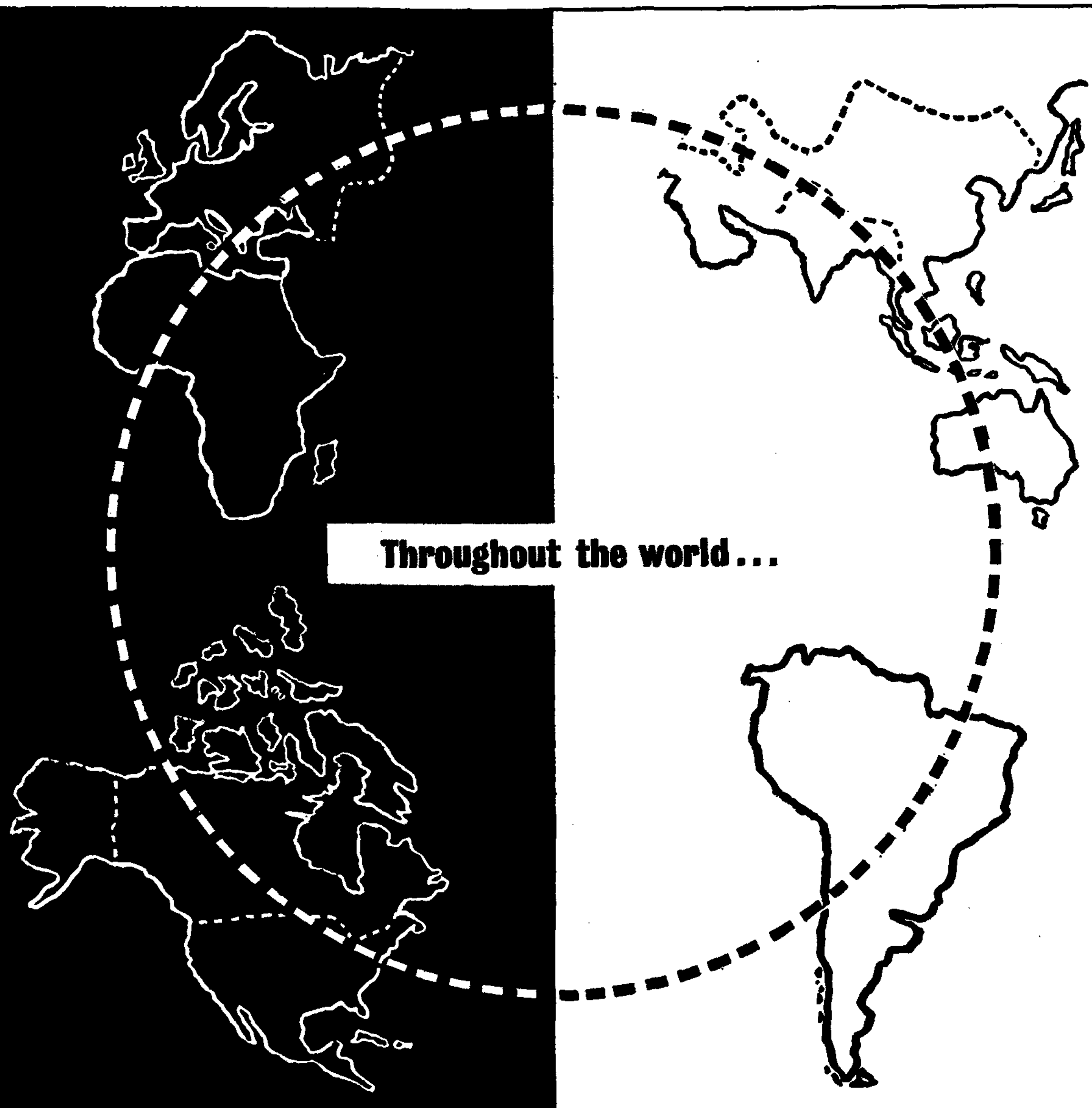

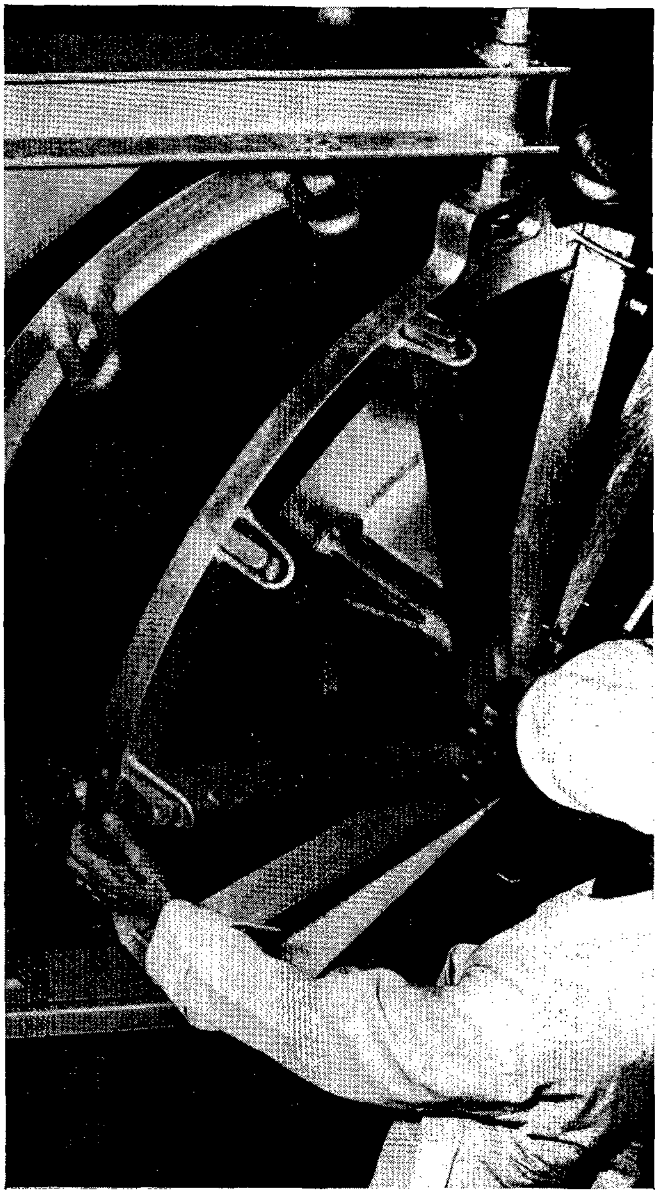

The Inflexible Yield....

(Continued from page 7)

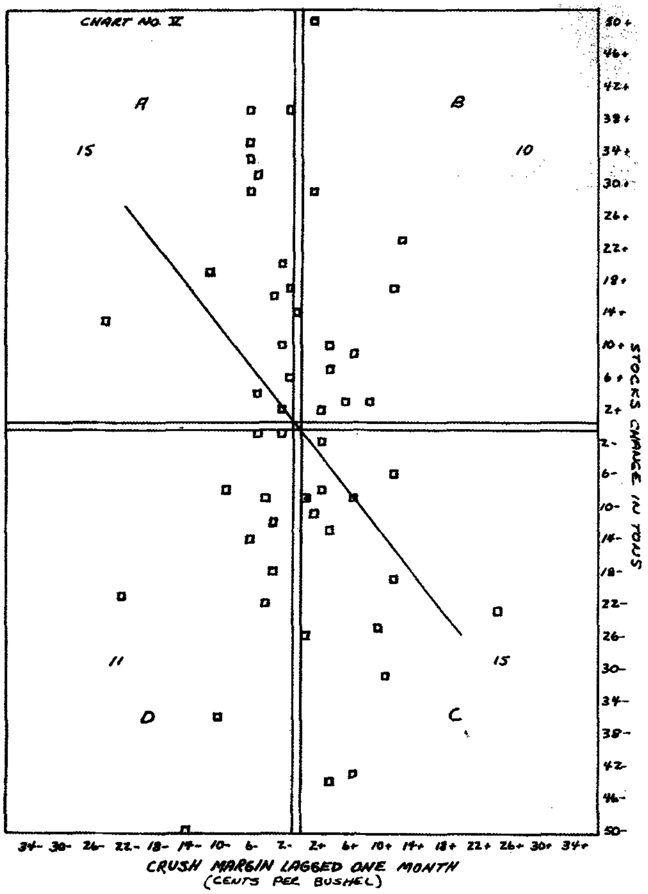

Chart V. Month to month increase/decrease U.S.D.A. version of Illinois crush margin October, 1953 to April, 1962 as compared to changes of the value of oil—value of meal—price of beans same months. (Plots on zero line not counted.)

either because of price or because of competing supplies.

There are four components of the crush complex that have to be considered. They are oil, meal, beans, and crusher profits. Since product yields are inflexible and to a considerable extent processing costs are also inflexible, none of the components can be considered out of context with the others—at least as far as market analysis is concerned.

James E. McHale,
Merrill Lynch, Pierce, Fenner and
Smith Inc., Chicago, Ill.

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• *Obituary*

Paul A. Xander (1951), of Nescopeck, Pa., died May 25, 1962. Mr. Xander was Director of Research at the Wise Potato Chip Co., Berwick, Pa.

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Industry Items....

(Continued from page 12)

Armour Agricultural Chemical Co. reports their six-plant fertilizer complex is nearing full operation in Cherokee, Ala. The complex was completed in July.

Distillation Products Industries, Division of Eastman Kodak Company, will begin construction on a new research building in the fall. This new research facility will be located adjacent to DPI's manufacturing plant at 2255 Mt. Read Blvd., Rochester, N.Y., and is planned to be completed in 1964.

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New Books . . . .

(Continued from page 16)

Distillation: Principles and Design Procedures, by Robert J. Hengstebeck (Reinhold Publishing Corporation, 365 pages, 1961, $11.50). This book is 6″ x 9″. It has many illustrative diagrams, tables of data, graphs, and mathematical equations. The table of contents is divided into sixteen chapters. These cover physical chemical theoretical discussions, description of the different types of distillations, mechanical construction of distillation columns, methods of calculating column sizes, and methods of estimating efficiencies. From a utilitarian point of view for ease of finding subject matter, it is unfortunate that three different chapters have the same running heads on the right hand pages. This is particularly so when the chapters are not adjacent.

The author starts from the beginning in his theoretical discussion of distillation and its application to design, construction, and operation of stills and fractionation equipment for industry. The book will be of value to students as well as the practicing engineer. Because of his experience with a large industrial organization that is based on separation operations, the author has been able to choose with authority those superior methods of design from among the many that have been proposed. Frequently throughout the book he will evaluate alternate procedures and indicate the strong points and the weak points of various methods and in which particular areas these characteristics are evidenced.

Although the author quite properly includes, for the sake of completeness, much elementary work that has often been described in distillation texts, he gives only references for the Ponchon and Savarit methods. Because these references are so obscure it seems that for the same reason a description of these methods might have been given.

The author has given many references to original publications on the subject matter. They have amounted to as many as seventy in some chapters. In addition bibliographies are given for selected topics.

J. D. Lindsay, Texas Agricultural
Expt. Station, College Station, Tex.

Organic Peroxides, Their Formation and Reactions, by E. G. E. Hawkins (D. Van Nostrand Co., Inc., Princeton, New Jersey, 434 pp., 1962; $12.50). Dr. Hawkins' book is one of the most welcome additions to the organic chemical literature of recent years. Although many review articles, books, and monographs describing certain aspects of peroxide chemistry have appeared, "Organic Peroxides" is the first really comprehensive text covering the subject of peroxide synthesis and reactions. In comparison, Rieche's monograph, "Alkylperoxides and Ozonides," published in 1931, is now outdated, while Hawkins' review article, "Organic Peroxides, Quart. Reviews, *4,* 251 (1950) and Rieche's summary, "Uber Peroxyde of Athers, der Carbonyl-Verbindungen und die Ozonide," Angew, Chem. *70,* 251 (1958) are incomplete. Walling's book, "Free Radicals in Solution," gives an admirable coverage of the free radical formation and decomposition of peroxides, but obviously does not discuss ionic reactions of these compounds. The very comprehensive reviews on ozonides by Bailey and by Long deal with a rather limited subject. The monograph by Tobolsky and Mesrobin on the "Chemistry, Decomposition, and Role of Organic Peroxides in Polymerization" gives an extensive but not a very comprehensive coverage of peroxides. Hawkins' book, however, treats the entire field of organic peroxide synthesis and reactions in a comprehensive and critical manner. He discusses mechanisms liberally.

The book is organized in chapters according to compound type (i.e. alicyclic, cyclic, aryl, and heterocyclic hydroperoxides and peroxides, peroxyacids, cyclic peroxides and α-oxy substituted peroxides. A very brief chapter is devoted to the analysis, removal, and applications of peroxides. Since one chapter is hardly enough to cover the

(Continued on page 40)

• *New Literature*

Foster D. Snell, Inc. offers a new monthly publication entitled FATTY ABSTRACTS. It will contain marketing data for surfactants, soaps, oils, fats, waxes, and related materials. (Client Relations Dept., 29 West 15th St., New York 11, N.Y.)

Air Reduction Chemical and Carbide Co. has a 15-page technical bulletin S-5, describing Surfynol 400 nonionics, new surfactants that are presently available in developmental quantities. (New Products Dept., 150 East 42nd St., New York 17, N.Y.)

Emery Industries, Inc. technical bulletin No. 230, introduces eight new fatty acids. (Dept. 5, Carew Tower, Cincinnati 2, O.)

Knapp Mills, Inc. has published a new Chemical Process Industry section for its general catalog, describing the Insmetals. (23-15 Borden Ave., Long Island City, N.Y.)

Switzer Brothers, Inc. announced the updated 1962 edition of their technical bulletin No. 1115-B, on Day-Glo daylight fluorescent pigments for the color and coating industries. (4732 St. Clair Ave., Cleveland 3, O.)

Beckman Scientific and Process Instruments Division have a descriptive bulletin, No. 7004, explaining features of the new Beckman A.C. DU Power Supply. (Information Dept., 2500 Harbor Blvd., Fullerton, Calif.)

Beckman Instruments, Inc., Spinco Division, have published a 16-page brochure describing their Model 120B Amino Acid Analyzer. (Palo Alto, Calif.)

Fritzsche Brothers, Inc. have a July, 1962 issue of their wholesale price list, available upon request to those who purchase in wholesale quantities. (76 Ninth Ave., New York 11, N.Y.)

La Pine Scientific Co. has released a bulletin E-96 (4), announcing an improved model of the Leeds & Northrup 7401 Stabilized pH meter. (6001 S. Knox Ave., Chicago 29, Ill.)

Brinkmann Instruments, Inc. has released a bulletin describing the uses of thin layer chromatography in essential oils, resins, balsams, waxes, fatty dyes, and tars. (115 Cutter Mill Rd., Great Neck, N. Y.)

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New Books . . . .

(Continued from page 39)

formidable subject of peroxide applications, this topic might well have been left for another text. A final chapter reviews autoxidation reactions and is a welcome addition to the book.

It is difficult to see how a volume of this nature could be organized to avoid repetition and overlap of subject matter. Yet, the greatest criticism of Hawkins' book is needless repetition. A second problem is that of locating or piecing together information about a particular class of compounds which may be located in several different sections of the text. For example the subject of ozonides is discussed under at least four different headings, while the Crieger mechanism for ozonolysis of olefins is described in no less than three different places in the book (pp. 141, 252, 294).

The book contains about 1700 references and is therefore an excellent literature source for the organic chemist working in the field of organic peroxides. The text should be of particular value to this journal's average subscriber, who is so often concerned with the problems of peroxide formation and autoxidation. The cost ($12.50) is not prohibitive; consequently the book would be a good addition to the library of any organic chemist.

Wm. F. Erman, Procter & Gamble
Co. Cincinnati, O.

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