ABSTRACTS

R. A. REINERS, Editor. ABSTRACTORS: J. G. Endres, J. Iavicoli, K. Kitsuta, F. A. Kummerow, Gladys Macy, E. G. Perkins, T. H. Smouse, J. A. Thompson and R. W. Walker

• Fats and Oils

On the autoxidation of methyl linoleate in water. III. Chromatographic separation of water soluble reaction products. H. Esterbauer (Univ. of Graz, Austria). *Fette Seifen Anstrichmittel* 70, 1–4 (1968). Twenty substances were preparatively isolated in pure form through the use of adsorption column chromatography from the water-soluble reaction products formed by the autoxidation of methyl-9,12-linoleate in water. The conditions employed in the isolation of these substances are given in detail.

IV. Isolation and identification of 4-hydroxy-octenal and methyl hydroxycaprylate. H. E. Schauenstein and H. Esterbauer. *Ibid.* 4–8. From the water-soluble reaction product formed by the autoxidation of methyl-9-12-linoleate, methyl hydroxycaprylate and 4-hydroxy-2,3-octen-1-al were isolated. The ester of 4,4′-nitroazobenzolcarboxylic acid and 2,4′-dinitrophenylhydrazone were prepared.

An ion exchange method for the determination of aliphatic amides and esters. M. Qureshi, S. Qureshi and S. Singhal (Chemical Labs., Aligarh Muslim Univ., Aligarh, U.P., India). *Anal. Chem.* 40, 1781–83 (1968). An ion exchange method for the determination of amides and esters has been developed. The amide or ester is passed through a 30 × 0.8 cm (i.d.) column of Amberlite IR-120 resin in the H^+ form at a flow rate of 2 ml per minute. The column is maintained at a temperature of 80 C. The effluent is recycled three times and is finally titrated with standard alkali. The method is simple, fast, reproducible and suitable for water soluble aliphatic amides and esters.

Absorption of reactants on catalysts in the hydrogenation of fats. J. W. E. Coenen and H. Boerma (Unilever Res. Lab., Vlaardingen, Netherlands). *Fette Seifen Anstrichmittel* 70, 8–14 (1968). The study involves selective hydrogenation of fatty oils containing polyenoic fatty acids. In the initial stage of hydrogenations, the catalyst surface is probably predominantly occupied by the polyenoic acids. At that stage, the monoenoic acids are only lightly hydrogenated and the isomerization of the monoenoic acids is largely supressed. Analysis of the monoenoic acids formed from linoleic acid shows that the reaction product is so composed as if an equimolecular mixture of 9-*cis*,11-*trans* and 10-*trans*,12-*cis*-conjugated isolinoleic acids was taken as starting material. Obviously, the catalyst surface is occupied by the conjugated polyenoic acids.

Rapid economical method of particle sizing materials used in chromatography. J. B. Wilkie (Bureau of Science, FDA, U.S. Dept. of H.E.W., Washington, D.C. 20204). *Anal. Chem.* 40, 1784–87 (1968). Particle-size determination is essential in chromatography, but past methods have been too tedious to gain acceptance. The proposed method, which overcomes this handicap, involves a modified photometer and is designed to avoid the need for sedimentation measurements. The derivation of equations, the theory, instrument modifications, procedure and results are presented. Data confirm the validty and utility of the method.

Determination of double bond positions in polyunsaturated fatty acids by combination gas chromatography-mass spectrometry. W. G. Niehaus, Jr. and R. Ryhage (Dept. of Chem., Karolinska Inst., Stockholm, Sweden). *Anal. Chem.* 40, 1840–47 (1968). Fatty acids and hydroxy fatty acids which contain one to five double bonds were oxidized to the corresponding polyhydroxy acids with permanganate or osmium tetroxide. The polyhydroxy acids were converted to polymethoxy methyl esters with dimethylsulfinyl carbanion and methyl iodide. These derivatives were analyzed by gas chromatography-mass spectrometry. Characteristic fragmentation between methoxyl-substituted carbon atoms allowed the determination of the positions of the methoxyl groups, and thus of the positions of the double bonds in the original fatty acids. Ambiguities in fragment identification were eliminated by the determination of the elemental composition, through the use of a peak-matching accessory of the LKB-9000 single focusing instrument, which allows determination of the molecular weight with an accuracy of 10 parts per million. With another modification of the instrument, which will simultaneously record the intensities of three different m/e values as a function of time, it was possible to use this method to determine the compositions of mixtures of derivatives of monounsaturated fatty acids, which were not resolved by gas chromatography, with an accuracy of ±10%.

Identification and estimation of choline derivatives by mass spectrometry. G. A. R. Johnston, A. C. K. Triffett and J. A. Wunderlich (Dept. of Physiol., John Curtin School of Medical Res., Australian National Univ., Canberra). *Anal. Chem.* 40, 1837–40 (1968). The halide salts of choline and related derivatives including acetylcholine, when heated under vacuum, dissociate by N-demethylation to the methyl halide and to the tertiary amine, the latter giving characteristic mass spectra under electron impact. Some fragment ions are common to all or most of the compounds studies; however, those arising from the loss of $(CH_3)_2N\cdot$ are specific to each compound. These characteristic ions and the less abundant molecular ions permit identification of suitable choline derivatives at the 1–10 nmole level. The lower limit of detection and estimation of total cholines in a mixture is approximately 0.1 nmole, while the estimation of individual choline derivatives requires approximately 10 nmole of each derivative.

Fatty acid composition of extract from pyrethrum flowers (Chrysanthemum cineraiaefolium). S. Head (Res. Lab., The Pyrethrum Marketing Board, P.O. Box 420, Nakuru, Kenya). *J. Agr. Food Chem.* 16, 762–5 (1968). The fatty acid fraction from an unrefined commercial pyrethrum extract containing 30% "pyrethrins" was isolated and the methyl esters were separated by column chromatography on silica gel into saturated or olefinic nonhydroxy acids and a hydroxy acid fraction. Combined fatty acids represented up to 40% of the pyrethrum extract, approximately 18% being nonhydroxy fatty acids. The latter were examined by gas chromatography and a series of normal saturated acids from C_{14} to C_{30} was identified. The major acids were palmitic, stearic, oleic, linoleic and linolenic, which together constituted up to 90% of the nonhydroxy fatty acids. Pyrethrum flowers of clonal origin containing different proportions of the six insecticidal constituents had similar fatty acid composition.

Stabilization of crude carotene-containing mycelium. C. J. Gogek (Arthur D. Little, Inc., 15 Acorn Park, Cambridge, Mass. 02140). *J. Agr. Food Chem.* 16, 730–4 (1968). Carotene in dry crude mycelia produced by fermentation was stabilized by blending with polymers, frequently in the presence of dextrose. Starch, gelatin, gum arabic, carboxymethyl cellulose, and several bacterial polysaccharides stabilized the carotene effectively. In a typical preparation of a stabilized product, the dry mycelium was blended with polymer and dextrose dispersed in water, the pastry mixture was extruded, and the extruded filaments were air-dried and powdered. Several stabilized products showed 80% or more of the original carotene content after storage at 41 C for one year. If the powder was too fine, stability was poor. As humidity increased, storage stability decreased. Blends of the stabilized products in three commercial poultry feeds also showed good stability.

Pumpable stabilizer-emulsifier incorporating readily dispersible hydrophilic colloids. A. J. Leo and E. Bielskis (National Pectin Products Co.). *U.S. 3,396,039.* A stabilizer-emulsifier preparation for foodstuffs is made by heating a mixture of water, edible solvent and monoglyceride, adding a finely divided hydrophilic colloid and homogenizing the entire mixture.

Preparation of liquid shortening. A. J. Haighton and A. Mijnders (Lever Bros. Co.). *U.S. 3,395,023.* Liquid shortenings are prepared by gradually cooling a mixture of fatty acid triglycerides having a solids content of 5–35% at 20C to form a slurry and rapidly comminuting this, for example by passage through a colloid mill, so that the maximum dimension of substantially all solid particles is not greater than 15 microns.

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Rearrangement of lard. J. R. Thompson. *U.S. 3,392,031.* Lard containing 0.025 to 0.1% water is interesterified in the presence of an anhydrous dehydrating salt, sodium or magnesium sulfate, using a reduced amount of catalyst.

Process for the manufacture of hard butter. R. J. Bell, R. L. Campbell, Jr., P. Gibson and J. F. Sims (Anderson, Clayton & Co.). *U.S. 3,396,037.* A process for the manufacture of hard butter comprises rearranging a lauric type oil or a mixture of at least 50% lauric type oil with certain other oils in the presence of a small amount of low temperature molecular rearrangement catalyst at temperatures below about 240F and a pressure of less than about 50 mm Hg abs. for a time in excess of 30 minutes. Thereafter, the catalyst is deactivated by the addition of an acid to form an anhydrous salt which is subsequently removed by filtration.

Production of liquid shortening. R. O. Simmons, E. J. Reid, A. E. Blankenship and P. W. Morgan, Jr. (Hunt Foods, Inc.). *U.S. 3,394,014.* A liquid shortening is produced by hydrogenating a vegetable oil to an I.V. of 70–100, then cooling under controlled agitation to produce large-sized crystals, and separating the crystals.

Flavored fatty material and process for preparing the same. B. M. Dirks and G. M. Nakel (Procter & Gamble Co.). *U.S. 3,394,013.* Shortening having a yeasty or crusty flavor is produced by heating bland shortening together with a yeast-sugar ferment and then segregating the flavored shortening.

• Fatty Acid Derivatives

Aqueous, saturated monoglyceride dispersion. N. H. Kuhrt and R. A. Broxholm (Eastman Kodak Co.). *U.S. 3,388,999.* An aqueous dispersion of saturated monoglyceride in water contains a quantity of lecithin sufficient to prolong the maximum activity condition of the monoglyceride. Additionally, the water may have an acid pH and the composition may include a small quantity of a mold inhibitor to prevent the growth of mold over a substantial period of time. Also, the composition may comprise a quantity of unsaturated monoglyceride, which creates an improved texture in baked goods, as well as a quantity of triglycerides. A process for making the composition by blending the ingredients together at a temperature above the melting point of the monoglyceride is also described.

Lubricating grease containing odd and even-numbered fatty acids. J. H. Bartlett, A. J. Morway and J. R. Livingston, Jr. (Esso Research and Eng. Co.). *U.S. 3,389,084.* Lubricating greases are thickened with alkali or alkaline earth metal salts of low molecular weight fatty acid and a mixture of odd and even numbered fatty acids averaging at least 14 C atoms, with 25–75% by wt. of the mixture being acids containing an odd number of C atoms.

Fabric softener and method of using. R. W. Fisher and K. E. McCaleb (Foremost-McKesson, Inc.). *U.S. 3,395,100.* A method of softening fabrics comprises rinsing with liquid quaternary ammonium chlorides having at least two structurally modified saturated C_{16}–C_{24} hydrocarbon radicals attached to the nitrogen and the remaining nitrogen bonds connected to lower alkyl groups. High concentrations of di(isostearyl) dimethyl ammonium chloride in alcohol are preferred.

• Biochemistry and Nutrition

Behavior of sterols of insect muscle during homogenization and differential centrifugation. W. Roeske and R. Clayton (Dept. Psychiatry, Stanford Univ., Med. Center, Palo Alto, Calif. 94304). *J. Lipid Res.* 9, 276–84 (1968). Labeled sterol, introduced *in vitro* into a homogenate of insect muscle, was distributed in the various subcellular fractions in a manner similar to that obtained by fractionation of muscle of insects to which labeled sterol had been administered *in vivo.* Two differently labeled sterols, cholesterol and cholestanol, were added to the *in vitro* preparation, the ratio of concentrations of the two compounds remained the same for the supernatant as for the particulate fractions. This was true for widely different total concentrations of the sterols. This result differs from that previously reported for the *in vivo* incorporation of these sterols and is viewed as further support for the proposal that some form of structural selectivity regulates the *in vivo* incorporation of the sterols into the membranous parts of the cell.

Enzymic studies of bile acid metabolism. I. 6β-Hydroxylation of chenodeoxycholic and taurochenodeoxycholic acid by microsomal preparations of rat liver. W. Voigt, P. J. Thomas and S. L. Hsia (Depts. of Biochem., and Dermatology, Univ., of Miami School of Med., Miami, Florida 33136). *J. Biol. Chem.* 243, 3493–3499 (1968). 6β-Hydroxylation of chenodeoxycholic acid-24-^{14}C and taurochenodeoxycholic acid-24-^{14}C was demonstrated *in vitro* by cell-free preparations of rat liver. The enzymic activity, requiring O_2 and NADPH, was located in the microsomes prepared in 0.1 M phosphate buffer and could be stimulated by addition of the 105,000 × g supernatant fluid. The microsomal fraction prepared in 0.01 M phosphate buffer had full activity and was not further stimulated by the 105,000 × g supernatant fluid. A clear extract made by suspending this microsomal pellet in 1.0 M phosphate and subsequently centrifuging it at 105,000 × g contained the complete 6β-hydroxylase system. The activity of the 1.0 M phosphate extract was inhibited by sulfhydryl reagents, Cu^{++}, cytochrome c, and CO. The inhibition by CO could be reversed by light. The presence of cytochrome b_5 and the CO-binding pigment, P-450, in the extract was detected by differential spectrophotometry.

Fatty-acid composition of mycoplasma lipids: Biomembrane with only one fatty acid. A. Rodwell (Commonwealth Scientific and Ind. Res. Organization, Animal Health Res. Lab., Parkville, Victoria 3052, Australia). *Science* 160, 1350–51 (1968). Mycoplasma strain Y grew well when elaidate was the only fatty acid added to the medium, and this acid then comprised over 97% of the lipid fatty acids. It also grew well when elaidate was supplied together with any one of a series of straight-chain saturated fatty acids, and the lipids then contained both in approximately equimolar proportions. The ratio of cholesterol to phospholipid remained constant.

Rapid labeling of mitochondrial lipids by labeled orthophosphate and adenosine triphosphate. Amiya Hajra, E. Seguin and B. Agranoff (Mental Health Res. Inst., Univ. of Michigan, Ann Arbor, Mich. 49104). *J. Biol. Chem.* 243, 1609–1616 (1968). Rapidly labeled lipids of guinea pig liver mitochondria incubated with $^{32}P_i$ (polyphosphoinositides) or γ-^{32}P-ATP were studied. With the use of inhibitors of oxidative phosphorylation, it was shown that $^{32}P_i$ is converted to labeled ATP, which is the more direct precursor of labeled lipid. Atractyloside blocks phosphorylation of lipid by endogenous ATP under conditions in which it has little effect on oxidative phosphorylation or lipid labeling by externally added ATP. Two radioactive lipids were identified by chromatography as phosphatidylinositol phosphate and phosphatidic acid. The properties of an unknown third lipid were studied. Its formation was selectively blocked by the addition of hydroxylamine to the incubation medium. It is postulated that the lipids are labeled by the action of kinases and phosphatases in the mitochondrial fraction.

Acyl dihydroxyaceton phosphate. Characterization of a ^{32}P-labeled lipid from guinea pig liver mitochondria. Amiya Hajra and B. Agranoff. *Ibid.*, 1617–1622. An unknown mitochondrial lipid which is labeled *in vitro* by incubation with γ-^{32}P-ATP has been isolated. A series of degradations including hydrolysis, oxidation and reduction of the ^{32}P-lipid resulted in various labeled products which were then characterized by co-chromatography or by co-electrophoresis. Alkaline methanolysis resulted in the release of all radioactivity from the lipid as inorganic phosphate. On the basis of its chemical properties in comparison with synthetic palmitoyldihydroxyacetone phosphate, the lipid has been identified as an acyl dihydroxyacetone phosphate.

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The effect of vitamin A acid on tumorigenesis and protein production. L. Prutkin (Dept. of Anatomy, New York Univ. Med. Center, New York, N.Y. 10016). *Cancer Res.* **28**, 1031–30 (1968). Vitamin A acid in lotion form was topically applied to skin tumors, which were induced by dimethylbenzanthracene, during their very early stages on a rabbit ear. The application of vitamin A acid resulted in an increased number of keratoacanthomas which exuded a thick viscous mucus. Cessation of the vitamin applications resulted in reversion to the usual keratotic keratoacanthoma. Reinstitution of vitamin A acid once again resulted in a metaplasia with production of a viscous material which continued until the applications of vitamin A acid were stopped. Thus, based on electron microscopic studies, it was possible by application and cessation of vitamin A acid to revert from one epidermal product (tonofibrils) to another (mucus). Cytologically, when the tumor exuded mucus, mucigen droplets were present, as well as tonofibrils, rough surfaced endoplasmic reticulumn, and Golgi apparatus. Horny keratoacanthomas had no mucigen droplets but increased membrane-coating granules and toaofibrils. In the later stages of the experiment, autophagocytic vacuoles which may play a role in the regression of the keratoacanthoma were observed.

A phospholipase specific for sphingomyelin from Clostridium perfringens. I. Pastan, V. Macchia and R. Katzen (Clin. Endocrinology Branch, Nat. Inst. of Arthritis and Metabolic Diseases, Nat. Inst. Health, Bethesda, Md. 20014). *J. Biol. Chem.* **243**, 3750–5 (1968). An enzyme that hydrolyzes sphingomyelin to ceramide and phosphorylcholine has been purified from the growth medium of *Clostridium perfringens*. The activity of the enzyme is stimulated about 2-fold by magnesium chloride and by diethyl ether. The activity of the enzyme is completely inhibited by 10^{-3} M ethylenediaminetetraacetic acid or 10^{-3} M calcium chloride. Lysolecithin and dipalmitoyl lecithin are hydrolyzed at about 10% of the rate of sphingomyelin. No hydrolysis of phosphatidylserine, phosphatidylethanolamine or phosphatidylinositol is detected. The enzyme does not catalyze the exchange of phosphorylcholine-^{14}C into sphingomyelin.

Cholesterol solubilization by solutions of bile salts and bile salts plus lecithin. D. H. Neiderhiser and H. P. Roth (Veterans Admin. Hosp. and the Dept of Med. and Biochem., Case-Western Reserve Univ. School of Med., Cleveland, Ohio). *Proc. Soc. Expl. Biol. Med.* **128**, 221–25 (1968). Model synthetic solutions were used to study cholesterol solubilization by the 6 conjugated bile salts found in human bile individually and as a mixture, and by lecithin in combination with bile salts. In the range of concentrations found in bile, bile salts alone solubilized only about one third as much cholesterol as might be found in comparable concentrated human gallbladder bile. Between 0.023 and 0.046 mmoles of cholesterol were solubilized per mmole of bile salts. Addition of lecithin to a bile salt solution increased the quantity of cholesterol dissolved to values observed in bile; 0.36 mmole of cholesterol was solubilized per mmole of added lecithin. Cholesterol solubilization by lecithin was independent of the concentration and nature of the bile salt.

Hemodynamic effects of prostaglandins E_1, A_1 and F_{2a} in dogs. J. Nakano and J. R. McCurdy (Depts. of Pharmacology and of Med., Univ. of Oklahoma School of Med., Oklahoma City, Ok.). *Proc. Soc. Expl. Biol. Med.* **128**, 39–42 (1968). The cardiovascular effects of PGE_1, PGA_1, and PGF_{2a} were studied in anesthetized, open chest dogs. It was found that PGE_1, PGA_1, and PGF_{2a} decrease left atrial pressures, and increase heart rate, pulmonary arterial pressure, cardiac output, and myocontractile force. However, both PGE_1 and PGA_1 are vaso-dilators and decrease systemic arterial pressure. The multiple hemodynamic changes induced by the three prostaglandins are caused, not only by their direct effect on the peripheral vasculatures, but also by their effects on the myocardium.

Effect of vitamin D on the ability of cows to mobilze blood calcium. L. A. Muir, J. W. Hibbs and H. R. Conrad (Dept. of Dairy Sci., Ohio Agricultural Res. and Devel. Center, Wooster, Ohio). *J. Dairy Sci.* **51**, 1046–50 (1968). The intravenous infusion of ethylene-diaminetetraacetic acid (EDTA) was used as a blood calcium challenge technique to measure the relative ability of vitamin D fed and control cows to mobilize blood calcium, and as an indicator of available calcium reserves. Based on one-half recovery time, six- to 10-minute infusions revealed no differences in blood calcium mobilizing ability due to vitamin D feeding. However, cows with previous milk fever history had a longer one-half recovery time than cows with no milk fever history. A more severe challenge, four-hour EDTA infusions, showed older cows to require longer for one-half recovery of blood calcium, but no differences due to vitamin D feeding or level of milk production. The linear regression coefficients calculated from reciprocals of serum calcium plotted against infusion time, for vitamin D and control cows, were statistically different and indicated that vitamin D fed cows could withstand a similar drain on their blood calcium at least 1.5 times longer than the controls. Herein may lie the key to the effectiveness of vitamin D feeding in milk fever prevention.

Regulation of cell lipid metabolism and accumulation. VII. Increase by glycerol of the polar lipid and triglyceride content of cultured cells. J. B. Mackenzie, C. G. Mackenzie and O. K. Reiss (Dept. of Biochem., Univ. of Colorado School of Medicine and Webb-Waring Inst. Med. Res., Denver, Colorado). *Proc. Soc. Expl. Biol. Med.* **128**, 42–46 (1968). Glycerol, at the concentrations used in cell freezing and storage procedures, causes a large increase in the lipid content of cultured mammalian cells. Column chromatography on silicic acid of the isolated lipid indicates that the increase is due primarily to increases in polar lipids and triglycerides. The homologues of glycerol, ethylene glycol and erythritol also increase cell lipid.

Gangliosides of bovine adrenal medulla. R. Ledeen, K. Salsman and Maria Cabrera (Dept. of Biochem., Albert Einstein College of Med., Bronx, New York 10461). *Biochemistry* **7**, 2287–95 (1968). Gangliosides were isolated from bovine adrenal medulla and separated by thin-layer chromatography into five fractions. Total yield was 223 μg of lipid-bound sialic acid/g of fresh tissue, equivalent to about 840 μg of ganglioside. This amounted to 0.68 μmole of ganglioside, which is slightly over 50% the molar concentration in gray matter of brain. In terms of micromoles of ganglioside per gram of lipid, the adrenal medulla contained 75% as much as gray matter. Approximately 92% of the mixture consisted of two hematosides, AG_5 and AG_6, which contained N-glycolylneuraminic acid (NGNA) and N-acetylneuraminic acid (NANA), respectively. Both contained 1 unit each of glucose and galactose but no hexosamine. The remainder was a mixture of slow-migrating, brain-type gangliosides. One of these, AG_3, was found by gas-liquid partition analysis to contain glucose, galactose, galactosamine and NANA in molar ratios of 1:1.93:0.96:1.98. One of the NANA units was removed by neuraminidase. Fraction AB_2 gave a similar though not identical analysis, except that approximately half the sialic acid was NGNA. It was not homogeneous, but the major component of AG_2 interestingly contained both NANA and NGNA in the same structure. Fraction AG_1 was a mixture but gave indication of another ganglioside containing both types of sialic acid.

Adrenal gland in vitamin E deficiency. Lipid peroxidation and malonaldehyde production in vitro. A. E. Kitabchi and R. H. Williams (Dept. of Med., Div. of Endocrinology and Metabolism, Univ. of Washington, Seattle, Wash. 98105). *J. Biol. Chem.* **243**, 3248–54 (1968). Incubation of adrenal homogenates of tocopherol-deficient rats was shown to produce a compound which was identified as malonaldehyde. This product formed a pink color with thiobarbituric acid (TBA) which had the same absorption characteristics as authentic malonaldehyde-TBA complex. It is suggested that with gradual diminution of tocopherol, the high level of polyunsaturated lipids in the adrenal particulate matter, in the presence of high ascorbic acid in the adrenal supernatant solution, may contribute to the high lipid peroxidation *in vitro* in vitamin E-deficient rats.

Vitamin E and essential fatty acids in avian reproduction. L. S. Jensen (Dept. of Animal Sciences, Washington State Univ., Pullman, Wash.). *Fed. Proc.* **27**, 914–9 (1968). A deficiency of vitamin E has different manifestations within the same species and the particular disease expressed is governed by composition of the diet fed. Easily oxidizable lipids included in a diet increase the requirement for vitamin E and are necessary for certain tocopherol-deficiency diseases to develop. Chemical antioxidants structurally unrelated to vitamin E have been shown to reduce the requirement for tocopherol and, indeed, can substitute completely for vitamin E in some instances. Selenium can replace vitamin E for the prevention of certain deficiency signs, but is ineffective, or

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only partially effective, in others. There are two divergent opinions on the function of tocopherol in animal organisms. Many investigators believe that the only function of vitamin E and its interrelated nutrients is as a physiological antioxidant to prevent *in vivo* peroxidation of lipids. Others admit that one of the major functions of vitamine E is as a physiological antioxidant, but that it must have a more specific role, perhaps as a cofactor in enzyme systems, in order to explain its complex interrelationship with chemically unrelated nutrients. Here our attention is focused on the role of vitamin E and its relationship to other factors involved in avian reproduction.

β-Hydroxydecanoyl thioester dehydrase. Specificity of substrates and acetylenic inhibitors. G. M. Helmkamp, Jr., R. R. Rando, D. J. H. Brock and K. Bloch (J. B. Conant Lab., Harvard Univ., Cambridge, Mass. 02138). *J. Biol. Chem.* **243**, 3229–31 (1968). The enzyme β-hydroxydecanoyl thioester dehydrase, a requisite component of the fatty acid synthetase system of *Escherichia coli,* catalyzes the reversible interconversion of the thioesters of β-hydroxydecanoic acid, *trans*-α,β-decenoic acid, and *cis*-β,γ-decenoic acid. All activities of the dehydrase are strongly inhibited by 3-decynoyl-N-acetylcysteamine. A marked preference for C_{10} substrates has previously been noted. For further elucidation of dehydrase specificity, kinetic parameters for the enzymatic dehydration and isomerization were determined with a series of substrates varying in chain length from eight to 12 carbon atoms in the acyl moiety. Inhibition constants for β,γ-acetylenic thioesters of the same series were also measured. The data showed a remarkable parallelism between the relative activities of substrates and inhibitors as a function of carbon chain length. The inhibitor 3-decynoyl-N-acetylcysteamine appears to be irreversibly bound to the dehydrase.

Impaired secretion of triglycerides by the liver; a cause of tetracycline-induced fatty liver. C. H. Hansen, L. H. Pearson, S. Schenker and B. Combes (Liver-Gastroenterology Unit, The Dept. of Internal Med., Univ. Texas Southwest. Med. School at Dallas, Dallas, Texas). *Proc. Soc. Expt. Biol. Med.* **128**, 143–46 (1968). The increments in plasma triglyceride levels observed after administration of Triton were consistently and significantly lower in tetracycline-injected rats, when hepatic tetracycline concentration was high, than in Triton-injected controls. These data are interpreted as indicating impaired release of hepatic triglyceride in tetracycline-injected animals. Hepatic triglyceride increased in tetracycline-injected rats and most of this could be accounted for by impaired release of liver triglyceride. This mechanism, possibly due to impaired synthesis of hepatic lipid acceptor protein, appears to be the major cause of tetracycline-induced fatty liver.

The effect of palmityl coenzyme A on pigeon liver fatty acid synthetase. Judith A. Dorsey and J. W. Porter (Lipid Metabolism Lab., Veterans Admin. Hosp., and the Dept. of Physiological Chem., Univ. of Wisconsin, Madison, Wis. 53706). *J. Biol. Chem.* **243**, 3512–16 (1968). Because of the rather widespread interest in palmityl coenzyme A as a possible physiological inhibitor of a large number of enzymes, we have further investigated the inhibition of pigeon liver fatty acid synthetase by palmityl-CoA initially reported in 1958 by Porter and Long. The inhibition of the fatty acid synthetase is dependent on the presence of a critical mixed micellar concentration of palmityl-CoA and, more importantly, on the molar ratio of the CoA ester to protein. The molar ratio requirement eliminates the possibility of a site-specific inhibition of the fatty acid synthetase. It is concluded, rather, that palmityl-CoA inhibits this enzyme by virtue of its detergent nature. In support of this conclusion, data are reported which show that sodium lauryl sulfate, another strong detergent, acts in a similar way on the fatty acid synthetase. It is suggested, from the above results, that the inhibiting effect of palmityl-CoA on a number of enzymes reported in the literature may be solely or largely attributed to its detergent action. However, examination of these enzymes with respect to a possible molar ratio requiremeent for palmityl-CoA inhibition will be necessary before a final conclusion can be drawn.

Studies on the microbiological degradation of steroid ring A. A. W. Coulter and P. Talalay (Dept. of Pharmacology and Exptl. Therapeutics, Johns Hopkins Univ. School of Med., Baltimore, Md. 21205). *J. Biol. Chem.* **243**, 3238–47 (1968). The synthesis of 2-oxo-*cis*-4-hexenoic acid from DL-2-amino-*cis*-4-hexenoic acid is described. The α-oxo acid appears to exist at neutral pH largely in the dienolic form. Ultracentrifuged extracts of steroid-induced *Pseudomonas testosteroni* rapidly converted 2-oxo-*cis*-4-hexenoic acid-1-^{14}C to $^{14}CO_2$. The same enzyme preparations, when supplemented with NAD and a NADPH-generating system, have been previously shown to convert Δ^4-androstene-3,17-dione-4-^{14}C to $^{14}CO_2$ and to accumulate L-2-amino-*cis*-4-hexenoic acid-1-^{14}C and DL-alanine-1-^{14}C in the presence of ethylenediaminetetraacetate. It has now been shown that, under similar conditions, 2-oxo-*cis*-4-hexenoic acid is efficiently converted to 2-amino-*cis*-4-hexenoic acid and alanine. The α-oxo acid also undergoes stereospecific enzymatic hydration to 2-oxo-4-hydroxyhexanoic acid, which is lactonized in the presence of acid to give a product that has been identified as one of the optically active isomers of 2-oxo-4-ethylbutyrolactone of unestablished configuration. These findings suggest that 2-oxo-*cis*-4-hexenoic acid is a key intermediate in the degradation of steroid ring A by microbial enzymes. The enzyme preparations also contain an enzyme which reduces the double bond of the α-oxo acid but does not appear to be involved in the degradative pathway of the steroids.

Phytosphingosines and branched sphingosines in kidney. H. E. Carter and C. B. Hirschberg (Div. of Biochem., Noyes Lab. of Chem., Univ. Ill., Urbana, Ill.) *Biochemistry* **7**, 2296–2300 (1968). The sphingolipids of beef and rat kidney have been isolated and separated into cerebroside and sphingomyelin fractions. The long-chain base mixture obtained from the cerebrosides, both beef and rat, contained a substantial amount of phytosphingosine in addition to sphingosine and dihydrosphingosine. Kidney tissue thus is unique in the simultaneous presence of all three bases. The sphingomyelin fractions of rat and beef contained no detectable phytosphingosine. However, the sphingomyelin fraction from beef, but not from rat, contained a branched chain sphingosine (13.4% of total long-chain base). Its structure was determined to be Δ^4-16-methyl-C_{17}-sphingosine. This is the first report of a branched-chain base in mammalian tissue, although brached long-chain bases have also been found in protista. A crude sphingomyelin fraction from beef blood also contained this branched long-chain base, which in conjunction with the previous observations raises the question as to whether protista of the rumen may be the source of the branched long-chain base in beef kidney.

Branched chain α-keto acid metabolism. II. Evidence for the common identity of α-ketoisocaproic acid and α-keto-β-methyl-valeric acid dehydrogenases. J. A. Bowden and J. L. Connelly (Dept. of Biochem., Univ. of North Dakota School of Med., Grand Forks, N. D. 58201). *J. Biol. Chem.* **243**, 3526–31 (1968). Evidence derived from physical, chemical and kinetic studies of a partially purified branched chain α-keto acid dehydrogenase established that both α-ketoisocapric and α-keto-β-methylvaleric acids are oxidatively decarboxylated by a single enzyme complex. This situation is consistent with the current clinical observations of branched chain ketoaciduria. The significance of this finding is discussed in relation to metabolic aspects of the disease.

Resinoids of carboxy containing copolymers containing unsaturated acids, amides, other vinyl monomers and epoxides. S. Tanaka and T. Minami (Hitachi Kasei Kogyo). *U.S. 3,378,601.* Resinoids may be prepared by copolymerizing 4–40 parts of a mixture consisting of 2–20 parts of an *alpha-beta* unsaturated monocarboxylic acid and 2–20 parts of an *alpha-beta* unsaturated carboxylic acid amide and/or monoalkyl substituted amides, with 30–80 parts of a vinyl monomer and 3–35 parts of polyepoxide, wherein the epoxide is incorporated into the polymer. Phenoplasts or aminoplasts may be added to the copolymer.

Water-dispersible alkyds and alkyd resins. Y. Jen (Chevron Research Co.). *U.S. 3,379,548.* An improvement is claimed in the process for the preparation of a water-dispersible, oil-modified alkyd by condensing phthalic acid or phthalic anhydride with a glyceride oil fatty acid partial ester of glycerol or pentaerythrol. The improvement consists in admixing with the reactants a water-soluble aliphatic monoether derivative of polyethylene glycol having molecular weight above about 300, in an amount of 5–30%, and condensing the resulting mixture until a water-dispersible product is formed.

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IMPROVED METHOD FOR THE PREPARATION OF MALONYL COENZYME A. H. Mohrhauer, K. Christiansen, Minerva Gan, M. Deubig and Ralph T. Holman (The Hormel Inst., Univ. of Minn., Austin, Minn. 55912). *J. Lipid Res.* **9**, 398 (1968). Malonyl coenzyme A is synthesized by transacylating S-malonyl-N-decanoyl cysteamine with coenzyme A. A simplified procedure for the preparation of S-malonyl-N-decanoyl cysteamine, using cysteamine as starting material, is described.

MECHANISMS FOR THE INTESTINAL ABSORPTION OF BILE ACIDS. J. M. Dietschy (Gastrointestinal-Liver Unit, Dept. of Internal Med., Univ. of Texas Southwestern Med. School at Dallas, Dallas, Texas 75235). *J. Lipid Res.* **9**, 297–309 (1968). In this review experimental data are summarized which indicate that at least four different transport mechanisms account for net movement of bile acids across the gastrointestinal tract. These are active transport and the passive mechanisms of ionic, nonionic, and micellar diffusion. Of these four, active transport and passive nonionic diffusion are quantitatively of the greatest importance. Active transport is confined to the ileum and probably plays a dominant role in the absorption of conjugated bile acids. Passive nonionic diffusion may occur at any level of the gastrointestinal tract and probably is the major mechanism for the absorption of unconjugated bile acids.

PHOSPHOLIPID SPHERULES (LIPOSOMES) AS A MODEL FOR BIOLOGICAL MEMBRANES. G. Sessa (Dept. of Med., New York Univ. School of Med., New York 10016) and G. Weissmann. *J. Lipid Res.* **9**, 310–18 (1968). This review describes the properties of artificial spherules composed of phospholipids and various long-chain anions or cations. The lipids, which are in the liquid-crystal state, trap aqueous solutes such as cations, anions, glucose or glycine in aqueous compartments between a series of lipid bilayers. The diffusion of these solutes from the spherules can be studied in the same way that diffusion across biological membranes is studied. The spherules exhibit many of the properties of natural membrane-bounded structures: they are capable of ion discrimination, osmotic swelling, and response to a variety of physiologic and pharmacologic agents. These agents (steroids, drugs, toxins, antibiotics) accelerate or retard diffusion of ions or molecules from the spherules in a way that qualitatively mimics their action on erythrocytes, lysosomes, or mitochondria. Thus the spherules constitute a valuable model system with which to study the properties of biological membranes that may be dependent on their lipid components.

RAPID, SENSITIVE SPECTROPHOTOMETRIC METHOD FOR QUANTITATIVE DETERMINATION OF SULFATIDES. E. L. Kean (Depts. of Ophthalmology and Biochem., Case Western Reserve Univ. School of Med., Cleveland, Ohio 44106). *J. Lipid Res.* **9**, 319–27 (1968). A rapid, sensitive spectrophotometric method for the analysis of sulfatides is described. The assay method is based upon the formation of a colored complex between the cationic dye, azure A, and (anionic) sulfolipids; the complex is extractable by a solution of chloroform-methanol 1:1. With the exception of some of the phospholipids, the reaction is specific for the sulfolipids. Cardiolipin was the most reactive of the nonsulfolipid compounds that were tested. Except for sphingosine and the mono- and dihexose derivatives of sphingosine, a wide variety of lipids did not interfere with the formation of color by standard sulfatides. Sulfur-containing amino acids, sugar sulfates, and sulfated polymers neither produced color nor interfered in its formation by sulfatide. Chloride and nitrate ions produced relatively little color. The method is much more sensitive (lower limit, about 0.002 μmole) than most methods currently employed for the analysis of sulfatides and has a high degree of precision. It is applicable to the analysis of sulfolipids in tissue extracts and gives values similar to those obtained by previously published procedures. The reliability of the method is increased when it is applied to partially purified lipid solutions. Sulfatides added to extracts of rabbit brain tissue were quantitatively accounted for by the assay. In addition, the method can be applied to samples obtained directly from thin-layer plates.

7α-HYDROXYLATION OF CHOLESTANOL BY RAT LIVER MICROSOMES. S. Shefer (Dept. of Lab. Diagnosis, Public Health Res. Inst. of the City of New York, Inc., and the Bureau of Lab., New York City Dept. of Health, New York 10016) and S. Hauser and E. H. Mosbach. *J. Lipid Res.* **9**, 328–33 (1968). In a study of the mechanism whereby 5α-bile acids are formed from cholestanol, the 7α-hydroxylation of cholestanol was investigated in rat liver preparations *in vitro.* It was found that in the presence of NADPH and oxygen, rat liver microsomes catalyzed the 7α-hydroxylation of cholestanol to the same extent as that of cholesterol. The rate of the hydroxylation was enhanced by prior treatment of the experimental rats with cholestyramine (a bile acid sequestrant) or by establishment of bile fistulas, i.e., by partial or complete removal of bile acids from the enterohepatic circulation. The 7-hydroxylation reaction was further stimulated by pretreatment of the animals with phenobarbital, a drug known to produce increased biosynthesis of hepatic endoplasmic membranes. The 7α-hydroxylase was inhibited by the reaction product, by sterols with 7-keto or 7β-hydroxyl groups, and also by mono- and dihydroxy bile acids of the 5-β series, although cholic acid or taurocholate produced no inhibition unless added in high concentrations. The results of these studies are in accord with the concept that the presence of a Δ^5-double bond is not required for the enzymatic formation of the 7α-hydroxy derivative. The rate of this hydroxylation reaction *in vitro* appears to depend on the concentration.

CONVERSION OF 7α,12α-DIHYDROXYCHOLEST-4-EN-3-ONE TO 5α-CHOLESTANE-3α,7α,12α-TRIOL BY IGUANA LIVER MICROSOMES. T. Hoshita, S. Shefer and E. H. Mosbach (Dept. of Lab. Diagnosis, Public Health Res. Inst. of the City of New York, Inc., and the Bureau of Lab., New York City Dept. of Health, New York 10009). *J. Lipid Res.* **9**, 237–43 (1968). The role of 7α,12α-dihydroxycholest-4-en-3-one as an intermediate in the formation of 5α-bile acids from cholesterol was investigated with liver preparations of *Iguana iguana in vitro.* The microsomal fraction of iguana liver catalyzed the transformation of 7α,12α-dihydroxycholest-4-en-3-one to 5α-cholestane-3α,7α,12α-triol in good yield. 7α,12α-Dihydroxy-5α-cholestan-3-one served as an intermediate. Under the conditions employed, formation of the corresponding 5β-isomers could not be detected. High speed supernatant solution and mitochondrial fraction of iguana liver did not reduce 7α,12α-dihydroxycholest-4-en-3-one to a measurable extent. The microsomal enzyme system required NADPH as hydrogen donor and was inactive in the presence of NADH. 7α,12α-Dihydroxycholest-4-en-3-one may serve as a common intermediate in the formation of 5α- and 5β-bile acids from cholesterol.

EFFECT OF INGESTION OF UNSATURATED FAT ON LIPOLYTIC ACTIVITY OF RAT TISSUES. S. S. Pawar (Biochem. Dept., Univ. of Texas Southwestern Med. School, Dallas, Texas 75235) and H. C. Tidwell. *J. Lipid Res.* **9**, 334–36 (1968). Homogenates of some rat tissues, incubated in Tris-maleate buffer containing bovine serum albumin, olive oil emulsion, heparin and serum, liberated free fatty acids. The total lipolytic activity in tissues of rats fed a low fat, 20% lard, or 20% corn oil diet for 6 wks was measured. Similar activities were found in all the livers, but there was a significant increase in the total lipolytic activity of the mucosa, epididymal fat and mesenteric tissues after ingestion of an unsaturated fat diet as compared with that containing a more saturated fat. From measurements of the lipolytic activity in the presence of 1 M NaCl or 0.2 M NaF and in the absence and presence of heparin and serum, the conclusion is drawn that more lipoprotein lipase was present in adipose tissue of rats on unsaturated fat diets. An increase in available lipoprotein lipase after unsaturated fat diets may aid in clearing lipids from the blood of these rats and thus in producing the lower blood lipid levels obtained.

ON THE ORIGIN OF PRISTANE IN MARINE ORGANISMS. J. Avigan and M. Blumer (Lab. of Metabolism, Nat. Heart Inst., Nat. Inst. of Health, Bethesda, Md. 20014). *J. Lipid Res.* **9**, 350–2 (1968). Phytol-U-^{14}C was adsorbed on algae and ingested in this form by zooplanktonic copepods (two species of Calanus). The lipids of these animals were analyzed after 48 hr and found to contain radioactive pristane and radioactive phytanic acid. The conversion of phytol to pristane by the copepods is interpreted as a likely biological source of pristane in nature.

TALL OIL FATTY ACID ALKYDS. CONTRIBUTION OF SIDE REACTIONS. J. T. Geoghegan, H. G. Arlt, Jr. and C. O. Myatt (Arizona Chem. Co., Stamford, Conn.). *Paint Technol.* **40**, 209–213 (1968). The effect of side reactions, especially thermal dimerization and etherification during tall oil fatty acid-phthalic anhydride-polyol alkyd preparations, have been investigated under normal reaction conditions of 240C for 8 hours. Gas-liquid chromatographic techniques have been developed to follow the reaction. A comparative analysis of tall oil fatty acid feedstock and the fatty acid recovered from the saponified alkyds demonstrates that essentially no changes occur in the fatty acid chain. This investigation showed that the thermal dimerization and etherification side reactions occur at a very slow rate and, as such, do not substantially increase the average molecular weight of the reaction products. Even at the later stages of reaction, esterification is predominant.

Contribution to the maleinisation of drying oils. J. Hires, E. Krejcar and J. Mleziva. *Chem. Prumysl.* 17(42), 485–91 (1967). The reaction of maleic anhydride with unsaturated vegetable oils has been followed by I.R. spectroscopy. The study of changes accompanying the maleinisation of linseed and soybean oil between 120 and 240C led to the conclusion that the reaction of maleic anhydride (up to 10% by weight) is very quick and quantitative above 200C; the conjugated double bonds in the *trans-trans* and *cis-trans* configurations art attacked preferably and a cyclohexenyl structure is formed. The reaction is much slower below 200C. A substitution reaction proceeds simultaneously with the preservation of double bonds. The structure formed is reflected in an absorption band at 917 cm^{-1}. With increasing amount of maleic anhydride, the capability of these oils to absorb oxygen is lowered, obviously due to the loss of conjugated double bonds present. (Rev. Current Lit. Paint Allied Ind. No. 311.)

Conversion of pyruvate to glyceride-glycerol in adipose tissue of obese and nonobese mice. K. Chakrabarty and G. A. Leveille (Univ. of Illinois, Urbana, Ill.). *Arch. Biochem. Biophys.* 125, 259–68 (1968). Isolated adipose tissue from obese and nonobese mice has been shown to incorporate radioactivity from pyruvate-^{14}C into glyceride-glycerol, the rate of incorporation being lower in the tissue of the obese animals. Experiments were designed to elucidate the pathway of this conversion. Pyruvate-1-^{14}C was found almost exclusively in the α-carbons of glycerol and about 50% of the total glyceride-glycerol radioactivity derived from pyruvate-2- or 3-^{14}C was found in the α-carbons of glycerol. These data suggest that pyruvate is converted to phosphoenol pyruvate (PEP) by the abbreviated dicarboxylic acid shuttle. Activity of the two enzymes required for this pathway, pyruvate carboxylase and PEP-carboxykinase, has been demonstrated in adipose tissue of obese and nonobese mice. The significance of the reversal of glycolysis in mouse adipose tissue is discussed. Also, the differences observed between adipose tissue of obese and nonobese mice are considered in terms of the known metabolic aberrations in the obese hyperglycemic mouse.

A study of nutritional value of animal and vegetable fats in milk substitutes. J. Rossi and J. Amich-Gali (Animal Nutr. Res. Center, Geneva, Switzerland). *Oli, Grassi, Derivati* 4, 16–18 (1968). Feeding tests were conducted on eight calves using milk substitutes, containing in one case 18% animal fat (tallow) and in another vegetable fat. The substitute containing animal fat gave superior conversion and growth indexes and supplied more biological energy than the one with vegetable fat. It was concluded that the digestibility coefficient is not sufficient for the evaluation of the physiological and nutritional availability of fats in milk substitutes. Both substitutes tested were shown to have good keepability.

The biological behavior of fatty acids containing triple bonds. III. The metabolism of tariric acid. K. Bernhard, K. Yekundi and E. Kaempf (Univ. of Basel, Basel, Switzerland). *Helv. Chim. Acta* 51, 373–6 (1968). Octadec-6-inoic acid (tariric acid) fed to rats as a triglyceride is incorporated into both depot fats and liver lipids. A metabolite isolated from the urine is the so far undescribed dec-4-ene-6-inedioic acid, $HOOC\text{-}(CH_2)_2\text{-}CH = CH\text{-}C \equiv C\text{-}(CH_2)_2\text{-}COOH$.

The chemical synthesis of glucosaminylphosphatidylglycerol. M. I. Gurr, P. P. M. Bonsen, J. A. F. Opdenkamp and L. L. M. van Deenen (State Univ., Utrecht, Netherlands). *Biochem. J.* 108, 211–9 (1968). Chemical methods are described which have been used to synthesize a glucosamine derivative of phosphatidylglycerol having the same structure as that of the natural compound isolated from *Bacillus megaterium.* The synthetic and natural compounds appeared identical when compared by chromatography and by identification of hydrolysis products from chemical and enzymic degradations.

A study of the fatty acid metabolism of the yeast, Pityrosporum ovale. P. F. Wilde and P. S. Stewart (Unilever Res. Lab., Isleworth, Middlesex, England). *Biochem. J.* 108, 225–31 (1968). The yeast *Pityrosporum ovale,* a skin saprophyte, will only grow if fatty acids of chain length greater than C_{10} are added to the culture medium. 9-Hydroxypalmitic acid is the major product of metabolism of even carbon number fatty acids; 9-hydroxystearic acid is also found. The optimum pH for this conversion is pH 4.5. The hydroxy fatty acids produced are found bound in a polar form in the aqueous phase of the medium. Growth of the organisms is facilitated by the substrate being present as a two-phase liquid system.

Effect of alloxan and portacaval shunt on the synthesis of fatty acids and sterols by rat liver. J. V. Dahlen, A. L. Kennan and J. W. Porter (Univ. of Wisconsin School of Medicine, Madison, Wis.). *Arch. Biochem. Biophys.* 124, 51–7 (1968). Experiments are presented which show the diminished capability with time of rat liver homogenates to synthesize nonsaponifiable compounds from mevalonic-2-^{14}C acid and fatty acids from acetyl-1-^{14}C-CoA and malonyl-2-^{14}C-CoA after induction of diabetes by alloxan injection. Insulin treatment partially repairs this defect. Portacaval shunted rats were also used to show a similar decline with time of lipogenesis after the shunting operation. This decreased production is not due to activators or inhibitors present in the liver homogenate, nor is it due to a limiting supply of NADPH; the suggestion is made that it reflects a decreased level of enzymes concerned with the biosynthesis of fatty acids and nonsaponifiable compounds in the liver.

Photoperoxidation in isolated chloroplasts, I. Kinetics and stoichiometry of fatty acid peroxidation. R. L. Heath and L. Packer (Univ. of California, Berkeley, Cal.). *Arch. Biochem. Biophys.* 125, 189–98 (1968). A photo-induced cyclic peroxidation in isolated chloroplasts is described. In an osmotic buffered medium, chloroplasts upon illumination produce malondialdehyde (MDA, a decomposition product of tri-unsaturated fatty acid hydroperoxides), bleach endogenous chlorophyll and consume oxygen. These processes show (a) no reaction in the absence of light; (b) a 10–20 min. initial lag upon illumination; (c) a linear phase with the rate proportional to the square root of light intensity; (d) cessation of the reaction within 3 min. after illumination ceases; and (e) a termination phase after several hours of illumination. The kinetics of this process fit a cyclic peroxidation equation with rate coefficients near those for chemical peroxidation. The stoichiometry of $MDA/O_2 = 0.02$, and $O_2/Chl_{bleached} = 6.9$ correlates well with MDA production efficiency in other biological systems and with the molar ratio of unsaturated fatty acids to chlorophyll. The energies of activation for the two phases of the process are the same as for autoxidation. It is concluded that isolated chloroplasts upon illumination can undergo a cyclic peroxidation initiated by the light absorbed by the chlorophyll. Photoperoxidation results in a destruction of the chlorophyll and tri-unsaturated fatty acids of the chloroplast membranes.

Metabolism of phospholipids and the characterization of fatty acids in bovine corpus luteum. T. W. Scott, W. Hansel and L. E. Donaldson (Scientific and Industrial Res. Org., Prospect, N.S.W., Australia). *Biochem J.* 108, 317–23 (1968). Phosphatidylcholine was found to be the predominant phospholipid in bovine corpus luteum, accounting for about 50% of the total phospholipid phosphorus, with phosphatidylethanolamine (13%) and ethanolamine (8–9%) the next two major components. The proportion of oleate in the neutral lipids and phospholipids was higher than that of any other acid; tissue lipids contained unsaturated fatty acids in excess of 60% almost half of which was polyunsaturated, mainly arachidonate (20:4), docosatetraenoate (22:4) and docosapentaenoate (22:5). After incubation with 1-^{14}C-acetate, the greatest proportion of radioactivity was found in palmitate and docosatetraenoate. Polyunsaturated acids accounted for almost 50% of the ^{14}C radioactivity incorporated and this pattern was observed in phospholipids, triglycerides and fatty acids.

Advances in bile acid research. Shohei Hayakawa (Shionogi & Co., Osaka). *Yukagaku* 17, 415–429 (1968). A review with 195 references.

THE METABOLISM OF GLYCERIDE GLYCOLIPIDS. R. A. Pieringer (Dept. of Biochem., Temple Univ. Sch. of Med., Philadelphia, Pa. 19140). *J. Biol. Chem.* 243, 4894–903 (1968). Particulate enzyme preparations of *Streptococcus faecalis* ATCC 9790 catalyze the synthesis of 1,2-di-O-acyl-3-O-(α-D-glucopyranosyl)-*sn*-glycerol (monoglucosyl diglyceride), 1,2-di-O-acyl-3-O-(2-O-α-D-glucopyranosyl-α-D-glucopyranosyl)-*sn*-glycerol (diglucosyl diglyceride), and a third glucolipid of unknown structure from two common precursors, UDP-glucose and 1,2-diglyceride. The three glucolipids appear to be formed sequentially. Isolated, radiochemically pure monoglucosyl diglyceride is converted to diglucosyl diglyceride in a reaction dependent upon UDP-glucose and enzyme. The biosynthetic enzyme or enzymes displayed a relatively high degree of specificity for UDP-glucose (the best of five nucleoside diphosphate glucose substrates tried) and for the 1,2-stereoconfiguration of the diglyceride substrate. ^{14}C-Galactose of UDP-galactose-^{14}C is converted to glucose prior to incorporation into glycolipids of *S. faecalis.* Of seven ^{14}C-diglycerides, ^{14}C-dilinolein served best as a substrate for the synthesis of the three glucolipids. Magnesium ion stimulates the reaction. None of 18 surface active agents tried appeared to enhance the enzymatic reaction.

THE HYDROLYSIS OF PHOSPHATE ESTERS OF α-HYDROXY ACIDS CATALYZED BY MOLYBDATE. Zelda Rose and L. I. Pizer (Inst. for Cancer Res., Philadelphia, Pa. 19111). *J. Biol. Chem.* 243, 4806–09 (1968). The hydrolysis of phosphate esters of 2-hydroxy acids is catalyzed by molybdate. Half-times were determined for the hydrolysis of 2,3-phosphoglyceric acid (PGA) (24 min), 2-PGA (34 min), phosphoglycolic acid (35 min), and phospholactic acid (46 min). Conditions are given for determining the distribution of ^{32}P in 2,3-PGA which is hydrolyzed to 3-PGA and inorganic phosphate.

THE CONVERSION OF (3β-^{3}H)5β-CHOLESTAN-3α-OL INTO (3β-^{3}H) DEOXYCHOLIC ACID IN MAN. R. S. Rosenfeld and L. Hellman. *Biochemistry* 7, 3085–88 (1968). Since 5β-cholestan-3α-ol possesses the structural features of bile acids at C-3 and at the A/B ring juncture, its conversion into bile acids was investigated. (3β-^{3}H)5β-Cholestan-3α-ol was prepared and administered to a patient with a bile fistula. Over 15% of the radioactivity in the biliary steroids was associated with the dihydroxycholanic acids of which labeled deoxycholic acid comprised the major portion. Preparation of suitable derivatives showed that ^{3}H was retained at C-3β through the transformation.

INJECTABLE AQUEOUS EMHLSIONS OF FAT SOLUBLE VITAMINS. R. E. Aiello and J. C. Bauernfeind (Hoffmann-La Roche, Inc.). *U.S. 3,384,545.* An aqueous emulsion is described, comprising (a) up to about 12% by wt. of either vitamin A palmitate, vitamin D or vitamin E, or mixtures thereof, (b) about 8–25% by wt. of a polyoxyethylene ether of castor oil containing 20–40 EtO groups per mole of castor oil, (c) about 4–44% by wt. of glycerin, and (d) about 15–85% by wt. of water. The quantity of component (b) present in the emulsion should not exceed three times the weight of component (a).

COATED FLAVORINGS AND PREPARATION THEREOF. E. Fujita, K. Ishii, H. Nakatani, Y. Nakai and K. Katagiri (Takeda Chemical Industries, Ltd.). *U.S. 3,389,000.* Nucleoside-5′-phosphates in granular form, for use in flavoring for foods and beverages, are protected against degradation by phosphatase by coating the granules with animal or vegetable fat melting within the range 40–100C, thereupon releasing the 5′-phosphates *in situ* in the food or beverage to which they are added. The particular fat employed is correlated to storage and use temperature conditions, and the granule size is adjusted to 16–65 mesh prior to coating.

METHOD FOR REDUCING CHOLESTEROL IN THE BODY. F. Kagan (Upjohn Co.). *U.S. 3,389,051.* A method for reducing the cholesterol content of both blood and tissue in mammals by partially arresting the biosynthesis of cholesterol in the body, comprises orally administering between about 1 and 250 mg. of 3β-(diethylaminoethoxy)-5-androsten-17-one or a physiologically acceptable acid addition salt thereof.

METHOD OF PRODUCING REHYDRATABLE, FREEZE-DRIED PEANUT BUTTER PRODUCTS. M. Laskin (W. R. Grace & Co.). *U.S. 3,396,041.* A process for the production of a rehydratable, cellular, freeze-dried peanut butter consists of admixing peanut butter with water, freezing at atmospheric pressure to a hard solid and freeze-drying at low pressure.

• Detergents

NEW CHLORINE-BASED DETERGENT-DISINFECTANT. P. M. Norick, P. M. Brown, F. H. Dondershine and R. A. Hollis (Ethicon, Inc.). *Soap Chem. Specialties* 44(3), 70–80 (1968). A new chlorine-releasing detergent-disinfectant has been formulated, using sodium dichloro-S-triazine-trione and sodium dodecylbenzene sulfonate as the active ingredients. The mixture is stable after storage at room and elevated temperatures for extended periods of time. Various microbiological tests showed a wide spectrum of activity. Both gram-positive and gram-negative bacteria, fungi and aerobic spore formers were destroyed. This latter property showed an advantage over quaternary, iodophor and phenolic products. Vegetative bacterial cells were destroyed in seconds or minutes, while spore destruction required hours. As with other chlorine solutions, activity was diminished on storage and influenced by the presence of organic matter and pH. Oral toxicity is low and a 24-hour contact with intact and abraded rabbit skin produced no evidence of irritation.

A STUDY OF THE FLOCCULATION STABILITY OF DISPERSE SYSTEMS. H. Sonntag (German Acad. of Sci., Berlin, Germany). *Tenside* 5, 188–93 (1968). The flocculation process has been characterized on model emulsion droplets by measuring the approach speed and the equilibrium distance. Both of these quantities give a certain amount of information about the reciprocal effects between the droplets. The dispersion forces are very strongly influenced by adsorption layers and the structure of the polar group of surface active compounds is of major importance for the modification of these forces.

THE PREPARATION OF 1-AMINOETHYL-2-ALKYL-2-IMIDAZOLINES WITH LONG ALKYL GROUPS. O. Dobozy (Orgon. Chem. Research Inst., Budapest, Hungary). *Tenside* 5, 145–8 (1968). Diethylene triamine and sperm oil fatty acid can give rise to a condensation reaction leading to the corresponding cyclic imidazoline derivative, as identified by I.R. spectra. The reaction does not, however, proceed quantitatively since, depending upon the reaction conditions, various amounts of linear by-products are also formed, mainly acid amides.

ANALYSIS OF POWDERED ALKALINE CLEANING COMPOUNDS. A. A. Treffler. *Soap. Chem. Specialties* 44(3), 31–3, 82–3 (1968).

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The methods for quantitative analysis of surfactants, builders and other miscellaneous ingredients found in commercial alkaline cleaning compounds are reviewed.

Consumer testing of liquid syndets, IV. K. L. Johnson (Swift & Co.). *Soap Chem. Specialties* 44(5), 96–8 (1968). Consumer testing results of several heavy-duty liquid detergent formulations are reported. Formulas containing equal parts of trisodium phosphate and sodium tripolyphosphate and a modified amine condensate-nonionic blend for the active portion appear to produce heavy-duty liquids of acceptable utility. Addition of opacifying agents is also possible.

Predicting the durability of dress shirts in home laundering. C. T. Handy, H. W. Arnold, D. C. Reitz and P. R. Wilkinson (DuPont de Nemours & Co.). *Am. Dyestuff Rept.* 57, 36–8 (1968). Experiments have shown that the relative durability of dress shirts can be predicted with considerable assurance from results of a multiple wash test. Abrasion damage in dress shirts centers on the collar and cuff areas and most of it occurs during laundering. Durability increases with increasing polyester content: durable-press shirts containing 65% polyester will outwear most untreated cottons.

Soil redeposition of polyester fiber and its test methods. S. Shimauchi and H. Mizushima (Teijin Ltd., Osaka, Japan). *Am. Dyestuff Rept.* 57, 35–42 (1968). Observations have been made of the soil redeposition phenomenon on polyester and cotton fabrics by means of a scanning-type electron microscope. The redeposition behavior of various kinds of artificial soils, such as carbon black and clay, was studied in comparison to that of natural soil and the conclusion was reached that the behavior of the two types of soil is quite different from one another. It is recommended that natural soils be employed in preference to artificial soils for testing fabric soiling properties.

Mechanical dishwashing formulations. R. R. Keast, E. S. Roth and J. S. Thompson (FMC Corp.). *Soap Chem. Specialties* 44(6), 56–60 (1968). A review is offered of the criteria to be used in formulating mechanical dishwashing compounds and the role of the various ingredients. Some formulations are given for use in soft-water and hard-water products.

All-purpose household cleaners. R. P. Berni (GAF Corp.). *Soap Chem. Specialties* 44(5), 53–4, 134–7 (1968). Dilutable concentrates and non-aerosol spray-on types represent recently introduced all-purpose household cleaners which have met with general acceptance. Formulations of commercially available products are given and a number of modifications and new ingredients are suggested.

New trends in fabric softeners. E. G. Shay and A. N. Petrocci (Onyx Chemical Co.). *Soap Chem. Specialties* 44(5), 76–84, 138–40 (1968). Methods for the evaluation of fabric softener/sanitizer combinations are described and some of the recent data and concepts related to the physical and bacteriological testing of these products are discussed.

Alkali-resistant enzyme for detergents. S. R. Green (Enzyme Development Corp.). *Soap Chem. Specialties* 44(5), 86–94, 133–4 (1968). The properties of a commercially available enzyme suitable for use in detergent formulations within a wide pH range (5 to 11) are discussed. Its interaction with other formula components, such as surfactant and builders is given. The modified Anson-hemoglobin method for determining the proteolytic activity of this alkali-resistant enzyme is reported in full.

Liquid active oxygen detergent bleaching concentrate. K. Lindner and E. Eichler (Henkel & Cie. G.m.b.H.). *U.S. 3,388,069.* A liquid storage-stable, active oxygen containing detergent-bleaching concentrate consists essentially of water, hydrogen peroxide (3–90% by wt.) and a water-soluble surface active C_{10}–C_{24} amine oxide. The substituents attached to the N atom of the tertiary amine group of the amine oxide are selected from the group consisting of alkyl and hydroxy alkyl. The amine oxide represents from 2 to 40% by wt. of the total composition and is in a weight ratio to the hydrogen peroxide of from 10% to 200%. The composition may have a pH from 1 to 10.0.

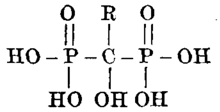
Hydroxysulfoxides—A new group of tensides. H. Distler (Bavarian Aniline and Soda Co., Ludwigshafen, Germany). *Fette Seifen Anstrichmittel* 70, 21–23 (1968). Hydroxyalkylsulfoxides can be prepared by the oxidation of thioether-alcohols. The thioether-alcohols are formed by the addition of beta-hydroxyethyl mercaptan to olefins. The various reactions and the properties of the new substances are discussed.

Liquid crystals: The mesomorphic phases of surfactant compositions. F. B. Rosevear (Procter and Gamble Co., Miami Valley Lab., Cincinnati, Ohio). *J. Soc. Cosmetic Chemists* 19, 581–594 (1968). Liquid crystals are mesomorphic structure types between liquids, which are random, and crystals, which are periodic in all three dimensions. The mesomorphic state is surprisingly widespread in organic, and even certain inorganic, compositions. In the surfactant industry, mesomorphic material by the ton occurs as an intermediate in processing. The layered smectic structure of the industrially important neat phase will serve as an introduction to mesomorphic structures. In each layer, elongated molecules or other units are arranged parallel to each other and with their head ends at the interface between layers; the stacking of layers is periodic. Laterally, however, the molecules have a random, liquid-like arrangement. Thus, a single structure has a hybrid liquid and crystalline nature. The layers, however, slide easily over each other and the structure flows under its own weight even while maintaining crystal-like periodicity. The chemical and physical factors leading to this and other mesomorphic structures in surfactant compositions are reviewed.

Studies on nonaqueous emulsions. R. V. Peterson and R. D. Hamill (Coll. of Pharm., Univ. of Utah, Salt Lake City, Utah). *J. Soc. Cosmetic Chemists* 19, 627–640 (1968). A departure from traditional methods and concepts of emulsion technology has resulted in the development of a family of nonaqueous emulsions which possess a variety of interesting and unique properties. Liquids such as glycerin, propylene glycol and polyethylene glycol 400 represent the polar phase, while olive oil represents the nonpolar phase. Representative anionic, cationic and nonionic surfactants were used. Conventional theories and methodology are not readily translatable to the nonaqueous systems. Emulsion type and the method of preparation seem to be more closely related to the chemical nature of the surfactant than to other types of classification such as the HLB system.

Spray dried products. G. G. Shields and C. B. Patterson (Purex Corp., Ltd.). *U.S. 3,380,922.* Film forming synthetic resinous polymers having the repeating unit $-[CH_2-CH_2-CHCOOH-CHCOOH]-$ have been found to be effective binders for beaded inorganic salt base products such as synthetic detergents.

Surface-active products. B. Werdelmann, K. H. Worms and B. Blaser (Henkel & Cie., G.m.b.H.). *U.S. 3,380,924.* Detergent soaps are stabilized against rancidity and discoloration by addition of 0.05–2.5% by wt. of a compound of the formula



$$\mathrm{HO-\overset{\overset{O}{\|}}{\underset{\underset{HO}{|}}{P}}-\overset{\overset{R}{|}}{\underset{\underset{OH}{|}}{C}}-\overset{\overset{O}{\|}}{\underset{\underset{OH}{|}}{P}}-OH}$$

or its sodium, potassium or ethanolamine salts, with R being either a phenyl group or a C_1–C_{11} saturated aliphatic hydrocarbon.

Polyglycol ethers suitable for detergent preparations. B. Blaser and H. Rutzen (Henkel & Cie., G.m.b.H.). *U.S. 3,380,925.* A detergent preparation is described, containing as wash active component at least one of (a) a synthetic organic wash active sulfate compound and (b) a synthetic organic wash active sulfonate compound, together with a nonionic surface active polyglycol ether adduct of alkylene oxide and higher molecular weight aliphatic 1,2-glycol having 8–26 C atoms in the molecule and 0.1–0.7 alkylene glycol ether radicals for each C atom in the glycol radical. The wetting, washing, cleaning and rinsing capacity of synthetic detergents of the type mentioned is increased by inclusion of these polyglycol ether adducts.

Detergent compositions of soap and a urea-olefin-sulfuric acid condensation product. J. D. Zech (Atlas Chemical Industries, Inc.). *U.S. 3,384,591.* Detergent compositions are claimed, comprising soap and a water-soluble salt of a urea-olefin-sulfuric acid condensate (see U.S. 3,384,593). The detergent compositions may also contain an inorganic detergency builder.

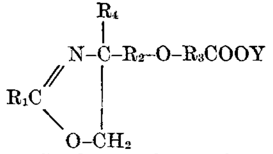
Detergent compositions containing a urea-olefin-sulfuric acid condensation product. J. D. Zech (Atlas Chemical Industries, Inc.). *U.S. 3,384,593.* Detergent compositions are described in which one of the surface active agents is a water-soluble salt of a urea-olefin-sulfuric acid condensate. The olefin is either butadiene or a blend of butadiene with a small amount of cyclopentadiene, unhindered tertiary monoolefin or 2-alkyl-1,3-butadiene. The condensate may be prepared by adding the olefin to a suspension of urea and sulfuric acid in an inert solvent at a temperature from −10C to 70C. The detergent compositions may also contain inorganic detergent builders.

Detergent compositions containing builders and a urea-olefin-sulfuric acid condensation product. T. J. Galvin and F. A. Hughes (Atlas Chemical Industries, Inc.). *U.S. 3,384,594.* Detergent compositions are claimed, comprising an inorganic detergency builder and a water-soluble salt of a urea-olefin-sulfuric acid condensate (U.S. 3,384,593).

Detergent compositions containing gamma-hydroxy organic sulfonate type compounds. G. L. Broussalian (Monsanto Co.). *U.S. 3,384,595.* Detergent compositions are described which contain, in addition to conventional detergent ingredients, about 5 to 50% by wt. of a gamma-hydroxy sulfonate type compound. This organic compound acts as a supplemental detergent active material and results in the production of large quantities of foam or lather which is extremely stable in the presence of greases.

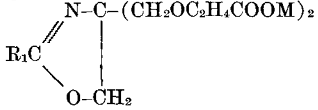
Method of removing alkyl aryl sulfonates and phosphates from waste water. W. W. Eckenfelder, Jr. and E. L. Barnhart (McGraw-Edison Co.). *U.S. 3,389,081.* A method of removing alkylaryl sulfonates and phosphates from waste water is described, which comprises complexing the sulfonates with a quaternary ammonium compound to form a disperse precipitate and complexing the phosphates with a calcium salt, forming an insoluble phosphate, which then flocs the disperse precipitate out of the water.

Fatty oxazoline surfactants and a process for their preparation. J. Katz. *U.S. 3,389,145.* A fatty oxazoline surfactant is claimed, having the formula



$$\mathrm{R_1C{=}N{-}C(R_4)(R_2{-}O{-}R_3COOY){-}CH_2{-}O}$$

in which R_1 is a C_{11}–C_{18} alkyl or alkenyl, R_2, R_3 and R_4 are C_1–C_6 alkyl groups and Y is selected from the group consisting of hydrogen, alkali metal, di-butyl amine, tripropylamine, monoethanolamine and morpholine. Also, another surfactant having the formula



$$\mathrm{R_1C{=}N{-}C(CH_2OC_2H_4COOM)_2{-}CH_2{-}O}$$

where R_1 is a C_{11}–C_{18} alkyl or alkenyl and M is selected from the group consisting of hydrogen, alkali metal and low molecular weight amines. The process of making these surfactants by reacting selected amino compounds with C_7–C_{21} fatty acids is also described.

Amine oxide blends. R. R. Fields and E. Tobler (Union Carbide Corp.). *U.S. 3,389,178.* Blends of random higher-alkyl di(lower-alkyl)amine oxides are described. These blends are useful in detergent formulations.

Dishwashing detergent preparations containing sodium or potassium dichloroisocyanurate. R. R. Keast and D. S. Corliss (FMC Corp.). *U.S. 3,390,092.* Dishwashing tablets and granular preparations are formulated to contain a dichloroisocyanurate, white paraffin oil, a low-foaming nonionic surfactant, sodium silicate, a polyphosphate and a filler.

Detergent compositions containing hydrated alkali metal tripolyphosphates. H. E. Feierstein, C. Y. Shen and R. R. Versen (Monsanto Co.). *U.S. 3,390,093.* A detergent making process comprises the steps of forming an aqueous slurry containing (a) at least about 8% by wt. of a water soluble alkali trimetaphosphate, (b) an amount, sufficient to convert a major proportion of the trimetaphosphate to a tripolyphosphate, of a base of a strength such that a 1% solution in water at 25C provides a pH of at least 10.2, (c) an amount of water exceeding by at least 5% that required to hydrate the tripolyphosphate and comprised between the values of 10% and 50% by wt. of the slurry; interspersing water vapor or other non-reactive gas into the slurry to form a foam at temperature of 50 to 135C and maintaining the temperature of the foam within the range of 50 to 135C while removing sufficient water from it to form a porous solid product containing a substantial proportion of hydrated tripolyphosphate.

Detergent compositions containing sulfonio sulfonates. F. L. Diehl, H. F. Drew and A. O. Snoddy (Procter & Gamble Co.). *U.S. 3,390,094.* Detergent compositions containing sulfonio sulfonates having a long chain alkyl and an alkaline builder salt are described as having superior cool water laundering effectiveness.

Detergent composition containing phosphonio sulfonates. F. L. Diehl (Procter & Gamble Co.). *U.S. 3,390,095.* Detergent compositions containing phosphonio sulfonates having a long chain alkyl and an alkaline builder salt are described as having superior cool water laundering effectiveness.

Combination of wash-active substances in liquid or paste form. W. Stein, O. Koch and H. Weiss (Henkel & Cie., G.m.b.H.). *U.S. 3,390,096.* A method for improving the viscosity of a wash-active aqueous concentrate having a liquid to pasty consistency and consisting essentially of alkylbenzene sulfonates having 8–18 C atoms in the alkyl moiety is described. The method comprises admixing the concentrate with α-sulfofatty acid salt having 10–14 C atoms in the fatty acid radical, in an amount sufficient to give a content of 2.5–50% of α-sulfofatty acid in the resulting mixture and a total content of wash-active substances of 5–45%, with the remaining 95–55% being water. At least one of the mixture components should be heated to dissolve at least some of the resulting mass in the water present.

Surface active agents. R. R. Irani and K. Moedritzer (Monsanto Co.). *U.S. 3,391,083.* A dishwashing composition is claimed, consisting essentially of 0.5–2.0% available chlorine, in the form of a chlorine-releasing agent, 40–60% of a sodium or potassium orthophosphate, hydroxide, carbonate or sulfate, 10–30% of a corrosion inhibitor such as sodium or potassium ortho- or metasilicate, 1–40% of a sequestering agent such as sodium or potassium tripolyphosphate, pyrophosphate, amino polycarboxylate, gluconate, methylene diphosphonate and 1-hydroxyethylidene diphosphonate, and 1–10% of an unsymmetrical tri-alkyl phosphate ester surfactant of the following formula: $RO{-}PO(OR_1)(OR_2)$ where R is a C_8–C_{20} alkyl group and R_1 and R_2 are C_1–C_5 alkyl groups.

Process for the preparation of detergent alkylate. G. C. Feighner, O. C. Kerfoot, D. W. Marshall and T. E. Howell (Continental Oil Co.). *U.S. 3,391,210.* An n-alkylbenzene detergent alkylate composition having a desirably high content of internally substituted phenyl alkanes is produced by alkylating benzene with a partially chlorinated detergent-range n-paraffin in the presence of a recycle stream recovered as a fraction from a previous alkylation run and rich in the external phenyl alkane isomers of the highest molecular weight alkyl benzenes present in the run from which it was obtained.

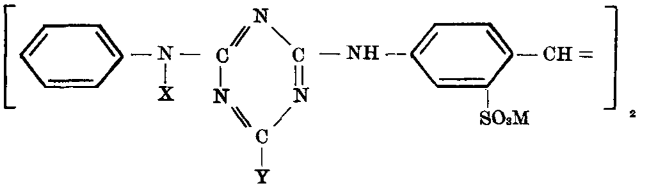
High purity sodium tripolyphosphate. C. Y. Shen (Mitsubishi Petrochemical Co.). *U.S. 3,391,990.* A process for purifying an impure sodium tripolyphosphate containing inorganic iron, aluminum or iron and aluminum complex salts comprises (a) initially contacting the impure material with an aqueous solvent containing at least one mole of water per mole of tripolyphosphate in excess of the amount required to completely hydrate the tripolyphosphate, but less than the amount of water required to dissolve it and (b) separating the purified sodium tripolyphosphate from the aqueous liquid containing dissolved at least part of the inorganic heavy metal salt impurity.

Production of sodium tripolyphosphate. J. F. Herink and H. J. Comer (FMC Corp.). *U.S. 3,391,991.* A process for producing sodium tripolyphosphate comprises reacting a phosphoric acid with an aqueous slurry of sodium sesquicarbonate to form a sodium phosphate solution having a molar ratio of Na:P of about 5:3 and a specific gravity of 1.5–1.65, then heating the solution in a heating zone to at least 250C, removing free water and converting the residual sodium phosphate to sodium tripolyphosphate.

Dry detergent mixtures. E. H. Krusius and R. R. Keast (FMC Corp.). *U.S. 3,392,120.* The bulk density of dry mixtures of alkali metal phosphates and anionic and nonionic synthetic detergents is reduced by agitating the mixtures with a water-dispersible copolymer of acrylic acid and polyallyl sucrose. The bulk densities of the mixtures following the treatment approximate those of products prepared by spray-drying techniques.

Built detergent compositions. B. H. Gedge III (Procter & Gamble Co.). *U.S. 3,392,121.* A builder mixture composition is claimed, consisting essentially of (a) the trisodium salt of ethane-1-hydroxy-1,1-diphosphonic acid and (b) a builder selected from the group consisting of sodium tripolyphosphate and sodium pyrophosphate, the trisodium salt of nitrilotriacetic acid, and mixtures thereof. The molar proportions of the components of this builder mixture are indicated by an area in a triangular diagram provided. The compositions have a pH in water solution ranging from about 9 to about 12.

Washing agents containing optical brightening agents. K. Obayashi, K. Ishihara, Y. Minagawa and T. Noda (Sumitomo Chemical Co., Ltd.). *U.S. 3,392,122.* A composition is claimed, consisting essentially of a member selected from the group consisting of soap, dodecyl benzene sulfonate, a higher alcohol sulfate, or mixtures thereof, and about 0.01 to 1% by wt. of a brightening agent, 4,4′-bis-triazinylstilbene-2,2′-disulfonic acid derivative having the formula

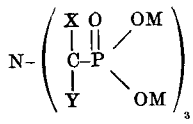


where M represents hydrogen or alkali metal, X is a methyl or ethyl radical and Y represents amino, cyclohexylamino, primary or secondary alkylamino having 1–4 C atoms or primary or secondary hydroxyalklamino. The X and Y groups may be different in the two halves of the symmetrical molecule.

Process of sulfating alkoxylated derivates of aliphatic alcohols and phenols. J. M. Walts and L. M. Schenck (General Aniline & Film Corp.). *U.S. 3,392,185.* Ammonium salts of sulfuric acid esters of alkoxylated derivatives of aliphatic alcohols and phenols, which are surface active agents having good detergency, are prepared by complexing one mole of urea in two moles of a compound having the formula: $R{-}O{-}(CH_2C(R_1HO)_nH$, where R is either a C_8–C_{18} alkyl or a phenyl which may be unsubstituted or substituted by 1 to 2 C_4–C_{18} alkyl groups, R_1 is hydrogen or methyl and n is an integer from 1 to 10. The reaction is carried out at 15–25C. To the resulting solution containing the complex is added one mole of sulfur trioxide and subsequently one mole of sulfuric acid, and the mixture is heated to 35–125C for a period of time until the evolution of carbon dioxide ceases.

Laundry method. A. F. Martz, Jr. (Whirlpool Corp.). *U.S. 3,393,970.* A method of washing and rinsing clothes in an automatic washing machine is described, characterized by the fact that the electrical conductivity of the supply water, the washing water and the rinsing water are sensed to control automatically the operation of the washing machine.

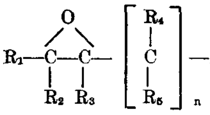
Effervescent builder compositions and detergent compositions containing the same. C. Y. Shen (Monsanto Co.). *U.S. 3,394,083.* A detergent composition is described, consisting essentially of an anionic, nonionic or amphoteric active detergent compound and of an effervescent builder component consisting of a stable admixture of an alkali metal or ammonium carbonate with an amino tri(lower alkylidene phosphonic acid) compound having the formula



$$N-\left(\overset{X}{\underset{Y}{\overset{|}{\underset{|}{C}}}}-\overset{O}{\overset{\|}{P}}\begin{matrix}OM\\ \\ OM\end{matrix}\right)_3$$

where X and Y are either hydrogen or C_1–C_4 alkyl and M is selected from the group consisting of hydrogen, alkali metal ions, ammonium ion and amine ions of amines having molecular weight below 200, with at least four of the members being hydrogen. The ratio of active to builder may be in the range of 4:1 to 1:4 and the ratio of carbonate to phosphonic compound may be in the range of 1:10 to 10:1.

Proteinaceous surface-active agents prepared by reacting a protein with the reaction product of a fatty ester or ether with a halogenated epoxy. S. B. Luce and H. H. Young (Swift & Co.). *U.S. 3,394,119.* A method for producing proteinaceous surface-active agents is described, which comprises: reacting (a) the reaction product of a fatty material and a halogenated epoxy compound, the fatty material being either a fatty acid or a fatty alcohol containing 8 to 22 C atoms, and the halogenated epoxy compound having the formula



where X is a halogen, R_1, R_2, R_3, R_4 and R_5 are either hydrogen or a C_1–C_{10} alkyl radical and n is an integer from 1 to 10; with (b) an alkaline aqueous solution of hydrolyzed proteinaceous material having a molecular weight of about 500 to 5,000.

Preparation of surface-active agents. A. Cahn and H. Lemaire (Lever Bros. Co.). *U.S. 3,394,155.* A method is disclosed for preparing esters of predominantly coco fatty acid and a hydroxy sulfonate by direct esterification which minimizes the residues of unreacted C_8–C_{12} fatty acids. This is achieved by adding the fatty acid reactant in two steps. In the first step typical coco fatty acids, containing substantial quantities of C_8–C_{12} acids, are added in an amount sufficient to provide the desired yield of coco esters but insufficient to consume completely the hydroxy sulfonate. In the second step sufficient additional fatty acid is added to provide a high conversion of the hydroxy sulfonate, the additional fatty acid, however, containing substantially lower proportions of the C_8–C_{12} fatty acids.

Process for the preparation of amides. V. Lamberti (Lever Bros. Co.). *U.S. 3,395,162.* A method for the production of fatty acid dihydroxyalkyl amides comprises reacting a C_8–C_{18} fatty acid ester of glycerol with a secondary dihydroxy lower alkyl amine at temperatures of 65–100C in the presence of 0.02 to 0.2 moles of an alkali metal hydroxide catalyst, in addition to the amount required to neutralize any free fatty acid present in the glycerol ester. The total molar proportion of amine to ester group should be at least 1.1:1.0, the reaction conditions being maintained so that at all times there exists in the reaction medium an excess of amine relative to the fatty acid glycerol ester.

Extreme pressure soap and complex thickened greases. G. P. Caruso (Shell Oil Co.). *U.S. 3,396,108.* A soap base grease composition having improved extreme pressure properties consists essentially of (1) a lubricating base oil thickened to grease consistency with (2) a thickening amount of metal-containing soap, and (3) a mixture containing 0.5–10.0% by wt., basis total composition, each of (a) an oil-soluble sulfonate having the formula $(RSO_3)_n(A)$ where A is selected from the group consisting of alkali metal, alkaline earth metal, ammonium and omega-amino-C_{2-6}-alkylammonium, n equals the valence of A and R is a radical selected from the group consisting of alkyl, aryl, alkaryl and aralkyl containing at least 6 C atoms, and (b) a metal sulfide selected from the group consisting of an amorphous antimony sulfide and molybdenum disulfide. The composition is further characterized as containing no naphthenate compounds.

• Drying Oils and Paints

Vacuum dehydration of castor oil by ion-exchange resins, and its subsequent bodying. N. A. Ghanem. *Paint Tech.* 32, No. 1, 10–1 (1968). Castor oil is dehydroxylated by heating at 250C under reduced pressure with a sulphonated polystyrene (Dowex-50) catalyst (4%). The oil is of low A.V. (<4) and good colour and bodies normally on continued heating. (Rev. Current Lit. Paint Allied Ind. No. 331)

Catalytic air blowing of Malawi tung oil. H. W. Chatfield. *Paint, Oil Col. J.* 153, No. 3615, 224–5 (1968). The tung oil on air blowing at 170C in the presence of ditertiary butyl peroxide catalyst (2%) reaches a viscosity of 100 poise in 5 hr. Mixtures of tung oil and resin, *e.g.*, a pentaerythritol/maleinised rosin ester, may be similarly bodied by blowing in the presence of catalyst, and have been compared with similar products obtained by heat treatment. (Rev. Current Lit. Paint Allied Ind. No. 331)

Adsorption of C^{14}-labelled stearic acid on iron. C. O. Timmons, R. L. Patterson and L. B. Lockhart, Jr. *J. Colloid & Interface Sci.* 26, No. 1, 120–7 (1968).

Amino salts of dimerized fatty acids used as auxiliaries for lacquers. W. Offermann and H. Linden (Dehydag Deutsche Hydrierwerke G.m.b.H.). *U.S. 3,386,845.* A novel use is claimed for amine salts of dimerized fatty acids as agents of multiple effectiveness for influencing the characteristics of pigments in organic media. These materials have an extraordinary effect as sedimentation preventing agents, as auxiliary grinding agents as well as serving to prevent the pigments from "floating out."

Polymer fractionation. I—The preparative problem. II.—The analytical problem. R. Koningsveld and A. J. Staverman. *J. Polymer Sci. A-2* 6, No. 2, 237–406 (1968). The mol. wt. distributions of the fractions in the two liquid phases which, in preparative fractionation, form upon a change in temp., have been calculated for various initial concentrations and model distributions differing widely in shape and width. It was found that the normally recommended conditions do not always lead to the result desired, *i.e.*, to a fraction with a narrow distribution. Complete fractionations into 5, 10 and 20 fractions were calculated by a numerical method based on the Flory-Huggins theory in order to evaluate various procedures for determining the mol. wt. distribution from fractionation data. If the initial distributions are wide, the differential distribution cannot be accurately reconstructed, not even if each fraction is characterised by two average mol. wts. (instead of one, as is customary). Polymer fractionation does not appear to be a suitable procedure for accurate determination of the differential distribution. From the assembled material, a thermodynamic method has been derived which seems to hold out better prospects. It should enable the differential distribution to be directly determined from a detailed analysis of the liquid-liquid phase relationships, provided that the free energy of mixing function of the system is known. (Rev. Current Lit. Paint Allied Ind. No. 314.)

Modified rosin oils and their use in paper. W. D. McDavid (Tenneco Chemicals, Inc.). *U.S. 3,390,046.* Rosin oil having an acid value of 70 to 130 is reacted with an aliphatic α,β-unsaturated acid having 1 to 3 carboxylic groups, such as maleic anhydride or fumaric acid, to form a modified rosin oil that has an acid value of 150 to 290. Alkali metal soaps of the modified rosin oils can be used alone or in combination with rosin soaps in the sizing of paper.

Ester polyol-carboxylic acid adducts and water-based paint compositions therefrom. K. L. Hoy and P. C. Payne (Union Carbide Corp.). *U.S. 3,392,129.* Ester polyol-carboxylic acid adducts having pendant carboxyl groups are prepared by the adduction of α,β-ethylenically unsaturated polycarboxylic acids or anhydrides to an ethylenically unsaturated polyester. These adducts, after being rendered water compatible by the reaction of the pendant carboxyl groups with a water-soluble cation, can be used to manufacture water-based coating compositions.

Conjugation of vegetable oils via iron tricarbonyl complex and decomposition thereof by carbon monoxide. E. N. Frankel (U.S. Sec'y of Agric.). *U.S. 3,392,177.* This invention involves the pressurized carbon monoxide decomposition of iron tricarbonyl complexes of polyunsaturated vegetable oils formed during the isomerization of such oils with iron pentacarbonyl catalyst at 185C.

Polyamide resin compositions of ethylenediamine and fractionated polymeric fat acids. D. E. Floyd, R. J. Ess and L. R. Vertnik (General Mills, Inc.). *U.S. 3,396,180.* An improvement is claimed in an ethylene-diamine polyamide or polymeric fat acids prepared by reacting diamine and polymeric fat acids in the 150–300C range, and employing essentially one molar equivalent of amine per molar equivalent of carboxyl group, the polymeric fat acids being polymerized monocarboxylic C_8–C_{24} aliphatic acids. The improvement consists in employing a polymeric fat acid having a substantial dimeric fat acid content and a specific ratio of trimeric to monomeric fat acids as defined in an attached graph.

Superbodied oils. C. E. Penoyer (Sherwin-Williams Co.). *U.S. 3,396,181.* An improved process is described for superbodying unsaturated fatty oils to produce a product which is free from gelled particles and false body and having a viscosity in the range of 20 to 75 minutes, Gardner-Holdt. The process is characterized by first thermally bodying the oil by causing it to polymerize under the influence of heat, and finally subjecting the oil in bulk form to oxidative polymerization.