

ABSTRACTS . . . R.A. REINERS, Editor

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• Fats and Oils

DETERMINATION OF BUTYLATED HYDROXYANISOLE AND BUTYLATED HYDROXYTOLUENE IN POTATO GRANULES BY GAS-LIQUID CHROMATOGRAPHY. R.G. Buttery and B.N. Stuckey (Eastman Chem. Prd., Inc., Kingsport, Tenn.). *J. Agr. Food Chem.* 9, 283-5 (1961). A rapid and specific method for quantitative analysis of low levels of butylated hydroxyanisole and hydroxytoluene in dehydrated potato granules using gas-liquid chromatography with flame ionization detection is described. The method is shown to give analyses with an average error of less than 11% from the true concentration for both antioxidants within the range 0.5 to 10 p.p.m. of antioxidant in the granules.

PARTIAL CHARACTERIZATION OF THE FLAVORS OF OXIDIZED BUTTER-OIL. A.M. El-Negoumy, D.M. Miles, and E.G. Hammond (Dept. of Dairy and Food Industry, Iowa State Univ., Ames, Iowa). *J. Dairy Sci.* 44, 1047-56 (1961). Butteroil was oxidized at 40° and distilled in a falling-film molecular still. The volatile flavor components were trapped in a U-tube cooled with liquid nitrogen, and the flavor was extracted from the trap contents with a few drops of petroleum ether. The flavor concentrate was then fractionated by gas phase chromatography, using butanediol succinate polymer as a stationary phase. Most of the compounds in the distillate were carbonyl compounds and were identified by their retention times in the gas chromatograph and by paper chromatography of their 2,4-dinitrophenylhydrazones. The fractions from the gas chromatograph were also incorporated into milk and butter and judged organoleptically. It was found that the carbonyl compounds produced in relatively large amounts made only a limited contribution to the oxidized flavor.

THE EICOSAPOLYENOIC ACIDS OF HERRING OIL. E. Klenk and L. Brieker-Voigt (Physiologisch-Chem. Inst., Univ. Cologne). *Z. Physiol. Chem.* 324, 1-11 (1961). The fatty acid composition of herring oil was studied using gas chromatography. The fatty acids were separated into four fractions by acetone crystallization and analyzed as the methyl esters using a 1200 by 4 mm. column packed with Reoplex 400 on Celite at 200° with argon carrier gas. Vacuum distillation and countercurrent distribution of the C₂₀ polyene fraction (from the fraction soluble in acetone at -70°) yielded purified components of this material, which were further characterized by the usual methods. The polyene acids found were all of the linoleic and linolenic type. Acids identified and concentrations as per cent of total fatty acids were: $\Delta^{11,14}$ -eicosadienoic, <<0.1%; $\Delta^{8,11,14}$ and $\Delta^{11,14,17}$ -eicosatrienoic, <0.1%; $\Delta^{5,8,11,14}$ and $\Delta^{8,11,14,17}$ -eicosatetraenoic, 0.2%; and $\Delta^{5,8,11,14,17}$ -eicosapentaenoic, 5.8%.

INFRARED SPECTROSCOPY: APPLICATION TO FATS. J. Chouteau (Fac. Science, Marseille). *Rev. franc. Corp. Gras* 8, 268-284 (1961). The author presents a review of the applications of infrared spectroscopy to fats, oils, and their derivatives as well as much of the theory involved. A considerable number of infrared spectra are reproduced, and the position and intensity of the important bands are indicated.

INFRARED SPECTROSCOPY OF FATS. V. INVESTIGATION OF MILK FATS FOR TRANS-UNSATURATED FATTY ACIDS. H.P. Kaufmann, F. Volbert, and G. Mankel (Deut. Inst. Fettforsch, Münster). *Fette Seifen Anstrichmittel* 63, 261-263 (1961). The trans-fatty acid content of human milk fat was determined using infrared spectroscopy and compared with that of other milk fats. The trans-acid content found for human milk ranged from 0-4% for the women studied. The summer milk of five cows had from 6.3 to 9.0% trans-acids, while their corresponding winter milk had from 0.1 to 1.7% trans-acids in their milk fat.

THIN LAYER CHROMATOGRAPHY OF FATS. II. SEPARATION OF CHOLESTEROL FATTY ACID ESTERS. H.P. Kaufmann, Z. Makus, and F. Deicke (Deut. Inst. Fettforsch, Münster). *Fette Seifen Anstrichmittel* 63, 235-238 (1961). Cholesterol esters of 15 saturated and unsaturated fatty acids were prepared in a pure state and investigated with the aid of thin film chromatography. The esters of short chain and unsaturated fatty acids on unimpregnated kieselgel plates and mixtures of these with long chain fatty acid esters were separated two dimensionally on plates made hydrophobic with paraffin. Tetralin-hexane, and

methyl ethyl ketone-acetonitrile were used as developing solvents. Phosphomolybdic acid was used to detect the separated compounds.

PAPER CHROMATOGRAPHY OF FATS. XLIV. THE PAPER CHROMATOGRAPHIC ANALYSIS OF GLYCERIDES. H.P. Kaufmann and Z. Makus (Deut. Inst. Fettforsch, Münster). *Fette Seifen Anstrichmittel* 63, 125-132 (1961). Glycerides were determined paper chromatographically by separation in an undecane/acetic acid solution, and the resultant spots were detected using Sudan black. Composition of individual spots was determined quantitatively based on fatty acid composition.

CHEMISTRY OF THE COLOR REACTION OF 2-THIOBARBITURIC ACID WITH CARBONYL COMPOUNDS. K. Tafel and R. Zimmermann (German Acad. Science, Berlin). *Fette Seifen Anstrichmittel* 63, 226-234 (1961). The authors have systematically investigated the reaction between 2-thiobarbituric acid (TBA) and several model carbonyl compounds and natural materials. The specificity of the resulting color reactions and the structure, properties, and reaction conditions of the resulting colored material were investigated. The colored products formed appeared to be the result of the formation of a new compound by reaction of an active methylene group in the TBA with the carbonyl function of an aldehyde to give a colorless addition compound. When the resulting compound loses 2 hydrogen atoms, it exists in the colored state in an ionic condition.

INFRARED SPECTROSCOPIC INVESTIGATION OF FATTY ACID ESTERS OF POLYALCOHOLS. H.P. Kaufmann, F. Volbert, and G. Mankel (Deut. Inst. Fettforsch, Münster). *Fette Seifen Anstrichmittel* 63, 8-13 (1961). Spectra of fats and synthetic triglycerides with only saturated fatty acids exhibit absorption at 10.3 μ , which can be mistaken for absorption due to trans-unsaturation. Absorption in this region was also found when fatty esters of polyols and fatty esters with varying chain lengths were examined.

THE CATALYTIC HYDROGENATION OF OITICICA OIL. H.P. Kaufmann and R.K. Sud (Deut. Inst. Fettforsch, Münster). *Fette Seifen Anstrichmittel* 63, 138-147 (1961). The hydrogenation of oiticica oil using different catalysts and under different conditions was studied. The hydrogenations were followed using acid, iodine, saponification, and carbonyl values, as well as UV and infrared spectra. The use of zinc and chromium oxides as catalysts reduced the keto and ester groups, but not the double bonds, to produce diene hydrocarbons.

GAS CHROMATOGRAPHY OF FREE FATTY ACIDS. THE ANALYSIS OF SATURATED AND UNSATURATED FATTY ACIDS FROM CAPROIC UP TO ARACHIDIC ACID. W. Stuve (Main Lab., Margarine-Union Co., Hamburg-Bahrenfeld). *Fette Seifen Anstrichmittel* 63, 325-329 (1961). The free fatty acids of from 6 to 20 carbon atoms, both saturated and unsaturated, were separated gas chromatographically using columns coated with Reoplex 400 (both at the 10 and 20% level) and temperatures up to 180°. Separations achieved were as complete under these conditions as with methyl esters.

PRINCIPLES OF AUTOXIDATION PROCESSES IN LIPIDS WITH SPECIAL REGARD TO THE DEVELOPMENT OF AUTOXIDATION OFF-FLAVORS. H.T. Badings (Netherlands Institute for Dairy Research at Ede, The Netherlands). *Neth. Milk & Dairy J.* 14, 215-42 (1960). The theoretical aspects of autoxidation processes in lipids are reviewed and the origin and development of off-flavors due to autoxidation are discussed.

ALCOHOL SOLUBLE GLYCERIDES. G. Barsky and V.K. Babayan (E.F. Drew & Co., Inc.). *U.S. 2,988,483*. The described product is the solution of an edible oil which is the triglyceride of a mixture of caprylic and capric acids in the ratio of at least 2 to 1, the mixture containing caproic and lauric acids in approximately equal proportions and constituting from 0 to 5% of the total acids, in a monohydric alcohol having 1-6 carbon atoms and containing an oil soluble dye. *U.S. 2,988,484*, ALCOHOL SOLUBLE PHARMACEUTICAL COMPOSITIONS, describes similar vehicles which contain vitamins or antibiotics.

METHOD OF REDUCING MOISTURE LOSS FROM FROZEN MEAT. T.R. Anderson. *U.S. 2,989,401*. The improved method consists of coating the meat with ice and forming on the ice coated meat a moisture-retarding film of a saturated fatty compound such

as ethyl stearate or a fatty alcohol or acid having at least 11 carbon atoms. In *U.S. 2,989,402* the moisture-retarding film of fatty material is maintained on an underlying glycerol-containing layer spread over the surface of the meat.

OIL EXTRACTION APPARATUS. R.R. Mickus and G.W. Brewer (Rice Growers Assoc. of California). *U.S. 2,990,255*. Apparatus for extracting oil from rice bran consists of a tank with a liquid pervious support extending horizontally in the tank for supporting a batch of bran. The tank is provided with an opening above the support for discharging bran into the tank, solvent discharge means above the support for soaking the batch with solvent. The oil in the bran is dissolved in the solvent and the solution of oil and solvent drains through the support, means operating across substantially the entire width of the tank at the support for horizontally discharging substantially all of the batch from the support except for a bed of bran adjacent to the support. The bed thus remains undisturbed upon operation of the means, the means comprising a conveyor adjacent to but spaced upwardly from the support to provide a space extending longitudinally of the conveyor between the lowermost point of the conveyor and the support.

PROCESS FOR DEODORIZING EDIBLE LIQUID FATS. R. Raffaceta. *U. S. 2,991,298*. The described process consists of the following: dividing the liquid fat into a plurality of streams, dropping the streams so that they fall freely vertically by gravity, passing a vapor derived from a source other than the said liquid horizontally through the freely falling streams, extracting some of the odorous volatile components from the streams, drawing off the extracted volatile components mixed with the vapor, collecting the remaining liquid at the end of the free fall, dividing the remaining collected liquid into a plurality of other streams, and repeating the process.

• Fatty Acid Derivatives

GLYCERIDE AND FATTY ACID COMPOSITION OF SOME MONO-DIGLYCERIDE ICE CREAM EMULSIFIERS. R.G. Jensen, J. Sampugna, and G.W. Gander (Dept. of Animal Industries, Storrs Agri. Exp. Station, Storrs, Conn.). *J. Dairy Sci.*, **44**, 1057-60 (1961). The glyceride and fatty acid compositions of 20 commercial ice cream emulsifiers were determined. Since many suppliers suggested about 0.1% of mono-diglyceride emulsifier for ice cream, it is recommended that the amount be adjusted according to the actual monoglyceride content and that this information be placed on the label. Two of the emulsifiers were labelled as containing glucose. Three of them were liquid at or near room temperature and the rest were in the form of free-flowing beads or flakes.

EPOXY AND EPISULFIDO COMPOUNDS IN THE FIELD OF FATS. I. THE LITERATURE OF EPOXY-FATTY ACIDS AND THEIR USE IN THE SYNTHESIS OF HYDROXYAMINO ACIDS. H. P. Kaufmann, G. Hauschild, and R. Schickel (Deut. Inst. Fettforsch., Münster). *Fette, Seifen, Anstrichmittel* **63**, 239-250 (1961). The authors have presented a complete literature survey as well as preparatory methods and reaction of epoxy compounds. The syntheses of several model hydroxy-amino fatty acids and conversion products were described.

THE EPOXIDATION OF UNSATURATED FATTY ACID ESTERS. I. Kovacs (Paint & Varnish Res. Lab., Budapest). *Fette, Seifen, Anstrichmittel* **63**, 251-256 (1961). The results of a study of the epoxidation of unsaturated esters indicated that the process was dependent on many factors. The effect on the epoxidation, of various epoxidizers, reaction temperature, time, catalyst, and degree of dispersion of the epoxidizing oil phase have been investigated and are presented.

CREAM SHAMPOO. J.J. Parran, E.W. Lang, and D.D. Whyte (Procter & Gamble Co.) *U. S. 2,979,465*. The formulation of a soap-free opaque cream shampoo is as follows: (1) 100 parts of sodium alkyl glyceryl ether sulfonate in which the alkyl radicals contain from 10 to 18 carbon atoms and the sodium alkyl diglyceryl ether sulfonate content is between 5 and 30%; (2) 10 to 50 parts of a member of the group consisting of N-acyl seosine, sodium N-acyl sarcosinate, or mixtures, in which the acyl radicals contain from 10 to 16 carbon atoms; (3) from 25 to 60 parts of an inorganic sodium salt such as NaCl, Na₂SO₄, NaNO₃, Na₂PO₄, NaH₂PO₄, or NaH₂PO₄; and (4) water at 45-70% of the total composition to achieve a plastic consistency.

COSMETIC CREAM. K. Riethmiller. *U. S. 2,987,446*. A cream for use as a shaving cream, tooth paste, skin- and hair-treating

cream and sunburn preventive consists of a dispersion having an aqueous continuous phase and comprising a fatty alcohol component (cetyl or stearyl alcohol or mixtures thereof), fatty alcohol sulfonate as an emulsifier, oleic acid oleyl ester as an active lubricant, water, *Oleum hyperici*, urea, and citric acid.

FLY REPELLENT. W. N. Bruce. *U. S. 2,991,219*. A composition for repelling insects contains, as a repellent, di-n-butyl succinate and, as a synergist, a fatty acid material such as oleic acid, sorbitan trioleate, sorbitan monooleate, linoleic acid, ricinoleic acid, propyl oleate, or benzyl oleate.

• Biology and Nutrition

TISSUE STORAGE AND APPARENT ABSORPTION OF ALPHA- AND GAMMA-TOCOPHEROLS BY HOLSTEIN CALVES FED MILK REPLACER. R.T. Chatterton, Jr., D.G. Hazzard, H.D. Eaton, B.A. Dehority, A.P. Grifo, Jr., and D.G. Gosslee (Storrs Agr. Exp. Station, Storrs, Conn.). *J. Dairy Sci.*, **44**, 1061-72 (1961). *Gamma-* or *alpha*-tocopherol were fed in a milk replacer at two levels, 1.0 and 3.0 mg. per pound of live weight per day, to 12 Holstein male (22 ± 2 days old) calves for a 14-day period. Based on total tocopherol analyses, *gamma*-tocopherol was found to have 49% of the value of *alpha* when utilizing plasma concentration as the criterion, 22% when using liver concentration, and 44% when using heart concentration. Based on paper chromatographic separation of *alpha* and *gamma* (in this separation, the *gamma* fraction also included the *beta* and *zeta* forms of tocopherol) similar values were, respectively, 26, 1, and 13%. The calves receiving *gamma* tocopherol had a considerably higher proportion of other forms of tocopherol (particularly *alpha*) in their tissues than calves receiving *alpha*-tocopherol, thereby indicating a possible dietary interaction between the two forms of tocopherol.

PHOSPHOLIPID ANALYSIS OF CELLULAR FRACTIONS OF THE LIVER FOLLOWING ADMINISTRATION OF SINGLE DOSE OF CHOLINE. W.E. Cornatzer (Guy and Bertha Ireland Res. Lab., Dept. of Biochem., Univ. of N. Dakota School of Med., Grand Forks) and D.G. Gallo. *Proc. Soc. Exp. Biol. Med.* **107**, 383-386 (1961). The effect of a single dose of choline on total lipid phosphorus, lecithin P, and cephalin P of mitochondria, nuclei and homogenates of the liver was studied in choline-deficient rats. Administration of single doses of choline of 40, 75 or 150 mg. significantly increased in 6 hours the total lipid P, and lecithin P concentration of liver mitochondria. A statistically significant increase in total lipid P and lecithin P of liver mitochondria and homogenates occurred in 3, 6, 10, and 18 hours following administration of a single dose of choline. Diets low in protein reduce the level of total lipid P, lecithin P, and cephalin P in liver mitochondria.

EFFECT OF CERTAIN LIQUID ORGANOPOLYSILOXANES ON CHOLESTEROL ATHEROSCLEROSIS OF THE RABBIT. F. Gollan (Vets Admin. Hosp. and Univ. of Miami School of Med., Coral Gables, Fla.). *Proc. Soc. Exp. Biol. Med.* **107**, 442-44 (1961). Addition of dimethylpolysiloxane to a diet containing 2% cholesterol does not alter hypercholesterolemia as measured by cholesterol content of the liver of rabbits. However, it increases cholesterol content of the aorta and produces atheromatous lesions of the intima. Addition of phenylmethylpolysiloxane to a diet containing 2% cholesterol prevents severe hypercholesterolemia and increases cholesterol content of the liver. It lowers the cholesterol content of the aorta and prevents atheromatous proliferation.

BIOCHEMISTRY OF THE SPHINGOLIPIDS. H.E. Carter, R.A. Hendry, S. Nojima, N.Z. Stanacev, and K. Ohno (Div. of Biochem., Noyes Lab. of Chem., Univ. of Illinois, Urbana). *J. Biol. Chem.* **236**, 1912-16 (1961). A cerebroside fraction has been isolated from wheat flour lipid and subjected to structural studies. The presence of dihydrosphingosine, phytosphingosine, dehydrosphingosine, and a new long-chain base in wheat flour was established. Hydrolysis of the cerebroside mixture yielded glucose. α -Hydroxystearic acid was found to be the major acidic component of wheat flour cerebroside.

LIPOPROTEIN PRE-STAINING AND ULTRACENTRIFUGAL ANALYSIS IN A DENSITY GRADIENT. D.G. Cornwell and F. A. Kruger (Dept. of Physiological Chem. and Div. of Endocrinology and Metabolism, Dept. of Med., Ohio State Univ., Columbus). *Proc. Soc. Exp. Biol. Med.* **107**, 296-299 (1961). The preparation and standardization of a SBB-Celite slurry for lipoprotein pre-staining is described. Dye uptake is proportional to lipid concentration and may be used to estimate chylomicrons, S_r 10-400

and S₂ 0-10 lipoproteins isolated by density gradient ultracentrifugation. Precipitation on Celite by altering solvent polarity is an effective means for preparing highly dispersed SBB and other lipid soluble substances. A polar dye contaminant is removed from SBB by solvent precipitation.

FATTY LIVERS INDUCED BY OROTIC ACID. W.A. Creasey, L. Hankin, and R.E. Handschumacher (Dept. of Pharmacology, Yale Univ. School of Med., and the Biochemical Lab. of the Conn. Agri. Exp. Station, New Haven, Conn.). *J. Biol. Chem.* 236, 2064-70 (1961). Rats fed a purified diet supplemented with 1% of orotic acid developed an extensive accumulation of triglycerides in the liver, an effect nullified by dietary adenine and diminished if the animals were receiving dog chow instead of purified diet. Incorporation of radioactivity derived from acetate-2-C¹⁴ into the liver triglycerides *in vivo* was increased 15-fold in animals ingesting orotic acid with a purified diet, a result reflected in increased uptake of carbon 14 into the saponifiable lipids of liver slices from such rats.

LIPOLYTIC ACTIVITY OF AORTA OF YOUNG AND OLD RATS AND INFLUENCE OF HEPARIN *IN VIVO*. A. Dury, Ph.D. (Res.-in-Aging Section, Gen. Med. Res., Vet. Admin. Hosp. and Dept. of Anatomy, Univ. of Pittsburgh School of Med., Pittsburgh, Penn.). *J. Gerontology* 16, 114-17 (1961). The lipolytic activity of aortic tissues was determined *in vitro* by measurement of production of non-esterified fatty acids (NEFA) during incubation with an artificial triglyceride substrate. A relationship was shown to exist between weight of aortic tissue and NEFA production and the amount of NEFA released with time of incubation of a constant amount of aortic tissue. Albumin participation in NEFA production was also confirmed. The results are discussed as suggestive of a role of vascular tissue, specifically that of the aorta, in the mechanism of fat transport.

BLOOD TOCOPHEROL VALUES IN NORMAL HUMAN ADULTS AND INCIDENCE OF VITAMIN E DEFICIENCY. P.L. Harris, E.G. Hardenbrook, F. P. Dean, Eleanor Cusack, and J.L. Jensen (Biochem. Lab., Distillation Prod. Industries, Div. of Eastman Kodak Co., Rochester, N.Y.). *Proc. Soc. Exp. Biol. Med.* 107, 381-3 (1961). The mean tocopherol concentration in 197 factory workers in Rochester, N.Y., was 1.05 ± 0.32 mg./100 ml. About 7% of the subjects had less than 0.50 mg. tocopherol/100 ml., the level below which red blood cell hemolysis tests become positive, indicating vitamin E deficiency.

ESSENTIAL FATTY ACID NUTRITION IN SWINE. I. LINOLEATE REQUIREMENT ESTIMATED FROM TRIENE : TETRAENE RATIO OF TISSUE LIPIDS. E.G. Hill, E.L. Warman, C.L. Silbernack, and R.T. Holman (Hormel Inst. and Dept. of Animal Husb. and Physio. Chem., Univ. of Minnesota, Austin). *J. Nutrition* 74, 335-41 (1961). Sixty-six swine were fed purified diets varying in linoleate content from zero to 12.9% of calories. Polyunsaturated fatty acids were determined in the lipids of the hearts and livers. Characteristic high levels of tissue trienoic acids and low levels of tetraenoic acids were observed in the unsupplemented swine. As dietary linoleate was increased, this relationship was rapidly reversed. The linoleate requirement was reduced from the plot of triene/tetraene ratio versus dietary linoleate. The curves for heart and liver were remarkably similar. From these curves and the weight gains, the dietary linoleate requirement is stated to be near 2% of calories.

INFLUENCE OF VARIOUS FEED ON *IN VIVO* AND *IN VITRO* PRODUCTION OF VOLATILE FATTY ACIDS. R.C. Hinders and G.M. Ward (Dept. of Dairy Industry, Colorado State Univ., Fort Collins). *J. Dairy Sci.*, 44, 1129-33 (1961). Rumen fluid was collected from two rumen fistulated animals on six different rations and was used to prepare washed cell suspensions of bacteria. Each suspension was used to ferment five of seven different substrates which were prepared from the same feeds as those fed the donor animals. The greatest *in vitro* production of volatile fatty acids (VFA) from each substrate occurred when the substrate consisted of the same hay as that in the ration of the donor animal. With one exception, the addition of concentrates to a hay diet reduced the VFA concentration *in vivo* when determined 4 hr. after feeding. The *in vitro* VFA production also decreased when the donor animal received concentrate in addition to hay. Under *in vitro* conditions the total acid production, pH, and acetate/propionate ratio was lower than in rumen fluid.

VARIATIONS IN LINOLEIC ACID CONTENT OF DIETARY FAT IN RELATION TO METABOLISM OF FAT, NITROGEN AND MINERALS, AND TO CHANGES IN BLOOD LIPIDS. Isabel Irwin and Hilda Wiese (Dept. of Pediatrics, Univ. of Texas School of Med., Galveston). *J. Nutrition* 74, 217-25 (1961). In a study with 6 young men students as subjects, the linoleic acid content was raised from 10 to 20 and 30% of the dietary fat in a mixed

diet in which fat provided 40% of the calories. No significant effects of linoleic acid level were observed on the retention of calcium, magnesium, and phosphorus. Magnesium retention showed a quadratic trend as the proportion of linoleic acid in the dietary fat increased. The effect on nitrogen metabolism and fecal fat excretion was not clear cut. There was a downward trend in serum cholesterol and total fatty acid levels with increasing amounts of dietary linoleic acid, but the differences in these serum levels between the increments of linoleic acid intake were not significant. The proportion of dienoic acid in the serum fatty acids increased significantly in all fractions studied as the linoleic acid content of the dietary fat increased.

METABOLISM OF PROPIONIC ACID IN ANIMAL TISSUES. Y. Kaziro, S. Ochoa, R.C. Warner, and J.Y. Chen (Dept. of Biochem., N.Y. Univ. School of Med., New York, N.Y.). *J. Biol. Chem.* 236, 1917-23 (1961). The preparation of crystalline pig heart propionyl carboxylase is described. The enzyme, with isoelectric point in the vicinity of pH 6.1 and a molecular weight of 700,000, represents approximately 0.1% of the protein of the initial extract. It contains 1 mole of bound biotin/175,000 g or 4 moles per mole of protein. The enzyme is dissociated by urea into small, inactive subunits of equal size. The turnover number of six times crystallized propionyl carboxylase in the forward reaction is in the neighborhood of 20,000 per mole of enzyme, or 5,000 per mole of biotin, at 30°. The enzyme is active, although to a lesser extent, with butyryl, acetyl, and crotonyl coenzyme A besides propionyl coenzyme A. Relative rates with nonsaturating concentrations of substrate, that with propionyl coenzyme A being taken as 100, were approximately 6, 1, and 3, respectively.

IN VITRO METABOLISM OF C-14 LABELED β -CAROTENE. R.F. Krause (Dept. of Biochem., West Virginia Univ. Med. Center, Morgantown, W. Va.). *Proc. Soc. Exp. Biol. Med.* 107, 363-66 (1961). Ten to 20% of β -carotene was destroyed by incubating C-14 labeled β -carotene with various tissues from the rat. All tissues studied had the ability to transfer radioactivity from β -carotene to sterols, saponifiable material and steam distillable compound or compounds. ATP, DPN, nicotinamide and MgCl₂ were cofactors that increased β -carotene destruction by cell-free homogenates. A negligible amount of CO₂ was liberated during incubation.

VITAMIN A, CAROTENOID, IODINE, THIOCYANOGEN VALUES, AND THE REFRACTIVE INDEX OF MILK FAT AS INFLUENCED BY FEED AND BY INDIVIDUAL BREED DIFFERENCES. V.N. Krukovsky (Dept. of Dairy and Food Sci., N.Y. State College of Agr., Cornell Univ., Ithaca, N.Y.). *J. Agr. and Food Chem.* 9, 326-30 (1961). An inverse relationship was indicated between carotenoid and iodine values of fat. As an average, Ayrshire fat was lower in carotenoid and higher in iodine values than fat from any other breed; Jersey fat was highest in carotenoid and lowest in iodine values; Brown Swiss and Holstein fats were intermediate. Information of these relationships is of value in connection with studies of storage life of fat in milk products, and of fat metabolism. Data suggest that conversion of carotene to vitamin A in an animal body may vary with the degree of unsaturation of fat and is regulated by the same metabolic processes which control the degree of unsaturation of secreted fat.

SOME RELATIONSHIPS BETWEEN CALORIC RESTRICTION AND BODY WEIGHT IN THE RAT. M. Lee and S.P. Lucia (Dept. of Preventive Med., Univ. of Calif. School of Med., San Francisco, Calif.). *J. Nutrition* 74, 243-48 (1961). It has been confirmed that weight maintenance of rats by means of caloric restriction is accompanied by a gradual decline in caloric requirements. This caloric-restriction-adaptation was retained even after a period of severe caloric restriction accompanied by weight loss. Body composition, measured as the proportion of fat in the body, and protein in the fat-free body were the same following caloric restriction as in the zero-time control and *ad libitum* control animals. Some slight but significant changes were noted in body water. Liver total lipid, total cholesterol, and phospholipid levels were unaffected by caloric restriction. Although there were some significant changes in liver weight during caloric restriction, they did not follow any apparent pattern.

THE SPECIFIC DISTRIBUTION OF FATTY ACIDS IN THE GLYCERIDES OF VEGETABLE FATS. F.H. Mattson and R.A. Volpenhein (Procter and Gamble Co., Miami Valley Lab., Cincinnati 39, Ohio). *J. Biol. Chem.* 236, 1891-4 (1961). The distribution of fatty acids in the triglyceride molecules of 18 species of vegetable fats has been determined. Certain fatty acids were found to exhibit specific distribution. Fatty acids having a chain length of more than 18 carbon atoms regardless of whether they are saturated or unsaturated are esterified almost exclusively at

the 1- and 3-positions. Similarly, palmitic and stearic acids are preferentially esterified at the 1- and 3-positions. As a result of the specific distribution of these acids, the 2-position of the triglyceride molecule contains a high proportion of oleic, linoleic, and linolenic acids.

STUDIES ON THE BIOSYNTHESIS OF CHOLESTEROL. G. Popjak, D.S. Goodman, J.W. Cornforth, and R. Ryhage (Med. Res. Council, Exp. Radiopathology Res. Unit, Hammersmith Hosp., London, England). *J. Biol. Chem.* 236, 1934-47 (1961). Squalene biosynthesized from mevalonate-5-D₂ was examined for the disposition of deuterium atoms. It was found that the substance contained 11 atoms of deuterium instead of the theoretically possible number of 12. Mass spectrometric analysis of the succinic acid (as succinic anhydride and dimethyl succinate) derived by ozonolysis from the deuterio-squalene showed that the specimen consisted mostly of trideuterio molecules. Consequently the labeling in the center of squalene was asymmetrical, -CHD·CH₂-. There was no incorporation of tritium from the water of the incubation medium into squalene during its synthesis from farnesyl pyrophosphate with liver microsomes.

FACTORS AFFECTING THE ABSORBABILITY OF SATURATED FATTY ACIDS IN THE CHICK. Ruth Renner and F.W. Hill (Dept. of Poultry Husbandry and Grad. School of Nutrition, Cornell Univ., Ithaca, New York). *J. Nutrition* 74, 254-58 (1961). Absorbability by chicks of fatty acids in tallow, lard, and soybean oil fed as the intact and hydrolyzed fats has been studied using gas chromatography. The absorbability of palmitic and stearic acid present in mixtures of unsaturated fatty acids increased as the level of unsaturated fatty acids in the mixture increased. Absorbability of palmitic and stearic acids in the fatty acid mixtures, however, was much less than their absorbability when fed in the form of mixed triglycerides present in the respective intact fats. Evidence obtained in the course of these experiments supports the particulate theory of fat absorption in the chick.

UTILIZATION OF FATTY ACIDS BY THE CHICKEN. Ruth Renner and F.W. Hill (Dept. of Poultry Husbandry and Grad. School of Nutrition, Cornell Univ., Ithaca, New York). *J. Nutrition* 74, 259-64 (1961). Studies were conducted with chicks up to 4 weeks of age and with hens to determine the absorbability of single fatty acids fed at a level of 20% in a semipurified diet. Absorbability was estimated both by determination of fecal lipids and by combustion analysis of energy utilization. The two methods were in generally close agreement. In the chick, utilization of the saturated fatty acids from C₂ to C₁₃ decreased as chain length increased. Palmitic and stearic acids were essentially unutilized. Oleic acid was found to be approximately 88% utilized by the chick. In the hen, utilization of the saturated fatty acids also decreased with increase in chain length. Absorbability of myristic, palmitic, and stearic acids, however, was significantly greater for the hen than for the chick. Hens refused to consume a diet containing 20% of lauric acid.

OBSERVATIONS ON THE REQUIREMENTS OF YOUNG CHICKS FOR DIETARY FAT. E. Ross and Lucile Adamson (Dept. of Poultry Sci., Dept. of Foods and Nutrition, Univ. of Hawaii, Honolulu, Hawaii). *J. Nutrition* 74, 328-34 (1961). In three experiments conducted with New Hampshire chicks, highly significant growth increases were obtained as early as two weeks by the addition of 3% of corn oil to the "fat-free" (0.05% fat) basal diet. An additional response was obtained by the supplementation of the basal diet with 15% of corn oil, a hydrogenated vegetable oil, or butterfat. Responses to the different fats were of equal magnitude. Supplementation of the "fat-free" diet with 0.33% of methyl linoleate also resulted in significantly increased growth.

STUDIES OF HUMAN LOW DENSITY LIPOPROTEINS IN AGED, ATHEROSCLEROTIC, AND DIABETIC INDIVIDUALS. Judy Spitzer and J.J. Spitzer (Dept. of Physio., Hahnemann Med. Col. and Hosp., Philadelphia 2, Pa.). *J. Gerontology* 16, 125-8 (1961). The quantitative complement fixation technique was used to study human low density lipoproteins *in vitro* and *in vivo*. The work done *in vivo* included 61 normal subjects as well as 24 patients with diabetes mellitus and 20 with atherosclerotic heart disease. Complement fixation curves of low density lipoproteins seem to change as the individual grows older, inhibition of fixation becoming less and less in antigen excess. Low density lipoproteins of diabetics show complement fixation curves similar to those of normal individuals in the same age bracket. The incidence of flat and irregular complement fixation curves is much higher in atherosclerotic patients than in normal individuals.

COMPLETE CHARACTERIZATION OF THE MYO-INOSITOL POLYPHOSPHATES FROM BEEF BRAIN PHOSPHOINOSITIDE. R.V. Tomlinson and C.E. Ballou (Dept. of Biochem., Univ. of Calif., Berkeley, Calif.). *J. Biol. Chem.* 236, 1902-6 (1961). Four methods are described which, when used in conjunction, can lead to the characterization of complex myo-inositol polyphosphate esters. These methods involve periodate oxidation, acid-catalyzed migration, and partial dephosphorylation by ammonia and by a phosphoesterase. The four myo-inositol polyphosphate components obtained by alkaline hydrolysis of a beef brain phosphoinositide preparation have been characterized as L-myo-inositol 1,4,5-triphosphate, myo-inositol 2,4,5-triphosphate, L-myo-inositol 4,5-diphosphate, and myo-inositol 1,4-diphosphate.

OXIDATIVE RANCIDITY IN COOKED MULLET. Marelynn W. Zipser and Betty W. Watts (Dept. of Food and Nutrition, Florida State Univ., Tallahassee, Fla.). *Food Tech.* 15, 318-21 (1961). The muscle lipids of mullet begin to oxidize very rapidly after cooking, as shown by increases in TBA number and rancid odors. Intensity of the reaction appears to be greater in tissues containing large quantities of lipids and heme pigments than in tissues containing lesser amounts. The oxidative reaction is retarded by limited oxygen supply and by low (freezer) temperatures, but was not completely inhibited under the conditions studied. Inhibition was nearly complete with the antioxidant mixture sodium tripolyphosphate and sodium ascorbate, either alone or in combination with curing salts.

SALAD DRESSINGS STABLE TO FROZEN STORAGE. Helen L. Hanson and Lorraine R. Fletcher (Western Regional Research Lab., Albany, Calif.). *Food Tech.* 15, 256-62 (1961). Factors influencing oil and water separation from salad dressings composed of emulsions and starch paste conforming to the oil and egg-yolk specifications of the standards of identity were evaluated at temperatures ranging from +20 to -50°F. Below the freezing point (23-24°F.) of the aqueous phase, 6 factors were of importance: (1) The characteristics of the oil: Oil separation is minimized when the oil used does not crystallize, crystallizes to a limited extent, or crystallizes slowly. (2) Thickening agents: Waxy rice flour is superior to other thickening agents tested because of its slower rate of retrogradation. (3) The egg-yolk level used: Increasing it increases stability. (4) Storage condition of frozen yolk used: The emulsifying function of egg yolk decreases as the storage temperature of frozen salted yolk is lowered. (5) Salt level: Increasing it from 0.5% to 1.7% increases stability. (6) Variations in the ratio of emulsion to starch paste: Increase in the emulsion percentage increases the tendency to oil separation; increase in paste increases the tendency of water separation.

THERMAL CONDUCTIVITY OF MEATS, FATS, GELATIN GELS, AND ICE. C.P. Lentz (Div. of Applied Biology, Natl. Research Council, Ottawa, Canada). *Food Tech.* 15, 243-7 (1961). The thermal conductivities of ice, gelatin gels of several concentrations, different kinds of meat (including fish and poultry), and several kinds of fat, measured over a range of temperatures between 5° and -25° are presented. At above-freezing temperatures the conductivities of the different meats were about equal to each other and slightly lower than the value for water. A simple linear equation expressed the relation between temperature and conductivity for the gels and meats at temperatures below -10°. The conductivity of fats varied only slightly with temperature. Comparison of measured and calculated results indicated that calculations would be of limited usefulness in predicting the thermal conductivity of frozen or other nonhomogeneous food in practice.

THE EFFECTS OF SMOKING AND SMOKING TEMPERATURES ON THE SHRINKAGE, RANCIDITY DEVELOPMENT, KEEPING QUALITY, AND PALATABILITY OF DRY-CURED HAMS. J.D. Kemp, W.G. Moody, and J.L. Goodlett (Univ. of Kentucky, Lexington). *Food Tech.* 15, 267-70 (1961). Hams were dry-cured, with one group not being smoked and the other groups being heated during smoking to 80-140°F. All hams were stored 6 months at 65°F. with a relative humidity of 55-60%. Shrinkage increased with aging, and tended to increase with higher smoking temperatures, especially above 120°F. Iodine numbers showed no definite pattern. Peroxide numbers increased with aging, but increased faster in the unsmoked hams, followed by a smaller increase with an increase in temperature. Free fatty acids also increased with aging, but increased less as smoking temperature increased. Free fatty acid values of seam fat were lower but followed the same pattern. Hams smoked below 110°F. were similar in desirable appearance and aroma and were sounder than those smoked above 110°F. Hams smoked above 110°F. had a lighter color, less pronounced aroma, and more undesirable green spots and deteriorated areas.

FAT BALANCE AND METABOLISM IN HEALTHY INFANTS USING COWS' MILK AND VEGETABLE FATS. W. Droese and H. Stolley (Univ. Children's Clinic, Munich). *Fette Seifen Anstrichmittel* 63, 264-268 (1961). The balance and metabolism of fats in infants has been investigated by determining the daily intake and secretion of the total fatty acids and especially linoleic and oleic acid. It was found that from a chemical and metabolic point of view, a diet containing $\frac{1}{2}$ and $\frac{2}{3}$ milk with the addition of 2% cottonseed oil surpassed the method of feeding with $\frac{1}{2}$ and $\frac{2}{3}$ milk.

THE SULFOLIPIDS. I.H. Goldberg (Dept. of Medicine and Biochem., Univ. of Chicago, Chicago 37, Illinois). *J. Lipid Research* 2, 103-109 (1961). The author has reviewed the literature concerning the chemistry of sulfolipids. The chemical characterization and properties of brain sulfatide is discussed. Tissue distribution and the question of *in vivo* biosynthesis and metabolism as well as possible schemes of biosynthesis of cerebroside sulfate and other sulfolipids are discussed. Finally the occurrence of sulfolipids in plants and tubercle bacilli are discussed (76 references).

FAT TRANSPORT IN SERUM PROTEIN FRACTIONS BY POSTPRANDIAL HYPERLIPEMIA. G. Berg (Univ. Med. Clinic, Erlangen). *Fette Seifen Anstrichmittel* 63, 329-331 (1961). Examination of blood serum using starch electrophoresis showed normally a small content of light lipoproteins in the α_2 fraction. Transport of these chylomicrons taking place in the α_2 fraction was observed. A high content of these chylomicrons in the α_2 fraction of a serum gives a possible indication of a disturbance in fat transport.

MOLECULAR COMPLEXES IN THE ISOLATION AND CHARACTERIZATION OF PLASMA LIPOPROTEINS. D.G. Cornwell and F.A. Kruger (Dept. of Physiol. Chem. and Medicine, Ohio State Univ., Columbus, Ohio). *J. Lipid Research* 2, 110-134 (1961). The molecular complexes formed by the interaction of certain polysaccharides with lipoproteins are discussed in great detail (260 references).

RELATION BETWEEN FOOD FAT AND BLOOD LIPIDS IN INFANTS. H. Löhner and A. Wolf (Univ. Children's Clinic Göttingen). *Fette Seifen Anstrichmittel* 63, 269-271 (1961). Investigation of the blood lipids of infants fed with a cow's milk substitute based on corn oil, with normal cow's milk and human milk showed no changes in the total serum fat content during the different feeding periods. Serum cholesterol levels in the case of feeding human and substitute milk are significantly increased. The highest cholesterol, lipid phosphorus, and iodine values occurred with the use of human milk. The serum values obtained with normal cow milk feeding correspond partly to those found on feeding with human milk and less closely with those fed the substitute milk.

MECHANISM OF FATTY ACID SYNTHESIS. S.J. Wakil (Biochem. Dept., Duke Univ. Med. Center, Durham, N.C.). *J. Lipid Research* 2, 1-24 (1961). The author has reviewed the current status of the mechanism of fatty acid synthesis in great detail (105 references).

THE DIRECT DETERMINATION OF LIVER TRIGLYCERIDES. W.M. Butler, Jr., H.M. Maling, M.G. Horning, and B.B. Brodie (Nat. Heart Inst., Bethesda 14, Md.). *J. Lipid Research* 2, 95-96 (1961). An adaptation of the method of Van Handel and Zilversmit to the direct determination of liver triglycerides is presented and consists of five steps: a) homogenization of the tissue; b) the adsorption of phospholipids onto Zeolite followed by the extraction of triglycerides into CHCl_3 ; c) hydrolysis of triglycerides to fatty acids and glycerol; d) oxidation of glycerol with NaIO_4 to formic acid and formaldehyde; and e) the formation and determination of the optical density at 570 $\text{m}\mu$, of a colored complex of formaldehyde and chromotropic acid.

PROGRESS IN THE STUDY OF FAT METABOLISM AND ITS CLINICAL SIGNIFICANCE. W.S. Schrade, E. Böhle, and R. Biegler (Med. Univ. Klinik, Frankfurt, Germany). *Deutsche Med. Wochenschrift* 86, 781-791 (1961). In studies on fat metabolism in humans, measurement of free fatty acid (FFA) levels in blood serum, and the determination of the fatty acid composition of the FFA gives significant data concerning fat metabolism. Application of gas chromatography to FFA separated by column chromatography permits a detailed study of the normal FFA pattern and in this way changes induced by diabetes, diet, drugs, and other pathological conditions may be studied. Data from analyses of blood serum, FFA, and other serum lipid fractions are given in detail for a large number of normal and abnormal patients and possible interrelationships between disease and FFA composition discussed.

ESSENTIAL FATTY ACIDS IN MITOCHONDRIA. T. Richardson, A.L. Tappel, and E.H. Gruger, Jr. (University of California, Davis). *Arch. Biochem. Biophys.* 94, 1-6 (1961). The fatty acid contents of mitochondria from chicken liver, beef heart, rat liver, catfish liver, carp liver, salmon liver, and salmon heart were determined by gas-liquid chromatography of the methyl esters. The degree of unsaturation of the fatty acids increased in the above order, and the molar amounts of essential fatty acids, arachidonic and linoleic, accounted for 22.3, 51.6, 41.0, 4.5, 20.6, 4.9, and 2.7%, respectively. Fish mitochondria were generally low in essential fatty acids, but contained high levels of docosapentaenoic and docosahexaenoic acids. Chicken liver mitochondria also contained 2.6% of a docosahexaenoic acid. Linoleic acid was very low in salmon liver (0.9%) and salmon heart mitochondria (1.1%) and undetectable in catfish liver mitochondria.

DIETARY EFFECTS OF FATS UPON FATTY ACID COMPOSITION OF THE MITOCHONDRIA. G.J. Marco, L.J. Machlin, E. Emery, and R.S. Gordon (Monsanto Chemical Co.). *Arch. Biochem. Biophys.* 94, 115-20 (1961). Liver and cerebellum mitochondria were prepared from chickens fed a fat-free diet and diets high in linoleic and linolenic acids. The mitochondrial fatty acids were released by mild saponification and analyzed by gas chromatography. Diets high in linoleic and linolenic acids resulted in greatly increased incorporation of the specific acids into mitochondria of liver and cerebellum as compared to mitochondria obtained from chicks on the fat-free diet. The incorporation of a high level of linoleic and arachidonic acids into the cerebellum precedes the incidence of encephalomalacia in vitamin E deficient chicks.

THE LIVER-LIPID CONSTITUENTS OF MALE AND FEMALE RATS. J. EFFECTS OF THE FAT-DEFICIENCY SYNDROME. R.A. Morton and A.A. Horner (Univ. of Liverpool). *Biochem. J.* 79, 631-5 (1961). The liver vitamin A stores of male and female fat-deficient rats did not differ significantly from those of their controls which had received linoleic acid, administered as cottonseed oil. Fat-deficient rats had higher liver-lipid concentrations, owing to increases in cholesteryl esters and triglycerides. Both effects were more marked in males than in females. The total weights of dioenoic and tetraenoic fatty acids fell, and the weight of trienoic acid rose, in the livers of fat-deficient rats. These effects were mostly due to changes in the phospholipid fatty acids. Falls in total liver and phospholipid-bound tetraenoic acids were almost equally marked in male and female rats. Losses of dioenoic and increases in trienoic acids were more marked in males. In liver triglycerides and cholesteryl esters, rises in trienoic and falls in dioenoic acid levels due to fat deficiency were more marked in males, but tetraenoic acid levels fell to a greater extent in females.

• Drying Oils and Paints

PREPARATION OF ALKYL RESINS INVOLVING THE ACIDOLYSIS OF TRIGLYCERIDE OILS, ISOPHTHALIC AND TEREPHTHALIC ACIDS. E.F. Carlston (California Research Corp.). U.S. 2,991,259. A mixture of a triglyceride and a phthalic acid in which the carboxyl groups are separated from each other by at least 3 carbon atoms is heated to a temperature of 500° to 535° F. A saturated aliphatic polyhydric alcohol is then added slowly and continuously to the mixture, heating to maintain the temperature in the desired range to avoid the formation of incompatible gel. Heating is continued to effect esterification and to produce a resin of acid number below 25. The polyhydric alcohol is used in an amount sufficient to react with all the carboxyl groups up to 25% stoichiometric excess over the phthalic acid; the glyceride is present at a concentration of 20% to 90%, based on total resin weight.

• Detergents

FORCES IN DETERGENCY. J.C. Harris (Monsanto Chemical Co. Dayton, O.). *Soap Chem. Specialties* 37(5), 68-71, 125 (1961). Presented is a theoretical treatment of the mechanisms of soil removal. *Ibid.*, 37(6), 50-52 (1961). Part 2 describes the effect of chemisorption and van der Waals physical forces on soil retention, removal, and redeposition. Included are data for the heats of wetting of various solids by water, heats of wetting by polar, polarizable, and nonpolar liquids, and heats of wetting of cellulose.

Ibid., 53-55. In this article, the third of a series, the author discusses the heat and entropy of micelle formation, the heat of adsorption, and the heat of immersion.

MEASURING DETERGENT CONSISTENCY. H.E. Tschakert (Chem. Werke Huels, A.G., Marl-Huels, Germany). *Soap Chem. Specialties* 37(6), 157, 159, 161 (1961). A technique is described for measuring detergent consistency on the Plastograph (Brabender Instruments, Inc.).

THE U.S. SURFACTANT INDUSTRY. J.J. Ayo, Jr., J.H. Bruun, and J.R. Matchett (Agricultural Res. Service, USDA). *Soap Chem. Specialties* 37(5), 59-61, 252; 37(6), 54-5, 111, 113 (1961). Surfactants are described according to their structures, properties, and uses, classified and illustrated according to their uses. An estimate has been made of the annual requirement of various agricultural chemicals in the surfactant industry. Also included are requirements for satisfactory detergent bars.

LIGHT DUTY LIQUID DETERGENTS. M. Gluckman (Kwikbrite Ltd., South Africa). *Soap Chem. Specialties* 37(7), 43-6, 99-100 (1961). Caustic soda, ammonia, caustic potash, triethanolamine, and morpholine were evaluated for neutralizers for alkyl benzene sulphonic acid for the manufacture of light duty liquid detergents. Caustic soda was not the most efficient neutralizing agent. It was definitely overshadowed performance-wise and price-wise by a mixture of $\frac{3}{4}$ caustic soda and $\frac{1}{4}$ ammonia. Thus ammonia was shown to have a definite synergistic effect on caustic soda as a neutralizing agent for alkyl benzene sulphonic acid.

METHOD OF PREPARING WASHING COMPOSITION. V. Dvorkovitz and J.A. Goldman (The Diversey Corp.). *U.S. 2,982,736*. The process of producing a particulate detergent composition consisting of a nucleus of inorganic material and a coating of a relatively neutral, reaction-set salt of a synthetic organic, acidic wetting agent comprises: spraying solid inorganic alkaline material which serves as a detergent builder with about 0.5-50% by weight of an anhydrous normally slow-reacting higher alkyl aryl-, alkyl- or arylsulfonic or sulfuric acid or their esters in the presence of at least 20% by weight of a member of the group consisting of alkylene glycols having 2-4 carbon atoms, alkyl alcohols having 1-4 carbons, and concentrated sulfuric acid. Reaction is complete within about 5 minutes and a dry, solid, coated, finely divided detergent is produced at once during the neutralization process.

CLEANSING COMPOSITION AND METHOD OF MANUFACTURE THEREOF. I.R. Schmolka. (Colgate-Palmolive Co.). *U.S. 2,982,738*. A cleansing composition in gel form consists of 50-98% of an alkane of boiling range between 350°F. and 500°F. and 2-50% of a water soluble salt of a higher fatty amide of sarcosine, the fatty acyl radical having 10-18 carbon atoms. Sufficient sarcosine amide is added to form a gel with the alkane.

DETERGENT ADDITIVES. V. Dvorkovitz, N.M. Berst, G.G. Leist (The Diversey Corp.). *U.S. 2,982,739*. At least 0.1% by weight of gluconic acid or its water-soluble alkali metal salts is added to a synthetic organic detergent such as sodium higher alkylbenzene sulfonate or a higher alkyl phenyl ether of polyethylene glycol to reduce the skin irritation normally induced by such organic detergents.

DETERGENT COMPOSITION. W.L. St. John (Procter & Gamble Co.). *U.S. 2,985,592*. A cleansing and laundering composition having improved sudsing power at dishwashing temperatures consists of an anionic sulfate or sulfonate detergent as the cleansing agent and, as a suds-promoting agent, an alkyurea glycoside in which the alkyl radical has 10 to 15 carbon atoms.

METAL PHOSPHATING COMPOSITION AND PROCESS. J.A. Sharp (Canadian Industries Ltd.). *U.S. 2,986,432*. An anhydrous composition suitable for cleaning and phosphating metal articles consists of a chlorinated hydrocarbon degreasing solvent containing from 1 to 10% by weight of at least one sorbitan monoester of an aliphatic acid having from 1 to 6 moles of phosphoric acid per mole of sorbitan monoester.

CLOSED DIE MOLDING A DETERGENT BAR. O.I. Lundberg and J. Blinka (Procter & Gamble Co.). *U.S. 2,987,434*. The process consists of the following steps: (1) forming, for injection, a fluid melt comprising a mixture of 35-70% normally solid, water-soluble, anionic, non-soap, synthetic detergent and from 22-50% normally solid fatty vehicle having a melting point between 120° and 220°F. selected from the group consisting of saturated higher molecular weight fatty acids and alcohols and mono- and diesters of the fatty acids and a polyhydric alcohol such as glycerol, ethylene glycol, etc.; (2) continuously agitating the dispersion prior to injection; (3) injecting the

dispersion into a closed bar mold, filling the mold which is precooled to a temperature in the range of -30° to +40°F.; (4) ejecting the bar from the mold.

SURFACE-ACTIVE ESTERS OF POLYMERIZED POLYETHENOID FATTY ACIDS. W.H. Kirkpatrick, V.I. Seale, Alice Walker, and J.B. Love (Visco Products Co.). *U.S. 2,987,490*. An ester having a molecular weight of at least 1500 is formed by the esterification of (a) a polymerized polyethenoic fatty acid mixture consisting of at least 70% trimerized tricarboxylic acid having a molecular weight of at least 834, with the remainder of the mixture being a dicarboxy dimer of the polyethenoic fatty acid in the trimerized fatty acid, and (b) a polyoxyalkylene organic compound having an esterifiable hydroxy group in the polyoxyalkylene chain.

TREATING COMPOUND AND METHOD. D.E. Sineroff and E.F. Sipos (Central Soya Co.). *U.S. 2,987,527*. A surface-modifying composition is prepared by reacting 10 to 99 parts by weight of lecithin with 90 to 1 parts of an N-alkyl substituted polymethylene-diamine in which the alkyl groups are derived from fatty acids, at a temperature and for a time to reach equilibrium, characterized by the formation of amides which constitute at least 10% of the amines derived from the polymethylene-diamine and by the corresponding decrease in titratable amines.

NONDUSTING DETERGENT AND BLEACHING COMPOSITION. J.C. Harris, T.C. Tesdahl, and R.M. Anderson (Monsanto Chemical Co.). *U.S. 2,988,510*. A dry, granular composition consists of 25-60% of sodium tripolyphosphate, 10-60% of sodium silicate, 20-60% of sodium sulfate, 0.05-10% of an active organic chlorine-containing compound, and about 0.1-10% by weight of a silicone selected from the group consisting of methyl, ethyl, phenyl, or ethylphenyl silicones.

NONSMEARING DETERGENT BAR. V. Mills and E.O. Korpi (Procter & Gamble Co.). *U.S. 2,988,511*. The described milled detergent bar contains at least 75% by weight of (1) 15-55% of normally solid sodium or potassium detergent salts of anionic organic sulfuric reaction products containing at least 50% alkyl glyceryl ether sulfonates 10-30% of which are alkyl diglyceryl ether sulfonates, the alkyl radicals of which contain 10-20 carbon atoms; (2) 5-50% of a water-soluble soap of fatty acids having from 10-18 carbon atoms; and (3) 20-70% of a binder material such as freshly precipitated calcium or magnesium soaps of fatty acids containing 10-18 carbon atoms, starch, or normally solid waxy materials which will become plastic under the conditions encountered in the milling of the soap.

FOAMING CLEANSING COMPOSITION. A. Kirstahler and K. Goldmann (Bohme Fettechemie G.m.b.H.). *U.S. 2,989,484*. The described composition consists of a surface-active component (water soluble soap, synthetic organic non-soap anionic or nonionic detergent) which produces a foam in aqueous solution and, as a foam-improving and foam-stabilizing additive, from 0.5 to 6.0% by weight of an amino-carboxylic acid amide. Up to 35% by weight of sodium polyphosphate may also be present.

HEAVY DUTY LIQUID DETERGENT COMPOSITIONS. A.F. Steinhauer and J.C. Valenta (Dow Chemical Co.). *U.S. 2,990,375*. A clean transparent aqueous liquid detergent composition contains an alkyl diphenyl ether sulfonate in which the alkyl radical contains from 9 to 15 carbon atoms and an inorganic phosphate such as sodium tripolyphosphate, potassium tripolyphosphate, potassium pyrophosphate, or mixtures of these phosphates. A trilinear diagram is included for calculation of possible concentrations of the ingredients.

SOLID SOAP COMPOSITION. M.L. Sheely and E.P. Glynn (Armour & Co.). *U.S. 2,991,253*. The described composition consists of a mixture of potassium soap of fatty acids containing from 16 to 18 atoms with an anionic synthetic detergent having pronounced detergent power and including in its molecular structure an alkyl radical containing from 6 to 18 carbon atoms and a radical selected from the group consisting of sulfuric acid and sulfonic acid ester radicals. The composition contains from 0.2 to 1 part by weight of detergent to each part of potassium soap. The fatty acid stock used to prepare the potassium soap should have a titer of from 40 to 50°.

METHOD FOR IMPROVING FOAM STABILITY OF FOAMING DETERGENT COMPOSITION AND IMPROVED STABILIZERS THEREFOR. O.L. Scherr. *U.S. 2,991,296*. The described product is an ethoxylated aliphatic carboxylic acid amide of isopropanolamine in which the aliphatic carboxylic acid radical has 13 or more carbon atoms in the chain.