ABSTRACTS

R.A. REINERS, Editor. ABSTRACTORS: N.E. Bednarcyk, J.E. Covey, J.C. Harris, Yoshio Hirano, S. Kawamura, D.A. Leo, F.A. Kummerow, E.G. Perkins, and R.W. Walker

• Fats and Oils

THE STRUCTURE OF AN ORNITHINE-CONTAINING LIPID FROM THIOBACILLUS THIOOXIDANS. H.W. Knoche and J.M. Shively (Dept. of Biochem. and Nutr., Univ. of Nebraska, Lincoln, Neb. 68503). *J. Biol. Chem.* 247, 170–8 (1972). The structure of an ornithine-containing lipid from *Thiobacillus thiooxidans* has been elucidated. Methanolysis of the lipid released methyl cis-11,12-methylene-2-hydroxyoctadecanoate. Acid hydrolysis of the residue yielded ornithine and a mixture of fatty acids, the major components of which were 3-hydroxyhexadecanoic and 2-hexadecenoic acids. Identification of the 3-hydroxy fatty acid was based on the thin-layer chromatographic mobilities of the acid, its methyl ester, the methyl ether and acetate derivatives of its methyl ester, the equivalent chain lengths of the derivatives of the acid and the acid obtained by oxidation of the natural acid with permanganate and mass spectral studies. Similar techniques were used for the identification of 2-hexadecenoic acid. The minor fatty acids and the 2-hexadecenoic acid were found to be degradation products of the 3-hydroxy acid. Data obtained in this investigation indicated that the δ-amino group and the carboxyl group of ornithine were free and that the extracted lipid existed as a zwitterion. Elemental analysis and unit weight determinations were consistent with the proposed structure.

PHYSICOCHEMICAL ANALYSES OF BOVINE MILK FAT GLOBULE MEMBRANE. I. DIFFERENTIAL THERMAL ANALYSIS. R.C. Chandan, J. Cullen, B.D. Ladbrooke and D. Chapman (Unilever Res. Lab., Colworth-Welwyn, The Frythe, Welwyn, Herts, G.B.). *J. Dairy Sci.* 54, 1744–51 (1971). Freeze-dried milk fat globule membrane contained 63% by weight lipids of which 68% were triglycerides and 14% phospholipids. Diglycerides, monoglycerides, cholesterol, cholesteryl esters, free fatty acids and pigments were also present. Differential thermal analysis of the membrane preparation and of various fractions isolated therefrom, revealed pronounced thermal transitions from melting of the triglyceride components. Thermal characteristics of the isolated phospholipids were also examined, but transitions from these components could not be detected in the intact membrane because of the dominant thermal effects from triglycerides. Fat globule membrane underwent an irreversible endothermic transition near 80C which is of interest in relation to the pasteurization of cream.

II. ELECTRON MICROSCOPY. A.F. Henson, G. Holdsworth, and R.C. Chandan. *Ibid.*, 1752–63. Samples of cream and milk fat globule membrane fractions from bovine milk were examined by electron microscopy with thin sectioning and freeze-etching. Certain components of the fat globule membrane aggregated inside the continuous envelope surrounding the globule. At the site of aggregates the trilaminar electron microscopic image is similar to that of a normal cytoplasmic membrane. However, most of the membrane, contiguous with fat of the globule, exhibited no trilaminar structure. This difference in the structure of the membrane at various points is probably due to a re-arrangement of its components. Freeze-etching provided further evidence of the orientation of a layer of triglyceride crystals adjacent and parallel to the membrane in fat globules.

NUCLEAR MAGNETIC RESONANCE STUDIES OF PHOSPHOLIPID MICELLES. R. Haque, I.J. Tinsley and D. Schmedding (Dept. of Agr. Chem. and Envir. Health Sciences Center, Oregon St. Univ., Corvallis, Ore. 97331). *J. Biol. Chem.* 247, 157–61 (1972). The proton magnetic resonance spectrum of DL-α-lecithin at 100 MHz in $CHCl_3$ solvent is reported. An analysis of the spectrum is made. The chemical shifts of the $N\text{-}(CH_2)_3$ protons and the resonance peak associated with the condensed water molecule showed concentration dependence with the latter showing the more pronounced response. These chemical shift changes are interpreted in terms of micelle formation through intermolecular hydrogen bond formation between lecithin monomers. The chemical shift data are used to calculate the critical micelle concentration of lecithin as well as the number of monomer lecithin units required to form a micelle. The temperature-dependent studies showed a small negative enthalpy change associated with the micelle. The micellar behavior in $CHCl_3$ is compared with those in benzene and carbon tetrachloride.

CONTINUOUS MANUFACTURE OF A LOW-FAT DAIRY SPREAD HAVING A WATER-IN-FAT EMULSION. D.H. Bullock, K.C. Thomas and L.M. McKnight (Dept. of Food Sci., Univ. of Guelph, Guelph, Ontario, Canada). *J. Dairy Sci.* 54, 1801–06 (1971). A 40% fat dairy spread of a water-in-fat emulsion has been made successfully with a continuous laboratory-scale unit. The method included swept-surface chilling and controlled crystallization of butteroil to achieve a consistency similar to butter tempered at 21C. Reconstituted calcium-reduced skimmilk was introduced stepwise into the flow of plasticized fat. This, with recirculation of 44% of the product through the working and emulsifying chambers, resulted in a small amount of serum being introduced into a much larger volume of product at each point of addition. In this way the serum was dispersed in droplets 20 μ or less in diameter.

ANALYSIS OF STEROIDS BY OFF-LINE COMPUTERIZED GAS CHROMATOGRAPHY-MASS SPECTROMETRY. R. Reimendal and J. Sjovall (Dept. of Chem., Karolinska Inst., Stockholm, Sweden). *Anal. Chem.* 44, 21–29 (1972). Procedures are described for handling of data recorded on magnetic tape in gas chromatographic-mass spectrometric analyses of steroids from biological materials. The methods are intended for use in biochemical and clinical studies where large numbers of samples consisting of complex mixtures are analyzed. The aim has been to achieve high capacity and speed in the processing of data. In isothermal analyses, spectra are taken automatically with a continuously increasing interval between scans. Thus, the number of spectra is reduced markedly compared to that obtained by repetitive scanning with constant intervals. Short processing times are achieved by limiting the preliminary evaluation of spectra to 100–120 selected ions, the intensities of which are listed in retention time sequence. Plots of fragment ion current chromatograms, and computer search for appearance of gas chromatographic peaks may also be used in the evaluation. Sensitivity limits in applications of fragment ion current plots to quantitative work are discussed. A computer search for possible molecular ions has been used as an aid in the interpretation of the normalized spectra which are often due to mixtures of compounds.

NEW METHOD FOR PREDICTION OF PARTITION COEFFICIENTS IN

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CALL FOR PAPERS

AOCS 46TH ANNUAL FALL MEETING

The Technical Program Committee has issued a call for papers to be presented at the AOCS Fall Meeting, September 24-28, 1972, in the Chateau Laurier Hotel, Ottawa, Canada. Papers on lipids, fats and oils, and all related areas are welcome.

Submit three copies of a 100-300 word abstract with title, authors and speaker to Neil Tattrie, Division of Biology, National Research Council, 100 Sussex Drive, Ottawa, Ontario, Canada K1A OR6. The deadline for abstracts is May 15, 1972.

• *Abstracts . . .*

(Continued from page 154A)

LIQUID-LIQUID SYSTEMS AND ITS EXPERIMENTAL VERIFICATION FOR STEROIDS BY STATIC AND CHROMATOGRAPHIC MEASUREMENTS. J.F.K. Huber, C.A.M. Meijers and J.A.R.J. Hulsman (Lab. Anal. Chem., Univ. Amsterdam, Netherlands). *Anal. Chem.* **44**, 111–6 (1972). A new method for the prediction of partition coefficients is given in which the partition coefficients are described as a function of *n* parameters characterizing the solute and the liquid-liquid system. A reference set of parameters had been determined by the correlation of a number of experimental partition coefficient data according to the least square method by a computer procedure. For the measurement of partition coefficients, a dynamic method had been elaborated in which standard data obtained by static measurements are used. The correlation method had been tested for 28 steroids in 6 ternary liquid-liquid systems composed by water, ethanol and 2,2,4-trimethyl pentane. For $n = 3$, a precision of about 4% was obtained.

VIBRATIONAL SPECTRA OF LIQUID CRYSTALS. III. RAMAN SPECTRA OF CRYSTAL, CHOLESTERIC AND ISOTROPIC CHOLESTEROL ESTERS, 2800–3100-CM^{-1} REGION. B.J. Bulkin and K. Krishnan (Dept. of Chem., Hunter College of the City Univ. of New York, N.Y., N.Y. 10021). *J. Am. Chem. Soc.* **93**, 5998–6004 (1971). The Raman spectra of a series of cholesteric liquid crystals have been recorded in an attempt to elucidate the nature of intermolecular interactions in these phases. While most Raman bands are unaffected by the crystal-liquid crystal and liquid crystal-isotropic liquid phase transitions, certain C–H stretching bands change both frequency and intensity. These bands are assigned using arguments based on model steroids. It is shown that the results are indicative of regions of local order in the cholesteric phase which are similar to those in the crystal.

SEPARATION OF GEOMETRIC ISOMERS OF UNSATURATED FATTY ACIDS BY CIRCULATION GAS CHROMATOGRAPHY. V.P. Chizhkov et al. *Izv. Akad. Nauk, Ser. Khim.* **1971**, No. 6, 1154–7. A method of recirculation gas chromatography was used for the separation of geometric isomers of the methyl esters of 9-octadecenoic and 9,12-octadecadienoic acids. The effectiveness of the separation is comparable with that of the capillary column. (World Surface Coatings Abs. No. 354)

SOLUBILITY OF STEARIC ACID IN SOME HALOFLUOROCARBONS, CHLOROCARBONS, ETHANOL AND THEIR AZEOTROPES. D.A. Brandreth and R.E. Johnson. *J. Chem. Eng. Data* **16**, No. 3, 325–7 (1971). The solubility of stearic acid in each of the solvents CCl_2FCClF_2, CCl_3CF_3, CH_3CCl_3, CCl_2FCCl_2F, CF_2Br-CF_2Br, CCl_4, CH_2Cl_2, CH_3CH_2OH, and the azeotropes of CCl_2FCClF_2 with CH_3CH_2OH, CH_2Cl_2, $CHCl_3$, $(CH_3)_2CO$, and $(CH_3)_2CHOH$ was determined as a function of temp. in the range of 20–50C by the phase disappearance method. (World Surface Coatings Abs. No. 354)

INDUSTRIAL OILS, FATS AND WAXES. S.D. Manton, *Soap, Perfumery Cosmet.* **44**(11), 705–14 (1971). Oils, fats and waxes as used in the cosmetic, detergent and allied industries are reviewed. Individual oils, fats or waxes are reviewed by source, characteristics, physical and chemical data and application. Included is an extensive table of the fatty acid composition of animal fats and oils and another covering the principal vegetable fats and oils.

PROCESS FOR MAKING AERATED SHORTENINGS. E.J. Reid and P.W. Morgan, Jr. (Hunt-Wesson Foods). *U.S. 3,637,402.* A shortening containing 20–26% gas by volume is processed in conventional chilling and agitating units. The liquid fat and gas mixture is initially pressurized to a relatively high pressure to place the gas in solution. The pressure is then reduced to about half to release part of the gas in solution and to disperse gas prior to chilling and agitating. Processing can thus be carried out at lower pressure.

• Fatty Acid Derivatives

X-RAY STRUCTURE OF RACEMIC GLYCEROL 1,2-(DI-11-BROMOUNDECANOATE)-3-(P-TOLUENESULFONATE). P.H. Watts, Jr., W.A. Pangborn and A. Hybl (Dept. of Biophys., Univ. of Maryland School of Med., Baltimore, Md. 21201). *Science* **175**, 60–61 (1972). The single crystal x-ray structure of racemic glycerol 1,2-(di-11-bromoundecanoate)-3-p-toluenesulfonate, a sulfolipid analogous to the membrane phospholipids, reveals a folded conformation.

POLYURETHANES PREPARED FROM GLYCERIDE REACTION PRODUCTS. P. Wolff and H.-O. Larsen. *U.S. 3,637,539.* The polyurethanes are the reaction product of a polyisocyanate and a polyol component, of which a substantial part is a reaction mixture of hydrocarbon fatty acid glyceride with dialkanolamine. At least half of the fatty acid has been converted into alkanolamide.

POLYURETHANES FROM FATTY ACIDS. P. Wolff and H.-O. Larsen. *U.S. 3,637,540.* The process is similar to the one disclosed in *U.S. 3,637,539* except that a free fatty acid or lower alkyl ester of the fatty acid is used in place of the glyceride. The polyol component contains at least 25% of monomeric fatty acid radicals.

PROCESS FOR THE MANUFACTURE OF UNSATURATED ESTERS OF CARBOXYLIC ACIDS. K. Sennewald, W. Vogt, H. Erpenbach, H. Glaser and H. Dyrschka (Knapsack Aktiengesellschaft). *U.S. 3,637,819.* The esters are produced by reaction of an olefinic compound and an aliphatic or aromatic carboxylic acid, each containing 2–20 carbon atoms, with molecular oxygen or air in the gas phase at elevated temperature. The reaction is carried out in contact with a carrier catalyst containing palladium acetate, alkali metal acetate, and one or more vanadium compounds as its active constituents. The dry, powdery carrier catalyst is irradiated with ultraviolet or visible light prior to use.

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Northern California Section Announces May Meeting

The Northern California Section of the AOCS will hold a dinner meeting at H'S LORDSHIP RESTAURANT, Berkeley Marina, Berkeley, California, May 19, 1972. "Quality Control and Quality Assurance" will be the topic of the evening. Alan McGregor, Quality Control Manager of Brookside Division Safeway Stores, Incorporated, will head a discussion group.

• *Abstracts . . . .*

(Continued from page 156A)

PREPARATION OF CARBOXYLIC ACIDS AND ESTERS FROM LIPID EXTRACTS. A.D. Forbes (British Petroleum Co.). *U.S. 3,642,844.* Fatty acids can be prepared from the lipid extracts obtained by the solvent extraction of the yeast grown on a hydrocarbon substrate by separating the esters of the fatty acids contaminated with hydrocarbon from the rest of the lipid extract. The esters are then saponified, the hydrocarbons extracted, and the saponified esters neutralized.

• Biochemistry and Nutrition

STUDIES OF THE METABOLISM OF 5α-CHOLESTA-8,14-DIEN-3β-OL AND 5α-CHOLESTA-7,14-DIEN-3β-OL IN RAT LIVER HOMOGENATE PREPARATIONS. B.N. Lutsky, J.A. Martin and G.J. Schroepfer, Jr. (Dept. Biochem., School Chem. Sci., Univ. of Illinois, Urbana, Ill. 61801). *J. Biol. Chem.* 246, 6737–44 (1971). (3α-^{3}H)Cholesta-7,14-dien-3β-ol has been prepared by chemical synthesis and incubated with rat liver homogenate preparations. Under aerobic conditions, the incorporation of label into cholesterol, cholest-7-en-3β-ol and cholest-8(14)-en-3β-ol was shown. Under anaerobic conditions, labeled cholest-8(14)-en-3β-ol and cholest-7-en-3β-ol were formed. A method for the separation of the acetate derivatives of cholesta-8,14-dien-3β-ol, cholesta-7,14-dien-3β-ol and 7-dehydrocholesterol has been described. Employing this method, the convertibility of labeled cholesta-8,14-dien-3β-ol to cholesta-7,14-dien-3β-ol upon incubation with washed rat liver microsomes has been investigated. Significant conversion of the $\Delta^{8,14}$-sterol was not observed.

LIPID MOBILIZATION AND FOOD INTAKE IN EXPERIMENTALLY OBESE MICE BEARING TRANSPLANTED TUMORS. R.A. Liebelt, A.G. Liebelt and H.M. Johnston (Dept. of Anatomy, Baylor College of Med., Houston, Tx. 77025). *Proc. Soc. Exp. Biol. Med.* 138, 482–91 (1971). A transplanted stomach tumor (CBA 2663) caused a striking decrease in total body lipid content and suppression of food intake while growing in GTG-obese and genetically "yellow obese" mice. Nonobese mice bearing the same tumor showed a comparable percentage of lipid depletion, but food intake decreased only as the host became moribund. The rate of lipid depletion was greater in the GTG-obese compared to nonobese hosts on a per gram tumor weight basis. Lipid depletion proceeded at a faster rate in GTG-obese (CBA X C57Bl)F1 hybrids bearing the CBA tumor compared to a sarcoma (C57Bl14) both having the same growth rate. Food intake was also rapidly depressed in the F1 hybrids bearing the CBA tumor, but not in those with the C57Bl sarcoma. It is suggested that the CBA tumor has some unique biological characteristics, which facilitates mobilization of body lipid stores which in turn influences food intake.

SPECIFICITIES OF PROSTAGLANDINS B_1, $F_{1\alpha}$, AND $F_{2\alpha}$ ANTIGEN-ANTIBODY REACTIONS. L. Levine, R.M. Gutierrez Cernosek and Helen Van Vunakis (Grad. Dept. of Biochem., Brandeis Univ., Waltham, Mass. 02154). *J. Biol. Chem.* 246, 6782–85 (1971). Antibodies to prostaglandins B_1, $F_{1\alpha}$ and $F_{2\alpha}$ recognize structural changes on the cyclopentane ring and, in part, the degree of saturation of the C_5–C_6 bond. Structural modifications in these two parts of the molecule are also known to be responsible for the varying physiological functions of the prostaglandins. The antiprostaglandins $F_{1\alpha}$ and $F_{2\alpha}$ distinguish the homologous prostaglandins from prostaglandins $F_{1\beta}$ and

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1971 Methods

Several errors have been noted in the 1971 Revisions to *AOCS Methods.* The following information is correct:

AOCS Method Ca-5a-40: in the table, 1.0 *N* alkali should be used when the FFA range is 50 to 100%.

AOCS Method Ca-6b-53: B-6. Aqueous sodium hydroxide solution; 0.2 *N*.

AOCS Method Ca-6a-40: B-5. Phenolphthalein indicator soln., 1.0% in 95% alcohol.

• *Abstracts . . .*

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$F_{2\beta}$ in which the hydroxyl group on C_{11} is trans to the hydroxyl group on C_9. The position of the double bond in the cyclopentane ring is also recognized by antibodies, suggesting that prostaglandins E and A in biological fluids may be estimated in terms of generated prostaglandin B by assay before and after base-catalyzed conversion of prostaglandin E, or prostaglandin A to prostaglandin B, or both.

THE EFFECT OF NORADRENALINE ON GLYCERIDE SYNTHESIS AND OXIDATIVE METABOLISM IN VITRO IN THE BROWN FAT OF NEWBORN RABBITS. B.L. Knight and N.B. Myant (Med. Res. Council Lipid Metabolism Unit, Hammersmith Hosp., London W120HS, U.K.). *Biochem. J.* 125, 1–8 (1971). The effect of noradrenaline on the synthesis of glyceride from glucose-U-^{14}C and on gas exchange in the brown fat of newborn rabbits in vitro was investigated. The specific radioactivity of L-glycerol 3-phosphate was lower than that of lactate, presumably because glycerol derived from glyceride was rephosphorylated by glycerokinase. In the basal state more than 25% of the total respiration was due to pyruvate oxidation. The extra ADP released by noradrenaline stimulation of glyceride synthesis could not have supported more than 2% of the observed increase in substrate oxidation if mitochondria from brown fat cells remain fully coupled in the stimulated state, but could have supported about one-third of the observed increase if they become uncoupled in the presence of noradrenaline.

ON THE METABOLISM OF PROSTAGLANDINS E_1 AND E_2 IN MAN. M. Hamberg and B. Samuelsson (Dept. of Med. Chem., Royal Veterinary College, Stockholm, Sweden). *J. Biol. Chem.* 246, 6713–21 (1971). 7α-Hydroxy-5,11-diketotetranorprosta-1,16-dioic acid was identified as the major urinary metabolite after intravenous administration of tritium-labeled prostaglandin E_2, prostaglandin E_1, 11α-hydroxy-9,15-diketoprosta-5,13-dienoic acid, 11α-hydroxy-9,15-diketoprosta-5-enoic acid and 11α-hydroxy-9,15-diketoprostanoic acid to male and female subjects. Injected prostaglandin E_2 was rapidly converted initially into 11α-hydroxy-9,15-diketoprosta-5-enoic acid. Kinetic parameters for these two compounds are given. A method for quantitative determination of the major urinary metabolite was developed. In three subjects, 7, 16, and 27 μg/24 hours were excreted.

GLYCOLIPID SYNTHESIS IN THE EARLY PREREPLICATIVE PHASE OF ISOPROTERENOL-STIMULATED SALIVARY GLANDS OF MICE. N. Galanti and R. Baserga (Dept. Pathol. and Fels Res. Inst., Temple Univ. Health Sci. Center, Philadelphia, Penn. 19140). *J. Biol. Chem.* 246, 6814–21 (1971). The synthesis of glycolipids, glycoproteins and phospholipids was investigated in the isoproterenol-stimulated salivary glands of mice. The synthesis of a glycolipid present in the lower phase of the chloroform-methanol extract of salivary glands increases as early as 1 hour after stimulation with isoproterenol, reaching a peak at 2 hours and returning to control levels by 24 hours. The increased synthesis of this glycolipid, which shows characteristics suggesting that it may be a glycerol glycolipid, is related to the synthesis of DNA that occurs 20 hours later. No quantitative changes were found in the rate of synthesis of glycoproteins or phospholipids after isoproterenol stimulation that could be related to the subsequent DNA synthesis.

UNMASKING OF INSULIN RECEPTORS IN FAT CELLS AND FAT CELL MEMBRANES. P. Cuatrecasas (Dept. of Med., Johns Hopkins Univ. School of Med., Baltimore, Md. 21205). *J. Biol. Chem.* 246, 6532–42 (1971). Digestion of isolated fat cells, fat cell membranes and liver cell membranes with phospholipase C and phospholipase A from various sources leads to a 3- to 6-fold increase in the specific binding of ^{125}I-insulin to receptors in these structures. Calcium is required for digestion with phospholipase A; digestion with phospholipase D is without effect. In contrast to the studies with insulin, the specific binding of glucagon to its receptor in fat cells or fat cell membranes is diminished or destroyed after digestion with phospholipase C. The present studies indicate that displacement of phospholipids from liver and fat cell membranes can result in the unmasking of substantial quantities of insulin receptor which is probably identical with that normally exposed to the solvent in these cells.

NOTICE

An annual Directory of Environmental Consultants will be published beginning in 1972. Environmentally concerned professionals interested in having their name and short resume appear in the Directory should send a No. 10, self-addressed, stamped envelope to: Directory of Environmental Consultants, P.O. Box 8002, University Station, St. Louis, Missouri 73108.

EFFECT OF HIGH TEMPERATURE AND DIETARY FAT ON MILK FATTY ACIDS. E.G. Moody (Div. Agr., Arizona State Univ., Tempe, Arizona 85281), P.J. Van Soest, R.E. McDowell and G.L. Ford. *J. Dairy Sci.* 54, 1457–60 (1971). Two Latin squares balanced for carry-on effects were used to study milk fat composition of 12 cows fed high fat under two environmental temperatures: cool (15 to 24C) and a constant hot (32.2C with 60% relative humidity). Cows were fed alfalfa-grass hay daily at 1.25% their body weight and one of three concentrates: control (without added lipids), oil (10% soybean oil) or fat (10% hydrogenated vegetable fat, iodine value 48) replacing corn by weight. Exposure to constant hot conditions caused a significant decline in milk and fat production, body weight and rumen fermentation. Characteristics of the milk fat were altered by 32.2C temperature. Reductions were found in the concentrations of myristic, myristoleic, pentadecenoic, palmitoleic, oleic and linoleic acids. Quantitatively oleic was the most important, declining from more than 35% when the cows were cool to less than 33% when thermally stressed. Corresponding increases in palmitic and stearic acid concentrations were noted. Dietary soybean oil increased the proportion of linoleic acid in the milk, the hydrogenated fat depressed it.

BIOLOGICAL ACTIVITY OF 1,25-DIHYDROXYCHOLECALCIFEROL. J. Omdahl, M. Holick, T. Suda, Y. Tanaka and H.F. DeLuca (Dept. Biochem., College of Agr. Life Sci., Univ. Wisc., Madison, Wisc. 53706). *Biochemistry* 10, 2935–40 (1971). A biologically active vitamin D_3 metabolite (1,25-dihydroxycholecalciferol) was generated in deficient chicks and isolated using Sephadex LH-20 chromatography. The use of silicic acid chromatography for the isolation of 1,25-dihydroxycholecalciferol from chicks dosed with high levels of vitamin D (6.5 μmoles) resulted in a heterogeneous metabolite fraction, as revealed by LH-20 chromatography. The concentration of 1,25-dihydroxycholecalciferol in the intestine was found to be constant at 13 pmoles/chick, regardless of vitamin dosage. Use of a sensitive in situ technique revealed that 1,25-dihydroxycholecalciferol (325 pmoles) stimulated intestinal calcium transport more rapidly and to a greater extent than an equivalent dose of 25-hydroxycholecalciferol when assayed for antirachitic activity in the rat. This result was not unexpected since 1,25-dihydroxycholecalciferol has an apparently short half-life in vivo. Serum calcium concentration of rats on a low-calcium, vitamin D deficient diet was also increased by 1,25-dihydroxycholecalciferol (65 pmoles), but to a lesser degree than a similar dose of 25-dihydroxycholecalciferol. Results indicate that the 1,25-dihydroxycholecalciferol is the apparent metabolically active form of the vitamin in catalyzing intestinal calcium transport.

EFFECTS OF AGE AND SEX ON RAT BILE ACID METABOLISM. W.T. Beher, K.K. Casazza and G.J. Lin (Edsel B. Ford Inst. for Med. Res., Henry Ford Hosp., Detroit, Mich. 48202). *Proc. Soc. Exp. Biol. Med.* 138, 645–51 (1971). A study was made of the effects of age (1 through 450 days) and sex on bile acid half-lives, pool sizes and spectra. No significant sex or age differences were found in the cholic or chenodeoxycholic pool half-lives. Chenodeoxycholic acid half-lives were considerably shorter than corresponding cholic acid half-lives in all groups (cholic acid ≅ 3.5 days; chenodeoxycholic acid ≅ 2.0 days). With respect to pool sizes, from 1 through 15 days the pools of females and males were equal in size and contained only cholic acid, possibly because the liver enzyme systems necessary for chenodeoxycholic acid synthesis had not yet developed. From 27 through 450 days, the pools of females contained major concentrations of both cholic and chenodeoxycholic acid. In contrast, the male pools from 46 to 450 days contained only traces of chenodeoxycholic acid, along with cholic acid concentrations about equal to those of female rats. This lack of chenodeoxycholic acid in the male bile acid pool, which could result from the action of androgens or estrogens on the bile acid synthetic pathway, has implications with respect to the relative ability of mature male and female rats to handle body cholesterol. The secondary bile acids (α- and β-muricholic and deoxycholic acids) did not appear in the pools until day 46. From then through 450 days, the concentrations of these acids were similar for the two sexes although there were individual variations. The fact that α- and β-muricholic acids are present in the adult male pool, although chenodeoxycholic acid is absent, suggests the possibility that alternate pathways may exist for the synthesis of the muricholic acids which do not involve chenodeoxycholic acid.

PERTURBATION OF THE INSULIN RECEPTOR OF ISOLATED FAT CELLS WITH PROTEOLYTIC ENZYMES. P. Cuatrecasas (Dept. of Med. and Dept. of Pharm. and Experimental Therapeutics, Johns Hopkins Univ. School of Med., Baltimore, Md. 21205). *J. Biol. Chem.* 246, 6522–31 (1971). Tryptic digestion of fat cells leads to a selective and profound fall in the affinity of the receptor for insulin. This occurs under conditions where the maximal insulin response (glucose oxidation) and the total amount of receptor are unaffected. These effects are easily detected by either measuring glucose oxidation or insulin binding as a function of increasing concentrations of insulin. More drastic tryptic digestion results in additional and qualitatively different effects. Such digestion either destroys more critical regions of the receptor or prevents the normal transmission of signals from the insulin-receptor complex to the glucose transport mechanisms of the cell membrane. Effects similar to those observed with trypsin are obtained by digesting fat cells with α-chymotrypsin.

PURIFICATION AND PROPERTIES OF A LIPASE FROM RAT LIVER MITOCHONDRIA. W.C. Claycomb and Grace S. Kilsheimer (Dept. Pharmacol., Indiana Univ. School of Med., Indianapolis, Indiana 46202). *J. Biol. Chem.* 246, 7139–43 (1971). Rat liver mitochondrial lipase has been purified 77-fold. The procedure involves solubilizing the enzyme by homogenizing mitochondria in Triton X-100 and sonication. Purification is achieved by gel filtration on Sephadex G-50 and G-200. This enzyme has a molecular weight greater than 800,000. Hydrolysis of various triglycerides by this lipase increases as the chain length of the esterified fatty acids decreases. Hydrolysis of unsaturated glycerides is in the order monoglyceride > diglyceride > triglyceride. Hydrolysis of palmitic acid glycerides is in the order monopalmitin > tripalmitin > dipalmitin. With respect to the unsaturation of the esterified fatty acids of glycerides the hydrolysis increases as the degree of unsaturation increases. The pH optimum for this lipase is between 7.5 and 8.0. Triton X-100, calcium chloride, sodium fluoride, diisopropyl fluorophosphate and ammonium chloride inhibit the mitochondrial lipase. The characteristics of the mitochondrial lipase are compared to those of lipases from other sources.

RAT STRAIN DIFFERENCES IN THE UTILIZATION OF GLUCOSE-U-^{14}C AND ACETATE-1-^{14}C FOR FAT SYNTHESIS. M.L.W. Chang, J.A. Lee and N. Simons (Human Nutr. Res. Div., Agr. Res. Service, U.S. Dept. of Agr., Beltsville, Md. 20705). *Proc. Soc. Exp. Biol. Med.* 138, 742–48 (1971). The difference in utilization of glucose and acetate for fat synthesis between rats of the BHE and Wistar strains was studied after the administering of acetate-1-^{14}C or ^{14}C-glucose labeled either uniformly or at the C-1 or C-6 position. Wistar rats were found to show a higher 1-$^{14}CO_2$/6-$^{14}CO_2$ ratio than BHE animals; but the difference was too small to demonstrate a real difference in whole-body utilization of the HMP shunt. The BHE animals incorporated a larger fraction of glucose and acetate label into the liver lipids than did Wistar animals; but incorporation of these labels into total carcass lipid was similar in the two strains at this age. Results indicated that hereditary differences in lipogenesis between these strains occur chiefly in the liver, where BHE animals synthesize fatty acids, glyceride-glycerol, phospholipids and cholesterol at a higher rate than Wistar animals.

ETHANOL STIMULATES TRIGLYCERIDE SYNTHESIS BY THE INTESTINE. E.A. Carter, Gladys D. Drummey and K.J. Isselbacher (Dept. of Medicine, Harvard Med. School, Boston, Mass. 02114). *Science* 174, 1245–7 (1971). In vivo ethanol given acutely or chronically by two dietary means resulted in significant increases in palmitate-1-^{14}C incorporation into triglyceride by intestinal slices or microsomes derived from intestinal slices. In vitro, 2.6% ethanol, an amount comparable to that found in the intestinal lumen of social drinkers, also resulted in significant increases in palmitate-1-^{14}C incorporation into triglyceride. Pyrazole, an inhibitor of alcohol dehydrogenase, diminished the stimulatory effect of ethanol both in vivo and in vitro. These data may provide a new insight into the effects of alcohol, and specifically on the possible contribution of intestinal triglyceride synthesis to alcoholic hyperlipemia and the alcohol-induced fatty liver.

TESTOSTERONE ACTION IN THE RAT VENTRAL PROSTATE. J.E. Belham and G.E. Neal (Marie Curie Memorial Found., Oxted, Surrey, U.K.). *Biochem. J.* 125, 81–91 (1971). Recent reports have indicated that the prior metabolism of testosterone by the secondary sexual tissues may be necessary for its androgenic effect. The effects of two anti-androgens, diethylstilboestrol and cyproterone acetate (17α-acetoxy-6-chloro-1,2α-methylenepregna-4,6-diene-3,20-dione) used in the chemotherapy of human prostatic carcinoma, have been examined on both the metabolism of testosterone and the retention of its metabolites by the rat ventral prostate gland. Cyproterone acetate was found to inhibit the retention of labelled metabolites of (^{3}H)-testosterone by prostatic nuclei, both in vivo and in vitro. This inhibition appeared to be competitive. In contrast with its effects on nuclear retention of metabolites of testosterone, cyproterone acetate had no significant effect on the metabolism of (^{3}H)-testosterone by rat ventral prostate tissue. Diethylstilboestrol similarly had little effect on the metabolism of (^{3}H)-testosterone by prostatic tissue, although it did appear partially to inhibit its initial metabolism in all the incubation systems used. Diethylstilboestrol inhibited the nuclear retention of dihydrotestosterone when both (^{3}H)-testosterone and diethylstilboestrol were injected intraperitoneally in vivo, but had no effect on dihydrotestosterone retention when both testosterone and diethylstilboestrol were supplied directly to the prostate either in vivo or in vitro. It was concluded that if diethylstilboestrol has an anti-androgenic effect at the level of the target organ as distinct from its effect on androgen production by the testes, then it is probably due to a mechanism differing from that of cyproterone acetate.

FURTHER STUDIES ON THE GLYCEROL TEICHOIC ACID OF WALLS OF STAPHYLOCOCCUS LACTIS 13. A.R. Archibald, J. Baddiley, J.E. Heckels and S. Heptinstall (Microbiological Chem. Res. Lab., School of Chem., Univ. Newcastle upon Tyne, Newcastle upon Tyne NE1 7RU, U.K.). *Biochem. J.* 125, 353–59 (1971). The teichoic acid from walls of *Staphylococcus lactis* 13 is readily degraded in dilute alkali. Degradation proceeds by selective hydrolysis of the phosphodiester group attached to an alcoholic hydroxyl group of the N-acetylglucosamine and gives a repeating unit in high yield. Further studies on a different repeating unit isolated by partial acid hydrolysis have shown that the glycerol diphosphate is attached to the 4-hydroxyl group of the N-acetylglucosamine and not to the 3-hydroxyl group as was proposed earlier. The susceptibility towards hydrolysis by alkali of other structural types of teichoic acid has been examined and found to vary markedly according to their structure.

PHYSIOLOGICAL EFFECTS OF FATS IN THE HUMAN DIET. M. Apfelbaum and M. Lavan (Hopital Bichot, Paris). *Rev. Franc. Corps Gras* 18, 587–90 (1971). This review covers fats in the diet from three viewpoints: digestion of fats, obesity and cardiovascular diseases. Various studies on humans and on animals are included. The authors conclude that many of the observed effects are determined in large measure by the enzymatic make-up of each individual.

NUTRITIONAL VALUE AND PHYSIOLOGICAL EFFECTS OF HEATED FATS. B. Potteau and J. Causeret (I.N.R.A., 21-Dijon). *Rev. Franc. Corps Gras* 18, 591–604 (1971). The authors review past work on heated fats. They include low-temperature oxidation, thermal oxidation, thermal polymerization, heating to frying temperatures in the absence of food, regular frying, and thermal treatments during processing. In conclusion, they state that although heated fats can be toxic, as a practical matter, the risk is low. Certain precautions do have to be taken, however, so as to minimize overheating.

Phospholipase A activity of lysosomes of rat myocardial tissue. R. Franson, M. Waite and W. Weglicki (Dept. of Biochem., Bowman Gray School of Med. of Wake Forest Univ., Winston-Salem, N.C. 27103). *Biochemistry* 11, 472–6 (1972). Lysosomes were isolated by isopycnic sucrose gradient centrifugation from myocardial tissue of control rats and rats injected with Triton WR-1339. As measured by the shifts in distribution of acid phosphatase, β-glucuronidase, and one of the phospholipases A, three populations of lysosomes were found which had engorged Triton. A less dense population contained relatively more β-glucuronidase, whereas a denser population contained relatively more acid phosphatase.

Stimulation of hydrogenation of linoleate in Treponema (Borrelia) sp. strain $B_{2}5$ by reduced methyl viologen and by reduced benzyl viologen. M.T. Yokoyama and C.L. Davis (Dept. of Dairy Sci., Univ. of Ill., Urbana, Ill. 61801). *Biochem. J.* 125, 913–15 (1971). A number of studies have been conducted to elucidate the properties and mechanism of the hydrogenation of C_{18} unsaturated fatty acids by rumen micro-organisms. The complete system in which the viologen dyes had been reduced with sodium dithionite (tube 1) showed the greatest effect on the hydrogenation of linoleate to trans-monoenoate by the cell-free extract. Under either H_2 or N_2 atmosphere the reduced viologen dyes resulted in 79 84% of the recovered radioactivity being associated with octadec-trans-11-enoate.

Prevalence of plasma lipoprotein abnormalities in a free-living population of the Central Valley, California. P.D S. Wood, M.P. Stern, A. Silvers, G.M. Reaven and J.V.D. Groeben (Dept. of Med., Stanford Univ. Med. School and the Vet. Adm. Hosp., Palo Alto, Cal.). *Circulation* 45, 114–26 (1972). In an epidemiologic study of 1,118 free-living volunteers, aged 25 to 79 (552 male, 566 female) drawn from eight countries of the Central Valley, California, the following determinations were included: a medical history, blood pressure, resting electrocardiogram, plasma total cholesterol and glycerides (following a light, fat-free breakfast) and (when lipids were considered to be elevated) plasma lipoproteins determined by electrophoresis. A subgroup of the entire study population (494 male, 503 female) free of overt diabetes and electrocardiographic abnormalities, and with diastolic blood pressure not above 100 mm Hg, that was considered to be clinically "normal," forms the basis of this report. Significant sex differences for mean levels of total cholesterol were absent or of small magnitude at all age decades up to and including the seventh. In contrast, glyceride levels for men were significantly higher than for women aged 25–59, and differences were substantial. Beyond the seventh decade, females had higher mean levels of both plasma total cholesterol and glycerides. The type IV lipoprotein pattern was the most common abnormality (8.6%) within the entire normal population and was 2.7 times as common in men (13%) as in women (4.8%). Type II pattern was less common overall (3.7%) and was more frequent in women than in men. Types III (0.2 to 0.4%) and V (0.2%) were both very uncommon, and type I was not encountered. Results were similar when the entire population (normal and abnormal) was considered. These findings suggest that sex differences in plasma total-cholesterol level cannot account for the known male preponderance in coronary heart disease within the population studied. Prolonged elevation of plasma glycerides (usually expressed as the type IV pattern) in males during the years when atherogenesis is occurring might account for the sex difference.

The localization of 1,25-dihydroxycholecalciferol in bone cell nuclei of rachitic chicks. J.C. Weber, V. Pons and E. Kodicek (Dunn Nutr. Lab., Univ. of Cambridge & Med. Res. Council, Milton Road, Cambridge CB4 1XJ, U.K.). *Biochem. J.* 125, 147–53 (1971). A simple technique has been developed to obtain subcellular fractions of chick bone. The method yielded 60–70% of total DNA in the nuclear debris fraction and 80–90% of total ^{14}C recovered in bone after a dose of radioactive vitamin D. After a dose of (4-^{14}C,1,2-$^{3}H_2$) cholecalciferol (0.5 μg) was given to vitamin D-deficient chicks, the time-course of total ^{14}C radioactivity in the epiphysis, metaphysis and diaphysis of proximal tibiae was measured. The maximum concentrations were reached at 6h, corresponding to a similar peak of radioactivity in blood, decreasing until 24h and indicating the dependence on the circulating ^{14}C and on the blood supply of the three bone components. The preferential accumulation of 1,25-dihydroxycholecalciferol in the nuclear fraction and the overall pattern of other metabolites, found previously in intestinal tissue, suggests a similar mechanism of action in bone to that postulated for the intestinal cell in calcium translocation.

Regulation of adipose tissue pyruvate dehydrogenase by insulin and other hormones. H.G. Coore, R.M. Denton, B.R. Martin and P.J. Randle (Dept. of Biochem., Univ. of Bristol, Bristol BS8 1TD, U.K.). *Biochem. J.* 125, 115–27 (1971). In epididymal adipose tissue synthesizing fatty acids from fructose in vitro, addition of insulin led to a moderate increase in fructose uptake, to a considerable increase in the flow of fructose carbon atoms to fatty acid, to a decrease in the steady-state concentration of lactate and pyruvate in the medium, and to net uptake of lactate and pyruvate from the medium. It is concluded that insulin accelerates a step in the span pyruvate → fatty acid. Mitochondria prepared from fat-cells exposed to insulin put out more citrate than non-insulin-treated controls under conditions where the oxaloacetate moiety of citrate was formed from pyruvate by pyruvate carboxylase and under conditions where it was formed from malate. These results are discussed in relation to the control of fatty acid synthesis in adipose tissue and the role of cyclic AMP in mediating the effects of insulin on pyruvate dehydrogenase.

Apollo 12 lunar material: Effects on lipid levels of tobacco tissue cultures. J.D. Weete, C.H. Walkinshaw and J.L. Laseter (Lunar Sci. Inst., Houston, Tx. 77058). *Science* 175, 623–4 (1972). Tobacco tissue cultures grown in contact with lunar material from Apollo 12, for a 12-week period, resulted in fluctuations of both the relative and absolute concentrations of endogenous sterols and fatty acids. The experimental tissues contained higher concentrations of sterols than the controls did. The ratio of campesterol to stigmasterol was greater than 1 in control tissues, but less than 1 in the experimental tissues after 3 weeks. High relative concentrations (17.1 to 22.2%) of an unidentified compound or compounds were found only in control tissues that were 3 to 9 weeks of age.

Fat metabolism in higher plants. Inder K. Vijay and P.K. Stumpf (Dept. of Biochem. and Biophys., Univ. of California, Davis, Cal. 95616). *J. Biol. Chem.* 247, 360–6 (1972). A membrane-bound oleyl coenzyme A desaturase from maturing *Carthamus tinctorius* seeds specifically catalyzed the conversion of oleyl-CoA to linoleyl-CoA. Any modification of the substrate, that is, a trans double bond, a shift in the position of the cis double bond, chain length and the substitution of acyl carrier protein for CoA as the thioester moiety resulted in complete loss of activity. The system was strongly inhibited by a number of –SH reagents and metal chelators; carbon monoxide at various concentrations was ineffective; cyanide partially inhibited. Although DPNH and molecular oxygen were components of the system, DPNH could be replaced by photochemically reduced ferredoxin. This result would suggest that DPNH did not interact directly with molecular oxygen and the desaturase but served only as a source of electrons. Attempts at solubilization were unsuccessful.

Effects of dietary lipids on growth, food conversion, lipid and fatty acid composition of channel catfish. R.R.

Stickney and J.W. Andrews (Skidaway Inst. of Oceanography, 55 West Bluff Road, Savannah, Ga. 31406). *J. Nutr.* 102, 249–58 (1972). Channel catfish (*Ictalurus punctatus*) fingerlings were reared in 1-m-diameter fiberglass tanks at 26C and fed 27 experimental diets differing in the source of lipid. Duplicate groups of fish were fed each of eight primary lipid sources and each lipid was fed at a level of 10% of diets in three molecular forms: triglyceride, free fatty acid and ethyl ester. Highest average weights occurred when the fish were supplemented with beef tallow, olive oil and menhaden oil triglycerides. Substantially lower gains were obtained from groups fed short- and medium-chain fatty acids, a fat-free diet, safflower oil (high in $18{:}2\omega 6$) and linseed oil (high in $18{:}3\omega 3$). In general, triglyceride and ethyl ester diets led to more rapid growth of channel catfish than did free fatty acid diets. Food conversions for fish fed triglyceride diets were superior to those of fish on the other two dietary lipid types. The deposition of fatty acids in whole carcasses followed very closely the fatty acid composition of the diet whereas deviation from the dietary fatty acid composition was noted in liver.

Phosphatidyl cholines of aorta from rabbits fed cholesterol. D.N. Skurdal and W.E. Cornatzer (Guy and Bertha Ireland Res. Lab., Dept. of Biochem., Univ. of North Dakota School of Med., Grand Forks, N.D. 58201). *Proc. Soc. Exp. Biol. Med.* 139, 133–6 (1972). Male and female New Zealand white rabbits were fed ground Purina rabbit pellets containing 1% cholesterol for 14 weeks. A significant increase in the total phosphatidyl choline-P, percentage of total lipid-P, total sphingomyelin-P and percentage of lipid-P occurred in the aorta of the animals fed cholesterol. The total phosphatidyl cholines of the aorta were fractionated into four fractions by thin-layer chromatography on silica gel H impregnated with silver nitrate. A significant increase occurred in all the phosphatidyl choline fractions of the aorta from the animals fed cholesterol. A greater increase occurred in fractions 1–2 and 3.

Effects of acetylcholine on labeling of phosphatidate and phosphoinositides by (^{32}P)orthophosphate in nerve ending fractions of guinea pig cortex. J. Schacht and B.W. Agranoff (Mental Health Res. Inst. and Dept. of Biol. Chem., Univ. of Michigan, Ann Arbor, Mich. 48104). *J. Biol. Chem.* 247, 771–7 (1972). The effect of acetylcholine on the incorporation of $^{32}P_i$ into phospholipids was studied in subfractions of guinea pig cerebral cortex obtained by sucrose density fractionation. Incorporation of label into phosphatidic acid and phosphatidylinositol was stimulated approximately 100 and 70%, respectively, by 10^{-4} M acetylcholine esterase. The effect was not significant in other subcellular fractions investigated, including a denser nerve ending fraction. This action of acetylcholine was blocked by the addition of atropine but not by tubocurare. Labeling of phosphatidylinositol phosphate and phosphatidylinositol diphosphate was inhibited by about 20% in the presence of 10^{-4} M acetylcholine. This inhibition was not specific for any of the subfractions and was not affected by the addition of atropine.

Effects of whey components and methionine analog on bovine milk fat production. R.A. Rosser, C.E. Polan, P.T. Chandler and T.L. Bibb (Dept. of Dairy and Vet. Sci., Virginia Polytech. Inst. and St. Univ., Blacksburg, Va. 24061). *J. Dairy Sci.* 54, 1807–16 (1971). In three experiments, dietary whey products and methionine analog were evaluated for their effect on milk fat production, rumen fermentation and lipid metabolism in the bovine. Partially delactosed whey and methionine analog increased the relative amounts of ruminal acetate ($P < 0.05$) and butyrate ($P < 0.01$) and decreased ruminal propionate ($P < 0.01$). Ruminal volatile fatty acid differences were not reflected in milk fat content. Arteriovenous differences indicate that the whey and the analog may enhance triglyceride transport into the mammary gland.

Influence of some hypocholesterolemic compounds on the serum protein patterns and serum cholesterol of normal and diethylstilbestrol-treated cockerels. Annette C. Reynolds, A.V. DeGuzman and R.E. Clegg (Dept. of Biochem., Kansas State Univ., Manhattan, Ks. 66502). *Poultry Sci.* 50, 1783–86 (1971). Effects of diethylstilbestrol and four hypocholesterolemic agents on serum cholesterol of cockerels were studied. Starch gel electrophoresis showed definite alterations in serum patterns of diethylstilbesterol-treated birds. Certain bands present in the normal serum disappeared upon treatment with diethylstilbestrol. Although treatment with hypocholesterolemic drugs significantly lowered serum cholesterol of the experimental birds, the electrophoretic patterns did not return to normal.

• Drying Oils and Paints

Surfactant demand. Philadelphia Soc. for Paint and Tech. Subcommittee on Surfactant Demand, G.A. Kolznak, chairman. *J. Paint Technol.* 43(563), 73–79 (1971). Of several procedures investigated to develop a standard method for pigment surfactant demand, a modified spatula flow point determination gave consistently good results. Surfactant dispersant demands of six titanium dioxides of published oil absorption, and five common anionic surfactants were employed in the tests. The surfactant demand of the pigments is nearly independent of the nature of the anionic used and related to pigment oil absorption values.

Fast drying binder based on dehydrated, epoxidized linseed oil in theory and practice (1). J.D. von Mikusch (Unilever Forschungsgesellschaft mbH, Hamburg). *Farbe Lack* 77(12), 1173–78 (1971). Chemical properties and drying behavior of partially epoxidized linseed oils and products obtained from them by thermal treatment with or without catalysis are investigated. If an epoxidized linseed oil containing about 4% of oxirane oxygen is esterified with linseed fatty acids, and the resulting estolide is heated under vacuum to 260–310C, a portion of the fatty acids is split off again leading to the formation of new double bonds. The products obtained by the process are referred to as "Delinois." The 90 poise Delinol tries twice as quickly as dehydrated castor or isomerized linseed oils of similar viscosity, but the films produced are completely tack-free in contrast to the controls.

Fast-drying binder based on dehydrated, epoxidized linseed oil in theory and practice (2). E.W. Trautschold (F. Thorl's Vereinigte Harburger Olfabriken, Hamburg, Harburg). *Farbe Lack* 77(12), 1179–82 (1971). Typical characteristic constants and practical experience regarding the application and behavior of dehydrated epoxidized linseed oils having different degrees of viscosity are reported. Delinol of 8, 22 or 90 poises showed good compatibilty with fatty oil alkyd resins, maleic resins, phenolic resins and cyclized rubber. The hardening behavior of Delinols is comparable to that of a linseed oil alkyd resin containing 81% oil. The rapid and tack-free drying with an exceptionally good film elasticity make them ideally suited for application in the corrosion and building-proofing sectors.

Effect of dispersion conditions on the critical pigment volume concentration (2). Determination of the wetting characteristics of vehicles and the wettability of pigments. W. Herbst and K. Merkle (Farbwerke Hoechst AG vormals Meister Lucius & Bruning, Frankfurt (Main)-Hoechst). *Farbe Lack* 78(1), 25–34 (1972). A method is described which permits determination of the wetting effect of vehicles on the surfaces of pigments and determination of the wettability of pigments and the effectiveness of surfactants as wetting auxiliaries for pigments. The method described was developed and tested on pigments of varying chemical composition and vehicles of varying constitution.

Water-soluble alkyd resins using trimellitic anhydride and various ethylene glycols (1). Preparations via the alcoholysis process. N.A. Ghanem and F.F. Abd El-Mohsen (Lab. for Polymers and Pigments, Nat. Res. Center, Dokki, Cairo, UAR). *Farbe Lack* 78(1), 17–24 (1972). Based on theoretical equations and concepts, practical water-soluble drying alkyds were prepared after preliminary trials. The alkyds were prepared via alcoholysis of castor oil already dehydrated with a low percentage of trimellitic anhydride. The other alkyd components included trimellitic anhydride, for its extra carboxyl group, and ethylene glycols of various chain lengths, for their polar ether groups. Replacing phthalic anhydride with adipic acid produced low viscosity alkyd solutions. The characteristic features of water-soluble alkyds prepared via alcoholysis were increase in glycol chain length reduced the alcoholysis time. Formulations approaching the theoretical alkyd constant K gave practical alkyds of reasonable molecular weights. The results extend the applicability of the alkyd constant concept to systems of more than four components.

Critical pigment volume concentration in linseed oil films. R.L. Eissler and F.L. Baker. *Applied Polymer Symposia* 1971, No. 16: *Scanning Electron Microscopy of Polymers & Coatings*, 171–82. Photomicrographs taken with a scanning electron microscope appear to demonstrate clearly a relationship between pigment volume concentration (PVC) and structure of linseed oil films. At loadings above the critical pigment volume concentration (CPVC) films seem to form from individual particles, each having its own coating of vehicle. At pigmentations below critical, the particles are embedded in a continuous vehicle matrix. The structure can be most clearly observed in outer (non-substrate) surfaces and those formed by fracture. Structure of outer surfaces is influenced by factors other than PVC. Some specimens with internal structures characteristic of films with pigment loadings above the CPVC have outer surfaces composed of a continuous layer of vehicle. Pigment particles that sedimented into outer surfaces could be observed in films which were dried upside down. End points from a modified oil absorption test on several pigments occurred at PVC's higher than the CPVC of films formed from the same pigment/vehicle combinations used in testing. (World Surface Coatings Abs. No. 354)

Manufacture of maleyl-fatty acid adduct. L.O. Cummings (Pacific Vegetable Oil Corp.). *U.S. 3,639,650.* An adduct of an unsaturated, unconjugated fatty acid or ester, such as a glyceride oil, and a maleyl compound is produced by reacting these components at a temperature of 300–350F in the presence of sulfur dioxide. The adduct is lower in viscosity, lighter in color and of higher acidity than other similar adducts, and therefore gives better results in coatings.

• Detergents

The application of surfactants and polymers for ceramics. K. Inagaki (Ind. Res. Inst., Aichi Prefecture, Hanada-cho, Nagoya, Japan). *Yukagaku* 20, 131–37 (1971). Review with 28 references.

Purification of α-olefins for removing colored substances in sulfonation process. A. Mori, M. Nagayama and H. Okada (Res. Lab., Lion Fat and Oil Co., Hirai, Edogawa, Tokyo). *Yukagaku* 20, 234–8 (1971). Impurities in commercial α-olefins were removed by mixing with urea to form an adduct followed by filtration. The separated impurities were identified by GLC and TLC as cyclic compounds composed of more than 140 components. The cyclic compounds gave intensive coloration with sulfuric acid. Treatment with Friedel-Craft catalyst such as anhydrous $FeCl_3$ or BF_3 was another method for removing impurities.

IR Spectroscopic determination of cationic surfactants with ammonium reineckate. S. Miyagishi, S. Goto and M. Nishida (Dept. Ind. Chem., Kanazawa Univ., Kanazawa, Japan). *Yukagaku* 20, 422–4 (1971). Cationic surfactants were converted to reineckates by ammonium reineckate, which were washed with water and dried. Quantitative IR spectroscopic determination was carried out at 1250 cm^{-1}. Each surfactant required a separate calibration curve. The determination of mixed surfactants was also investigated.

Studies on the synthesis and the applications of polyalkylene glycol derivatives. V. Synthesis and surface activity of sodium polyoxypropylated higher alcohol phosphates. M. Matsuda, W. Yano and W. Kimura (Suzuka College of Tech., Suzuka, Japan). *Yukagaku* 20, 165–8 (1971). A series of sodium polyoxypropylated lauryl phosphates was synthesized and their surface activities related to the moles of propylene oxide in the adducts. The surface tension of propylene oxide adducts, especially 3–15 mole adducts, was lower than that of lauryl phosphate and their foaming power and foam stability were generally low. The propylene oxide addition greatly improved the wetting power and dispersing power, but did not much improve the emulsifying power.

VI. Synthesis and surface activity of sodium polyoxybutylated higher alcohol sulfates. M. Nakamura, W. Yano and W. Kimura. *Ibid.*, 169–73. Polyoxybutylated lauryl sulfates were synthesized by 1,2-butylene oxide addition to lauryl alcohol followed by sulfation. At least 5 wt % of KOH as a catalyst was required to give a good yield at 170C. The polyoxybutylated lauryl sulfates showed lower surface tension and c.m.c. value, and had better foam stability and dispersing power than sodium lauryl sulfate. The wetting power of the products containing less than 3 moles of butylene oxide was excellent and the ones containing more than 10 moles of butylene oxide had good emulsifying power.

Soap bars containing salts of fatty acids derived from the Guerbet reaction. G.C. Feighner and W.L. Groves, Jr. (Continental Oil Co.). *U.S. 3,607,761.* A detergent bar comprising an alkali metal salt of blends of C_{12}-C_{16} acids derived from the oxidation of alcohols produced by the Guerbet reaction and an alkali metal soap of a C_{16}-C_{18} fatty acid.

Soap compositions containing vicinal hydroxyalkyl maleates. R.L. Kidwell and J.H. Payne (Monsanto). *U.S. 3,607,762.* From 12–25% of this composition inhibits soap deposition in hard waters.

Process for the preparation of laundering compositions. L.A. Salmen, M. Liebowitz and J.S. Schrager (Colgate-Palmolive). *U.S. 3,607,763.* Composition is a spray-dried, built, detergent-softener.

Detergent-softener compositions. H.E. Wixon (Colgate-Palmolive). *U.S. 3,607,765.* Product consists of an imidazoline oxide and a detergent. It does not yellow fabrics or render them water repellent.

Combination soap and hydrogenated olefin sulfonate detergent bars. G.L. Woo and W.A. Sweeney (Chevron Research Co.). *U.S. 3,607,766.* A minor proportion of the sulfonate containing 10–24 carbon atoms helps to retain in suspension the insoluble lime soaps formed in hard water.

Anionic surface active agents from epoxyalkanes and method for their production. R.M. Lincoln and J.A. Meyers, III (Atlantic Richfield Co.). *U.S. 3,607,778.* Random epoxyalkanes in the C_8-C_{20} range are reacted with ethylene glycol to produce a hydroxy ether having a primary alcohol group. The product is then sulfated.

Cleaning and softening detergent compositions. M.A. Barbera (Procter and Gamble). *U.S. 3,609,075.* The organophosphorus softener consists of alkylphosphinic and alkyldiphosphinic compounds which should be present at the level of at least 16 p.p.m. in the washing solution.

Process for washing laundry and detergent composition for working of this process. M.R.R. Gobert and G. Mouret (Colgate-Palmolive) *U.S. 3,609,990.* A water soluble peroxide bleaching agent is used in the presence of a compound capable of inhibiting enzyme-induced decomposition of the bleach.

Process for producing alkali metal orthophosphates. O. Gehrig and T. Riehm (J.A. Benckiser GmbH). *U.S. 3,615,184.* Concentrated phosphoric acid is continuously reacted with 40–70% alkali metal hydroxide solution in a flash reactor. The resulting product is passed continuously through a single or multiple effect evaporator and eventually crystallized from the concentrated mother liquor. With this process, substantially dry crystalline alkali metal orthophosphates can be produced without additional supply of heat energy.

Process for the production of trisodium phosphate. J.B. Jacobs and S. Taborosi (FMC Corp.). *U.S. 3,615,185.* A free-flowing, non-caking, crystalline trisodium phosphate

(Continued on page 173A)

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dodecahydrate is formed via cocrystallization of the phosphate from aqueous solution in the presence of 0.25–0.80% of sodium sulfate.

PROCESS FOR MAKING HYDRATES OF POTASSIUM MAGNESIUM PHOSPHATES. W. Jahn-Held and O. Braun (Wintershall Aktiengesellschaft). *U.S. 3,615,186.* The process involves (a) reacting phosphoric acid with an aqueous solution containing an excess of aliphatic water-soluble amine, (b) adding an amount of K_2SO_4 equal to the stoichiometric amount of P_2O_5, (c) adding a solution of $MgSO_4$ in an amount equal to two equivalents per equivalent of P_2O_5, and (d) precipitating the mixed salt at pH 11–14.

PROCESS FOR THE PREPARATION OF AN ANHYDRIDE OF TRIVALENT PHOSPHORUS. A.K. Reed, W.M. Goldberger, and D.O. Whyte (Procter and Gamble). *U.S. 3,615,194.* The anhydride is prepared from an anhydride of pentavalent phosphorus by reduction with CO in a DC plasma flame. It is useful as an intermediate in the preparation of detergent builders.

ALKALINE SOLUTIONS CONTAINING CERTAIN ALKYLBENZENE SULFONATE WETTING AGENTS. A. Benson and G. Karg (Witco Chemical Co.). *U.S. 3,617,207.* Aqueous solutions of pH 10 or higher and containing 0.01% or more of water soluble alkylbenzene sulfonates having 6–9 carbon atoms, have unusually effective wetting properties.

PROCESS OF INHIBITING PRECIPITATION BY THE USE OF PHOSPHORUS COMPOUNDS CONTAINING THE ATOM SKELETON $\mathrm{P\text{-}(C\text{-}P)_2}$ OR $\mathrm{P\text{-}(C\text{-}P)_3}$. L. Maier. *U.S. 3,617,574.* The method for making these compounds is disclosed, and their use as sequestering agents, detergent additives, peroxy solution stabilizers and chlorine releasing agent stabilizers is claimed.

PROCESS OF TREATING AQUEOUS SOLUTIONS WITH AN ETHANE TRIPHOSPHONIC ACID COMPOUND. O.T. Quimby (Procter and Gamble). *U.S. 3,617,575.* Aqueous solutions containing polyvalent metal ions are treated with a sequestering ethane triphosphonic acid compound.

COOL WATER LAUNDERING PROCESS. F.L. Diehl and N R. Smith (Procter and Gamble). *U.S. 3,619,115.* A process is described for laundering fabrics in 60–90F water containing 0.05–0.5% of a detergent composition made up of 4–35% of specific zwitterionic detergents and 8-90% of builders which complex the calcium and magnesium ions in hard water.

BUILT-SOAP MANUFACTURING PROCESS. C.Y. Shen, N.E. Stahlheber and R.E. Walters (Monsanto). *U.S. 3,622,516.* The process involves saponifying fatty acids or glycerides in the presence of water and excess caustic followed by the addition of an amount of alkali metal trimetaphosphate sufficient to react with the excess caustic. The mixture is then dried to give a detergent free of caustic and containing soap and tripolyphosphate.

SYNTHETIC DETERGENT COMPOSITIONS. C.J. Norton (Marathon Oil Co.). *U.S. 3,622,517.* The composition has a major proportion of primary alkane sulfonates derived predominantly from alpha olefins containing from 11 to 20 carbon atoms and minor amounts of each of the following: (a) a water soluble inorganic salt, (b) a plasticizing and/or binding agent such as a higher molecular weigh alcohol or fatty acid or a polyhydric alcohol, and (c) a mineral oil which is substantially free of alkanes containing less than 17 carbon atoms. The mineral oil is best obtained from the unreacted alkanes carried over from the sulfitation of the alpha olefins.

WATER-IN-OIL INVERT EMULSIONS. J G. Atherton and H.C. Nemeth (Armour Industrial Chem. Co.). *U.S. 3,622,518.* Invert emulsions containing arylaliphatic acid salts of alkoxylated arylaliphatic amines are claimed.

POLYETHER-SUBSTITUTED CHLOROHYDRINS AS LOW FOAM, CAUSTIC-STABLE CLEANING AGENTS. D.R. Weimer (Continental Oil Co.). *U.S. 3,623,988.* A new use for the known polyether-substituted chlorohydrins is as low foam, caustic-stable, nonionic surfactant cleaning agents. They are especially effective for spray cleaning metal and for rinsing aids in mechanical dishwashers.

LIQUID DETERGENT COMPOSITION. C.M. Cambre (Procter and Gamble Co.). *U.S. 3,623,990.* Stable liquid detergents for cleaning hard surfaces containing particulate matter (*e.g.*,

abrasives) consist of water, ABS detergent, a zwitterionic synthetic detergent and an electrolyte builder.

STABLE, OPAQUE LIQUID DETERGENTS. G. Karg (Witco Chemical Corp.). *U.S. 3,624,006.* The composition includes alkyl metal polyphosphate, ABS, higher molecular weight fatty acid alkanolamide and a phosphate ester of an ethoxylated linear or branched chain aliphatic alcohol.

PROCESS FOR MAKING 2-HYDROXY-3-ALKOXY QUATERNARY AMMONIUM PROPANE SALTS. M. Lewis and T.W. Findley (Swift & Co.). *U.S. 3,624,082.* The salts are produced by reacting, in the presence of water, a tertiary amine and 1-halo,2-hydroxy,3-alkoxy propane, or by reacting the corresponding tertiary amine hydrohalide and glycidyl ether. The compositions possess surfactant properties and can be used as emulsifiers and germicides.

DISHWASHING RINSE AIDS. L.M. Rue, D.W. Groth, A.W. Liepnitz, T.E. Brunelle and S.B. Crecelius (Economics Laboratory). *U.S. 3,625,901.* The surfactants are comprised of condensation products of alkylene oxides with tall oil heads and have a desirable combination of foaming, defoaming and sheeting properties.

METHOD OF PREPARING AGGLOMERATED DETERGENT COMPOSITION. C.A. Sumner (Stauffer Chemical Co.). *U.S. 3,625,902.* The detergent materials are charged into the agglomerating zone, wetted, tumbled to agglomerate, and withdrawn from the bottom of the zone.

SOAP BAR. J.F. Davies and W.M. Cheng (Lever Bros.). *U.S. 3.625,903.* The discoloration of certain antibacterial compounds, such as halogenated *o*-hydroxydiphenyl ethers, in a soap bar is reduced by including 1–15% of free C_8-C_{22} straight chain fatty acids.

ANTIMICROBIAL WASHING AGENTS. H.G. Nosler, H. Schnegelberger, H. Bellinger and K. Rehnelt (Henkel & Cie). *U.S. 3,625,904.* The agents consist of substituted phenyl ethers. They may be incorporated in detergent compositions at levels of 1–30%.

DETERGENT-SOFTENER COMPOSITION. M.C. Weast (Purex Corp.). *U.S. 3,625,905.* The composition is a mixture of a synthetic organic noncationic detergent and an alkali metal salt of isostearic acid.

SOAP-DETERGENT TABLETS. A. Alsbury and D.P. Barrett (Lever Bros.). *U.S. 3,625,906.* Personal washing tablets consist of 40–90% of an alkali metal or alkaline earth metal sulfate of a primary alcohol containing 10–75% of branched molecules.

HYDROGENATED OLEFIN SULFONATE DETERGENT BARS. W.A. Sweeney and G.L. Woo (Chevron Research Co.). *U.S. 3,625,910.* Nonsoap detergent toilet bars are prepared from a mixture of hydrogenated olefin sulfonates containing 10–24 carbon atoms and a plasticizing amount of water.

LOW FOAMING RINSING AND WASHING AGENTS FOR DISHWASHERS. G. Jakobi (Henkel & Cie). *U.S. 3,629,122.* The products consist of (A) 70–98% by weight of water soluble polyvinyl alcohols having molecular weights between 1000 and 4000, and (B) 2–30% of foam inhibiting compounds selected from the group consisting of aliphatic alcohols and carboxylic acids and their alkali metal salts, aliphatic carboxylic acid amides and aliphatic amines. These latter compounds have at least one aliphatic or aliphatic-cycloaliphatic radical with 8–22 carbon atoms.

STABILIZED AMYLASE COMPOSITIONS. A.E. O'Reilly and C.A. Hong (Procter and Gamble Co.). *U.S. 3,629,123.* The stabilized amylase complex consists of amylase and hydrolysis products of chemically-modified cross-linked pregelatinized amylopectin. The process comprises mixing the amylase and amylopectin in an aqueous slurry at a temperature of 35–110F and a pH of 4.5–8.5. The weight ratio of amylase to amylopectin can range from 1:1 to 1:200. A laundry detergent composition consisting of 0.001–3% of the stabilized amylase complex mixed with other granular detergent materials is described. Granular amylase-containing detergents containing the complex attached to a water soluble carrier granule are also described.

LIQUID DETERGENT COMPOSITIONS. T.A. Payne, Jr. and W.E. Olson (Lever Bros.). *U.S. 3,629,125.* These products are phase stable, pourable, heavy duty, liquid detergent emulsions which do not exhibit significant changes in viscosity on standing. They consist of a nonionic synthetic detergent, an alkali metal pyrophosphate, and a two-part stabilizer. The first part is a hydrolyzed linear copolymer of ethylene and maleic anhydride; the second part is a hydrolyzed, cross-linked copolymer of ethylene and maleic anhydride.

LIQUID DETERGENT COMPOSITION. W. Fries, R. Nagel and W. Grundel (Henkel & Cie). *U.S. 3,629,126.* The product consists of 40–70% water and 30–60% of dissolved and suspended materials. These materials consist of 1–5% of a salt of a cellulose ether carboxylic acid, 5–20% of a surface active amine oxide or ether sulfate, 0–40% of conventional detergent additives, 0–30% of wash active substances other than amine oxides and/or ether sulfates, and 0.5–25% of a mixture of 40–60% of at least one C_{16}-C_{24} fatty alcohol sulfate and 60–40% of at least one sulfabetaine.

SURFACE ACTIVE NONIONIC 2-HYDROXYALKYL 3-ALKOXY-2-HYDROXYALKYL PHOSPHATE ESTERS. R. Ernst (Textilana Corp.). *U.S. 3,626,035.* The esters contain one or two higher alcohol or alkylphenol oxyethylate radicals. They are useful as detergents, dry cleaning agents, wetting agents, emulsifiers, and lubricants.

DETERGENT COMPOSITION. W.E. Adam, A. Hardy, A.S. Roald and W.N. Zaki (Procter and Gamble Co.). *U.S. 3,627,683.* The compositions contain compounds bearing sulfhydryl radicals as activators for enzymes which themselves do not contain sulfhydryl groups or disulfide bonds.

PRODUCTION OF WASHING, BLEACHING AND PURIFICATION AGENTS. H. Pistor (Deutsch Gold-und Silber-Scheideanstalt vormals Roessler). *U.S. 3,627,684.* An agent with an active oxygen-containing compound of a boric acid salt is prepared by adding the active oxygen carrier to a slurry of the active washing substances, washing aids and additives shortly before introduction into a spray dryer.

STABILIZED AQUEOUS ENZYME-CONTAINING COMPOSITIONS. C.B. McCarty and J.S. Berry (Procter and Gamble Co.). *U.S. 3,627,688.* The stabilized compositions contain a protease and/or an α-amylase and a stabilizing agent selected from the group consisting of dialkyl glycol ethers, heterocyclic oxyethers, and dialkyl ketones. The compositions may also contain a nonionic or zwitterionic detergent and are useful especially in the removal of soils and stains from textiles.

CARBOXYLATED STARCHES AS DETERGENT BUILDERS. I.A. Eldib. *U.S. 3,629,121.* Certain carboxy-containing derivatives of starches in salt form with more than one carboxyl group per repeating glucose unit are effective detergent builders in both solid and liquid laundry detergents. They exhibit excellent chelating ability with heavy metal ions as well as excellent detergency and do not accelerate eutrophication. Alkali metal salts of carboxymethyl cellulose are also useful as builders.

LOW FOAMING RINSE ADDITIVE. F.W. Palmer and O.T. Aepli (BASF Wyandotte Corp.). *U.S. 3,629,127.* The additives are prepared from a blend of nonionic and anionic surfactants which are water soluble or miscible at temperatures above 180F. The nonionic surfactants are modified oxyalkylated linear alcohols; the anionic surfactants are sulfosuccinic acid esters of phosphate esters.

(Continued on page 175A)

Sullivan Announces Contract With Pacific Vegetable Oil

Frank E. Sullivan Co., a California-based engineering firm which specializes in the design and engineering of vegetable oil processing systems, has been awarded a contract by Pacific Vegetable Oil Corp., covering process design and detailed engineering for a high capacity, fully automated continuous caustic refinery, continuous acidulation and continuous bleaching plant. F.E. Sullivan, an AOCS member since 1949, is president of the company and a widely recognized food processing expert; he reports that the plant will be a modernization and expansion at PVO's Drew Division, Boonton, N.J., edible oil refinery.

(Continued from page 174A)

SURFACTANT DEMAND. Philadelphia Soc. for Paint Tech. Subcommittee on Surfactant Demand, G.A. Kolznak, chairman. *J. Paint Technol.* 43(563), 73–79 (1971). Of several procedures investigated to develop a standard method for pigment surfactant demand, a modified spatula flow point determination gave consistently good results. Surfactant dispersant demands of six titanium dioxides of published oil absorption, and five common anionic surfactants were employed in the tests. The surfactant demand of the pigments is nearly independent of the nature of the anionic used and related to pigment oil absorption values.

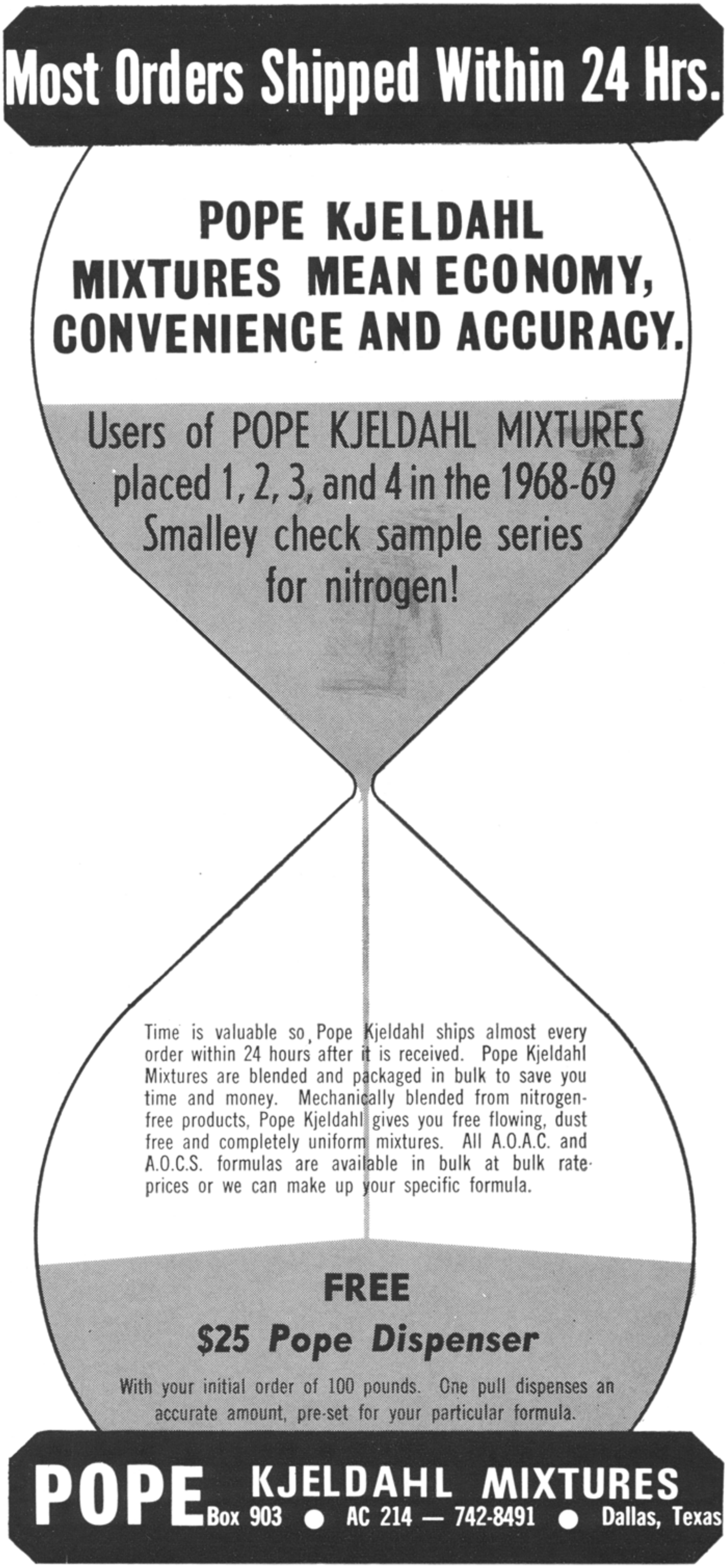
CONCEPTUAL CLARIFICATION OF THE TERMS USED TO DESCRIBE EMULSION BEHAVIOR. K.L. Mittal (J. Harrison Lab. of Chem., Univ. of Pennsylvania, Philadelphia, Pa. 19104). *J. Soc. Cosmet. Chem.* 22, 815–24 (1971). Terms used to describe emulsion behavior, particularly stability, are critically examined and should be superseded by a better justified vocabulary. The whole instability pattern is divided into physical and chemical forms. Physical instability is represented as by creaming, flocculation, inversion, coalescence and demulsification. "Coagulation" should be avoided as describing emulsion behavior. The concept of reversible and irreversible instability is emphasized, the latter being realized in practice in micro and macro systems.

T.L.C. IDENTIFICATION OF THE HYDROPHILIC COMPONENTS OF SELF-EMULSIFYING BASES. L. Petkov (Anal. Chem. Lab., Exp. Unit for Perfumery and Cosmetic Res. Alen Mak State Enterprise, Plovdiv, Bulgaria). *Soap, Perfumery Cosmetics* 44, 481–3 (1971). A method has been found using TLC techniques, to identify the lyophilic components of self emulsifying emulsion bases. It has been established that the additive method used in the standard methods of determining HLB reflects the actual relationship between the hydrophilic and lyophilic portions of such emulsifying mixtures.

DETERGENT COMPOSITIONS. C.N. Lazardis and H.E. Wixon (Colgate-Palmolive). *U.S. 3,630,894.* The composition, which is nonyellowing, softens textiles, and does not render them water-repellent, comprises a detergent and a sulfolanyl (or sulfolenyl) ester of a long chain carboxylic acid.

TEXTILE SOFTENING AND BRIGHTENING COMPOSITIONS. H.-J. Krause, M. Dohr and H. Blocking (Henkel & Cie). *U.S. 3,630,895.* The product is comprised of a water dispersible salt of a surface active ammonium compound and a water dispersible cationic optical brightener.

ESTERS OF GLYCEROL AND POLYHYDRIC ALCOHOL COPOLYMERS USEFUL AS EMULSIFYING AGENTS. J. Harwood (SCM Corp.). *U.S. 3,637,523.* The polyhydric alcohol can have 2–6 carbon atoms. The mole ratio of glycerin to alcohol is from 0.1:1 to 10:1. The esters are produced by reacting the copolymer with a carboxylic acid or carboxylic acid radical-donating compound which has 8–22 carbon atoms, and preferably is a fatty acid radical. These agents have been found particularly useful in food and bakery products.



Water soluble coatings for granular detergents or detergent tablets. M. Freifeld and G.G. Tauth (GAF Corp.). *U.S. 3,630,920.* The coating is a partial ester of a nonionic hydroxyl-containing micelle-forming surface active agent and a vinyl-maleic anhydride interpolymer.

Liquid detergent compositions. H.K. McClain and R.F. Stradling (Procter and Gamble). *U.S. 3,630,922.* The product contains abrasives, water, oxysulfonchloramide bleaching agents, potassium iodide, ABS detergent, zwitterionic synthetic detergent and a builder.

Low sudsing alkaline dishwasher detergent. J.K. Simmons and E.A. Kitchen (Procter and Gamble). *U.S. 3,630,923.* The detergent is based on an alkaline sequestrant builder, sodium silicate, a chlorine bleach, an alcohol ethoxylate nonionic surfactant, and a mono or dialkyl acid phosphate suds depressant.

Soap compositions. C.Y. Shen (Monsanto). *U.S. 3,630,927.* The tendency of natural soap compositions to deposit precipitates in hard water is inhibited by addition of 5–70% of alkali metal alkyl amino diacetates. The alkyl group contains 10–24 carbon atoms.

Fast dissolving, nonaqueous built liquid detergent compositions. A.B. van Dijk (Lever Bros.). *U.S. 3,630,929.* The rate of solution is improved by use of a small amount of an acidic substance.

Enzyme-containing detergent. J.E. Davis and H.J. Wick (Procter and Gamble Co.). *U.S. 3,630,930.* The alkaline granular detergent contains 0.5–20% of enzyme carrier granules which comprise phosphate builder salts, an acid component consisting of dihydrogen disodium pyrophosphate, sodium bicarbonate, sodium bisulfate, or mixtures of these, and alkaline proteases or mixtures of alkaline proteases and α-amylases.

Mildness additive. R. Kelly and E.J. Ritter (Procter and Gamble). *U.S. 3,630,934.* The degree of skin irritation of detergents is reduced by adding small amounts of a hydroxyl derivative of a polymerized fatty acid.

Optical brightening agents with high whitening power. M. Ohkawa, M. Matsuo, T. Sakaguchi, S. Sato and Y. Momoi (Sumitomo Chem. Co.). *U.S. 3,630,944.* Crystals of a polycyclic compound are prepared by pulverizing the crystals in the presence of alkaline phosphates and/or alkaline silicates or in the presence of an organic liquid.

Detergent compositions containing soluble polymer-enzyme product. B.S. Wildi and T.L. Westman (Monsanto). *U.S. 3,634,258.* The product is a protease covalently bound to the polymer. Production and use of the products are disclosed.

Sanitizing presoak compositions. R.E. Keay and R.R. Keast (FMC Corp.). *U.S. 3,634,261.* The compositions are especially useful on diapers. They comprise an organic N chloro compound which hydrolyzes to yield positive chlorine, a sulfamic acid compound, a polyphosphate, an organic buffer salt, sodium tetraborate, and an anionic or nonionic surfactant. The chlorine is very stable under presoaking conditions.

Liquid detergent compositions containing amylolytic enzymes. K.W. Theile, D.A. Lennert and F.G. Rose (Procter and Gamble). *U.S. 3,634,266.* The compositions contain a water soluble organic synthetic detergent, a water soluble calcium salt, sodium thiosulfate and amylolytic enzymes. The enzymes are stabilized against loss of activity during storage.

Enzyme additives. R.T. Haynes, R.P. Langguth and R.L. Liss (Monsanto). *U.S. 3,634,267.* A method is described for preparing stable particulate additives, useful in detergents, which comprise a core of enzymatically inactive material and a surface coating of enzyme material. The core material consists of ethylenemaleic anhydride copolymer or an alkali metal, ammonium or amine salt of the polymer.

Liquid detergent compositions. G. Karg (Witco Chem. Co.). *U.S. 3,634,268.* The clear detergents consist of 3–6% ABS, 2–5% hydrotropic sulfonate of benzene or lower alkyl benzene, 1.5–4% urea, 1.5–4% fatty alkanolamide, 3–8% alkali metal inorganic phosphate builder, and the balance water. They exhibit improved viscosity and low temperature clear point properties.

Hydrocarbyl butanediol disulfate phosphate-free detergent compositions. R.G. Anderson (Chevron Res. Co.). *U.S. 3,634,269.*

Liquid detergent compositions. C.A. Friedman, F.J. Scarcello, A. Schultz and J.E. Walter (Allied Chemical). *U.S. 3,634,271.* The compositions consist of linear ABS containing a mixture of sodium and ethanolamine salts of the sulfonates and polyethylene glycol. They have improved low temperature storage stability.

Low-foaming rinsing and washing agents for dish washers. G. Jakobi (Henkel & Cie). *U.S. 3,635,827.* The agents consist of 70–98% of water soluble polyvinyl alcohols having molecular weights between 1000 and 4000 and 2–3% of interface active compounds containing oxypropylene and/or oxybutylene radicals which may contain oxyethylene units.

Enzyme-containing detergents. L. Benjamin and J.F. Sullivan (Procter and Gamble). *U.S. 3,635,828.* The enzyme is a lipoxidase used at levels of 0.01–2%. The composition may optionally contain a fatty acid or ester substrate having cis-cis double bonds for coupled oxidation of stains. Inorganic peroxy compounds can also be used.

Detergent compositioner. M.T. Yang (Ethyl Corp.). *U.S. 3,635,829.* The non-phosphorus-containing builders are water soluble salts of 2-(N,N-di-(carboxymethyl))amino-3-sulfopropionic acid (e.g., the tetrasodium salt). Synthesis of the builders is described.

Detergents containing oxydisuccinic acid salts as builders. V. Lamberti and M.D. Konant (Lever Bros.). *U.S. 3,635,830.* The builders consist of the normal alkali metal, ammonium or alkanol amine salts of ether polycarboxylic acids selected from the group consisting of oxydisuccinic acid, carboxymethyloxy succinic acid and hydrofuran tetracarboxylic acid.

Choosing an emulsifying agent. M. Bierre (I.T.E.R.G. Lab. de Recherches Maurice Bierre). *Soap, Perfumery Cosmet.* 44(10), 623–628, 646, 648, 650, 652, 654 (1971). The fundamentals of emulsion constitution and formation are reviewed. Phase diagrams for a variety of systems are given.

Conceptual clarification of the terms used to describe emulsion behavior. K.L. Mittal (J. Harrison Lab. of Chem., Univ. of Pennsylvania, Philadelphia, Pa. 19104). *J. Soc. Cosmet. Chem. 22,* 815–24 (1971). Terms used to describe emulsion behavior, particularly stability, are critically examined and should be superseded by a better justified vocabulary. The whole instability pattern is divided into physical and chemical forms. Physical instability is represented as by creaming, flocculation, inversion, coalescence and demulsification. "Coagulation" should be avoided as describing emulsion behavior. The concept of reversible and irreversible instability is emphasized, the latter being realized in practice in micro and macro systems.

Accelerated testing of emulsion stability. P. Sherman (Dept. of Food Science and Nutr., Queen Elizabeth College, Univ. of London). *Soap, Perfumery Cosmet.* 44(11), 693–99 (1971). Reviewed are accelerated aging tests such as elevated and low temperatures, exposure to high speed or ultracentrifugation, electrophoretic mobility and phase inversion temperature (effect of HLB). Visible separation of dispersed phase fluid occurs well after other substantial alterations, hence provides limited information. Accelerated aging tests proceed differently from normal storage therefore an empirical relationship should be established before relying upon the accelerated test. Particle size and distribution is cited as a quantitative method for rating storage stability. Phase inversion temperature determinations appeared to offer a simple and rapid method for assessing emulsion stability.

Stain removal. F.W. Gray. *U.S. 3,637,339.* A composition for removing stains from fabrics is disclosed. It contains an enzyme, a perborate compound, and an activator for the perborate.

Process for producing fatty acid esters of sugars. K. Tanaka and T. Suzuki (Kyowa Hakko Kogyo., Ltd.). *U.S. 3,637,461.* A process for producing fatty acid esters of sugars by fermentation of *n*-paraffins containing 6–25 carbons is disclosed.

(Continued on page 180A)

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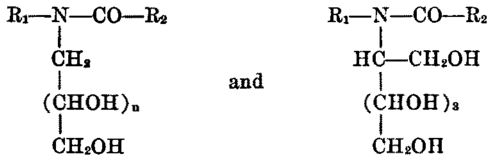
• *Abstracts . . . .*

(Continued from page 176A)

AGENT FOR POSTTREATMENT OF LAUNDRY. H.-W. Eckert and A. Heins (Henkel & Cie). *U.S. 3,637,495.* The softening agents have the following formulas:



$$\begin{array}{l} R_1\text{—N—CO—}R_2 \\ \quad\ | \\ \quad CH_2 \\ \quad\ | \\ \ (CHOH)_n \\ \quad\ | \\ \ CH_2OH \end{array} \qquad \text{and} \qquad \begin{array}{l} R_1\text{—N—CO—}R_2 \\ \quad\ | \\ \ HC\text{—}CH_2OH \\ \quad\ | \\ \ (CHOH)_3 \\ \quad\ | \\ \ CH_2OH \end{array}$$

R_1 is alkyl containing 10–22 carbon atoms and may be interrupted by ether oxygen atoms in the vicinity of the N atom group; R_2 is alkyl containing 7–21 carbon atoms; and n is either 3 or 4.

PHOSPHINIMINOSULFOXONIUM COMPOUNDS AND PROCESS. T.J. Logan and T.W. Rave (Procter and Gamble). *U.S. 3,637,496.* These salts are useful as emulsifying, fabric softening and antibacterial agents.

CHLORINATED MACHINE DISHWASHING COMPOSITION. W.R. Brennan and P.M. Sabatelli (W.R. Grace). *U.S. 3,637,509.* The composition is a combination of an organic chlorinating agent and an alkali metal tripolyphosphate. Particles of the combination are coated or encapsulated with tetrapotassium pyrophosphate. An admixture of the coated composition with a low-foaming surfactant and a defoamer remains stable after long storage periods with respect to retention of both available chlorine and low-foaming characteristics during use even in the presence of proteinaceous substances.

ANTISEPTIC DETERGENT COMPOSITION. M.H. Zakaria (Armour-Dial). *U.S. 3,637,510.* The products resulting from the reaction of halogenated aminobenzothiazoles with 3,4-dichlorophenyl isocyanate in a dry inert organic solvent are disclosed. These products have a high degree of activity against bacteria such as *S. aureus.*

ANTIOXIDANT COMPOSITIONS. H. Klaui and W. Schlegel (Hoffmann-LaRoche). *U.S. 3,637,772.* The compositions contain a mixture of colamine and/or higher fatty acid salt thereof and a higher fatty acid ester of ascorbic acid.

◆