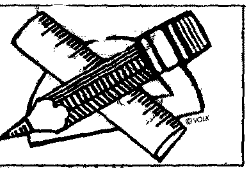


Abstracts

EDITOR: S. KORITALA–ABSTRACTORS: N.E. Bednarcyk, J.C. Harris, M.G. Kokatnur, F.A. Kummerow, T. Mares, B. Matijasevic, J.C. Means, D.B.S. Min, E.G. Perkins, and R.A. Reiners

• Drying Oils and Paints

FATTY ACID COMPOSITION OF OLEORESINS FROM VARIOUS SOFTWOODS. I.I. Bardyshev, S.L. Kryuk, B.G. Udarov and N.G. Yaremchenko. *Khim. Prirod. Soed.* 10(5), 650–2 (1974). Compositions are tabulated of the fatty acid fractions isolated from the oleoresins of Norway, Siberian, Yezo and Schrenk spruce; Scotch, Siberian and Aleppo pine, and Siberian larch. Separation of fatty acids from the oleoresins was based on the former's ease of esterification. Gas-liquid chromatography was then used to analyse the methyl esters. Most of the acids were unsaturated. (World Surface Coatings Abs. No 405)

DRYING OILS, DRIERS AND VARNISHES. N.F. Lythgoe. *Repts. on Progr. Appl. Chem.* 58, 212–6 (1973, Publ. 1975). Trends in natural drying oils, modified oils and analytical studies are reviewed. (World Surface Coatings Abs. No. 404)

CONCENTRATION EFFECTS IN VISCOELASTIC DISPERSIONS. J. Mewis and R.De Bleyser. *Rheol. Acta* **14**(8), 721–8 (1975). Viscometric measurements are reported on titanium dioxide (rutile form) particles dispersed at volume concns. ranging from 0 to 23.8% in an 85% soln. of polymerised linseed oil in linseed oil. The data extend from the Newtonian to the power law region, with equilibrium shear stresses and first normal stress differences being recorded. Oscillatory flow tests were performed immediately after stationary flow tests at the highest shear rate. The results are discussed in the light of hydrodynamic and physicochemical interactions. (World Surface Coatings Abs. No. 404)

COATING COMPOSITIONS. B. Leary and F.J. Lubbock (Dulux Australia Ltd.). *U.S. 3,956,210.* The composition comprises a blend of (1) the substance obtained by reaction of (a) an autoxidizable maleinized monocarboxylic fatty acid with (b) a diol and an alkylene oxide and (2) a cross linking agent in the weight ratio of 70:30 to 95:5 of (1) to (2).

AQUEOUS ELECTROCOATING COMPOSITION. I. Hazan and R.N. Iacona (Du Pont). *U.S. 3,954,688.* The composition, having a pH of 7.2–10.0, comprises 5–50% of film-forming [illegible] tuents uniformly dispersed in an aqueous medium. [illegible] forming constituents consist of (a) 50–97% of [illegible] polymer reaction product of an epoxy ester resin and [illegible]nized drying oil, and (b) 3–50% of a water-dispersible [illegible]linking agent which is a formaldehyde derivative. The [illegible]c compound used to give the desired pH is selected from the group consisting of an alkali metal hydroxide, an am[illegible] or a polyamine.

CONDENSATION REACTIONS OF DRYING AND SEMI-DRYING OILS WITH CINNAMIC ACID, ETHYL CINNAMATE AND VINYL ACETATE. S.N. Behere and B.B. Gogte (Laxminarayan Inst. [illegible] Nagpur U., Nagpur, India). *Paintindia* 25(10), 11–17 [illegible] Study of systematic and stepwise condensation reacti[illegible] drying and semi-drying oils with compounds of the t[illegible] ethyl cinnamate, cinnamic acid and vinyl acetate und[illegible]ferent conditions of temperature and pressure. Iodine [illegible] was mainly chosen as a measure in following the prog[illegible] reaction. Attempts were made to determine the opti[illegible] time, temperature and proportion of reactants to br[illegible] maximum lowering of iodine value. The final samples o[illegible]tained after desired time of heating were washed free [illegible] unreacted ethylenic derivative and systematically analyzed for their characteristic constants like saponification value, iodine value, acid value, etc. The fatty acid mixture isolated through saponification of the final condensate product was fractionated in stepwise manner by urea adduct technic.

A NEW METHOD FOR IMPROVING THE ADHESION OF LACQUERS CURABLE WITH RADICALS ON METALS. B. Trathnigg and J. Wendrinsky (Inst. for Chem., in the Research Center, Seibersdorf/Austria). *Farbe + Lack* 82(2), 100–04 (1976). The adhesion of lacquers curable with radicals on metals may be considerably improved by employing primers which may be easily obtained by reacting (meth)acrylic hydroxyalkyl esters with the anhydride of a dicarboxylic acid. The primers may be added to the lacquer or better used as a separate coating which may be polymerized before the lacquer coat is applied in order to avoid working in the wet.

NON-EDIBLE OILS USED IN SURFACE COATINGS. S.B. Dabhade, P.K. Matai and G.C. Patil (Laxminarayan Inst. Technol., Nagpur Univ., Nagpur, India). *Paintindia* 25(10), 18–20 (1975). From the study of film properties such as drying time, rocker hardness, gloss, hiding power, resistance to acid, alkali, water and corrosion, of various surface coatings obtained, it was seen that the 20% resin (prepared from epoxidized neem, rubberseed oils and phthalic anhydride) to 80% boiled linseed oil compositions gave much better paints.

COMPOSITION OF POLYMERIZED LINSEED OIL BODIED BY A MOLTEN EUTECTIC SALT MIXTURE. A.E. Rheineck and S.N. Koley (Polymers and Coatings Dept., N. Dakota State Univ., Fargo, N.D. and Univ. Colleges Sci. and Technol., Dept. Applied Chem., 92, Acharyya Prafulla Chandra Road, Calcutta-9, India). *Paintindia* 25(10), 21–7 (1975). Quantities of alkali refined linseed oil, ARLO, were passed through molten eutectic mixtures of KNO_3, $NaNO_2$ and $NaNO_3$ or KNO_3 and $NaNO_3$ in the temperature range 280–320 C at various flow rates. The oils increased in viscosity. Color degradation was very slight and the acidity increased to as high as 5 mg KOH/g. The bodied oils were readily separated into two fractions on the basis of solubility in acetone, decreasing with increase in bodying temperature. Both fractions were analyzed for fatty acid composition and structure. Spectroscopic technics, NMR and chromatographic studies indicated that there was an absence of nitrogen compounds, some degradation (to shorter than 18 carbon atom acids), formation of "oxy" groups, and some cyclization in a single acid and in the formation of polymers which were di- and trimeric structures.

• Fats and Oils

DETERMINATION OF SOME PERMITTED ANTIOXIDANTS [illegible] ANIMAL FEEDING-STUFFS, OILS AND FATS. G. Keen and M[illegible] Green, (County Lab., County Hall, Preston, Lancs., Eng[illegible]d). *J. Assoc. Public Anal.* 13(3), 99–102 (1975). The [illegible]posed method involves continuous distillation with amyl [illegible]cetate from satd. NaCl soln. into a modified Clavenger t[illegible] (as prescribed in 'The Preservatives in Food Regulations [illegible]74', H.M.S.O.), with use of thymol as internal standard, [illegible] the subsequent determination of butylated hydroxyanis[illegible] and 2,6-di-t-butyl-*p*-cresol in the distillate by g.l.c. The t[illegible]ue requires little working time and gives recoveries of [illegible]% after distillation for 2 h. A simple qualitative test for [illegible]tes, which can be used as a limit test, based on the fo[illegible]ation of a transient red color when the sample is shak[illegible] wi[illegible] amyl [illegible] and a few drops of conc. aq. NH_3, is also described.

SPOT-TEST METHOD CONVEN[illegible] FOR DETE[illegible] LIPID CONTENT IN COLUMN CHROMATOGRAPHY. S. [illegible] T. Hanai ([illegible] Dielectrics, [illegible] Chem. [illegible], [illegible] Japan). *[illegible] Chem. [illegible], Kyoto [illegible]* 53(3), [illegible] (1975). Extracts of, *e.g.*, [illegible] kidney [illegible] subjected [illegible] column chromatography, and 0.0[illegible]-ml portions of the [illegible] fractions containing lipids were applied, [illegible] intervals of time, [illegible] layer of silica gel. Spots were revealed by spraying the [illegible] with [illegible]phosphoric acid or H_2SO_4, or by exposure to iodine vapour, and their lipid contents were estimated by visual comparison of the spots with those of standards prepared from soln. of total lipids (0.025 to 1.0 mg ml^{-1}) in $CHCl_3$. Results obtained by this method were in satisfactory agreement with those of the method based on determination of P (for P-containing lipids) and those of the dry-weight method.

(Continued on page 587A)

• Abstracts . . . . (Continued from page 586A)

RAPID GAS-CHROMATOGRAPHIC METHOD FOR QUANTITATION OF UNDERIVATISED INDIVIDUAL FREE FATTY ACIDS IN PLASMA. D. Sampson and W.J. Hensley (Dept. Biochem., Roy. Prince Alfred Hosp., Camperdown, N.S.W., Australia). *Clinica Chim. Acta* **61**(1), 1–8 (1975). Plasma (1 ml) plus 150 nmol of ethanolic heptadecanoic acid as internal standard is extracted with 20 ml of $CHCl_3$-heptane-methanol (28:21:1) for 30 sec in a vortex mixer. After 15 min, and mixing for a further 10 sec, the phases are separated by centrifugation, and the organic layer is evaporated. A soln. of the residue in heptane (100 μl) is used for g.l.c. (with 2-μl injections), which is carried out in a glass U-tube (1.8 m × 3 mm) packed with 10% of SP-1,000 on Chromosorb W-AW (100 to 120 mesh) and operated at 280°, with N (25 ml min^{-1}) as carrier gas and flame ionisation detection. Alternatively, a column (1 m × 2 mm) packed with Supelcoport (100 to 120 mesh) supporting 10% of SP-216-PS can be used, operated at 200°; in this event, pentadecanoic acid is used as internal standard. With the SP-1,000 column, one analysis takes $\simeq$45 min and up to 20 samples can be analysed in a day; with the other column, the corresponding figures are 30 min and 30 samples. Recoveries (75 to 80%) and retention times are reported for 8 acids (C_{14} to C_{20}).

ANALYSIS OF α-SULPHOFATTY ACID METHYL ESTERS AND FATTY ALCOHOL SULPHOACETATES. H. Koenig, and E. Walldorf (Analyt. Lab., Blendax-Werke, Mainz, W. Germany) *Z. Analyt. Chem.* **276**(5), 365–370 (1975). Qualitative and quantitative analysis is described with reference to four commercial samples, with emphasis on the problem of separation of these from other detergents by ion-exchange chromatography, t.l.c. and chemical reaction. Identification of components by i.r. and n.m.r. spectrometry and possibilites of determination by gravimetric and two-phase titration methods are also described.

EFFECTS OF SOLVENT EXTRACTION ON LIPID COMPOSITION, MIXING TIME, AND BREAD LOAF VOLUME. K.F. Finney, Y. Pomeranz, and R.C. Hoseney (U.S. Grain Marketing Research Center, U.S. Department of Agriculture, Manhattan, Kans.) *Cereal Chem.* **53**(3), 383–8 (1976). Wheat-flour lipids were extracted with each of nine solvents, petroleum ether, n-hexane, n-heptane, benzene, chloroform, acetone, water-saturated 1-butanol, methanol, and 95% ethanol. Nonpolar solvents extracted substantially less lipids than the more polar solvents. Lipids extracted with nonpolar solvents contained less polar lipids than those extracted with polar solvents. Generally, as extracted bound or total lipids increased, mixing time increased and loaf volume decreased for reconstituted flours. Extracting lipids with each of the three alcohols reduced to zero or greatly impaired the gas-retaining capacity of gluten protein.

AUTOMATED GLASS CAPILLARY GAS-LIQUID CHROMATOGRAPHY OF FATTY ACID METHYL ESTERS WITH REFERENCE TO CIS AND TRANS ISOMERS. H. Jaeger, H.U. Klor, and H. Ditschuneit (Dept. of Internal Med., Div. of Metabolism and Nutr., Univ. of Ulm, West Germany) *J. Lipid Res.* **17**, 185–90 (1976). The availability of an excellent separation method for fatty acid methyl esters, including separation of *cis* and *trans* isomers and of isomers that differ only in the position of double bonds, has become more and more important. The present glass capillary chromatography system combines high separation power with high precision and easy handling. Moreover, the system is completely automated and therefore provides a time saving method. As compared to a conventional packed column, the glass capillary column provides about one hundred fold more theoretical plates (227,000), as well as narrower peaks, thus giving rise to less error when integrating with electronic integrators. The reproducibility for relative retention time is better with the capillary column (0.26%) and reproducibility of the weight percent values is at least similar to that of the packed column (1.53%). When handling only small sample amounts the capillary provides better values because of its low capacity. This powerful system should open up new possibilities in the field of fatty acid investigation.

APPARATUS FOR FILTERING COOKING LIQUIDS. K.S. Arvanitakis. *U.S. 3,959,143.* An apparatus for filtering liquids such as cooking oils and shortenings to remove particulate and chemical contaminants and eliminate odors consists of a frame within a container through which the oil is circulated. Filter cake-forming material is mixed with the oil before entering the container. The inside of the container is baffled in such a way as to create a vortex in the oil which helps to distribute the filter cake-forming material uniformly throughout the frame.

METHOD FOR REFINING OF SOAPS USING SOLVENT EXTRACTION. B. Holmbom and E. Avela. *U.S. 3,965,085.* Pertaining to a method for refining crude sulfate soap and soaps obtained from alkali treatment of wood extractives, and products of tall oil or vegetable oils in which unsaponifiable neutral substances are extracted in organic solvents, there is claimed an improvement comprising dissolving the soap in acetone/water and extracting the unsaponifiables with an immiscible solvent. There results an organic phase containing the unsaponifiables and a water phase containing salts of fatty and resin acids. The two phases are separated, and the solvents removed to collect the products.

SYNTHESIS OF HIGHER POLYOL FATTY ACID POLYESTERS. G.P. Rizzi and H.M. Taylor (Procter & Gamble). *U.S. 3,963,699.* A solvent-free, low temperature process for synthesizing polyol fatty acid polyesters consists of (a) heating a mixture of a polyol selected from the group consisting of monosaccharides, disaccharides and sugar alcohols, a fatty acid C_{1-2} alkyl ester, an alkali metal fatty acid soap, and a basic catalyst at 110–180 C under reduced pressure to form a homogeneous melt of partially esterified polyol and unreacted starting materials; (b) adding excess lower alkyl esters to the reaction product to form the polyol fatty acid polyester; and (c) separating the desired product from the reaction mixture.

STABILIZED FATTY ACIDS. A.L. McKenna (Kraftco Corp.). *U.S. 3,959,321.* A method for stabilizing fatty acids against oxidation comprises adding an alkali metal salt of an organic phosphate ester stabilizer to the fatty acids. The ester is the condensation product of an alcohol and a pentavalent phosphorus compound. The alcohol is selected from the group consisting of polyalkylene alcohols and hydrocarbyl polyols.

FATTY ACID COMPOSITION OF MARGARINES. D. Nazir, B. Moorecroft and M. Mishkel (Lipid Res. Lab., Hamilton Gen. Hosp., Hamilton, Ontario L8L 2X2, Canada) *Am. J. Clin. Nutr.* **29**, 331–9 (1976). The fatty acid composition of 27 samples of bar margarines, 58 samples of tub margarines, and one sample of liquid margarine spread, purchased at different centers in Canada and the United States over a 1-year period (1973–1974), has been determined. The values of total polyunsaturated fatty acids determined by gas-liquid chromatography were compared to the results obtained by an enzymatic method using lipoxidase. The margarines have also been compared on the basis of fatty acid composition and polyunsaturated to saturated fatty acid ratios. All of these parameters showed considerable variations among the different samples analyzed in this study. As a general rule, soft (tub) margarines tended to have a higher concentration of cis, cis-9,12-octadecadienoic (linoleic) acid than hard (bar) margarines. The labeling of the products as regards fatty acid composition was not always helpful in choosing a margarine of high linoleic acid composition.

EFFECTS OF PARAMAGNETIC SHIFT REAGENTS ON THE ^{13}C NUCLEAR MAGNETIC RESONANCE SPECTRA OF EGG PHOSPHATIDYLCHOLINE ENRICHED WITH ^{13}C IN THE N-METHYL CARBONS. B. Sears, W.C. Hutton, and T.E. Thompson (Dept. of Biochem., Univ. of Virginia Schl. of Med., Charlottesville, Virginia 22901) *Biochemistry* **15**, 1635–9 (1976). Effects of paramagnetic shift reagents on the ^{13}C NMR spectra obtained from single-walled vesicle dispersions of egg phosphatidylcholine enriched with ^{13}C in the *N*-methyl carbons are investigated. Spectra obtained at 25.1 MHz show that, at Yb^{3+} to phospholipid molar ratios as low as 0.06, complete resolution of the *N*-methyl carbon resonances is obtained from molecules on the inner and outer faces of the vesicles bilayer. No precipitation of the vesicles is caused by Yb^{3+} at these concentrations nor is appreciable line broadening observed. Other paramagnetic shift reagents frequently used in proton NMR investigations of phosphatidylcholine vesicles do not give complete separation of the *N*-methyl ^{13}C signals from the two bilayer surfaces.

INFLUENCE OF GRINDING, COOKING AND REFRIGERATED STORAGE ON LIPID STABILITY IN TURKEY. L.E. Dawson and K. Schierholz (Food Sci. and Human Nutr., Michigan State Univ., East Lansing, Michigan 48824) *Poult. Sci.* **55**, 618–22 (1976). Frozen whole tom turkeys were thawed at 3° C. and samples were either roasted whole or boned, ground and broiled as patties. TBA values were determined to estimate development of lipid oxidation in breast, thigh, skin and natural proportion combinations. TBA values were highest from ground, cooked patties held 7 days at 3° C., followed, respectively, by ground patties held 7 days, roasted meat held 7 days, freshly broiled patties, freshly roasted meat and freshly ground patties. Stability of turkey meat was therefore influenced by cooking, grinding and storage and the combination resulted in maximum lipid oxidation. Variations in lipid stability among meat source (breast, thigh, skin) were less than among processing treatments.

PROTON MAGNETIC RESONANCE STUDIES OF LIPID BILAYER MEMBRANES. EXPERIMENTAL DETERMINATION OF INTER- AND INTRAMOLECULAR NUCLEAR RELAXATION RATES IN SONICATED PHOSPHATIDYLCHOLINE BILAYER VESICLES. P.A. Kroon, M. Kainosho and S.I. Chan (Arthur Amos Noyes Lab. of Chem. Phys., Calif. Inst. of Technology, Pasadena, Calif. 91125) *Biochim. Biophys. Acta* 433, 282–93 (1976). We have determined the relative magnitudes of the intra- and intermolecular contributions to the nuclear magnetic relaxation rates of the methylene protons of the hydrocarbon chains in phosphatidylcholine bilayer vesicles over a range of temperatures and at two NMR frequencies (100 and 200 MHz). These measurements have been made by the isotopic dilution method using deuterated phosphatidylcholines containing fully deuterated hydrocarbon chains. The results showed that both the methylene linewidths and the spin-lattice relaxation rates are dominated by intramolecular dipolar interactions. That the hydrocarbon chain motion must be fairly effective efficient spin-lattice relaxation is evident from the negligible intramolecular interchain contribution to the relaxation found in the present work.

THE EFFECT OF A PROTEOLIPID FROM SARCOPLASMIC RETICULUM ON THE PHYSICAL PROPERTIES OF ARTIFICIAL PHOSPHOLIPID MEMBRANES. P. Laggner and D.E. Graham (Inst. fur Rontgenfeinstrukturforschung der Osterreichischen Akademie der Wissenschaften und des Forschungszentrums Graz, Graz, Austria) *Biochim. Biophys. Acta* 433, 311–17 (1976). Sarcoplasmic reticulum membranes from skeletal muscle contain a proteolipid ($M_r \sim 12{,}000$) which reduces both the nonspecific ion and water permeabilities of artificial planar phospholipid bilayers. The proteolipid does not show any ionophoric effect or specific pore formation for Ca^{2+}. The a.c. capacitance of the bilayers is unaffected whereas the refractive index is increased by the presence of proteolipid. The results support the view that the proteolipid interacts with the phospholipids in the bilayer interior and causes a condensation in the packing of the alkyl chains.

THE EFFECTS OF PROCESSING ON SOME CHARACTERISTICS, INCLUDING FATTY ACID COMPOSITION, OF CHICKEN FAT. A.S. Pereira, R.W. Evans, and W.J. Stadelman (Animal Sci. Dept., Purdue Univ., West Lafayette, Indiana 47907) *Poult. Sci.* 55, 510–5 (1976). Chicken fatty tissues were dry rendered, wet rendered, and solvent extracted. Fat samples obtained from these operations and also fat samples from skimming of commercial poultry cooking were analyzed. Peroxide values, free fatty acid and moisture contents were determined by A.O.C.S. official methods. Organoleptic characteristics were comparatively observed and described. Lipids were fractionated on thin layer plates. Fatty acids were analyzed on a gas-liquid chromatograph as their methyl ester derivatives. Results obtained indicated that processing had little effect on all the variables considered. The small variations observed may be attributed to temperature differences during processing and from the use or non-use of added water during rendering. All of the procedures used resulted in chicken fats complying with existing recommended specifications for poultry fats.

STRUCTURE IN THE POLAR HEAD REGION OF PHOSPHOLIPID BILAYERS: A ^{31}P {^{3}H} NUCLEAR OVERHAUSER EFFECT STUDY. P.L. Yeagle, W.C. Hutton, C. Huang and R.B. Martin (Depts. of Chem. and Biochem., Univ. of Virginia, Charlottesville, Virginia 22901) *Biochemistry* 15, 2121–4 (1976). The structure of the head-group region of some phospholipid bilayers in vesicle form has been studied and an intermolecular association of the *N*-methyl protons of phosphatidylcholine (PC) with the phosphate of phosphatidylethanolamine (PE) in mixed vesicles has been identified. A corollary of these results is that there is little if any tendency for either PC or PE in the mixed vesicles to segregate into separate domains.

A CALORIMETRIC STUDY OF THE THERMOTROPIC BEHAVIOR OF AQUEOUS DISPERSIONS OF NATURAL AND SYNTHETIC SPHINGOMYELINS. Y. Barenholz, J. Suurkuusk, D. Mountcastle, T.E. Thompson and R.L. Biltonen (Dept. of Biochem., Univ. of Virginia Schl. of Med., Charlottesville, Virginia 22901) *Biochemistry* 15, 2441–7 (1976). A recently developed differential scanning calorimeter has been used to characterize the thermotropic behavior of aqueous dispersions of liposomes containing sphingomyelin. The thermotropic behavior of four pure synthetic sphingomyelins is reminiscent of multilamellar lecithin liposomes in that a single, sharp, main transition is observed. Results obtained for liposomes containing mixtures of different sphingomyelins are complex. Furthermore, it appears that the behavior of the liposomes derived from natural sphingomyelins cannot be explained in terms of phase separation of the individual components.

MEAT WITH HIGH LINOLEIC ACID CONTENT: OXIDATIVE CHANGES DURING FROZEN STORAGE. H.A. Bremner, A.L. Ford, J.J. MacFarlane, D. Ratcliff and N.T. Russell (Meat Res. Lab., CSIRO Div. of Food Res., Cannon Hill, Queensland, Australia 4170) *J. Food Sci.* 41, 757–61 (1976). "High linoleic" meat with fat containing up to 20% linoleic acid was produced by feeding a protected lipid supplement to sheep and steers. A comparison was made of the frozen storage life of this meat and of conventional meat, packaged in sealed polyethylene film pouches and stored at −10°C or at −20°C. Peroxide development was much more rapid in adipose tissue from high linoleic meat stored at −10°C. Rate of peroxide development in high linoleic meat was greatly decreased when stored at −20°C. Taste panel assessments indicated that high linoleic meat stored at −10°C developed rancid odors and flavors 2–3 times more rapidly than did conventional meat.

VIBRATIONAL SPECTROSCOPY OF CHEMISORBED FATTY ACIDS WITH INELASTIC ELECTRON TUNNELING. D.A. Cass, H.L. Strauss and P.K. Hansma (Dept. of Chem., Univ. of California, Berkeley 94720) *Science* 192, 1128–30 (1976). We have measured and assigned the inelastic tunneling spectra of hexanoic acid chemisorbed onto an oxidized aluminum film. We present evidence for gauche-trans as well as all-trans conformers in the monolayer and evidence in support of a recent theory of tunneling intensities.

• Biochemistry & Nutrition

DETERMINATION OF MICROSOMAL CHOLESTEROL BY AN ISOTOPE-DERIVATIVE METHOD. C. Nicolau, S. Shefer, and E.H. Mosbach (Public Hlth Inst., 455 First Ave., New York, N.Y. 10016, U.S.A.). *Anal. Biochem.* 68(1), 255–9 (1975). The sample, containing 0.2 to 4 mg of protein, was hydrolysed by refluxing for 3 h with 25% KOH in 95% ethanol (5 ml), then diluted with H_2O, and total cholesterol was extracted with hexane (2 × 10 ml). The solvent was evaporated under N at 40°. Free cholesterol was extracted from the microsomes with CH_2Cl_2-ethanol (5:1). The solvent was evaporated as before. The residues were dissolved in benzene-methanol (4:1) in reaction vials, the solvent was evaporated and the residues were acetylated by heating for 3 h at 100° with [^{3}H]acetic anhydride in dry pyridine. The excess of reagent was removed in a stream of air at 60°, and the cholesteryl acetate was separated by t.l.c. on Alumina G with ethyl ether-hexane (1:1). The spots were visualised by spraying with 3.5% molybdophosphoric acid in isopropyl alcohol. The cholesteryl acetate spot was removed, dissolved in H_2O in a vial, and counted in a liquid scintillator (5 g of 2,5-diphenyloxazole and 100 g of naphthalene in 11 of 1,4-dioxan).

ANALYSIS OF ENZYMIC STEROID CONVERSIONS BY HIGH-PRESSURE LIQUID CHROMATOGRAPHY. S.A. Slocum and J.F. Studebaker (IBM Thomas J. Watson Res. Center, Yorktown Heights, N.Y. 10598, U.S.A.). *Anal. Biochem.* 68(1), 242–7 (1975). Enzyme-catalysed introduction of a double bond into a steroid was monitored by u.v. spectrophotometry after adding the electron acceptor *N*-methylphenazinium methyl sulphate. Enzymes were obtained from testosterone-induced *Pseudomonas testosteroni*. Substrates used were androst-4-ene-3,17-dione and progesterone, and the products of the reaction, *viz*, androsta-1,4-diene-3,17-dione and pregna-1,4-diene-3,20-dione, were identified by t.l.c. and h.p.l.c. on a column (30 cm × 4 mm) of μBondapak C_{18} with H_2O-acetonitrile (11:9, or 1:1) as solvent. The use of a H_2O-based solvent ensures that extraction with an organic solvent is unnecessary.

ENZYMIC DETERMINATION OF TOTAL CHOLESTEROL [IN SERUM] BY MEANS OF THE CENTRIFICHEM SYSTEM. H.G. Eisenwiener (Lab. Abt. Diagnostica, F. Hoffmann-La Roche & Co. A.-G., Schweizerhalle, Switzerland). *Medsche Lab.* 28(4), 81–8 (1975). Adaptation of this automated system to the determination of cholesterol (I) is described. I is oxidised by cholesterol oxidase, and the H_2O_2 produced is determined with Trinder reagent (prep. described). Before use, the reagent is mixed with cholesterol esterase and cholesterol oxidase. A determination takes ≃15 min, an initial blank determination being carried out by measuring the extinction of the reaction mixture, within 3 s of mixing, against a soln. of the reagents. Only 5 μl of sample is required, and up to 100 analyses can be carried out in 1 h. A soln. of I (200 mg) in 7% aq. Pistocain (an ethoxylated dodecyl ether) is used as standard.

MEASUREMENT OF E AND 19-HYDROXY-E PROSTAGLANDINS IN HUMAN SEMINAL PLASMA. I. Cooper and R.W. Kelly (M.R.C. Unit Reprod. Biol., Edinburgh, Scotland). *Prostaglandins* 10(3), 507–14 (1975). Semen stored at −20° in acetone is centrifuged before assay, the supernatant liquid is evaporated to dryness at 40°, and an aliquot of an ethanolic soln. of the residue is heated at 60° for 1 h with methoxylammonium chloride in pyridinium acetate medium of pH 5. The cooled mixture is diluted with H_2O, then the methoxime derivatives are extracted into ethyl ether-ethyl acetate (3:1) and the extract is evaporated. The residue is treated with cholesteryl acetate (as internal standard) and diazomethane soln. in ether-methanol, this mixture is evaporated, and the residue is allowed to react at 60° for 30 min with trifluorobis-(trimethylsilyl)acetamide. The reaction mixture is analysed by g.l.c. on a glass column (5 ft. × 0.25 in.) packed with 1% of Dexsil 300 on Chromosorb G and temp.-programmed from 190° to 240° at 1.5° min^{-1}, with flame ionisation detection. Determination is by peak-area measurement. Prostaglandins of the A and B series do not interfere. Normal levels of the E and 19-hydroxy-E compounds are reported and discussed. Down to 0.2 μg ml^{-1} of E prostaglandins could be determined in the sample. Routinely, the E_1 and E_2 prostaglandins, and their 19-hydroxy-derivatives, were measured together, but separate determinations were possible.

COLORIMETRIC IDENTIFICATION OF PROSTAGLANDINS IN SUBNANOMOL AMOUNTS. H.C. Kiefer, C.R. Johnson, K.L. Arora and H.S. Kantor (Dept. Biochem., Northwestern Univ., Med. and Dent. Sch., Chicago, Ill. 60611, U.S.A.). *Anal. Biochem.* 68(1), 336–40 (1975). Prostaglandins were extracted from frozen tissue with acetone at −60°, and were separated by t.l.c. on Chromagram 6061 silica gel plates (Eastman) with benzene-1,4-dioxan-acetic acid (20:10:1, or 20:20:1), methanol-$CHCl_3$-acetic acid (1:95:5) or ethyl acetate-formic acid (80:1) as developing solvent. The separated compounds were located by spraying with anisaldehyde reagent (mix 1 ml of anisaldehyde, 9 ml of 95% ethanol and 1 ml of conc. H_2SO_4 in an ice bath) and heating the plate at 90° for 10 min.

CYTIDINE DIPHOSPHATE DIGLYCERIDE OF BOVINE BRAIN. POSITIONAL DISTRIBUTION OF FATTY ACIDS AND ANALYSIS OF MAJOR MOLECULAR SPECIES. W. Thompson and G. MacDonald (Department of Biochemistry, University of Toronto) *Eur. J. Biochem.* 65, 107–11 (1976). A method is described for the isolation of CDP-diglyceride from bovine brain. Yields of the product ranged from 9.2–15.5 μmol per kilogram of tissue, which corresponds to about 1% of the level of phosphatidic acid. Mild alkaline hydrolysis of the product gave three water-soluble phosphate esters which had the same electrophoretic mobilities as CMP, CDP-glycerol and glycerol 3-phosphate. The liponucleotide was quantitatively hydrolysed by CDP-diglyceride hydrolase from *Escherichia coli* to phosphatidic acid and CMP. No dCMP was recovered in enzymatic or alkaline hydrolysates and it is concluded there can be little or no dCDP-diglyceride in bovine brain. Brain CDP-diglyceride was similar to phosphatidylinositol in that in both lipids stearate was the major saturated fatty acid and arachidonate the most abundant unsaturated fatty acid. This differed significantly from the fatty acid patterns of other metabolically related phospholipids, phosphatidic acid and cardiolipin. Brain CDP-diglyceride was hydrolysed with phospholipase C from *Clostridium welchii* with the liberation of the diglyceride moiety in high yield. Treatment of the diglyceride with pancreatic lipase showed CDP-diglyceride with the asymmetric distribution of fatty acids characteristic of most mammalian phospholipids, saturated fatty acids being found mostly at position 1 and polyunsaturated fatty acids at position 2. The derived diglyceride acetates were separated into different molecular species by argentation thin-layer chromatography. These analyses showed that 1-stearoyl, 2-arachidonoyl was the major species of brain CDP-diglyceride.

METABOLISM OF PREEXISTING LIPIDS IN BABY HAMSTER KIDNEY CELLS DURING FUSION FROM WITHIN, INDUCED BY NEWCASTLE DISEASE VIRUS. H. Diringer and R. Rott (Institut für Virologie, Justus Liebig-Universität. GieBen) *Eur. J. Biochem.* 65, 155–60 (1976). The effect of fusion from within induced by Newcastle disease virus on the metabolism of phospholipids, neutral lipids and glycolipids has been studied in baby hamster kidney cells. Hematoside, the only ganglioside in these cells, is rapidly broken down shortly after the onset of virus-induced neuraminidase activity resulting in an increased level of lactosylceramide. No specific breakdown of any phospholipid or neutral lipid could be related to cell fusion.

METABOLISM OF PHOSPHATIDYLGLYCEROL IN CELL-FREE EXTRACTS OF ESCHERICHIA COLI. C. Luzon and J.P.G. Ballesta (Instituto de Biologia Celular, Madrid) *Eur. J. Biochem.* 65, 207–12 (1976). Cell-free extracts from *Escherichia coli* strain number 9, lacking among other enzymes glycerol kinase, are able to incorporate [2-^{3}H]glycerol into phospholipids. The characteristics of this incorporation indicate that it is not taking place through the regular glycerol phosphate pathway of phospholipid synthesis which occurs when this compound is used as a precursor or even when extracts of *E. coli* strain 7, having a functional glycerol kinase, are incubated with [2-^{3}H]glycerol. In *E. coli* strain 9 extracts glycerol is exclusively incorporated into the distal position of phosphatidylglycerol while in the other strains the middle position glycerol is partially labelled.

CONTROL OF FATTY-ACID SYNTHETASE LEVELS BY EXOGENEOUS LONG-CHAIN FATTY ACIDS IN THE YEASTS CANDIDA LIPOLYTICA AND SACCHAROMYCES CEREVISIAE. K. Meyer and E. Schweizer (Institut für Biochemie der Universität Würzburg) *Eur. J. Biochem.* 65, 317–24 (1976). Endogeneous fatty acid biosynthesis in the two yeast species, *Saccharomyces cerevisiae* and *Candida lipolytica* is completely repressed by the addition of long-chain fatty acids to the growth medium. In *Candida lipolytica,* this repression is accompanied by a corresponding loss of fatty acid synthetase activity in the cell homogenate, when the cells were grown on fatty acids as the sole carbon source. The activity of the *Saccharomyces cerevisiae* fatty acid synthetase, however, remains unaffected by the addition of fatty acids to a glucose-containing growth medium. From fatty-acid-grown *Candida lipolytica* cells no fatty acid synthetase complex can be isolated, nor is there any immunologically cross-reacting fatty acid synthetase protein detectable in the crude cell extract. From this it is concluded that *Candida lipolytica,* but not *Saccharomyces cerevisiae,* is able to adapt to the growth on fatty acids either by repression of fatty acid synthetase biosynthesis or by a fatty-acid-induced proteolytic degradation of the multienzyme complex. Similarly, the fatty acid synthetase complex disappears rapidly from stationary phase *Candida lipolytica* cells even after growth in fatty-acid-free medium. Finally, it was found that the fatty acid synthetase complexes from *Saccharomyces cerevisiae* and *Candida lipolytica,* though very similar in size and subunit composition, were immunologically different and had no common antigenic determinants.

INTERCONVERSION BETWEEN 17β-HYDROXY-5α-ANDROSTAN-3-ONE (5α-DIHYDROTESTOSTERONE) AND 5α-ANDROSTANE-3α,17β-DIOL IN RAT KIDNEY: HETEROGENEITY OF 3αHYDROXYSTEROID OXIDOREDUCTASES. G. Verhoeven, W. Heyns and P. DeMoor (Departement voor Ontwikkelingsbiologie, Laboratorium voor Experimentele Geneeskunde, Rega Instituut, Leuven) *Eur. J. Biochem.* 65, 565–76 (1976). 3α-Hydroxysteroid oxidoreductases catalyzing the interconversion between 17β-hydroxy-5α-androstan-3-one (5α-dihydrotestosterone) and 5α-androstane-3α,17β-diol (3α-androstanediol) have been studied in rat kidney. Three enzymes can be distinguished: a soluble NADPH-dependent oxidoreductase, a microsomal NADPH-dependent enzyme and a microsomal NADH-linked enzyme. Traces of the microsomal enzymes are consistently observed in the 108,000 × g supernatant. Studies on crude preparations reveal that these enzymes differ not only in subcellular localization and co-factor requirement, but also in optimum pH, kinetic characteristics, sensitivity to potential steroidal inhibitors and sensitivity to detergents, ionic strength and temperature. Moreover, salient sex differences exist in the activity of all three kidney enzymes. The soluble NADPH-dependent enzyme is more active in female rats whereas both microsomal enzymes are considerably more active in male animals. The microsomal NADH-dependent oxidoreductase displays favorable characteristics to catalyze the 3α-dehydrogenation of 3α-androstanediol. Evidence is presented that it is mainly this enzyme that enables the kidney to use 3α-androstanediol as an efficient precursor for the local formation of 5α-dihydrotestosterone.

11, 15, 19-Trihydroxy-9-ketoprost-13-enoic acid and 11, 15, 19-trihydroxy-9-ketoprosta-5, 13-dienoic acid in human seminal fluid. H.T. Jonsson, Jr., B.S. Middleditch, M.A. Schexnayder and D.M. Desiderio (Dept. of Biochem., Med. Univ. of South Carolina, Charleston, South Carolina 29401) *J. Lipid Res.* 17, 1–6 (1976). Two novel prostaglandins (PG) have been found in human seminal fluid which had been frozen immediately after collection. They were characterized by combined gas-liquid chromatography-mass spectrometry of various derivatives as 19-hydroxy prostaglandin E_1 (11, 15, 19-trihydroxy-9-ketoprost-13-enoic acid) and 19-hydroxy prostaglandin E_2 (11, 15, 19-trihydroxy-9-ketoprosta-5,13-dienoic acid). They were present in three to five times the quantity of prostaglandins E_1 and E_2. Incubation of seminal fluid for 3 hr at 25°C reduced levels of 19OH-PGEs 2.5-fold and PGE_2 2-fold, while increasing levels of PGAs and PGBs 2-fold. No 19OH PGA or 19OH PGB was detected in extracts of unincubated fluid. The PGAs, PGBs and their 19-hydroxy analogs are probably artifacts arising metabolically or as a result of classical isolation techniques.

Characterization of fatty acid desaturase activity in rat lung microsomes. M.R. Montgomery (Clinical Pharmacology and Res. Sections, V.A. Hosp., Minneapolis, Minn. 55417) *J. Lipid Res.* 17, 12–5 (1976). Preparations of rat lung microsomes containing 0.030–0.050 nmole of cytochromes P-450 and b_5 per mg microsomal protein have been observed to contain significant levels of fatty acid desaturase activity. Both stearoyl CoA and palmitoyl CoA are desaturated to their monounsaturated analogues, oleic acid and palmitoleic acid, respectively. Activity (per mg microsomal protein) of the lung preparations varied according to the diet of the animals prior to killing in the order: fat free diet > normal rat chow > starvation. All preparations exhibited approximately 50% inhibition when incubated in the presence of 0.10 mM CN^-. Maximal activity was obtained with 0.50 mM NADH, less activity with equal amounts of NADPH, and there was no synergistic interaction of NADH and NADPH together. These results indicate that the same fatty acid desaturation system which is functional in the liver is also present in significant amounts in mammalian lungs.

Fatty acids of mitochondrial membranes from Tetrahymena pyriformis. F.K. Gleason (Dept. of Genetics and Cell Biol., Univ. of Minn., St. Paul, Minn. 55108) *J. Lipid Res.* 17, 16–20 (1976). We have examined the fatty acid composition of the mitochondrial membranes in three strains of *Tetrahymena pyriformis.* All three had similar components and exhibited large amounts of unsaturated fatty acids. The cytoplasmic mutant, CA-10, which has a slower growth rate and unusual membrane morphology, had a slightly higher amount of *iso*-acids but was otherwise similar to the other strains in fatty acid composition. Arachidonic acid, previously undetected in extracts of *Tetrahymena,* was identified as a minor component of the mitochondrial membrane.

Bile acids. XLIX. Allocholic acid, the major bile acid of Uromastix hardwickii. S.S. Ali, H. Farhat and W.H. Elliott (Dept. of Biochem., St. Louis Univ. Schl. of Med., St. Louis, Missouri 63104) *J. Lipid Res.* 17, 21–4 (1976). Tauroallocholate is the major bile salt of the lizard, *Uromastix hardwickii.* Alkaline hydrolysis of bile from 25 gallbladders provided 1.21 g of acidic material, about 90% of which was allocholic acid. Analyses by gas-liquid chromatography, and mass spectrometry verified the presence of almost 10% of deoxycholic acid and smaller amounts of other 5α- and 5β-bile acids.

Measurement of squalene in humane tissues and plasma: validation and application. G.C.K. Liu, E.H. Ahrens, Jr., P.H. Schreibman and J.R. Crouse (Rockefeller Univ. New York, N.Y. 10021) *J. Lipid Res.* 17, 38–45 (1976). A method is described for accurate and reproducible measurement of squalene in plasma, feces, urine, bile, and tissue that depends on isolation by alumina column chromatography after mild saponification and on measurement by gas-liquid chromatography. Recoveries from all tissues exceeded 80% and from plasma 96%; losses were accurately corrected by appropriate additions of squalane as an overall recovery standard. There was a direct relationship between plasma levels of squalene and triglycerides but not with cholesterol. Plasma squalene levels rose strikingly with increased dietary squalene and varied directly but not consistently with cholesterol synthesis rates.

Prostaglandin E_2 biosynthesis: changes in rabbit aorta and skin during experimental atherogenesis. P.A. Berberian, V.A. Ziboh and S.L. Hsia (Dept. of Physiology, Biophysics, Dermatology, and Biochem., Univ. of Miami Schl. of Med., Miami, Florida 33136) *J. Lipid Res.* 17, 46–52 (1976). The transformation of [1-^{14}C]arachidonic acid into [^{14}C] prostaglandin E_2(PGE_2) by rabbit aorta and skin was demonstrated by cell-free preparations, and the PGE_2 synthetase activity was located mainly in the microsomal fraction (105,000 g pellet) of both tissues. Rabbits fed an atherogenic diet (Purina rabbit chow plus 1% cholesterol and 2% cottonseed oil) developed atheroma in the aortas and skin lesions resembling xanthoma in 6 to 7 months. At the end of this period, increases in the conversion of [1-^{14}C]-arachidonic acid into [^{14}C]PGE_2 were observed in microsomal preparations of the intima-media of the aortas (2.5-fold of control) and normal-appearing skin (3.0-fold of control) of the experimental animal. Microsomal preparations of skin lesions particularly had greater ability to form PGE_2 (7-fold of control).

Accumulation of glyceryl ether lipids in Wolman's disease. H.J. Lin, M.S.F. Lie K. Jie and F.C.S. Ho (Depts. of Pathol. and Chem., Univ. of Hong Kong, Hong Kong) *J. Lipid Res.* 17, 53–6 (1976). We have shown that ether-linked glycerolipids accumulated in the adrenal, liver, and spleen of a male Chinese infant with Wolman's disease; the increases were mainly in the alkyl and alk-1-enyl glycerclipids that did not contain phosphorus. Alkyldiacylglycerol accounted for a portion of the rise in the neutral alkylglycerols. The spleen also contained increased amounts of ether-linked phosphoglycerides of the alkyl and alk-1-enyl types. Organs from a Niemann-Pick patient were also included in this study; they did not show comparable rises in the content of ether-linked glycerolipids, suggesting the possibility that storage of these compounds may be characteristic of Wolman's disease, or a variant form thereof.

Retention of lipolytic products in chylomicrons incubated with lipoprotein lipase: electron microscope study. E.J. Blanchette-Mackie and R.O. Scow (Section on Endocrinology, Lab. of Nutr. and Endocrinology, National Inst. of Arthritis, Metabolism and Digestive Diseases, National Insts. of Health, Bethesda, Md. 20014) *J. Lipid Res.* 17, 57–67 (1976). Early effects of lipolysis on the structure of chylomicrons in vitro were studied in rat chylomicrons incubated with purified bovine milk lipoprotein lipase at pH 8.1. The amount of the albumin added to the incubation medium was limited so that free fatty acids (FFA) and partial glycerides formed during lipolysis would accumulate in the chylomicrons. The structures visualized in lipolyzed chylomicrons was found to be affected by pH during preparation of specimens for microscopy, whether fixed with OsO_4 and sectioned, or stained with sodium phosphotungstate and examined as whole mounts. It is concluded that the monolayer lining the aqueous spaces is an inward extension of the chylomicron surface film produced by the accumulation and movement of lipolytic products, FFA and partial glycerides, in the interfacial plane between core triglyceride and water.

Effect of p-chlorophenoxyisobutyrate on the antilipolytic action of insulin and insulin binding in isolated adipocytes. C. Ip, H.M. Tepperman and J. Tepperman (Dept. of Pharmacology, State Univ. of New York, Upstate Med. Center, Syracuse, N.Y. 13210) *J. Lipid Res.* 17, 68–73 (1976). The present study was undertaken to investigate the potentiation by *p*-chlorophenoxyisobutyrate (CPIB) of the antilipolytic effect of insulin in isolated adipocytes from rats fed a sucrose diet, glycerol-lard diet, or chow diet. CPIB supplementation in the diet consistently resulted in decreased serum triglyceride levels in rats from the three dietary groups. The catecholamine-stimulated glycerol release was significantly depressed to a greater extent by insulin when the fat cells were obtained from rats given CPIB compared to those without drug treatment. Thus it seems that CPIB can potentiate the action of insulin in inhibiting mobilization of free fatty acid from the adipose tissue, and the coordinated effect of both antilipolytic agents is important in lowering serum triglyceride concentration.

Synthesis of 5β-cholestane-3α,7α,12α,25-tetrol and 5β-cholestane-3α,7α,12α,24ξ,25-pentol. B. Dayal, S. Shefer, G.S. Tint, G. Salen and E.H. Mosbach (Dept. of Med., Col. of Med. and Dentistry of New Jersey, New Jersey Med. Schl., Newark, N.J. 07103) *J. Lipid Res.* 17, 74–7 (1976). This paper describes syntheses of 5β-cholestane-3α,7α,12α,25-tetrol and 5β-cholestane-3α,7α,12α,24ξ,25-pentol which give higher yields than previously published methods. In addition, 5β-cholestane-3α,7α,12α,24ξ,25-pentol was synthesized by a different procedure, namely via performic acid oxidation of the corresponding unsaturated triol, which gave a lower yield but avoided the formation of 5β-cholestane-3α,7α,12α,25,26-pentol, which normally tends to contaminate the final product. Structures were confirmed by gas-liquid chromatography, infrared-, proton magnetic resonance- and mass spectrometry. 5β-Cholestane-3α,7α,12α,25-tetrol and 5β-cholestane-3α,7α,12α,24ξ, 25-pentol were required for in vivo and in vitro studies of the (hypothetical) 25-hydroxylation pathway of cholic acid biosynthesis.

ESTIMATION OF BILE ACID EXCRETION IN MAN: COMPARISON OF ISOTOPIC TURNOVER AND FECAL EXCRETION METHODS. M.T. Subbiah, N. Tyler, M. Buscaglia and L. Marai (Mayo Clinic and Mayo Foundation, Rochester, Minnesota) *J. Lipid Res.* **17,** 78–84 (1976). Bile acid excretion was studied in 9 human subjects simultaneously by the Lindstedt isotopic turnover method and by fecal chemical analysis during a balance study. The identities of the fecal bile acids were confirmed by combined gas-liquid chromatography/mass spectrometry. Under the steady state conditions of the patient studies, bile acid excretion values obtained by fecal analysis were lower (by 18.1 to 44.2%) than the values obtained by the isotopic turnover method. This difference persisted even in those patients given [^{14}C]chenodeoxycholic acid instead of [^{3}H]chenodeoxycholic acid. It is recommended that the data obtained from the isotopic turnover method should not be compared with fecal excretion data.

A STEROSPECIFIC SYNTHESIS OF 7α-HYDROXYCHOLESTEROL. D.B. Johnson and L. Lack (Dept. of Physiol. and Pharmacol., Duke Univ. Med. Ctr., Box 3185 Durham, North Carolina 27710) *J. Lipid Res.* **17,** 91–3 (1976). The five step synthesis of 7α-hydroxycholesterol utilizes the solvolysis of 7α-bromocholesterol benzoate with potassium acetate in acetic acid as the key step in controlling the stereospecificity of the reaction sequence. This reaction yields 7α-acetoxycholesterol benzoate with retention of configuration at position seven. The diester is readily reduced with lithium aluminum hydride to 7α-hydroxycholesterol.

STEROL BALANCE IN HYPERLIPIDEMIC PATIENTS AFTER DIETARY EXCHANGE OF CARBOHYDRATE FOR FAT. P.H. Schreibamn and E.H. Ahrens, Jr. (The Hosp. of the Rockefeller Univ., New York, N.Y. 10021) *J. Lipid Res.* **17,** 97–106 (1976). Dextrose was exchanged isocalorically for polyunsaturated fat in the liquid formula diets of 10 hyperlipidemic patients maintained under metabolic steady state conditions. Carbohydrate caused an increase of plasma triglycerides in all 10; plasma cholesterol rose in 7, and 6 of these 7 failed to show any increase in total fecal excretion of cholesterol. In contrast, fecal steroid excretion increased significantly in the three patients who maintained an unchanged or lower plasma cholesterol on the high-carbohydrate diet. Squalene, an obligatory precursor in the biosynthesis of cholesterol, rose in the plasma during carbohydrate feeding in 6 out of 6 patients studied. These experiments demonstrate a divergent response between plasma cholesterol concentration and cholesterol excretion. To establish causal relationship between the two (i.e., plasma cholesterol increased because excretion does not increase) will require further research.

THE EFFECT OF COLCHICINE AND VINBLASTINE ON THE RELEASE OF PULMONARY SURFACE ACTIVE MATERIAL. T.J. Delahunty and J.M. Johnston (Depts. of Biochem. and Obstetrics and Gynecology and The Cecil H. and Ida Green Ctr. for Reproductive Bio. Sci., Univ. of Texas Southwestern Med. Schl., Dallas, Texas 75235) *J. Lipid Res.* **17,** 112–6 (1976). The secretion of phosphatidylcholine was studied by incubating hamster lung slices which had been prelabeled by the in vivo administration of ^{14}C-labeled choline. The release of ^{14}C-labeled phospholipid into the medium continued for 2 hr. The specific activity of phosphatidylcholine in the medium was one-third that found in the tissue, and the fatty acid composition of the released phosphatidylcholine corresponded to that of surfactant. The prior injection of colchicine resulted in a 60% inhibition of phosphatidylcholine release into the incubation medium. A similar effect was obtained when vinblastine was administered. Colchicine demonstrated no inhibiting effect on the release of protein from lung slices which had been prelabeled by the administration of ^{14}C-labeled leucine. The possible function of the microtubular system in the secretion of surface active components is discussed.

ABSORPTION OF CHOLESTEROL BY THE GALLBLADDER. D.H. Neiderhiser, C.K. Harmon and H.P. Roth (Med. Service, Vet. Adm. Hosp. and the Depts. of Med. and Biochem., Case Western Reserve Univ. Schl. of Med., Cleveland, Ohio 44106) *J. Lipid Res.* **17,** 117–24 (1976). To study whether cholesterol is absorbed by the gallbladder, we instilled from 1 to 300 nmoles of [4-^{14}C]cholesterol dissolved in 1 ml of guinea pig bile into the in situ guinea pig gallbladder. The bile used in these experiments contained 7 μmole/ml bile acid, 27 nmole/ml lecithin, and 8 nmole/ml cholesterol. To this bile, we added the radioactive cholesterol, from 0 to 1 μmole/ml egg lecithin, and 100 μg/ml of bromosulfophthalein, a nonabsorable marker. This study presents evidence that significant quantities of cholesterol but not cholesterol ester can be absorbed by the guinea pig gallbladder. We also found that the absorbed cholesterol can be converted to cholesterol ester and the relevance of these findings to cholesterosis in man are discussed.

THE EFFECTS OF N-HEXYL-O-GLUCOSYL SPHINGOSINE ON NORMAL CULTURED HUMAN FIBROBLASTS: A CHEMICAL MODEL FOR GAUCHER'S DISEASE. K.R. Warren, I.A. Schafer, J.C. Sullivan, M. Petrelli and N.S. Radin (Depts. of Pediatrics and Pathology, Cleveland Metropolitan Gen. Hosp., Case Western Reserve Univ., Cleveland, Ohio 44109) *J. Lipid Res.* **17,** 132–8 (1976). Normal human skin fibroblasts were grown in the presence of *N*-hexyl-*O*-glucosyl sphingosine (HGS), an inhibitor of aryl glycosidase and glucocerebrosidase. Tests of the cells with aryl glycosides showed that β-glucosidase activity in the cells was drastically reduced while other enzyme activities (α-glucosidase, β-galactosidase, and *N*-acetyl-β-hexosaminidase) were normal or elevated. Exposure of cells to HGS for 28 days resulted in increased values for cell weight per plate, glucocerebroside concentration, and galactosylgalactosylglucosyl ceremide concentration. The concentrations of total lipid, cholesterol, and protein were unchanged, as was the fatty acid distribution within the glycolipids. Chemically, the inhibitor-treated cells exhibited a model form of Gaucher's disease. Although many membranous cytoplasmic inclusions were induced by HGS, they were unlike the characteristic inclusions seen in individuals with the genetic disorder. Skin fibroblasts from a Gaucher patient showed no abnormalities in composition or appearance.

THE EFFECT OF SEX ON THE QUANTITY AND PROPERTIES OF THE VERY LOW DENSITY LIPOPROTEIN SECRETED BY THE LIVER IN VITRO. C. Soler-Argilaga, H.G. Wilcox and M. Heimberg (Dept. of Pharmacology, Vanderbilt Univ., Schl. of Med., Nashville, Tenn. 37232) *J. Lipid Res.* **17,** 139–45 (1976). Livers from normally fed male and female rats were perfused in vitro with different amounts of oleate, and the production and properties of the very low density lipoprotein (VLDL) were studied. The mobility of the VLDL in the zonal ultracentrifuge was dependent on the uptake of free fatty acid and on the sex of the animal from which the liver was obtained. A higher proportion of the VLDL secreted by livers from females displayed a more rapid mobility in the zonal ultracentrifuge and, in addition, contained less phospholipid and cholesterol per mole triglyceride than the VLDL from the male, suggestive of larger size of the VLDL secreted by livers from the female rats. Such differences were diminished when the VLDL was compared at equal output of triglyceride but unequal uptake of free fatty acid. The change of fatty acid composition of the VLDL phospholipid may reflect inclusion of specific types of phospholipid in the VLDL structure for transport of triglyceride from the liver under particular conditions.

DISTRIBUTION OF GLYCOSPHINGOLIPIDS IN THE SERUM LIPOPROTEINS OF NORMAL HUMAN SUBJECTS AND PATIENTS WITH HYPO- AND HYPER-LIPIDEMIAS. G. Dawson, A.W. Kruski and A.M. Scanu (Depts. of Pediatrics, Biochem. and Med., Univ. of Chicago, Pritzker Schl. of Med. and the Franklin McLean Memorial Res. Inst., Chicago, Ill. 60637) *J. Lipid Res.* **17,** 125–31 (1976). Five glycosphingolipids (GSL), glucosylceramide, lactosylceramide, trihexosylceramide, globoside, and hematoside (G_{M3}) were studied in serum from normal human subjects and patients with dyslipoproteinemia and found to be exclusively associated with the various classes of serum lipoproteins. Based on a unit weight of lipoprotein protein, the total amount of GSL in serum from normal subjects was twice as high in very low density lipoprotein (VLDL) ($d < 1.006$ g/ml) and low density lipoprotein (LDL) (d 1.019–1.063 g/ml) as in high density lipoproteins HDL_2 (d 1.063–1.125 g/ml) or HDL_3 (d 1.125–1.21 g/ml). In abetalipoproteinemia the levels of serum GSL were slightly reduced when compared to normal serum and were all found in the only existing lipoprotein, HDL; this contained 2–3 moles of GSL/mole of lipoprotein as compared to 0.5 GSL/mole in normal HDL. Although our results establish that glycosphingolipids are intimately associated with serum lipoprotein, the mode of association or the structural and functional significance of such an association remains undetermined.

GANGLIOSIDE BIOSYNTHESIS. CHARACTERIZATION OF URIDINE DIPHOSPHATE GALACTOSE: GM$_2$ GALACTOSYLTRANSFERASE IN GOLGI APPARATUS FROM RAT LIVER. F.E. Wilkinson, D.J. Morre and T.W. Keenan (Depts. of Bio. Sci., Botany and Plant Pathology, and Animal Sci., Purdue Univ., West Lafayette, Indiana 47907) *J. Lipid Res.* **17**, 146–53 (1976). An enzyme that transfers galactose from UDP-Gal to ganglioside GM$_2$ (Tay-Sachs ganglioside) was concentrated 50 times in Golgi apparatus from rat liver relative to total homogenates. This enzyme required detergents or phospholipids as dispersing agents. Of the numerous detergents tested, sodium taurocholate and Triton CF-54 were most effective in stimulating the reaction. Cardiolipin alone was more effective than any of the detergents tested in stimulating enzyme activity. The pH optimum for the reaction varied with the nature of the dispersing agent. The newly synthesized GM$_1$, the product of the reaction, was incorporated into or became tightly associated with the membranes of the Golgi apparatus.

HALOFENATE AND CLOFIBRATE: MECHANISM OF HYPOTRIGLYCERIDEMIC ACTION IN THE RAT. R.J. Cenedella and W.G. Crouthamel (Dept. of Pharmacology and Schl. of Pharmacy, West Virginia Univ., Morgantown, West Virginia 26506) *J. Lipid Res.* **17**, 156–66 (1976). Rats fed a fat-free diet containing no drug, 0.02% or 0.10% halofenate, or 0.25% clofibrate for 14 days were injected intravenously with equivalent amounts of either [2-^{3}H] glycerol or [1(3)-^{3}H] glycerol. Blood samples were collected at times up to 150 min after injection and serum triglycerides were isolated and assayed for radioactivity. Kinetic analysis of the serum appearance and clearance curves of ^{3}H-labeled triglyceride permits estimation of serum total ^{3}H-labeled triglyceride formation and triglyceride fractional turnover rates. The total amounts of ^{3}H-labeled triglycerides formed from [2-^{3}H] or from [1(3)-^{3}H] glycerol in control-fed animals were very similar.

CHARACTERIZATION OF MYELIN OF CHICK SCIATIC NERVE DURING DEVELOPMENT. M.R. Oulton and C. Mezei (Dept. of Biochem., Faculty of Med., Dalhousie Univ., Halifax, Novia Scotia, Canada) *J. Lipid Res.* **17**, 167–75 (1976). Myelin was isolated from the sciatic nerves of chicks of ages 18-day embryonic, 1-day, 4-day, 7-day posthatch, and adult to study developmental changes in lipid composition of this structure. The yield of myelin increased throughout the early stages of development and the preparations were of high purity. Although the lipid content of the myelin did not change, significant changes took place in lipid composition during development. The most significant changes were a relative increase in cerebrosides, phosphatidylethanolamine and long-chain fatty acids of cerebrosides, and a relative decrease in the content of phosphatidylserine and phosphatidylethanolamine.

A SOLVENT SYSTEM FOR DELIPIDATION OF PLASMA OR SERUM WITHOUT PROTEIN PRECIPITATION. B.E. Cham and B.R. Knowles (Dept. of Med., Univ. of Queensland, Royal Brisbane Hosp., Brisbane, 4029, Australia) *J. Lipid Res.* **17**, 176–81 (1976). A technique has been developed which attains in 30 minutes complete removal of triglyceride, cholesterol, phospholipid, and unesterified fatty acids from plasma without protein denaturation. Plasma is agitated at room temperature with a mixture of butanol and di-isopropyl ether in a 40:60 (v/v) ratio. The plasma proteins, including the apolipoproteins, remain in solution in the aqueous phase, while the organic phase contains the dissolved lipids. The phases can easily be separated by low speed centrifugation. Different lipids are simultaneously extracted, but the rate of extraction is most rapid for unesterified fatty acids, followed by triglyceride, cholesterol, and phospholipid at, respectively, decreasing rates. Selective extraction of unesterified fatty acids, triglyceride and total cholesterol can be achieved by di-isopropyl ether alone. Ionic strength and pH are not altered by these procedures.

AN ENZYMATIC METHOD FOR THE DETERMINATION OF THE INITIAL RATE OF CHOLESTEROL ESTERIFICATION IN HUMAN PLASMA. W. Patsch, S. Sailor and H. Braunsteiner (Med. Dept., Univ. of Innsbruck, Innsbruck, Austria) *J. Lipid Res.* **17**, 182–5 (1976). A method is described for the determination of the initial rate of cholesterol esterification in human plasma, based on the enzymatic determination of free cholesterol in the plasma before and after incubation at 37°C. The cholesterol esterification rate was linear up to 40 minutes. In 18 normal male and 10 normal female subjects the cholesterol esterification rate was 91 ± 15 (mean ± SD) and 62 ± 12 nmoles/hr/ml of plasma, respectively.

HUMAN FAT CELL SIZING—A QUICK, SIMPLE METHOD. M. Ashwell, P. Priest, M. Bondoux, C. Sowter, and C.K. McPherson (Clin. Res. Ctr., Watford Rd., Harrow HA1 3UJ, England) *J. Lipid Res.* **17**, 190–2 (1976). Two methods were used to determine the mean cell diameters of 37 samples of human adipose tissue, obtained by open or needle biopsy. Method I was the sizing of cells in cell suspensions and Method II was a quick; simple method of sizing cells from fixed sections. The agreement between the two methods was good ($r = 0.93$, $P = < 0.001$). The results using Method II were slightly lower than those using Method I, and a correction factor is suggested. Method II has several advantages over Method I and we propose that it is a suitable method for sizing cells when a quick method with a permanent record is required.

DIETARY INTAKE AND CORONARY RISK FACTORS IN PERUVIAN QUECHUA INDIANS. SERUM LIPIDS, BODY FAT, AND BLOOD PRESSURE. E.W. Watt (Laboratory for Human Performance Research, Inst. of Science and Engineering, The Pennsylvania State University, University Park), E. Picon-Reateyui, H.E. Gahagan, and E.R. Buskirk. *J. Am. Diet. Assoc.* **68**, 535–7 (1976). The study included 30 men living in the coastal region, who had actually migrated there at least ten years earlier, and 30 men from the highlands area. Mean age of the total group was 33 years. The highland men had higher serum triglycerides (122 vs 90 mg/dl) than the coastal group, but there were no significant differences between the two groups in serum cholesterol (150 vs 157 gm/dl), body fat (15 vs 17%), or blood pressure (113/72 vs 114/72 mm Hg). Both groups consumed about 2,500 Calories per man per day. The highland group consumed more carbohydrate (66 vs 51%) and less fat (19 vs 33%).

ANTI-ATHEROSCLEROSIS AGENTS. Y. Nakmura, K. Agatsuma, Y. Tanaka and S. Aono (Sumitomo Chemical Co.). *U.S. 3,959,484*. A method for lowering an elevated cholesterol or lipid level in a human adult comprises administering a phenoxyaliphatic carboxylic acid derivative.

LIPID METABOLISM IMPROVING AND ANTI-ATHEROMATIC AGENT. M. Kobayashi (Amano Pharmaceutical Co.). *U.S. 3,959,467*. Lipolytic substance GA-56 is administered to patients suffering from atherosclerosis to ameliorate the condition. GA-56 acts specifically on neutral fat and oil, chylomicron, and low-density lipoprotein to decompose them. Elementary analysis of GA-56 gives C: 47.72%, H: 6.85%, O: 26.05%, N: 14.38%, and S: 0.35%.

TRANSMEMBRANE ASYMMETRY OF VESICLE LIPIDS. P.J. Yeagle, W.C. Hutton and R.B. Martin (Dept. of Chem., Univ. of Virginia, Charlottesville, Virginia 22901) *J. Biol. Chem.* **251**, 2110–2 (1976). The role of fatty acyl chain unsaturation in promoting asymmetry in phospholipid vesicle bilayers was investigated in mixed lipid systems with differing acyl chains and a constant phosphatidylcholine headgroup. Ratios of outside to inside components were determined by nuclear magnetic resonance spectroscopy of ^{13}C-enriched egg phosphatidylcholine. An asymmetry or disproportionation ratio is defined and used to express quantitatively how a mixture of two lipids distributes in the outer and inner vesicles surfaces. In mixed systems with ^{13}C-enriched egg phosphatidylcholine as one component, increasing fatty acyl unsaturation in the other component results in an increasing preference of the unsaturated chains for the outer surface.

STUDIES ON THE 1α,25-DIHYDROXYCHOLECALCIFEROL-LIKE ACTIVITY IN A CALCINOGENIC PLANT, CESTRUM DIURNUM, IN THE CHICK. R.H. Wasserman, R.A. Corradino, L. Krook, M.R. Hughes and M.R. Haussler (Dept. of Phys. Biol. and Dept. of Path., N.Y. State College of Vet. Med., Cornell Univ., Ithaca, N.Y. 14853) *J. Nutr.* **106**, 457–65 (1976). *Cestrum diurnum* (day-blooming jessamine) has been proposed to cause calcinosis in horses and cattle in Florida. The present studies investigated some physiological properties of the plant, using the chick as the experimental animal. The inclusion of dried leaf powder in a rachitogenic diet restored intestinal calcium-binding protein synthesis (CaBP) and increased calcium absorption in the cholecalciferol-deficient chick. The estimated level of cholecalciferol-equivalents in the dried leaf was about 30,000 to 35,000 IU/kg. These findings indicate that the 1α,25-dihydroxycholecalciferol-like principle in *C. diurnum* may cause excessive calcium and phosphate absorption leading to calcinosis.

UTILIZATION OF EXOGENOUS GDP-MANNOSE FOR THE SYNTHESIS OF MANNOSE-CONTAINING LIPIDS AND GLYCOPROTEINS BY OVIDUCT CELLS. D.K. Struck and W.J. Lennarz (Dept. of Physio. Chem., The Johns Hopkins Univ. Schl. of Med., Baltimore, Maryland 21205) *J. Biol. Chem.* **251**, 2511–9 (1976). Suspensions of oviduct cells were prepared by subjecting oviduct tissue to sequential incubations with EDTA, α-chymotrypsin, and crude collagenase, followed by a final incubation with EDTA. Cells isolated in this way incorporate mannose from exogenase GDP-mannose into mannosyl-lipid, oligasaccharide-lipid, and glycoproteins(s). Based on several criteria, the mannosyl-lipid is identical with mannosyl-phosphoryldolichol. Similarly, the oligosaccharide-lipid appears to be identical with the oligosaccharide-lipid synthesized *in vitro*. In contrast, the glycoproteins are much lower in molecular weight than those labeled in cell-free preparations. These results indicate that the enzymes catalyzing synthesis of lipid-linked intermediates involved in glycoprotein synthesis are not only associated with intracellular membranes, but with the plasma membrane as well.

THE TEMPORAL INTERACTION OF CORTICOSTERONE AND PROLACTIN IN AFFECTING LIVER LIPID METABOLISM OF THE CHICK. J.W. Simpkins and C.J.V. Smith (Dept. of Biol., Univ. of Toledo, Toledo, Ohio 43606) *Poult. Sci.* **55**, 728–34 (1976). Experiments were conducted to determine if Brown Leghorn chickens (*Gallus domesticus*) showed a daily differential responsiveness to the phased injections of corticosterone and prolactin. It is concluded that the chick has a diurnal sensitivity to the effects of corticosterone and that once the liver is affected by corticosterone, a temporal interaction between this steroid and prolactin can affect the liver lipid content of the Brown Leghorn chick.

THE CARBON PATHWAY FOR LIPOGENESIS IN ISOLATED ADIPOCYTES FROM RAT, GUINEA PIG, AND HUMAN ADIPOSE TISSUE. E. Shrago and T. Spennetta (Dept. of Med. and Nutr. Sci., Univ. of Wisc., Madison, Wisc. 53706) *Am. J. Clin. Nutr.* **29**, 540–5 (1976). The synthesis of fatty acids from a variety of labeled substrates by isolated adipocytes of the rat, guinea pig, and human was investigated. The incorporation of radioactive glucose and pyruvate into triglyceride fatty acids was considerably lower in human than either rat or guinea pig adipose tissue. By contrast, the incorporation of palmitate into adipose tissue triglycerides was approximately the same in all three species. End carbon analysis of fatty acids isolated from adipocytes incubated with pyruvate-U-^{14}C indicated that although the synthesis of fatty acids in human adipose tissue was extremely low compared to that of the rat and guinea pig, it represented de novo biosynthesis rather than chain elongation of existing fatty acids. It is suggested that in the human, fatty acids are synthesized de novo primarily in the liver. In adipose tissue, lipogenesis consists essentially of the esterification of fatty acids, obtained from plasma, into triglycerides.

EFFICACY OF DIET AND EXERCISE IN THE REDUCTION OF SERUM CHOLESTEROL AND TRIGLYCERIDE IN FREE-LIVING ADULT MALES. R.L. Shorey, B. Sewell, and M. O'Brien (Clayton Foundation Biochem. Inst., Univ. of Texas at Austin, Austin, Tx 78712) *Am. J. Clin. Nutr.* **29**, 512–21 (1976). Young males with levels of serum cholesterol or triglyceride in the upper quartile of the distribution for volunteers tested, participated in a program designed to determine the effect of diet and exercise on serum lipids. Dietary modifications involved caloric restriction superimposed on either the National Institutes of Health (NIH) recommendations for type II or IV hyperlipoproteinemia, as appropriate, or superimposed on a fat-controlled regimen in which fat of an unspecified nature was restricted to 30% of total calories. Those with elevated levels of both cholesterol and triglyceride were less amenable to change than those with a single hyperlipidemia. For some diagnostic types, the results were suggestive of a beneficial effect of exercise in addition to diet in accelerating or maintaining reductions in serum lipids.

THE EFFECT OF AGE AND SEX ON THE RATE OF CHANGE OF FATTY ACID COMPOSITION OF TURKEYS FOLLOWING A CHANGE OF DIETARY FAT SOURCE. R.E. Salmon (Res. Station, Res. Branch, Agr. Canada, Swift Current, Saskatchewan S9H 3X2) *Poult. Sci.* **55**, 201–8 (1976). Small White turkeys were fed 10% dietary rapeseed oil or animal tallow to 6, 12 or 18 weeks of age. The dietary fat was then changed from rapeseed oil to tallow or from tallow to rapeseed or corn oil. Weekly core samples of skin and subcutaneous fat were taken for nine weeks after each change of dietary fat. The half-time ($t_{1/2}$) of the exponential rate of change of individual fatty acids was unrelated to either the fatty acid carbon chain length or the degree of unsaturation. The average $t_{1/2}$ of 2.4 weeks was influenced by sex, with more rapid change of fatty acid composition in females than males during the first but not later periods, and by age, with decreasing rate of change of fatty acids as the birds approached maturity. The extent of change of fatty acid composition in response to dietary fat decreased with age. The data presented will aid in predicting the carcass fatty acid composition of turkeys fed specific dietary fats and in estimating the effect of a change of dietary fat on carcass characteristics.

EFFECT OF HIGH DIETARY COPPER ON FATTY ACID COMPOSITION OF THE CHICK. C. Poupoulis and L.S. Jensen (Dept. of Poultry Sci., Univ. of Georgia, Athens, Georgia 30602) *Poult. Sci.* **55**, 122–9 (1976). Three experiments were conducted to study the effect of varying levels of dietary copper on fatty acid composition of adipose and liver tissue of male broiler chicks. Chicks were fed the experimental diets to 4 weeks at which time leg adipose and liver samples were obtained for fatty acid determination. Adding 500 or more p.p.m. copper to either a practical or corn starch-soy basal diet caused significant changes in fatty acid composition, but the differences were variable perhaps due to a depression of growth caused by these levels of copper. Fatty acid composition of the tissues was not greatly affected by adding 250 p.p.m. of copper to the practical diet which contained 1.5% poultry fat. When a corn starch-soy diet was fed with 0, 2, or 8% added corn oil, the ratio of 16:0 + 18:0 to 16:1 to 18:1 was not lowered in leg adipose lipids by copper supplementation (250 p.p.m.) with any level of added corn oil. With liver lipids copper appeared to reduce the ratios in birds fed the diets with 0 or 2% added corn oil, but the differences were not statistically significant. The results indicate that using copper levels in practical diets that do not depress growth rate will not have much effect on fatty acid composition of carcass lipids and probably not on physical characteristics of the fat.

VARIOUS TYPES OF DIETS, SOURCES OF ENERGY, AND POSITIVE ENERGY BALANCE IN THE INDUCTION OF FATTY LIVER HEMORRHAGIC SYNDROME. D. Polin and J.H. Wolford (Poultry Sci. Dept., Michigan State Univ., East Lansing Michigan 48824) *Poult. Sci.* **55**, 325–34 (1976). Adult female chickens were force-fed a corn-soy base diet at 150% of the daily amount consumed by those allowed the same diet *ad libitum*. Other hens were force-fed diets isocaloric to the 150% group just mentioned, but diet composition was adjusted to that ⅔ of the metabolizable energy (M.E.) came from the corn-soy diet and ⅓ from either corn oil or glucose; or force-fed a low energy diet accounting for ⅔ of the M.E. and corn oil ⅓ of M.E., or a purified diet accounting for all M.E. Fatty liver-hemorrhagic syndrome (FLHS) was induced in all force-fed groups with only the low energy diet plus corn oil having produced a significantly lower score for FLHS. However, the livers from the hens of the latter group had as much lipid, and the hens gained at least as much weight as those in other force-fed groups. During the third week of the experiment M.E. was determined along with a partition of energy among eggs, basal metabolism, body weight gain, and subsistance plus heat increment (H.I.). The data showed that the hens force-fed corn oil had lower H.I. values indicative of associative dynamic action of fats at a plane of nutrition above normal. The data revealed that various types of diets and sources of energy in excess can induce FLHS, and this is discussed in terms of FLHS arising out of a positive energy balance.

RADIOPROTECTIVE EFFECT OF SUPEROXIDE DISMUTASE ON MODEL PHOSPHOLIPID MEMBRANES. A. Petkau and W.S. Chelack (Atomic Energy of Canada Ltd., Whiteshell Nuclear Res. Estab., Med. Biophysics Branch, Pinawa, Manitoba, Canada) *Biochim. Biophys. Acta* **433**, 445–56 (1976). Hydroperoxide formation in model membranes was measured via the net increase in absorbance at 232 nm after exposure to X-rays or ^{137}Cs gamma rays in the presence and absence of bovine superoxide dismutase and other radical scavengers. Membranes X-irradiated in air to 4,200 rad at 210 rad/min exhibited a large increase in absorbance, a major portion of which was O_2^--mediated since active superoxide dismutase at

1 μg/ml reduced it by more than 80% to the level observed in N_2O. In N_2 the change in absorbance was smaller than in N_2O but not in proportion to the halving in OH production. The enzyme protected membranes after an acute exposure and from low level radiation at natural background while its inactivated form sensitized.

KINETIC STUDY OF THE ACTION OF SNAKE VENOM PHOSPHOLIPASE A_2 ON HUMAN SERUM HIGH DENSITY LIPOPROTEIN 3. N.M. Pattnaik, F.J. Kezdy, and A.M. Scanu (Depts. of Biochem. and Med., The Univ. of Chicago Pritzker Schl. of Med., and the Franklin McLean Memorial Res. Inst., Chicago, Illinois 60637) *J. Biol. Chem.* **251**, 1984–90 (1976). The hydrolysis of the phospholipids of intact human serum high density lipoprotein 3 (HDL_3) by pure α-phospholipase A_2 from *Crotalus adamanteus* was studied by pH-stat titration. The enzyme quantitatively hydrolyzed phosphatidylcholine and phosphatidylethanolamine and left sphingomyelin intact, yielding a stable and water-soluble modified HDL. Lysophospholipids and free fatty acids, the products of hydrolysis, remained in the lipoprotein. The immunological reactivity of the hydrolyzed HDL remained unaltered in both the presence and absence of albumin. From the accessibility of the HDL phospholipids to phospholipase A_2 one concludes that the phosphatidylcholine and phosphatidylethanolamine are located at, or are in rapid equilibrium with, the surface of this lipoprotein. It also appears that these phospholipids are not essential for maintaining the supramolecular properties of the lipoprotein *in vitro.* Thus the study of the modified HDL should provide valuable information concerning the structure and function of this lipoprotein particularly with regard to the role played by sphingomyelin.

POSTPRANDIAL PLASMA TRIGLYCERIDE AND CHOLESTEROL RESPONSES TO A LOW-FAT MEAL. J.M. Olefsky, P. Crapo and G.M. Reaven (Dept. of Med., Stanford Univ. Schl. of Med., and the V.A. Hospital, Palo Alto, Calif.) *Am. J. Clin. Nutr.* **29**, 535–9 (1976). Postprandial plasma cholesterol and triglyceride (TG) levels were measured after the consumption of a relatively low-fat (35% of calories) diet in 41 subjects. Plasma cholesterol levels did not change appreciably during the postprandial state. In 34 subjects a biphasic plasma TG response curve was noted, with an initial peak occurring 1 to 3 hr. after feeding and a secondary TG peak 4 to 7 hr after the meal. The primary peak was $>90\%$, accounted for by chylomicrons, whereas the secondary peak represented very low-density lipoproteins ($>82\%$). Furthermore, the heights of the primary and secondary peaks were closely correlated to the fasting TG level ($r = 0.61$ and 0.72, respectively) indicating that the fasting TG concentration is an important determinant of the postprandial TG response. Because low-fat (high-carbohydrate) diets are known to raise fasting TG levels in patients who do not have fasting hyperchylomicronemia, and because relatively few patients have chylomicrons in the fasting state, these data suggest that such diets may lead to day long increases in plasma TG levels in the majority of subjects.

FACTORS AFFECTING THE ACYL SELECTIVITIES OF ACYLTRANSFERASES IN ESCHERICHI COLI. H. Okuyama, K. Yamada and H. Ikezawa (Faculty of Pharm. Sci., Nagoya City Univ., 3-1 Tanabedori, Mizuho-ku, Nagoya, Japan) *J. Biol. Chem.* **251**, 2487–92 (1976). In *Escherichia coli* the synthesis of phosphatidic acid from glycerophosphate involves first the intermediate formation of 1-acylglycerophosphate. This reaction is catalyzed by the membrane-bound acyl-CoA(acyl-ACP): glycerophosphate acyltransferase. The 1-acylglycerophosphate is then converted to phosphatidic acid by acyl-CoA(acyl-ACP): 1-acylglycerophosphate acyltransferase. *In vitro* both acyltransferases utilize various saturated and unsaturated acyl-CoAs at comparable rates, resulting in the incorporation of both saturated and unsaturated fatty acids into position 1 as well as position 2 of the glycerophosphate moiety. Thus, highly selective positioning of various acyl-CoAs observed at lower concentrations of the acceptors in phosphatidic acid synthesis *in vitro* helps to explain the selective distribution of saturated and unsaturated fatty acids at positions 1 and 2 of glycerophospholipids in the membranes. Another factor, the availability of acyl donors, affects the proportions of different molecular species of phosphatidic acid, which at least partly explains the variability of molecular species of phospholipids found *in vivo.*

EFFECT OF EXCESSIVE DIETARY VITAMIN E ON THE CHICK. C.F. Nockels, D.L. Menge and E.W. Kienholz (Dept. of Animal Sci., Colorado State Univ., Fort Collins, Colorado 80523) *Poult. Sci.* **55**, 649–52 (1976). Day-old male broiler chicks were fed a broiler ration for five weeks to which was added one of the following levels of dl-alpha tocopheryl acetate; 0; 2,000; 4,000; 8,000; 16,000; 32,000, and 64,000 I.U./kg. The chicks fed diets containing 4,000 I.U./kg. or more of vitamin E showed decreased pigmentation in their beaks, feet and shanks, and liver as a percent of body weight was significantly increased. Feeding at least 8,000 I.U./kg. of the vitamin significantly reduced chick body weight and resulted in waxy appearing feathers. Dietary inclusion of 16,000 I.U./kg. or more of vitamin E significantly increased feather, spleen, liver, and plasma vitamin E content.

THE CHOLESTEROL PROBLEM, THE EGG AND LIPID METABOLISM IN THE LAYING HEN. E.C. Naber (Dept. of Poultry Sci., The Ohio State Univ., Columbus, Ohio 43210) *Poult. Sci.* **55**, 14–30 (1976). There is little doubt that high blood serum lipid levels are related to a higher incidence of atherosclerotic disease in humans. Investigation of the lipid metabolism of the laying hen has shown that most of the cholesterol found in the egg is synthesized in the liver where it is under both dietary and drug control. Most of the cholesterol deposited in egg yolk may be essential for embryonic development. Drugs that severely limit cholesterol biosynthesis probably also limit synthesis of adrenal and sex hormones and hence limit reproduction. Moderate depressions in lipogenesis achieved without feeding of large amounts of dietary fat may offer a means for moderating cholesterol deposition in eggs. On the other hand, it also seems clear that genetic selection could be used to moderate egg cholesterol concentration. In any event, a great deal more evidence from well constructed human diet studies will be needed before low cholesterol diets can be recommended to the general population as an aid to control of cholesterol balance and heart disease.

PRECISION OF EXTRACTION, FRACTIONATION, AND FATTY ACID ANALYSIS OF RAT LIVER LIPIDS AND STABILITY OF FATTY ACIDS DURING STORAGE. J. Miller and D.R. Landes (Food Sci. Dept., Univ. of Georgia Coll. of Agr. Exper. Stations, Georgia Station, Experiment, Georgia 30212) *J. Agric. Food Chem.* **24**, 499–503 (1976). Lipids were extracted from freeze-dried liver with a coefficient of variation of 1%. Separation of lipids on acid-washed Florisil yielded a neutral lipid and two phospholipid fractions with relative errors of 2% for each fraction, but fractionation of neutral lipids on unwashed Florisil was less precise. Samples of freeze-dried liver or of lipid extracted from liver tissue were stored at −30°C. After 2 weeks, the fatty acid compositions of neutral and lecithin lipids were essentially unchanged but that of cephalin lipids had changed significantly. Changes in lipid composition continued rather slowly through 8 weeks of storage but rapidly between 8 and 12 weeks. Changes in fatty acid composition during storage were less apparent when calculated as percent of total fatty acids rather than in absolute quantity, and were less evident when total lipids rather than lipid fractions were analyzed.

CHARACTERIZATION OF THE PLASMA LIPOPROTEINS AND APOPROTEINS OF THE ERYTHROCEBUS PATAS MONKEY. R.W. Mahley, K.H. Weisgraber, T. Innerarity and H.B. Brewer, Jr. (Natl. Heart and Lung Inst., Bethesda, Maryland 20014) *Biochemistry* **15**, 1928–33 (1976). Patas monkey lipoproteins were fractionated into four distinct classes by a combination of ultracentrifugation and Geon-Pevikon block electrophoresis and characterized with respect to their chemical and physical properties. Very low density lipoproteins (VLDL) were isolated as $d < 1.006$, were triglyceride rich, and were in the size range 300–850 Å. They were similar in apoprotein content to the VLDL of man, dog, and swine. The Patas monkey low density lipoprotein referred to as LDL-I had β mobility and a size which ranged from 190 to 240 Å in diameter. Their chemical composition and apoprotein content were similar to those of human LDL.

INTERACTIONS BETWEEN ANESTHETICS AND LIPID MIXTURES. NORMAL ALCOHOLS. A.G. Lee (Dept. of Physiol. and Biochem., Univ. of Southampton, Southampton S09 3TU, England) *Biochemistry* **15**, 2448–54 (1976). The effects of normal alcohols up to 1-dodecanol on phase transitions in phosphatidylcholines and phosphatidylethanolamines have been studied using chlorophyll as a fluorescent probe. With the phosphatidylcholines, alcohols up to octanol cause a lowering of the transition temperature, and a broadening of the transition, whereas for dipalmitoylphosphatidylethanolamine, only a lowering of the transition is observed. The lowering of the phase transition temperature in dipalmitoylphosphatidylcholine by butanol and hexanol is close to that expected for ideal behavior, but the behavior of the longer chain alcohols become less ideal. The effects of these alcohols on mixtures of lipids have been studied, and they illustrate the care necessary if these plots of temperatures of onset and completion of gel phase formation are to be called "phase diagrams."

EFFECT OF MEMBRANE PROTEIN ON LIPID BILAYER STRUCTURE: A SPIN-LABEL ELECTRON SPIN RESONANCE STUDY OF VESICULAR STOMATITIS VIRUS. R.F. Landsberger and R.W. Compans (The Rockefeller Univ., New York, N.Y. 10021) *Biochemistry* **15**, 2356–60 (1976). Spin-label electron spin resonance (ESR) methods have been used to study the structure of the envelope of vesicular stomatitis virus (VSV). The data indicate that the lipid is organized in a bilayer structure. Proteolytic digestion of the glycoproteins which are the spike-like projections on the outer surface of the virus particle increases the fluidity of the lipid bilayer. Since the lipid composition of the virion reflects the composition of the host plasma membrane and the protein composition is determined by the viral genome, VSV was grown in both MDBK and BH-K21-F cells to determine the effect of a change in lipid composition on the structure of the lipid bilayer of VSV. The lipid bilayer of the virion was found to be more rigid when derived from MDBK cells than from BHK21-F cells. Studies comparing spin-labeled intact cells and cell membrane fractions suggest that upon labeling the whole cell the spin label probes the plasma membrane. Comparison of spin-labeled VSV particles and their host cells indicates that the lipid bilayer of the plasma membrane is considerably more fluid than that of the virion. These results are discussed in terms of the effect of membrane-associated protein on the structure of the lipid bilayer.

METABOLISM OF 1,25-DIHYDROXYVITAMIN D_3: EVIDENCE FOR SIDE-CHAIN OXIDATION. R. Kumar, D. Harnden, and H.F. DeLuca (Dept. of Biochem., Coll. of Agr. and Life Sci., Univ. of Wisconsin-Madison, Madison, Wisconsin 53706) *Biochemistry* **15**, 2420–3 (1976). Approximately 7% of a 650-pmol dose of 25-hydroxy [26,27-^{14}C] vitamin D_3 and 25% of a 325-pmol dose of 1,25-dihydroxy [26,27-^{14}C] vitamin D_3 are metabolized to $^{14}CO_2$ by vitamin D deficient rats. Nephrectomy prevents the metabolism of 25-hydroxy [26,27-^{14}C] vitamin D_3 to $^{14}CO_2$ but not that of 1,25-dihydroxy [26,27-^{14}C] vitamin D_3. Less than 5% of the ^{14}C from 24,25-dihydroxy [26,27-^{14}C] vitamin D_3 is metabolized to $^{14}CO_2$. Feeding diets high in calcium and supplemented with vitamin D_3 markedly diminishes the amount of $^{14}CO_2$ formed from 25-hydroxy [26,27-^{14}C] vitamin D_3 but not that from 1,25-dihydroxy [26,27-^{14}C] vitamin D_3. These results provide strong evidence that only 1-hydroxylated vitamin D compounds and especially 1,25-dihydroxyvitamin D_3 undergo side-chain oxidation and cleavage to yield an unknown metabolite and CO_2.

SODIUM ARACHIDONATE CAN INDUCE PLATELET SHAPE CHANGE AND AGGREGATION WHICH ARE INDEPENDENT OF THE RELEASE REACTION. R.L. Kinlough-Rathbone, H.J. Reimers and J.F. Mustard (Dept. of Pathology, McMaster Univ., Hamilton, Ontario L8S 4J9 Canada) *Science* **192**, 1011–2 (1976). Sodium arachidonate causes shape change and aggregation of rabbit or human platelets that have been washed and then degranulated by treatment with thrombin. Since these platelets do not contain releasable adenosine diphosphate (ADP) and the aggregation is not inhibited by the creatine phosphate-creatine phosphokinase system, sodium arachidonate must be able to cause aggregation that is independent of the release of ADP. Since aggregation of these platelets induced by sodium arachidonate is inhibited by acetylsalicylic acid or indomethacin, it seems likely that products (such as prostaglandin G_2) formed from sodium arachidonate are responsible for aggregation. Thus, sodium arachidonate-induced shape change and aggregation of platelets may be caused by the release of ADP by products of sodium arachidonate metabolism, independently of released ADP.

TRIGLYCERIDE, DIGLYCERIDE, MONOGLYCERIDE, AND CHOLESTEROL ESTER HYDROLASES IN CHICKEN ADIPOSE TISSUE ACTIVATED BY ADENOSINE 3′:5′-MONOPHOSPHATE-DEPENDENT PROTEIN KINASE. CHROMATOGRAPHIC RESOLUTION AND IMMUNOCHEMICAL DIFFERENTIATION FROM LIPOPROTEIN LIPASE. J.C. Khoo, D. Steinberg, J.J. Huang and P.R. Vagelos (Div. of Metabolic Disease, Dept. of Med., Univ. of California San Diego, La Jolla, California 92093) *J. Biol. Chem.* **251**, 2882–90 (1976). Hormone-sensitive lipase and cholesterol ester hydrolase of chicken adipose tissue were markedly activated by adenosine 3′:5′-monophosphate (cAMP)-dependent protein kinase (on the average, 235 to 275%; occasionally as much as 1000%). Diglyceride and monoglyceride hydrolases were also activated, but to a lesser extent (60 to 87%). The activation of all four hydrolases was inhibited by protein kinase inhibitor and reversed by the addition of exogenous protein kinase. Following activation by cAMP-dependent protein kinase, all four hydrolases were deactivated in a Mg^{2+}-dependent reaction and then reactivated to or near initial levels on incubation with cAMP and Mg^{2+}-ATP. Although the absolute activities and relative degrees of kinase activation differed according to the particular emulsified substrates used, the results do not rule out the possibility that all four hydrolase activities are referable to a single hormone-sensitive hydrolase.

AN ASSOCIATION OF HARDNESS OF WATER WITH INCIDENCE OF FATTY LIVER SYNDROME IN LAYING HENS. L.S. Jensen, J.M. Casey, S.I. Savage and W.M. Britton (Div. of Poultry Sci., Univ. of Georgia, Athens, Georgia 30602) *Poult. Sci.* **55**, 719–24 (1976). Twenty-two samples of water were collected from commercial egg production farms in Georgia with or without a history of fatty liver syndrome. These samples plus a sample of water from the University of Georgia Poultry Farm were analyzed for various mineral elements by atomic absorption, direct reading emission spectroscopy and by neutron activation. Water samples from farms with a history of fatty liver syndrome had significantly more calcium, magnesium, strontium, sodium, iron and barium than water samples from farms reporting no significant problem with fatty liver syndrome. Levels of manganese, boron, copper, zinc and aluminum were not significantly different. Although the results do not prove that water quality is the cause of the disease, they do demonstrate an association of hardness of water with fatty liver syndrome that should be further investigated.

INFLUENCE OF CARBOHYDRATE SOURCE ON LIVER FAT ACCUMULATION IN HENS. L.S. Jensen, C.H. Chang and R.D. Wyatt (Dept. of Poultry Sci., Univ. of Georgia, Athens, Ga. 30602) *Poult. Sci.* **55**, 700–9 (1976). Four experiments were conducted with laying hens and one with broiler chicks to investigate the effect of carbohydrate source on fat accumulation in the liver. When corn and wheat in various proportions were fed to laying hens, the percent fat and total fat per liver increased as the proportion of corn increased. In comparison of different cereal grains and wheat samples in isocaloric diets, the total liver fat accumulated was the highest for hens fed grain sorghum, corn or triticale and the lowest for those fed barley, oats or rye. Intermediate levels of liver fat were obtained with wheat and similar liver fat contents were observed with hens fed different samples of West Coast wheat. There was no significant difference in liver fat of groups fed wheat diets made isocaloric with corn oil or animal fat.

VITAMIN E: A REEXAMINATION. M.K. Horwitt (Dept. of Biochem., St. Louis Univ. Schl. of Med., St. Louis, Missouri 63104) *Am. J. Clin. Nutr.* **29**, 569–78 (1976). An attempt is made to place into proper perspective the relative values of the eight natural forms of vitamin E and the epimers of the synthetic products with regard to their biological activities. Since differences in activities reported are mostly a function of different rates of biological turnover, feeding a non-α-tocopherol compound three times a day would be expected to give a different biological value than if the total were fed once a week or together with α-tocopherol. An analysis of data to support an increase in the current RDA for vitamin E is presented. Recent developments on the prolongation of blood clotting time by vitamin E are interpreted from the viewpoint that α-tocopherol is oxidized to tocopherylquinone, which is an inhibitor of vitamin K.

FRAGMENTS FORMED BY THE SIDE CHAIN CLEAVAGE OF A 20-ARYL ANALOG OF 20α-HYDROXYCHOLESTEROL BY ADRENAL MITOCHONDRIA. R.B. Hochberg, P.D. McDonald, M. Feldman and S. Lieberman (Dept. of Biochem. and of Obstetrics and Gynecol. and the International Inst. for the Study of Human Reproduction, Col. of Physicians and Surgeons, Columbia Univ., New York, N.Y. 10032) *J. Biol. Chem.* **251**, 2087–93 (1976). An analog of 20α-hydroxycholesterol, (20*R*)-20-phenyl-5-pregnene-3β,20-diol, which is completely substituted at C-22 was prepared with radioisotopes at various positions. The analog labeled with ^3H at C-7 and ^{14}C at C-4 and C-21 was converted into radioactive pregnenolone by an enzyme preparation derived from adrenal mitochondria. Cleavage of the phenyl analog labeled with ^{3}H in the aromatic ring by the same enzyme preparation led to the formation of [^{3}H] phenol. Using the substrate doubly labeled with ^{14}C at C-4 and ^{3}H in the aromatic ring, it appeared that the products of the reactions, pregnenolone and phenol, were formed in equal amounts. During incubation of the side chain labeled substrate, another labeled fragment was formed. It was identified as acetophenone, a product resulting from cleavage of the C-17,20 bond. The steroidal fragment corresponding to this C_8 ketone was traced using nuclear label analog. From its nonpolar chromatographic properties it appears to be a C-17-deoxy-C_{19} steroid.

BIOCHEMICAL ASPECTS OF THE VISUAL PROCESS. XXXII. MOVEMENT OF SODIUM IONS THROUGH BILAYERS COMPOSED OF RETINAL AND ROD OUTER SEGMENT LIPIDS. Th. Hendriks, A.A. Klompmakers, F.J.M. Daemen and S.L. Bonting (Dept. of Biochem., Univ. of Nijmegen, Nijmegen, The Netherlands) *Biochim. Biophys. Acta* **433**, 271–81 (1976). The leakage of Na^+ from sonicated liposomes, composed of rod outer segment lipids, retinal lipids and a 4:1 phosphatidylcholine/phosphatidylserine mixture, has been studied. Both retinal and rod outer segment lipid liposomes lose Na^+ faster than Ca^{2+} which indicates that the observed leakage occurs from closed liposomal structures. Liposomes from rod outer segment lipids are extremely leaky, losing sodium about 10 times as fast as retinal lipid liposomes and twice as fast as the phosphatidylcholine/phosphatidylserine liposomes. The sodium leakage from rod outer segment lipid liposomes is little affected by the presence of 5 mM calcium in the external dialysis medium, but with the two other types of liposomes significant decreases in permeability of about 20% are observed.

LIPID-PROTEIN INTERACTIONS IN MODEL MEMBRANES FROM BOVINE BRAIN WHITE MATTER. AN ESR SPIN LABEL AND ELECTRON MICROSCOPY STUDY. M.A. Hemminga and J.F.M. Post (Lab. of Physical Chem., Univ. of Groningen, Groningen, The Netherlands) *Biochim. Biophys. Acta* **436**, 222–34 (1976). Lipid-protein model membranes, prepared from bovine brain white matter and containing all the lipids and Folch-Lees proteolipids, have been studied in macroscopically oriented multibilayers. To examine the lipid environment the membranes were spin labeled with the cholestane spin label (3-spiro (2′-(*N*-oxyl-4′,4′-dimethyloxazolidine))5α-cholestane) and a fatty acid spin label (4′,4′-dimethyloxazolidine-*N*-oxy derivative of 5-ketostearic acid). The ESR spectra exhibit two components arising from fairly well oriented and completely unoriented lipids. Up to a temperature of 55°C the amount of oriented lipids is almost constant, being about 35%. At higher temperatures this percentage drops rapidly to zero. It is shown that the presence of unoriented lipids arises mainly from disrupted areas in the lipid bilayer structure. This is confirmed by electron microscopy and from an analysis of the temperature dependence of the order parameters of the spin labels. The presence of locally disrupted lipid parts in the bilayer is discussed in relation to the interaction of the brain white matter lipids with Folch-Lees protein.

ROLE OF MANNOSYL LIPID INTERMEDIATE IN THE SYNTHESIS OF NEUROSPORA CRASSA GLYCOPROTEINS. M.H. Gold and H.J. Hahn (The Rockefeller Univ., New York, N.Y. 10021) *Biochemistry* **15**, 1808–14 (1976). Particulate membrane preparations from *Neurospora crassa* incorporated mannose from GDP-[^{14}C] mannose into endogenous lipid and particulate protein acceptors. Synthesis of the mannosyl lipid is reversible in the presence of GDP. The effect of a chase with an excess of unlabeled GDP-mannose on the incorporation of mannose into endogenous acceptors was immediate cessation of the synthesis and subsequent turnover of the mannosyl lipid; in contrast, however, incorporation of mannose into protein continued and was proportional to the loss of mannose from the mannosyl lipid.

A NEW VITAMIN K-DEPENDENT PROTEIN. A PHOSPHOLIPID-BINDING ZYMOGEN OF A SERINE ESTERASE. C.T. Esmon, J. Stenflo and J.W. Suttie (Dept. of Biochem., Coll. of Agr. and Life Sci., Univ. of Wisconsin-Madison, Madison, Wisconsin 53706) *J. Biol. Chem.* **251**, 3052–6 (1976). Conclusive evidence is presented that a recently purified vitamin K-dependent protein (arbitrarily referred to as Protein C) which is not related to prothrombin, Factors IX or X is also unrelated to Factor VII. It therefore appears to be a new, previously unrecognized vitamin K-dependent protein. In contrast to prothrombin, which binds to negatively charged phospholipid only in the presence of Ca^{2+} ions, Protein C binds to the phospholipid both in the presence and absense of Ca^{2+} ions. Protein C, like the other vitamin K-dependent proteins, is a precursor of a serine esterase, presumably a protease, but it does not seem to be necessary for blood coagulation. Although the lipid-binding properties of Protein C may suggest that it is associated with membrane structures, its biological function remains unknown.

ISOLATION AND CHARACTERIZATION OF A DOG SERUM LIPOPROTEIN HAVING APOLIPOPROTEIN A-I AS ITS PREDOMINANT PROTEIN CONSTITUENT. C. Edelstein, L.L. Lewis, J.R. Shainoff, H. Naito and A.M. Scanu (Depts. of Med. and Biochem., The Univ. of Chicago Pritzker Schl. of Med., and the Franklin McLean Memorial Res. Inst., Chicago, Illinois 60637) *Biochemistry* **15**, 1934–41 (1976). The serum high density lipoproteins (HDL) of normolipemic dogs (beagles) were isolated in the density range of ρ 1.063 to 1.21 g/ml, and characterized in terms of composition and physical properties (flotation and diffusion coefficients, partial specific volume, molecular weight, electrophoretic mobility, ultraviolet absorption, and circular dichroism). The results indicated that canine HDL is a relatively homogeneous class with a molecular weight of about 230,000 and general properties similar to those reported for human HDL. These findings together with evidence for the relatively homogeneous nature of the canine HDL provide new prospects for unraveling the relationship between polypeptide composition and HDL structure.

CHANGES OF NONELECTROLYTE PERMEABILITY IN CHOLESTEROL-LOADED ERYTHROCYTES. B. Deuticke and C. Ruska (Abteilung Physiologie, Medizinische Fakultat, Technische Hochschule Aachen, D-5100 Aachen) *Biochim. Biophys. Acta* **433**, 638–53 (1976). Membrane cholesterol in porcine and bovine erythrocytes was elevated up to 165% of its normal value by incubation of the cells in cholesterol/phosphatidylcholine dispersions with or without serum. This alteration of membrane lipid composition brought about only a minor (10–40%) decrease of the permeability to glycerol, erythritol and to organic acids penetrating by non-ionic diffusion, although additional cholesterol had actually been incorporated into the lipid bilayer, as indicated by determination of cell surface area from the critical hemolytic volume, in combination with quantitative evaluation of freeze-etch electron micrographs. On the basis of this finding and of the previously demonstrated considerable increase of permeability in cholesterol-depleted cells, it is proposed that in the erythrocyte membrane a pronounced "specific" reduction of permeability by cholesterol occurs only up to a molar ratio cholesterol/polar lipid of 0.6. At higher ratios cholesterol affects permeability only slightly, owing to an "unspecific" rigidifying effect on the membrane lipid phase.

ESSENTIAL FATTY ACID REQUIREMENTS IN INFANCY. W.F.J. Cuthbertson (Glaxo Res. Ltd., Sefton Park, Stoke Poges, Buckinghamshire, England) *Am. J. Clin. Nutr.* **29**, 559–68 (1976). The infant's requirements for essential fatty acids (EFA) have been calculated by different workers from the same limited number of observations which depended on the use of butterfat, linoleic acid, and its esters as the source of EFA. The linoleic acid content of the butterfat employed was determined by a method known not to be specific for the biologically active linoleic acid (cis cisC18:2ω6). The assay reported (3.3%) is about double that (1 to 1.6%) usually anticipated. If the butterfat used was actually of average linoleic acid content, then estimates of requirements are about twice the true values. In some tests, linoleic acid or its esters were used rather than fat or triglycerides. In other tests the total fat content of the diet was very low, and the tocopherol content of the diet was not controlled. All of these factors could adversely affect linoleic acid utilization and so exaggerate EFA requirements. If minimum EFA needs are as high as those suggested (1.0% of cal), deficiency should be commoner than it in fact is. For the reasons noted above it is believed that the minimum requirements for EFA have been set far too high and are in fact less than 0.5% of cal, so that a daily allowance of 65 mg/100 cal (about 0.6% cal) should provide ample margin of safety.

DIETARY ENERGY AND FAT CONTENT AS FACTORS IN THE NUTRITION OF DEVELOPING EGG STRAIN PULLETS AND YOUNG HENS. EFFECT ON SEVERAL PARAMETERS AND BODY COMPOSITION AT SEXUAL MATURITY. D.C. Cunningham and W.D. Morrison (Dept. of Animal and Poultry Sci., Univ. of Guelph, Guelph, Ontario, Canada N1G 2W1) *Poult. Sci.* **55**, 85–97 (1976). Four hundred commercial S.C.W.L. chicks of two strains were cage reared on two dietary programmes (pullet *versus* broiler diets) which differed in energy content by approximately 457 kcal. of M.E./kg. for the starting and growing diets. Upon reaching sexual maturity (age of first egg) the pullets were killed and a number of parameters measured. Moisture, fat, nitrogen and ash were determined on each carcass and liver. Significant strain differences were apparent for many of the parameters studied. The heavy bodied pullets (Strain B) showed less mortality, consumed more feed, energy and protein to 18 weeks of age and gained more weight. The heavy bodied pullets reached sexual maturity 6.3 days earlier and weighed 168 grams more than the light bodied strain. Abdominal fat pad and liver weights were heavier at sexual maturity for Strain B birds. Livers from Strain B birds showed a lighter color score. The heavy bodied birds contained 2.21% less water, 2.7% more fat and 0.43% less protein than the light bodied pullets. Total body ash and liver composition were unaffected by strain.

GROWTH, HEMOGLOBIN, CHOLESTEROL, AND BLOOD PRESSURE OBSERVED IN RATS FED COMMON BREAKFAST CEREALS. W.O. Caster and M.D. Parthemos (Dept. of Food and Nutr., Schl. of Home Econ., Univ. of Georgia, Athens, Georgia 30602) *Am. J. Clin. Nutr.* 29, 529–34 (1976). Most of the common breakfast cereals tested were unable to support growth or promote health in young rats that consumed these products as their only food. An anemia, accompanied by fatty liver and large concentrations of iron stored in the liver, was observed with cereals having the lowest protein content. Some cereals produced a marked elevation of systolic blood pressure at certain times. Low cholesterol levels were invariably associated with fatty livers, whereas high cholesterol levels seemed to be associated with hypertension at the 45-day period. When only the ready-to-eat cereals were considered, there was a positive correlation between the dietary zinc/copper ratio and the plasma cholesterol concentration.

MOLECULAR FLOW RESONANCE RAMAN EFFECT FROM RETINAL AND RHODOPSIN. R.H. Callender, A. Doukas, R. Crouch and K. Nakanishi (Physics Dept., City College of New York, New York, N.Y. 10031) *Biochemistry* 15, 1621–9 (1976). We have performed resonance enhanced Raman measurements of retinal isomers in solution (all-trans, 11-cis, 9-cis, and 13-cis) and cetyltrimethylammonium bromide (CTAB) detergent extracts of bovine rhodopsin near physiological temperatures (17°C). In order to measure these photolabile systems, we have developed a general technique which allows Raman measurements of any photosensitive material. This technique involved imposing a molecular velocity transverse to the Raman exciting laser beam sufficient to ensure that any given molecule moves through the beam so that it has little probability of absorbing a photon. The data show that each isomer has a distinct and characteristic Raman spectra and that the spectrum of 11-*cis*-retinal is quite similar but not identical with that of rhodopsin and similarly for 9-*cis*-retinal compared with isorhodopsin.

ONE-STEP PURIFICATION AND PROPERTIES OF A TWO-PEPTIDE FATTY ACID SYNTHETASE FROM THE UROPYGIAL GLAND OF THE GOOSE. J.S. Buckner and P.E. Kolattukudy (Dept. of Agr. Chem. and the Program in Biochem. and Biophys., Washington State Univ., Pullman, Washington 99163) *Biochemistry* 15, 1948–57 (1976). Cell-free extracts from the uropygial gland of goose catalyzed the incorporation of malonyl-CoA into normal fatty acids with NADPH as the preferred reductant. Purification of fatty acid synthetase from this extract was accomplished in one step by gel filtration with Sepharose 4B. Homogeneity of the fatty acid synthetase was shown by analytical ultracentrifugation, immunodiffusion assays, polyacrylamide disc gel electrophoresis, and sodium dodecyl sulfate polyacrylamide disc gel electrophoresis. Sodium dodecyl sulfate-activated proteolytic activity was shown to be associated with goose fatty acid synthetase, and this proteolysis was shown to result in the formation of small-molecular-weight protein fragments (<200,000) during treatment of the enzyme with sodium dodecyl sulfate. This proteolysis could be prevented by diisopropyl fluorophosphate and *p*-chloromercuribenzoate. These results strongly suggest that the goose uropygial gland fatty acid synthetase consists of two multifunctional polypeptide subunits, each containing one covalently linked 4′-phosphopantetheine.

REVERSAL OF EXPERIMENTAL ESSENTIAL FATTY ACID DEFICIENCY BY CUTANEOUS ADMINISTRATION OF SAFFLOWER OIL. H. Böhles, M.A. Bieber and W.C. Heird (Dept. of Pediatrics and Inst. of Human Nutr., Columbia Univ. College of Physicians and Surgeons, New York, N.Y. 10032) *Amer. J. Clin. Nutr.* 29, 398–401 (1976). The intriguing observation that cutaneous application of essential fatty acid (EFA)-rich oil corrects the biochemical abnormalities of EFA deficiency was evaluated in EFA-deficient rats. Approximately 185 mg of safflower oil (140 mg of linoleic acid) were applied daily for 15 days to the skin of EFA-deficient rats. Before and after treatment with the safflower oil, the fatty acid patterns of plasma and erythrocyte phospholipid as well as of plasma triglyceride and cholesterol ester fractions were determined. Whether or not cutaneous application of such oils will prevent EFA deficiency, however, remains to be proven.

INTERACTION OF SWINE LIPOPROTEINS WITH THE LOW DENSITY LIPOPROTEIN RECEPTOR IN HUMAN FIBROBLASTS. T.P. Bersot and R.W. Mahley (Lab. of Exper. Atherosclerosis, Natl. Heart and Lung Inst., Bethesda, Maryland 20014) *J. Biol. Chem.* 251, 2395–8 (1976). HDL_c, a cholesterol-rich lipoprotein that accumulates in the plasma of cholesterol-fed swine, was shown to resemble functionally human and swine low density lipoprotein in its ability to bind to the low density lipoprotein receptor in monolayers of cultured human fibroblasts. This binding occurred even though HDL_c lacked detectable apoprotein B, which is the major protein of low density lipoprotein. After it was bound to the low density lipoprotein receptor, HDL_c, like human and swine low density lipoprotein, delivered its cholesterol to the cells, and this, in turn, caused a suppression of 3-hydroxy-3-methylglutaryl coenzyme A reductase activity, an activation of the cholesterol-esterifying system, and a net accumulation of free and esterified cholesterol within the cells. These results indicate that two lipoproteins that have been associated with atherosclerosis—low density lipoprotein in humans and HDL_c in cholesterol-fed swine—both can cause the accumulation of cholesterol and cholesteryl esters within cells through an interaction with the low density lipoprotein receptor.

INHIBITION OF 3-HYDROXY-3-METHYLGLUTARYL COENZYME A REDUCTASE ACTIVITY IN HEPATOMA TISSUE CULTURE CELLS BY PURE CHOLESTEROL AND SEVERAL CHOLESTEROL DERIVATIVES. EVIDENCE SUPPORTING TWO DISTINCT MECHANISMS. J.J. Bell, T.E. Sargeant and J.A. Watson (Dept. of Biochem. and Biophys., Univ. of California at San Francisco, San Francisco, California 94143) *J. Biol. Chem.* 251, 1745–58 (1976). Pure cholesterol associated in complexes with lipoproteins (whole serum and human low density lipoproteins) or esterified with succinic acid (cholesteryl succinate) and bound to albumin effectively suppresses 3-hydroxy-3-methylglutaryl coenzyme A (HGM-CoA) reductase activity in hepatoma tissue culture (HTC) cells grown in lipoprotein-poor serum medium during short (4-hour) incubation periods. Increasing concentrations of whole serum and cholesteryl succinate have no significant effect on the apparent rate constant of inactivation of the enzyme, whereas its apparent rate of synthesis is decreased 3- and 10-fold, respectively. HMG-CoA reductase activity in HTC cells thus appears to be modulated by two different mechanisms in which steroid structure is important. Whole serum and cholesteryl succinate specifically decrease the rate of enzyme synthesis, while 25-hydroxycholesterol, 7-ketocholesterol, and cholestenone increase the rate of inactivation of the reductase.

STIMULATION OF 25-HYDROXYVITAMIN D_3-1α-HYDROXYLASE BY PHOSPHATE DEPLETION. L.A. Baxter and H.F. DeLuca (Dept. of Biochem., Coll. of Agr. and Life Sci., Univ. of Wisconsin-Madison, Madison, Wisconsin 53706) *J. Biol. Chem.* 251, 3158–61 (1976). The ability of low phosphorus diets to stimulate the activity of the 25-hydroxy-vitamin D_3-1α-hydroxylase was tested in the chick. Feeding low phosphorus diets for 2 weeks resulted in a marked increase in enzyme activity relative to chicks fed a normal phosphorus diet. Stimulation of the 25-hydroxyvitamin D_3-1α-hydroxylase activity by low phosphorus diets, however, was not as great as that observed with a low calcium diet. The low phosphorus and low calcium diets also resulted in a marked stimulation of intestinal calcium absorption. The stimulation by low calcium diets probably results from increased 1,25-dihydroxyvitamin D_3 synthesis, whereas the stimulation by phosphate deprivation is only partly the result of increased 1,25-dihydroxyvitamin D_3 production.

EFFECT OF THE LIPID COMPOSITION OF MYCOPLASMA MYCOIDES SUBSPECIES CAPRI AND PHOSPHATIDYLCHOLINE VESICLES UPON THE ACTION OF POLYENE ANTIBIOTICS. D.B. Archer (Sub-Dept. of Chem. Microbio., Dept. of Biochem., Univ. of Cambridge, Tennis Court Rd., Cambridge CB2 1QW U.K.) *Biochim. Biophys. Acta* 436, 68–76 (1976). The effects of filipin and amphotericin methyl ester upon the K^+ efflux from *Mycoplasma mycoides* subsp. *capri* and egg lecithin sonicated vesicles were investigated. Both the nature of the sterol and the composition of the membrane affected the sensitivity to each polyene antibiotic. *M. mycoides* subsp. *capri* containing ergosterol was much more sensitive to amphotericin methyl ester than cells containing cholesterol. Cholesterol-containing cells were about twice as sensitive to filipin as the ergosterol-containing cells. These results were confirmed with phosphatidylcholine vesicles. At 2°C the filipin sensitivity of *M. mycoides* subsp. *capri* was independent of the membrane cholesterol content and the sensitivity towards amphotericin methyl ester decreased when the membrane cholesterol content was increased, in contrast to the results at 20°C. At 2°C, sterol-free egg lecithin vesicles became very sensitive to both filipin and amphotericin methyl ester and the presence of cholesterol in the vesicles did not increase the sensitivity further. At high concentrations of cholesterol (30 mol %), the polyene antibiotic sensitivity, particularly towards amphotericin methyl ester, was greatly reduced.

PROTEINS MASK GANGLIOSIDES IN MILK FAT GLOBULE AND ERYTHROCYTE MEMBRANES. J.M. Tomich, I.H. Mather and T.W. Keenan (Dept. of Animal Sci., Purdue Univ., West Lafayette, Ind. 47907) *Biochim. Biophys. Acta* **433**, 357–64 (1976). Gangliosides in the membrane of erythrocytes and the fat globules of cow's milk were not degraded by neuraminidase treatment at pH 5.2 or 7.4. Removal of portions of the membrane protein by treatment with trypsin or by extraction with a solution of EDTA and 2-mercaptoethanol rendered these membrane-associated gangliosides accessible to neuraminidase attack. After trypsin treatment under conditions where the membranes are impermeant to this enzyme, gangliosides were exposed to neuraminidase. The results suggest that the carbohydrate groups of the gangliosides of bovine erythrocytes and milk fat globules are located primarily on the environmental face of the membrane and are shielded from neuraminidase attack by membrane proteins.

HYDROLYSIS OF TRI- AND MONOACYLGLYCEROL BY LIPOPROTEIN LIPASE: EVIDENCE FOR A COMMON ACTIVE SITE. J.S. Twu, P. Nilsson-Ehle, and M.C. Schotz (Res. Service, Vet. Adm., Wadsworth Hosp. Ctr., Los Angeles, Calif. 90073) *Biochemistry* **15**, 1904–9 (1976). The relationship between triacylglycerol and monoacylglycerol hydrolyzing activities of purified rat heart lipoprotein lipase was studied using emulsified trioleoylglycerol and micellar of albumin-bound monooleoylglycerol as substrates. The maximal reaction rates obtained with the two substrates were similar (650 and 550 nmol of fatty acid released per min per mg of protein, respectively). Addition of apolipoprotein C-II or serum increased the maximal reaction rate for the trioleoyglycerol hydrolyzing activity about fourfold, but had no effect on the monooleoylglycerol hydrolyzing activity.

COMPARATIVE STUDIES OF LIPASE AND PHOSPHOLIPASE A_2 ACTING ON SUBSTRATE MONOLAYERS. R. Verger and J. Rietsch (Centre de Biochim. et de Biologie Moleculaire du C.N.R.S., 13274 Marseille Cedex 2 France) *J. Biol. Chem.* **251**, 3128–33 (1976). The kinetic aspects of lipolysis by pancreatic lipase and phospholipase A_2 from different sources have been compared using monomolecular films of short chain lipids as the substrates. Phosphatidylcholine monolayers, in contrast to phosphatidylethanolamine and phosphatidylglycerol monolayers, were resistant to hydrolysis by pancreatic lipase. The induction time, measured during pre-steady state conditions, increased abruptly for a given value of the surface pressure. This appears to be due to a degree of lipid packing above which the enzyme no longer can penetrate the lipid film. The existence of an optimum in the velocity *versus* surface pressure profile is the result of at least two counterbalancing factors. As the surface pressure increases, the amount of enzyme present in the interface decreases, whereas the minimal specific activity of the enzyme increases. From this study with monolayers we can conclude that activity of lipolytic enzymes used as tools for probing biological membranes will be greatly influenced by the physicochemical nature of the membrane-water interface. Thus, studies such as this one which can measure the penetrating ability of various lipolytic enzymes can be useful in deriving a better understanding of biological membrane structure.

• Edible Proteins

PROCESS FOR PRODUCING PROTEIN CONCENTRATE USING AIR CLASSIFICATION. R.B. Swain and D.E. O'Connor (Procter & Gamble). *U.S. 3,965,086.* The process comprises the steps of (1) fine grinding an oilseed meal so that 90% of the particles are less than 100 microns in diameter and air-classifying the resulting ground meal into a fraction characterized by its relatively high protein content and relatively low water insoluble carbohydrate content, and (2) washing the fraction either in water or in a 20–80% aqueous alcohol solution followed by separating the protein from the supernatant.

MEAT-LIKE TEXTURED PROTEIN PRODUCT. S. Kumar (Quaker Oats Co.). *U.S. 3,962,481.* A process for forming a meat-like textured protein product comprises (a) solubilizing a protein in an aqueous alkaline medium to form a slurry, (b) precipitating the protein, (c) recovering the precipitated protein, (d) shaping the protein, and (e) texturizing the shaped protein by heating in a hydrophobic liquid.

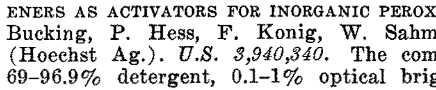
TEXTURED PROTEIN PRODUCT. S. Kumar (Quaker Oats Co.). *U.S. 3,962,335.* A process for forming a textured protein comprises (a) hydrating a vegetable or animal protein source to form a slurry, (b) heating the slurry to the boiling point to condition the protein, (c) recovering the protein, (d) shaping the protein, (e) heating the shaped protein in a liquid hydrophobic medium to induce texture, and (f) recovering the textured protein.

• Detergents

METHOD OF MEASUREMENT OF INTERFACIAL TENSION AT OIL-WATER INTERFACE IN AN ELECTRIC FIELD. B. Dobias. *Tenside Deterg.* 12(6), 328–9 (1975). Apparatus and method of estimating the interfacial tension γ_i at the oil-water interface in an electric field are described. An example the dependance of γ_i values of phosphatidyl-ethanolamine (PEA) dissolved in 4-methyl-pentan-2-one on the polarization potential E are studied at various PEA concentrations.

ON "SURFACTANT/SURFACTANT" AQUEOUS SYSTEMS. R. Despobović, Lj.A. Despotović, N. Filipović-Vinceković, V. Horvat and D. Mayer (Zagreb). *Tenside Deterg.* 12(6), 323–7 (1975). The results of investigations of the surfactant/surfactant systems in aqueous media show complex mutual phenomena, indicating, as a reasonable possibility, the formation of submicellar species, below the critical micellar concentration and with distinguished colloid properties. Systems analyzed were n-dodecylamine nitrate (LAN) + sodium n-dodecyl sulfate (NaLS); LAN + Triton × 305; NaLS + TX 305. On the basis of surface tension, turbidity, conductivity and electrophoretic mobility measurements one model of interactions in the observed system is proposed, confirming the hypothesis of submicellar associate formation in surfactant solutions as reasonable.

SECONDARY ALCOHOL ETHER ETHOXYLATES. W. Stein, W. Rupilius and P. Krings (Henkel & Cie). *U.S. 3,943,178.* The compounds have the formula:



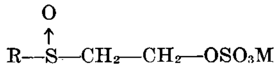
$$R_1\text{—}\underset{\displaystyle O\text{—}(CH_2\text{—}CH_2\text{—}O)_z\text{—}H}{\underset{|}{CH}}\text{—}CH_2\text{—}O\text{—}R_2$$

R_1 is a straight chain aliphatic hydrocarbon radical having 4–18 carbon atoms selected from the group consisting of alkyl and alkenyl; R_2 is an aliphatic hydrocarbon radical having 1–10 carbon selected from the group consisting of alkyl and alkenyl; and z is an average value between 3 and 18, with the proviso that the sum of the carbon atoms in R_1 and R_2 is 6–22.

PERACYLATED POLYAMINES COMPATIBLE WITH OPTICAL BRIGHTENERS AS ACTIVATORS FOR INORGANIC PEROXO COMPOUNDS. H.W. Bucking, P. Hess, F. Konig, W. Sahm and G. Schneider (Hoechst Ag.). *U.S. 3,940,340.* The composition consists of 69–96.9% detergent, 0.1–1% optical brightener, and 3–30% of an inorganic peroxo compound.

GRANULAR DETERGENT COMPOSITIONS. F.W. Gray, V.J. Richter and A.H. Limekiller (Colgate-Palmolive Co.). *U.S. 3,940,341.* A process for the production of hollow granules of detergent compositions containing sulfite which is retained even in storage under heated conditions comprises forming an aqueous slurry containing 5–40% organic detergent and 3–70% alkali metal sulfite, heating the slurry to at least 90 F, and spray drying it at 300–900 F to form the air-containing hollow granules containing at least 3% sulfite.

NOVEL 2-(ALKYLSULFINYL)ETHYL SULFATES AND COMPOSITIONS EMPLOYING SAME. V. Lamberti and W.F. Pease (Lever Bros. Co.). *U.S. 3,940,433.* The compound has the structure



$$R{-}\overset{\overset{\displaystyle O}{\uparrow}}{S}{-}CH_2{-}CH_2{-}OSO_3M$$

R is a straight or branched chain alkyl radical having 10–20 carbon atoms, and M is selected from the group consisting of an alkali metal, ammonium, alkyl substituted ammonium, and alkylolammonium cations. The alkyl groups have 1–6 carbon atoms.

PHOSPHATE-FREE DISHWASHING COMPOSITIONS. A.H. Gilbert and D.V. Kinsman (Lever Bros. Co.). *U.S. 3,941,710.* The compositions, which are suitable for use in mechanical dishwashing, consist of (a) 2–6% of a polyether carboxylate based on C_{14}–C_{15} alcohol mixture condensed with 13.5 moles of ethylene oxide; (b) 20–35% of a silicate having a Na_2:SiO_2 ratio of 1:2 to 1:24; (c) 2–6% of a low foaming nonionic surface active agent; (d) 0.5–1.5% of an antifoaming agent selected from the group consisting of monostearyl acid phosphate and a eutectic mixture of stearic and palmitic acids; (e) 1–2% of dichlorocyanurate; and (f) the balance filler.

NOVEL COMBINATION SOAP BAR. R.M. Gipson (Jefferson Chem. Co.). *U.S. 3,941,711.* A combination soap bar, which is effective in hard water, produces a stable lather, and is substantially resistant to scum formation in hard water, comprises 80% of a sodium and/or potassium fatty acid soap in which at least 80% is the sodium salt and at least 70% of the fatty acids are derived from tallow; and 20% of an alkali metal, amine, or ammonium salt of an N-2(2-hydroxyethoxy) ethyl fatty amide-H-sulfate containing 12–18 carbon atoms in the fatty amide chain.

SOAP COMPOSITION. P.J. Ferrara, G. Dalby, C.A. Barnes, Jr., and R. Gordon. *U.S. 3,941,712.* The solid, milled bar soap contains 5–100%, based on the fatty acid content of the soap, of mineral oil. The process by which it is formed comprises adding to a hot liquid mixture of soap and water the mineral oil to form a homogeneous mixture. The mixture is then cooled, dried, and formed into bars by usual processes.

RINSE COMPOSITION. P.L. Dawson, M.D. Rickard, and M.T. Rothwell (Lever Bros. Co.). *U.S. 3,941,713.* A liquid rinse composition for use in machine dishwashing comprises (a) 3–30% of a low foaming nonionic surface active agent, (b) 0.5-10% of a monoalkylphosphate ester, and (c) 35–80% of lactic, citric, or glutaric acid.

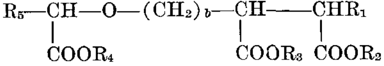
MILD LIGHT DUTY DETERGENT CONTAINING HOMOPOLYMERS OF ETHYLENE OXIDE. S. Weiss, V. Temnikow and E. Eigen (Colgate-Palmolive Co.). *U.S. 3,944,663.* Irritation of the skin on the hands caused by light duty liquid or powder detergents consisting of alkyl benzene sulfonates, alkyl sulfates, olefin and paraffin sulfonates, or alkyl phenol ethoxamer sulfates is reduced by adding to the product a homopolymer of ethylene oxide having the general formula $(CH_2CH_2O)_n$. *n* is an integer sufficient to provide a molecular weight between 100,000 and 4,000,000. The formulation contains 10–35% surfactant, 0.01–5% polymer, and the balance either sodium sulfate or an aqueous medium containing up to 15% of a solubilizing agent.

GERMICIDAL DETERGENT. C.L. Moyle (Dow Chemical Co.). *U.S. 3,944,498.* The composition, for controlling bacteria, fungi, and yeasts, comprises an anionic or nonionic detergent, or a mixture of the two, and 4-chlorophenyl-2-thienyliodonium chloride, trifluoroacetate or trichloroacetate salt.

HEAT STABLE, CALCIUM COMPATIBLE WATERFLOOD SURFACTANT. R. Farmer, III, J.B. Lawson and W.M. Sawyer, Jr. (Shell Oil Co.). *U.S. 3,943,160.* A sterically-hindered branched chain surfactant comprises a sulfate of a polyethoxylated alcohol in which the alcohol form of the alcohol portion has the formula:

$$CH_3(CH_2)_{12\text{–}15}(OCH_2CH_2)_5OC(CH_3)_2CH_2OH$$

ESTERS OF CARBOXYMETHYLOXYSUCCINIC ACID. V. Lamberti (Lever Bros.). *U.S. 3,943,165.* The compound has the formula:



$$R_5{-}\underset{\displaystyle COOR_4}{\underset{|}{CH}}{-}O{-}(CH_2)_b{-}\underset{\displaystyle COOR_3}{\underset{|}{CH}}{-}\underset{\displaystyle COOR_2}{\underset{|}{CHR_1}}$$

R_1 is selected from the group consisting of —H and —CH_3; R_2, R_3, and R_4, which may be the same or different substituents, are selected from the group consisting of straight and branched chain alkyl groups having 1–12 carbon atoms, benzyl, and cyclohexyl; R_5 is selected from the group consisting of —H, —CH_3, and —C_2H_5; and b = 0,1.

BATH BEADS CONTAINING ALLANTOIN. E.J. Shevlin (Chattem Drug & Chemical Co.). *U.S. 3,941,722.* A free flowing bath bead composition comprises 0.1–2.0% allantoin, 0.1–2.0% allantoin proteinate containing 5–7% allantoin and a substantive protein derived from collagen and comprising straight chain polypeptides with a molecular weight up to 10,000, 0.5–5.0% of a collagen hydrolysate, and 10–84% of water softener.

DEXTRIN CARBOXYLATES AND THEIR USE AS DETERGENT BUILDERS. J.H. Finley (FMC Corp.). *U.S. 3,941,771.* The dextrin carboxylate comprises a dextrinized starch of 20–100 anhydroglucose units in which 2.2–2.8 average OH groups per anhydroglucose unit are esterified through one of the carboxyls of a nonaromatic polycarboxylic acid of 2–4 carboxyls containing 2–10 carbon atoms. Water soluble salts of the dextrin carboxylate are also claimed.

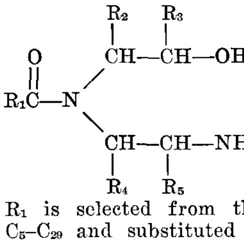
STABILIZATION AND ENHANCEMENT OF ENZYMATIC ACTIVITY. F.L. Diehl, E. Zeffren, and E.J. Milbrada (Procter & Gamble). *U.S. 3,944,470.* An enzyme composition having improved activity and stability in aqueous solution comprises an enzyme and an aminated polysaccharide selected from cellulose, hydroxyethylcellulose, methyl cellulose, or starch having 0.01–2% of nitrogen in its elemental composition. The ratio of aminated polysaccharide to enzyme is in the range of 500:1 to 1:1.

DETERGENT COMPOSITION CONTAINING COATED BLEACH PARTICLES. D.S. Alterman and K.W. Chun (Lever Bros. Co.). *U.S. 3,944,497.* The composition comprises an anionic detergent mixed with encapsulated dichloroisocyanurate in particulate form. The particles have an inner coating comprising a fatty acid with 12–20 carbon atoms and an outer coating comprising a sodium salt of the fatty acid completely enclosing the inner one. The detergent is free of amino nitrogen in its molecular structure.

ACIDIC EMOLLIENT LIQUID DETERGENT COMPOSITION. C.L. Roggenkamp (Procter & Gamble). *U.S. 3,943,234.* A liquid dishwashing detergent composition which provides skin emolliency benefits consists of (a) 1–10% of an amine oxide of formula $RR'R''N{\rightarrow}O$ wherein R is an alkyl group containing 8–18 carbon atoms and R′ and R″ are each C_1–C_4 alkyl groups; (b) 1–5% of a C_{12}–C_{22} monohydric alcohol serving as an emollient; (c) 1–5% of an organic acidic pH controlling agent; (d) 5–50% of a noninterfering auxiliary surfactant consisting of olefin sulfonates, alkyl sulfates, and alkyl ether sulfates; and (e) the balance a liquid carrier selected from the group consisting of water and mixtures of water with C_2–C_4 alcohols. The pH of a 0.2% aqueous solution of the composition lies within the range 4–6.9.

METHOD AND EQUIPMENT FOR THE MANUFACTURE OF VARIEGATED DETERGENT BARS. A. D'Arcangeli (Colgate-Palmolive Co.). *U.S. 3,940,220.* The equipment comprises two plodders connected to a vacuum chamber with a third plodder connected to and located below the vacuum chamber. This final plodder contains a mixing worm of predetermined diameter which is operated such that 30–70% of it is uncovered. At the end of the third plodder is a pressure plate with a plurality of holes. Beyond the plate is located a device for imparting a transverse or radial motion to detergent passing through the plate and also a cutter. Beyond the cutter is a compression device which includes a chamber having a length less than one-half the predetermined diameter of the worm. After the compression device, the detergent is extruded and formed into the final desired shape.

TERTIARY AMIDE AMPHOTERIC SURFACE ACTIVE AGENTS. P.M. Chakrabarti (GAF Corp.). *U.S. 3,741,817.* The amide has the formula:

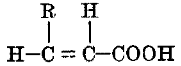


R_1 is selected from the group consisting of unsubstituted C_5–C_{29} and substituted C_5–C_{29} aliphatic hydrocarbon radicals, which, when substituted, have one or more substituents selected from the group consisting of Cl, Br, OH, and OCH_3; and R_2–R_5 are each selected from the group consisting of hydrogen, unsubstituted and/or substituted C_2–C_4 aliphatic hydrocarbon radicals. In the process for making the amides, a fatty acid ester having 6–30 carbon atoms is condensed with a hydroxy diamine in the presence of a base catalyst for 5 minutes to 1 hour at 60–120 C.

ANHYDROUS LIQUID IODOPHORE SOLUTION. H.P. Landi and V.A. Perciacante (American Cyanamid Co.) *U.S. 3,950,261.* The detergent solution comprises (a) 30% propylene glycol, (b) 43% nonionic detergent consisting of a condensation product of ethylene oxide and alkylphenol, (c) 22% iodine complex of an ethylene oxide alkylphenol condensation product having at least 20% available iodine, (d) 2% sodium acetate, (e) 2% sodium iodide, and (f) sufficient citric acid to produce a pH of 3–5.5.

APPARATUS FOR FINISHING SOAP BARS. C.F. Fischer (Colgate-Palmolive Co.) *U.S. 3,950,122.* An apparatus for high intensity shear refining of soap from a soap plodder to produce a striated product consists of an auger and a housing. At the end of the auger is some free volume within the housing, the outlet from which is aligned at an angle to the axis of the auger. Coloring matter may be introduced into the free space.

POLYACRYLATES OF SELECTIVE VISCOSITY AS DETERGENT BUILDERS. I.A. Eldib. *U.S. 3,950,260.* A detergent formulation comprises an organic water soluble surfactant and a polyelectrolyte builder comprising a water soluble salt of a homopolymer of an acid having the general formula



$$\mathrm{H{-}C(R){=}C(H){-}COOH}$$

R is hydrogen or methyl radical. The chelation value of the polyelectrolyte is at least 75. The viscosity of a 12.5% aqueous solution of the sodium salt of the homopolymer at 72 F is in the range 25–350 cp. The ratio of builder to surfactant ranges between 1:5 and less than 5:1.

MANUFACTURE OF GRANULAR DETERGENTS. S. Toyoda, K. Takenouchi, N. Hara and F. Kondo (Lion Fat & Oil Co.) *U.S. 3,950,275.* A process of preparing a granular detergent with improved resistance to powdering and reduced hygroscopicity comprises the steps of (a) wetting the surfaces of spray dried detergent granules with a liquid binder consisting of a dilute aqueous solution of carboxy-methylcellulose and water glass, (b) coating the wetted granules with a powdered builder, and (c) drying the coated granules. The amount of binder applied is 0.01–0.30 parts per part of granules, and the amount of builder is 0.02–4.0 parts per part of granules.

SULFONATE DETERGENT COMPOSITIONS. P.S. Grand (Colgate-Palmolive Co.) *U.S. 3,950,276.* A granular, nonphosphate, nonenzymatic detergent composition consists of an anionic sulfonate detergent, sodium silicate, nonionic detergent, and carboxymethyl cellulose. When dissolved in 0.15% concentration in water of 150 ppm of hardness, the composition brings about a pH below 10, a turbidity of less than 30, and a calcium electrode potential of at most 20 mv less than the potential of the hard water.

LAUNDRY PRE-SOAK COMPOSITIONS. R.L. Stewart, H.W. McCune and F.L. Diehl (Procter & Gamble) *U.S. 3,950,277.* A composition for improved triglyceride stain removal comprises 0.01–7.0% of a lipase and 0.1–70% of a water soluble lipase activator selected from the alkali metal salts and ammonium salts of isopropylnaphthalene sulfonate, methylnaphthalene sulfonate, or butylnaphthalene sulfonate.

SULFOSUCCINATE DERIVATIVES AS DETERGENT BUILDERS. V. Lamberti (Lever Bros. Co.) *U.S. 3,950,331.* The compounds are α-alkylthio-β-sulfosuccinic acids and their alkali metal, ammonium, and substituted ammonium salts.

HIGH LATHERING, NON-IRRITATING DETERGENT COMPOSITIONS. R.J. Verdicchio and J.M. Walts (Johnson & Johnson) *U.S. 3,950,417.* A detergent composition having good foam stability and low ocular irritation consists of a surfactant betaine, an anionic surfactant, and a polyoxyethylene derivative of a hydrophobic base as nonionic surfactant.

DETERGENT COMPOSITIONS CONTAINING SHORT CHAIN QUATERNARY AMMONIUM CLAYS. P.R. Hartley (Procter & Gamble) *U.S. 3,948,790.* The composition comprises 5–99% detergent and 1–50% of an impalpable smectic clay having an ion exchange capacity of at least 50 meq/100 grams. In the clay, 5–100 molar percent of the exchangeable cations are alkyl-substituted ammonium ions of the general formula $R^1R^2R^3R^4N^+$. Each of R^1, R^2, R^3, and R^4 represents an alkyl group having 1–4 carbon atoms or hydrogen, provided that the total number of carbon atoms does not exceed 8 and not more than any two R groups, represent hydrogen.

DETERGENT COMPOSITION. S. Tomiyama and M. Iimori (Lion Fat & Oil Co.) *U.S. 3,948,818.* The composition consists of surfactant component and builder component. The surfactant component comprises 10–30% of at least one salt selected from the group consisting of the lysine, hydroxylysine, arginine, histidine, and ornithine salts of alkylbenzene sulfonic acids, alkane sulfonic acids, sulfonates of fatty acids and their lower alcohol esters, and monohydric alcohol monoester sulfates.

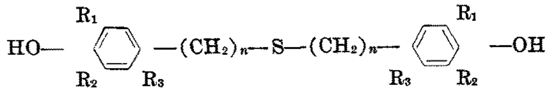
CLEANING COMPOSITION. A.G. Wilde (Minnesota Mining and Manufacturing Co.) *U.S. 3,948,818.* A cleaning composition having particular utility in the removal of soil from aluminum airplane surfaces and preventing its redeposition consists of an aqueous solution containing in each liter at least 1 gram of a nonionic surfactant system consisting of a first ethoxylated surfactant containing 35–50% oxyethylene units and a second ethoxylated surfactant containing at least 55% oxyethylene units. The mol ratio of the first surfactant to the second is 4:1–1:3.5. Redeposition of soil is prevented by adding at least 0.1 millimol per liter of a fluoroaliphatic phosphate.

APPARATUS FOR PRODUCING STRIATED SOAP BARS. C.F. Fischer (Colgate-Palmolive Co.) *U.S. 3,947,200.* An apparatus for producing striated soap on a high intensity mixer extruder comprises two barrels with screws therein and means for injecting dye into the soap downstream of the screws.

SUBSTITUTED HALOTRIAZINES AS PEROXYGEN BLEACH ACTIVATORS. F.F. Loffelman and T.E. Brady (American Cyanamid Co.) *U.S. 3,947,374.* A bleaching composition consists of hydrogen peroxide or a hydrogen peroxide-releasing compound and an activating amount of a halotriazine compound. The mole ratio between the two components ranges between 1:1 and 10:1.

MILDNESS ADDITIVE. R. Kelly and E.J. Ritter (Cincinnati Milacron, Inc.) *U.S. 3,947,382.* A detergent composition exhibiting improved mildness properties consists of a nonionic organic detergent and 0.005–10 parts of a mildness additive which comprises the substituted polymerized product of 2–4 molecules of a monomeric C_{12}–C_{26} unsaturated fatty acid wherein the polymerized product contains a cyclohexene moiety and instead of 2–4 carboxyl groups from the fatty acid, radicals selected from the group consisting of various substituted and unsubstituted amides and morpholido.

YELLOWING-PREVENTIVE DETERGENT COMPOSITION. H. Arai, J. Mino and K. Ide (Kao Soap Co.) *U.S. 3,945,951.* A clothes washing detergent composition contains 0.001–5% of a compound of the formula



n is 0 or 1, R_1 is an aliphatic hydrocarbon having 8–14 carbon atoms or tert-butyl, and R_2 and R_3 are H, alkyl, or hydroxyalkyl having 1–2 carbon atoms. There is the proviso that at least one of R_2 and R_3 is the alkyl or hydroxyalkyl.

METHOD OF IMPROVING THE STABILITY OF DETERGENT BLEACH COMPOSITIONS. F.G. Villaume (American Cyanamid Co.) *U.S. 3,945,937.* The compositions contain an inorganic peroxygen bleaching composition and a substituted halotriazine compound as an activator in mole ratios of 1:1 to 10:1. The preparation method comprises forming an aqueous slurry of a detergent composition and the substituted halotriazine, at 50–65% solids, and spray drying it to yield a product with 8–13% moisture and a bulk density of 0.30–0.35 g/cc. This composition is then dry-blended with the inorganic bleach compound to form the storage-stable composition.

ANTIBACTERIAL DITHIOCARBAMATE ESTER DETERGENT COMPOSITIONS. E.V. Rowan (R.T. Vanderbilt Co.) *U.S. 3,945,938.* A bacteriostatic skin and scalp cleansing composition comprises detergent and a skin substantive dithiocarbamate ester compound.

PHENOLIC SYNTHETIC DETERGENT-DISINFECTANT. M.W. Winicov and W. Schmidt (West Laboratories, Inc.) *Reissue Patent Re. 28,778.* The composition comprises an aqueous alkaline solution having a pH of 10–13 and containing a mixture of phenolics and at least 0.2 parts per part of phenolic mixture of anionic surface active agent. The phenolic mixture consists of at least 5% ortho phenylphenol and the balance other phenolics including high and medium activity phenolics. The ratio of ortho phenylphenol to the other phenolics ranges between 2:1 and 1.5:1 depending on the activity of the other phenolics.

SOAP CURD DISPERSANT. G.T. Hewitt (Colgate-Palmolive Co.) *U.S. 3,951,596.* A method of washing fabrics using soaps of higher fatty acids comprises adding to the wash or rinse water a liquid soap curd dispersant which consists of 10–60% of an amide, 5–25% of a hydrotrope, 5–25% organic solvent, and the balance water.

ALL PURPOSE LIQUID DETERGENT. P.H. Rasmussen (Colgate-Palmolive Co.) *U.S. 3,951,826.* A single phase, all purpose heavy duty liquid detergent consists of 75–95% water, 0.4–5% nonionic detergent, 3–17% builder salt, and 0.1–4% of phosphoric acid mono- and diester salts which contribute detergency to the product and stability against phase separation during storage.

STABILIZERS FOR SODIUM PERCARBONATE IN SOLID BLEACHES AND DETERGENTS. M.D. Jayawant and P.C. Yates (Du Pont) *U.S. 3,951,838.* A method of preparing sodium percarbonate having improved stability in solid bleach and detergent formulations comprises treating particles of the percarbonate with an aqueous sol containing 3–8% of silica having a maximum particles size of 0.1 micron, depositing 1–10% of silica on the percarbonate particles, and drying the product. The silica is prepared by deionizing a solution of water soluble silicate to a pH of 3–10.

DETERGENT COMPOSITION. J. Mino and H. Arai (Kao Soap Co.) *U.S. 3,951,839.* The composition consists of 0.001–1.0% of at least one radical chain-inhibiting antioxidant selected from the group consisting of 4,4′-butylidene-bis(6-tert-butyl-3-methylphenol, and mono- and distyrenated cresol and phenol, and 1,1′-bis(4-hydroxyphenyl) cyclohexane; 0.5–50% of an oxygen type bleaching agent; and the balance surfactants and builders.

STABLE BLEACHING COMPOSITION. T. Fujino, M. Yamanaka and K. Deguchi (Kao Soap Co.) *U.S. 3,951,840.* A powdery bleaching composition comprises an inorganic peroxide bleaching agent and 0.05–5% of a chelating agent selected from the group consisting of salicylaldoxime, α-benzoinoxime, cupferron, dithizone, aluminon, dimethylglyoxime, sulfosalicylic acid, mercaptobenzothiazole, and oxine.

SYNTHETIC DETERGENT BAR WITH ANTIMUSHING AGENT. L.M. Prince and J.P. Furrier (Lever Bros. Co.) *U.S. 3,951,842.* The bar comprises 30–60% of water soluble alkali metal detergent salts of esters of isethionic acid with mixed aliphatic fatty acids; 2–10% of a suds-boosting detergent salt; 1–9% water; 2.5–25% higher fatty acid soap; 10–40% of a higher fatty acid having 25 carbon atoms; and 3–25% antimushing agent. The antimushing agent is linoleic acid dimer or linoleic acid dimer together with a mixture of sodium sulfate and sodium chloride. The bar has improved hardness, improved firmness recovery characteristics, and is free of efflorescence.

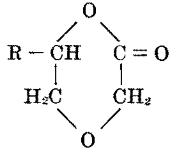
DEFOAMER COMPOSITION. D.W. Suwala (Diamond Shamrock Corp.) *U.S. 3,951,853.* The composition comprises (a) 75–98 parts of an organic liquid, (b) 1–15 parts of an amide reaction product of a polyamine and a fatty acid, (c) 0.1–10 parts of a base, (d) 0.1–5 parts of a reactive chlorosilane monomer, and (e) 0–3 parts of an organic component selected from the group consisting of an organic polymer, a fatty acid of 10–20 carbon atoms, and a glyceride of fatty acids from 10 to 20 carbon atoms.

HEAVY DUTY GRANULAR DETERGENT COMPOSITION. O. Okumura, K. Ohbu, M. Kachi and M. Nagayama (Lion Fat & Oil Co.) *U.S. 3,951,877.* The detergent has the form of free-flowing, hollow, spherical particles with sufficient shell strength to minimize breaking during packaging and transportation. It is prepared by spray drying an aqueous slurry consisting of 10–60% sodium citrate, 5–40% nonsoap anionic surfactant, 0.1–10% inorganic aluminum substance such as aluminum salts, aluminum oxide, and aluminum hydroxide, and the balance sodium sulfate or sodium sulfate and sodium silicate.

DETERGENT THAT REDUCES ELECTROSTATIC CLING OF SYNTHETIC FABRICS. H.E. Wixon (Colgate-Palmolive Co.) *U.S. 3,951,879.* The product consists of 5–24% anionic detergent, 2–20% nonionic detergent, 2–20% amphoteric detergent, 0.5–1% of a water soluble magnesium or calcium salt, and 0.25–1% of a quaternary ammonium compound.

ANTI-DUSTING ALPHA-OLEFIN SULFONATE DETERGENT COMPOSITIONS. M. Mausner and B.L. Kapur (Witco Chemical Co.) *U.S. 3,951,880.* A process of suppressing the dusting tendencies of an alkali metal salt of a C_{10}–C_{22} alpha-olefin sulfonate detergent comprises incorporating therein 10–35% of a lower alkanolamine salt of the alpha-olefin sulfonate.

2-KETO-6-SUBSTITUTED DIOXANE-(1,4) COMPOUNDS. J. Barillo, T.A. Payne, Jr., and W.J. Urban (Lever Bros. Co.) *U.S. 3,952,016.* There is claimed a compound of the formula:



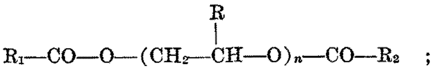
R is $R'OCH_2$ and R′ is an alkyl radical containing 5–8 carbon atoms.

FORMULATING OPTIONS FOR HEAVY DUTY LIQUID DETERGENTS. H.R. Flammer (Conoco Chemicals, Houston, Tx.). *Soap, Cosmet., Chem. Spec.* **52**(4), 38–42 (1976). The factors which go into making an economic decision on the combination of chemicals which will yield the desired performance under a set of specific test conditions are examined. Initially shown is the price relationship of these chemicals based on projected feedstock and production costs and the importance of using three to five year projected costs in making formulation decisions. The soil removing capabilities of these materials are then discussed and how these differences affect cost/performance. Also shown is the role which the surfactant plays in obtaining the desired viscosity and clear point and the fact that various surfactants have various cost benefits or penalties depending on the quantity of solubilizing agent or viscosity modifier necessary to achieve the desired physical properties. The cost per equivalent performance factor is then used to calculate and economically compare various formulating options. From the study of nonbuilt formulations, the linear alkyl benzene sulfonate secondary alcohol ethoxylate system, because of its soil removal and solubility characteristics, had the lowest cost per equivalent performance factor, while alcohol ethoxylate was the product of choice in the built system.

BLUE BOOK ISSUE. *Soap, Cosmet., Chem. Spec.* **52**(4A), (1976). The book covers over 1,000 raw materials, manufacturing machinery, containers, accessories, and services for the soap, cosmetic, detergent, and chemical specialties industries. Section I lists alphabetically the raw materials, equipment, and services used by manufacturers and converters. Also included are listings of finished products. Section II contains listings of trademarks of suppliers, trademarks filed with the U.S. Patent Office during the past year for finished products, and the national trade associations in the soap, detergent, cosmetic, perfume, pest control, and chemical specialty manufacturing and marketing fields. Included also are the official specifications of the American Wax Importers and Refiners Association for candelilla, carnauba, ouricury, and beeswax. Finally, there is an index to the monthly articles appearing in *Soap, Cosmet., Chem. Spec.* over the years 1972 through 1975.

FABRIC SOFTENING LAUNDRY DETERGENT. C. Vérité (Colgate-Palmolive Co.). *U.S. 3,957,661.* A heavy duty particulate laundry detergent consists of (a) 0.1–4% of $R^1O(CH_2CH_2O)_m$-$PO(OM)_2$; (b) 0.1–3% of $(R^1O(CH_2CH_2O)_m)_2POOM$; (c) 0.1–2% of $R^2OPO(OM_2)$; (d) 0.1–1% of $(R^2O)_2POOM$; (e) 10–35% of alkali metal or ammonium C_{11}–C_{15} alkyl benzene sulfonate; (f) 2–50% of an alkali metal silicate; (g) 10–60% of an alkali metal non-silicate builder salt; and (h) 1–15% moisture. R^1 is an alkyl of 14–20 carbon atoms; R^2 is an alkyl of 6–10 carbon atoms; *m* ranges from 1 to 6; and M is alkali metal or ammonium. The proportions of (a) to (b) and of (c) to (d) are from 4:1 to 2:3. The proportions of the total of (a) and (b) to the total of (c) and (d) is from 19:1 to 1:1.

FATTY ACID ESTER MIXTURES LIQUID AT LOW TEMPERATURES. G. Dieckelmann, H. Hartmann and J. Plapper (Henkel & Cie). *U.S. 3,957,426.* A fat-liquoring agent is selected from the group consisting of (a) 0–100% of fatty acid esters liquid at low temperature having the formula



$$R_1\text{—CO—O—}(CH_2\text{—}\overset{R}{\overset{|}{C}}H\text{—O})_n\text{—CO—}R_2 \;;$$

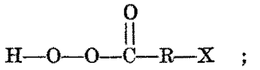
0–100% of the sulfation products of the liquid fatty acid esters having a degree of sulfation of 15–60%; and (c) 0–100% of the sulfonation products of the liquid fatty acid esters having a degree of sulfonation of 15–60%. The total of (a), (b), and (c) is 100%. In the formula, R_1–CO is the acyl of at least one fatty acid selected from the group consisting of (i) train-oil fatty acids and (ii) liquid fatty acid mixtures containing train-oil fatty acids and containing 10–60% polyunsaturated fatty acids having 20–24 carbon atoms. CO–R_2 is the acyl of a liquid fatty acid free of polyunsaturated train-oil fatty acids and having more than 75% of mono- and di-unsaturated fatty acids. R is hydrogen or methyl. *n* is an integer from 1 to 10. Up to 20 mol percent of either R_1–CO or CO–R_2 can be replaced by hydrogen.

Foam-regulated washing compositions. P. Krings, G. Jakobi and J. Galinke (Henkel & Cie). *U.S. 3,954,643.* The compositions consists of (a) a surface active component consisting of 50–100% of an anionic surface active compound selected from the group consisting of olefin sulfonates and α-sulfo-fatty acid ester salts esterified with an alcohol selected from the group consisting of alkanols, alkanediols, and alkanetriols, and 0–50% of a surface active compound having good biodegradability and low toxicity selected from the group consisting of anionic surface active compounds of the sulfonate and sulfate type other than the olefin sulfonates and α-sulfo-fatty acid ester salts, and nonionic surface active compounds; (b) soaps of saturated fatty acids at least 50% of which have 20–24 carbon atoms; and (c) a complexing builder salt component consisting of 75–100% of a high molecular weight polyalkylene-polycarboxylic acid copolymer of a lower alkene with maleic acid and 0–25% of complexing builder salts having phosphorus or nitrogen atoms. Components (a), (b), and (c) are present in a weight ratio of 2 to 10:1:7 to 35.

Liquid laundry washing aid. H. Bauer (Days-Ease Home Products Corp.). *U.S. 3,956,198.* A composition suitable for use on delicate fabrics which are deleteriously affected by alkaline pH conditions consists of (a) a phosphate ester surfactant; (b) an alkali metal salt of an aminopolyacetic acid to chelate calcium, magnesium, iron, and cobalt in an amount sufficient to neutralize the surfactant to a pH of 7; (c) a water miscible organic alcohol solvent in an amount sufficient to solubilize organic borne stains and dirt; and (d) water in an amount sufficient to solubilize the aminopolyacetic acid salt. The composition has a pH of 7 and is free of inorganic phosphate builders.

Pigmented detergents. D.I. Lee (Dow Chemical). *U.S. 3,956,163.* The detergent contains an aqueous liquid detergent and an opacifying amount of a non-film-forming water- and detergent-insoluble emulsion polymer in the form of a latex. The latex is prepared by an emulsion polymerization process comprising the steps of (a) subjecting a polymerization recipe containing an aqueous medium, a catalyst, and an ethylenically unsaturated monomer to emulsion polymerization conditions; (b) adding an excess of a nonionic surfactant to the polymerization recipe when 15–70% of the monomer has been polymerized, and (c) continuing addition and polymerization of the monomer. The excess of nonionic surfactant is more than required to cover the total surface area of the emulsion polymer particles of the latex.

Stable concentrated liquid peroxygen bleach composition. J.P. Jones (Procter & Gamble). *U.S. 3,956,159.* The composition consists of (a) 94–98% of an anhydrous ternary solvent mixture consisting of 20–45% of *t*-butyl alcohol, 20–40% of ethylene diacetate, and 20–40% of glycerol triacetate; (b) 1–6% of a peroxyacid having the formula



$$H\text{—O—O—}\overset{O}{\overset{||}{C}}\text{—R—X} \;;$$

(c) 0.005–0.05% of a stabilizing agent selected from the group consisting of picolinic acid, dipicolinic acid, and quinaldic acid; and (d) 0–3% of a pH 6.5–12 buffering agent. In the peroxyacid, R is an alkylene group of 1–12 carbon atoms and X is methyl, chloromethyl, carboxyl, sulfonate, or peroxycarboxylate and their water soluble salts.

Production of textile softeners. G. Pusch, H. Singer and J. Ibrahim (Ciba-Geigy Corp.). *U.S. 3,956,350.* The process comprises condensing with stirring and heating an aliphatic monobasic fatty acid of at least 8 carbon atoms, provided that the fatty acid is at least 40 mole % of saturated or monounsaturated straight chain fatty acid with at least 12 carbon atoms, with diethylene triamine or dipropylene triamine, in a molar ratio of fatty acid to triamine of 2:1, to form a *bis*-amide. The resulting fatty acid amine condensation product is heated with urea in a molar ratio of 1:0.5 to 1:1 so that 0.5–1 mole of ammonia per mole of fatty acid amine condensation product is given off. The resulting urea condensation product is treated with 1–5 moles of formaldehyde per mole of urea to methylolate the urea condensation product.

Detergent compositions containing coated particulate calcium sulfate dihydrate. V. Lamberti (Lever Bros. Co.). *U.S. 3,954,649.* Particulate calcium sulfate dihydrate has a coating of water-insoluble calcium salt on it. The coating comprises 10–75% of a substance selected from the group consisting of calcium carbonate, calcium silicate, calcium sulfite, calcium orthophosphate, and hydroxyapatite. A process for producing a detergent composition comprises (a) charging into a crutcher 35–45% water; (b) mixing in 10–60% sodium carbonate; (c) adding 1–75% particulate calcium sulfate dihydrate; (d) agitating the mixture at 20–100 C until a coating of calcium carbonate forms on the particles of calcium sulfate; (e) adding 0–30% sodium sulfate; (f) adding 5–30% of a surfactant having detergent properties to form a built detergent slurry in the crutcher; and (g) spray drying the slurry.

Detergent compositions. R.E. Nelson and A.H. Gilbert (Lever Bros. Co.). *U.S. 3,953,382.* The composition comprises a ternary combination of (a) 15–70% water soluble polyetheneoxy organic nonionic detergent compound; (b) 2–8% water insoluble polyalkyleneoxy nonionic compound; and (c) 2–80% of an organic compound selected from the group consisting of (i) N-alkanol alkaneamides, (ii) tertiary amine oxides, and (iii) alkyl sulfoxides. The ratio of (b) to (c) ranges between 15:1 and 1:15.

Stable, low viscosity fabric softener. J.A. Monson, W.L. Stewart and H.F. Gruhn (S.C. Johnson & Co.). *U.S. 3,954,634.* A process for producing an aqueous, storage stable fabric softening dispersion having an initial viscosity under 150 cp comprises (a) premixing 7–15% of a cationic fabric softening agent such as a quaternary ammonium compound and an imidazolinium compound with 1–10% of an aliphatic alcohol and 74.5–92% of an electrolyte-free aqueous vehicle at temperatures of 65 F to somewhat above the softening point of the fabric softening agent, with sufficient agitation to provide a creamy, gel-like emulsion free of entrapped air; (b) mixing the emulsion at high shear pressure of 500–8,000 psi at a temperature above the softening point of the fabric softening agent to provide a thin, translucent, stable dispersion; and (c) immediately thereafter cooling the dispersion to less than 80 F to prevent agglomeration of the dispersed particles.

Coning oil. J.E. Obertz and A.R. Tarini (Diamond Shamrock Corp.). *U.S. 3,953,339.* A coning oil composition which is applied to yarn prior to processing comprises mineral oil, an anionic or nonionic surfactant, and an aluminum soap of saturated fatty acids. The aluminum soap reduces slinging of the oil during yarn processing. The composition is prepared by dispersing the soap in the mineral oil, heating to 110 C to clear, cooling to 80 C, introducing the emulsifier, and then agitating.

Foaming bleaching composition. T. Fujino, M. Nashimura and M. Yamanaka (Kao Soap Co.). *U.S. 3,953,350.* Sodium percarbonate is heated for times and temperatures ranging between 2–6 hours at 75 C and 5–30 minutes at 135 C. A bleaching composition consists of 30–90% of the heated percarbonate, 3–10% surfactant, and 6–30% builders and fillers.

Liquid laundry detergent. A.A. Keller (Lever Bros. Co.). *U.S. 3,953,351.* The detergent comprises 5–80% of a liquid nonionic surface active agent having a melting/pour point of up to 25 C, 95–20% of a fatty acid 0–40% neutralized to produce a water soluble soap and having a melting/pour point of up to 25 C, and 0–20% water. The pH of the detergent is between 4 and 8.

Acidic cleaning composition. H. Mizutani, M. Abe and Y. Nakasone (Kao Soap Co.). *U.S. 3,953,352.* A liquid acidic cleaning composition for removing adhering soils and strains from hard surfaces and fabrics consists of (a) 0.1–20%

of a pyrrolidone-carboxylic acid; (b) up to 10% surfactant; (c) up to 10% mono- or diethylene glycol monoalkyl (C_1–C_4) ethers; (d) up to 10% hydrotropic agent sufficient to dissolve (a); and (e) the balance water. A similar liquid composition may contain 5–15% hydrocholic acid, and a solid acid cleaning composition may contain, in addition to the pyrrolidone-carboxylic acid, sodium chloride, sodium sulfate, sodium bisulfate, or potassium bisulfate.

IMPROVED AQUEOUS ALKALI METAL SILICATE-ALKALI METAL HYDROXYALKYL IMINODIACETATE COMPOSITIONS. F.R. Cala (Colgate-Palmolive Co.). *U.S. 3,953,379.* The method of manufacturing the compounds comprises mixing the imino salt at an elevated pH with a solution of the alkali metal silicate thereby producing a composition in which the gellation and/or precipitation which would normally occur is prevented or decreased. The ratio to alkali metal oxide, M_2O to SiO_2 in the alkali metal silicate is 1:1.6 to 1:3.

LAUNDERING PRESPOTTER. J.H. Barrett, Jr. and B.P. Flynn (Purex Corp.). *U.S. 3,953,353.* For rub-on application to stains and soil deposits on fabrics preparatory to laundering, this solid product consists of water soluble nonionic detergent and stable laundry enzyme uniformly dispersed on it.

LIQUID DETERGENT. B. Sundby (Colgate-Palmolive Co.). *U.S. 3,953,380.* A clear, concentrated liquid detergent, free of builder salts except in sequestering amounts, consists of (a) 40–75% nonionic detergent, (b) 0.5–5% brightener, (c) 5–35% water, and (d) 5–35% ethanol or isopropanol. The proportions of the four components are such that the detergent solubilizes the brightener in the water-alcohol solvent system.

SOFTENING ADDITIVE AND DETERGENT COMPOSITION. R.A. Gloss (Procter & Gamble). *U.S. 3,954,632.* A detergent-compatible granular fabric softening composition consists of (a) 5–90% of a smectite clay having an ion exchange capacity of at least 50 meq/100 g; (b) 1–40% of a water insoluble quaternary ammonium antistatic agent; and (c) 1–40% of an acid compatibilizing agent to avoid affixing the quaternary compound to the surface of the clay. This agent is selected from the group consisting of fatty acids of 8–30 carbon atoms, compounds such as benzene mono-, di-, and tricarboxylic acid containing 0–2 hydroxyl functions, and mixtures of these two groups of compounds.

POST-WASH FABRIC TREATING COMPOSITION. P. Ramachandran (Colgate-Palmolive Co.). *U.S. 3,954,630.* The composition consists of water, an organic complexing acid, and a quaternary ammonium softening agent. The latter two compounds are present in amounts such that upon dilution in the rinse water their concentrations are 0.01–0.1% each. The organic complexing agent is selected from the group consisting of citric, maleic, tartaric, fumaric, adipic, and succinic acids. It acts to reduce yellowness imparted to fabrics by the cationic softening agent.

DETERGENT COMPOSITIONS AND DISHWASHING METHOD. G.E. Brown, Jr. (Safe-Tech, Inc.). *U.S. 3,954,500.* A method of washing eating utensils and tableware comprises subjecting them to an agitated aqueous solution of a detergent composition consisting of 20–75% of the dialkali metal salts and the diammonium salts of oxydipropionic acid and 10–50% of sodium metasilicate.

REMOVAL OF PHOSPHATES IN DRAIN LINE OF LAUNDRY TUB. J.G. Ferraro (Colgate-Palmolive Co.). *U.S. 3,954,403.* A solution of a precipitant salt such as oxides, hydroxides, and soluble salts of calcium, aluminum, and iron is added to the drain line of a washing machine, by Venturi action as the washing solution is being discharged, in sufficient quantity to precipitate all of the soluble phosphate in the washing solution.

DISINFECTANT COMPOSITIONS. N.E. Dewar and S.I. Raziq (Chemed Corp.). *U.S. 3,954,646.* A liquid detergent-germicide composition consists of 1–36 parts of an antimicrobially-active alpha-halogenated fatty acid, 2–30 parts of anionic detergent, and 1–20 parts of a monobasic organic acid.

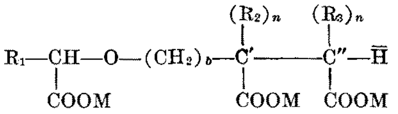
VISCOSITY REDUCTION OF AQUEOUS ALPHA OLEFIN SULFONATE DETERGENT COMPOSITION. H.E. Wixon (Colgate-Palmolive Co.). *U.S. 3,954,679.* The composition consists of an alpha olefin sulfonate detergent, aqueous medium, and a viscosity reducing proportion of a water soluble inorganic halide salt selected from the group consisting of alkali metal, alkaline earth metal, and ammonium halides.

SULFONATE DETERGENTS. M.E. Tuvell (Ethyl Corp.). *U.S. 3,954,676.* The composition consists of an aqueous solution containing at least 8% alpha olefin sulfonate and monoethanol amide in ratios of 2.67:1 to 3.33:1. The monoethanol amide is a mixture of lauric monoethanol amide and myristic monoethanol amide in a ratio of about 70:30.

HEAVY DUTY OXIDIZING BLEACH STABLE LIQUID LAUNDRY DETERGENT. J.T. Inamorato and R.W. McDonnell (Colgate-Palmolive Co.). *U.S. 3,954,675.* The composition, which is substantially devoid of phosphate and nitrogenous builder, comprises 30–80% of a detergent system consisting of nonionic and anionic detergents in ratios of 15:1 to 1:1:5–35% of a lower monohydric, dihydric, or trihydric alkanol; 5–35% water; and 0.5–5% of a fluorescent brightener system including a major amount of 4,4′-Bis(4-phenyl-1,2,3-triazol-2-yl)-2,2′stilbene disulfonic acid and salts thereof.

SYNTHETIC DETERGENTS OF THE AMPHOLYTIC BETAINE TYPE, PROCESS FOR PREPARING THE SAME AND COMPOSITIONS. E.M. Martinsson and K.M.E. Hellsten (Modokemi Ab.). *U.S. 3,954,845.*

NOVEL SEQUESTRANT BUILDERS. V. Lamberti, M.D. Konort and I. Weil (Lever Bros. Co.). *U.S. 3,954,858.* There is described a compound having the general formula:



$$R_1{-}\underset{\substack{|\\ COOM}}{CH}{-}O{-}(CH_2)_b{-}\overset{\substack{(R_2)_n\\ |}}{\underset{\substack{|\\ COOM}}{C'}}{-\!-\!-}\overset{\substack{(R_3)_n\\ |}}{\underset{\substack{|\\ COOM}}{C''}}{-}\overline{\overline{H}}$$

R_1 is selected from the group consisting of H, an alkyl group having 1–12 carbon atoms, a hydroxyalkyl group having 1–4 carbon atoms, and a COOM group. *n* is zero or 1; when *n* is 1, R_2 and R_3 are selected from the group consisting of H, CH_3, and CH_2COOM provided that when R_1 is H, R_2 and R_3 cannot both be H. When *n* is zero, a double bond is present between C′ and C″. *b* is zero or 1, and M is selected from the group consisting of H, alkyl metal, ammonium, and substituted ammonium cations.

DISHWASHING COMPOSITIONS. P.L. Dawson and M.T. Rothwell (Lever Bros. Co.). *U.S. 3,956,199.* A detergent composition with a pH in the range 4–8.5 and suitable for hand dishwashing comprises (a) 10–50% of active detergent compound of which 5–10% is calcium/magnesium sensitive anionic synthetic detergent, (b) 1–40% of a solubilizer of which 0–25% is nonionic solubilizer, (c) 0–5% of a pH controller, and (d) an effective amount of an organic phosphonate derived from an acid.

CLEANING COMPOSITIONS. F.E. Woodward (Westvaco Corp.). *U.S. 3,956,161.* A clear, water soluble, biodegradable alkaline cleaning solution consists of a salt of a C_{21} dicarboxylic acid and a nonionic surfactant. The dicarboxylic acid, which solubilizes the nonionic surfactant, has a primary carboxylic acid group with a pKa of 6.4 and a secondary carboxylic acid group with a pKa of 7.15.

HEAVY DUTY DETERGENT POWDER. Y. Watanabe and H. Ueno (Dai-Ichi Kogyo Seiyaku Co.). *U.S. 3,956,160.* A process for producing the detergent comprises neutralizing a fatty acid, containing a nonionic surface dissolved in it, with a powdered hydrous sodium carbonate, containing 5–10% water, at a temperature above the melting point of the fatty acid. The nonionic surface active agent amounts to 3–30% of the pure soap.

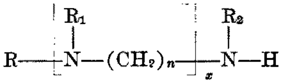
IMPREGNATED TEXTILE FIBROUS STRUCTURES FOR CLEANING PURPOSES. M.J. Schwuger (Henkel & Cie). *U.S. 3,954,642.* The material comprises a water insoluble textile fibrous structure containing at least 1 mVal [SLC] of salt-forming carboxyl groups per gram. The structure is impregnated to 0.05–20% of its weight with a water-soluble nonionic polyalkoxylated surface active agent having a turbidity point above 20 C.

TEXTILE FIBROUS CLEANING STRUCTURES. M.J. Schwuger (Henkel & Cie). *U.S. 3,956,155.* This patent is similar to *U.S. 3,954,642* except that the nonionic polyalkoxylated surface active agent impregnant has a turbidity point below 80 C.

DETERGENT AND BLEACHING AGENT. N.S. Marans (W.R. Grace & Co.). *U.S. 3,956,157.* A free-flowing particulate solid composition useful as a detergent and bleach is prepared by combining a mixture of equal molar amounts of sodium α-glucoheptonate and sodium β-glucoheptonate with sodium perborate and water. Following agitation to dissolve the components, the water is evaporated to form the particulate solid composition.

CLEANSING OF FABRICS. A.N. Osband, F.W. Gray and J.C. Jervert (Colgate-Palmolive Co.). *U.S. 3,956,156.* A process of removing stains from fabrics comprises immersing them in water containing 0.15–0.5% of a composition of (a) a peroxygen compound, (b) an activator capable of forming a peracid on reaction with the peroxygen compound, and (c) 10–60% of an alkali metal or alkaline earth metal citrate. The peroxygen compound is selected from the group consisting of urea-hydrogen peroxide and sodium perborate, sodium percarbonate, and sodium perborate monohydrate and their corresponding calcium, magnesium, potassium, and hydrogen salts. The mol ratio of activator to active oxygen ranges between 2:1 and a :60.

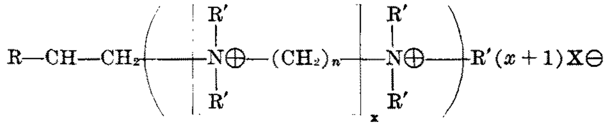
FLAME-RETARDANT SOFTENING AGENTS. P.M. Hay (Sandoz, Inc.). *U.S. 3,956,144.* A textile softening agent is produced by reacting the phosphate compound of the formula $(BrCH_2{-}CHBrCH_2O)_3PO$ with a compound of the formula



$$R-\left[\overset{\overset{\displaystyle R_1}{|}}{N}-(CH_2)_n\right]_x-\overset{\overset{\displaystyle R_2}{|}}{N}-H$$

at 30–150 C for 12 minutes to 12 hours. R is a monovalent aliphatic hydrocarbon radical containing 10–24 carbon atoms; R_1 and R_2 are, independently, hydrogen, lower alkyl of 1–4 carbon atoms, or hydroxyalkyl of 2 to 3 carbon atoms; *n* is 2 or 3; and *x* is 0, 1, or 2. The weight ratio of the second compound to the first ranges between 10:1 and 1:1.

PREPARATION FOR THE ANTISTATIC FINISHING OF FABRICS. U. Cuntze, G. Dollinger and R. Kleber (Hoechst Ag.). *U.S. 3,956,143.* A liquid antistatic composition consists of 50–80% water and 20–50% of a compound of the formula

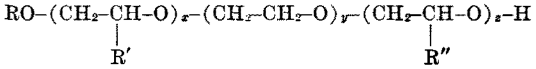


$$R-CH-CH_2\left(\left[\underset{\underset{\displaystyle R'}{|}}{\overset{\overset{\displaystyle R'}{|}}{N}}{\oplus}-(CH_2)_n\right]_x\underset{\underset{\displaystyle R'}{|}}{\overset{\overset{\displaystyle R'}{|}}{N}}{\oplus}\right)R'(x+1)X\ominus$$

R is alkyl of 6 to 16 carbon atoms; R′ stands for the same or different lower alkyls; X is chloride, lower alkylsulfate, or tosylate; *n* is 2 or 3; and *x* is 1, 2, or 3.

BLEACHING AID. G.D. Hansen, E.G. Varney and P.S. Davis (Betz Laboratories, Inc.). *U.S. 3,956,165.* The bleaching aid comprises, on a weight ratio basis, 1:12 to 12:1, of a water soluble acrylic acid polymer or its water soluble salt and a water soluble carboxy methyl cellulose. The polymer has a molecular weight of 500–20,000.

LOW FOAMING, BIODEGRADABLE, NONIONIC SURFACTANTS. M. Scardera and R.N. Scott (Olin Corp.). *U.S. 3,956,401.* A surfactant product has the formula:



$$RO-(CH_2-\underset{\underset{\displaystyle R'}{|}}{CH}-O)_x-(CH_2-CH_2-O)_y-(CH_2-\underset{\underset{\displaystyle R''}{|}}{CH}-O)_z-H$$

R is a linear, alkyl hydrocarbon having 7–10 carbon atoms. R′ and R″ are linear, alkyl hydrocarbons of 1–4 carbon atoms. *x*, *y*, and *z* are integers of 1–6, 4–15, and 4–25, respectively.

ARTICLE FOR CONDITIONING FABRICS IN A CLOTHES DRYER. A.R. McQueary (Procter & Gamble). *U.S. 3,956,556.* The article comprises a flexible web substrate carrying a nonsoap fabric conditioning agent removable to fabrics with which it comes in contact in a laundry dryer. The web substrate contains perforations sufficient in size and number to permit at least 75% of the normal volume of air flow through the dryer.

CLEANING COMPOSITION IN DRY POWDER FORM. D. Schoenholz, A. Peterson and H. Terry (Foster D. Snell, Inc.). *U.S. 3,956,197.* The composition comprises (a) a water soluble alkaline detergent, (b) a water-immiscible organic liquid adsorbed on the detergent, and (c) an emulsifying agent with an HLB number higher than that required for the water-immiscible liquid. When dispersed in water, the composition forms an unstable emulsion which breaks within 1 hour releasing droplets of the organic liquid.

FABRIC TREATMENT COMPOSITION. F.L. Diehl (Procter & Gamble). *U.S. 3,958,059.* A water insoluble, water dispersible antistatic composition consists of a quaternary compound and an electrically conductive salt selected from the group consisting of aluminum salts and non-fluosilicate [sic] lithium salts dispersed in the quaternary compound at ratios of quaternary compound to salt ranging from 1,000:1 to 1:2.

SULFOSUCCINATE DERIVATIVES AS DETERGENT BUILDERS. V. Lamberti (Lever Bros. Co.). *U.S. 3,957,775.* There is claimed an α-carboxyalkoxy-β-sulfosuccinic acid and various alkali metal, ammonium, and substituted ammonium salts of the acid.

DETERGENT COMPOSITIONS CONTAINING CALCIUM CARBONATE. C.B. Davies, J.F. Davies and W.F.S. Neillie (Lever Bros. Co.). *U.S. 3,957,695.* The compositions comprise 5–40% of a detergent active compound selected from the group consisting of an anionic active which does not form an insoluble calcium salt during use, a nonionic active, an amphoteric active, a zwitterionic active, and mixtures of these; 10–75% of sodium or potassium carbonate; and 5–60% of finely divided precipitated calcium carbonate having a surface area of 30–100 m^2/g. The calcium carbonate is prepared by passing carbon dioxide into a suspension of calcium hydroxide.

MODERN PROCESSES FOR FINE SOAP PRODUCTION. D. Osteroth (Dynamit Nobel AG) *Seifen Ole Fette Wachse* 102(3), 71–5 (1976). In order to avoid classic boiling processes new data are given for continuous soaping. The principles of all types of plant go back to a simple loop reactor. The plants of a soap production line are dealt with. Veined soaps, two-color soaps and transparent soaps have met with popular current interest. The production of these soaps are dealt with.

INFLUENCE OF PHOSPHATE REDUCTION IN WASHING AGENTS ON DETERGENCY AND TEXTILE DEPOSITION AS A FUNCTION OF WATER HARDNESS. H. Krüssmann and A. Barbu (Waschereiforschung Krefeld e. V.) *Tenside Deterg.* 13(1), 23–31 (1976). Influence of the concentration of phosphate as a function of water hardness on the washing effect is characterized by removal of dirt, redeposition of pigments, incrustation, bleaching intensity and chemical damage to textiles. While the two latter factors remained largely unchanged, clear relations could be found between water hardness and the amount of phosphate on one hand, and between the other three measurable variables. At high temperatures and high water hardness, the incrustation reacted particularly sensitive to variations of the phosphate contents, at low temperatures and low hardness, this was chiefly the case for the removal of dirt. With larger amounts of dirt on the fiber, the influence of phosphate on redeposition must be equally taken into account since larger amounts of pigments come into the first rinsing bath. For a good washing effect, the complete complexing of the hardness causing agents is essential, the water-soluble 1:1 complex having to be formed to prevent incrustation, and the 2.5:1 complex between calcium and the triphosphate anion to prevent redeposition.

CONTRIBUTION TO THE SUBJECT OF ALKYLBENZENESULFONATE (ABS) AND ENVIRONMENT. I. DETERMINATION OF ABS IN SURFACE WATER BY THE LONGWELL-MANIECE-METHOD. R. Wickbold (Chem. Werke Huls AG, Marl) *Tenside Deterg.* 13(1), 32–3 (1976). Determination of small concentrations of anionic surfactants according to the methylene blue method of Longwell and Maniece, which is of equal importance for the biodegradation test and for observing surface waters, shows a positive error with regard to these waters which increases inversely proportional to the reduction of the concentration. This error, which is presumably traceable to humine substances, is avoided when the determination proper is preceded by isolating and enriching the surfactant by a blow-out.

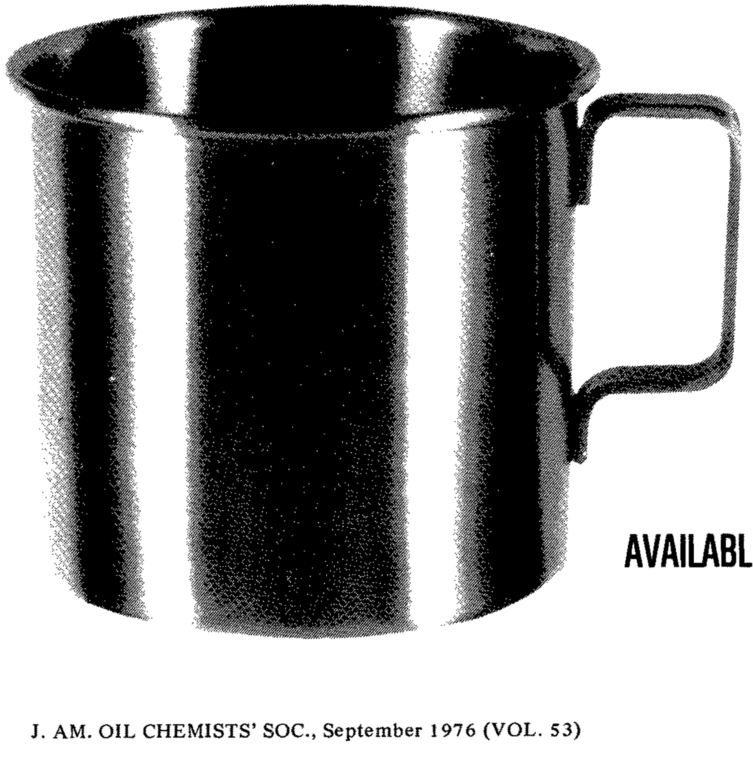
MEASUREMENT OF SURFACE AND INTERFACIAL TENSIONS WITH THE BALL REMOVAL METHOD. J. Burri and S. Hartland (Allied Tech. Highschool, Techno-chemical Lab., Zurich) *Tenside Deterg.* 13(1), 18–22 (1976). A method for measuring surface and interfacial tensions is described, consisting in tearing a ball off the surface or interface. From a balance of all forces acting on a ball that is in equilibrium at an interface, a dimensionless equation is obtained which defines an external force that is exerted on the ball. For a large range of possible physical properties, including the contact angle, a computer is used to find the maximum of this force which must be exerted to tear the ball off the interface and which can be easily measured. This force will be highest when the contact angle of that liquid into which the ball is submerged in the beginning of the experiment is zero. When the fluid density is known, the interfacial tension can be determined from the maximum force. A series of experiments has been performed which agree well with the values found in the literature.

THE STABILITY OF HYDROCARBON OIL DROPLETS AT THE SURFACTANT/OIL INTERFACE. S.S. Davis and A. Smith (Pharmaceutics Res. Group, Pharmacy Dept., Univ. of Aston, Birmingham). *Colloid Polym. Sci.* **254**(1), 82–98 (1976). The effect of oil nature on the coalescence of single oil droplets at the plane aqueous surfactant solution/oil interface has been investigated. The drop rest-times for the first stage coalescence of a range of hydrocarbon oils have been measured with constant drop volume. The apparatus was based on a design by Nielsen et al. Variables that affected drop lifetimes such as drop size, apparatus dimensions, saturation of the two phases with the other component, and surfactant concentration and chain length were investigated and a standard technic was developed. For saturated hydrocarbons the droplet stability falls progressively with increase in chain length. Unsaturation or aromatic character brings about a decrease in droplet stability. The results are discussed in terms of the balance between the cohesive forces between oil molecules and the adhesive forces, between the alkyl chain of the surfactant and oil molecules. The addition of small quantities of long chain alcohol brings about a marked increase in stability through the formation of a complex condensed film at the oil/water interface. Attempts to correlate droplet stability data and the stabilities of bulk emulsion systems and spreading coefficient were not successful.

KINETICS OF WETTING OF A COMPACTED POWDER BY AQUEOUS SOLUTIONS OF SURFACE ACTIVE AGENTS. L. Carino (Ciba-Geigy AG, Basel, Switzerland). *Colloid Polym. Sci.* **254**(1), 108–13 (1976). The capillary rise of aqueous solutions of anionic wetting agents into a compacted powder of an organic chromium complex is discussed on the basis of the Washburn-Rideal equation expanded to account for the porous structure parameters. At the porosity $\sim 1 - \pi/6$, corresponding to the loosest packing of monodisperse spheres the penetration rate is found to be mostly governed by the effective tensions operative at the moving three phase line of contact in case no deflocculation intervenes.

HYDRODYNAMICS OF THIN LIQUID FILMS. EFFECT OF SURFACE DIFFUSION ON THE RATE OF THINNING OF FOAM FILMS. E.D. Manev, Chr. St. Vassileff and I.B. Ivanov (Dept. Phys. Chem., Sofia Univ., Sofia, Bulgaria). *Colloid Polym. Sci.* **254**(1), 99–102 (1976). The rate of thinning of foam films of aqueous solutions of valeric and caproic acids is studied. Substantial deviations from Reynolds' equation have been obtained which correspond to the previous theoretical prediction. The higher rate of thinning of the films is considered to be due to the effect of surface diffusion. From the experimental data and the theory the order of magnitude of the surface diffusion coefficient for these systems has been estimated.

THE SIGNIFICANCE OF CRITICAL MICELLE CONCENTRATION BY THE ELECTROSORPTION ANALYSIS FROM ANION TENSIDES WITH ALTERNATING CURRENT POLAROGRAPHY. D. Vollhardt (Central Inst. Org. Chem., Region of Surface Active Agents, Scientific Academy of the DDR, Berlin-Adlershof). *Colloid Polym. Sci.* **254**(1), 64–81 (1976). Using the electrosorption analysis of different anionic surfactants in the presence of supporting electrolyte concentrations ($\geqslant$ 0.1 m NaCl) was found that the CMCs can be determined on the basis of alternating current-potential—(I_E-E)-curves. The CMC values resulted from discontinuities in the concentration dependence of height and summit potential of alternating current polarographic desorption maxima. Investigated were the different influences of the alkyl chain length, of the polar groups, and the positions of SO_4Na in isomeric alkyl sulfates upon the alternating current polarographic desorption characteristics. Experimental data show that, dependent on the alkyl chain length two possibilities exist for the state of the adsorption layers above/the CMC at the interface mercury/electrolyte. 1) The state of adsorption layer remains unchanged if above the CMC no or only small changes of desorption peaks are observed. 2). The formation of new desorption peaks and strong discontinuities of position and height of the desorption peaks already existing is rationalized by additional association at the interface. It is assumed that an additional discontinuity



which occurs with straight chain alkyl compounds (R $\geqslant$ 12) results from association (dimerization) in the premicellar range.

Study of the interaction natural polymers-surfactants. I. Interaction of catalase with ionic surfactants. G. Popescu, M. Marinescu and I. Brad. ("P. Poni" Inst. for Macromolecular Chem. Iasi and Faculty of Chem., Univ. of Craiova). *Colloid Polym. Sci.* **254**(1), 55-63 (1976). Catalase interaction with anionic type (sodium laurate and sodium dodecylsulfate) and cationic type (dodecylpyrimidinium chloride) surfactants was investigated. Viscosity, electric conductivity, enzyme activity and kinetics depend on surfactant concentration. Corroborating data demonstrate the existence of interaction between catalase and anionic surfactants. Results were interpreted in the terms of nonpolar interactions, taking into account both the physico-chemical properties of surfactants in aqueous solutions and the better known structure of haemic proteins (haemoglobin) similar to catalase.

High concentrated solutions of surfactants and nature of the black foam films. A study of electroconductivity. M. Sidorova, M. Nedyalkov and D. Platikanov (Inst. Phys. Chem., Sofia Univ., Bulgaria). *Colloid Polym. Sci.* **254**(1), 45-9 (1976). The analogy between the properties of the high concentrated surfactant solutions and the black foam films is discussed. Measurements of the specific electric condustance x of high concentrated (40-60%) sodium lauryl sulfate solutions are carried out with the aid of a special conductance cell. The temperature dependence of x for several surfactant concentrations is compared with the temperature dependence of the specific electric conductance x_f of the black foam films. The results show that at low temperatures a complete analogy between the electroconductivity properties of the second black film on one hand and the surfactant-water gel on the other is evident, which indicates an analogy between the structures of these two systems. A further analogy is available between the electroconducitivities and respectively the structures of the first black film and the liquid crystal phase surfactant-water, both being stable at higher temperatures.

A ^{13}C spin-lattice relaxation study of micelle formation in aqueous solutions of sodium n-hexanoate. U. Henriksson and L. Odberg (Div. Phys. Chem., Royal Inst Technol., Stockholm). *Colloid Polym. Sci.* **254**(1), 35-8 (1976). The concentration dependence of the ^{13}C-relaxation times of the alkyl carbons in aqueous solutions of sodium hexanoate have been measured. Below CMC the relaxation is dominated by the overall motion of the hexanoate ion. In the micelles the overall motion is slower and the internal rotations around the C-C bonds contribute to the relaxation.

Non-phosphate detergent-softening compositions. J.T. Inamorato (Colgate-Palmolive Co.). *U.S. 3,959,157.* A clear, stable liquid detergent free of phosphate and possessing detergent anti-static and softening properties consists of 10-40% of a synthetic organic detergent selected from the group consisting of alkyl amine oxides and water soluble nonionic surface active compounds produced from the condensation of a C_8-C_{50} hydrophobic compound with ethylene oxide; and 3-15% of a mixture of (1) a quaternary ammonium fabric softener selected from the group consisting of quaternary ammonium compounds and alkyl imidazolinium compounds, and (2) a polyethoxylated quaternary ammonium compound.

Detergent composition. R.E. Montgomery, W.L. Mullane, Jr., F.L. Diehl and J.B. Edwards (Procter & Gamble). *U.S. 3,959,155.* A fabric softener and anti-static composition adapted for use with anionic, zwitterionic, and ampholytic surfactants comprises (a) 10-99% of a smectite clay and (b) 1-99% of an anti-static component comprising a mixture of a quaternary ammonium compound and an electrically conductive salt. The salt is selected from the group consisting of aluminum salts and lethium salts.

Fabric softener. P.M. Hay (Sandoz, Inc.). *U.S. 3,959,156.* A textile softening agent is produced by reacting a phosphate compound of the formula $(BrCH_2\text{-}CHBrCH_2O)_3PO$ with the rection product of a fatty acid or ester derivative of the fatty acid and a diamine. The reaction product is substantially free of unreacted diamine.

Stain removal. G.T. Farley (Colgate-Palmolive Co.). *U.S. 3,959,163.* A fabric bleaching composition consists of stabilized diperisophthalic acid and a water soluble nonionic detergent selected from the group consisting of (a) C_{10}-C_{16} alkanols condensed with 5-15 moles of ethylene oxide and (b) an ether of polyethylene glycol and a blend of C_{16}-C_{18} alcohols. The ratio of (a) to (b) is 0.2:1 to 1:1.

Detergent composition. J.A. Yurko (Colgate-Palmolive Co.). *U.S. 3,959,165.* A biodegradable, non-polluting heavy duty phosphate-free synthetic organic detergent composition characterized by excellent laundering ability in hard and soft waters for both low and high temperature washing, without causing yellowing, comprises 5-25% of a higher C_{10}-C_{20} alkane sulfonate synthetic organic detergent, 1-5% of nonionic detergent, 1-5% of a higher C_{12}-C_{18} fatty acid soap, 5-20% of sodium silicate, 40-75% of a carbonate most of which is alkali metal carbonate, 0.5-4% anti-redeposition agent, and 1-20% moisture.

Synergistic sequestering agent compositions. H.G. Germscheid, H.-R. Kranick, H.-J. Rehm, R. Scharf and H.-J. Schlusser (Henkel & Cie). *U.S. 3,959,168.* The composition consists of a first component which is 1-hydroxyethane-1,1-diphosphonic acid and/or aminotrimethylenephosphonic acid and their alkali metal and ammonium salts and a second component which is a dicarboxyl phosphonic acid. The ratio of the first component to the second ranges between 8:1 and 1:8.

Process for manufacturing detergent builders. D.R. Harris (ICI Australia Ltd). *U.S. 3,959,186.* The process comprises sulfating a compound of the formula

$$R\text{—}O\text{—}(\overset{\displaystyle R'}{\overset{|}{C}}H\text{—}CH_2O)_n\text{—}Y$$

in which Y is H and n is 8-25; adding a similar compound to the reaction mixture and continuing the reaction until sulfation has ceased; and then neutralizing residual sulfating agent. In the compound added at the later reaction stage, n is 2-12.

Dishwashing compositions. P.L. Dawson and M.T. Rothwell (Lever Bros. Co.). *U.S. 3,963,635.* A liquid hand dishwashing composition having a pH of less than 7 comprises 10-50% of a detergent active compound from 5 to 40% of which is a calcium/magnesium sensitive anionic synthetic detergent. The claimed improvement comprises incorporating in the composition 0.01-2% of a phosphate monoester, and 1-40% of a solubilizer, a 0.05% aqueous solution of which will remain clear at 24°H hardness and neutral pH at temperatures of 20-45 C.

Powdery bleaching detergent composition. K. Tachibana, and T. Fujino (Kao Soap Co.). *U.S. 3,963,634.* T composition consists of sodium percarbonate, detergent, builder, and other conventional additives. The claimed improvement comprises at least 60% of the detergent particles and 60% of the sodium percarbonate particles having diameters larger than 250 μ. The copper content of the detergent is less than 2 ppm, and the iron content is less than 5 ppm.

Liquid detergent composition. G.L. Spadini and B. Dekker (Procter & Gamble). *U.S. 3,963,649.* A liquid dishwashing detergent composition comprises (a) 2-40% of a water soluble organic nonionic surface active agent selected from the group consisting of tertiary oxides, amides, and a condensation product of 3-25 moles of ethylene oxide and one mole of an organic hydrophobic compound; (b) 0.1-5% of a water soluble gelatin having a molecular weight of at least 15,000, an isoelectric point between pH 4.5 and pH 9.2, and a gel strength between 50 and 300 Bloom grams; and (c) 5-95% water.

Method of agglomerating chlorocyanurates. F.K. Rubin and D.V. Kinsman (Lever Bros. Co.). *U.S. 3,962,106.* The method, which results in a particle having increased storage stability and uniformity when mixed with a detergent base, comprises the steps of contacting salts of chlorocyanuric acid with an agglomerating liquid, drying the resultant particles, and sizing them through a sieve corresponding in size to the detergent base particles. The agglomerating liquid is a concentrated solution of compounds selected from the group consisting of potassium citrate monohydrate, sodium citrate dihydrate, sodium acetate trihydrate, and anhydrous sodium sulfate. Contact between the liquid and the chlorocyanurate is effected in a continuously moving bed.

Anionic fabric conditioners. A.S. Giordano, R.L. Burke and H.E. Wixon. (Colgate-Palmolive Co.). *U.S. 3,965,014.*

The composition comprises a dimethylpolysiloxane polymer, water, and an anionic surfactant having a derivable pH of 7–9 and selected from the group consisting of alkyl benzene sulfonates, alkyl toluene sulfonates, ethoxylated alcohol sulfates, soaps of fatty acids, paraffin sulfonates, and N-(2-hydroxyalkyl)-amino acids.

Bleach-resistant fabric softener. R.A. Bauman (Colgate-Palmolive Co.). *U.S. 3,965,015.* The composition comprises 2–75% of a detergent, and 1–20% of a softening agent selected from the group consisting of urea, diurea, thiourea, dithiourea, and mixtures of these.

Washing agent compositions. E. Schmadel, G. Jakobi, K.-H. Worms and H. Blum (Henkel & Cie). *U.S. 3,065,024.* The compositions comprise (a) 0.5–70% of a phosphonopolycarboxylate, (b) 0–96.5% of customary nonsurface active components, and (c) 3–45% of at least one surface active compound. The components are so selected that a 1% solution has a pH between 6 and 11.5 and the total content of phosphorus does not exceed 4%.

Method for manufacturing alkaline detergents and disinfectants. A. Klopotek, J. Profic, J. Uminski and G. Dziela (Instytut Chemii Przemyslowej). *U.S. 3,965,025.* A process for preparing alkaline polyphosphate complexes of the formula

$$Me(PO_3Me)_x\text{–}OH...Br\text{–}Br...HO\text{–}(PO_3Me)_xMe,$$

wherein Me is an alkali metal ion and x is an integer from 2 to 50, comprises reacting one mole of a compound selected from a bromoiodate ion $(IBr_2)^-$ and a bromine nonionic surfactant complex with not more than 2 moles of a polyphosphate at a temperature of 0–50 C.

Germicidal all-purpose cleaner. A.J. Lancz (Colgate-Palmolive Co.). *U.S. 3,965,026.* An aqueous germicidal liquid cleaner which is stable, homogeneous, and clear between 30 and 120 C consists of 0.10–15.0% of a quaternary ammonium compound, 1.0–25.0% of nitrilotriacetic acid trisodium salt, 0–10% of a polyethoxylate of a C_{10}–C_{16} fatty alcohol, and the balance water.

Soap curd dissolving drain cleaner. J.J. Murtaugh (The Drackett Co.). *U.S. 3,965,048.* The composition consists of (a) 0.25–10% of a potassium salt of a member selected from the group consisting of nitrilotriacetic acid, N-2-hydroxyethylimino diacetic acid, and an alkylene polyamine polycarboxylic acid; (b) 0.50–10% potassium hydroxide; and (c) up to 99% water. The composition is substantially free of other alkali metal ions.

Powder detergent composition. I. Homma, J. Mino, and K. Kunikawa (Kao Soap Co.). *U.S. 3,960,744.* The composition consists of 0.001–0.5% of a bluing dye precursor and the balance surfactant and builder.

Non-caking detergent composition. M. Murata, M. Yamanaka and F. Sai (Kao Soap Co.). *U.S. 3,960,780.* A granular or powdery detergent composition consists of 3–25% of an ether sulfate surfactant, 10–100% based on the weight of ether sulfate surfactant of polyethylene glycol of molecular weight 2,000–50,000, and the balance other surfactant and builder. To prepare the detergent, all the named components are slurried in water and then dried. The polyethylene glycol ends up uniformly distributed on the detergent particles.

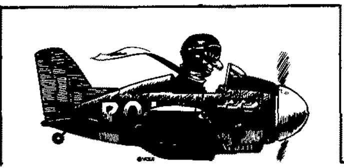
Isocyanate-capped surface active compositions. R.E. Freis and L.M. Rue (Economic Laboratories). *U.S. 3,960,781.* A rinse additive composition comprises a diaryl urethane blended with a solid wax or poly(oxyalkylene)-containing wetting agent. The diaryl urethane has the following general formula $Ar\text{–}NH\text{–}CO\text{–}O\text{–}(AO)_n\text{–}CO\text{–}NH\text{–}Ar'$. Ar and Ar′ are monovalent aryl groups free of –NCO radicals. The divalent radical $-(AO)_n-$ has a molecular weight less than 12,000.

Shampoo compositions. E.W. Daley and M.P. Yowler (Procter & Gamble). *U.S. 3,960,782.* The compositions comprise (a) 8–22% of a surfactant selected from the group consisting of fatty acid monoglyceride sulfonate and alkyl sulfate, (b) 2–25% urea, (c) 1–10% guanidine, and (d) 0.2–2.0% dodecyl alcohol. The composition has a pH of 5–0.8 and imparts high luster and manageability to hair.

Preparation of quaternary ammonium salt powders. M. Takaku and S. Imai (Kao Soap Co.). *U.S. 3,962,121.* A process for preparing powders of long chain alkyl quaternary ammonium salts comprises mixing water and/or alcohol with 1–33% of the quaternary ammonium salt and spray-cooling the mixture to produce the powdery product.

Detergent compositions. C.H. Nicol and H.R. Hays (Procter & Gamble). *U.S. 3,962,152.* A detergent composition having improved soil release properties consists of 2–95% surface active agent and 0.05–25% of a soil release polymer comprising ethylene terephthalate and polyethylene oxide at a molar ratio of 25:75 to 35:65, respectively. The polyethylene oxide terephthalate contains polyethylene oxide linking units having a molecular weight of 300–700. Molecular weight of the soil release polymer is from 25,000 to 55,000.

Non-phosphate spray dried detergents. W. Chirash, A.E. Haasa and A.H. Limckiller (Colgate-Palmolive Co.). *U.S. 3,762,149.* The detergent bead composition is post-treated with 3–5% of a liquid spray containing polyethoxylated nonionic organic detergent. The base spray dried composition consists of (a) 5–25% of an alkali metal salt of a dibasic acid; (b) up to 35% of anionic soap or synthetic organic sulfated or sulfonated detergent, zwitterionic, or ampholytic detergent material; (c) 0–2% nonionic detergent; (d) 0–7% alkali metal silicate; and (e) the balance sodium sulfate. The final composition contains up to 6% nonionic detergent and is adapted to yield a pH in aqueous solution of 7–9.



REDUCED-STAINING COLORANT FOR LIQUID LAUNDRY DETERGENTS. R.J. Lala (Lever Bros. Co.). *U.S. 3,958,928.* A liquid synthetic detergent having reduced staining characteristics while retaining the ability to increase the apparent whiteness of fabrics comprises 0.006–0.025% of a dye mixture consisting of 0.0005–0.0030% of 1,4-bis(2-ethylhexylamino) anthraquinone and at least one soluble anthraquinone, 0–40% of a nonionic detergent, 5–20% of an alkali metal or organic amine salt of an alkyl aryl sulfonate, 0–30% of a builder, 3–10% of a hydrotrope, 0–10% of a stabilizer, and the balance water to 100%. ■

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