

## • Fats and Oils

**RIBOFLAVIN BEADLET COMPOSITION.** A. Koff (Hoffmann-LaRoche Inc.). *U.S. 3,279,994*. Described is a riboflavin-active material in the form of pleasant-tasting beadlets having a diameter of less than 150 microns. The beadlets are composed of 20-45% riboflavin-active material, 3-20% edible starch, and 45-77% of a material comprised of a mixture of mono- and diglycerides of naturally occurring saturated fatty acids having from 16 to 18 carbon atoms.

**TABLE SYRUP EMULSION AND METHOD OF MAKING SAME.** H. H. Topalian and C. C. Elsesser (General Foods Corp.). *U.S. 3,282,707*. An edible, stable, pourable oil-in-water emulsion suitable for use as a table syrup, comprises an aqueous phase containing at least 65% sugar solids, an oil phase containing 1-40% edible oil (on weight of emulsion), .02-5% lecithin, and .1-1% gum ghatti.

**METHOD OF PREPARATION OF FAT COATED FEED ANNULI.** M. A. Williams (Central Soya Co.). *U.S. 3,284,211*. A method of animal food production comprises heating and moistening an animal food mixture in a pressure cooking chamber, the mixture including 20-32% crude protein, 2-8% crude fiber, 5-15% ash and 50-70% grain, to a temperature of about 230F, passing the mixture to a screw extruder and uniformly extruding the food as an annulus of about 1" diameter, while simultaneously transversely severing the annulus to provide a plurality of discrete annuli to reduce the moisture content from 40 to 25-35% and expanding the same, drying the annuli to reduce the moisture content to 10-15%, spraying liquid fat on the annuli at a temperature above the melting point of the fat while tumbling the annuli to add about 3% fat to the annuli, and cooling the annuli to provide an animal food having a surface impregnated with a layer of fat.

**IDENTIFICATION OF SOME TRACE LIPIDS IN HONEY.** M. R. Smith and W. F. McCaughey (Dept. of Agricultural Biochem., Univ. of Arizona, Tucson). *J. Food Sci.* 31, 902-5 (1966). The trace lipids of cotton honey were extracted with Skellysolve B and diethyl ether. The crude lipid extract was subjected to transesterification, purified on a silicic acid column, and analyzed by gas-liquid chromatography. For further confirmation the crude lipid extract was saponified and the fatty acids identified by reverse-phase chromatography. The infrared spectrum of the crude lipid extract and methyl esters showed absorption bands typical of alkane and ester groups. Palmitic and oleic acids were, respectively, found in concentrations of 26.7 and 60.3%, along with small amounts of lauric, stearic and linoleic acids.

**AUTOXIDATION OF METHYL LINOLEATE IN FREEZE-DRIED MODEL SYSTEMS. I. EFFECT OF WATER ON THE AUTOCATALYZED OXIDATION.** J. F. Maloney, T. P. Labuza, D. H. Wallace and M. Karel (Dept of Nutr. and Food Sci., Mass. Inst. of Technol., Cambridge, Mass. 02139). *J. Food Sci.* 31, 878-84 (1966). Oxidation of methyl linoleate was studied in a freeze-dried model system based on micro-crystalline cellulose. Oxidation was followed manometrically in samples adjusted to various water activities ranging from approximately 0 to approximately 0.6. Water was found (as determined from induction period and rate data) to have an inhibitory effect on the oxidation reaction, varying with water activity up to a value of 0.5. Evaluation of the rate data indicates that the inhibitory effect of water is most pronounced in the initial stages of oxidation, including the period during which the hydroperoxide decomposition follows monomolecular decomposition kinetics. Possible interpretations of the observed water effect and its significance to the general problem of lipid oxidation in dehydrated foods are discussed.

**II. EFFECT OF WATER ON COBALT-CATALYZED OXIDATION.** T. P. Labuza, J. F. Maloney and M. Karel. *Ibid.*, 885-91. Water had an inhibitory effect on the metal-catalyzed oxidation of the fatty ester, as well as on oxidation in the absence of added metals. The kinetics of the reactions were evaluated in terms of the previously established hydroperoxide decomposition mechanisms. The effect of water on the metal-catalyzed oxidation was found to exist in the monomolecular decomposition period as well as in the more rapid phase of the reaction, during which the hydroperoxide decomposition is known to follow bi-

molecular decomposition kinetics. The inhibition of the reaction by water is interpreted as due to deactivation of added, as well as of originally present, metal catalysts by hydration of the coordination shells; and also possibly as due to hydrogen bonding between hydroperoxides and water, and therefore to interference with the normal bimolecular decomposition reaction.

**III. EFFECTS OF ADDED AMINO ACIDS.** M. Karel, S. R. Tannenbaum, D. H. Wallace and H. Maloney. *Ibid.*, 892-96 (1966). Oxidation of methyl linoleate in a model system based on microcrystalline cellulose was studied in the presence and absence of added amino acids in concentrations ranging from  $10^{-4}$  to  $10^{-2}$  moles of additive per mole of linoleate. Parallel experiments were conducted on the same systems in the presence of conventional antioxidants including propyl gallate. Certain amino acids, including histidine,  $\beta$ -aminobutyric acid, lysine, and cysteine, had substantial antioxidant activity. The nature of this activity was found to be different from that observed with propyl gallate, since the main, if not sole, effect of the amino compounds was to prolong the induction period and to affect the initial rate of oxidation. No effect was present in the more rapid, bimolecular phase of oxidation; whereas propyl gallate had an inhibitory effect in this later stage also. Kinetic interpretation of the data and the significance of the findings to stability problems in dehydrated foods are discussed.

**EFFECT OF SYNTHETIC CHELATES ON THE AUTOXIDATION OF UNSATURATED FATTY ACID ESTERS.** G. Jacini, E. Fedeli (Experiment Station for Oils and Fats, Milan, Italy) and W. C. Schaefer (Northern Regional Res. Lab., ARS, U.S. Dept. of Agr., Peoria, Ill.). *J. Agr. Food Chem.* 14, 650-3 (1966). Metals of the first transition series were chelated with Schiff bases obtained from salicylaldehyde and ethylenediamine (I) and from salicylaldehyde and 1,3-propylene diamines substituted in position 2 with various fatty chains (II). Both types of chelates catalyze the autoxidation of unsaturated fatty acid esters to varying degrees according to the metal constituent. Chelates of type I are sparingly soluble in fats and necessitate studies on heterogeneous systems. Chelates of type II, which are highly fat-soluble, are about 10 times as active as type I chelates, and the activity of type II chelates differs with substituted fatty chains as well as with metal constituents. Among the chelates studied, those with oleic chains were the most active; Zn<sup>2+</sup> chelates were not autocatalytic.

**LOW TEMPERATURE PARTIAL ALCOHOLYSIS OF TRIGLYCERIDES.** F. V. Marinetti (Univ. of Rochester School of Med. and Dentistry, Dept. of Biochem., Rochester, N.Y.). *J. Lipid Res.* 7, 786-8 (1966). Egg triglycerides chromatographed on silicic acid are eluted in a skew curve in which fatty acid composition varies. The triglycerides were cleaved by sodium methoxide in chloroform-methanol at 0C to yield diglycerides (11.3%) and monoglycerides (17.5% of original triglycerides) after 3 min. Complete cleavage to fatty acid methyl esters and glycerol was obtained at 18 min at 0C or 5 min at room temperature.

**SEPARATIONS OF LIPIDS BY SILVER ION CHROMATOGRAPHY.** L. J. Morris (Biosynthesis Unit, Unilever Res. Lab., Colworth House, Sharnbrook, Bedford, Eng.). *J. Lipid Res.* 7, 717-32 (1966). The possibility of separating lipid materials on the basis of the number, type and position of the unsaturated centers they contain, by virtue of the complexing of these unsaturated bonds with silver ions, provides a relatively recent but now very important addition to the range of separatory methods available to lipid chemists and biochemists. In this review, the nature of the complexing of silver ions with olefins is considered briefly and the history of the development of separation methods based on argentation is traced. Some practical considerations of argentation chromatography are discussed and separations of fatty acids and aldehydes, substituted fatty acids, neutral lipids, polar lipids and sterols and other terpenoid compounds, by argentation methods alone and in conjunction with other separation techniques, are then reviewed. Conclusions are presented as to the present and potential utility of argentation methods in studies of the occurrence, metabolism and function of lipids.

ADSORPTION OF STERYL ALCOHOL AND TRIPALMITIN ON RUTILE. K. Sokola. *Chem. Průmysl* 15/40, No. 12, 735-9 (1965). The previous work dealing with adsorption studies by a radiochemical method of substances important in paint technology on pigments has been extended. The behaviour of alkyd resins in solution in the presence of solid phase was simulated using a higher alcohol and an ester. On the basis of all ascertained facts it was possible to justify on theoretical grounds the advantage of lower drier contents of paint materials. Simple laboratory tests of drying and dispersion stability were performed on paints containing different amounts of driers. (Rev. Current Lit. Paint Allied Ind., No. 292)

INFLUENCE OF ULTRASONICS ON THE DRYING OF LINSEED OIL. G. Saracco and E. M. Spaccamela. *Chim. e l'Ind.* 47, No. 12, 1368 (1965). The linseed oil in 30% solution in CCl<sub>4</sub> is subjected to ultrasonic radiation in the presence of KI (which forms I<sub>2</sub>). The drying of the oil (which undergoes some isomerisation and polymerisation) is improved. (Rev. Current Lit. Paint Allied Ind., No. 292)

THE FATTY ACID COMPOSITION OF LIPIDS IN THE FAT OF BREWING YEAST. A. Jaforte and A. Daghetta (Univ. of Milan, Milan, Italy). *Riv. Ital. Sostanze Grasse* 43, 349-51 (1966). The fat extracted from brewing yeast has been analyzed by gas phase chromatography and found to have the following fatty acid composition: 12:0 = 2-2.5%, 14:0 = 2.5-3.5%, 14:1 = 2.5-3.5%, 15:0 = 0.6-0.8%, 15:1 = 0.7-0.9%, 16:0 = 7-9%, 16:1 = 50-65%, 18:0 = 1-2%, 18:1 = 20-35%.

THE OXIDATION OF LIPIDS IN CANNED BEEF. D. Raffaelli (Prov. Chem. Lab., Latina, Italy). *Ind. Alim.* 5, 82-4 (1966). Canned beef contains lipids both as free fat, separated during the sterilization treatment, and as fat still adhering to the lean meat. The increase in peroxide number of both fractions has been investigated over a period of one year, during which period the canned meat was held at ambient temperature. The peroxide number remains unchanged during the first three months of storage, but it starts to increase rapidly between 3 and 4 months to reach its maximum value (30-40, from an initial 2-5) at 6-8 months after canning. The free fat shows a somewhat higher peroxide number than the extracted fat at all times.

MODIFIED DETERMINATION OF THE BENZIDINE VALUE IN RANCID FATS. J. Pokorný and G. Janiček (Inst. Chem. Tech., Prague, Czechoslovakia). *Papers Inst. Chem. Tech.* E-9, 81-4 (1966). The following procedure for determining the benzidine value of rancid fats is recommended: the sample is dissolved in 20 ml. of chloroform, 5 ml. of a 0.5% benzidine solution in acetic acid are added, the mixture allowed to stand 40 min. at 60C and the light transmission is measured at 430 mμ. This procedure has advantages in the better solubility of samples and in being better suited for routine determinations.

PROBLEMS IN FAT HARDENING. A REPORT ON RECENT TECHNICAL AND SCIENTIFIC AND SCIENTIFIC PROGRESS. H. Wissebach (Margarine Union G.m.b.H., Emmerich, Germany). *Tenside* 3, 285-96 (1966). The current status of hydrogenation technology is surveyed.

STUDIES ON THE AUTOXIDATION OF VIRGIN AND CRUDE SICILIAN OLIVE OILS. A. Corrao (Univ. of Palermo, Palermo, Italy). *Olearia* 20, 5-17 (1966). The autoxidative behavior of Sicilian virgin and crude olive oils was studied over a three-year period, during which period the oil samples were kept at ambient temperature. By comparing the changes in peroxide number, carbonyl number and I.V., a critical level of peroxidation is identified, beyond which even a small increase in peroxide number corresponds to an important increase in carbonyl number and I.V., attributable to an intensification of the oil's oxidative degradation. The rancidity threshold level appears to be independent, to a certain extent, of peroxidation but it corresponds closely to a positive result of the Kreis reaction. Crude olive oils show an earlier tendency to rancidity than virgin oils and generally greater oxidative degradation at a given age.

THE QUALITY OF PLASTIC PACKAGING FOR EDIBLE OILS. B. Ostric-Matijasevic and V. Markovic (Belgrade, Yugoslavia). *Riv. Ital. Sostanze Grasse* 43, 104-6 (1966). The use of PVC bottles as containers for edible oils has been investigated. The state of preservation of the oil in these plastic packages is generally as good as in glass bottles. Mechanical resistance is good down to -10C and, for some types of material, down to -30C.

CHEMICAL ALTERATIONS OF GLYCERIDES AND FATTY ACIDS CAUSED BY THE PRESENCE OF METALS. E. Fedeli (Exper. Stat. Fats and Oils, Milan, Italy). *Riv. Ital. Sostanze Grasse* 43, 99-103 (1966). The presence of catalysts (metallic soaps) in fats greatly accelerates the autoxidation reaction by eliminating the induction period present in the uncatalyzed reaction. When metal chelates are used as catalysts, the activity of the different catalysts varies according to whether the bond between the metal and the organic moiety is ionic or covalent. Metal chelates are of course very important in biologic systems (e.g., chlorophyll, hemoglobin, vitamins) and their catalytic activity is enhanced by their high solubility in lipids. The presence of two long alkyl chains in the chelates also enhances catalysis, especially if the chains contain double bonds.

HYDROCARBONS, TRITERPENIC ALCOHOLS AND STEROLS IN RAPESEED OIL. A. Rutkowski, G. Jacini, P. Capella and M. Cirimelle (Exper. Stat. Fats and Oils, Milan, Italy). *Riv. Ital. Sostanze Grasse* 43, 89-94 (1966). The unsaponifiable fraction of rapeseed oil has been investigated by TLC, VPC and IR. In the sterol fraction the following compounds have been identified: β-sitosterol (57%), campesterol (33%) and brassicasterol (11%). Stigmasterol is only present in traces. Among the terpenic alcohols, the following have been analyzed: 24-Me cycloartenol, cycloartenol, β-amirine and three other unidentified alcohols. Oil processing does not affect the composition of these fractions. Among the hydrocarbons, 33 components between C<sub>11</sub> and C<sub>31</sub> were identified. Those lower than C<sub>22</sub> are removed during hydrogenation.

OLIVE OIL IN TUNA FISH CANNING. A. Cucurachi (Agr. Exp. Stat., Bari, Italy). *Riv. Ital. Sostanze Grasse* 43, 335-42 (1966). The composition of the oil covering tuna fish in commercial canned product is found to differ considerably from that of the olive oil originally used. Experiments on this subject have revealed that this is caused by contamination with the oil contained in the fish, which is itself quite variable in amount (from 1 to 6.5%). The degree of contamination of the covering oil is directly related to the oil content of the fish and occurs very soon after canning. The low level of linoleic acid contained in tuna fish oil makes it possible to detect whether the covering oil used is genuine olive oil.

THE PRESENCE OF TRANS ISOMERS IN NON-ESTERIFIED OLIVE OILS. A. Montefredine (Prov. Chem. Lab., Pescara, Italy). *Riv. Ital. Sostanze Grasse* 43, 343-8 (1966). The presence of *trans* isomers (especially elaidinic acid) in esterified olive oils has been confirmed once more. The question of whether the presence of this acid can be considered characteristic of esterified olive oils remains open.

CONTACT PHENOMENA BETWEEN FATS AND OILS AND PLASTIC MATERIALS. T. Garlanda, M. Masoero and A. Giussani (Montecatini S.p.A., Milan, Italy). *Riv. Ital. Sostanze Grasse* 43, 108-13 (1966). The amount of styrene monomer migrating from a polystyrene plastic into vegetable oils with which it is contact has been examined over a period of one month at 40C. This amount is very small (5.1-5.4 mg/sq. in.) and is slightly less than the amount of styrene migrating into vaseline oil under the same conditions.

PHYSICO-CHEMICAL CHARACTERISTICS OF VIRGIN OLIVE OILS FROM UMBRIA. G. Petruccioli (Exp. Inst., Spoleto, Italy). *Olearia* 20, 24-9 (1966). The physico-chemical characteristics of 2,900 samples of olive oil produced in the Italian region of Umbria over a period of several years are reported. Differences are found between oils made from different varieties of olive. The generally excellent quality of the oil produced in this region is confirmed.

OLIVE HARVESTING WITH POLYPROPYLENE NETS. U. Dedini (Monteshell S.p.A., Milan, Italy). *Riv. Ital. Sostanze Grasse* 43, 330-4 (1966). The technical and economic advantages of harvesting olives with polypropylene nets stretched under the trees are discussed.

GAS CHROMATOGRAPHIC STUDIES ON THE MINOR CONSTITUENTS OF BUTTER. M. Brogioni and G. Bosi (Prov. Chem. Lab.,

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Perugia, Italy). *Olearia* 20, 80-1 (1966). A number of very small peaks appearing in the gas chromatogram of butter have been investigated. The presence of pelargonic, glutaric, adipic, pimelic and azelaic acids in butter oil has been ascertained. The presence of succinic, suberic and sebacic acids is still uncertain.

RECENT STUDIES ON GREEK OLIVE OILS. P. Katsoulis and P. Kaloxylas (Chem. Res. Lab., Athens, Greece). *Riv. Ital. Sostanze Grasse* 43, 352-6 (1966). The results of extensive analyses of Greek olive oils, conducted over several years, are reported.

INITIAL STUDIES ON THE IDENTIFICATION OF ELAIDINIC ACID IN STRONGLY OXIDIZED OLIVE OILS. G. Taponeco (Prov. Chem. Lab., Pisa, Italy). *Riv. Ital. Sostanze Grasse* 43, 357-9 (1966). The presence of elaidinic acid has been detected in a genuine virgin olive oil sample after 3 years' exposure to daylight. When the sample was submitted to a laboratory refining procedure, an increase in the elaidinic acid content was observed. The elaidinic acid content increased also when methyl esters of the same sample were exposed to U.V. light.

THE OLIVE OIL INDUSTRY AND ITS PRESENT PROBLEMS. M. Guida (Internat. Feder. Olive Growers, Rome, Italy). *Riv. Ital. Sostanze Grasse* 43, 398-413 (1966). A review.

THE TUNG TREE, ITS FRUIT AND OIL IN ARGENTINA. G. Loew (Bologna, Italy). *Riv. Ital. Sostanze Grasse* 43, 414-9 (1966). The climate and soil conditions of the areas in Argentina where the tung tree is grown are described. The close relationship between fruit gathering procedures and end product quality is pointed out and the process requirements for oil extraction are discussed. Chemical properties and analytical controls of the tung oil are reviewed.

A STUDY OF THE AUTOXIDATION OF SOME VEGETABLE OILS AT ELEVATED TEMPERATURES. XIII. THE EFFECT OF TEMPERATURE AND DIFFUSION ON THE WEIGHT CHANGE DURING THE OXIDATION OF RAPESEED OIL. J. Pokorný (Inst. Chem. Tech., Prague, Czechoslovakia). *Papers Inst. Chem. Tech.* E-9, 103-6 (1966). The effect of temperature and film thickness on the weight increase of rapeseed oil films during autoxidation has been studied. Contrary to what happens in highly unsaturated oils, the amount of O<sub>2</sub> absorbed during the oxidation of rapeseed oil increases relatively little. The rate of weight increase reaches its maximum at the point of maximum increase of the peroxide number. The decomposition of peroxides is then accompanied by a substantial weight reduction, caused by extensive production of volatile compounds. This weight loss is about three times greater at 75°C than at 30°C. The course of the oxidation reaction is greatly dependent on the thickness of the oil film, but not in a linear fashion. The effect of film thickness is marked in films 1 mm. thick, especially at the higher reaction temperatures.

PRODUCTION METHODS OF TOP QUALITY REFINED OLIVE OILS. C. Stella (Univ. of Florence, Florence, Italy). *Olearia* 20, 18-23 (1966). Relatively small differences in the method of olive oil extraction greatly influence the chemical and physical properties of refined olive oil. Extraction and refining procedures are described which produce oils with physico-chemical characteristics very close to those of good quality virgin olive oils.

CHANGES IN THE FATTY ACID COMPOSITION OF TRIGLYCERIDES DURING THE COURSE OF THE METABOLIC PROCESSES IN THE PLANT. O. T. Rotini (Univ. of Pisa, Pisa, Italy). *Olearia* 20, 64-79 (1966). Tunisian olive oil has been found to differ from olive oil produced elsewhere in fatty acid composition, especially in a higher content of saturated acids (15-24% vs. 9-18%) and also of polyunsaturated acids (10-18% vs. 4-12%). Since Tunisian olives are harvested late in the season, for purposes of obtaining higher yields, and under relatively dry climatic conditions, a study of the history of fatty acid development during ripening of the olive was undertaken. The level of saturated acids decreases during maturation of the fruit, while that of the unsaturated acids increases. The highest amount

of saturated acids was found in olives grown under the warmest climatic conditions (Tunisian South). Parallel studies on other fruits (almond, grape, walnut, pumpkin) show in all cases a decrease in palmitic acid level during ripening, coupled to an increase of the oleic acid and a decrease in linoleic acid.

SESAME SEEDS PRODUCED IN SICILY. I. OIL YIELD AND PROPERTIES OF THE OIL AND MEAL. G. Cerutti and A. Maccarrone (Univ. of Catania, Catania, Italy). *Riv. Ital. Sostanze Grasse* 43, 95-8 (1966). Sesame seeds grown in Sicily have an oil yield of 48.5-53.4% (based on dry matter). Their fatty acid composition is typical of sesame seed oil: 14:0 < 0.1%, 16:0 = 9.1-10.9%, 18:0 = 5.2-5.9%, 18:1 = 32.2-38.7%, 18:2 = 45.1-51.4%, 18:3 = 0.4-0.5%. The extracted meal has an average protein content of 44.6%.

## • Fatty Acid Derivatives

SYNTHESIS OF MONOALKYL PHOSPHATE AND ITS PROPERTIES FOR ANTISTATIC AGENT. Kyoichi Suga, Takashi Miyashige, Kimio Takada, Shoji Watanabe and Keizo Kamma. *Yukagaku* 15, 598-600 (1966). Monoalkyl phosphates were prepared from various fatty alcohols and pyrophosphoric acid in benzene solution. Mono-2-ethylhexyl phosphate and monoöleil phosphate showed excellent properties as antistatic agents for polyvinyl chloride.

TRACES OF BY-PRODUCTS GENERATED IN THE CATALYTIC HYDROGENOLYSIS OF HIGHER FATTY ESTER USING VARIOUS HETEROGENEOUS CATALYSTS. Isao Ikeda and Saburo Komori (Osaka Univ.). *Yukagaku* 15, 596-7 (1966). Hydrocarbons having higher carbon numbers than original fatty compounds, olefins and aldehydes with the same carbon number as that of the original material, and dialkyl ethers were found as the trace amounts.

THERMAL ADDITION OF 10-UNDECENOIC ACID WITH FORMALDEHYDE. Choichi Hirai, Yasuyuki Sasaki and Taro Matsumoto (Nihon Univ., Tokyo). *Yukagaku* 15, 594-5 (1966). The reaction product was found to be mainly of 12-hydroxy-trans-9-decenoic acid from examination of its oxidation products.

CORRELATION BETWEEN CHEMICAL STRUCTURE OF PLASTICISERS AND THEIR PERFORMANCE. G. J. Van Veersen and A. J. Meulenbergh. *Kunst.* 56(1), 23-9 (1966). An attempt has been made to correlate the chemical structure of plasticisers for polyvinyl chloride (PVC) with their performance. A simple and rapid method is used to give an impression of the solvent power of plasticisers for PVC. The result shows that a relatively simple correlation exists between chemical structure characterised by the *Ap/Po* ratio, which is the ratio between the amount of aliphatic C atoms and the amount of ester groups, and the solvent power of the plasticisers for PVC. A comparison is made of the authors' technique with other existing methods. Performance data on properties such as efficiency, heat stability, ageing of plastisols, low temperature properties, volatility and extractions are correlated with the chemical structure of the plasticiser used. (Rev. Current Lit. Paint Allied Ind., No. 292).

INVESTIGATING EPOXY PLASTICISERS IN POLYVINYL CHLORIDE MIXTURES. I.—EPOXIDISED BUTYL OLEATE AND EPOXIDISED BUTYL ESTER OF COTTON-SEED OIL. A. Peneva. *Polimeri Sbornik Tr. NI Kauchuk i Plast. Prom.* 1, 163-177 (1964). The following epoxy plasticisers were investigated: epoxidised butyl oleate and epoxidised butyl ester of cotton-seed oil in PVC mixtures as plasticisers and stabilisers. It was established that they yield softer and more cold-resistant products with PVC than those with dioctyl phthalate. Their mixtures are elastic and they can stand a greater number of bendings compared to those with dioctyl phthalate, dibutyl phthalate and dioctyl sebacate. They give good heat stability to PVC mixtures (at the rate of 3% of the PVC) and do not influence the viscosity of the pastes, under laboratory conditions. Epoxidised butyl ester of cotton-seed oil is very suitable for preparing pastes of permanent viscosity and suitable for long storage. They can be treated as secondary plasticisers. (Rev. Current Lit. Paint Allied Ind., No. 292).

## • Biochemistry and Nutrition

CHOLESTEROL ESTERS IN MYELIN AND THE COMPONENT FATTY ACIDS. F. Young and F. H. Hulcher (Bowman Gray School of Med., Wake Forest College, Winston-Salem, N.C.). *Proc. Soc. Exp. Biol. Med.* 123, 385-7 (1966). Cholesterol esters

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were isolated from purified bovine myelin by thin-layer and column chromatography. Liebermann-Burchard reaction and infrared spectroscopy were used to identify the isolated fraction. Component fatty acids of the cholesterol esters were quantitated by gas-liquid chromatography.

INFLUENCE OF A PLANT-STEROLS-PREPARATION ON THE SOLUBILITY OF CHOLESTEROL IN TRIGLYCERIDES. L. D. Wright (Graduate School of Nutr., Cornell Univ., Ithaca, N.Y.). *Proc. Soc. Exp. Biol. Med.* 123, 447-50 (1966). The effect of a plant-sterols-preparation on the solubility of cholesterol in various triglycerides at several cholesterol concentrations was studied. At cholesterol levels between one-half and full saturation cholesterol and the plant-sterols-preparation compete for solubility sites in the triglycerides. At cholesterol levels below one-half of saturation the dissolved plant sterols are without effect on the solubility of cholesterol but in the presence of excess, undissolved plant-sterols-preparation the concentration of cholesterol in solution is reduced, perhaps by adsorption on the undissolved plant sterols or by the formation of mixed crystals of cholesterol and the plant sterols. These studies furnish further evidence for the suggestion, previously made, that cholesterol at saturation in triglycerides is present in two states of dispersion; one form from one-half to full saturation that yields insoluble clathrates with appropriate dicarboxylic acid or imidazole and now appears to compete with plant-sterols-preparation for solubility sites, and a second form from zero to one-half saturation that does not yield clathrates and does not appear to compete with the plant sterols.

GAS-LIQUID RADIOCHROMATOGRAPHY OF INTACT LABELED CHOLESTEROL ESTERS. L. Swell (Veterans Admin. Hosp. and Dept. of Biochem., Med. College of Va., Richmond, Va.). *Proc. Soc. Exp. Biol. Med.* 121, 1290-4 (1966). Gas-liquid radiochromatography has been successfully applied to the simultaneous analysis of mass and radioactivity of labeled intact cholesterol esters. Representative curves are presented for labeled cholesterol esters isolated from rat serum, liver and adrenal gland. Quantitative mass and radioactive measurements were carried out on the labeled cholesterol esters isolated from the liver of rats given cholesterol-4-<sup>14</sup>C and cholesterol-7 $\alpha$ -<sup>3</sup>H. The results indicate that gas-liquid radiochromatography coupled with thin-layer chromatography affords an excellent means of determining the specific radioactivity of labeled cholesterol ester classes.

ACCENTUATION OF ESSENTIAL FATTY ACID DEFICIENCY BY DIETARY TRI-O-CRESYL PHOSPHATE. C. R. Seward, G. Vaughan, G. M. Shue and E. L. Hove (Div. of Nutr., Bureau of Sci., Food and Drug Admin., U.S. Department of Health, Education, and Welfare, Washington, D.C.). *J. Nutr.* 90, 245-51 (1966). Dietary addition of tri-o-cresyl phosphate (TCP) to an EFA-free 18% casein diet accentuated the deficiency and decreased the time of onset of dermal lesions in rats. Dietary intake of TCP cause increases in dermal scores and eicosatrienoic acid and decreases in arachidonic acid in liver lipids of both the deficient and the control groups. In carcass lipid, however, dietary additions of TCP caused decreases in both eicosatrienoic and arachidonic acids of the deficient groups. TCP depressed growth of the deficient and control rats; however, the depression was greatest in the deficient animals. Dietary TCP accentuated the decrease in oxidative phosphorylation noted in an uncomplicated EFA deficiency. Liver cholesterol increased in EFA-deficient rats, and this was accentuated by dietary TCP. Values for total lipids of liver, heart and carcass are also reported.

STEREOSPECIFIC CONVERSION OF OLEIC ACID TO 10-HYDROXY-STEARIC ACID. G. J. Schroeffer, Jr. (Div. of Biochem., Dept. of Chem. and Chemical Engineering, U. of Ill., Urbana, Ill. 61801). *J. Biol. Chem.* 241, 5441-7 (1966). The conversion of oleic acid to 10-D-hydroxystearic acid by a pseudomonad was studied in a medium enriched in deuterium oxide. The reaction occurred with stereospecific incorporation of 1 atom of solvent hydrogen at carbon atom 9. The location of the deuterium was established by a combination of chemical and mass spectrometric evidence. The hydroxyl function of the deuterium-labeled

hydroxystearate was replaced by hydrogen through a series of standard organic reactions which should not affect the stereochemistry at carbon atom 9. The resulting deuterium-labeled stearate was incubated with a growing culture of a strain of *Corynebacterium diphtheriae*, a system which stereospecifically removes hydrogen in the D configuration at carbon atom 9 of stearate in the enzymatic introduction of the  $\Delta^9$ -double bond of oleic acid. Retention of the labeled hydrogen in the oleate was observed, indicating that the configuration of the deuterium in the stearate, and hence in the 10-hydroxystearate, was L.

EFFECT OF CHOLESTYRAMINE ON CHOLESTEROL METABOLISM IN YOUNG ADULT SWINE. D. L. Schneider, D. G. Gallo and H. P. Sarett (Dept. of Nutritional Res., Mead Johnson Res. Center, Evansville, Ind.). *Proc. Soc. Exp. Biol. Med.* 121, 1244-7 (1966). Nine-week-old swine were fed the bile acid sequestrant, cholestyramine, at 2% and 4% of the diet for successive 4-week periods. Cholestyramine increased bile acid excretion about 10-fold, but the rate of liver biosynthesis of cholesterol was 19 times higher in the cholestyramine fed pigs than in the control pigs. This marked increase in cholesterol synthesis was apparently sufficient to prevent a decrease in plasma cholesterol levels. Feeding 4% cholestyramine (approximately 70 g/day) had no effect on growth, food efficiency, organ weights, plasma lipids and aorta cholesterol. Liver cholesterol levels were decreased slightly, liver vitamin A stores were decreased about one-third, and excretion of fecal fat and cholesterol-like (Lieberman-Burchard reactive) materials were increased in the cholestyramine fed pigs.

INTESTINAL METABOLISM OF CHOLESTEROL: EVIDENCE AGAINST SIDE-CHAIN OXIDATION BY MAMMALIAN INTESTINAL MUCOSA. R. K. Oekner (Thorndike Memorial Lab., Boston City Hospital, Boston, Mass.). *Proc. Soc. Exp. Biol. Med.* 123, 374-8 (1966). Preparations of intestinal mucosal scrapings, homogenates, and mitochondria from normal rats and guinea pigs, and mucosal scrapings and everted intestinal segments from bile-fistula rats, failed to oxidize cholesterol-26-<sup>14</sup>C- to <sup>14</sup>CO<sub>2</sub>. It is concluded that oxidation of side-chain in the intestinal mucosal cells is not a quantitatively significant metabolic fate of cholesterol.

INTERACTION OF LOW-DENSITY LIPOPROTEIN (LDL) FROM YOLK PLASMA WITH METHYL ORANGE. C. M. Nowak, W. D. Powrie and O. Fennema (Dept. of Food Sci. and Industries, Univ. of Wisconsin, Madison, Wisconsin 53706). *J. Food Sci.* 31, 812-18 (1966). The surface characteristics of plasma low-density lipoprotein (LDL) in various buffers were investigated by determining the binding of an anionic dye, methyl orange, during equilibrium dialysis at 10C. As the buffer pH increased from 4.5 to 8.6, the binding capacity of native LDL diminished. Additional experiments were carried out at pH 6.5, the normal value for egg yolk and plasma. A plot of dye concentration vs. dye binding by native LDL produced a curve with a shape similar to that for  $\beta$ -lipoprotein from blood. Native LDL, with only about 15% protein, bound as much dye as a pure protein,  $\beta$ -lactoglobulin. The LDL from pasteurized yolk (63 and 64.8C) bound as much dye as LDL from native yolk. Sodium chloride and sucrose did not restrict the dye adsorption to native LDL. When yolk plasma was treated with bromelain, the dye-binding capacity of isolated LDL was somewhat reduced.

EFFECT OF SELENIUM AND VITAMIN E ON THE REGENERATION OF RAT LIVER. T. N. Maros, G. P. Fodor, Virginia V. Kovacs and B. Katonai (Dept. of Human Anatomy and Dept. of Hygiene, Med. and Pharmacy, Univ. Tirgu-Mures, Rumania). *J. Nutr.* 90, 219-27 (1966). Because previous studies have shown the hepatoprotective effect of selenium (a constituent of Factor 3), the effect of selenium on the hepatic regeneration of albino rats was studied. The experiments used 125 animals, divided into 4 groups. The control group was maintained with a semipurified diet. The 3 experimental groups received the same basal diet which was supplemented with Na<sub>2</sub>SeO<sub>3</sub>, vitamin E or Na<sub>2</sub>SeO<sub>3</sub> and vitamin E together. The weight increase of the hepatic regenerate was observed, as well as its microscopic appearance and the percentage of the different forms of cell division. It was found that selenium caused an increase in weight of the residual liver, favoring selectively the mitotic processes, and, combined with vitamin E, it stimulated all forms of cell division in the liver. The physiological dose used for stimulation of liver regeneration was about 1  $\mu$ g/100 g body weight. When selenium was given in larger doses it produced certain vascular lesions, appearing in the form of parenchymatous hepatic microhemorrhages.

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(Continued from page 68A)

LIPOGENESIS AND ENZYME ACTIVITY IN RAT AND MOUSE EPIDIDYMAL ADIPOSE TISSUE. G. A. Leveille (U.S. Army Med. Res. and Nutr. Lab., Fitzsimons General Hosp., Denver, Col.). *Proc. Soc. Exp. Biol. Med.* 121, 1125-27 (1966). The ability of rat and mouse epididymal adipose tissue to incorporate acetate-1-<sup>14</sup>C into fatty acids was studied. The activity of glucose-6-phosphate dehydrogenase (G-6-PD), 6-phosphogluconate dehydrogenase (6-PGD) NADP malic dehydrogenase (malic enzyme), NAD malic dehydrogenase, glutamic-pyruvic transaminase (GPT) and glutamic-oxaloacetic transaminase (GOT) in these tissues was also determined. Mouse adipose tissue incorporated significantly more acetate-1-<sup>14</sup>C into fatty acids and exhibited higher G-6-PD, 6-PGD and malic enzyme activity than comparable tissue from rats.

AMINO ACID UTILIZATION BY ISOLATED ADIPOSE TISSUE OF MEAL-FED RATS. *Ibid.*, 123, 521-4. Meal-feeding (limiting access to food to 2 hours per day) in the rat stimulated the utilization of leucine and lysine-<sup>14</sup>C by isolated adipose tissue. Epididymal adipose tissue from meal-fed rats incorporated significantly more amino acid carbon into protein and fatty acids than did similar tissue from nibbling (*ad libitum*-fed) animals. Greater quantities of amino acids were also oxidized by adipose tissue of meal-fed rats. The incorporation of leucine- and lysine-<sup>14</sup>C into protein and fatty acids was stimulated by addition of glucose to the incubation medium, and insulin addition resulted in a further stimulation. The possible regulatory mechanisms involved are discussed in light of available knowledge concerning adipose tissue metabolism.

OBSERVATIONS ON THE DECOMPOSITION OF HEMIN BY FATTY ACID HYDROPEROXIDES. M. G. Kokatnur, J. G. Bergan and H. H. Draper (Div. of Nutritional Biochem., Dept. of Animal Sci., U. of Ill., Urbana, Ill.). *Proc. Soc. Exp. Biol. Med.* 123, 314-17 (1966). The possible destruction of hematin compounds in the presence of oxidizing lipids *in vivo* (e.g., the decomposition of cytochromes in the presence of peroxidizing mitochondrial lipids) is of interest from the standpoint of the lesions observed in animals deficient in vitamin E or exposed to ionizing radiation. The present results emphasize the strong oxidative properties of preformed peroxides toward such compounds. However, in the colloidal medium and under the pH conditions which prevail *in vivo* the role of fatty acid and peroxide free radicals may assume primary importance.

THE EFFECT OF RAT LIVER MICROSOMES AND CYTOPLASMIC SUPERNATANT ON RESPIRATORY DECLINE. J. A. Grove, R. M. Johnson, and J. H. Cline (Dept. of Animal Sci. and Inst. of Nutr. and Food Technol., The Ohio State Univ., Columbus, Ohio 43210). *J. Biol. Chem.* 241, 5564-70 (1966). Weanling male rats were fed for approximately 3 weeks either a vitamin E-deficient or a vitamin E-supplemented diet. Liver homogenates were prepared and separated into mitochondrial, microsomal, and supernatant fractions, and the contributions of the microsomal and supernatant fractions to the maintenance or inhibition of mitochondrial oxidation of  $\beta$ -hydroxybutyrate were studied. When microsomes were added to mitochondria such that approximately equal amounts of protein from each fraction were present, oxidation was inhibited in a manner similar to that of vitamin E-deficient or vitamin E-supplemented rats. The further addition of the supernatant fraction from either type of liver resulted in maintenance of oxygen consumption when vitamin E-supplemented microsomes were present. The microsomal inhibitor was inactivated by boiling, but remained bound to the microsomal membranes after both sonic disruption followed by dialysis and sonic disruption followed by centrifugation. Dialysis of the supernatant fraction removed the factor, or factors, which overcame the inhibition due to the vitamin E-supplemented microsomes. Inhibition of oxygen consumption was not correlated with either peroxidation or lysosomal enzyme activity. It is suggested that the microsomal inhibitor is protein in nature.

EFFECT OF COCONUT OIL ON SERUM LIPIDS OF NORMAL AND OF THYROIDECTOMIZED DOGS. F. Grande and A. Schultz (Jay

Phillips Res. Lab., Mount Sinai Hospital and Depts. of Physiological Hygiene and Medicine, U. of Minn., Minneapolis, Minn.). *Proc. Soc. Exp. Biol. Med.* 121, 1107-10 (1966). Thyroidectomized dogs respond to the addition of coconut oil to the diet with greater elevations of serum cholesterol concentration than do normal dogs. This greater elevation is not explained by the higher serum cholesterol level of the thyroidectomized dogs on the low-fat diet. Serum phospholipids are elevated by administration of coconut oil but there is no difference between the responses of normal and thyroidectomized dogs. Serum triglycerides are elevated in both groups of animals by coconut oil. The elevation tends to be greater in the thyroidectomized animals but the difference between normal and thyroidectomized dogs was not statistically significant.

DIALKYL CARBONATE-INDUCED TRANSESTERIFICATION FOR ANALYSIS OF FATTY ACIDS IN MILK. R. L. Glass and Heidi A. Troolin (Dept. of Biochem., Univ. of Minnesota, St. Paul). *J. Dairy Sci.* 49, 1469-72 (1966). A procedure is described whereby the alkyl esters of fatty acids may be prepared for gas-liquid chromatography (GLC) by a transesterification reaction applied directly to extracts of milk. To prepare the methyl esters the milk is extracted with a reagent consisting of methanol, dimethyl carbonate, and benzene. A portion of the clear extract is made alkaline by addition of sodium methoxide and the methyl esters are formed from the chemically bound (glyceryl and steryl) fatty acids in 1-2 min at room temperature. The mixture may be analyzed by GLC immediately. However, free fatty acids present are not esterified under these conditions. These may be subsequently esterified, at room temperature, by acidification of the reaction mixture. This forms the basis for a differential procedure for determination of free and chemically bound fatty acids in a mixture containing both. Fatty acid ethyl, propyl, and butyl esters may be obtained in a completely analogous manner.

CONCENTRATIONS OF VOLATILE FATTY ACIDS AND LACTIC ACID IN THE RUMEN AS INFLUENCED BY DIET AND POST-FEEDING TIME. K. Z. Ghorban, K. L. Knox and G. M. Ward (Dept. of Animal Sci., Colorado State Univ., Fort Collins). *J. Dairy Sci.* 49, 1515-18 (1966). The concentration and the percentage of individual volatile fatty acids and the concentration of lactic acid was determined in the rumen fluid of rumen-fistulated cattle at 15 intervals after feeding. Diets consisted of long alfalfa hay, dehydrated alfalfa pellets, flaked corn, rolled barley, dried beet pulp, rolled milo, cracked corn and corn silage, and flaked corn and corn silage. An acetic:propionic acid ratio similar to that for hay was produced by dried beet pulp or milo. Flaked corn produced a lower ratio than cracked corn but more lactic acid when both were fed with corn silage. Dried beet pulp resulted in the highest lactic acid levels (73 mg %). The possible significance of ruminal lactate levels to milk-fat depression is discussed.

RENAL LIPID COMPOSITION OF CHOLINE-DEFICIENT RATS. Mona E. Fewster, J. F. Nyc and W. H. Griffith (Dept. of Biological Chem. Univ. of Calif. at Los Angeles, Calif.). *J. Nutr.* 90, 252-58 (1966). Three groups of weanling male rats of the Sprague-Dawley strain were used in a study of the changes in lipid composition between normal kidneys and severely hemorrhagic kidneys from choline-deficient rats. A semipurified diet, with and without choline supplement, and a laboratory ration diet were fed for 11 to 14 days. The fatty acid composition of the renal lipids from these animals was determined by gas-liquid chromatography. The fatty acid patterns of the total lipids from severely hemorrhagic kidneys showed a striking decrease in the relative amounts of linoleic and arachidonic acids when compared with values obtained with control animals. Changes in the fatty acid composition of the renal phospholipids accounted for much of the difference observed in the total lipids. The values obtained for kidneys with less severe lesions were intermediate between the extremes noted in normal and severely affected kidneys. The fatty acid changes in the abnormal kidneys appear to be related to the severity of the syndrome.

SECRETION OF HEPTACHLOR EPOXIDE IN MILK. B. J. Demott, J. T. Miles, S. A. Hinton and L. J. Hardin (Dairy Dept., Univ. of Tennessee, Knoxville). *J. Dairy Sci.* 49, 1495-99 (1966). Twelve cows, fed alfalfa hay containing 0.08 or 0.29 ppm heptachlor and heptachlor epoxide for 35 days, secreted into their milk an average of 17 and 9% of the intake, respectively, all in the form of the epoxide. A log-log relationship with a correlation coefficient of 0.97 was found between the amount of heptachlor plus its epoxide consumed and the concentration

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of the epoxide in the milk fat. Cows in early lactation secreted slightly more of their intake into their milk than cows in late lactation. However, cows in late lactation produced milk and milk fat with a slightly higher concentration of the epoxide than cows in early lactation. Jersey cows had a higher concentration of the epoxide per kilogram of milk than did Holsteins, but the Jersey milk fat had a lower concentration than did Holstein milk fat.

EFFECT OF FEEDING A MILK FAT DEPRESSING RATION ON FATTY ACID COMPOSITION OF BLOOD LIPIDS. C. L. Davis and D. S. Sachan (Dept. of Dairy Sci., Univ. of Illinois, Urbana). *J. Dairy Sci.* 49, 1567-69 (1966). Major changes were found to occur in the fatty acid composition of blood from lactating cows fed a high concentrate, low-fiber ration. The most noticeable change was a decrease in the concentration of palmitic and stearic acid, with a concomitant increase in oleic, linoleic, and linolenic. Changes seen in the fatty acid composition of the blood lipids are reflected in the fatty acid make-up of the milk fat.

EFFECT OF SATURATED AND UNSATURATED FATTY ACIDS ON THE DESATURATION IN VITRO OF PALMITIC, STEARIC, OLEIC, LINOLEIC AND LINOLENIC ACIDS. R. R. Brenner and R. O. Peluffo (Catedra de Bioquímica, Instituto de Fisiología, Facultad de Ciencias Médicas, La Plata, Argentina). *J. Biol. Chem.* 241, 5213-19 (1966). Quantitative oxidative desaturation of labeled palmitic, stearic, oleic, linoleic and linolenic acids to palmitoleic, oleic, octadeca-6,9-dienoic,  $\gamma$ -linolenic, and octadeca-6,9,12,15-tetraenoic acids, respectively, by liver microsomes of rats was studied by gas-liquid radiochromatography after incubation of the acids in a medium containing adenosine triphosphate, reduced nicotinamide adenine dinucleotide, reduced nicotinamide adenine dinucleotide phosphate,  $MgCl_2$ , coenzyme A, glutathione, nicotinamide, NaF, and NaCN in oxygen at 35°C. The rates of conversion of oleic into octadeca-6,9-dienoic, linoleic into  $\gamma$ -linolenic, and linolenic into octadeca-6,9,12,15-tetraenoic acids were measured, and Lineweaver-Burks plots showed the existence of competitive reactions among the three acids.

COMPARISON OF INTESTINAL ABSORPTION AND ESTERIFICATION OF  $4\text{-}^{14}\text{C}$ -VITAMIN  $D_3$  AND  $4\text{-}^{14}\text{C}$ -CHOLESTEROL IN THE RAT. N. H. Bell (Dept. of Med., Northwestern Univ. Med. School, Chicago, Ill.). *Proc. Soc. Exp. Biol. Med.* 123, 529-32 (1966). Intestinal absorption and esterification of  $4\text{-}^{14}\text{C}$ -vitamin  $D_3$  and  $4\text{-}^{14}\text{C}$ -cholesterol were studied in rats with lymph fistulas. After oral administration, extracts of lymph, fractionated by thin-layer chromatography, were found to contain the sterols, their esters and unidentified more polar compounds. In contrast to cholesterol, very little vitamin D was esterified. The esters of both sterols, separated by thin-layer chromatography on the basis of the degree of unsaturation of the fatty acid moiety, were found to consist of principally of saturated and mono-unsaturated fatty acids.

XANTHOPHYLL AND CAROTENE STABILITY DURING ALFALFA DEHYDRATION. A. L. Livingston, R. E. Knowles, M. Israelsen, J. W. Nelson, A. C. Mottola and G. O. Kohler (Western Regional Res Lab., U.S. Dept. of Agr., Albany, Calif.). *J. Agr. Food Chem.* 14, 643-6 (1966). The xanthophyll content of dehydrated alfalfa meal was greatly reduced as the outlet temperature was increased and the moisture content of the meal decreased. Although total carotene was relatively unaffected by temperature of dehydration or moisture of meal, the beta-carotene isomers increased with the higher outlet temperature and lower moisture levels.

CAROTENOID PIGMENTS IN PLANTS. MAJOR INTERFERING SUBSTANCES IN DETERMINING 2,4-D, A METABOLITE OF 2,4-DB. R. D. Hagin, D. L. Linscott, R. N. Roberts and J. E. Dawson (Crops Res. Div., U.S. Dept. of Agr., and Cornell Univ., Ithaca, N.Y.). *J. Agr. Food Chem.* 14, 630-2 (1966). Methylated derivatives of two natural plant pigments, the all *trans* isomer of lutein (3,3'-dihydroxy- $\alpha$ -carotene) and violaxanthin (3,3'-dihydroxy-5,6,5',6'-diepoxy- $\beta$ -carotene), isolated from brome grass (*Bromus inermis* Leyss.) and timothy (*Phleum pratense* L.), have retention characteristics identical to the methyl ester of 2,4-dichlorophenoxyacetic acid (2,4-D) on several types of chromatographic columns and ranges of column parameters that are commonly used in determining this herbicide.

DISTRIBUTION OF LIPIDS IN AIR-FRACTIONATED FLOURS. R. D. Daftary, A. B. War and Y. Pomeranz (Dept. of Flour and Feed Milling Ind., Kansas State Univ. and Crops Research Division, ARS, USDA, Manhattan, Kansas 66502). *J. Food Sci.* 31, 897-901 (1966). Lipids were extracted with petroleum-ether, then water-saturated butanol or directly with water-saturated butanol from a composite hard red winter wheat

flour and from five flours separated from the original flour by air classification. The lipids were fractionated by silicic acid column and thin-layer chromatography. Lipid contents increased as the protein contents of the flour fractions increased. The original flour contained a higher concentration of total and bound lipids than the residual coarse flour; the two flours contained comparable amounts of protein. It is postulated that shifts in particle size and in lipids during air fractionation might be responsible for differences in storability of various flour fractions as such, or in combination with other perishable food ingredients.

EFFECT OF ETHOXYQUIN ON CAROTENOID STABILITY AND UTILIZATION. H. S. Nakae, A. A. Kurnick, B. J. Hulett and B. L. Reid (Dept. Poultry Sci., Univ. of Arizona, Tucson). *Poultry Sci.* 45, 478-83 (1966). The stabilities of beta-carotene and xanthophylls of dehydrated alfalfa meal in the presence of 150, 300, 600, and 1,200 ppm ethoxyquin were compared after 8-weeks' storage. The alfalfa meal was stored in galvanized cans at room temperature during August and September. Improved retention due to the increasing levels of ethoxyquin amounted to 49.6, 48.4, 54.7 and 69.3%, respectively, for beta-carotene and 19.3, 18.7, 23.4 and 25.4%, respectively, for xanthophylls compared with the untreated alfalfa meal. When 600 or 1,200 ppm was added to the alfalfa in the diets of laying pullets, improvements of yolk color intensities were 29.0, 36.7, 37.6 and 40.4%, respectively, compared with untreated alfalfa meal. The losses of beta-carotene and xanthophylls from the mixed feed during the 4 weeks feeding period were lowered by the addition of ethoxyquin. The most labile carotenoids in the absence of the antioxidant appeared to be flavoxanthin, violaxanthin, beta-carotene and neoxanthin. Cryptoxanthin, lutein and zeaxanthin were retained to the extent of 72 to 77% in the absence of ethoxyquin. The relative effectiveness of the major xanthophyll components of dehydrated alfalfa meal for yolk pigmentation was determined. Cryptoxanthin, lutein and zeaxanthophylls extracted from egg yolks. Zeaxanthin appeared to be the most efficiently utilized and was deposited to the extent of 36 to 43% of that consumed while lutein showed the poorest utilization being deposited to the extent of only 8%. Total xanthophylls present were deposited in the egg yolk to the extent of 14%.

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SOLUBILIZATION AND PROPERTIES OF THE APOPROTEINS OF THE VERY LOW- AND LOW-DENSITY LIPOPROTEINS OF HUMAN SERUM. J. L. Granda and A. Seanu (Depts. of Med. and Biochem., Univ. of Chicago, Chicago, Ill.). *Biochemistry* 5, 3301-08 (1966). Normal human serum lipoproteins of  $\rho < 1.006$  g/ml (VLDL),  $1.006 < \rho < 1.019$  g/ml (LDL<sub>1</sub>), and  $1.019 < \rho < 1.063$  g/ml (LDL<sub>2</sub>) were subjected to delipidation by either diethyl ether (Et<sub>2</sub>O) or a mixture of 1:3 ethanol-diethyl ether (EtOH-Et<sub>2</sub>O) in the presence of 0.2 M sodium dodecyl sulfate. The products were soluble in alkaline aqueous buffers with protein recoveries of 98-100% (Et<sub>2</sub>O treatment) and 85-90% (EtOH-Et<sub>2</sub>O treatment). Ether removed essentially all cholesterol and triglycerides; EtOH-Et<sub>2</sub>O removed all lipids except for 1-3% phospholipids and traces of triglycerides. The above results indicate that differences exist between the protein moieties of VLDL and LDL. They do not answer the question whether the number of N-terminal residues of VLDL are indeed part of the structural protein or due to nonlipoprotein contaminants. The second interpretation appears to be valid for VLDL from hyperlipemic sera.

HEPATIC LIPID METABOLISM IN EXPERIMENTAL DIABETES. I. RELEASE AND UPTAKE OF TRIGLYCERIDES BY PERFUSED LIVERS FROM NORMAL AND ALLOXAN-DIABETIC RATS. M. Heimberg, A. Dunkerley and T. O. Brown (Dept. of Pharmacol., Vanderbilt Univ., School of Med., Nashville, Tenn.). *Biochem. Biophys. Acta* 125, 252-64 (1966). The uptake of nonesterified fatty acids was accelerated and the net release of triglyceride by the isolated perfused rat liver was depressed in alloxan diabetes. Triglyceride release by livers from either normal or diabetic rats was proportional to the palmitate presented to the liver; triglyceride release, however, was depressed in livers from diabetic rats at all concentrations of perfusate fatty acid. Uptake of triglyceride from chylomicra was more rapid by livers from diabetic animals than by livers from normal fed rats.

ANALYSIS OF PHOSPHOLIPIDS. C. Pries, A. Aumont and C. J. F. Bottecher (Gaubius Inst. of the Univ., Leyden, The Netherlands). *Biochem. Biophys. Acta* 125, 277-87 (1966). The well-known method of successive chemical hydrolysis of phospholipid mixtures according to Dawson has been modified in several respects and can be applied to a whole phospholipid mixture as well as to fractions obtained by silica gel column pre-fractionation. In contrast to known methods, the combination of silica gel column fractionation and step-wise hydrolysis presented here makes it possible to discriminate between diacyl- and monoacyl-glycerophosphatides. The improvements in the technique of step-wise hydrolysis proposed here are the following: by modification of the mild alkaline hydrolysis, a quantitative deacylation with a minimum of additional breakdown of the polar part of the phosphatides is achieved; by using a Folch partition after alkaline hydrolysis no interference by emulsions or interfacial fluff is encountered, even though the total sphingolipid content of the sample may be as high as 60-70%; a better paper-chromatographic separation of the glycerophosphate esters has been made possible by the use of relatively small quantities of alkali; an increase in accuracy, again compared with the known procedure, has been achieved by determining the phosphorus content of the various fractions, and of the upper and lower layers after partition separately, and using the paper-chromatographic separation of the glycerophosphate esters only as means to determine the ratio of the components; finally, by modification of the acid hydrolysis, losses of phosphate esters due to the washings necessary when using trichloroacetic acid-mercuric chloride are avoided.

INDIVIDUAL MOLECULAR SPECIES OF PHOSPHOLIPIDS. III. MOLECULAR SPECIES OF OX-BRAIN LECITHINS. O. Renkonen (Dept. of Serology and Bacteriology, Univ. of Helsinki, Finland). *Biochem. Biophys. Acta* 125, 288-309 (1966). A mixture of native choline plasmalogens and alkoxy lecithins was isolated from ox brain by partial alkaline methanolysis of the total lecithin. Hydrolysis of total ox-brain lecithins with phospholipase C (EC 3.1.4.3) from *Clostridium welchii* converted all three subclasses of the glycerylphosphorylcholine lipids into

diglycerides; these were subsequently acetylated. The resulting mixture of diglyceride acetates was separated by chromatography on kieselgel G into ordinary diglyceride acetates (95.2%), plasmalogenic diglyceride acetates (1.9%) and corresponding alkoxy compounds (2.2%). Chromatographic evidence and observations on partial hydrolysis with pancreatic lipase (EC 3.1.1.3) proved that the fraction of the ordinary diglyceride acetates contained about 99% 1,2-diglyceride acetates and about 1% 1,3-diglyceride acetates. Hydrolysis of the plasmalogenic diglyceride acetates and the alkoxy analogs with pancreatic lipase suggested that their long-chain acyl esters groups were located on C-2 and the acetyl group on C-3 of glycerol.

THE PHOSPHOLIPID FATTY ACID COMPOSITION OF LIVER, KIDNEY, HEART AND SPLEEN MITOCHONDRIA FROM RATS OF VARIOUS AGE GROUPS. E. A. Glende, Jr. and W. E. Cornatzer (Guy and Bertha Ireland Res. Lab., Dept. of Biochem. Univ. of North Dakota School of Med., Grand Forks, N.D.). *Biochem. Biophys. Acta* 125, 310-18 (1966). The fatty acid compositions of phosphatidyl inositol, phosphatidyl choline and phosphatidyl ethanolamine, isolated by silicic acid paper chromatography from the lipid extracts of mitochondria from rat liver, kidney, heart and spleen, were determined from animals 73, 159 and 252 days of age which had been maintained on laboratory chow. Stearic acids was found to be the major fatty acid component of phosphatidyl inositol. The levels of palmitate and linoleate were higher in the phosphatidyl cholines than in the phosphatidyl ethanolamines, whereas the phosphatidyl ethanolamines contained larger amounts of stearate and arachidonate than the phosphatidyl cholines. A decrease in the phosphatidyl inositol stearate content with age was noted in liver, kidney and heart mitochondria. Lower levels of palmitate occurred with age in heart and spleen phosphatidyl inositol. Stearate increased while linoleate of spleen phosphatidyl ethanolamine decreased in the older animals. With these exceptions, the fatty acid composition of the mitochondrial phospholipids remained relatively unchanged with age in the tissues examined.

ISOLATION AND PROPERTIES OF A SOLUBLE LIPOPROTEIN FROM FASCIOLA HEPATICA. Stephane Korach (Lab. de Chimie physique des Proteides, Inst. Pasteur, Paris, France). *Biochem. Biophys. Acta* 125, 335-51 (1966). A new lipoprotein has been isolated from the liver fluke (*Fasciola hepatica*) and its physical, chemical and immunological properties have been studied. The method of isolation includes extraction with buffer, followed by precipitation of the lipoprotein with dextran sulphate and final purification by differential ultracentrifugation (floating) in a high-density salt medium. The material thus obtained appeared to be homogenous in the ultracentrifuge, as well as by free-boundary electrophoresis and by immunochemical analysis. Its chemical composition is rather similar to that of alpha (high density) lipoprotein from human serum.

STUDIES ON THE CHOLESTEROL ESTERS OF THE ADRENAL GLANDS AND OTHER TISSUES OF THE RABBIT. J. H. Moore and D. L. Williams (National Inst. for Res. in Dairying, Shinfield, Great Britain). *Biochem. Biophys. Acta* 125, 352-66 (1966). The concentration of *cis*-vaccenic acid in the adrenal cholesterol esters was highest in the rabbits given a high-starch, low-fat diet and lowest in rabbits given a diet containing 20% maize oil. Appreciable concentrations of homo- $\gamma$ -linolenic acid occurred in the adrenal cholesterol esters of the rabbits and there was a direct linear relationship between the concentration of this acid in the adrenal cholesterol esters and the linoleic acid content of the diet. No such relationship was found between the concentration of arachidonic acid in the adrenal cholesterol esters and the linoleic acid contents of the diet. In the adrenal cholesterol esters there were highly significant positive correlations between the concentrations of linoleic and homo- $\gamma$ -linolenic acids and between the concentrations of arachidonic and adrenic acids. It was concluded that in the adrenal gland of the rabbit the rate of synthesis of homo- $\gamma$ -linolenic acid from linoleic acid is greater than the rate of synthesis of arachidonic acid from homo- $\gamma$ -linolenic acid.

MICELLAR SOLUBILISATION OF PALMITIC, STEARIC AND OLEIC ACIDS IN SOLUTIONS OF CONJUGATED BILE ACIDS. P. Savary (Inst. de Chimie Biologique, Faculte des Sciences, Place Victor Hugo, Marseille 3<sup>e</sup>, France). *Biochem. Biophys. Acta* 125, 328-34 (1966). Oleic acid increases the solubility of saturated fatty acids in micellar solutions of conjugated bile acids by lowering the melting point. It is the liquid part of the saturated and unsaturated fatty acid mixtures which is preferentially incorporated into the conjugated bile acid micelles. When only a limited quantity of these bile acids is present, the liquid fatty acid mixtures are partly in the form of particles coarser than

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the ordinary micelles, but smaller than 100 $\mu$ . Analogous results are found with mixtures of stearic acid and monoolein. THE INTERACTION OF THE PSYCHOTOMIMETIC GLYCOLATE ESTERS WITH ADENOSINE TRIPHOSPHATE, CALCIUM AND LECITHIN MONOLAYERS. G. A. Rogeness, L. G. Krugman and L. G. Abood (Dept. of Psychiatry, U. of Ill. Medical Center, Chicago, Ill., and Center for Brain Research, U. of Rochester, Rochester, N.Y.). *Biochem. Biophys. Acta* 125, 319-27 (1966). The action of a psychotomimetic agent, N-methyl-3-piperidinol cyclopentyl-phenylglycolate, on the surface pressure and surface viscosity of lecithin monolayers was investigated. Evidence is presented suggesting that PHCG associates with the phosphate group of the lecithin as well as with the fatty acid chains of the lecithin molecule. Also, it was shown that the drug associates with Ca<sup>2+</sup> and phosphate ions and with ATP. The association with APT primarily involves the adenine groups, while the phosphate chain interferes in some manner with this association. The results are discussed in terms of their possible significance in explaining some of the observed effects of PMCG and related agents on excitable tissue.

THE RELATIVE AMOUNTS OF LONG-CHAIN ACYLCARNITINE, ACETYLCARNITINE AND FREE CARNITINE IN ORGANS OF RATS IN DIFFERENT NUTRITIONAL STATES AND WITH ALLOXAN DIABETES. T. Bohmer, K. R. Norum and J. Bremer (Institute of Clinical Biochem., U. of Oslo, Rikshospitalet, Oslo, Norway). *Biochem. Biophys. Acta* 125, 244-51 (1966). The relative amounts of free carnitine, acetylcarnitine, and long-chain acylcarnitines have been investigated in the heart, liver and kidney of male rats during different nutritional states and with alloxan diabetes. The relative proportion of long-chain acylcarnitines to free carnitine increases during fat-feeding, diabetes and fasting, and decreases when glucose is given again. The level of long-chain acylcarnitines changes in the same direction as the level of long-chain acyl-CoA's which is known to alter in these conditions. In the kidney the relative proportion of acetylcarnitine to free carnitine increases during fat-feeding, diabetes and fasting, and decreases when glucose is again consumed. These changes are in accord with the changes known to occur with acetyl-CoA in similar conditions. In the liver and the heart the changes in acetylcarnitine were not significant. The method described seems to be convenient for studying the level of activated fatty acids in the tissues.

INCORPORATION OF GLUCOSE-1-<sup>14</sup>C, -6-<sup>14</sup>C, -1-<sup>3</sup>H AND -6-<sup>3</sup>H AND OF GLYCEROL-1-<sup>14</sup>C AND -2-<sup>3</sup>H INTO VARIOUS FATTY ACIDS OF THE NORMAL MOUSE. G. Abelin, S. Rouse and P. Favarger (Inst. de Biochimie Medicale de l'Universite' de Geneve Geneve (Suisse)). *Biochem. Biophys. Acta* 125, 237-43 (1966). The following pairs of compounds, in the ration 1:1, were injected intravenously into mice 17 min before sacrifice: glucose-6-<sup>3</sup>H and glucose-1-<sup>14</sup>C, glucose-1-<sup>3</sup>H and glucose-6-<sup>14</sup>C, glucose-6-<sup>3</sup>H and glucose-6-<sup>14</sup>C, glucose-1-<sup>3</sup>H and glucose-1-<sup>14</sup>C or glycerol-2-<sup>3</sup>H and glycerol-1-<sup>14</sup>C. The incorporation of these isotopes into the total fatty acids of the triglycerides of the carcass and liver was studied, as well as their distribution in palmitic, oleic and stearic. The hydrogen at C-1 showed a much greater incorporation than the hydrogen at C-6. This difference was not observed in the liver. The newly formed oleic acid contained a greater proportion of <sup>3</sup>H derived from the glucose-1-<sup>3</sup>H than the stearic or palmitic acids. This difference was not apparent in the liver. The NAD-<sup>3</sup>H formed from glycerol-2-<sup>3</sup>H does not seem to play a specific part in the synthesis of oleic acid.

LIPID METABOLISM IN CULTURED CELLS. VI. LIPID BIOSYNTHESIS IN SERUM AND SYNTHETIC GROWTH MEDIA. J. M. Bailey (Dept. of Biochem., George Washington Med. School, Washington, D.C.). *Biochem. Biophys. Acta* 125, 226-36 (1966). I-strain mouse fibroblasts grown on a lipid-free chemically defined medium (NCTC 109) derived cell lipids by synthesis from simpler components in the medium. By supplementing the medium with <sup>14</sup>C-labelled precursors it was found that, under the conditions used, over half of the cell lipids were synthesized from glucose and about 20% from acetate. When serum was added to the growth medium, incorporation of <sup>14</sup>C-acetate into cell lipids was almost completely (up to 98%) inhibited, and incorporation of glucose was also considerably (70%) reduced. The lipid composition of the cells, however, was essentially unchanged. The inhibiting effect of serum on acetate incorporation could be duplicated by addition of certain purified lipids, including cholesterol, to the synthetic growth medium. By fractionation of radioactive cell lipids on silicic acid columns it was shown that added serum depressed incorporation into all lipid classes to approximately the same extent. Mevalonic acid-2-<sup>14</sup>C added to synthetic growth medium was also utilized for synthesis of cellular lipids, most of the radioactivity being found in cholesterol. Addition of serum or purified lipids did not inhibit mevalonic acid incorporation.

## • Drying Oils and Paints

DRYING AND OXIDATION RATES FOR LINOLEIC MODIFIED ALKYD RESINS. E. G. Bobalek, E. R. Moore and J. R. Shelton (Engineering Div., Case Inst. of Technol., Cleveland, Ohio). *I & EC Product Res. Dev.* 5, 323-5 (1966). The hardening rates and volumetric rates of catalyzed oxygen absorption during film formation at 21C were examined as a function of molecular weight for an alkyd resin prepared by a solvent process reaction from glycerol, phthalic anhydride, and linoleic acid in the molar ratio of 1:1:0.4. The rate of oxygen uptake up to 150 hours at 22C increased with increasing molecular weight. It is hypothesized that a diffusion limitation was imposed on the termination step of the free radical oxidation process. This diffusional limitation is related to current gelation theory.

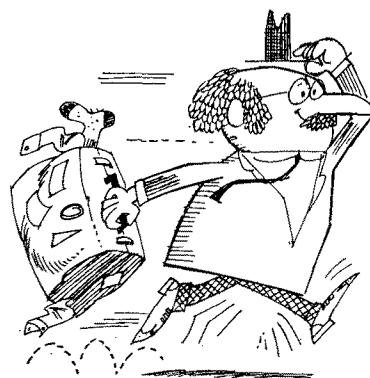
NITROPARAFFINS AND THEIR USE IN PAINTS. R. F. Purecell. *Ind. della Vernice*, 20, No. 1, 14-20 (1966). The properties of nitromethane, nitroethane and 1- and 2-nitropropane are tabulated and discussed in comparison with other solvents used in the paint industry. 2-Nitropropane (b.p. 120.3C) appears particularly suitable for use as a component of solvent mixtures (though not, in general, as the sole solvent) and is considered in greatest detail. The uses of the amino-derivatives obtained by the reduction of nitroparaffins and related nitro-compounds are considered more briefly. Thus, trimethylol-aminomethane may be used as a polyol for making alkyds having novel properties. (Rev. Current Lit. Paint Allied Ind., No. 292)

LINSEED FATTY ACIDS BETULINOL ESTERS AND THEIR EVALUATION AS PROTECTIVE COATING VEHICLES. M. Aslam, K. Aslam and S. Akhtar. *Pakistan J. Sci. Ind. Res.* 8, 31-5 (1965). Esters of linseed fatty acids with betulinol and extracts of *Betula utilis* have a longer induction period than linseed oil. Esters obtained by partial reduction in A.V. by use of extracts followed by esterification with glycerol or pentaerythritol yield improved products. The varnish properties of these esters are better than those of linseed oil. (Rev. Current Lit. Paint Allied Ind., No. 291)

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## • Detergents

**POURABLE AND FREE-FLOWING DETERGENT, WETTING AND EMULSIFYING COMPOSITIONS.** W. Stein, H. Weiss, and O. Koch (Henkel & Cie G.m.b.H., Dusseldorf-Holthausen). *U.S. 3,274,117*. Described is a surface active composition characterized by outstanding pouring and free-flowing properties comprising (a) 5-65 weight % of a salt of an alpha sulfo fatty acid having 10-24 carbon atoms in its molecule; and (b) 35-95 weight % of a surface active alpha sulfo fatty acid ester salt, the fatty acid radical component of which has 10-24 carbons atoms, the alcohol radical component being derived from a member selected from the group consisting of mono-valent alcohols having 1-18 carbon atoms and polyvalent alcohols having 2-4 carbon atoms in their molecules, the cations of the salt being selected from one member of the group consisting of Na, K, Mg and  $\text{NH}_4$  cations.

**TRANSPARENT SOAP BAR.** S. Goldwasser and F. V. Ryer (Lever Brothers Co.). *U.S. 3,274,119*. A process for preparing a transparent soap bar comprises working a liquid neat soap composition having 5-24% total *trans*-oleic acid radicals based on total fat charge to convert mechanical energy into heat energy and to cause a rise in temperature to within a range of about 100-110F, whose moisture content and salt content have been adjusted prior to the end of the working step to provide 14-17% moisture and 0.2-0.8% water-soluble, soap-compatible alkali metal salt in the finished bar; and compacting the soap composition into bar form.

**QUATERNARY AMMONIUM SALTS OF HIGHER ALPHA-SULFO FATTY ACIDS.** R. L. Wakeman and J. F. Coates (Millmaster Onyx Corp.). *U.S. 3,274,199*. Described is the salt of an alkyl quaternary ammonium compound and an alpha-sulfo acid selected from the group consisting of alpha-sulfo-decanoic acid, -octanoic acid, -lauric, -palmitic, -stearic, -myristic, -arachidic, and -behenic acids, the alkyl quaternary ammonium compound having a phenol coefficient of at least 100 with respect to both *Staphylococcus aureus* and *Salmonella typhosa* at 30C, and having at least one alkyl with 8-22 carbon atoms.

**PREPARATION OF DETERGENT ALKYLATES.** B. L. Kapur and R. D. Eccles (Continental Oil Co.). *U.S. 3,274,278*. An improved process for preparing detergent alkylates comprises reacting a chlorination product of from 0.1-0.8 atom of chlorine per mole of an alkane selected from the group consisting of  $\text{C}_{10}$ - $\text{C}_{16}$  normal paraffins and mixtures thereof with a substantially stoichiometric excess of benzene in the presence of  $\text{AlCl}_3$  catalyst and an added amount of a diphenyl substituted higher alkane.

**IODINE DETERGENT COMPOSITIONS.** L. M. Schenck and H. Kaplan (General Aniline & Film Corp.). *U.S. 3,277,010*. A water-soluble, low-foaming germicidal detergent composition consists of (A) the halide of a nonionic surface active agent selected from the class consisting of polyethoxylated phenols and polyoxylated aliphatic alcohols having from 2 to 12 recurring oxyalkylene units and (B) elemental iodine in an amount sufficient to provide from 1-30% by weight available iodine in the composition.

**WATERLESS SKIN CLEANSER AND PROCESS FOR PRODUCING THE SAME.** J. L. Gianladis (G. H. Packwood Mfg. Co.). *U.S. 3,277,013*. A thixotropic skin cleanser having fast breaking qualities when massaged upon the skin and adapted to be used without water, comprises a mineral oil solvent for skin contaminants including grease, grime and dirt, a nonionic polyethylene oxide reaction product emulsifying agent, a tertiary amine having one alkyl group and 2 polyoxyethylene groups in an amount not to exceed 2%, a synthetic hydrophilic acid polymer colloid at least partially neutralized *in situ* by an alkaline agent, the colloid being a copolymer of about 99% by weight of acrylic acid and about 1% of a polyallyl sucrose, and water.

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**POLYOXYETHYLENE DERIVATIVES OF SUCROGLYCERIDES.** L. Nobile (Ledoga, S.p.A., Milan). *U.S. 3,277,080*. Condensation products of sucroglycerides with 0.5 to 9 parts by weight of ethylene oxide exhibit surfactant, detergent and emulsifying properties and have a cloud point in aqueous solution from 92-7C.

**DETERGENT COMPOSITION.** L. McDonald (Kelite Chemicals Corp.). *U.S. 3,278,444*. A bar soap composition resistant to sloughing and capable of being effectively used in salt, acid, and alkaline solution consists of 5-50% by weight of an organic non-soap anionic detergent, 0.05-5% of a metal salt of a linear organic polymer containing acid groups in the molecule, having a molecular weight in the range of 70,000-5,000,000, the polymer being selected from the group consisting of polyvinyl toluene and polystyrene, sodium and calcium sulfonates, and 50-95% by weight of a soap selected from the group consisting of a sodium salt of tallow and a sodium salt of coconut oil fatty acids.

**WASHING COMPOSITIONS.** R. R. Irani (Monsanto Co.). *U.S. 3,278,446*. An alkaline washing composition consists of a combination of an alkali cleanser and an inhibiting agent selected from the group consisting of amino tri(lower alkylidene phosphonic acids) having substituents on the carbon atom of the N-C-P linkages selected from the group consisting of hydrogen and alkyl groups containing from 1 to 4 carbon atoms, and their water soluble salts. The proportion by weight of the inhibiting agent to the alkali cleanser should be between about 5/1 to 1/400.

**ANTISEPTIC DETERGENT COMPOSITIONS.** K. Moedritzer (Monsanto Co.). *U.S. 3,281,365*. An antiseptic detergent composition consists of a detergent selected from the class consisting of soap and organic synthetic detergents selected from the class consisting of non-soap anionic, nonionic and amphoteric surfactants and an antiseptically effective amount of a quaternary phosphonium halide in which one of the R groups is an aliphatic group containing from 6-24 carbons and the other 3 R groups are members selected from the group consisting of aliphatic, aryl, alkaryl, aralkyl and alicyclic groups of from 1-12 carbon atoms and the halide is chlorine, bromine, or iodine ion.

**SYNERGISTIC ANTIBACTERIAL COMPOSITIONS.** L. F. Judge and D. J. Kooyman (Procter & Gamble Co.). *U.S. 3,281,366*. An antibacterial detergent composition consists of (A) a combination of (1) the zinc salt of 1-hydroxy-2-pyridinethione and (2) at least 2 antibacterial agents selected from the group consisting of 3,5,4'-tribromosalicylanilide, bis(2-hydroxy-3,5,6-trichlorophenyl)methane, 3-trifluoro-methyl-4,4'-dichlorocarbani- lide, 4,3,3'-trichlorocarbani- lide and 3,4,4'-trichlorocarbani- lide, the proportions by weight of (1) and (2) being about 1 part ingredient (1) to 0.666 to 5 parts of each of the agents, and (B) a detergent base, the combination displaying a synergistic antibacterial action when used with water on the human body, the concentration of ingredient (1) ranging from 0.1% to 0.5% by weight of the composition, the total concentration of the agents being not more than about 1.5%, and the balance of the composition being the detergent base which consists of a water-soluble organic detergent selected from the group consisting of (a) sodium and potassium soaps of higher fatty acids, (b) water-soluble salts of organic sulfuric reaction products having in their molecular structure an alkyl group containing from 8-22 carbon atoms and a sulfonic or sulfuric acid ester radical and (c) nonionic synthetic organic detergents.

**LIQUID DETERGENT COMPOSITIONS.** T. G. Jones and D. W. Stephens (Lever Bros. Co.). *U.S. 3,281,367*. A stabilized liquid abrasive detergent composition consists of 35-95% of an aqueous medium and 65-5% of a finely-divided, water-insoluble abrasive material. The aqueous medium consists of water and 2-45% of a water-soluble, non-acidic salt of a phosphoric acid having a molecular weight below 400; 1-10% of a fatty acid alkanolamide selected from the group consisting of the mono- and diethanolamides, isopropanolamides, glycerolamides and tris-(hydroxymethyl)-methylamides of fatty acids having from 8-18 carbons; 3-8% of a water-soluble synthetic organic anionic non-soap detergent (sodium or potassium alkylaryl sulfonates, alkyl sulfates, acylaminoalkane sulfonates); and 0-5% of the sodium or potassium soap from tallow, palm oil, coconut or groundnut oil.

**BUILT TERTIARY AMINE OXIDE DETERGENTS.** R. E. Zimmerer and H. F. Drew (Procter & Gamble Co.). *U.S. 3,281,368*. A detergent composition consists of 5-80% of a tertiary amine oxide compound having the formula  $\text{R}_1\text{R}_2\text{R}_3\text{N} \rightarrow \text{O}$ , in which  $\text{R}_1$  is selected from the group consisting of 2-hydroxyalkyl,

3-hydroxyalkyl and 3-alkoxy-2-hydroxypropyl radicals in which the alkyl and alkoxy, respectively, range in chain length from 10-18 carbon atoms,  $R_2$  and  $R_3$  are each selected from the group consisting of 2-hydroxyethyl, 2-hydroxypropyl and 3-hydroxypropyl radicals, and 95-20% of a normally solid material selected from the group consisting of water-soluble inorganic alkaline builder salts, water-soluble organic alkaline sequestrant builder salts, and mixtures thereof.

GERMICIDAL CLEANING COMPOSITION. H. G. Diehn, D. J. Berenshot and J. M. Willhoite (Armour & Co.). *U.S. 3,282,849*. A cleansing composition consists of water; a water soluble nonionic detergent; and a long-chain quaternary ammonium salt selected from the group consisting of the dodecylbenzyl chloride quaternary of N,N-dimethyloctadecylamine, the dodecyl chloride quaternary of N,N dimethyloctadecylamine, the pro-tallow)amine, the dodecyl chloride quaternary of N,N-dimethyldodecylamine, and the dodecylbenzyl chloride quaternary of N-tallow tris-(hydroxyethyl)-trimethylenediamine, the quaternary ammonium salt being present in an amount sufficient to thicken the cleansing composition.

HEAVY-DUTY LIQUID DETERGENTS. F. W. Trusler and A. N. Hunter (Colgate-Palmolive Co.). *U.S. 3,282,852*. A detergent composition consists of 10-40% by weight of a mixture of a water-soluble alkyl mononuclear aryl sulfonate detergent salt having 8-15 carbons in the alkyl group and a multi-branched alkyl polyoxyethylene ethanol having 8-18 carbons in the alkyl group which has a molecular configuration corresponding to that in the saturated aliphatic alcohol produced by the Oxo process from a polymerized olefin of 3-4 carbons and an average of 5-30 moles of ethylene oxide, the ratio of the alkyl aryl sulfonate to polyethoxamer being from 10:1 to 1:4 by weight with at least 3% of each material being present in the composition, 5-20% of a water-soluble alkanolamine having 2-3 carbons in the alkanol group, 1-15% of a water-soluble alkali metal lower alkyl substituted benzene sulfonate hydro-tropic salt having up to 3 carbons in each alkyl group, and the balance water.

STABILIZATION OF SOAP COMPOSITIONS. H. Q. Zussman (Geigy Chemical Corp.). *U.S. 3,284,362*. The described composition comprises an alkali metal fatty acid soap, a germicidally effective amount of a bacteriostat, and about 10-100% by weight of the amount of the bacteriostat of a member selected from the group consisting of a benzene carboxylic acid having from 1-6 carboxylic acid groups and the alkali metal salts thereof.

GERMICIDAL SOAPS. W. M. Bright (Lever Brothers Co.). *U.S. 3,284,363*. A germicidal soap composition consists of a water-soluble alkali metal soap having from 8-26 carbon atoms and from 0.1-0.5% by weight of the soap of a synergistic germicidal mixture of from 40-10% by weight of the mixture of 3,4',5-tribromosalicylanilide and from 60-90% respectively of 3,4,4'-trichlorocarbanilide.

SOIL ANTI-REDEPOSITION AGENTS. F. H. Siegele (American Cyanamid Co.) *U.S. 3,284,364*. A detergent composition capable of preventing the redeposition of soil comprises a detergent and as a soil redeposition inhibitor an organic linear hydrocarbon chain polymer containing relative molar ratios of hydroxyl to carboxylic acid group of from 30-99 to 1 to 70, respectively.

LOW-FOAMING COMPOSITION HAVING GOOD DETERGENT PROPERTIES. H. Y. Lew (Chevron Res. Co.). *U.S. 3,285,856*. The described composition consists of a nonionic surfactant, a normally high foaming anionic detergent component selected from the group consisting of water-soluble salts of organic sulfonic acids and water-soluble salts of sulfuric acid alkyl esters, and to suppress foaming of the detergent component about 2-35%, by weight, of the detergent of a foam-suppressing agent of the formula:  $RCONHR'$  in which R is a saturated alkyl radical of 13-21 carbon atoms, and R' is selected from the group consisting of hydrogen, a hydrocarbyl radical of 1-22 carbons, and N-methyleneamide radicals, the alkyl group in the last-mentioned amide having 13-21 carbons, the nonionic surfactant being present in an amount of 5-75% by weight based on it and the anionic detergent component.

INTERNAL ANTISTATIC TREATMENT OF POLYSTYLENE WITH METAL SALTS OF AMPHOTERIC SURFACE ACTIVE AGENTS. Hideo Marumo, Minoru Saito, Morio Ninomiya and Hideo Ogata (Lion Fat & Oil Co., Tokyo). *Yukagaku* 15, 588-93 (1966). Metal salts of new type amphoteric surface active agents were incorporated as internal antistatic agents into polystyrene and ABS resin by extruding and other molding methods. The antistatic property was evaluated by surface resistivity, charge genera-

tion, static Honestmeter test and dirt chamber test. These metal salts showed good compatibility with resins and showed no bleeding out onto the surface of incorporated sheets and exhibited good antistatic properties for polystyrene and ABS resin. The Mg showed superior antistatic properties.

PREPARATION OF STANDARD CARBON BLACK FOR ARTIFICIALLY SOILED CLOTH. I. RELATIONSHIP OF PROPERTIES OF CARBON BLACK TO NATURE OF ARTIFICIALLY SOILED CLOTHS. Chiyo Tada and Miwa Sato (Niigata Women's College, Ebigase Niigata). *Yukagaku* 15, 579-87 (1966). The effect of factors such as structure, particle size, specific surface area, oxygen-containing groups on the particle surface and oily matter of carbon black on soiling and detergency of cloths has been investigated. All of above factors influenced the nature of soiled cloth. A suitable amount of oily matter on the particle surface was necessary. Uniformity of particle size and low chain structure of carbon were also desirable factors.

POLYGLYCEROL. IV. KINETICS OF THE POLYMERIZATION OF GLYCEROL. J. Zajic (Inst. Chem. Tech., Prague, Czechoslovakia). *Papers Inst. Chem. Tech.* E-9, 91-101 (1966). The polymerization of glycerol has been found to be a sequential reaction, having in its initial stage a pseudo first order character. The fact that the rate constants in the consecutive reactions bear the approximate ratio of 1:2" to one another, supports this conclusion. Addition of alkalis markedly influences the contraction of the initial phase, which is characterized by the formation of an intermediate substance. From the magnitude of the rate constants for different degrees of polymerization it follows that the drop in alkalinity at higher temperatures due to pyrolytic decomposition is of considerable importance in changing the rate of etherification. A practical conclusion of these findings would be the necessity of limiting the alkalinity of glycerol before distillation to the lowest possible degree.

FOAM, AN APPLICATIONAL PROBLEM. I. H. E. Tschakert (Hüls A. G., Marl, Germany). *Tenside* 3, 317-22 (1966). Theories of foam formation and breakdown are discussed, with reference to foam stability, foam prevention and foam fractionation. Several test methods currently in use for measuring foam (both in amount and degree of stability) are reviewed.

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