ABSTRACTS

R. A. REINERS, Editor. ABSTRACTORS: R. Aguilar B., J. G. Endres, Kazuo Fukuzumi, J. Iavicoli, K. Kitsuta, F. A. Kummerow, Gladys Macy, Louise R. Morrow E. G. Perkins and T. H. Smouse

• Fats and Oils

THE IDENTIFICATION OF VOLATILE PRODUCTS RESULTING FROM THE AUTOXIDATION OF OLEIC ACID BY THIN-LAYER AND PAPER CHROMATOGRAPHY. M. Loury, G. Lechartier and M. Forney (Lab. J. Ripert, Inst. of Fats and Oils, Paris, Fr.). *Rev. Franc. Corps Gras* 12, 253 (1965). Thin-layer and paper chromatography were used to identify the volatile products formed during the degradation of oleic acid by autoxidation. The entire homologous series of normal aliphatic aldehydes from C-1 to C-12 was characterized using thin-layer chromatography. Paper chromatography was used to detect the lower molecular weight aliphatic acids, particularly formic acid. The authors perfected the two techniques as a means of confirming their theories concerning the mechanism of the degradation of oleic acid during autoxidation.

THEORY OF LIQUID FILTRATION. F. Heitz. *Rev. Franc. Corps Gras* 12, 233 (1965). A discussion of the applications of theoretical filtration to commercial practice. Commercial filtration is a compromise between quality, speed of operation and cost.

STUDY OF STEROLS BY GAS-LIQUID CHROMATOGRAPHY. APPLICATION TO THE CONTROL OF THE PURITY OF VEGETABLE OILS. A. Karloskind, F. Audiau and J. P. Wolff. *Rev. Franc. Corps Gras* 12, 399 (1965). The contamination or adulteration of a vegetable oil can be learned by determining the type and ratio of the sterols present in the oil. The sterols are isolated from the unsaponifiables by thin-layer chromatography and then separated using gas-liquid chromatography. The various vegetable oils have different amounts of campesterol, stigmasterol and sitosterol. For each of the common vegetable oils the author calculated an R value. This R value is the ratio of sitosterol to campesterol plus stigmasterol. The R value for olive, cotton, soya and grape seed oil is different, but the value for corn, peanut and soya is the same.

INFLUENCE OF VARIED MANUFACTURING CONDITIONS ON THE CONSISTENCY OF MARGARINES. E. Sambuc and M. Naudet (ITERG, Faculty of Science, Marseilles, Fr.). *Rev. Franc. Corps Gras* 12, 241 (1965). A bench scale apparatus which allows the preparation of margarine on a small scale and under controlled conditions is described. The authors present an extensive description of the conditions of its use and a correlation between the margarine prepared using the small scale apparatus and commercially prepared margarine. With the bench scale apparatus the authors have been able to investigate the influence of working conditions during emulsification and conditioned cooling upon the consistency of margarines.

UTILIZATION OF FATS OBTAINED BY THE OXIDATION OF HIGHER HYDROCARBONS. I. WATER EVAPORATION REDUCING AGENTS. C. Matasa (Chief of Res. Ser., Craiova, Rumania). *Rev. Franc. Corps Gras* 12, 451 (1965). The author describes a new class of products obtained by oxidizing higher hydrocarbons, especially paraffin. The oxidation of higher hydrocarbons to fatty acids has been commercialized in some countries. The new ampholytic agents allow an appreciable decrease in the evaporation rate and also show a higher resistance to microorganisms. Their low cost permits their use on a large scale.

II. ANTIFOAMING AGENTS. *Ibid.*, 511. Oxidation products of higher hydrocarbons and their derivatives with a large number of carbon atoms, whose general structure shows branched chains and different mono-or poly-functional groups have a strong antifoaming action. Because of their accessibility and their low cost, these antifoaming agents are already used by twenty Rumanian companies.

ON THE DETERMINATION OF SMALL AMOUNTS OF PARTIAL GLYCERIDES IN OILS AND FATS. M. Naudet, J. Pasero and S. Biasini (I.T.E.R.G., Marseille, Fr.). *Rev. Franc. Corps Gras* 12, 525 (1965). An analytical method allowing determination of small amounts of partial glycerides in oils and fats has been developed. It involves successively the elimination of free fatty acids by absorption on ion exchange resin and concentration of the partial glycerides by silicic acid chromatography. This fraction is then analyzed by thin layer chromatography followed by a densitometric evaluation after charring. Examples of application of the method to synthetic blends and to peanut oils are given.

CONTRIBUTION TO THE STUDY OF THE ORIGIN OF THE FATTY ACIDS OF BUTTER. S. Kuzdzal-Savoie. *Rev. Franc. Corps Gras* 12, 461 (1965). The origin of a number of fatty acids present in butter is not yet quite elucidated. They comprise conjugated dienoic acids, branched chain acids and some minor monoenic acids. The amount of conjugated dienoic acid in butter varies in correlation with the iodine value of butter. A quantitative relationship has been found between the amount of conjugated dienoic acid of butter and the amount of linolenic acid present in the feed of dairy cows. Branched acids represent about 2% of total acids of butter, C-15 and C-17 acids are dominant. The origin of these acids is essentially endogenous. The increase in the amount of branched C-15 acids in butter when cows are turned to pasture may be explained by the specific lipid metabolism of the rumen microorganisms. Among the minor monoenic acids, myristoleic acid originates probably by desaturation of myristic acid. C-18 monoenoic acids, positional isomers of oleic acid, and C-18 and C-16 *trans*-monoenic acids may originate at least partially during the hydrogenation which occurs in the rumen. The bacterial origin of vaccenic acid is considered.

GRAVIMETRIC DETERMINATION AND PREPARATIVE PARTITION OF OXIDIZED ACIDS. M. Naudet, A. Check El Kar, S. Biasini and J. Pasero (ITERG, Marseille, Fr.). *Rev. Franc. Corps Gras* 12, 455 (1965). Starting from the principle of classical titrimetric method for oxidized acids as determined by polyethylenic column chromatography, the authors have developed suitable processing conditions allowing the gravimetric determination of the ''oxidized acids'' fraction. The process can be extended to the preparative step and up to 400 milligrams of ''oxidized acids'' can be isolated when this amount is contained in not more than 20 grams of oil.

ANALYSIS OF TRIGLYCERIDES OF CORN, SUNFLOWER AND RAPESEED OILS. G. Jurriens and L. Schouten (Unilever Res. Lab., Vlaardingen, Netherlands). *Rev. Franc. Corps Gras* 12, 505 (1965). The glyceride composition of corn, sunflower and rapeseed oils has been determined by thin layer chromatographic fractionation on silver nitrate-impregnated silica. The percentage of the obtained fractions and their composition have shown that in the above oils, the fatty acids are arranged on the triglycerides according to the distribution system 1,3 random, 2 random.

EFFECT OF TEMPERATURE HISTORY ON THE SOLID FAT CONTENT OF MILK FAT. J. Vasic and J. M. DeMan (Dept. of Dairy and Food Science, Univ. of Alberta, Edmonton, Alberta, Canada). *J. Dairy Sci.* 48, 1277–81 (1965). Thermal expansions of solid and liquid milk fat were determined by a dilatometric method. The thermal expansion of completely solid fat was independent of temperature history. Melting dilations in the range −40 to 40C were determined. Rapid cooling resulted in the highest solid fat content and rate of melting. Maximum rate of melting occurred in the range of 15 to 20C and was independent of temperature treatment. Stepwise cooling and tempering resulted in solid fat contents lower in the 0 to 20C range than those obtained with rapid cooling. Results obtained indicate that rapid cooling leads to mixed crystal formation with some lower melting constituents included in crystals melting in the 15 to 20C range.

CRYSTAL AND MOLECULAR STRUCTURE OF A PHOSPHOLIPID COMPONENT: L-α-GLYCEROPHOSPHORYLCHOLINE CADMIUM CHLORIDE TRIHYDRATE. M. Sundaralingam and L. H. Jensen (Dept. of Biological Structure, Univ. of Wash., Seattle, Wash.). *Science* 150, 1035–36 (1965). The structure of L-α-glycerophosphorylcholine cadmium chloride trihydrate has been determined by the conventional, single-crystal, x-ray diffraction technique. The phospholipid component displays the characteristic gauche conformation for the choline residue and the gauche-gauche conformation for the glycerol moiety. Therefore, a possible model for the structures of phospholipids is similar to that proposed by Finean.

POLAR VS. NONPOLAR WHEAT FLOUR LIPIDS IN BREAD-MAKING. Y. Pomeranz, G. Rubenthaler and K. F. Finney (Dept. of Flour and Feed Milling Ind., Kansas State Univ., Manhattan). *Food Technol.* 19, 120–21 (1965). Adding up to 3 g of vegetable shortening per 100 g of a hard winter wheat flour composite improved crumb grain and increased loaf volume from 802 to 948 cc. Higher levels of shortening had no additional improving effect. When the bread formula included 3 g vegetable shortening, adding 0.5 g of nonpolar, polar, or the unfractionated lipids from wheat flour had no significant effect on crumb grain and loaf volume. However, loaf volume of bread without vegetable shortening was increased strikingly, from 802 to 958 cc, by adding 0.5 g of polar flour lipids. Addition of 0.5 g of nonpolar lipids did not increase loaf volume significantly. Addition of 0.5 g of nonfractionated flour lipids (approximately 1:1 ratio of polar and nonpolar) gave an intermediate volume of 893 cc as expected from the contribution of the lipid components. Only 0.5 g of polar lipids from wheat flour increased loaf volume somewhat more than 3 g of vegetable shortening.

FATTY ACID COMPOSITION OF HAY. H. E. Oksanen and B. Thafvelin (Royal Vet. College, Stockholm and Nat. Vet. Inst., Stockholm, Sweden). *J. Dairy Sci.* **48**, 1305–9 (1965). Fatty acid composition of hay was studied by gas-liquid chromatography. Timothy grass, red clover, and tufted-hair grass were compared. The influence on fatty acid composition of timothy grass of growth stage, harvesting methods, climatic factors, and artificial drying was studied. In new-mown hay from the various species, a closely similar fatty acid pattern was observed. Approximately 50% of the total fatty acid content was linolenic acid. In timothy grass cut at a late stage of growth, a low linolenic acid content was demonstrated (21.8%). Hay dried on poles largely maintained its original fatty acid composition for the entire experimental period. In cocked hay no changes occurred during fair weather. Coinciding with a period of rainfall a considerable decrease occurred in linolenic acid content (to 18.5%). Watering of cocked hay resulted in a successive change of the fat. Hay dried as a swath showed marked, successive changes of fatty acid composition even under favorable weather conditions. The decrease in linolenic acid content (to 11.7%) was more conspicuous if the hay was watered. In new-mown hay, artificially dried in an electric oven, the linolenic acid content was higher than in a corresponding sun-dried sample.

HIGH COLUMN EFFICIENCY IN GAS-LIQUID CHROMATOGRAPHY AT INLET PRESSURES TO 2500 P.S.I. M. N. Myers and J. C. Giddings (Dept. of Chem., Univ. of Utah, Salt Lake City, Utah). *Anal. Chem.* **37**, 1453–57 (1965). A basic study of column characteristics has been made utilizing inlet pressures up to 2500 p.s.i. and packed column lengths up to 4000 feet. More than a million theoretical plates have been obtained in some instances. Various column parameters were examined over a wide pressure range, including plate height, reduced plate height, number of plates per second etc. The reduced or effective velocity was in some cases at least an order of magnitude greater than had been previously reached in gas chromatography. The Reynold's number was also higher than reached in previous chromatographic forms. This provides a more critical test of the coupling theory of eddy diffusion and perhaps of turbulent effects than the earlier experiments. The results are consistent with coupling but not with the classical theory. The appropriate "pressure dependent" plate height theory has been developed for this study.

SENSITIVE SELECTIVE GAS CHROMATOGRAPHY DETECTOR BASED ON EMMISSION SPECTROMETRY OF ORGANIC COMPOUNDS. A. J. McCormack, S. C. Tong and W. D. Cooke (Dept. of Chem., Cornell Univ., Ithaca, N. Y.). *Anal. Chem.* **37**, 1470–76 (1965). A gas chromatography detector has been developed which is based on monitoring the intensity of the electronic emission spectra of the eluted organic compounds in an argon carrier gas. The spectra are excited in the plasma of a 2450-Mc. electrodeless discharge and detected photoelectrically in the ultraviolet-visible region. The detector sensitivity is 2×10^{-16} gram of hexane per second. By choosing the wave length of various atomic lines and molecular bands, a degree of selectivity can be obtained. The system can be sensitized to the halogens, phosphorus, and sulfur, as well as permanent gases. The detector has a high sensitivity and selectivity, a small volume, rapid response, and a wide dynamic range.

POROUS THIN-LAYER MODIFIED GLASS BEAD SUPPORTS FOR GAS LIQUID CHROMATOGRAPHY. J. J. Kirkland (E. I. du Pont de Nemours & Co. Experimental Station, Wilmington, Del.). *Anal. Chem.* **37**, 1458–61 (1965). Glass beads modified with thin layers of finely divided diatomaceous earth or silica show significant advantages over untreated glass beads as gas chromatographic supports. Altering particles are tightly anchored to the glass bead surface by means of a fibrillar boehmite (alumina). Modified bead columns exhibit lower HETP and higher optimum linear gas velocities when compared with columns of untreated beads. The significant improvements are believed to be primarily the result of thinner liquid film coatings, leading to more efficient solute mass transfer. HETP of 0.8 mm have been obtained with silica sol-modified 60- to 80-mesh glass beads coated with a silicone oil.

TEST OF THE THEORY OF GLASS BEAD COLUMNS IN GAS-LIQUID CHROMATOGRAPHY. S. J. Hawkes, C. P. Russell and J. C. Giddings (Dept. of Chem., Univ. of Utah, Salt Lake City, Utah). *Anal. Chem.* **37**, 1523–26 (1965). The plate height theory of glass bead columns in gas-liquid chromatography has been tested over a wide practical range, including bead diameters from 0.004 to 0.023 cm. and liquid loadings from 0.1 to 3.9%. Theoretical values are calculated without reference to plate height data from any chromatographic system. The agreement between calculated and determined values is very good (usually within 10% for the largest beads). The conformity deteriorates for the smallest beads, the theory predicting plate height terms too small by factors of from 2 to 4 at liquid loadings less than 1%. Possible reasons for the divergence are discussed. The agreement is also very poor for high liquid loadings as expected from theory and observation.

STUDIES IN OIL TANNAGES. I. OXIDATION STUDIES. K. S. Jayaraman and Y. Mayudamma. *Leather Sci.* **11**, 253 (1964). The ease of oxidation of Indian fish oils with different degrees of unsaturation has been investigated. It has been found that the greater the ease of oxidation (as indicated by the I.V.), the better is the oil for tanning. Oils with I.V. < 125 appear to have no tanning action. The formation of peroxides and aldehydes in the oxidation process is found to be influenced by temperature and time. The peroxides have a tendency to give rise to aldehydes as well as to polymerised products, the latter being responsible for the increase in density. The course of oxidation is also apparently governed by the surface area over which the oil is distributed and the moisture in the air. (Rev. Current Lit. Paint Allied Ind. #280.)

POLYMORPHISM OF THE TRIGLYCERIDES OF SOME HIGHER FATTY ACIDS AND NATURAL MIXTURES OF TRIGLYCERIDES. V. M. Vergelesov and A. P. Belovsov. *Russian J. Phys. Chem.* **37**, 1082–85 (1963). The polymorphism of some linoleic and linolenic acid triglycerides is studied; these have been newly synthesised. A similar study of milk fat triglycerides is also reported. (Rev. Current Lit. Paint Allied Ind. #280.)

FATTY-ACID COMPOSITION OF RAPE-SEED OIL. I. Zeman. *Prûm. Potravin* **15**, 287–8 (1964). Rape-seed oil is characterised by its high content of erucic acid. Conditions for the analysis of rape-seed oil by gas chromatography are outlined. For rapid determination of erucic acid, a method of analysis on a nonpolar stationary phase has been developed. (Rev. Current Lit. Paint Allied Ind. #280.)

INFLUENCE OF RAPE-SEED ON THE QUALITY OF RAPE-SEED OIL. J. Pokorný, G. Janîček and H. Zwain. *Prûm. Potravin* **15**, 217–9 (1964). Rape-seed contains lipases with activities similar to those of other vegetable lipases. They are rapidly inactivated at 90–100C in aqueous medium, but $\nless$ 140–160C in the dry state. In extracted groats from rape-seed cake all the lipases were destroyed. The crushed seed cannot be stored long before being processed, as, although the lipolytic decomposition is slow, oxidation can affect the stability and biological value within 24 hr. (Rev. Current Lit. Allied Ind. #280.)

ARGENTINIAN TOMATO SEED OILS. CHEMICAL COMPOSITIONS. M. H. Bertoni, Karman de Sutton and P. Cattaneo. *An. Asoc. Quim. Argent.* **51**, 149–57 (1963). A range of oils from Argentinian tomato seeds was examined. The oil content varied from 23.9 to 29.2%. The oil extracted with hexane had I.V. 114.9–118.4, unsaponifiable 1.01–1.72%, tocopherols 99.2–119.1 mg./100 g. The per cent fatty acid composition was: saturated 23.0–26.3, oleic 13.2–20.3, linoleic 53.7–58.3, linolenic 1.7–2.4. The meal contained in per cent: water 11.7–12.6, ash 4.5–5.2, proteins 32.6–33.3, pentosans 2.7–3.0, fibre 22.3–27.7, ether extract 4.4–7.2, carbohydrates 9.7–13.5 and was free from reducing and invert sugars. (Rev. Current Lit. Paint Allied Ind. #280.)

THE DETERMINATION OF EPOXY ACIDS IN OILS AND FATS. M. M. Hassan and C. H. Lea (Low Temperature Res. Station, Cambridge). *Chem. Ind. (London)* 1965, 1760. The epoxy acid content of two seed oils containing natural epoxy fatty acids (*Cephalocroton* and *Malva*) was determined by the picric acid colorimetric method and the results compared with results obtained by gas-liquid or thin-layer chromatography. The colorimetric method is simple, sensitive and reproducible. *Cephalocroton* analyzed for 79% epoxy compounds by analysis of the methyl esters and 80% by analysis of the oil as compared with 75% obtained by thin-layer chromatography and 59% by gas-liquid chromatography. Corresponding figures for *Malva* were 9.7, 12.5, 9.2, and 8.2. The slightly higher result obtained by direct application of the picric acid method to the *Malva* oil suggests that some interfering substance might have been present. The GLC method gave results too low owing to partial decomposition of the labile epoxy esters on the column.

STABILIZED SALAD OILS. F. J. Baur (Procter & Gamble Co.). *U.S. 3,211,558.* A glyceride salad oil which has superior resistance to deposition of high-melting solids comprises a base salad oil and dissolved in it a crystal inhibiting amount, at least 0.001% by weight, of fatty acid ester of monosaccharidic material having an oxide ring structure and selected from the group consisting of aldohexose, aldohexuronolactone, aldohesuronic acid, aldohexonolactone, and methyl aldohexoside. The material is at least 25% esterified, based on the total hydroxyl availability, with at least 15%, based on the total fatty acid in the ester, of saturated long chain fatty acid having from 12 to 24 carbon atoms, the balance of the fatty acid being selected from the group consisting of short chain fatty acids having from 2 to 6 carbon atoms and unsaturated long chain fatty acids having from 12 to 24 carbon atoms. The molar proportion of the short chain fatty acids should not exceed the total molar proportion of the saturated and unsaturated long chain fatty acids.

MONOGLYCEROL-FATTY ACID PREPARATION. F. F. Hansen. *U.S. 3,216,829.* A monoglyceride of a fat-forming fatty acid, the fatty acid radical of which contains 16 or 18 carbon atoms, or mixtures in which the monoglyceride product is a solid at room temperature (the balance of the product consisting of diglyceride and triglyceride with the monoglyceride being in excess of 75% of the total) is heated to a temperature above its melting point. The melted product is mixed with about the same amount (by weight) of water which has been heated to a temperature at least as high as the temperature of the monoglyceride, thus forming a gel. The gel is immediately beat while it cools to a temperature at which the monoglyceride product is normally solid.

PROCESS FOR COUNTERCURRENT EXTRACTION OF VEGETABLE MATERIAL BY SEQUENTIAL CONTACTING OF THE MATERIAL WITH MUTUALLY-MISCIBLE HIGH-AQUOSITY AND LOW-AQUOSITY ORGANIC SOLVENTS. J. B. O'Hara and A. E. Shoepfer (A. E. Staley Mfg. Co.). *U.S. 3,207,744.* The described process comprises continuously moving a stream of vegetable material in one direction through a liquid-confining space; introducing the material in the vicinity of the first end of the space to a solvent mixture moving countercurrent to the material; removing the undissolved residue of the material from the vicinity of the second end of the space; forming the solvent liquid within the space in the vicinity of a region intermediate to the ends in part by introducing into the space in the vicinity of the second end a less aqueous liquid selected from the group consisting of the organic solvent and a mixture of water and the organic solvent and moving the less aqueous liquid toward the intermediate region, and in part by introducing into the region a more aqueous liquid selected from the group consisting of water and a mixture of water and the organic solvent whereby extracting by the aqueous solvent liquid takes place between the region and the first end. The undissolved residue of the extraction is in part at least dewatered by the less aqueous liquid between the region and the second end. The loaded solvent liquid is then removed from the vicinity of the first end.

FLUID SHORTENING FOR CREAM ICINGS. N. B. Howard and P. M. Koren (Procter and Gamble). *U.S. 3,208,857.* A fluid shortening composition suitable for the preparation of cream-type icings comprises a normally liquid glyceride base oil containing by weight of the composition, an icing stabilizer combination of from 1–12% hydrogenated vegetable phosphatide having an iodine value of less than 30 and from 1–12% of at least one surface active adjuvant selected from the group consisting of edible high molecular weight saturated fatty acids, esters of edible low molecular weight hydroxy compounds and fatty acids, acid anhydrides of edible high molecular weight acidic lipids, and edible high molecular weight saturated fatty alcohols. The total weight of the icing stabilizer combination should not exceed about 16% by weight of the shortening composition.

CONFECTIONERY PRODUCT CONTAINING A FATTY ACID ESTER OF A MONOHYDRIC ALCOHOL. A. Crossley and A. Thomas (Lever Bros.). *U.S. 3,208,858.* A confectionery composition which produces a cool sensation upon melting in the mouth is composed of a palatable sugar in admixture with an ester of a monohydric alcohol having 2 to 4 carbon atoms and a saturated fatty acid having 14 to 20 carbon atoms, the ester amounting to at least 30% by weight of the composition. The composition is substantially free from any ingredient which does not dissolve in the mouth.

PROCESSING OF PREPARING A FAT PRODUCT WHICH AFTER PLASTICIZING CAN BE USED AS A SPREADING, BAKING AND FRYING FAT, AND A PROCESS OF PREPARING A MARGARINE IN USING THIS FAT PRODUCT. H. Galenkamp (N.V. Verenigde Textiel- & Oliefabrieken Afd. Crok & Laan, Netherlands). *U.S. 3,210,197.* A mixture of fatty acids consisting of 1–2% caprylic, 2–5% capric, 55–38% lauric, 12–14% myristic, 10–12% palmitic, and 20–29% stearic is esterified with glycerol to form a solid fat in which the fatty acids are randomly distributed over the glycerol molecules; 15 to 30 parts by weight of the solid fat are then mixed with 70–85 parts of a polyunsaturated vegetable oil.

• Fatty Acid Derivatives

DIAZOTYPE AND BLUEPRINT PHOTOPRINTING MATERIALS HAVING A COATING OF WATER-INSOLUBLE METALLIC FATTY ACID SOAP THEREON. J. Savit (Eugene Dietzgen Co.). *U.S. 3,207,603.* Improved photoprinting materials comprise: a base selected from the group consisting of paper, cloth, and plastic film; a coating on the base containing particles of a water-insoluble metallic fatty acid soap in contact with the base (the fatty acid being selected from a group consisting of monocarboxylic fatty acids having from 12 to 33 carbon atoms and dicarboxylic fatty acids having from 6–12 carbons, and the metal being iron, lithium, strontium, copper, barium, cadmium, magnesium, calcium, aluminum, zinc, lead, cobalt, or manganese; and a light-sensitive compound in contact with the metallic fatty acid soap. The light-sensitive compound may be a diazonium salt or a blueprint ferric ammonium compound.

FATTY ACID AMIDE-DIESTERS. F. C. Magne, R. R. Mod and E. L. Skau (Secy. of Agr., U.S.A.). *U.S. 3,207,769.* Described is a diesteramide composition corresponding to the formula $RCON(CH_2CH_2OCOR')_2$ in which the RCO- moiety represents the composite acyls of the mixed fatty acids from cottonseed oil selectivity hydrogenated so that all polyunsaturation has been reduced to monoolefinic unsaturation and R′ is methyl.

• Biochemistry and Nutrition

A METHOD FOR PREPARING AN AQUEOUS COLLOIDAL DISPERSION OF ORGANIC MATERIALS BY USING WATER SOLUBLE POLYMERS: DISPERSION OF BETA CAROTENE BY POLYVINYL-PYRROLIDONE. T. Tachibane and A. Nakamura (Chem. Labs. Sankyo Co. Ltd., Tokyo, Japan). *Kolloid-Z.* **203**, 130 (1965). A new method was developed for preparing an aqueous colloidal dispersion of beta carotene. This method consists of preparing a solid mixture of beta carotene and polyvinyl-pyrrolidone (PVP) from their chloroform solution by evaporating the solvent and dissolving the mixture into water. From filtration experiment and electron microscopic observation, it was found that beta carotene in its aqueous dispersion exists as colloidal particles with a diameter of about 100 angstroms. Spectroscopic data showed that beta carotene is molecularly dispersed in solid PVP. It was considered that PVP acts as a solid carrier for beta carotene and at the same time, a stabilizing agent for its aqueous dispersion. In place of PVP a hydrophilic—oleophilic substance such as methylcellulose, polyvinylmethylether or Aerosol OT could be also used as the dispersing agent. Other materials than beta carotene could be dispersed by a similar technique.

NUTRITIONAL VALUE OF GRAPESEED OIL: INFLUENCE OF FRYING AND PHYSIOLOGICAL EFFECTS. P. Ramel, M.-T. Lanteaume, A.-M. Le Clerc, J. Roman and E. Morel. *Rev. Franc. Corps Gras* **12**, 517 (1965). Three homogenous groups of animals (male Wistar rats) have been fed for more than a year with a synthetic balanced diet. The lipids were: (1) fresh grapeseed oil (extraction oil), (2) the same oil after 10 fryings of potatoes, (3) olive oil obtained in first cold pressing. The growth curves of three animal series are perfectly superimposable. The digestive utilization coefficient of grapeseed oil is as high as the one of olive oil; it is by no means affected by this degree of frying. Biochemical determinations show that serum lipid cholesterol and the concentration of beta lipoproteins of animals fed with fresh or fried grapeseed oil are regularly lower than those of control animals. Histological examination of vital organs shows no lesion imputable to the treatment.

PHOSPHATIDE ANTIGENS OF MYCOBACTERIA. D. Subrahmanyam and D. R. Singhvi (Biochem. Div., Vallabhbhai Patel Chest Inst., and Nat. Inst. of Communicable Diseases, Delhi, India.). *Proc. Soc. Exp. Biol. Med.* **120**, 102–5 (1965). The nature of phosphatide antigens of 5 species of mycobacteria has been investigated by the kaolin-agglutination technique of Takahashi using serum from tuberculous patients as antibody source. The phosphatide antigens are present in virulent (H37 Rv, *M. avium*), avirulent (H37 Ra) and saprophyte (M. 607, *M. phlei*) strains of mycobacteria. The phosphatide antigens have been purified by silicic acid column and paper chromatography and identified as phosphatidyl inositomannosides.

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• Names in the News


M. R. McCorkle

J. H. Gardner, President of Armour Industrial Chemical Company, has announced the appointment of M. R. McCorkle (1947–56, 1959) as a Vice President of this division of Armour and Company. He will continue in his present capacity as technical director.

Dr. McCorkle joined Armour in 1938 as a research chemist. He became assistant chief chemist for the former Armour Auxiliaries in 1945 and was named technical director of Armour Industrial Company in 1952.

Simultaneous announcement was made of the appointment of K. M. Bierman as a Vice President of this division of Armour and Company. Mr. Bierman will continue in his present capacity as director of marketing.

On December 2nd, the Board of Directors of Armour and Company elected E. W. Wilson, Vice Chairman of the Board; E. J. McAdams, President; and C. R. Orem, Financial Vice President and Controller.

R. H. Hartigan has been named President of the Research and Development Division of National Dairy Products Corporation, it was announced recently by J. H. Wetenhall, Chairman of the Board of National Dairy.

Stockholders of Pacific Vegetable Oil Corporation unanimously elected all incumbent directors, plus a newcomer to the Board, W. S. Powell, President and Director of Hexcel Products, Inc., of Berkeley, Calif.

Three promotions and one appointment are announced by the Girdler Catalysts Unit of Chemetron Chemicals Division of Chemetron Corporation, Louisville, Ky. Frank O'Hara has been named assistant to the technical director; Clay Cornelius, Jr., has been promoted to research and development supervisor, analytical section, and Bill Masters has been named research and development supervisor, evaluation section. Wen-Hwa Yen has been appointed technical service engineer.

N. M. Molnar (1964), President of Fine Organics, Inc., Lodi, N. J., announces the appointment of R. B. Aron as Sales Manager of its Organic Chemical Division.

W. E. Myers (1958), is now Project Manager in the Public Relations Department of Sylvania Electric Products, Inc., and is responsible for the PR programs in the company's Chemical, Metallurgical, Sylcor and Commercial Electronics Divisions.

J. C. Hecker has been selected President and General Manager of Distillation Products Industries, a division of Eastman Kodak Company. He succeeds the late G. C. Mees in the office of divisional president.

Walter Sweet will assume the post of Sales Engineer for Quickfit Reeve Angel, of Clifton, N. J. He will be responsible for the sale of all company products, which include TLC apparatus, and the QRA Steady State Distribution Machine.

E. M. Toby, President of American Mineral Spirits Company, announces that Thomas Barker (1950) has been named Director of Domestic Marketing, Solvents and Chemicals. Mr. Barker joined the company in 1950 as a sales representative in the Southern region. In 1963 he was elected Vice President and named Manager of Midwest Marketing.

R. V. Hinman, Vice President, has been appointed Sales Manager, Domestic Marketing, Solvents and Chemicals.

(Continued from page 21A)

PHOSPHATIDYLCHOLINE SYNTHESIS IN AGROBACTERIUM TUMEFACIENS. S. I. Sherr and J. H. Law. (J. B. Conant Lab., Harvard Univ. Cambridge, Mass.). *J. Biol. Chem.* **240**, 3760–65 (1965). Utilization of choline for lipid synthesis in *Agrobacterium tumefaciens* has been studied. Experiments *in vivo* indicated that although some direct incorporation of choline into phosphatidylcholine takes place, the major route for incorporation of choline carbon involves oxidation of choline to 1-carbon compounds and glycine. No enzymatic pathway for direct incorporation of choline into phosphatidylcholine could be demonstrated in extracts of the bacterial cells. The cytidine diphosphate-diglyceride pathway for the enzymatic synthesis of phosphatidylserine and phosphatidylethanolamine was demonstrated, as well as the enzymatic oxidation of choline to betaine. The uptake of choline by *A. tumefaciens* was inhibited by the presence of L-methionine and L-serine in the medium. Several species of bacteria were found to be incapable of utilizing choline from the growth medium.

EFFECT OF INSULIN IN HYPERTRIGLYCERIDEMIA. G. Schlierf and L. W. Kinsell (Inst. for Met. Res., Highland-Alameda County Hos., Oakland, Calif.). *Proc. Soc. Exp. Biol. Med.* **120**, 272–4 (1965). Infusion of insulin to hyperglyceridemic subjects results in decreased plasma glyceride levels as compared to control infusions. Protamine can prevent this insulin-induced decrease. It is tentatively concluded that insulin accelerated removal of glycerides from the plasma by peripheral tissues.

INTERRELATIONSHIP BETWEEN THE BIOLOGICAL OXIDATION MECHANISM, SERUM LIPIDS AND THE SERUM IRON TRANSPORT SYSTEM IN THE RAT. R. R. Roehm and Helen L. Mayfield (Montana State Univ., Agr. Experiment Sta., Bozeman, Montana). *J. Nutr.* **87**, 322–330 (1965). This study was made to investigate the interrelationships in hemoglobin formation, the iron-transport system, serum protein, lipid metabolism and succinic dehydrogenase activity (SDH) of heart, liver and kidney of rats fed diets known to be hypercholesterolemia-inducing. These diets were fed with and without 1% added cholesterol and with and without sufficient iron. Control rats were fed a chow diet. Hemoglobin, hematocrits and serum iron of rats fed the 3 experimental diets were lower and serum protein higher, than those for control rats. Serum cholesterol was higher in all 3 groups and serum triglycerides markedly increased in the iron-deficient rats. Heart weights of iron-deficient rats increased and kidney weights of the 3 experimental groups were lower than those of controls. The SDH activity of the heart was not affected by feeding the experimental diets. Liver SDH per gram of rat decreased in rats fed the 3 experimental diets and appeared related to the hypercholesterolemic effect of the diet and not to its effect of lowering the hemoglobin level. The kidney SDH was lower in rats fed the experimental diets and appeared related to the lowered hemoglobin level, for rats fed the iron-deficient diet had significantly lower SDH than those with somewhat higher hemoglobin levels.

LIPID ANTIOXIDANTS IN PLANT TISSUE. D. E. Pratt (Dept. of Foods and Nutr., Univ. of Wis., Madison, Wis. 53706). *Food Sci.* **30**, 737–41 (1965). The antioxidant activities of several flavone glycosides and cinnamic acids were determined in lipid-aqueous systems. Flavone glycosides, except rutin, possessed approximately the same antioxidant activity as their respective aglycone, quercetin. Quercetin derivatives were the only glycosides isolated from green onions, green-pepper pods, green-pepper seeds, and potato peels. Green-onion tops also possessed a glycoside of myricetin. Caffeic acid was an effective antioxidant but chlorogenic acid had no antioxidant activity.

GLYCEROL METABOLISM IN THE HUMAN LIVER: INHIBITION BY ETHANOL. F. Lundquist, N. Tygstrup, K. Winkler and D. B. Jensen (Dept. of Biochem. A, Univ. of Copenhagen, Copenhagen, Denmark). *Science* **150**, 616–17 (1965). Glycerol is metabolized predominantly in the liver, the first step presumably being phosphorylation to α-glycerophosphate. When ethanol is present in the blood, the rate of glycerol uptake by the splanchnic organs is reduced to about one-third of the control value. At the same time glycerophosphate accumulates in the liver. Hepatic blood flow and oxygen consumption are not influenced by the combined infusion of glycerol and ethanol. The phenomenon may be connected with the increased concentration of the reduced form of diphosphopyridine nucleotide present in the liver during ethanol metabolism.

REGULATION OF CHOLESTEROL CATABOLISM BY BILE SALTS AND GLYCYRRHETIC ACID *in vivo*. M. J. Lee, D. V. Parke and M. W. Whitehouse (St. Mary's Hos. Med. School, London, England). *Proc. Soc. Exp. Biol. Med.* **120**, 6–8 (1965). Tritiated cholesterol was injected intraperitoneally into rats having 2 bile-duct cannulae, one for bile collection and the other for intraduodenal infusion of bile-salt solutions. Intraduodenal infusion of taurocholate (10 mg/hr) had no effect on rates of radioactive bile-salt formation from cholesterol-H^3. Intraduodenal infusion of taurochenodeoxycholate (10 mg/hr) inhibited radioactive bile salt formation. Taurocholate infusion also resulted in a 6-fold increased secretion of a dihydroxycholanate, apparently taurochenodeoxycholate. Sodium B-glycyrrhetate infusion (125 μg/hr) had no significant effect on secretion of either radioactive cholesterol or radioactive bile salts.

Effect of cottonseed oil on egg hatchability. A. R. Kemmerer, B. W. Heywang, M. G. Vavich and E. T. Sheenan (Dept. of Agricultural Biochem., Univ. of Arizona, Tucson, Ariz.). *Poultry Sci.* **44**, 1315–18 (1965). Crude gossypol-free cottonseed oil fed to laying hens at the dietary levels of 2 and 5% significantly lowered hatchability of the eggs. Dietary levels of 1.0 and 0.5% which encompass the range of practical type rations did not affect hatchability. Sterculia foetida oil fed at a level to give an amount of cyclopropenoid fatty acid equivalent to 5% crude cottonseed oil also lowered hatchability.

The purification and properties of the fatty acid synthetase of pigeon liver. R. Y. Hsu, Gertrude Wasson and J. W. Porter (Dept. of Physiol. Chem. Univ. of Wisc., Madison, Wisc.). *J. Biol. Chem.* **240**, 3736–46 (1965). The fatty acid synthetase of pigeon liver behaves as a single homogeneous protein on sedimentation, on moving boundary electrophoresis, and on gradient elution from diethylaminoethyl cellulose after purification by ammonium sulfate precipitation, calcium phosphate gel adsorption, DEAE-cellulose chromatography, a second ammonium sulfate precipitation, and passage through Sephadex G-100. The molecular weight of this protein is 5.4×10^5 g per mole. The fatty acid synthetase contains no flavin, but it contains at least 50 sulfhydryl groups per mole. The enzyme also has an excess of acidic amino acids, but it contains no nucleotides, nucleic acid, or heme compounds.

Dietary saturated medium-chain triglycerides and vitamin E deficiency in chicks and rats. H. Fisher (Nutr. Labs., Dept. of Animal Sci., Rutgers, The St. Univ., New Brunswick, N. J.) and H. Kaunitz. *Proc. Soc. Exp. Biol. Med.* **120**, 175–9 (1965). Saturated medium-chain triglycerides (C-6 to 13; MCT) were included in vitamin E-deficient diets fed to chickens and rats. This produced a high incidence of exudative diathesis in the birds but exerted a protective effect on testicular degeneration in the rats. It is speculated that this difference is related to the capacity of dietary MCT to decrease linoleate turnover in the rat but to increase it in the chicken, leading to opposite effects in the affected organs of the two species.

The characteristics of lipid mobilization and peripheral disposition in aged individuals. C. Eisdorfer, A. H. Powell, Jr., G. Silverman and M. D. Bogdonoff (Dept. of Med., Duke Univ. Med. Center, Durham, N. Carolina). *J. Gerontol.* **20**, 511–14 (1965). The peripheral characteristics of FFA utilization for young and old have been described. The aged individual mobilizes FFA in response to norepinephrine in a pattern comparable to that of the young individual; similarly, the aged individual removes injected albumin-bound palmitic acid-1-C^{14} at a rate equal to that of the young individual. Any difference in muscle-activity performance between the two age groups would not seem to depend upon significant differences in the peripheral mobilization and disposition of lipid substrate.

The utilization of unesterified palmitate by Ehrlich ascites tumor cells. A. A. Spector and D. Steinberg (Lab. of Metabolism, Natl. Heart Inst., N. I. H., Bethesda, Md.). *J. Biol. Chem.* **240**, 3747–53 (1965). The free fatty acid (FFA) that is rapidly taken up and bound reversibly in unesterified form by Ehrlich ascites tumor cells is readily utilized for both oxidation and esterification. Addition of glucose decreases the rate of oxidation of labeled palmitate to CO_2 but increases palmitate esterification into phospholipids and neutral lipids. Although less palmitate is oxidized to CO_2 at any given extracellular FFA-albumin molar ratio when glucose is present, the rate of exogenous palmitate oxidation still increases as ratio is raised.

Effect of 3,3′,5-triiodothyropropionic acid (T_3P) on serum cholesterol values of old female White Carneau pigeons. C. H. Eades, Jr., Victoria B. Solberg, Irene C. Hsu, Carol A. Ekholm and G. E. Phillips (Biochem. Dept., Warner-Lambert Res. Inst., Morris Plains, N. J.). *Proc. Soc. Exp. Biol. Med.* **120**, 99–101 (1965). Old female White Carneau pigeons were given 3,3′,5-triiodothyropropionic acid at 25, 75, and 200 μg per day for a period of 15 months. Mean serum cholesterol lowerings for 23 sample periods for the 3 groups compared to controls were 26%, 14% and 25% for the respective dose levels with a grand mean of 22% for all groups combined (since no dose response-relationship was apparent at these levels). This lowering was highly significant and agrees with the results found with the rat. The use of the pigeon to screen hypocholesterolemic drugs would not be the one of choice because of the wide fluctuations in serum cholesterol values and therefore the need for rather large numbers of birds and long periods of study to obtain significant data.

Vitamin A requirement of growing birds (Influence of breed). G. A. Donovan (Poultry Sci. Dept. Univ. of Vermont, Burlington, Vermont). *Poultry Sci.* **44**, 1292–98 (1965). Two strains of SCWL male chicks were compared with male chicks from two broiler type strains (WPR and WM). The SCWL chicks achieved relatively slower rates of gain than did the broiler type strains when adequate levels of vitamin A were included in the diets. The need to meet the vitamin A requirements of the birds appeared to be more critical for the broiler type strains, as deficiencies of equal magnitude were more detrimental to rate of gain for these birds. Diets deficient in vitamin A caused marked increases in intestinal weights and lengths.

Metabolism of phospholipids in Ehrlich ascites tumor. V. Donisch and R. J. Rossiter (Dept. of Biochem., Univ. of Western Ontario, London, Canada). *Cancer Res.* **25**, 1463–67 (1965). When Ehrlich ascites cells were incubated in a suitable medium containing one of a number of C^{14}-labeled phospholipid precursors, radioactivity was recovered from the lipid fraction. For the same concentration and specific radioactivity of precursor, the incorporation was in the following order: Choline > ethanolamine > L-serine > glycerol > formate > acetate. Radioactivity from choline-1,2-C^{14} was incorporated into the 3 choline-containing phospholipids—lecithin, choline plasmalogen and sphingomyelin. Radioactivity from ethanolamine-1,2-C^{14} was incorporated into phosphatidyl ethanolamine, ethanolamine plasmalogen, choline plasmalogen, and lecithin. Radioactivity from L-serine-C^{14} was incorporated into phosphatidyl serine, serine plasmalogen, and sphingomyelin, and also into phosphatidic acid and other glycerophosphatides. Radioactivity from glycerol-1-C^{14} was incorporated into phosphatidic acid and the glycerophosphatides, and also into sphingomyelin. Radioactivity from formate-C^{14} was incorporated into phosphatidyl serine, serine plasmalogen and sphingomyelin, with lesser amounts into other phosphatides. With acetate-1-C^{14}, radioactivity was poorly incorporated into the phosphatides of this tissue.

Utilization of volatile fatty acids in ruminants. I. Removal of them from portal blood by the liver. R. M. Cook and L. D. Miller (Depts. of Dairy Sci. and Vet Sci., Univ. of Idaho, Moscow, Idaho). *J. Dairy Sci.* **48**, 1339–45 (1965). Removal of volatile fatty acids from portal blood by the liver was studied in 20 ewes and 5 goats. When animals were fed hay, practically all of the propionate but only a small part of the acetate present in portal blood was removed by the liver. However, on a molar basis more acetate than propionate was taken up by the liver. In animals fed grain for extended periods, or grain plus fish oil, the proportion of propionate in the rumen fluid increased markedly and more propionate than acetate was taken up by the liver. The liver showed a greater capacity for removing acetate than either propionate or butyrate from the portal blood when these acids were added to the rumen. Butyrate was not present in significant amounts in right rumen vein blood or portal blood. Only acetate and propionate are absorbed from the rumen as such and presented to extraruminal tissues for metabolism. This work confirms the conclusion by others (4,6) that propionate is metabolized mainly by the liver and acetate by extrahepatic tissues. The manner in which butyrate is utilized by ruminant tissues under normal conditions remains to be elucidated.

Effect of estradiol benzoate on cholesterol and vitamin A metabolism. S. V. Bring (College of Agr., Univ. of Idaho, Moscow, Idaho). *Proc. Soc. Exp. Biol. Med.* 120, 45–8 (1965). Weanling male rats depleted of their liver vitamin A stores were given the following for 21 days: 0.5% or no cholesterol, 150 or 1000 IU of vitamin A acetate daily, and subcutaneous injections of 4 μg of estradiol benzoate 3 times a week in 0.1 ml of cottonseed oil or the carrier oil only. One-half of the rats were castrated at about 4 weeks of age. Castrates showed an inverse relationship between liver vitamin A and cholesterol deposition. Estrogenic-treated castrates fed cholesterol responded like the intact rats with an inverse relationship between liver cholesterol deposition in dietary vitamin A level. Estradiol benzoate 1) depressed the cholesterol/liver content in the intact rats fed cholesterol and the castrates fed cholesterol with the high vitamin A level which may be a reflection of the effect of EB on liver weight only; 2) increased the liver vitamin A concentration in castrates fed cholesterol and in intact rats fed cholesterol and the high vitamin A level; 3) increased the serum cholesterol level in all groups except the intact rats fed no cholesterol and the high vitamin A level.

THE METABOLISM OF GLUCOCEREBROSIDES (III). R. O. Brady, A. E. Gel, J. N. Kanfer and R. M. Bradley (Natl. Inst. of Neurological Diseases and Blindness, N. I. H., Bethesda, Md.). *J. Biol. Chem.* 240, 3766–70 (1965). The distribution of glucosyl- and galactosylceramide-cleaving enzymes has been investigated in various tissues of 14-day-old rats. An enzyme was purified 2300-fold from rat small intestinal tissue in 38% yield which catalyzes the hydrolysis of both glucosyl- and galactosylceramide. The products of the reaction with the latter substrate were identified as galactose and ceramide. The K_m appears to be the same for both substrates, and the reactions appear to be catalyzed by the same enzyme. The enzyme was inactive with sulfatide but did catalyze the hydrolysis of higher ceramide oligosaccharides at a much slower rate than cerebrosides. It was noncompetitively inhibited by cellobiose.

PHOSPHOLIPIDS. V. SYNTHESIS OF PHOSPHONIC ACID ANALOGUES OF L-α-LECITHINS. E. Baer and N. Z. Stanacev (Banting and Best Dept. of Med. Res., Univ. of Toronto, Toronto 5, Canada). *J. Biol. Chem.* 240, 3754–59 (1965). A method has been developed for the synthesis of both enantiomeric as well as racemic forms of phosphonic acid analogues of saturated and unsaturated α-lecithins of assured structural and configurational purity. The synthesis of the distearoyl-, dipalmitoyl-, and dimyristoyl-L-α-glyceryl-(2- trimethylammoniumethyl) phosphonates is described. The phosphonolipids were obtained by phosphonylating the corresponding D-α,β-di- glycerides with 2-bromoethylphosphonic acid monochloride and triethylamine, and treating the resulting diacyl L-α-glyceryl-(2-bromoethyl)phosphonates in dimethylformamide solution with trimethylamine at 50–55C.

INFLUENCE OF DIET ON THE HYPOCHOLESTEROLEMIC ACTION OF METHYLTESTOSTERONE IN DOGS. Liese L. Abell, E. H. Mosbach and F. E. Kendall (Columbia Univ. Res. Service, Goldwater Mem. Hosp. Welfare Island, N.Y.). *J. Nutr.* 87, 285–92 (1965). The effect of altering the relationship between the major constituents of the diet (protein, fat, carbohydrate) upon the hypocholesterolemic activity of 17α-methyltestosterone in dogs was studied. In diets containing casein, lard, salt mixture, vitamins, 1% cholesterol and either sucrose or corn starch, the amounts of fat or protein were varied at the expense of carbohydrate. Groups of 5 dogs were maintained on each regimen for 4 weeks, and the cholesterol content of the serum, high density (α-) and low density (β-) lipoprotein fractions was determined at regular intervals. An increase in the percentage of calories derived from lard from 5 to 48% enhanced the hypercholesterolemia resulting from cholesterol feeding. Administration of methyltestosterone to dogs fed the cholesterol-containing experimental diets consistently produced a decrease in the cholesterol content of the α-lipoprotein fraction that was not affected by varying the proportions of the 3 dietary components. Methyltestosterone decreased the β-lipoprotein cholesterol in dogs fed diets low in fat or diets containing corn starch and increased it in dogs fed diets high or containing sucrose.

COMPARISON OF BETA-CAROTENE CONTENT OF DRIED CARROTS PREPARED BY THREE DEHYDRATION PROCESSES. E. S. DellaMonica and Paulin E. McDonald (Eastern Reg. Res. Lab., D.A.). *Food Technol.* 19, 141–43 (1965). The β-carotene concentration was compared in fresh carrots and in carrots dehydrated by explosive puffing, air drying, and vacuum freeze-drying. Total β-carotene content of the explosive puffed product compared

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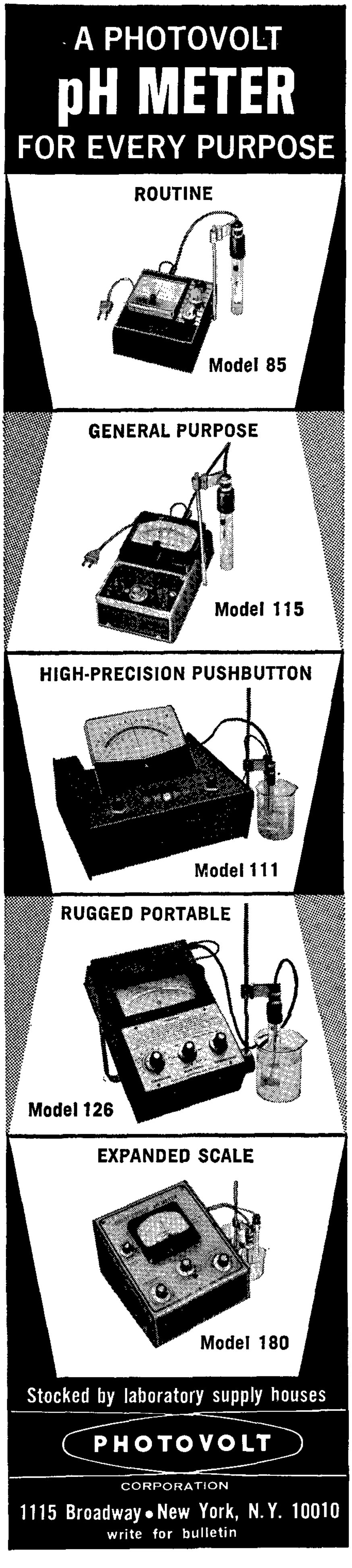

"A Cleaner America" Is Theme of Soap and Detergent Convention

The Waldorf-Astoria Hotel in New York City is the location for the 39th Annual Convention, Jan. 26–28, 1966. The convention is open to all persons, members or nonmembers, interested in soap, synthetic detergents, detergent materials, glycerine or fatty acids.

Fatty Acid Division

Among the highlights of the opening session, Wednesday, January 26th, is the Fatty Acid Division General Meeting, featuring "The Carbio Chemical Co. Faces the C-12 Crisis of 1970," a dramatized discussion panel by Charles Kline, Chemical Consultant, and Robert Wilkerson, President, of the Wilk Advertising Company; G. W. Boyd, General Manager Fatty Acid Division, Emery Industries, Inc.; and Norman Sonntag, Director, Research Center, National Dairy Products.

Industrial Division

The Industrial Division General Meeting will present "Upgrading Plant Housekeeping," by Harold Rowe, Executive Director of the Institute of Sanitation Management. The topic "Built-in Building Cleanability" will be covered by J. S. Sharp, AIA, Sharp and Handren, Architects, who will present "An Architect's View"; and J. C. Gardner, Assistant Director, Department of Buildings and Grounds, Columbia University, who will present "An Administrator's View."

The Thursday session will open with the Report of the President, J. P. Moser, of Lever Brothers Company. The session will also feature "A Report on the Consumer-Dynamics Supermarket Survey," by R. W. Mueller, Publisher, Progressive Grocer; "Packaging for the New Order of Buyers," by Tony Ruhmann, Director of Design & Market Research Laboratories, Container Corporation of America; "Reaching the New Consumer Through Advertising," by A. J. Seaman, President, Sullivan, Stauffer, Colwell & Bayles, Inc.; "Dynamics of Retail Soap Sales," A Report on McKinsey & Company Studies; "Weights and Measures Considerations," by M. W. Jensen, Chief, Office of Weights and Measures, N.B.S. US Department of Commerce.

Glycerine Division

At the Glycerine Division Business Meeting, Sheldon Schaffer, Head, Industrial Economics Section, Southern Research Institute, will discuss "Areas of Opportunity for Glycerine Research."

The Friday session will have W. K. Griesinger, Manager, Development Division, The Atlantic Refining Company as moderator. "Cotton Washability and Permanent Press," will be presented by W. M. Segall, National Cotton Council; "Washing of Synthetic-Natural Textile Blends," by R. P. S. Black, E. I. duPont de Nemours & Company; "Role of Soaps and Detergents in Hand Dermatology," by A. M. Kligman, University of Pennsylvania; Review of Surfactant Research," by the Technical & Materials Division, SDA.

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quite favorably with that of the vacuum freeze-dried product both before and after cooking. The conventional air-dried product has a lower total β-carotene content. Of the provitamin A available in the blanched fresh carrot, approximately 60% was retained by both the explosive puffed and conventional dried products, while about 80% was retained by the freeze-dried products. After proper reconstitution, however, the retention of provitamin A was 76% for freeze-dried carrots, 64% for explosive puffed and 52% for conventional dried carrots.

THE MECHANISM OF α-OXIDATION OF FATTY ACIDS BY PLANT TISSUES. C. Hitchcock and A. T. James (Unilever Research Lab., Bedford). *Biochem. J.* 97, 1C–3C (1965). The authors have investigated the oxidation of palmitate-U-C^{14} and DL-2-hydroxy-palmitate-U-C^{14} by acetone-dried powders of young pea leaves. Palmitic acid-U-C^{14} was degraded to 2-hydroxy-palmitic acid-C^{14} pentadecanoic acid-C^{14}, 2-hydroxy-pentadecanoic acid-C^{14}, myristic acid-C^{14} and 2-hydroxy-myristic acid-C^{14}. When the substrate was 2-hydroxy-palmitic acid-U-C^{14}, the radioactive products were pentadecanoic acid-C^{14}, 2-hydroxy-pentadecanoic acid-C^{14} and myristic acid-C^{14}. The suggested metabolic sequence is: $R \cdot CH_2 \cdot COOH \rightarrow R \cdot CH(OH) \cdot COOH \rightarrow R \cdot CHO \rightarrow RCOOH \rightarrow$ etc.

THE PRESENCE OF α-TOCOPHEROLQUINONE IN BLUE-GREEN ALGAE. N. G. Carr and Mary Hallaway (University of Liverpool). *Biochem. J.* 97, 9C–10C (1965). The amount of α-tocopherol quinone present/mole of chlorophyll was 0.03 mole in *Anabaena variabilis*, 0.05 mole in *C. fritschii*, 0.014 mole in *M. laminosus* and 0.12 mole in *N. muscorum*. In all these species quinones of both plastoquinone-A and vitamine K_1 type were also present. α-Tocopherolquinone could not be detected in *Anacystis nidulans*.

PREFERENTIAL CONVERSION OF CHOLESTEROL ARACHIDONATE TO HIGHLY POLAR LIPIDS. L. Swell and M. D. Law (Medical College of Virginia, Richmond). *Arch. Biochem. Biophys.* 112, 115–19 (1965). Cholesterol-4-C^{14} and cholesterol-4-C^{14} esters (palmitate, oleate, linoleate, and arachidonate) were injected into rats. Highly polar C^{14}-lipids representing 25–37% of the liver lipid C^{14}-activity were recovered after the injection of cholesterol arachidonate. Of the polar C^{14}-lipids 10% were formed from cholesterol linoleate; the remaining esters and free cholesterol formed negligible amounts (1–2%) of the polar lipids. Only traces of polar labeled lipids were found in the serum. The polar lipids contained 55–65% unchanged cholesterol; the cholesterol appeared to be bound as ester. Acetylation of the polar lipids gave less polar products suggesting the presence of hydroxyl groups. Thin-layer chromatography of the polar lipid fraction indicated the presence of at least 5 components. These results suggest the presence of a metabolic pathway in the metabolism of cholesterol not previously recognized.

FAT METABOLISM IN PRE-ADOLESCENT CHILDREN ON ALL-VEGETABLE DIETS. Ruth M. Feeley, Annie L. Staton, and Elsie Z. Moyer (Human Nutrition Res. Div., U.S. Dept. of Agriculture). *J. Am. Dietet. Assoc.* 47, 396–400 (1965). Fat intake and fecal fat excretion and levels of serum lipids were determined for 12 healthy 7 to 9 year old girls on controlled low-protein diets composed entirely of foods from plant sources. Diets provided 4% protein and 29% fat (based on total calories) or 7% protein and 34% fat. The fats consisted of margarine (a special blend of 50% partially hardened cottonseed oil and 50% soy oil), vegetable fats and oils used in cooking, and the fat in the nuts. Girls on the two diets excreted 6.9–7.7 and 8.5–12.4 g/day, respectively, two to three times more fat than has been reported for children of similar age groups on mixed diets of similar fat content. The mean apparent digestibilities of the fat on the two levels of protein intake were 90 and 88%, respectively. On the lower protein diets, no significant differences in mean serum cholesterol and phospholipid levels were observed; however, significant differences in mean glyceride levels were apparent. On the higher protein diets, no significant differences in mean values were observed for any of the serum lipid components.

STABILIZED TOCOPHEROL CONCENTRATES AND PROCESS FOR PREPARING THE SAME. C. D. Robeson (Eastman Kodak Co.). *U.S. 3,212,901.* A stable tocopherol concentrate useful for animal feeds and the like comprises: a stabilized deodorizer distillate prepared by forming an admixture containing (1) a deodorizer distillate having a tocopherol content of at least 2 weight per cent and representing at least about 1000 I.U. vitamin E and a free fatty acid content of at least the molecular equivalent of the tocopherol content, and (2) polyphosphoric acid in a parts by weight ratio (polyphosphoric acid to distillate) in a range from 0.9:1 to 1.5:1, and maintaining the mixture at a temperature in a range from 50–100C for at least 15 minutes.

• Drying Oils and Paints

[PHOSPHATIDES IN OILS FOR] ALKYD RESINS. R. M. Herralde. *Pinturas y Acabados Ind.* 6 (34), 105–6 (1964). Oils for alkyd resins should contain $\not> 0{\cdot}1\%$ of phosphatides, which interfere with polyesterification. They may be detected by adding a soln. of oxalic or citric acid to the heated oil, cooling and noting any turbidity, or determined by estimating the P content of the oil and applying a factor. (Rev. Current Lit. Paint Allied Ind. #278).

INVESTIGATION OF THE VISCOELASTIC BEHAVIOR OF PAINT FILMS. V. Zorll (Res. Inst. for Pigments and Varnish, Stuttgart, Ger.). *Paint Technol.* 29, 14 (1965). A torsion pendulum, specially designed for the investigation of coating materials, enables the determination of the torsion and the loss moduli. These two indices characterize the viscoelastic behavior of a substance. The progress of thorough drying can be effectively followed in various paints by measuring the gradually increasing torsion modulus during a period of up to 16 days. Satisfactory agreement has been found for four different types of binders between the Konig hardness measured in the temperature range of 10–40C and 20–100% relative humidity, and the torsion modulus of these materials determined under similar climatic conditions. The dependence upon temperature of the modulus value of the above materials was further demonstrated by measurements within the wider temperature range of minus 30C to plus 80C and compared with the moduli of some typical macro-molecular substances of well-known structure. The possibility of a direct comparison with corresponding values for high polymers represents an important feature of measuring the torsion modulus of paint films.

PAINT OILS FROM FISH OILS. II—EVALUATION. O. Notevarp and O. Vonen. *Färg och Lack* 10 (8), 213–24 (1964). Durability tests on paints based on a fish oil medium have shown that the performance is equivalent to that of linseed oil paints. A series of long-oil alkyds has been made in which the phthalic acid was wholly or partly replaced with dimerised/trimerised fish oil acids. The alkyds from the fish oil acids compared favourably in drying and film properties with those based on phthalic acid, but were darker. Modification with maleic or phenolic resin gave a high level of water-resistance. (Rev. Current Lit. Paint Allied Ind. #280.)

CONTROL OF THE ESTER INTERCHANGE OF TRIGLYCERIDES WITH POLYHYDRIC ALCOHOLS. W. Müller and K. Berger. *Plaste u. Kautschuk* 11 (10), 632–5 (1964). The course of the alcoholysis of triglyceride oils with polyhydric alcohols is followed by measurement of electrical resistance. The resistance at first falls as the glycerol dissolves in the oil and then rises to a constant value at equilibrium. The technique can be used with castor oil as well as oils such as linseed or soya. (Rev. Current Lit. Paint Allied Ind. #280.)

USE OF ION EXCHANGE RESINS IN THE DEHYDRATION OF CASTOR OIL. N. A. Ghanem and Z. H. Abdl El-Latif (Nat. Res. Centre, El-Dokki, Cairo). *Chem. Ind. (London)* **1965**, 1650. Castor oil can be dehydrated by heating for 30 minutes at 270C in the presence of 4% Dowex 50 resin. The catalyst can be easily removed by decanting or filtration to give a clear oil of very light color and specifications corresponding closely with those of dehydrated castor oil. A continuous process in columns may also be possible. The method is restricted by the thermal stability of the ion exchange resin and by its being more expensive than simple ionic catalysts.

• Detergents

DETERGENTS AND SUFACTANTS. L. Raphael. *Mfg. Chemist* 36, 67 (1965). A report of the progress in the field of detergents and surfactants. The topics covered include LAS, nonionics, alkylolamides, water purification, STPP, sodium alkyl sulphates, chlorinated cyanurics and polyglycolamines.

DETERGENTS FOR DEVELOPING COUNTRIES. A. Davidsohn. *Soap Chem. Specialties* 41(9), 73–6, 84, 86 (1965). The author describes the development of the Israel firm, Zohar Detergent Factory. Starting with alkyl benzene sulfonic acid produced by sulfonation with SO_3 converter gas, investment capital is minimal although a whole range of detergents can be produced.

SO_3 SULFONATION OF HEAVY ALKYLATES. Suzana Holtzman and B. M. Milwidsky (Zohar Soap and Detergent Factory, Kibbutz Dalia, Israel). *Soap Chem. Specialties* 41 (10), 64–7 (1965). The authors studied the conditions required for the sulfonation of heavy alkylates with SO_3 converter gas, the most suitable raw materials, degree of sulfonation needed to make soluble emulsifying oils, and suitable analytical procedures for interpretation of results and for the evaluation of the final products. A heavy alkylate with a distillation range of 337–393C at 760 mm Hg, specific gravity of 0.882 at 15C, and a refractive index of 1.494 at 15C yielded satisfactory soluble oils when 10–15% SO_3 was introduced. Best results were achieved with 12–13.5%. In this case a sulfonate containing 43–48% sulfonic acid was obtained with less than 2% free SO_3. The average molecular weight of the sulfonic acid was 370–80. Studies showed selective sulfonation of the hydrocarbons depending on their molecular weights. With 10% SO_3 hydrocarbons with an average molecular weight of 282 (14–15C in the alkyl chain) are sulfonated. With 15% SO_3, hydrocarbons having an average molecular weight of 315 (16–17C in the alkyl chain) are sulfonated but only with a very large increase in free SO_3.

THE TESTING AND PERFORMANCE OF DETERGENT-STERILISERS UNDER OPERATING CONDITIONS IN THE CATERING INDUSTRY. D. G. Pirie, C. W. Chater, C. E. A. Wescott and E. Telford (J. Lyons & Co., Ltd., London). *Chem. Ind. (London)* **1965**, 1676–80. The requirements for detergent-sterilisers which can be used satisfactorily in the catering industry, particularly for the utensil washing operations, can be summarized as follows. They should be non-toxic, non-corrosive (at least at the dilution recommended), free from persistent odors, and suitable for automatic dispensing. They should produce satisfactory visual cleanliness, and their bactericidal action must be rapid at the required temperature and effective against all types of bacteria of public health or sanitary significance. If they are to be used in washing machines they must have low foaming properties; for operations where there may be contact with the hands they must be non-irritating. They must also provide definite economic advantages or striking improvements in working conditions or hygiene standards.

LIQUID DETERGENT COMPOSITION. L. Rosnati (Lever Bros. Co.). *U.S. 3,208,949.* A homogeneous, readily pourable heavy duty liquid detergent composition consists of an aqueous emulsion of (1) 7–15% by weight of a synthetic organic nonionic detergent which is a condensate of a hydrophobic base with several moles of ethylene oxide, (2) 20–30% potassium pyrophosphate, (3) 1.5–3% of a stabilizer selected from the group consisting of (a) an alkali metal salt of an interpolymer of vinyl methyl ether and maleic anhydride, the interpolymer having a specific viscosity of 0.8 to 3.5 as determined on a 1% solution in 2-butanone, and (b) an alkali metal salt of a linear copolymer of ethylene and maleic anhydride, the copolymer having a specific viscosity of 1.2 to 1.8 as determined on a 1% solution in dimethyl formamide at 25C, and (4) 2–3% of an alkali metal salt of caprylic acid. The alkali metal cations of components (3) and (4) may be sodium or potassium. The detergent composition has a viscosity of from 200 to 700 centipoises measured by a Brookfield Viscosimiter, No. 3 spindle, 30 revolutions per minute.

DETERGENT COMPOSITION WITH IMPROVED BLEACHING EFFICIENCY. J. L. Hirtz and Gilles Noiriel (Colgate-Palmolive Co.). *U.S. 3,211,658.* A stable, substantially dry, perborate-containing detergent composition effective for washing at the boil consists of (by weight) 4–40% of a member selected from the group consisting of water-soluble, synthetic, non-soap anionic and nonionic organic detergents; 3–20% water-soluble inorganic perborate; 40–90% water-soluble inorganic alkali metal non-oxidizing builder salts, a water-soluble inorganic copper salt, and a sequestering agent selected from the group consisting of methylaminodiacetic acid, aminotriacetic acid, and hydroxyethylaminodiacetic acid. The copper salt is present in amount sufficient to produce a copper atom concentration of 30–300 ppm by weight of the detergent composition, and the sequestering agent is present in amount such that 3 to 15 molecules thereof are contained in the detergent composition per atom of copper.

PROCESS FOR PRODUCTION OF DETERGENT COMPOSITIONS. L. Habicht, B. Pyrmont, A. W. F. Kluge, P. H. Rasmussen and G. A. Glossop (Colgate-Palmolive Co.). *U.S. 3,202,613.* A method for producing a detergent composition of low bulk density comprises: mixing at a temperature up to about 50C an aqueous slurry (75–85% solids) containing a water-soluble higher alkyl benzene sulfonate detergent and a compound substantially non-reactive therein and which releases CO_2 when heated (sodium carbonate or bicarbonate), and 0.1 to 2% of a material selected from the group consisting of potassium stearate, methylcellulose, sodium polyacrylate, polyvinyl alcohol, polyvinylpyrrolidone and polyacrylamide; milling the slurry and forming solid films in ribbon form at a temperature insufficient to release the CO_2; drying the ribbons in hot air at a drying temperature of 100–250C to cause generation of the CO_2 from the films, thereby decreasing their density; and reducing the ribbons to dust-free particulate form having a bulk density of 0.35–0.45 and a moisture content of less than 10%.

POLYGLYCOL ESTERS OF OLEFINICALLY UNSATURATED HIGHER FATTY ACIDS. R. J. Nankee (Dow Chemical Co.). *U.S. 3,206,486.* Described is an oily liquid compound having the formula $RCOO(AO)_m(EO)_nH$ in which R is a straight chain aliphatic hydrocarbon radical containing 17 carbon atoms and 1 to 2 double bonds, A is a 1,2-propylene radical, E is an ethylene radical, m is an integer about 10 to 20, n is an integer about 3 to 8, and the ratio m/n is about 2.2 to 4.3.

LIQUID DETERGENT COMPOSITION. G. F. Marion, T. L. Treitler, and P. A. Munger (Colgate-Palmolive Co.). *U.S. 3,211,660.* The described composition consists of 10–18% by weight of a mixture of an alkali metal higher alkyl mononuclear aryl sulfonate detergent salt, the alkyl group having 8 to 15 carbon atoms, an alkali metal alkyl phenoxy polyethoxamer sulfate salt material, the alkyl group having 8 to 13 carbon atoms and the polyethoxamer sulfate having an average of 4 to 10 moles of ethylene oxide, the ratio of the alkyl aryl sulfonate to polyethoxamer sulfate being from 6.5:1 to 1:4 by weight; a total of 10 to 20% of water-soluble inorganic builder salts with at least 10% of potassium polyphosphate, 6 to 12% of a water-soluble hydrotropic salt selected from the group consisting of alkyl benzene sulfonates having up to 3 carbons in the alkyl group, and the balance containing primarily water. The composition has a solids content of up to 50% by weight and forms a homogeneous, pourable, clear liquid at room temperature.

LIQUID DETERGENT COMPOSITION. N. R. Smith (Procter & Gamble Co.). *U.S. 3,211,661.* A high-sudsing, light-duty liquid detergent composition consists of (1) 15–35% by weight of a sulfate detergent having the formula $R(OC_2H_4)_xSO_4Me$ in which R represents straight chain alkyl groups having 10 to 14 carbon atoms, x is a number of 0 to 4, and Me is selected from the group consisting of sodium, potassium, ammonium, and triethanol ammonium cations; (2) 3–8% of the reaction product of a primary amine having a straight chain alkyl group having 10–14 carbons with at least 50% of the alkyl groups having 12 carbons and a sultone having 3–4 carbons, the reaction product corresponding to that prepared by reacting equimolar quantities of the amine and sultone in acetone solution while refluxing at the boiling point of acetone; (3) 10–25% of a solubilizing agent selected from the group consisting of methyl, ethyl, and propyl alcohols; and (4) the balance water. The ratio of (1) to (2) is above 3/1 and not more than 6/1, and the total of (1) and (2) is more than 20% and not more than 40% by weight of the composition.

CLEANSING AND LAUNDERING COMPOSITIONS. F. L. Diehl (Procter & Gamble Co.). *U.S. 3,213,030.* An improved cleansing and laundering composition consists of a water-soluble salt of methylene diphosphonic acid selected from the group consisting of the sodium, potassium, ammonium, and substituted ammonium salts of the acid as a builder and a water soluble organic synthetic non-soap detergent selected from the group consisting of anionic, nonionic, zwitterionic, ampholytic detergents, and mixtures thereof, the ratio of the builder to the detergent being in the range of 1:3 to 10:1. The composition provides in aqueous solution a pH between about 8 and 12.

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