shortest distance horizontally is the settlement cup because, as can be seen, it represents either the most premium points or the fewest discount points. Conversely, if the charts are entered from the right, the combination of loss and color travelling the greatest distance horizontally is the settlement cup.

A limited number of larger-size charts is available from the author upon request.

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ABSTRACTS . . . .

R. A. REINERS, Editor

ABSTRACTORS: S. S. Chang, Sini'tiro Kawamura, F. A. Kummerow, H. S. Liles, Louise R. Morrow, and E. G. Perkins

• Fats and Oils

FREEZING POINT DATA FOR A PORTION OF THE TERNARY SYSTEM: ACETAMIDE-PALMITIC ACID-STEARIC ACID. R.R. Mod, F.C. Magne, and E.L. Skau (Southern Reg. Res. Lab., New Orleans, La.). *J. Phys. Chem.* 11, 1613–1616 (1960). Freezing point data were obtained for stable, metastable, and unstable crystalline phases in binary mixtures of the 1:1 molecular compounds acetamide-palmitic acid (AP) and acetamide-stearic acid (AS), and for a portion of the ternary system acetamide-palmitic acid-stearic acid. The equimolar mixture of AP and AS exhibited three freezing points, representing stable equilibrium with the high-melting modification of acetamide, metastable equilibrium with crystals of AS, and unstable equilibrium with a crystalline phase of unknown composition, respectively. X-ray and infrared data are also shown.

FATTY ACIDS ANALYSIS, QUANTITATIVE DETERMINATION OF STEAM-VOLATILE FATTY ACIDS BY GAS-LIQUID CHROMATOGRAPHY. C.W. Gehrke and W.M. Lamkin (Dept. of Agricultural Chem., Univ. of Missouri, Columbia, Mo.). *J. Agr. Food Chem.* 9, 85–8 (1961). A quantitative gas chromatographic procedure has been developed for the determination of steam-volatile fatty acids in biological materials. It is a modification of the original procedure of James and Martin and uses commercially available gas chromatographic apparatus. Techniques for low temperature vacuum concentration of samples and for the column removal of water are included. The removal of water is so complete that problems due to its presence are eliminated. Recovery in each step approaches 100%. Thermal conductivity detection is used, and an independent detector temperature control system is not required.

DETERMINATION OF BUTYLATED HYDROXYANISOL AND BUTYLATED HYDROXYTOLUENE IN POTATO FLAKES. V.J. Filipic and C.L. Ogg (Eastern Regional Research Lab., Philadelphia 18, Pa.). *J. Assoc. Off. Agr. Chem.* 43(4), 795–9 (1960). A simple method for the determination of BHA and BHT in potato flakes was developed by modification of a method applied to edible fats.

A COLORIMETRIC METHOD FOR DETERMINING FAT ACIDITY IN GRAIN. Doris Baker (Agr. Marketing Service, U.S.D.A., Beltsville, Md.). *Cereal Chem.*, 38, 7–50 (1961). A rapid colorimetric method for determining fat acidity in grain has been developed. The method is based upon the reaction of the fatty acids in benzene solution with aqueous cupric acetate to form soaps. The copper soaps are soluble in the benzene solution and the intensity of the resulting blue color of the solution is measured by a colorimeter.

BUTTER ADULTERATION, DETECTION OF HYDROGENATED FATS IN BUTTER FAT BY MEASUREMENT OF CIS-TRANS CONJUGATED UNSATURATION. J.C. Bartlet and D.G. Chapman (Food and Drug Directorate, Ottawa, Canada). *J. Agr. Food Chem.* 9, 50–3 (1961). Butter contains *cis-trans* conjugated unsaturation as well as isolated *trans* unsaturation, while hydrogenated fats contain only the latter. Both systems are detectable in the 940 to 990 $cm.^{-1}$ region of the spectrum. By using differential infrared spectroscopy, it was found that conjugated and isolated unsaturation are present in a constant ratio in pure butter. The addition of hydrogenated fats greatly increases the isolated *trans* double bonds (967 $cm.^{-1}$) but leaves the conjugated diene essentially unchanged (948 and 980 $cm.^{-1}$), thus changing the ratio. By using this technique it is possible to detect as little as 7% of a hydrogenated adulterant fat.

STUDIES IN PACKAGING, TRANSPORTATION, AND STORAGE OF SOME EDIBLE VEGETABLE OILS. M. Prasas and P.B. Mathur (Central Food Technological Res. Inst., Mysore, India). *Oil & Oilseeds J.* 13, 11–16 (1960). Castor, coconut, mustard, olive, and peanut oils were stored at 71–93°F. and 138–142°F. in colorless and green glass. A direct correlation was found between red/yellow pigment ratios and stability in both containers, and at both temperatures.

MASS SPECTROMETRY IN LIPID RESEARCH. R. Ryhage and E. Stenhagen (Laboratory for Mass Spectroscopy, Karolinska, Inst., Stockholm, Sweden). *J. Lipid Research* 1, 361–390 (1960). The authors have presented a complete review of the literature concerning the application of mass spectrometric techniques to the study of lipids. The principles, design, and construction of the instrument, reproducibility of the methods employed, and the application of the technique to structure determination of lipid materials is discussed.

SOME NEW METHODS FOR SEPARATION AND ANALYSIS OF FATTY ACIDS AND OTHER LIPIDS. K. Fontell, R.T. Holman and G. Lambertsen (Hormel Inst. and Dept. of Physiol. Chem., Univ. of Minn., Austin, Minn.). *J. Lipid Research* 1, 391–404 (1960). The authors review most of the methods of analysis for lipids now in use and discuss their relative merits. Methods for the analysis of fatty acids are emphasized. The methods discussed are: crystallization, zone melting, urea complexing, mercury-addition compounds, and distillation; adsorption methods—column, paper, thin film, and glass paper chromatography are presented. Displacement chromatography and its variations are treated. Various partition methods such as countercurrent distribution, partition separations on columns and paper are discussed. Finally gas liquid chromatography is given a detailed treatment and the existing methods compared to each other.

COMPOSITION OF CABBAGE LEAF PHOSPHOLIPIDS. L.W. Wheeldon (Lister Inst. of Preventive Medicine, London S.W. 1, England). *J. Lipid Research* 1, 439–445 (1960). The author has attempted to separate the phospholipids of the cabbage leaf by silicic acid chromatography. The compounds separated consisted of phosphatidyl glycerol and an unknown glycerophospholipid. The phospholipids were of fairly uniform fatty acid composition and contained predominantly palmitic, linoleic, and linolenic acids.

NONPHOSPHATIDE ALDEHYDROGENIC LIPIDS IN MILK FAT, BEEF TALLOW, AND OX HEART. J.C.M. Schogt, P.H. Begemann, and J. Koster (Unilever Res. Lab., Vlaardingen, The Netherlands). *J. Lipid Research* 1, 446–449 (1960). Phospholipid-free milk fat, beef tallow, and ox heart fat contain approximately 50 (calculated as tetradecanal), 65, and 1,000 mg. per kg. (calculated as hexadecanal), respectively, of aldehydes. The aldehydes are bound as enol ethers, and are located mostly in the *alpha* position of the glycerol molecule. A sample of milk fat was found to contain 45 mg. per kg. glycerol ether (calculated as chimyl alcohol).

SEPARATION OF TISSUE CHOLESTEROL ESTERS AND TRIGLYCERIDES BY SILICIC ACID CHROMATOGRAPHY. M.G. Horning, E.A. Williams, and E.C. Horning (Nat. Heart Inst., Nat. Inst. of Health, Bethesda, Md.). *J. Lipid Research* 1, 482–485 (1960). The authors have determined and presented conditions for the separation of cholesterol esters and triglycerides from other lipid components without the use of low boiling solvents, and which result in an easier separation of neutral lipids. The chromatographic columns consisted of silicic acid and the eluting solvent of mixtures of benzene in hexane, which separated the major classes of lipids.

THE COLORIMETRIC DETERMINATION OF ESTER GROUPS IN LIPID EXTRACTS. A. Antonis (Earnest Oppenheimer Heart Research Unit, South African Inst. for Medical Research, Johannesburg, South Africa). *J. Lipid Research* 1, 485–486 (1960). The author has modified the method of Stern and Shapiro (J. Clin. Pathol. 6, 158 [1953]) to employ essentially nonaqueous conditions both for the initial hydroxylamine hydrolysis and for the subsequent color development. Alcoholic ferric perchlorate solution was used instead of aqueous ferric chloride, resulting in the production of higher color yields which were more stable. The method has an average error of 1.7% (range 0% to 5.5%) and has been determined on duplicate aliquots of lipid extracts derived from 25 sera covering the range of 5 to 20 meq. of ester per liter of serum.

SEPARATION OF LIPIDS BY THIN LAYER CHROMATOGRAPHY. H.P. Kaufmann and Z. Makus (Deut. Inst. Fettforschung, Munster). *Fette Seifen Anstrichmittel* 62, 1014–1020 (1960). The authors have examined the separation of mixtures of mono-, di-, and triglycerides, hydroxy-, epoxy-, and episulfido-fatty acids, aldehydes, and amides by the technique of thin film chromatography. Some chemical processes such as oxidation and saponification were also investigated. The effects of several solvents on these separations and several methods of detecting the eluted materials were studied.

PAPER CHROMATOGRAPHY OF FATS. XLII. CONTRIBUTION TO THE ANALYSIS OF PHOSPHATIDES. III. THE SAPONIFICATION AND HYDROGENATION OF LECITHIN ON PAPER AND THE PAPER CHROMATOGRAPHHIC ANALYSIS OF ITS FATTY ACIDS. H.P. Kaufmann and H. Wessels (Deut. Inst. Fettforschung, Munster). *Fette Seifen Anstrichmittel* 62, 1020–1024 (1960). The authors have developed and carried out a method for the saponification of lecithin on paper, and the hydrogenation of the fatty acids by means of palladium chloride and hydrogen. The method is used by saponifying the lecithin on paper, paper chromatographic analysis of the fatty acids contained in it, and determination of the critical fatty acid pairs by catalytic hydrogenation of the lecithin on paper and comparison with a chromatogram that has not been hydrogenated. The method was applied to the analysis of synthetic lecithin, egg lecithin, and soya lecithin.

CHANGES IN THE MONOGLYCERIDE CONTENT AND FATTY ACID COMPOSITION OF FATS DURING THE DIFFERENT WAYS OF FAT SPLITTING. J. Peredi (Budapest). *Fette Seifen Anstrichmittel* 62, 1034–1038 (1960). During the hydrolysis of sunflower oil (Twitchell and autoclave) the fatty acid composition remains constant. At the same time monoglycerides are formed, the amounts of which are proportional to the conditions of hydrolysis. Hydrolysis in a homogeneous phase results in the formation of monoglycerides which approximate theoretical values based on random esterification. The author concludes that during fat hydrolysis, esterification also takes place resulting in an equilibrium depending upon the conditions employed.

ADSORPTION ON THE LIQUID PHASE IN GAS CHROMATOGRAPHY. R.L. Martin (Amer. Oil Co., Whiting, Ind.). *Anal. Chem.* 33, 347 (1961). A new equation in gas chromatography for retention volumes takes into account the contribution of adsorption at the liquid-gas interface. Liquid phase adsorption is critical when the liquid is highly polar and the surface area of the support is high. When nonpolar liquid phase is used, adsorption on the support is a factor.

LIPID OXIDATION IN PRECOOKED BEEF PRESERVED BY REFRIGERATION, FREEZING, AND IRRADIATION. Pi-Yu Chang, Margaret Younathan, and Betty Watts (Dept. of Food and Nutrition, Florida State Univ., Tallahassee). *Food Tech.* 15, 168–71 (1961). Oxidation of lipids in the lean tissue of roast beef slices preserved by refrigeration, freezing, or irradiation was followed by the thiobarbituric acid test and organoleptic evaluation. Oxidized products accumulate very rapidly in the refrigerator. Frozen samples maintain a somewhat lower oxidation over long storage periods. Lipid oxidation is not an important factor in irradiated beef stored at room temperature. Antioxidant combinations of ascorbate and polyphosphate, used either as dips or as cover solutions, eliminate lipid oxidation and greatly improve the odor of refrigerated and frozen beef, but do not benefit irradiated beef.

VEGETABLE OILS. IX. APPLICATION OF REVERSED-PHASE CHROMATOGRAPHY TO THE ANALYSIS OF SEED OILS. F.D. Gunstone and P.J. Sykes (The University, St. Andrews). *J. Sci. Food Agr.* 12, 115–123 (1961). A method of determining the composition of mixtures of saturated, unsaturated, and oxygenated acids by reversed-phase chromatography is described. Although not as simple to operate as gas-liquid chromatography, the authors feel that the technique may have some advantages: the analysis is effected under very mild conditions, it is easily carried out on quantities sufficient for further investigation, it requires no expensive or elaborate equipment, and it may be more easily adapted to the less volatile oxygenated acids.

FEED PRODUCT AND METHOD OF PRODUCING SAME. B.H. Thurman (Refining, Inc.). *U.S. 2,968,559.* A glyceride oil containing free fatty acids and gums is mixed with sufficient soda ash to precipitate the gums and to react with at least some of the free fatty acids to form soap. This amount of soda ash should be no more than about three times that theoretically required to neutralize the fatty acids. The resulting soapstock is completely soluble in petroleum ether. A minor portion of the soapstock is mixed with a major portion of a glyceride oil meal to give an animal feed product.

SHORTENING. C.J. Houser (National Dairy Products Corp.). *U.S. 2,968,562.* The described liquid shortening is a combination of (1) an edible liquid oil, (2) a surface active agent such as a partial ester of fatty acids with a hexahydric alcohol or anhydride, a polyoxalkylene derivative of such a partial ester, or an ester-ether resulting from the reaction of fatty acids with alkylene oxides, and (3) a reaction product consisting of glycerine combined with substantially saturated fatty acid radicals of more than 12 carbons with an iodine value no higher than 35 and a hydroxy acid of 6 or less carbons. The surface active agent should be present at concentrations of 0.1 to 2% by weight of the oil and the reaction product in amounts of 2 to 6%. *U.S. 2,968,563.* This liquid shortening contains in addition an edible monoglyceride component in amounts ranging from 0.8 to 3.5%.

SHORTENING. W.F. Schroeder and C.J. Houser (National Dairy Products Corp.). *U.S. 2,968,564.* The described composition is a combination of an edible liquid oil, a surface active agent (between 0.1 and 2.0%), and a monoglyceride component (between 0.8 and 2.5%).

DOMESTIC OIL HARD BUTTERS, COATINGS THEREOF, AND PROCESS FOR PREPARING SAID BUTTERS. W.M. Cochran, M.L. Ott, B.R. Wonsiewicz, and T.J. Zwolanek (Glidden Co.). *U.S. 2,972,541.* The hard butter qualities of a nonrandom triglyceride butter are due primarily to the presence in major amount of at least one edible triglyceride fraction of nonlauric oil, the combined fatty acids of which consist of acids of 16 and 18 carbons distributed in the following proportions: saturated fatty acids 25–55%, *trans* monoethenoic acids 30–50%, and *cis* monoethenoic acids 15–40%. The triglycerides may be tri-(*trans* monoene) glycerides; monosaturated, mono-(*trans* monoene), mono-(*cis* monoene) glycerides; disaturated, mono-(*cis* monoene) glycerides, or di-(*trans* monoene), mono-(*cis* monoene) glycerides.

FAT COMPOSITION. D.B. Zilversmit (Univ. of Tennessee Res. Corp.). *U.S. 2,972,565.* A concentrate composition suitable for admixture with physiologically acceptable aqueous media for intravenous administration consists of one part by weight of safflower oil, about 0.8 parts of glycerin, and about 1/120 as much lecithin w./v. as oil.

SEPARATION OF FATTY ACIDS FROM OXIDIZED FISH OILS. J.J. Bulloff (The Commonwealth Eng. Co. of Ohio). *U.S. 2,972,624.* An aqueous acid solution is added to an oceanic fish body oil. The resulting mass is heated, treated with potassium permanganate solution, and alkalized. The mass is then treated with a 5% to 30% stoichiometric excess of an aqueous solution of a water-soluble aluminum salt. The precipitate is removed by filtration. The resulting aluminum soap has the capacity to thicken benzene rapidly, characteristic of aluminum monohydroxy alkanoates.

CAKE MIXES AND IMPROVED SHORTENINGS THEREFOR. J.B. Thompson and B.D. Buddemeyer (The Paniplus Co.). *U.S. 2,973,086.* The described mix contains flour, baking powder, and sugar intimately blended with a shortening composition consisting of a triglyceride based fatty shortening material in which is dissolved at least 0.5% of an acyl lactylic acid product containing 1 to 6 lactyl groups. The acyl radical contains 16 to 24 carbon atoms.

METHOD OF MAKING POTATO CHIPS. C.M. Gooding and D. Melnick (Corn Products Co.). *U.S. 2,973,268.* Potato slices are fried continuously in a deodorized hydrogenated vegetable seed oil which has an iodine value of 75 to 94, a melting point of 80° to 95°F., and a setting point of 55° to 65°F.

METHOD OF MAKING MARGARINE. D. Melnick (Corn Products Co.). *U.S. 2,973,269.* A margarine product substantially free from occluded gas is produced by superchilling a liquid margarine to a temperature of about 15 to 40°F. below the setting

point of the fat ingredient. The superchilled liquid margarine is then worked to dissipate at least 20% of the potential titer heat due to fat crystallization but maintaining the margarine as a flowable mass, and the material is packaged. The fat ingredient has a Wiley melting point of 90° to 100°F., a setting point of 70 to 80°F., and an iodine value of 70 to 90. The process is operated in such a manner that no work is imparted to the solidified margarine.

COCOA BUTTER SUBSTITUTES AND PRODUCTS CONTAINING THEM. R.L. Best, A. Crossley, S. Paul, H. Pardun, and C.J. Soeters (Lever Bros. Co.). *U.S. 2,975,060*. The fat composition consists of cocoa butter or a Borneo tallow type fat mixed with at least 5% by weight of a palm oil fraction having an iodine value not exceeding 45, a dilation at 20°C. not less than 1,000, and a softening point of 30 to 45°C. If a Borneo tallow type fat or a mixture of cocoa butter and tallow are used, the palm oil fraction must amount to at least 25% of the mixture.

COCOA-BUTTER SUBSTITUTES AND COMPOSITIONS CONTAINING SAME. C.J. Soeters, H. Pardun, A. Crossley, and S. Paul (Lever Bros. Co.). *U.S. 2,975,061*. The described composition is a mixture of a lard fraction having an iodine value of 25 to 40, a softening point of 35–45°C., and a dilation at 20°C. of not less than 1,200 and either cocoa-butter or a palm oil fraction as described in the previous patent. Cocoa-butter should be present at a level of from 70 to 95% by weight; palm oil, if used, should be present at a concentration of 25 to 60%.

COMPOSITIONS CONTAINING COCOA-BUTTER SUBSTITUTES. C.J. Soeters, H. Pardun, A. Crossley, and S. Paul (Lever Bros. Co.). *U.S. 2,975,062*. A chocolate composition comprises decorticated cocoa bean, sugar, and additional fat, the fat phase of the composition consisting of cocoa-butter and mutton or beef tallow. The tallow fraction should be present at a level of from 5% to 30% of the fat mixture.

COCOA-BUTTER SUBSTITUTES, PROCESS OF PREPARING SAME, AND COMPOSITIONS CONTAINING SAID SUBSTITUTES. S. Paul and A. Crossley (Lever Bros. Co.). *U.S. 2,975,063*. A process for preparing a cocoa-butter substitute from palm oil consists of partly hardening palm oil and fractionating the resulting fat to obtain a fraction having an iodine value not greater than 45, a dilatation at 20°C. of not less than 1,000 and dilatation at 35°C. of not greater than 600.

• Fatty Acid Derivatives

THE RAPID PREPARATION OF FATTY ACID ESTERS FOR GAS CHROMATOGRAPHIC ANALYSIS. L.D. Metcalfe and A.A. Schmitz (Armour Industrial Chem. Co., McCook, Ill.). *Anal. Chem.* 33, 363 (1961). A rapid and simple procedure is used to convert fatty acids to their respective methyl esters. Fatty acids boiled in an excess of boron trifluoride-methanol reagent are converted to methyl esters in 2 minutes. The esterification reaction is essentially complete.

THICKENED COMPOSITIONS AND METHOD OF MAKING THE SAME. T.H. Ferrigno (Minerals & Chemicals, Philipp Corp.). *U.S. 2,975,071*. A glycerol ester of an unsaturated long chain aliphatic monocarboxylic acid or an oil-modified alkyd resin is mixed with from 0.5 to 5.0% of an arylene diisocyanate in the presence of particles of a hydrated siliceous material. The mixture is aged at ambient temperature for a time sufficient to cause it to form a thixotropic gel.

CARBOHYDRATE MONOESTERS. V.R. Gaertner (Monsanto Chem. Co.). *U.S. 2,973,353*. The described new compounds are water soluble carboxy carboxylic acid monoesters of carbohydrates in which the carboxylic acids have 10 to 25 carbon atoms and there are no more than 3 carbon atoms between the carboxy group and the carboxylic acid ester group. The carbohydrates are saccharides containing no more than two saccharide units.

FAT-LIQUORING PROCESS. C.E. Retzsch, J. Levy, and C.H. Lighthipe (Nopco Chemical Co.). *U.S. 2,974,000*. A process for fat-liquoring leather comprises contacting the leather with a composition consisting of water and a cationic amine salt of a condensate produced by heating at temperatures between 100 and 210° (a) a fatty material such as a fatty acid having a carbon chain length of 10 to 20 carbon atoms, a glyceride of such fatty acids, or an ester of the fatty acid with an aliphatic monohydric alcohol having from 1 to 5 carbon atoms and (b) a dialkanolamine, the alkyl groups of which contain up to 4 carbons. The ratio of acyl groups to nitrogen atoms in the reaction mixture should be about 1 to 2.

EMULSIFIER-WAX COMPOSITIONS. G.D. Fronmuller and M.J. Mirra (Comcolloid, Inc.). *U.S. 2,974,106*. The described emulsifier is a mixture of approximately equal parts of glyoxalidine and a condensation product of glyceride oil with an alkylolamine such as mono-, di-, or triethanol or propanol-amine.

• Biology and Nutrition

REVIEW OF FILLED MILK, NUTRITIONAL EVALUATION OF THE REPLACEMENT OF THE FAT IN WHOLE COW'S MILK BY COCONUT OIL. F.E. Rice (Food Research Associates, Chicago, Ill.). *J. Agr. Food Chem.* 8, 488–91 (1960). The fat of cow's milk in the light of modern nutritional knowledge is significantly preferable to coconut oil. The latter is low in unsaturated fatty acids, including linoleic acid, high in lauric acid, compounds of which have a toxic effect when fed under certain conditions. Milk fat carries with it important milk nutrients, not present in skim milk or coconut oil. Cow's milk fat more closely approaches human milk fat in composition. Feeding experiments with animals and man have demonstrated two special conditions under which milk fat rates higher nutritionally than coconut oil—during the growth period and when the diet otherwise is marginal. Full-cream cow's milk is significantly preferable to a substitute, the fat content of which is coconut oil, for consumption by the young in areas where dietaries are not all they should be.

NUTRITIVE QUALITY OF COTTONSEED, DIETARY EVALUATION OF COTTONSEED PROTEIN FROM COTTON BRED FOR LOW GOSSYPOL CONTENT. F.H. Smith, C.L. Rhyne, and V.W. Smart (North Carolina State Coll. of Agr. and Engineering, Raleigh, N.C.). *J. Agr. Food Chem.* 9, 82–4 (1961). Strains of cotton with a lower gossypol content than that found in varieties currently grown have resulted from crosses of commercial varieties with Upland cotton having the necessary genes for reducing the gossypol content. Feeding trials with rats showed good growth when meals prepared from three crops of these strains of seed were fed at the 10% protein level. The excellent growth when meals were prepared from certain genetic lines of cotton having relatively high levels of gossypol suggests that other components may have been improved through breeding.

COTTONSEED MEAL IN POULTRY FEED, DISCOLORATIONS IN STORED SHELL EGGS PRODUCED BY HENS FED COTTONSEED MEAL. V.L. Frampton (Southern Regional Research Lab., New Orleans, La.), B. Piccolo (Natl. Cottonseed Products Asso. Fellowship, Southern Regional Research Lab., New Orleans, La.), and B, Heywang (Southwest Poultry Expt. Sta., Glendale, Ariz.). *J. Agr. Food Chem.* 9, 59–63 (1961). The chromogen that appears in yolks of eggs produced by hens fed rations containing cottonseed meal and is responsible for the brown coloration that develops in such eggs (stored under refrigeration in the shell) is a pH indicator. A brown color develops in an alkaline medium, and reverts to yellow when the medium is acidified. The relative chromogen concentration may be estimated photographically, using color film, where portions of the yolk are adjusted to pH 4.6 and 10.4. Differences in the transmittance spectra of the positive transparencies were used as a measure of relative chromogen concentration in the yolk. The color data correlate well with the intensity of coloration estimated visually. Correlations between intensity of coloration in the yolks from cottonseed meal-fed hens and total gossypol, "free" gossypol, chemically uncombined gossypol, and gossypol-like pigments were all poor. Evidence indicates that the chromogen in cottonseed meals responsible for the brown coloration in stored shell eggs is heat-stable.

FOOD ADDITIVES, SAFETY, EFFECT OF FEEDING BUTYLATED HYDROXYANISOLE TO DOGS. O.H.M. Wilder, P.C. Ostby, and Barbara R. Gregory (Div. of Animal Feeds, American Meat Inst. Foundation, Univ. of Chicago, Chicago, Ill.). *J. Agr. Food Chem.* 8, 504–6 (1960). Groups of weanling Cocker Spaniel pups were fed BHA at levels of 0.0, 5.0, 50.0, and 250.0 mg. per kg. of body weight per day for a 15-month feeding period to see what effect, if any, these subacute levels of BHA might have on the dog. General health and weight gains were good throughout the period. Hemoglobin and blood cell counts were not appreciably affected by feeding BHA at the levels used here. Urine from dogs fed BHA contained higher ratio of total to inorganic sulfates, indicating that BHA excretion was by this route. Microscopic examination of tissue sections at the time of autopsy showed no changes beyond normal variation, except in three animals which had received the highest dosage, in which liver injury had occurred. The results indicate the the dogs can ingest BHA for a long period without harm,

at a level at least 220 times the maximum allowable level for the antioxidant in lard.

SOME CHEMICAL CHARACTERISTICS OF THE LIPIDS OF HUMAN AND BOVINE ERYTHROCYTES AND PLASMA, D.J. Hanahan, Ruth M. Watts and D. Pappajohn (Dept. of Biochemistry, Univ. of Washington, Seattle 5, Wash.). *J. Lipid Research* 1, 421–432 (1960). The results of a study on the chemical nature of the natural lipids and phospholipids in bovine and human erythrocytes and blood plasma are presented. The fatty acid distribution of the various lipids is reported and certain aspects of the general findings discussed. It was found that the erythrocytes from man and cow exhibit an almost identical neutral lipid to phospholipid ratio; free cholesterol is the major substance of the neutral lipids present.

THE ANALYSIS OF TISSUE PHOSPHOLIPIDS: HYDROLYSIS PROCEDURE AND RESULTS WITH PIG LIVER. G. Hubscher, J.N. Hawthorne and P. Kemp (Dept. of Medical Biochemistry and Pharmacology, The Medical School, Birmingham 15, England). *J. Lipid Research* 1, 433–438 (1960). A procedure for the hydrolysis of phospholipids is described. The effect of alkali concentration, organic solvents, and length of hydrolysis were studied. The initial reaction in the preferred solvent system appears to be a methanolysis. The phospholipids are converted quantitatively into water soluble phosphates, which are separated and estimated by ion exchange chromatography. In this way phosphatidylcholine, phosphatidylethanolamine, phosphatidylserine, phosphatidylinositol were determined in liver tissue.

INTERACTION OF SERUM LIPOPROTEINS WITH THE HYDROPEROXIDE OF METHYL LINOLEATE. T. Nishida and F.A. Kummerow (Dept. of Food Tech., Univ. Illinois, Urbana). *J. Lipid Research* 1, 450–458 (1960). The interaction of serum lipoproteins with the hydroperoxide of methyl linoleate was studied by means of analytical ultracentrifugation and paper electrophoretic analysis. The results indicated that lipohydroperoxide seemed to have a marked effect on the stability of low density or beta lipoproteins. Methyl linoleate hydroperoxide extensively denatured the low density lipoproteins. An initial or primary association of methyl linoleate hydroperoxide was noted prior to denaturation. The results indicated that the hydroperoxide selectively or preferentially denatured the beta lipoproteins and not other serum lipoproteins or protein constituents. *In vivo* studies indicated that the hydroperoxide inhibited lipid absorption. Although some lipohydroperoxide was absorbed from the intestinal tract, when diluted with methyl linoleate, it is not known whether an exogeneous source of lipohydroperoxide can contribute to the *in vivo* denaturation or degradation of beta lipoproteins.

ROLE OF THE PITUITARY AND THE ADRENAL IN THE MOBILIZATION OF FREE FATTY ACIDS AND LIPOPROTEINS. E. Shafrir, K.E. Sussman, and D. Steinberg (Natl. Heart Inst., Nat. Inst. of Health, Bethesda 14, Md.). *J. Lipid Research* 1, 459–465 (1960). Treatment of normal rats with epinephrine in oil resulted in a rapid rise of plasma free fatty acid (FFA) levels. The return of FFA levels to normal coincided with the steeply increasing blood glucose concentration. The plasma FFA response to epinephrine was abolished by hypophysectomy or by adrenalectomy. The *in vitro* rate of release of FFA from the epididymal fat bodies of operated animals was only about one-half that from fat bodies of normal animals. The *in vitro* rate of release from fat bodies removed 30 minutes after injection of epinephrine was two to three times as high as that in fat bodies taken from noninjected animals. The fat bodies taken from hypophysectomized and adrenalectomized animals showed stimulation by epinephrine but the absolute rates of release were lower than those from intact rats. Normal rats receiving epinephrine showed highly significant elevations of serum cholesterol and phospholipid levels but no rise in triglyceride levels. The cholesterol and phospholipid responses to epinephrine were also abolished by hypophysectomy, and adrenalectomy substantially reduced them. It was concluded that the pituitary and adrenal glands play an important part in the response to the lipid mobilizing action of epinephrine, both in terms of FFA and lipoprotein responses.

PLASMA CHOLESTEROL LOWERING ACTION OF BILE ACID BINDING POLYMERS IN EXPERIMENTAL ANIMALS. D.M. Tennent, H. Siegel, Mary E. Zanetti, G.W. Kuron, W.H. Ott, and F.J. Wolf (Merck Inst. for Therapeutic Research and the Merch Sharp and Dohme Labs., Rahway, N.J.). *J. Lipid Research* 1, 469–473 (1960). Feeding of bile acid-binding polymeric organic bases inhibited cholesterol rise and aortic plack formation in cholesterol-fed cockerels, lowered plasma cholesterol concentrations in normocholesterolemic cockerels and dogs, and increased fecal bile acid and sterol output in a dog. In experiments lasting as long as one year these substances have not produced visible toxic effects. They are thought to act by binding the bile acids in the intestinal tract. The polymeric materials fed were MK-325, a water soluble polymer with quaternary amino groups attached to a polyacrylic skeleton by ester linkages and a molecular weight of about two million, and MK-135, a quaternary ammonium anion exchange resin in which the basic groups are attached to a styrene divinyl benzene copolymer skeleton by carbon-carbon bonds.

EFFECT OF ADRENERGIC BLOCKING AGENTS ON THE RELEASE OF FREE FATTY ACIDS FROM RAT ADIPOSE TISSUE. M.C. Schotz and I.H. Page (Res. Div., The Cleveland Clinic, Cleveland 6, Ohio). *J. Lipid Research* 1, 466–468 (1960). Epididymal adipose tissues from epinephrine-treated rats release more fatty acids into the medium during *in vitro* incubation than do tissues from untreated rats. The effect of epinephrine was abolished when an adrenergenic blocking agent was administered to the animals before epinephrine was injected. Experiments *in vitro* showed that increased release of free fatty acids from adipose tissue due to addition of ACTH, epinephrine, and norepinephrine was inhibited by the addition of an adrenergic blocking agent to the medium. The results suggest that the mobilization of fatty acids from fat depots is at least partly under the control of vascomotor nerves.

DIET AND CHOLESTEROLEMIA: V. EFFECTS OF SULFUR CONTAINING AMINO ACIDS AND PROTEIN. J.C. Seidel, N. Nath, and A.E. Harper (Dept. of Biochemistry, Univ. of Wisconsin, Madison 6, Wis.). *J. Lipid Research* 1, 474–481 (1960). Interrelationships among the effects of dietary protein, sulfur containing amino acids and choline on the serum cholesterol concentration of the rat have been studied. Hypercholesterolemia was induced by feeding rats a diet containing cholesterol, choline and saturated fat. When the diet contained choline, additional casein alleviated the hypercholesterolemia. A similar effect was obtained with a supplement of methionine equal in amount to that in casein. Cystine and cysteine, but not taurine were as effective as methionine. These and other observations suggest that the serum cholesterol lowering effect of protein supplements is due largely to the sulfur containing amino acids they contain. The omission of choline from the diet also alleviated the hypocholesterolemia but when the choline-free diet was supplemented with either choline or methionine serum cholesterol concentrations increased. A supplement of choline alone caused a much greater rise than methionine or a combined supplement of choline and methionine. Methionine appeared to have two opposing effects on serum cholesterol concentration in rats fed a hypercholesterolemic diet lacking choline: a) a cholesterol elevating effect attributable to its ability to spare choline by providing a supply of preformed methyl groups, and b) a cholesterol lowering effect common to sulfur containing amino acids and not dependent upon the provision of methyl groups.

THE METABOLISM OF FATS. I. EFFECT OF DIETARY HYDROXY ACIDS AND THEIR TRIGLYCERIDES ON GROWTH, CARCASS, AND FECAL FAT COMPOSITION IN THE RAT. E.G. Perkins (Armour and Co., Food Research Div., Chicago, Ill.). J.G. Endres and F.A. Kummerow (Dept. of Food Tech., Univ. of Ill., Urbana, Ill.). *J. Nutrition* 73, 291–98 (1961). The influence of ingested ricinoleic acid, 12-hydroxystearic acid and their corresponding triglycerides on rat growth and their effects on carcass fat composition when compared with the effects of a commercial hydrogenated shortening and corn oil was investigated. The results indicated that dietary hydroxy acids are deposited and influence the character of the normal mixed fatty acid composition of the carcass fat; and that both saturated and unsaturated hydroxy fatty acids are converted to monoenoic acids in the rat. A larger amount of oleic acid and hexadecenoic acid seemed to be deposited and a preferential excretion of stearic and linoleic acids seemed to occur in animals fed a source of hydroxy fatty acids in comparison with those fed a source of linoleic acid.

FATTY ACID AND LIPID DISTRIBUTION IN EGG YOLKS FROM HENS FED COTTONSEED OIL OR STERCULIA FOETIDA SEEDS. R.J. Evans, J.A. Davidson, and Selma Bandemer (Depts. of Agricultural Chem. and Poultry Science, Mich. State Univ., East Lansing). *J. Nutrition* 73, 282–90 (1961). Feeding either *S. foetida* seeds or crude cottonseed oil to laying hens caused them to lay eggs with an increased proportion of saturated fatty acids and a decreased proportion of monoenoic acids. Over 50% of the fatty acids in eggs from hens fed cottonseed oil or *S. foetida* seeds were saturated. The linoleic acid content was also slightly increased. The saturated fatty acid content of the phospholipides was fairly constant at about 55% but the dienoic acids

increased from 18 to 24% and the monoenoic acids decreased from 28 to 20% of the total fatty acids. Larger changes took place in the fatty acid distribution in the triglycerides, where the saturated acids increased from 39 to 62% and the monoenoic acid decreased from 44 to 19% of the total fatty acids in the cases of hens fed *S. foetida* seeds. Linoleic acid increased from 17 to 19%.

EFFECT OF VARIOUS OILS AND FATS ON SERUM CHOLESTEROL IN EXPERIMENTAL HYPERCHOLESTEROLEMIC RATS. R. Nicolaysen and R. Ragard (Johan Throne Holst's Inst. for Nutrition Research, Univ. of Oslo, Blindern, Norway). *J. Nutrition* 73, 299–307 (1961). The method for the study of cholesterol metabolism in rats was used by which previous authors had found that cod liver oil had a distinctly stronger cholesterol-depressive effect than linoleic acid. A comparison was made between various marine oils, vegetable oils, egg yolk fat, whole egg yolk, and synthetic arachidonic acid.

EFFECT OF FEEDING ALCOHOL-SOLUBLE AND ALCOHOL-INSOLUBLE SOYBEAN PHOSPHATIDES ON PLASMA LIPIDS AND ON ATHEROMATOSIS IN RABBITS. E. Van Handel (Florida State Bd. of Health, Entomological Research Center, Vero Beach, Florida). *J. Nutrition* 73, 259–65 (1961). With rabbits fed cholesterol-supplemented chow, equicaloric amounts of the following were compared for their effect on atherogenesis: hydrogenated vegetable oil, alcohol-soluble and alcohol-insoluble soybean phosphatides. After 4 months, no difference in atherogenesis was noted among animals of the three groups; the alcohol-insoluble phosphatides caused less hypercholesteholemia and less hyperphospholipemia than alcohol-soluble phosphatides or vegetable oil. In a second experiment, rabbits were made atherosclerotic by cholesterol feeding. Subsequently the animals were fed chow, supplemented with alcohol-soluble, alcohol-insoluble phosphatides or with hydrogenated vegetable oil. Six months after cessation of cholesterol feeding, lesions and lipid deposits were equally severe in all three groups.

INFLUENCE OF DIETARY FATS AND CHOLESTEROL ON TISSUE LIPIDS IN CHICKENS. Lucile Adamson, Gertrude Leeper, and E. Ross (Depts. of Foods and Nutrition and Poultry Science, Univ. Hawaii, Honolulu). *J. Nutrition* 73, 247–58 (1961). The effects in New Hampshire cockerels of dietary fats and cholesterol on serum and liver cholesterol concentrations, liver lipid concentration, the degree of saturation of tissue fats, and endogenous cholesterol synthesis were measured after 10-, 16-, and 22-week feeding periods. Serum cholesterol concentrations were increased only when both fat and cholesterol were fed. The increase was not inhibited by unsaturated dietary fat. Cholesterol, when fed with corn oil, vegetable shortening, or butterfat, caused greatly increased liver cholesterol and (subsequently) increased liver lipid concentration; the increases were greatest with dietary corn oil and least with butterfat. The iodine number of the abdominal fat reflected that of the dietary fat when the diet contained 15% of fat but not when only 3% of fat was fed. Iodine numbers of liver lipids were independent of dietary fat saturation. Endogenous cholesterol synthesis decreased with age and appeared to be independent of the degree of saturation of dietary fat; it was strongly inhibited by diets containing both fat and cholesterol. No atherosclerotic changes were observed.

EFFECT OF SHORT-TERM FEEDING OF FISH OILS AND OF ANTIOXIDANTS ON PLASMA AND LIVER CHOLESTEROL IN THE RAT. M.E. Nimni, A.E. Mitta, Maria Troparevsky, and A. Troparevsky (Departamento de Biologia y Medicina, Comision Nacional de Energia Atomica, Buenos Aires, Argentina). *J. Nutrition* 73, 243–46 (1961). Addition of different fish oils to basal carbohydrate or fat diets induced hypocholesterolemia in the rat. On the other hand these same diets increased the liver cholesterol levels. The observed hypocholesterolemia is a consequence of a decrease in the esterified fraction, whereas liver cholesterol increase was mainly due to an accumulation of free cholesterol. The addition of N,N'-diphenyl-*p*-phenylenediamine and 1,2-dihydro-2,2,4-trimethyl-6-ethoxyquinoline to high fat diets supplemented with 20% of shad oil tended to reverse the effects produced by the fish oil. It decreased the degree of hypocholesterolemia and the accumulation of liver cholesterol. Butyl-4-methoxyphenol, another antioxidant studied, was ineffective in this respect.

SEX DIFFERENCES IN EFFECT OF RESTRICTION OF TIME OF ACCESS TO FOOD ON THE PLASMA LIPID COMPONENTS IN RATS. Elaine W. Lis and Ruth Okey (Dept. of Nutrition, Univ. of Calif, Berkley, Calif.). *J. Nutrition* 73, 117–25 (1961). An investigation of plasma lipid components in young adult rats of both sexes is reported. It was designed to find why part of the cholesterol-fed females given certain fats as 10% of adequate synthetic diets had a higher range of esterified plasma cholesterol values than males or than the rest of the females fed the same diets. Cottonseed and coconut oils were chosen as examples of unsaturated and saturated fats. The data suggest that the rate of esterification of excess dietary cholesterol may differ in males and females and that time restriction of access to food may delay removal of cholesterol ester from plasma to a greater extent in females than in males.

SERUM CHOLESTEROL AND DIFFERENT DIETARY FATS. Ethelwyn B. Wilcox and Leora S. Galloway (Utah State Univ.). *J. Am. Dietet. Assoc.* 38, 227–230 (1961). Serum cholesterol levels were studied in healthy university students (4 men and 4 women) maintained for 15 days on diets composed of ordinary foods and diets which contained 7 different fats: butter, margarine, cottonseed oil, hydrogenated cottonseed oil, lard, hydrogenated lard, and corn oil. The fat provided 35% of total calories. Significant decreases in cholesterol levels occurred on the diets containing margarine, cottonseed oil, hydrogenated cottonseed oil, and corn oil. The decrease was 22% on the corn oil diet and 12% for the other fats. On the butter diet, cholesterol levels increased slightly, but the change was not significant; changes on the two lard diets were also slight. The change in serum cholesterol depended on the initial serum cholesterol value and the cholesterol content in the test diet.

POLYUNSATURATED LIPIDS AND TOCOPHEROL REQUIREMENTS. M.K. Horwitt, C.C. Harvey, B. Century, and L.A. Witting (Elgin State Hospital, Elgin, Ill.). *J. Am. Dietet. Assoc.* 38, 231–235 (1961). This is an interim report of a study on the effects of feeding and storing polyunsaturated lipids which has been in progress for more than 7 years. Tocopherol requirements have been found to vary from a minimum of less than 5 mg. per day for a diet high in animal tissue components to 30 mg. *alpha*-tocopherol for diets providing 60 gm. of stripped corn oil per day. Changes in diet altered mitochondrial lipids of all tissues, with linoleic acid producing the most significant changes. The time of erythrocyte survival was shortened in man when a diet with a relatively low tocopherol to linoleic acid ratio was fed for prolonged periods.

PREPARATION OF VITAMIN A ALCOHOL. H.C. Klein and R. Kapp (Nopco Chem. Co.). *U.S. 2,972,634.* A process is described for converting a $\Delta^{2,4}$-unsaturated aldehyde such as vitamin A aldehyde, β-ionylidene acetaldehyde, α-vitamin A aldehyde or α-ionylidene acetaldehyde to its corresponding alcohol. An aqueous alkaline homogeneous single phase system containing the unsaturated aldehyde and formaldehyde is maintained at a temperature of from 5–75° for a period of time of from several minutes to 24 hours. The resulting $\Delta^{2,4}$-unsaturated alcohol is then recovered.

STABILIZATION OF FAT-SOLUBLE VITAMIN. A. Rosenberg. *U.S. 2,973,266.* Described is a process for making dry, discrete beads containing stabilized fat-soluble vitamin in a fatty core which is encased in an irreversibly heat-denatured, water-resistant proteinaceous digestible shell. A solution of the vitamin in a fat having a melting point of at least 35° is mixed with an aqueous solution of a heat coagulable, proteinaceous material at a temperature of about 10 degrees above the melting point of the fat. The mixture is then heated to denature the protein, homogenized to form an emulsion with the oil as the finely dispersed internal phase, and spray dried.

• Drying Oils and Paints

COMPOSITION OF MATTER AND PROCESS FOR OBTAINING SAME. J. Cunder and F.J. Licata (Nopco Chem. Co.). *U.S. 2,972,590.* The described composition is a mixture of zinc stearate and a resin selected from the group consisting of an epoxy resin and esters thereof. The resin is present in an amount of 0.5 to 20% by weight based upon the weight of stearic acid from which the zinc stearate is derived.

FORMING ALKYD RESINS BY THE INCREMENTAL ADDITION OF THE MONOBASIC ACID. W.M. Kraft (Heyden Newport Chem. Corp.). *U.S. 2,973,331.* A polyhydric alcohol, a polybasic acid, and from 20 to 90% of the monobasic acid component of the resin are heated at a temperature between 150 and 290° until the reaction product has an acid number below 20. The remainder of the monobasic acid (4 to 22 carbon atoms) is then added, and the resulting mixture is heated at a temperature between 190 and 300° until the alkyd has an acid number below 15.

• Detergents

LOW-FOAMING RAW MATERIALS FOR USE IN COMPOUNDED DETERGENTS. H.E. Tschakert (Chemische Werke Huls, Marl.). *Soap, Perfumery, & Cosmetics* 2, 179–198 (1961). Sudsing and cleaning of washing powder raw materials, alone and mixed with other materials, are reported. Low sudsing nonionics and soap-synthetic mixtures were of prime interest.

AN EVALUATION OF THE ELECTROSTATIC FREE ENERGY OF MICELLE FORMATION. A. Veis and C.W. Hoerr (Armour & Co., Chicago). *J. Colloid Sci.* 15, 427–436 (1960). The acid dissociation constants, K, of decyl- and dodecylammonium chloride were determined from pH measurements just above and just below the critical micelle concentration. The change in K is related to the electrostatic work of forming the micelle. This work is 2.53 kT and 3.75 kT, respectively, for the C_{10} and C_{12} salts. A correlation between the change in K and the specific character of the ionizable group is shown. This effect is discussed with relation to the surface geometry of the micelle and the transmission of electrostatic effects through the micelle hydrocarbon cavity of low dielectric constant.

DETERGENTS FROM DIGLUCOSYLUREA. P.R. Steyermark, T.R. Steadman, and R.P. Germann (W.R. Grace and Co., Res. Div., Washington Res. Center, Clarksville, Md.). *Ind. Eng. Chem.* 53, 212 (1961). A new class of nonionic surfactants was prepared. 1,3-Bis-(D-glucopyranosyl)-urea (diglucosylurea) was prepared in good yields by condensation of D-glucose with urea in glacial acetic acid. The reaction was best carried out at a reduced pressure and in the presence of boric acid. Transesterification with diglucosylurea of methyl esters of fatty acids gave diglucosylurea monoesters, which were found to be good nonionic detergents. Their activity could be enhanced not only by formulating them with conventional phosphate builders but also by building them with urea. Condensation of aldohexoses with urea in glacial acetic acid seems to be a general reaction. Digalactosylurea and dimannosylurea were also made using this technique.

NEW TRENDS IN NONIONIC SURFACTANT TECHNOLOGY. L.D. Berger Jr. (Union Carbide Chemicals Co.). *Soap Chem. Spec.* 37 (3), 45–7, 106–7 (1961). By 1959, U.S. production of nonionic surface active agents had increased more than 5-fold over the 1950 level to a total of some 375 million pounds. Of this, 100 million pounds were fatty acid alkanolamides, about 50 million were polyethylene glycol fatty acid esters, and the balance consisted of alkyl phenol-ethylene oxide adducts and the fatty alcohol-ethylene oxide adducts. The author predicts that over the next five years surface active agent technology will be characterized by increasing diversity of products, substantial changes in hydrophobe technology, growing understanding of the relationship of chemical structure to performance, and closer technical cooperation between the laboratories of the basic raw material suppliers and the detergent manufacturers. The detergent industry will be consuming large quantities of synthetic organic chemicals not now considered detergent raw materials—perhaps not even being commercially marketed today.

EARNING A POSITION IN SURFACTANTS. C. Pacifico (American Alcolac Corp.). *Soap Chem. Spec.* 37(3), 52–5, 109 (1961). A check-list of the principal considerations involved in the marketing of a new surface-active agent is presented.

ACID-TOLERATING SOLUBLE OIL COMPOSITION. F.C. Teeter and V.R. Kahler (Sinclair Refining Co.). *U.S. 2,968,621.* The described composition consists of (1) 2 to 5% of a cationic surface active polyoxyethylene derivative of an aliphatic primary amine having 10 to 30 carbon atoms and 2 to 10 mols of ethylene oxide per mol of amine, (2) 2 to 5% of a nonionic surface active polyoxyethylene derivative of hexitol anhydride partial long chain fatty acid ester containing 2 to 25 mols of ethylene oxide per mol of ester, (3) 0.5 to 2.5% of a nonionic long chain fatty acid partial ester of hexitol anhydride in which the fatty acid portion contains 12 to 24 carbons, (4) up to 8% of a mixture of nonionic lower alkyl benzene polyether alcohols having relatively long and short polyethoxy radicals within the range of 5 to 25 ether groups, (5) from 0 to 5% of a mutual solvent for the surface active agents, and (6) the balance mineral oil.

FATTY ACID ESTERS OF HYDROXYALKANESULFONIC ACID AMINE SALTS. A.R. Sexton and E.C. Britton (Dow Chemical Co.). *U.S. 2,968,664.* A stoichiometric amount of a fatty acid halide having from 8 to 20 carbon atoms is added incrementally to a vic-hydroxyalkanesulfonic acid amine salt in which the alkanesulfonic acid has from 2 to 4 carbons and the amine has from 1 to 20 carbon atoms. The resulting mixture is heated at temperatures of from 70 to 150° under an absolute pressure not greater than 200 mm. of mercury while removing the evolved hydrogen halide from the reaction mixture as formed.

OIL COMPOSITIONS HAVING REDUCED FOAMING TENDENCIES. N.E. Delfel (Esso Res. and Eng. Co.). *U.S. 2,972,579.* A mineral oil composition having a decreased foaming tendency consists essentially of (1) a major proportion of mineral oil, (2) an oil-soluble detergent additive such as a metal sulfonate or a metal alkyl phenol sulfide, (3) about 0.001 to 1.000 gram of a dimethyl silicone polymer per 100 grams of dry additive, and (4) about 0.03 to 15 grams per 100 grams of dry additive of 1-octadecanol.

INHIBITION OF FOAMING OF OIL COMPOSITIONS. L.V. Mullen Jr. (Esso Res. and Eng. Co.). *U.S. 2,972,580.* A mineral lubricating oil contains an oil-soluble detergent additive mixture of a metal sulfonate and a metal alkyl phenol sulfide, from 0.01 to 0.2 weight per cent of dimethyl silicone having a viscosity in the range of 100 to 12,500 cs. at 25°, and from 0.5 to 5 weight per cent of diethylene glycol monoethyl ether. The weight percentages are based on the weight of dry detergent additive.

COSMETIC DETERGENT COMPOSITION. D.H. Powers and G. Barnett. *U.S. 2,972,582.* An aqueous cosmetic detergent composition consists of (1) about 10–30% by weight of an acyl isethionate in which the acyl group represents higher fatty acid radicals containing 12 to 18 carbon atoms, (2) about 5–30% of an acylated polypeptide in which the acyl group is also a higher fatty acid radical containing 12 to 18 carbon atoms and the polypeptide is obtainable from the alkaline hydrolysis of proteins, and (3) about 1–10% of a higher fatty acid ester of a polyhydric alcohol. The composition has a pH in the range of about pH 5.5 to pH 7.

DETERGENT CAKE AND METHOD OF MAKING SAME. G.T. Hewitt (Colgate-Palmolive Co.). *U.S. 2,972,583.* A substantially wax-free homogeneous detergent cake consists of 50–95% of a normally solid water soluble, nonsoap, noncationic organic detergent and 5–25% of an organic plasticizer selected from the group consisting of the normally solid polyethylene glycols and compounds possessing aliphatic groups of 12–18 carbon atoms. The latter compounds have hydrophilic and lipophilic groups so as to be emulsifiable in washing solutions.

SURFACE ACTIVE GLUCOSE ETHERS. E.L. Pollitzer (Universal Oil Products Co.). *U.S. 2,974,134.* A water-soluble surface active agent has the following empirical formula:

$$HCOHCORHCOR_1HCOR_2HCOR_3H_2COH_n \cdot (n-1)H_2O.$$

The R groups may be hydrogen or a monovalent hydrocarbon containing from 6 to 20 carbon atoms, and n is a whole number having a value of 2 to 4. At least one, but less than all, of the R groups should be the monovalent hydrocarbon group; however the total number of carbons in the hydrocarbon radicals should not be in excess of 20 per molecule.

LAUNDERING METHOD AND COMPOSITION THEREFOR. H.J. Kauffmann, A.P. Mentecki, and H.J. Wehrfritz (Food Machinery and Chemical Corp.). *U.S. 2,975,139.* A stable, dry-mixed detergent composition consists of an alkyl aryl sulfonate synthetic detergent, a water-soluble perborate (to supply an active oxygen content in the range of 0.8–2.4%), and a water-soluble inorganic copper salt (copper content in range of 0.04–0.4%).

PREPARATION OF SULFO DETERGENTS. V. Blinoff and G. Braude (American Alcolac Corp.). *U.S. 2,975,141.* An organic sulfoxy acid is neutralized in the presence of pulverulent solid carbon dioxide to form a dry, pulverulent detergent. Sufficient solid carbon dioxide is introduced into the mixture during the process to maintain the temperature below 20° and thus prevent hydrolysis and decomposition of the organic material.