ABSTRACTS

R. A. REINERS, Editor. ABSTRACTORS: N. E. Bednarcyk, J. E. Covey, J. G. Endres, J. Iavicoli, F. A. Kummerow, E. G. Perkins, T. H. Smouse, J. A. Thompson and R. W. Walker

• Fats and Oils

A NOTE ON AUTORADIOGRAPHY OF TRITIUM-LABELED GALACTOLIPIDS IN DOUGH AND BREAD. H. P. Wehrli and Y. Pomeranz (Dept. of Grain Sci. & Ind., Kansas State Univ., Manhattan, Kansas 66502). *Cereal Chem.* 47, 221–24 (1970). Tritium-labeled galactosyldidecanoylglycerol was synthesized. Sections 5 microns thick prepared from dough and bread containing the labeled galactolipid were studied by autoradiography. In the dough, the galactolipid was distributed in gluten and, to some extent, on the starch surface. In baked bread, most of the galactolipid appeared in the starch.

II. RELATIVE RATE OF UREA ADDUCT FORMATION WITH REFERENCE TO THE LENGTH OF FATTY ACID CHAIN. *Ibid.*, 149–53. Quantitative analysis of the amount of urea adduct was made by use of x-ray diffraction. The shorter the length of the fatty acid chain (12–18 carbons), the greater the reaction rate was. The apparent activation energy obtained by the Arrhenius equation was: C_{12} 31.1, C_{13} 22.9, C_{14} 26.1, C_{15} 19.2, C_{16} 22.0, C_{17} 15.6, and C_{18} 22.9 kcal/mole.

NATURE OF THE TASTE OF LIPIDS. II. ORGANOLEPTIC EFFECT OF FREE FATTY ACIDS CONTAINED IN THERMALLY OXIDIZED SOYBEAN OIL. Riichiro Usuki, Yukio Kobayashi and Takashi Kaneda (Tohoku Univ., Sendai, Japan). *Yukagaku* 19(1), 10–12 (1970). The results of organoleptic test showed that the original soybean oil (acid no. 0.06, I. no. 135.8) plus added free fatty acids (consisting of about 14% lower acids than C_{12}, 12.8% palmitic, 2.6% stearic, 13.1% oleic, 34.2% linoleic acids, etc.) separated from the heated soybean oil (acid no. 0.75, I no. 115.1), increased not only the oily taste but also the odor. The profile test, however, showed that these free fatty acids did not contribute to any essential change of the taste of oil upon heating.

STUDIES ON MONOGLYCERIDES BY THE DIFFERENTIAL SCANNING CALORIMETRY. I. DETERMINATION OF HEAT OF FUSION OF 1-MONOPALMITIN AND ISOMERIZATION OF 2-MONOPALMITIN. Mitsumasa Takasago, Kazuo Horikawa, and Shinroku Masuyama (Osaka Munic. Techn. Res. Inst., Kita-ku, Osaka, Japan). *Yukagaku* 19(1), 12–15 (1970). Heat of fusion of 1-monopalmitin was determined with the Perkin-Elmer DSC-1 differential scanning calorimeter. Differences were observed between the initial melting curve and the repeated heating curves of pure 1-monopalmitin. The original melting curve showed the endotherm corresponding to melting of the β-form. The repeated heating curves had 2 endothermic peaks corresponding to a sub-α-transformation and the melting of the α-form. The similar curves of 2-monopalmitin had only the peak of the stable form. The DSC curves of 2-monopalmitin stored at 50C support the following transformations; it was isomerized to 1-monopalmitin after 30 days, and then the α-form of isomerized 1-monopalmitin was transformed to the more stable β'-form after 70 days. These observations were confirmed also by gas chromatography.

ANTIOXIDATIVE ACTIVITY OF KOJIC ACID DERIVATIVES. I. ALKYL- AND *O*-ACYL-KOJIC ACIDS. Yoshiro Abe and Yukio Takahashi (Keio Univ., Koganei, Tokyo, Japan). *Yukagaku* 19(1), 23–7 (1970). Alkylkojic acids and *O*-acylkojic acids were synthesized from kojic acid and alkyl bromides or fatty acids (in the presence of $ZnCl_2$). Antioxidative activity was examined in lard, whale oil and soybean oil by the active oxygen method. In general these derivatives were effective in whale and soybean oils. Synergistic effects with butylated hydroxyanisoles and citric acid were clear especially with soybean oil oxidation.

TOXIC CHARACTER OF RANCID OIL. IX. DIGESTIBILITY OF POLYMERIZED FATTY ACIDS IN THERMALLY OXIDIZED SOYBEAN OIL. Goro Kajimoto and Katsunori Mukai (Univ. Kobe Gakuin, Ikawadani, Tarumi-ku, Kobe, Japan). *Yukagaku* 19(2), 66–70 (1970). Soybean oil (acid no. 0.05, carbonyl no. 8.0 mEq/kg) (i) was heated for 24 and 40 hrs. at 180C. The oil heated 24 hrs. (ii) and that heated 40 hrs. (iii) had, respectively, acid no. 0.16, 0.34 and carbonyl no. 53.2, 121.4. Rats fed i, ii or iii grew in decreasing order, clearly showing toxic character of ii and iii. Excrements and fat content of the liver increased in the order $i<ii<iii$. The excrements of rats fed iii contained more dimers and secondary products of fatty acids, i.e. they were not digested. When i was fed, the excrement contained less linoleic and linolenic acids, and the liver contained more of these acids than when ii or iii were fed.

EDIBLE FATS AND SHORTNESS OF BAKERY PRODUCTS. Nobuya Matsui (Kao Soap Co., Sumida-ku, Tokyo, Japan). *Yukagaku* 19(2), 57–65 (1970). Various kinds of bakery products (bread, cracker, cake, biscuit, pie crust, etc.) are reviewed. Some require one or more of the characteristics of shortening such as creaminess, plasticity, shortness, emulsifying property and stability against oxidation. The state of fats in dough, structure of lipoprotein in gluten, determination of shortness and shortening quality of various edible fats are discussed.

COMBINATION OF VARIOUS UNITS FOR THE FATTY ACID DISTILLATION AND FRACTIONATION AS WELL AS DISTILLATIVE DEACIDIFICATION AND DEODORIZATION OF FATS. I. H. Stage (Distillation techniques Dr. H. Stage, Koln-Niehl, W. Ger.). *Fette Seifen Anstrichmittel* 72, 229–34 (1970). Highly efficient units are described for flashing and degassing, for distillation using a falling film evaporator, for evaporation under protective conditions and for continuous, discontinuous and combined operations at extremely low pressure drop. These units may be combined with each other in the desired manner to achieve high purity, low color and odor and a high degree of separation with great economy. Examples of the application of these new units are described.

II. *Ibid.* 353–65. Equipment and controls used in distillation as applied to fatty acid and edible oil processing are reviewed.

III. *Ibid.*, 439–44. Modern distillation techniques are reviewed.

DECONTAMINATION OF OILS, OILSEEDS AND OIL-BEARING FRUITS FROM CESIUM-137. A. Scher and G. Zipple (Soc. for Fat Chem., Munster/Westf., W. Ger.). *Fette Seifen Anstrichmittel* 71, 948–51 (1969). It was shown by model experiments that cesium-137 is removed partly from raw oils and fats during deacidification and to a considerable extent during bleaching. Totally contaminated oilseeds and oil-bearing fruits can be freed from cesium-137 by diffusion, for which 10% sodium chloride or potassium chloride solutions were used. Recirculation and continuous removal of cesium ions which have already entered in the solution intensify and accelerate the decontamination. The attainable degree of decontamination is dependent on the plant material to be treated.

PRO- AND ANTIOXIDANTS IN THE FIELD OF FATS. XXVI. ANTHOCHLORES OF DAHLIA VARIABILIS AND COSMOS SULPHUREUS. H. P. Kaufmann and A. W. Baya (Inst. for Fat. Res. Munster/Westf. W. Ger.). *Fette Seifen Anstrichmittel* 72, 372–376 (1970). The authors have determined the antioxidative activity of the anthochlor pigments of *Dahlia variabilis* and *Cosmos sulphureus* on methyl linoleate. It was found that aglycones butein and sulphuretin exhibit stronger antioxidative action than the chalkone aglycone 2′,4,4′-trihydroxy chalcone. During the treatment of the two flowers, a splitting of the glycosides was observed. In the freshly cut *C. sulphureus* variety no aglycones could be detected. Furthermore, the distribution of anthochlores in the various series of petals in *D. variabilis* and *Helichrysum bracteatum* was studied.

SELECTIVE HYDROGENATION OF FATS AND FATTY ACIDS WITH SULFIDES OF TRANSISTION METALS AS CATALYSTS. J. Baltes (Harberger Edible Oil Plant, Brinckmann and Mergell, Hamburg-Harburg, W. Ger.). *Fette Seifen Anstrichmittel* 72, 425–32 (1970). Sulfides of some transistion metals are suitable as catalysts for the selective hydrogenation of fats and fatty acids. Ni_3S_2, a stoichiometrically, thermally and crystallographically defined compound is especially active. Also mixed catalysts containing tungsten sulfide and molybdenum sulfide are active. The same is true for cobalt sulfide catalysts, whereas molybdenum sulfide and tungsten sulfide exhibit considerably lower activities. The conditions of hydrogenation are essentially the same as customary; temperature range 180C to 210C for fats, 200C to 220C for fatty acids, hydrogen pressure 2–25 kg/cm, catalyst concentration 0.05 to 2 parts by weight of metal sulfide per 100 parts of fat or 0.5–5 parts by weight of metal sulfide per 100 parts of fatty acids. Using the above catalysts, the selectivity attained in the steps triene, diene, monoene or diene, monoene is over 75. The remaining double bonds in the hydrogenated product possess almost exclusively the trans configuration. The above catalysts are resistant to sulfur compounds and they exhibit exceptional longevity. The regeneration can be performed with ease. Consequently, the pretreatment of the material to be hydrogenated can be limited to washing and drying.

CHANGES IN STEROLS DURING THE INDUSTRIAL PROCESSING OF FATS AND OILS I. H. P. Kaufmann, E. Vennekel and Y. Hamza (Inst. for Fat Res., Munster/Westf. W. Ger.). *Fette Seifen Anstrichmittel* 72, 242–46 (1970). The investigations of the authors have shown that 7-hydroxy sterols are formed when soybean oil containing sterols is heated in the presence of oxygen. Hydrocarbons and disteryl ethers are formed by bleaching earth treatment of cholesterol, β-sitosterol, stigmasterol and brassicasterol. Treatment of 7-hydroxy sterol with bleaching earth leads to the formation of hydrocarbons and keto-steroids. The sterols are partly oxidized during deodorization under inadequate vacuum. Freshly extracted rapeseed oil does not contain any disteryl ether. However, these substances could be detected in commercial fat samples. In experiments on rats, no carcinogenic properties of dicholesteryl ether could be found.

II. H. P. Kaufmann and Y. Hamza. *Ibid.*, 432–33. Nonpolar steroids are formed by the action of bleaching earth on cholesterol, β-sitosterol, stigmasterol and brassicasterol in the presence of hexane. Tht hydrocarbons formed were isolated and investigated by column chromatography and preparative thin-layer chromatography. The hydrocarbons formed by the action of activated bleaching earth on cholesterol were repeatedly crystallized from ethyl alcohol and identified as $\Delta^{3,5}$-cholestadiene.

ANALYSIS AND EVALUATION OF FRYING FATS. A. Mankel (Chem. Res. Lab. Bochum, W. Ger.). *Fette Seifen Anstrichmittel* 72, 483–87 (1970). As a result of changed eating habits, the production of fried foods has considerably increased within the past years. Since the consumer ingests along with the fried food a part of the fat employed for frying, the hazard to health due to intake of overheated fat can not be ruled out. The results of investigations on frying fats and food preparations have been presented from the view-point of food control. Studies are reported on: 1) frying of pommes frites in various fats: 2) frying of fish in various oils: 3) investigation of samples from various manufacturers: and 4) permissible limits in the evaluation of heated fats.

STUDIES ON THE UV-SPECTRA OF AUTOXIDIZED FATS. III. B. A. J. Sedlacek (Inst. for Nutr. Res., Prague, Czechoslovakia). *Fette Seifen Anstrichmittel* 72, 488–90 (1970). The author has determined the various properties of oxidized oils and fats with relation to the first maximum of extinction E_1 according to the direct UV-method ($E^{1\%}_{1\,cm}$). The following fats and oils were investigated: sunflower oil, rapeseed oil, peanut oil, soybean oil, corn oil, lard, butter, beef tallow and hardened edible fat.

INFLUENCE OF LIGHT OF VARYING INTENSITY AND WAVELENGTHS ON THE OXIDATIVE DETERIORATION OF EDIBLE OILS I. P. Smits, K. Becker and R. Heiss (Inst. Nutr. Technol and Packaging, Munchen, W. Ger.). *Fette Seifen Anstrichmittel* 72, 490–97 (1970). The basic requirements for the experiments on light exposure are reported in this paper. This involves the use of an apparatus which holds the oil under a constant oxygen pressure and is able to measure very sensitively the amount of consumed oxygen. Measuring methods and the basis for calculation are given for an exactly defined exposure.

II. EXPERIMENTAL RESULTS AND DISCUSSION. R. Radtke, P. Smits and R. Heiss. *Ibid.*, 497–504. Since the action of light is a major cause for the deterioration of oils and fats, light-catalyzed oxidation of refined soybean oil was carried out under defined conditions of intensity and wavelength and the quantum yields were calculated. Not only was the intensity of light varied at a constant wavelength but also, in contrast to hitherto known work, the quantum density was held constant at various wavelengths. The photochemical action was dependent on the wavelength and the former increased with decreasing wavelength to a much greater extent than as might have been expected from the energy content of the light quantum.

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Progress in the field of lipid analysis I. Column chromotography. H. P. Kaufmann (Inst. for Fat. Res., Munster/Westf., W. Ger.). *Fette Seifen Anstrichmittel* 72, 505–518 (1970). Progress in the field of column chromotography as applied to lipid analysis is reviewed.

Pancreatic lipase hydrolysis of four seed fats and calculation of the glyceride compositions using a computer. V. V. S. Mani and G. Lakshminarayana (Reg. Res. Lab., Hyderabad-9 India). *Fette Seifen Anstrichmittel* 72, 434–38 (1970). The seed fats of *Carica papaya, Shorea robusta, Hydnocarpus wightiana* and *Argemone mexicana* were hydrolyzed with pancreatic lipase and the fatty acid compositions of the liberated monoglycerides, as well as of the original triglycerides were determined by gas-liquid chromatography. The glyceride compositions were calculated according to various theories using a digital computer. Experimental values for the positional isomers do not agree with random and restricted random values except in the case of *H. wightiana* oil. In the case of *A. mexicana* and *S. robusta* fats the experimental values for all the glyceride types agree with the values according to F. D. Gunstone. In the 2-positions of the respective triglycerides, linoleic acid predominated over oleic acid in *C. papaya*, oleic over linoleic in *S. robusta* and *A. mexicana*, and hydnocarpic over other long-chain cyclopentenyl acids in *H. wightiana*.

Micro and semimicro columns for separation by nondestructive distillation. W. G. Fischer (Lab. of Fischer, Bonn-Bad Gadesberg, W. Ger.). *Fette Seifen Anstrichmittel* 72, 444–54 (1970). New types of apparatus with split-tube columns have been developed for the micro and semimicro distillation under non-destructive conditions. Outstanding features are the desirable characteristics regarding pressure drop and separation efficiency, which previously have not been achieved by any other fractionating column. Owing to the significance of this equipment in the laboratory, three different standard types are described in detail. The field of application ranges from normal pressure to high vacuum.

Characterization of natural and synthetic waxes using combined chromatographic techniques. V. Abate, V. Badoux, S. Z. Hicks and M. Messinger (Chesebrough-Ponds Inc., Clinton, Conn.). *J. Soc. Cosmetic Chemists* 21, 119–28 (1970). A detailed thin-layer, gas-liquid and column chromatographic procedure for the evaluation of single waxes and various mixtures normally found in cosmetic preparation is presented. The thin-layer chromatographic systems developed have been found to give good class separations of the wax components, which facilitates the analysis of mixtures. The gas-liquid chromatographic evaluation utilized short columns (16–18 in. long) to separate the hydrocarbon, alcohol, and acid components of the various waxes. Thus, the alcohols with chain lengths to C_{32} were easily resolved without resorting to derivatives. The combination of the various techniques described resulted in the identification of individual waxes.

Some recent findings on energy requirements and heat transfer in scraped heat exchanges. O. Moller and A. M. Trommelen (Vlaardingen, Holland). *Fette Seifen Anstrichmittel* 72, 235–42 (1970). Scraped surface heat exchangers are widely used, especially in the food industry. In the past years, our knowledge on the physical relationships which are partly based on theoretical considerations, has been extended. Rules have been derived from these findings by which, under certain conditions, the technical properties can be calculated. Layout of equipment and their adaptation to definite working conditions are thus facilitated.

Nutritional value of various fractions of milk fat. V. Antila and M. Antila (State Res. Lab. for Milk Res., Jokioinen, Finland). *Fette Seifen Anstrichmittel* 72, 285–89 (1970). Milk fat was fractionated into four fractions having different melting ranges. The liquid fractions contained predominately short chain saturated and unsaturated fatty acids whereas the solid fractions contained mainly palmitic and stearic acids. Vitamins were mostly enriched in the liquid fractions. Rats were fed the milk fat fractions. Histopathological examination of the heart, kidney and liver showed no alterations caused by feeding.

Occurrence of ketones in products resembling butter. A. Huyghebaert, H. Hendrickx, N. Schamp and L. De Buyck (Fac. of Arg. Sci., Univ. of Gand, Belgium). *Fette Seifen Anstrichmittel* 72, 289–93 (1970). Ketones were found by thin-layer chromatographic examination of the unsaponifiable matter of butter substitutes or fats resembling butter. These substances are not methyl ketones resulting from oxidation. By gas chromatography and infrared spectroscopy, it is demonstrated that this fraction consists of two homologous series of ketones, namely $C_nH_{2n+1}COC_nH_{2n+1}$ and $C_nH_{2n+1}COC_nH_{2n-1}$′ where n varies from 11 to 17. The relationship between the fatty acid composition of these fat substitutes and the ketone composition indicates that the ketones are formed during the manufacture of such fats.

Continuous determination of water in mechanically manufactured butter (Fritz butter). K. Koenen (Dir. Milk Res. Lab., Nordrheim-Westfalen, Krefeld, W. Ger.). *Fette Seifen Anstrichmittel* 72, 296–99 (1970). A new apparatus for the continuous determination of water content in Fritz butter has been described. In this apparatus the water content is measured electrically on the basis of dielectric constant. It functions on the principle of capacity at a frequency of 13 MHz. The accuracy of measurement is ±0.1% water. A light signal indicates the levels at which the pre-adjusted upper and lower limits of water content are exceeded. The water content of butter can be directly read out and recorded during the entire process.

New technical developments in the production of fats and oils. II. J. Baltes (Harburger Oil Plant, Brinckman and Merzell, Hamburg-Harburg, W. Ger.). *Fette Seifen Anstrichmittel* 72, 166–180 (1970). This paper is an excellent review of progress made in the refining of edible fats and oils.

On the catalytic dehydrogenation of saturated and unsaturated fatty alcohols and ester formation. Part II. Kinetics and mechanism of the reaction steps. H. Reinheckel, K. Haaze, E. Konig and G. Konetzke (Inst. for Fat Chem., Ger. Acad. of Sci. in Berlin, Berlin-Adlershof, Ger.). *Fette Seifen Anstrichmittel* 72, 204–11 (1970). Dehydrogenation and dimerization have been kinetically investigated. The mechanism of reaction has been interpreted on the basis of observed and calculated data.

Recent technical developments in the industrial manufacture of edible fats. J. Baltes (Harburger Oil Plant, Brinckman and Merzell, Hamburg-Harburg, W. Ger.). *Fette Seifen Anstrichmittel* 72, 57–63 (1970). The development in the oilseed processing during the past decade was aimed towards increasing the capacity of the production units, especially of extraction plants, and, in connection herewith, towards reduction of costs. In the field of fat refining considerable progress was achieved during the same decade. The advances in processing technique comprise efforts to change over to continuous or semi-continuous processes. Processes are reported which were either found to be successful in the actual practice or whose pilot plant trials have been successfully completed. In the general technology, the decisive step is towards automation. The important features of the above are: multi-channelled and multi-step processes or sequence of processes of various types with frequent change of material over a main path, numerous multi-channelled process-loops and a few subsequent single or multi-channelled processes for the treatment of by-products and waste products.

Some interdependence of physical-chemical and pharmaceutical properties of fats. H. Szczepanska, H. Grynberg and E. Elsner (Inst. for Gen. Chem., Warsaw, Poland). *Fette Seifen Anstrichmittel* 72, 68–71 (1970). The influence of reaction conditions of the pharmaceutical properties of the products was determined during the preparation of glyceride-bases. The slip-point, solidification point, solid fat content as well as the rheological properties of the products are dependent on the conditions employed during the preparation. The investigations were carried out with palm kernel oil that was subjected to hydrogenation, glycerolysis and randomization.

100 years of margarine. From a substitute to a basic food stuff. K. F. Gander (Margarine-Union Gmb H., Hamburg, W. Ger.). *Fette Seifen Anstrichmittel* 72, 97–103 (1970). An extensive review in German of the history of margarine, formulation, production and use.

EVALUATION OF FRYING FATS. I. SHORT TIME ROASTING OF PROTEIN-RICH FOODS. J. Pokorny (Inst. for Food Chem., Chem.-Tech. College, Prague, Czeckoslovakia). *Fette Seifen Anstrichmittel* 72, 110–13 (1970). Following methods are suitable for determining the changes in frying fats during heating of meat products for short periods (1–6 hrs.): Acid value, benzidine and thiobarbituric acid values, discolouration at 400 nm and thin-layer chromatography on silica gel G. The values obtained by these methods are roughly proportional to the period of heating. Methods like peroxide value, epoxide value, rate of oxygen absorption, UV-absorption and the determination of polymer content by column chromatography on aluminum oxide are less desirable.

QUANTITATIVE EVALUATION OF GAS CHROMATOGRAMS. VII. REACTION OF METHYL OLEATE WITH THE STATIONARY PHASE. A. Seher and P. Josephs (Lab. for Fat Res., Munster/Westf., W. Ger.). *Fette Seifen Anstrichmittel* 71, 1007–14 (1969). During the GLC-analysis of methyl esters of unsaturated fatty acids a small portion remains in the column. In experiments with methyl oleate-1-^{14}C, a radioactive substance having a melting point 100C–100.5C could be isolated from the column. By IR and NMR-spectra as well as by chemical analysis, this compound was shown to be an ester from 1 mol oleic acid-1-^{14}C and polyethylene glycol succinate having an approximate mol. wt. of 1700. The same compound could also be prepared by synthesis from the individual components.

EFFECT OF GLYCERIDE DISTRIBUTION ON THE RHEOLOGICAL PROPERTIES OF FATS. A. Rutkowski and Z. Elsner (Inst. for Gen. Chem., Warsaw, Poland). *Fette Seifen Anstrichmittel.* 71, 1015–17 (1969). Investigations on suppository bases showed that the glyceride distribution influences the rheological properties of fats strongly. The authors presume that the viscosity behavior is related to the random distribution of glycerides.

DETERMINATION OF THE UREA ADDUCTIBLE FRACTION OF WAXES. A. Brink and C. Kelynjan (South African Coal and Gas Corp., Sasolburg, South Africa). *Fette Seifen Anstrichmittel* 71, 1017–20 (1969). Adduct formation between urea and n-parrafins is practically instantaneous in homogenous solution. An analytical method for the estimation of the n-parrafin content of parrafin waxes has now been developed, which is based on adduct formation from homogenous solution under suitable conditions of temperature and pressure.

EFFECT OF FRYING ON THE CHEMICAL COMPOSITION OF FATS FOR FISH FRYING. K. Lang and E. H. von Jan (Bad Kreozingen, W. Ger.). *Fette Seifen Anstrichmittel.* 71, 1027–32 (1969). If fats are heated to 180C in commercial frying plants with or without the material to be fried, chemical changes, depending on the period of heating occur. These changes are investigated by the methods commonly employed in food industry. Soybean oil and partially hydrogenated peanut oil were employed in these investigations. These two frying fats are very different as regards the degree of saturation of their fatty acids. Although these fats were subjected to more severe conditions than usually practiced in fish restaurants, no detrimental physiological properties were found in both the fats after an observation period of two years.

EFFECT OF FRYING ON THE NUTRITIONAL PROPERTIES OF FATS FOR FISH FRYING. *Ibid.* 1032–34. Experiments are reported in which the protein efficiency was determined by feeding albino rats with frying fats which were used in the industry. No correlation could be established between the chemical data and the results of animal experiments. For example the frying fats, which were used for a much longer period than the common industrial practice, did not show any injurious action on the growth and protein efficiency, although some of the chemical constants of the fats deviated considerably from those of the starting material. Considering the results obtained till now and in agreement with the instructional pamphlet of the public health authorities of Hamburg, it is recommended not to exceed a frying temperature of 180C in the frying of fish and fish products

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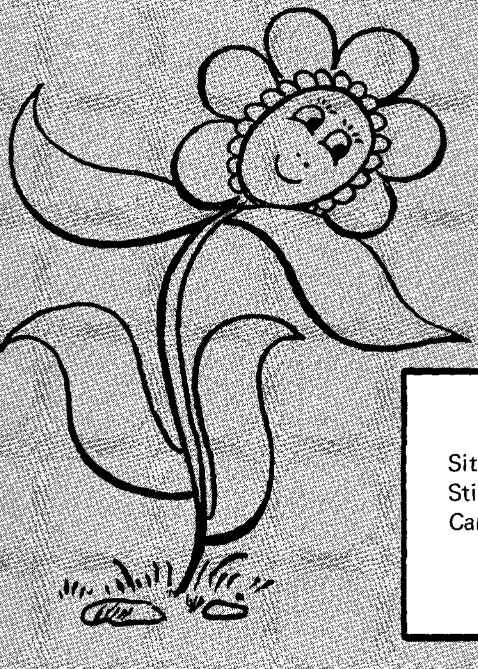

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and to fully replace the used frying fat with a fresh one once a week.

Formation of aromatic compounds in hydrogenated fish oils and their detection. T. L. Ong (Cent. Inst. Nutr. Res. TNO, Zeist, Netherlands). *Fette Siefen Anstrichmittel* **71**, 1034–38 (1969). Aromatic compounds can be formed as by-products during the hydrogenation of Peruvian fish oil with commercial nickel formate catalyst. The amount of these substances in the final product is dependent on the conditions of reaction, being greatest at high temperature and low pressure. By hydrogenating in a two-step process using high and low pressure in the first and second step, respectively, it is possible to decrease the amount of amomatic compounds below the limit of detection (0.005%) without impairing the selectivity. Hydrogenation with a copper catalyst gave a product with relatively high content of non-urea adduct forming fraction and of aromatic compounds.

Studies on the wax of fennel seed oil. A. Papov and K. Stefanov (Inst. for Org. Chem., Bulgarian Acad. of Sci., Safia, Bulgaria). *Fette Seifen Anstrichmittel* **71**, 952–53 (1969). Wax isolated from fennel seed oil was analyzed. It contains 2.8% unsaturated fatty acids (C15–C22). In this investigation chemical, ion-exchange, adsorption and gas-liquid chromatographic methods were employed.

Mass spectrometric investigation of dimeric fatty acids from frying fats subjected to thermal and oxidative action. A. Zeman and H. Scharman (Unilever Res. Lab., Hamburg, W. Ger.). *Fette Seifen Anstreichmittel* **71**, 957–60 (1969). Methyl esters of dimers from peanut oil, subjected to thermal and oxidative action in an industrial frying plant, were isolated by column chromatography and investigated by mass spectrometry. Di-unsaturated bicyclic and tetra-unsaturated acyclic structures were found to be the main components of the dimers. Dimers of very similar composition were synthesized. The mechanism of dimer formation is discussed.

Rapeseed meal. XVI. Evaluation of the spectra of toasted meal. E. Pogorzelska, J. Pokorny and A. Rutkowski (Dept. of Food Technol. and Agricultural Storage, Univ. of Olsztyn, Poland). *Oleagineux* **25**, 219–21 (1970). Toasting of rapeseed meal causes an increase in color due to nonenzymatic browning. The appearance of the absorption spectra of ethyl acetate or 70% ethanol extracts of the meal and the relationship between the optical densities at different characteristic wave lengths permit determination of the effects of time and temperature of heating. A method for evaluation of degree of browning is proposed.

Spectrophotometric determination of antioxidants in oils. P. Y. Vigneron and P. Spicht (Lab. Lesieur-Cotelle, Coudekerque). *Rev. Franc. Corps Gras* **17**, 295–302 (1970). The authors describe a method for the quantitative analysis in edible oils of the antioxidants authorized by French law, namely, propyl, octyl, and dodecyl gallates, BHA and BHT. The method consists of first extracting quantitatively each antioxidant from a hexane solution of the oil by use of an appropriate solvent. The solvents used were 1% aqueous ammonium acetate for PG, 32% aqueous acetonitrile for OG, and 48% aqueous acetonitrile for DG. BHA was extracted from another aliquot of the hexane solution with 72% ethanol after first eliminating the gallate esters. BHT was separated from a petroleum ether solution of the oil by column chromatography on silica gel. The second part of the analysis is quantification by UV spectrophotometry. The lower limit of sensitivity is about 50 ppm of each antioxidant in the oil.

Methods for improving the nutritional value of rapeseed meal. M. Chanet (Technol. Section, C.E.T.I.O.M., Paris). *Rev. Franc. Corps Gras* **17**, 309–14 (1970). The author first mentions briefly the different types of sulfur-containing compounds found in rapeseeds. Then, various procedures for detoxifying the meal are discussed. These processes include the classical one using steam and the Canadian process which also involves heating to inactivate myrosinase. Experimental treatments include use of ammonia, metallic salts and fermentation. This latter process also results in improved protein quality.

Singlet states of molecular oxygen in hydroperoxidation of olefinic systems. N. A. Khan (Ducca Laboratories, P.C.S.I.R., East Pakistan). *Oleagineux* **25**, 281–8 (1970). This article is an extensive review of the literature and of experiments carried out by the author for the purpose of elucidating the mechanism of attack of oxygen on olefinic systems during the early stages of oxidation. Experiments with chemically produced singlet state of molecular oxygen and with a chlorophyll-catalyzed system were carried out on methyl linoleate. Comparative studies on other active species of oxygen were also made.

Water management in the industry. J. Klere (Lab. Ste. Astra-Calve, Asnieres). *Rev. Franc. Corps Gras* **17**, 359–67 (1970). Management of water resources in France is discussed in terms of increasing levels of pollution and dwindling supply. Various methods for purifying and recycling waste waters which are applicable to the margarine industry are covered in some detail.

Preparation of difunctional derivatives by ozonolysis. M. Naudet (Lab. Nat. des Matieres Grasses, Marseille). *Rev. Franc. Corps Gras* **17**, 369–77 (1970). In the first part of this review article the general mechanism for ozonization of unsaturated acids (principally oleic) is discussed. Next, the principal decomposition reactions of the ozonides into acids, aldehydes, or mixtures are mentioned together with possible side reactions. Examples are given for the preparation of azelaic and ω-cyanocaprylic acid, hemialdehydoazelaic ester, and dimethylacetal of the ω-cyanocaprylic aldehyde.

Applications of polyfunctional derivatives: polyurethanes. J. P. Helme (Inst. des Corps Gras, Paris). *Rev. Franc. Corps Gras* **17**, 379–94 (1970). Following a brief review of the chemistry of the polyurethanes, the author discusses the principal raw materials used in their synthesis, *viz.*, polyisocyanates, polyesters, polyethers, other hydroxylated polymers derived from fats and miscellaneous additives. The chemical properties of the isocyanate group are reviewed, after which the principal applications of the polyurethanes are covered. These uses include protective coatings, foams and other spongy material, synthetic fibers, elastomers and adhesives.

Some new developments in the hydrogenation of fats and oils via homogeneous and heterogenous catalysis. E. Ucciani (Lab. Nat. des Matieres Grasses, Marseille). *Rev. Franc. Corps Gras* **17**, 395–402 (1970). Heterogeneous catalysis is reviewed in terms of kinetics, selectivity and isomer formation. Homogeneous catalysis using transition metal compounds is being studied to a greater extent and will become of increasing importance to the oil processing industry.

A new method for lipid extraction and its use on two species of brown algae. L. Pham Quang, M.-H. Laur and C. Paquot (C.N.R.S. 2, Rue Henry Dunant, 94-Thiais). *Oleagineux* **25**, 223–5 (1970). A description of a laboratory apparatus for the rapid extraction of the total lipids in a raw material is given. The apparatus is especially good on materials which contain small amounts of lipid, such as plant tissue. Basically, the equipment is a closed system liquid extractor, similar to a Soxhlet extractor, but with modifications for better contact between solvent and sample.

Separation of sterols by vapor-programmed thin-layer chromatography. W. H. J. M. Wientjens, R. A. De Zeeuw and J. Wijsbeek (Central Lab. TNO, Delft, Netherlands and Lab. of Pharm. and Anal. Chem., State Univ., Groningen, Netherlands). *J. Lipid Res.* **11**, 376–77 (1970). By vapor-programmed, thin-layer chromatography on silica gel it was possible to separate cholestanol from cholesterol and stigmastanol from β-sitosterol. The method was applied to the analysis of β-sitosterol-3-^{14}C.

Lipid constituents of some common weed seeds. E. W. Stoller and E. J. Weber (Crops Res. Div., Agr. Res. Service, Dept. of Agr., Dept. of Agronomy, Univ. of Ill., Urbana, Ill. 61801). *J. Agr. Food Chem.* **18**, 361–64 (1970). The fatty acid composition of the lipids extracted from weed seeds of 15 species which are members of the Compositae, Solanaceae, Malvaceae, Convolvulaceae, Gramineae, Amaranthaceae and Polygonaceae families was determined by gas-liquid chromatography. Linoleic acid was predominant in 14 species (36.5 to 76.5%), while all species contained oleic (10.3 to 42.9%), palmitic (6.0 to 22.1%) and stearic (1.2 to 6.3%) acids. Linolenic and palmitoleic acids were found in 13 species, arachidic acid in four species and cyclopropenoic acids in the two species of Malvaceae. Sterols, sterol glycosides and esters, α,α- and α,β-diglycerides and monoglycerides were found in each species. Lipid extracts from four species were separated into five lipid fractions by silicic acid chromatography. Triglycerides were predominant, followed by polar lipids in which phosphatidyl ethanolamine, choline and inositol, digalactosyl diglyceride, and monogalactosyl diglyceride were detected by thin-layer chromatography.

HYDROPEROXIDE OXIDATIONS CATALYZED BY METALS III. EPOXIDATION OF DIENES AND OLEFINS WITH FUNCTIONAL GROUPS. M. N. Sheng and J. G. Zajacek (Res. and Development Dept., ARCO Chem. Co., Glenolden, Penn., 19036). *J. Org. Chem.*, 35, 1839–43 (1970). The molybdenum hexacarbonyl and the vanadyl acetylacetonate catalyzed epoxidations of olefins by organic hydroperoxides have been tried on a series of diolefins and olefins with functional groups. Molybdenum hexacarbonyl was a better catalyst for the epoxidation of all the olefinic compounds except allylic alcohols. Only with allylic alcohols did vanadyl acetylacetonate give higher yields of epoxide. A mechanism has been proposed for that allylic alcohol vanadium catalyzed reaction.

SEPARATION OF THE OIL AND PROTEIN FRACTIONS IN COCONUT (COCOS NUCIFERA LINN.) BY FERMENTATION. C. L. Puertollano, J. Banzon (College of Agr., Univ. of Philippines College, Laguna, The Philippines) and K. H. Steinkraus (Cornell Univ., Geneva, N.Y., 14456). *J. Agr. Food Chem.* 18, 579–84 (1970). Patented and published methods of separating oil and protein from coconut meat by fermentation were studied and combined to devise a better process. Coconuts available commercially vary in maturity and length of storage before processing, and varied in their response to fermentation processing. Approximately 60% of the milks produced from individual coconuts showed a breaking of the emulsion when fermented under controlled conditions. Forty percent failed to break, indicating that some factor(s) responsible for the coconut milk emulsion stability remained uncontrolled during fermentation. The optimum dilution range for rapid fermentation of coconut milk and separation of the oil and protein was found to be 1:1 to 1:2 (w/v) coconut meat/water. *Lactobacillus plantarum* effected more rapid separation of oil than *Lactobacillus delbrueckii*. The fermentation progressed best under microaerophilic conditions at 40–50C. The fermentation was successful in breaking the emulsion at a relatively broad range of pH and titrable acidity.

THE EFFECTS OF STORAGE CONDITIONS OF THE LIPID COMPOSITION OF COMMERCIALLY PREPARED ORANGE JUICE. S. Nagy and H. E. Nordby (Fruit and Vegetable Products Lab., Winter Haven, Fla. 33880). *J. Agr. Food Chem.* 18, 593–97 (1970). An examination of the neutral lipid and polar lipid fractions of chilled orange juice was conducted upon storage over a 16-month period at 40 and 85F. The neutral lipid content of both 40 and 85F juice increased over 16 months and was due to fatty acids being hydrolyzed primarily from phospholipids. Free fatty acids increased three-fold in 40F juice and eight-fold in 85F juice. Phospholipid phosphorus decreased 69.6% while phosphatidyl choline, -ethanolamine, -serine, and -inositol showed decreases ranging from 46 to 91% at 85F.

SEPARATION BY GEL CHROMATOGRAPHY OF NATURALLY OCCURRING PHOSPHATIDYLCHOLINE MIXTURES ACCORDING TO NUMBER OF ETHYLENIC LINKAGES. R. J. King and J. A. Clements (Cardiovascular Res. Inst., Univ. of Calif., San Fran. Med. Center, San Francisco, Calif. 94122). *J. Lipid Res.* 11, 381–85 (1970). This paper describes a procedure for the separation of lecithins according to the number of ethylenic bonds in their fatty acid residues. The procedure uses a column of alkylated dextran (Sephadex LH-20) eluted with an organic solvent system, the unsaturated lipids being separated as their mercuric acetate addition compounds. The system is capable of resolving at least four species of lecithin, and the intact lecithin molecules can be recovered for further study. The chromatographic system has been tested with lecithin derived from dog lung, rat liver and hen's egg.

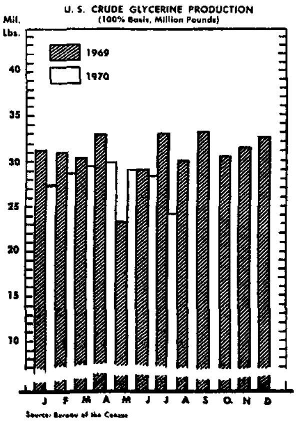
PLANT INTRODUCTION OF MAIZE AS A SOURCE OF OIL WITH UNUSUAL FATTY ACID COMPOSITION. M. D. Jellum (Dept. of

(Continued on page 481A)

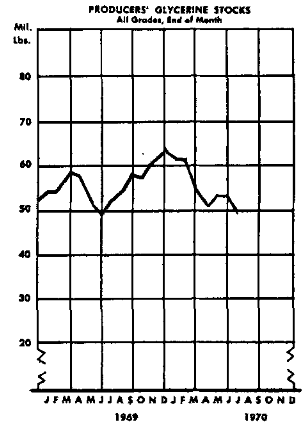
Crude Glycerine Production

According to the U.S. Department of Commerce, production of crude glycerine (including synthetic) for July 1970 totalled 23.9 million pounds, down seasonally 4.5 million pounds from June (revised), and down 9.0 million pounds from July 1969 (the highest July figure of record).

At the end of July, producers' stocks of crude and refined glycerine totalled 49.4 million pounds, down 3.9 million pounds from June (revised), and down 3.5 million pounds from the end of July 1969.



Source: Bureau of the Census



The June 1970 crude and refined glycerine production and stocks figures were revised as follows, in thousand pounds, 100% basis: production—crude, from 28,264 to 28,452; production—refined, from 28,817 to 28,847; stocks—crude, from 26,438 to 26,115; stocks—refined, from 27,347 to 27,173. These changes have lowered the total stocks figure for the end of June from 53.8 to 53.3 million pounds, and raised disappearance from 23.7 to 24.4 million pounds.

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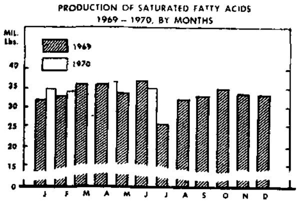
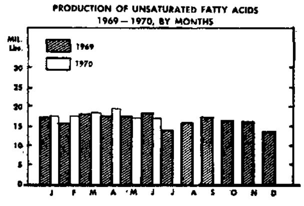
Tall Oil Fatty Acids Statistics

Production of animal, vegetable, and marine fatty acids totalled 51.4 million pounds in June 1970, up 2.2 million pounds from May. Inclusion of tall oil types raised the overall June production level to 82.7 million pounds, compared with 85.9 million pounds for May.





Disposition of fatty acids amounted to 59.1 million pounds in June, up 0.9 million pounds from May. Including tall oil fatty acids, June disposition totalled 91.5 million pounds, compared with 93.6 million pounds in May.

Stocks of fatty acids other than the tall oil types, amounted to 36.8 million pounds on June 30th, up 0.8 million pounds from the end of May (revised).

Source: Fatty Acid Producers' Council, 485 Madison Ave., New York, N.Y. 10022.

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• *Obituary*

We have just been informed of the death of J. B. Brown ('37). He was a retired Professor Emeritus, Dept. of Physiological Chemistry at Ohio State University, Columbus, Ohio.

(Continued from page 479A)

Agronomy, Univ. of Ga., College of Agr. Exp. Stations, Ga. Station, Experiment, Ga. 30212). *J. Agr. Food Chem.* **18**, 365–70 (1970). Gas-liquid chromatography was used to determine fatty acid composition of corn (*Zea mays L.*) oil in original sibbed kernels of plant introductions of foreign and U.S. origin, kernels from S_1 ears of plant introductions, and selfed kernels of Australian inbred lines. Extensive variability in oil composition was found among and within various plant introductions and inbred lines. The range in oil composition was 6 to 22% for palmitic acid, 0.6 to 15% for stearic acid, 14 to 64% for oleic acid and 19 to 71% for linoleic acid. This range in composition of these fatty acids is greater than previously reported in the literature for corn oil. Oil in plant introductions, Australian inbreds and corn from throughout the U.S. is more highly saturated (higher palmitic and oleic acids and lower linoleic acid) than commercial corn oil. Greater genetic diversity for oil composition is present in corn of foreign origin than in corn of U.S. origin.

• Fatty Acid Derivatives

COPOLYMERIZATION OF VINYL STEARATE WITH OTHER FATTY VINYL MONOMERS. G. N. Tewari, P. C. Chatterjee and J. S. Aggarwat (Reg. Res. Lab., Hyderabad, India). *Fette Seifen Anstrichmittel* **72**, 470–72 (1970). Homopolymerization of vinyl stearate and its copolymerization with five other fatty vinyl monomers have been carried out in benzene using benzoyl peroxide as the initiator. The comonomers included stearyl acrylate, stearyl methacrylate, allyl stearate, stearyl vinyl ether and divinyl sebacate. Stearyl acrylate and stearyl methacrylate furnished copolymers with inherent viscosities much higher than that of the vinyl stearate homopolymer while allyl stearate and stearyl vinyl ether gave copolymers with inherent viscosities much lower than that of the vinyl stearate homopolymer.

HYDRIODIC ACID REDUCTION OF ALPHA KETOL AND ALPHA DIKETO FATTY ACIDS. S. M. Osman and M. Ahmad (Dept. Chem., Aligarh Muslim Univ., Aligah, India). *Fette Seifen Anstrichmittel* **72**, 454–56 (1970). The hydriodic acid reduction of α-ketol and α-diketo derivatives of three monoethenoid fatty acids, oleic, petroselinic and erucic, has been studied. The formation of an isomeric mixture of monoketo acids in each has been established by characterization of monocarboxylic or dicarboxylic acids, the hydrolyzed fragments of Beckmann rearrangement of the corresponding oximes of monoketo acids and by thin-layer chromatography (TLC). Hydriodic acid has been found to be a satisfactory reagent for the synthesis of monoketo acids from the α-ketol and α-diketo acids.

HIGH-PRESSURE HYDROGENOLYSIS OF PISA, COCONUT AND COTTONSEED OILS AND PALMITIC ACID TO FATTY ALCOHOLS: USE OF PROMOTERS, CATALYST REUSE AND RETENTION OF UNSATURATION. K. V. Raghavan, A. J. Pantula, K. Seshacharyula and K. T. Achaya (Reg. Res. Lab., Hyderabad 9, India). *J. Oil Technologists' Assoc. India* **2**, 1–7 (1970). Studies are described relating to the batch high-pressure, hydrogenolysis process for conversion of fatty materials to fatty alcohols at 300C and 200 atmospheres of hydrogen pressure usually over a 6% of barium-stabilized, copper chromite catalyst. The presence of 5 or 10% of free fatty acid in coconut oil appeared to benefit its conversion to fatty alcohols: whether free acid was present or not, use of 3–4% of copper laurate was without clear advantage on the hydrogenolysis reaction. On the other hand, the presence of copper soap had a marked beneficial effect on the hydrogenolysis of cottonseed oil to alcohols. The crude seed fat of pisa (*Actinodaphne hookeri*) of AV 22 was poorly converted to fatty alcohols, and resinous non-fatty materials seemed to be responsible; alkali-washed and bleached fats were readily converted into fatty alcohols using 6% copper chromite as catalyst and 3% copper laurate as promoter. Some 72 kg of upgraded pisa fat (AV 14) was thus converted in 7.5 kg. lots to the alcohols, and the total products vacuum-fractionated to give distilled pisa alcohols in 64% yield on the fat converted. For the hydrogenolysis of palmitic acid using 12% copper palmitate as catalyst, 2–3% of copper chromite acted as an excellent promoter. Considerable retention of unsaturation was possible in the hydrogenolysis of cottonseed oil (IV 106) to fatty alcohols (IV 88) using a catalyst mixture consisting of the soaps of 1.25% copper and 0.6% cadmium; some linoleate was reduced to monoene alcohols, but no oleate was converted to stearyl alcohol. Experiments on catalyst reclamation suggested that one reuse was possible after simple defatting and drying; thereafter the catalyst activity could be restored by defatting, oxidizing in air and annealing at 600C–650C for 2 hr.

ACETYLATED GLYCOL RICINOLEATE AS PRIMARY PLASTICIZERS FOR POLYVINYL RESINS. A. K. Jain and R. K. Bhotnogar (Shir Ram Inst. for Ind. Res., 19 Univ. Road, Delhi 7, India). *J. Oil Technologist's Assoc. India* **2**, 12–15 (1970). Six derivatives prepared by interesterification of castor oil and different glycols after acylation as well as epoxidation were blended with PVC resin to evaluate the tensile strength, elongation at break, volatility, thermal stability, solvent and water extraction losses for assessment of their plasticization characteristics. Acylated as well as epoxidized glycolates imparted slightly lower tensile strength and elongation at break in comparison to D.O.P. Epoxidized derivatives showed better thermal stability and lower volatility losses than D.O.P.

• Biochemistry and Nutrition

CONTROL OF ENERGY METABOLISM IN HAMSTER BROWN ADIPOSE TISSUE. J. R. Williamson (Johnson Res. Found., Univ. of Penn., Philadelphia, 19104). *J. Biol. Chem.* **245**, 2043–50 (1970). Isolated brown fat cells were prepared from hamsters fasted for 48 hrs and were incubated in Krebs-bicarbonate buffer. Endogenous respiration was low and was stimulated 6-fold by succinate, 4-fold by α-glycerophosphate, 20-fold by oleate, up to 30-fold by epinephrine or norepinephrine and 2- and 4-fold by uncoupling agents.

CALORIMETRIC DETECTION OF A MEMBRANE-LIPID PHASE TRANSITION IN LIVING CELLS. J. Reinert and J. Steim (Dept. of Chem., Brown Univ., Providence, R.I. 02900). *Science* **168**, 1580–82 (1970). The membrane lipids in living *Mycoplasma laidlawii* exhibit a phase transition characteristic of that from crystal to liquid crystal within the bilayer conformation. The transition occurs at the same temperature in viable organisms, membranes isolated from the organisms and isolated membrane lipids. The enthalpy of the transition in the membrane is compared with that of an aqueous suspension of isolated membrane lipids. The result is consistent with presence of an extended lipid bilayer in the native membrane.

ON THE SPECIFICITY OF STEROID INTERACTION WITH MAMMARY GLUCOSE 6-PHOSPHATE DEHYDROGENASE. R. Raineri and H. R. Levy (Dept. of Bacteriol. and Botany, Biol. Res. Labs., Syracuse Univ., Syracuse, N.Y. 13210). *Biochemistry* **9**, 2233–43 (1970). Certain steroids were known to act as potent inhibitors of glucose 6-phosphate dehydrogenase. The effects of altering the steroid structure on this inhibition were employed in delineating features of the steroid binding site on the enzyme. Fifty-two steroids and 8 steroid analogs were tested as inhibitors; for 14 of these, K_i values were determined and the free energy of binding calculated. All 14 compounds showed uncompetitive inhibition with respect to glucose 6-phosphate. The possible presence of two types of steroid binding sites was suggested by studies with high concentrations of certain steroids.

PYRAZOLE AND INDUCTION OF FATTY LIVER BY A SINGLE DOSE OF ETHANOL. G. O. Bustos, H. Kalant, J. M. Khanna and Juliet Loth (Dept. of Pharmacol., Univ. of Toronto, Toronto 5, Ontario, Canada). *Science* **168**, 1598–99 (1970). Pyrazole (4 millimoles per kilogram or 272 milligrams per kilogram of body weight), given to fasted rats 10 minutes before gavage with ethanol (4 grams per kilogram), completely prevented both the disappearance of ethanol from the blood over a 16-hour period and the ethanol-induced reduction in the ratio of oxidized to reduced hepatic nicotinamide-adenine dinucleotide. However, it did not affect the accumulation of triglycerides in the liver after the administration of

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ethanol. These results indicate that metabolism of ethanol is not required for production of fatty liver by a single, large dose of ethanol.

STEROID METABOLISM IN THE CAT. M. F. Karim and W. Taylor (Dept. of Physiol., The Med. School, Univ. of Newcastle upon Tyne, Newcastle upon Tyne, NE1 7RU, U.K.). *Biochem. J.* 117, 267–70 (1970). Oestradiol-4-^{14}C was administered to seven male, seven female and two castrated male cats as a single intravenous injection. Bile and urine were collected for 6 hours. The radioactivity was excreted mainly in the bile of all animals (53–60%); only about 1% of the dose appeared in the urine. Bile and urine samples were hydrolysed successively by β-glucuronidase, cold acid and hot acid. There were significant differences ($P < 0.005$) between the percentage of the dose present in the bile fractions hydrolysed by β-glucuronidase (male, 9.0 + 1.7%; female, 18.6 ± 1.45%) and by cold acid (male, 18.9 ± 1.44%; female, 12.1 ± 1.02%). The excretion of radioactivity in these fractions by the castrated male cats was closer to that of female cats. About 20–27% of the dose could not be extracted from aqueous solution (pH 10.5) by ethyl acetate-ether after hydrolysis.

STRUCTURE OF MACROMOLECULAR AGGREGATES. II. CONSTRUCTION OF MODEL MEMBRANES FROM PHOSPHOLIPIDS AND POLYPEPTIDES. G. G. Hammes and S. E. Schullery (Dept. of Chem., Cornell Univ., Ithaca, New York). *Biochemistry* 9, 2555–63 (1970). The interactions of aqueous phospholipid dispersions (liposomes) with a variety of water-soluble polypeptides were investigated as models for the molecular interactions occurring in biological membranes. The data suggests that the phosphatidyl-L-serine-poly-L-lysine complex (pH 7.0) is stabilized by both electrostatic and hydrophobic interactions. The poly-L-lysine goes from a random coil to an α-helix when it interacts with phosphatidyl-L-serine. A dramatic rearrangement of the liposomes into large aggregates of membrane-like vesicles is seen under the electron microscope. This is accompanied by a relative immobilization of the lipid fatty acid chains.

THE BIOSYNTHESIS OF UNSATURATED FATTY ACIDS BY BACILLI. A. J. Fulco (Lab. of Nuclear Med. and Radiation Biol., UCLA, Los Angeles, Calif. 90024). *J. Biol. Chem.* 245, 2985–90 (1970). *Bacillus lichenoformis* 9259 has been shown to synthesize C_{16} polyunsaturated fatty acids from endogenous or added palmitate at 20C, but not at 35C. Ready conversion of added palmitic acid labeled with ^{14}C or ^{3}H to these fatty acids by cultures of *B. licheniformis* incubated at 20C permitted the isolation of sufficient amounts of material for the determination of structure and label distribution by physical and chemical methods. The major polyunsaturated component was shown to be 5,10-double bond configuration. It was further shown than the biosynthesis of the major dienoic acid resulted from the cooperative action of two distinct desaturation systems. One system, which was present at both 35 and 20C, desaturated palmitic acid to 10-hexadecenoic acid. A second system, active only at the lower temperature, resulted in the conversion of palmitic acid to 5-hexadecenoic acid. The finding that *B. licheniformis* can carry out the conversion of palmitic to 5, 10- and 7,10-hexadecadienoic acids apparently represents the first unequivocal indication of polyunsaturated fatty acid biosynthesis *de novo* in bacteria.

MECHANISM OF TRIGLYCERIDEMIA IN HYPERCHOLESTEROLEMIC RABBITS. C. C. Huang and K. J. Kako (Dept. of Physiol., Faculty of Med., Univ. of Ottawa, Ottawa, Ontario, Canada). *Circ. Res.* 26, 771–82 (1970). To elucidate mechanisms responsible for the increased plasma triglyceride (TG) which occurs on diet-induced hypercholesterolemia in rabbits, albino rabbits were fed a 3% cholesterol diet for various durations, and the following determinations were carried out: plasma lipids levels; turnover rate of plasma TG (labeled very low density lipoprotein, or glycerol-2-^{3}H method); lipoprotein lipase activity of the heart and plasma; fatty acid and acetate incorporation into TG in the liver (homogenized and slices). Plasma levels of both free and esterified cholesterol and of phospholipids increased rapidly, while TG increased relatively slowly during cholesterol feeding without change in hepatic TG synthesis. The fractional turnover was, on the other hand, depressed within a week. The decrease in plasma TG in response to a heparin injection was less in hypercholesterolemic rabbits than in normal animals. However, the measured activity of heart lipoprotein lipase of cholesterol-fed rabbits was higher than that of the control group. The presence of cholesterol in the substrate of lipoprotein lipase competitively inhibits the enzyme activity, and this is the mechanism of hyperglyceridemia observed in diet-induced hypercholesterolemic rabbits.

THE ENZYMATIC HYDROXYLATION OF N-OCTANE BY CORYNEBACTERIUM SP. STRAIN 7E1C. G. Cardini and P. Jurtshuk (Dept. of Microbiol., Univ. of Texas, Austin, Texas 78712). *J. Biol. Chem.* 245, 2789–96 (1970). Cell-free extracts from sonically disrupted *Corynebacterium* sp. (7E1C) oxidized *n*-octane to 1-octanol and octanoic acid in the presence of NADH and O_2. The hydroxylating activity, assayed by direct estimation of the reaction products, was found to be concentrated in the clarified S_3 supernatant fraction after centrifugation at 144,000 × *g* for 2 hours. By use of mass spectrometry it was shown that molecular oxygen is incorporated into the substrate during hydroxylation. The hydroxylating enzyme system was separated into two protein fractions, both of which were required for activity. One fraction, the S_3(25–40)D, which precipitated between 25 and 40% ammonium sulfate saturation, appeared "particulate" and contained cytochrome P-450. The participation of this hemoprotein in *n*-octane hydroxylation was established by inhibition, induction and spectral studies. The S_3(60–100)D fraction, which precipitated between 60 and 100% ammonium saturation, was soluble, contained flavoprotein, and was functional in reducing cytochrome P-450 or cytochrome *c* in the presence of NADH. A tentative scheme for *n*-octane hydroxylation in the *Corynebacterium* 7E1C system is proposed.

BIODEGRADATION MECHANISM OF FATTY ALCOHOL NON-IONICS. J. R. Nooi, M. C. Testa and S. Willemse (Unilever Res. Lab., Vlaardingen, Netherlands). *Tenside* 7, 61–5 (1970). Batch activated sludge degradation tests were carried out with long- and short-chain stearyl alcohol/ethylene oxide condensates labelled in three different ways: ^{14}C-labelled in the 1-position of the alkyl chain, randomly in the alkyl chain and randomly in the EO chain, respectively. The $^{14}CO_2$ produced, the ^{14}C activity in solution and, at the end of the experiment, the ^{14}C bound to the sludge were determined. The results are consistent with the following mechanism: initially the nonionic is very rapidly taken up by the sludge without significant CO_2 production. The subsequent (slower) biodegradation process starts at the alkyl chain, the process being interrupted when a major part of the alkyl chain is degraded. The resulting hydrophilic intermediates are largely desorbed from the sludge but after some time degraded at least as rapidly as the alkyl chain. Increase of the EO chain length retards the degradation of the alkyl as well as of the EO chain itself. The nonionics studied showed a biodegradability at least comparable to that of a reference, slightly branched alkylbenzene sulfonate, which itself had shown 75% removal of methylene blue-active substance in a sewage treatment plant, compared to 23% removal for tetrapropylene-benzene sulfonate.

CHANGES IN THE COMPOSITION OF THE RUMEN AND ABOMASUM LIPIDS OF SHEEP FROM BIRTH TO MATURITY. D. R. Body, F. B. Shorland and Z. Czochanska (Dept. of Scientific and Industrial Res., Wellington, New Zealand). *J. Sci. Food Agr.* 21, 220–5 (1970). The composition of the lipids of the rumen and abomasum tissues of foetal (at term), 1 month, 2 month and 1–2 yr. old sheep grazed on pasture has been determined. The lipid content of the rumen and abomasum tissues increased from, respectively, 2.0% and 2.6% at birth to 3.4% and 5.7% in 1–2 yr. old sheep. The main change in the neutral lipid fraction was a decrease in the hydrocarbon content from 0.13% in the rumen tissues and 0.08% in the abomasum tissues at birth to 0.003% and 0.006% respectively in the 1–2 yr. old sheep. The phospholipid fraction of both tissues contained phosphatidyl choline (34.9–46.8%), phosphatidyl ethanolamine (14.6–24.5%), sphingomyelin (14.3–21.1%), lysophosphatidyl choline (4.3–12.6%), cardiolipin (4.1–8.5%) and phosphatidyl inositol + phosphatidyl serine (3.0–5.5%). No marked changes in phospholipid composition with age were noted. The amounts of phosphatidyl choline and phosphatidyl ethanolamine tended to be higher in the abomasum than in the rumen while the opposite was true for sphingomyelin.

MODIFICATIONS IN THE FATTY ACIDS OF THE LIVER, DEPOT FAT AND SERUM OF FORCE-FED GEESE. G. Amelotti and C. Ruffini Castrovilli (Univ. of Milan, Milan, Italy). *Riv. Ital. Sostanze Grasse* 47, 257–61 (1970). Results are reported of a study on the effects of force-feeding on the fatty acid composition of goose liver fat, depot fat and serum fat. The main effects are: 1. The amounts of saturated acids esterified into cho-

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lesterol is decreased by force-feeding in all three regions; 2. The amount of monounsaturated acids esterified into triglycerides is increased in the liver and depot fats; 3. The monounsaturated acid content of free fatty acids is increased by force-feeding; 4. Among the total phospholipid fatty acids there is an increase of unsaturated and polyunsaturated acids in the liver and a decrease of polyunsaturates in the depot fat. In summary, the effect of force-feeding on goose liver fat is evidenced through a reduction in both polyunsaturated and stearic acids and an increase in oleic acid.

METABOLISM OF DIBUTYRYL CYCLIC ADENOSINE 3',5'-MONOPHOSPHATE DURING ITS REGULATION OF LIPOLYSIS AND GLUCOSE OXIDATION IN ISOLATED RAT EPIDIDYMAL ADIPOCYTES. M. Blecher, Jacquelyn T. Ro'Ane, and Pauline D. Flynn (Dept. of Biochem., Schools of Med. and Dentistry, Georgetown Univ., Washington D.C. 20007). *J. Biol. Chem.* **245**, 1867–70 (1970). The metabolism of $N^6,O^{2'}$-$(2',3'$-$^3H)$-dibutyryl adenosine 3',5'-cyclic monophosphate (^3H-DBcAMP) was studied in isolated rat epididymal adipocytes. ^3H-Butyric acid, isolated from incubation mixtures after stimulation by ^3H-DBcAMP of lipolysis or after stimulation of glucose oxidation by ^3H-DBcAMP, represented less than 4% hydrolysis of the butyryl groups of BDcAMP during up to 2 hours of incubation; this hydrolysis appeared to be nonenzymatic in nature. Of the butyric acid produced, less than 10% was lost by oxidation to CO_2 and by volatilization.

IMPAIRED LIPID AND VITAMIN E ABSORPTION RELATED TO ATROPHY OF THE PANCREAS IN SELENIUM-DEFICIENT CHICKS. J. N. Thompson and M. L. Scott (Dept. Poultry Sci. and Grad. School of Nutr., Cornell Univ., Ithaca, N.Y. 14850). *J. Nutr.* **100**, 797–809 (1970). Selenium-depleted chicks were fed crystalline amino acid diets containing high levels of vitamin E but less than 0.02 ppm selenium, with and without supplements of selenium. *Deficiency of selenium resulted in poor growth,* poor feathering and atrophy of the pancreas. Hydrolysis of fat was impaired, probably because of a lack of pancreas enzymes. Absorption of lipids, including vitamin E, was poor and this abnormality was attributed to impaired lipid-bile micelle formation in the absence of fat hydrolysis. Addition of bile acid to the diet did not restore fat digestion to normal and only temporarily enhanced vitamin E absorption. Addition of free fatty acids and monoglycerides improved vitamin E absorption and survival but did not prevent the degeneration of the pancreas. Selenium is thus an essential trace nutrient and in one of its roles it maintains the pancreas. The indirect effect of severe selenium deficiency on vitamin E absorption does not explain the ability of both selenium and vitamin E to prevent exudative diathesis. Another more direct interrelationship is probably responsible for this effect.

INVESTIGATION OF FATTY ACIDS AND DERIVATIVES FOR CARCINOGENIC ACTIVITY. D. Swern, R. Wieder, M. McDonough, D. R. Meranze and M. B. Skimkin (Fels Res. Inst., Temple Univ. School of Med., Philadelphia, Penn., 19140). *Can. Res.* **30**, 1037–46 (1970). Twenty-nine fatty acids and esters, lactones, epoxy and peroxy compounds were tested for carcinogenic activity by repeated subcutaneous injections in mice. Sarcomas at the site of injection were elicited with 12-hydroxystearic acid, methyl 12-hydroxystearate, 4-ketostearic acid, stearohydroxamic acid, glycidyl laurate, glycidyl oleate and p-nitroperoxybenzoic acid. Sarcomas were also elicited in mice given injections of lower doses of stearic acid and γ-stearolactone. These unexpected findings could not be interpreted satisfactorily and *raise serious questions regarding the interpretation of results* with other compounds. Nevertheless, it does appear that weak carcinogens for the subcutaneous tissue of mice occur among these classes of chemical compounds.

DIVERGENT BIOLOGICAL EFFECTS OF ADENOSINE AND DIBUTYRYL ADENOSINE 3',5'-MONOPHOSPHATE ON THE ISOLATED FAT CELL. S. S. Solomon, J. S. Brush and A. E. Kitabchi (Labs. of Endocrinology and Metab. Vets. Admin. Hosp., Memphis, Tenn. 38104). *Science* **169**, 387–88 (1970). Adenosine 3',5'-monophosphate stimulated production of carbon dioxide and lipid from glucose, whereas its dibutyryl derivative inhibited this conversion. Addition of the dibutyryl derivative to the isolated fat cell further stimulated lipolysis induced by adrenocorticotropic hormone, whereas addition of adenosine 3',5'-monophosphate inhibited this lipolysis. Hence, measured by these two parameters, the biologic properties of adenosine 3',5'-monophosphate and its dibutyryl derivative are distinctly different.

FATTY ACID SYNTHETASE FROM LACTATING RAT MAMMARY GLAND. I. ISOLATION AND PROPERTIES. S. Smith and S. Abraham (Bruce Lyon Memorial Res. Lab., Children's Hosp. Med. Center of N. Calif. Oakland, Calif. 94609). *J. Biol. Chem.* **245**, 3209–17 (1970). Fatty acid synthetase has been purified from lactating rat mammary gland and some of its physical and kinetic properties studied. This synthetase is an asymmetrical multienzyme complex of molecular weight 478,000 which readily dissociates into approximately half-molecular weight sub-units. The sedimentation and diffusion coefficients of the native enzyme are 12.9 sec × 10^{-13} and 2.56 cm^2 sec^{-1} × 10^{-7} respectively. The enzyme contains one 4'-phosphopantetheine residue and approximately 56 sulfhydryl groups per mole. Under optimum assay conditions, palmitic acid is the major product. With respect to size, shape, 4'-phosphopantetheine content, turnover number, and products of the reaction, the enzyme is very similar to the fatty acid synthetases purified from pigeon and rat liver. Studies of the kinetic properties, however, have revealed several differences in the Michaelis-Menten constants and inhibition and activation characteristics of the fatty acid synthetases from mammary gland and liver.

THE INCIDENCE OF VITAMIN E DEFICIENCY IN POULTRY AROUND TEHRAN. M. Saadat-Noori, J. Nahani, H. Saedi and K. Nikpour (Nutr. Res. Lab. of the School of Vet. Med., Tehran Univ., Tehran, Iran). *Poult. Sci.*, **49**, 675–78 (1970). It was found that the clinical symptoms of vitamin E deficiency may be correlated directly with depressed plasma α-tocopherol content. The study revealed that the incidence of vitamin E deficiency with the subclinical symptoms is present in poultry around Tehran. The low level of plasma vitamin E in chicks examined was indicative of this condition. The mean value of the plasma α-tocopherol level is 1.0280 mg. percent in the chicks fed a balanced ration supplemented with 10 mg. dl-α-tocopherol acetate per kg. of feed.

ABSORPTION BY THE RAT OF NONVOLATILE OXIDATION PRODUCTS OF LABELED, RANDOMIZED CORN OIL. E. G. Perkins, S. M. Vachha and F. A. Kummerow (Burnsides Res. Lab, Dept. of Food Science, Univ. of Illinois, Urbana, Ill. 61801). *J. Nutr.* **100**, 725–31 (1970). Randomized labeled corn oil was prepared by transesterification of corn oil with mono- and dilinolein prepared from ^{14}C-labeled methyl linoleate. A portion of this oil was heated at 200C for 24 hours in the presence of air, saponified, the recovered fatty acids were subjected to partitioning between ethanol and hexane, and the oxidation products in the ethanol layer converted to the corresponding methyl esters. The oxidized methyl esters were fed to thoracic duct-cannulated rats, the lymph was collected, freed of lipid, and the lipids were subjected to thin-layer chromatography (TLC) and radioassayed. Furthermore, the lipids from representative tissue were subjected to TLC and to radioassay analysis. The results indicated that maximum absorption of the methyl esters *of the nonvolatile oxidation products isolated from* randomized heat-abused corn oil did not occur until 21 to 48 hours after it had been fed, and only 31.2% was absorbed and 18.7% metabolized within 48 hours after its administration. Approximately 7.6% of the radioactivity was found in the carcass, 1% in the liver, 5.9% in the gastrointestinal tract, 4.5% in the urine and 62.8% in the feces.

AN ELECTRON MICROSCOPIC AND FUNCTIONAL STUDY OF VERY LOW DENSITY LIPOPROTEINS IN INTESTINAL LYMPH. R. Ockner and A. L. Jones (Depts. of Med. and Anatomy, Univ. of Calif., San Francisco Med. Center, San Francisco, Calif. 94122 and Veterans Admin. Hosp., San Francisco, Calif. 94121). *J. Lipid Res.* **11**, 284–92 (1970). Previous studies with fasting rats showed that the intestine produces endogenous, very low density lipoproteins (VLDL) which resemble those in the plasma. Intestinal VLDL also were found to be important in lipid transport during absorption of saturated but not of unsaturated fat. These findings depended upon separations of a chylomicron-rich fraction ($S_f > 400$) from VLDL (S_f 20–400) by preparative ultracentrifugation methods based on particle flotation rates. Almost all intestinal lymph lipoprotein particles from fasting rats were less than 750 A in diameter, and could not be distinguished morphologically from plasma VLDL. Cholestyramine administration or bile diversion led to decreased lymph lipid output, correlating with marked reduction in VLDL. This supports the concept that lymph VLDL contain endogenous lipid which is reabsorbed from the intestinal lumen.

CONVERSION OF GLUCOSE-^{14}C(UL) TO $^{14}CO_2$, ^{14}C-GLYCOGEN AND ^{14}C-FATTY ACIDS IN THE PARTIALLY HEPATECTOMIZED RAT. E. Neville, K. Talarico and D. Feller (Environmental Biol. Div., Ames Res. Center, NASA, Moffett Field, Calif. 94035). *Proc. Soc. Exp. Biol. Med.* **134**, 372–79 (1970). Partially hepatectomized (67%) rats and sham-operated controls were injected with glucose-^{14}C(UL) at various times postoperative from

1 hr to 1 week and the expired $^{14}CO_2$ and CO_2 was measured for 3 hr. At the end of the radiorespirometry procedure, plasma free fatty acids glucose, cholesterol, and ^{14}C-lipids were determined. The recovery of liver ^{14}C-fatty acids and nonsaponified ^{14}C-lipid was decreased, indicating that a decreased conversion of glucose to acetyl CoA occurs in the partially hepatectomized rat.

EFFECTS OF GUANOSINE 3′,5′-MONOPHOSPHATE ON GLYCEROL PRODUCTION AND ACCUMULATION OF ADENOSINE 3′,5′-MONOPHOSPHATE BY FAT CELLS. F. Murad, V. Manganiello and Martha Vaughan (Molecular Disease Branch, National Heart and Lung Inst., Nat'l Inst. of Health, Bethesda, Md. 20014). *J. Biol. Chem.* 245, 3352–60 (1970). The effects of guanosine 3′,5′-monophosphate (cyclic GMP) on glycerol production by isolated fat cells resembled those of adenosine 3′,5′-monophosphate (cyclic AMP) but were of lesser magnitude. In Krebs-Ringer phosphate medium, both nucleotides had little or no effect on basal lipolysis. Inhibition of theophylline-stimulated lipolysis by cyclic GMP was less and more variable than that by cyclic AMP. In phosphate-0.8% NaCl medium, with Na^+ as the only cation, both nucleotides stimulated glycerol production. The increase was directly related to the concentration of each. On a molar basis, cyclic GMP was less effective than cyclic AMP in stimulating lipolysis. Lipolytic effects of cyclic GMP were also observed in the presence of cyclic AMP and theophylline at concentrations that did not maximally stimulate lipolysis.

INHIBITION OF THE ACUTE ETHANOL-INDUCED FATTY LIVER BY PYRAZOLE. J. Morgan and N. Di Luzio (Dept. of Physiol., Tulane Univ. School of Med., New Orleans, La. 70112). *Proc. Soc. Exp. Biol. Med.* 134, 462–66 (1970). Since pyrazole specifically inhibits liver alcohol dehydrogenase and impairs the metabolism of ethanol, studies were undertaken in rats to evaluate the influence of inhibition of ethanol metabolism on the development of an acute ethanol-induced fatty liver. In agreement with previous observations, 20 hr after ethanol administration a 5-fold increase in hepatic triglyceride concentration occurred. In marked contrast, the pyrazole- and ethanol-treated group showed complete inhibition of ethanol-induced hepatic triglyceride accumulation. Thus, ethanol, *per se*, is not the causative factor in fatty liver development.

COFACTOR REQUIREMENTS AND GENERAL CHARACTERISTICS OF A SOLUBLE FATTY ACID ELONGATING SYSTEM FROM MITOCHONDRIA. L. A. Mooney and E. J. Barron (Virginia Mason Res. Center, Seattle, Wash. 98101). *Biochemistry* 9, 2138–42 (1970). A mitochondrial fatty acid chain elongation system was extracted from rat liver mitochondrial acetone powder, and the reactants and cofactors involved were studied. The coenzyme A (CoA) esters of fatty acids from 4 to 20 carbons could be elongated and acetyl-CoA was the 2-carbon donor for the elongation process. Malonyl-CoA was incorporated only after decarboxylation to acetyl-CoA. Maximum activity was dependent on both reduced diphosphopyridine nucleotide and reduced triphosphopyridine nucleotide.

IDENTIFICATION OF POSSIBLE INTERMEDIATES IN THE MITOCHONDRIAL FATTY ACID CHAIN ELONGATION SYSTEM. E. J. Barron and L. A. Mooney. *Ibid.*, 2143–51. Chain elongation has previously been described as the addition of a C_2 unit onto preexisting fatty acids. The enzyme system from mitochondria was able to combine acetyl coenzyme A (acetyl-CoA) and long-chain acyl-CoA in the presence of DPNH plus TPNH. In the work presented here, four products from the chain elongation system have been identified. The evidence strongly supports a reaction mechanism whereby the unfavorable energetics for a carbon-carbon fusion between acetyl-CoA and acetyl-CoA is overcome by a rapid reduction requiring DPNH, and producing the 3-hydroxy acid as the first intermediate.

METABOLISM OF L-CARNITINE ESTERS OF β-SUBSTITUTED PALMITIC ACID BY RAT LIVER MITOCHONDRIA. S. Mahadevan, M. Malaiyandi, J. D. Erfle and F. Sauer (Animal Res. Inst. and the Plant Products Div., Canada Dept. Agr., Ottawa, Ontario, Canada). *J. Biol. Chem.* 245, 3218–24 (1970). The chemical synthesis and properties of L-carnitine esters of β-ketopalmitic acid, β-hydroxypalmitic acid, and trans-α,β-unsaturated palmitic acid are described. Isolated rat liver mitochondria oxidize the carnitine esters of these acids more efficiently than the free acids as judged by acetoacetate production and oxygen uptake. Rat liver mitochondrial extracts catalyze the conversion of palmitoyl carnitine and β-ketopalmitoyl carnitine to the CoA esters with equal efficiency. The rates of the reaction with the carnitine esters of β-hydroxypalmitic acid and trans-α,β-unsaturated palmitic acid were about 70% and

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Low-Cost High Protein Drink

(The following is excerpted from an article written by Alan Yeo, Managing Director, Yeo Hiap Seng Ltd., Singapore.)

Yeo Hiap Seng Ltd., one of the biggest food and beverage concerns in South East Asia, has very successfully developed a low-cost protein soft drink from soya beans.

Soya bean milk, widely consumed by the Chinese, had always been prepared on a modest scale by housewives for home consumption; no one had ever undertaken to produce it on a commercial basis for the large consumer market. In 1952, Yeo Hiap Seng began bottling soya bean milk and marketing it as a beverage like other soft drinks. Sales grew.

In 1968, the Company began packaging its soya milk in "Tetra Pak." Widely used for packaging milk, the package comes in a tetrahedron shape. Made from kraft paper lined with polyethylene-coated aluminum foil, this one-way container is one of the few which can be used with a process whereby a product is sterilized prior to being sealed in a sterilized container.

The soya bean milk is heated to 142 C and held for 4 sec., then instantly cooled to its original temperature and put into previously sterilized packages. These methods of sterilization and of packaging under sterile conditions enable the product to be kept without refrigeration for about eight months. The product is much better in both appearance and taste than one resulting from normal sterilization at 115 C for 15 min.

The Company has introduced another similar product called "Vitabean." This is soya bean milk which has been enriched with various vitamins, including Vitamins A, B_1, B_2, B_6 C, D_3, nicotinamide and pantothenic acid. Half the normal daily requirements for adults is provided. It has been found that there are no great losses of heat sensitive vitamins processed under this UHT method.

As a soft drink, soya bean milk is unrivalled because of its nutritional value; it has a valuable protein content which is free from animal fat. For a soft drink of this nature, (retailing at about U.S. 6¢ a 284 cc. bottle), this provides a low-cost form of protein. The manufacturing cost is in the area of 2¢ per bottle.

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Pallet Shrink Wrapping With Polyethylene Film

Pallet shrink wrapping, simply stated, is the technique whereby palletized loads are protected and stabilized by shrinking a plastic film over the load. It can be adapted to almost anything which can be placed on a "skid" or pallet. Wrappings with corrugated board, corner pads, and steel or plastic banding straps are eliminated.

The shrink wrapping of pallet-size loads is expected to grow tenfold by 1975 with more than 1,000 manufacturers adopting this new materials handling system for distribution of their products. The dramatic growth of shrink-wrapped pallet loads in the next few years will be based on two factors:

1. Further demand for more efficient and less expensive ways to package products for shipment and distribution.
2. The introduction of high-speed, automated systems that greatly reduce time required for wrapping pallet loads.

U.S. Industrial Chemicals Co., a division of National Distillers and Chemical Corp., New York, is a leading producer of polyethylene resins for shrink films, with a completely equipped, fully operating pallet shrink wrap system to aid in the development of polyethylene film resins which best meet the requirements of the palletized load and equipment.

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(Continued from page 489A)

20% of that obtained with palmitoyl-L-carnitine. It is shown that β-ketopalmitic acid is rapidly decarboxylated to yield pentadecanone by a nonspecific nonenzymatic reaction with several proteins.

Effect of thyroid activity on fatty acid composition of serum lipids. J. Jurand and M. F. Oliver (Univ. Dept. of Clinical Chem. and Dept. of Cardiology, Royal Infirmary, Edinburgh, Great Britain). *Atherosclerosis* 11, 125–40 (1970). The effects have been studied of changes in thyroid function on serum lipid concentrations and on the fatty acid composition of free fatty acids (FFA), triglycerides, cholesteryl esters and phospholipids. Patients with hypothyroidism had increased serum concentrations of total cholesterol and phospholipids compared with normal control subjects of similar age. In FFA, there was a lower percentage of oleic and a higher percentage of palmitic acid; in triglyceride fatty acids, there was a higher percentage of stearic acid; and in the cholesteryl fatty acids, the percentage of arachidonic acid was low.

Effects of acute myocardial infarction and of noradrenaline infusion on fatty acid composition of serum lipids. *Ibid.*, 157–70. Changes in the fatty acid composition of serum free fatty acids (FFA), triglycerides, cholesterol esters and phospholipids have been studied during the first 3 days after acute myocardial infarction and after noradrenaline infusion. When compared with healthy subjects or patients with a long history of ischaemic heart disease, the only significant change in patients after acute myocardial infarction was elevated oleic acid in the FFA fraction. The composition of triglyceride, cholesteryl and phospholipid fatty acids was not consistently altered.

Enzymatic formation of dihydrosphingosine 1-phosphate. C. Hirschberg, A. Kisic, and G. J. Schroepfer, Jr. (Div. of Biochem., Dept. of Chem. and Chem. Eng., Univ. of Ill., Urbana, Ill. 61801). *J. Biol. Chem.* 245, 3084–90 (1970). A partially purified enzyme from rat liver catalyzes the adenosine triphosphate-dependent phosphorylation of C_{18}-dehydrosphingosine to yield C_{18}-dihydrosphingosine 1-phosphate, which has been postulated as an intermediate in the metabolism of C_{18}-dehydrosphingosine to palmitaldehyde and ethanolamine phosphate, was isolated in a high state of purity and characterized by a combination of chemical, enzymatic and chromatographic techniques.

Effect of cellulose in the diet on the recovery of dietary plant sterols from the feces. L. Denbesten, W. E. Connor, T. H. Kent and D. Lin (Depts. of Surgery and Internal Med. and Pathol., Univ. of Iowa College of Med., Iowa City, Iowa 52240). *J. Lipid Res.* 11, 341–45 (1970). In one normal subject, J. S., fed several formula diets in a sterol balance study, only 25–58% of the ingested plant sterols were recovered from the stool. The dietary plant sterols were completely recovered from the stools of five other men. Plant sterol recovery was complete in all men when a diet of mixed general foods was consumed. Since the chief differences in composition of the formula and the diet of mixed general foods were related to the different contents of cellulose and lactose, these components were added to the formula diet of J. S. and plant sterol balance studies were then carried out. The addition of fresh celery or pulverized cellulose to the formula diet partially corrected the usual fecal loss of plant sterols (80% being recovered). Lactose in the formula was only slightly corrective. However, the addition of both cellulose and lactose led to complete recovery of the ingested plant sterols in the feces.

Carcinogenicity of formic acid 2-[4-(5-nitro-2-furyl)-2-thiazolyl]-hydrazide in Swiss mice. S. M. Cohen, E. Ertürk and G. T. Bryan (Div. of Clinical Oncology, Univ. of Wisconsin, Med School, Madison, Wis. 53706). *Can. Res.* 30, 906–12 (1970). Formic acid 2-[4-(5-nitro-2-furyl)-2-thiazolyl] hydrazide was fed to 50 female 5-week-old Swiss mice at a dose of 0.1% by weight of diet for a total of 29 weeks, with a cumulative dose of 1.2 g/mouse/29 weeks. Because of acute toxicity of the chemical and cannibalization by other mice, only 22 of 50 mice survived to the end of feeding and were evaluated. Fifty-six mice received control diet, and 44 survived and were evaluated. Formic acid 2-[4-(5-nitro-2-furyl)-2-thiazolyl] hydrazide appeared to be a strong carcinogenic (21/22) and leukemogenic (19/22) chemical in this animal species. The solid tumors induced included squamous cell and adenocarcinoma of the stomach (21/22), alveolar lung carcinomas (9/22), mammary adenocarcinomas (7/22) and single tumors of the uterus and skin. In the control mice, the following tumor incidences were found: generalized leukemias, 15/44; and lung, 1/44.

Purification and properties of a palmityl thioesterase II from Escherichia coli. E. Barnes, Jr., A. Swindell and S. Wakil (Dept. of Biochem., Duke Univ. Med. Center, Durham, N. C. 27706). *J. Biol. Chem.* 245, 3122–28 (1970). A palmityl thioesterase II which is insensitive to inhibition by diisopropyl fluorophosphate has been purified 20-fold from extracts of *Escherichia coli.* This enzyme exhibits properties which distinguish it from the more substrate-specific diisopropyl fluorophosphate-sensitive palmityl thioesterase I known also to be present in *E. coli.* The present palmityl thioesterase II has a general specificity for long chain fatty acyl thioesters of coenzyme A or acyl carrier protein. The enzyme will catalyze the hydrolysis of saturated, unsaturated, or β-hydroxy fatty acyl coenzyme A thioesters. Palmityl, palmitoleyl, and D(-)-β-hydroxymyristyl derivatives are the preferred substrates in each respective series of homologues and V_{max} values are 0.53, 0.49 and 0.20 μmole per min per mg, respectively, for each CoA thioester.

Effect of dietary Sterculia foetida oil on pink-white discoloration and fatty acid distribution in stored eggs. A. M. Abou-Ashour and H. M. Edwards, Jr. (Dept. of Poultry Sci., Univ. of Georgia, Athens, Ga. 30601). *J. Nutr.* 100, 757–66 (1970). Single Comb White Leghorn laying hens were fed different levels of *Sterculia foetida* oil (SFO) ranging from 0.01 to 0.1% of the diet. Eggs were stored 6 to 7 weeks at room temperature and then observed for pink-white discoloration and for fatty acid distribution in yolk lipids. The intensity of pink-white discoloration seemed to be related to the amount of SFO ingested. The minimum dietary level required to cause pink-white discoloration was found to be 0.02% SFO when hens received these supplemented diets for 2 to 3 weeks. Dietary SFO caused a marked change in the fatty acid distribution of blood plasma and egg yolk lipids. The rate of change in blood plasma fatty acid composition was greater than in egg yolk. Blood plasma and egg yolk lipids contained more palmitic and stearic and less palmitoleic and oleic moieties when hens were fed SFO. The degree of association among the dietary levels of SFO, the intensity of pink-white discoloration and stearic/oleic acid ratios as measured by the coefficients of correlation was good.

Enzymes, nucleic acids and lipids in human breast cancer and normal breast tissue. R. Hilf, H. Goldberg, I. Michel, R. A. Orlando and F. L. Archer (Squibb Inst. for Med. Res., New Brunswick, N.J. 08903). *Cancer Res.* 30, 1874–82 (1970). Some of the biochemical characteristics of human breast cancer were defined by examining the activities of several specific enzymes associated with carbohydrate, lipid and amino acid metabolism in 49 samples of infiltrating ductal carcinoma of the breast. When enzyme activity was expressed per mg DNA, RNA and DNA levels were increased in neoplastic tissues, as were those of cholesterol and free fatty acids, whereas α-glycerophosphate dehydrogenase activity and triglyceride levels were significantly reduced in the tumors.

Effect of methylmalonyl coenzyme A, a metabolite which accumulates in vitamin B_{12} deficiency on fatty acid synthesis. G. J. Cardinale, T. J. Carty and R. H. Abeles (Grad. Dept. of Biochem., Brandeis Univ., Waltham, Mass. 02154). *J. Biol. Chem.* 245, 3771–75 (1970). We have proposed that the accumulation of methylmalonyl-CoA, which occurs when a deficiency of B_{12} coenzyme exists, may lead to its incorporation into fatty acids in place of malonyl-CoA. This leads to the production of fatty acids, which are not usually produced and which may be physiologically undesirable. As a first step in the test of this hypothesis, we have examined the effect of methylmalonyl-CoA on fatty acid synthesis in vitro in rat liver supernatant fractions. It was shown that methylmalonyl-CoA inhibits fatty acid synthesis and is incorporated into fatty acids.

Lipid metabolism in the perfused chicken liver. Lipogenesis from glucose, acetate and palmitate. R. Bickerstaffe, C. E. West and E. F. Annison (Unilever Res. Lab., Colworth House, Sharnbrook, Beds., U.K.). *Biochem. J.* 118, 427–31 (1970). A procedure for the perfusion of the isolated chicken liver was developed. The preparation satisfied many of the criteria of normal physiological function, e.g. oxygen consumption and the absence in the perfusion medium of enzymes indicative of cell damage, and retained its capacity to synthesize lipids from glucose, acetate and long-chain fatty acids. Part of newly synthesized triglyceride was released into the perfusion medium as lipoprotein.

• Drying Oils and Paints

Condensation products between dilinoleic acid and ethanolamine. G. B. Saracco and M. Gay (Polytech. Inst., Turin, Italy). *Riv. Ital. Sostanze Grasse* 46, 520–7 (1969). A kinetic study has been carried out on the reactions between dilinoleic acid and di- and triethanolamine, at various temperatures and reagent ratios, in the presence and absence of solvent. The drying characteristics of the prepolymers obtained from these reactions, in xylene solutions, have also been examined. Temperatures above 120C were necessary for any drying to take place; treatment at 200C for 90–105 min. was judged to be optimum from the standpoint of film hardening with minimal discoloration. Excellent adhesion of the film to untreated metal surfaces was observed.

Preparation of crystalline linoleate hydroperoxide for drying oil research. W. J. Bailey and G. L. Barlow (Dept. of Chem., Univ. of Maryland, College Park, Md.). *Paint Technology* 42, 287–98 (1970). Hydroperoxides form and decompose during the drying of unsaturated fatty acid esters. The liquid hydroperoxides are extremely difficult to separate and purify. This study was based on the synthesis and isolation of a chemically pure crystalline hydroperoxide of a linoleic acid derivative. Crystalline p-phenylphenacyl linoleate was prepared and oxidized and, through crystallization procedures, 99% p-phenylphenacyl linoleate hydroperoxide was obtained. Spectral analysis and other analytical methods confirmed the purity of this compound. A method is given for producing experimental quantities of this hydroperoxide for drier studies and reaction studies of oils and resins.

Water-soluble linseed oil curing agent for concrete. A. E. Rheineck and R. A. Heskin (North Dakota State Univ., Fargo, N.D. 58102). *Paint Technology* 42, 299–307 (1970). A series of water-soluble, linseed oil-based liquid curing membranes for application to wet, freshly poured concrete were evaluated for their moisture retention characteristics as compared to polyethylene sheeting. Laboratory evaluation studies on these compounds were limited. The modified ASTM test, used to evaluate cement mortars as dumbbell briquettes, was used to screen a number of coating compositions. The briquettes were coated with each vehicle immediately after setting. Tensile and moisture retention determinations were run at 7 and 28 days. By our methods, a relationship between tensile tests and moisture retention was evident. The coatings chosen from the test were further evaluated for their water vapor transmission characteristics by a laboratory-devised coated cylinder test and the standard AASHO test. The liquid coating membranes were next evaluated in the field on alternate 16′ × 20′ (5 × 6m) sections immediately after the concrete was finished. Control sections were covered with polyethylene sheeting. Cores were removed and tested for compressive strength at 28 days. The cores from the liquid curing membrane-coated sections were on the average equivalent to or slightly higher in compression than their polyethylene-cured counterparts.

• Detergents

A method of comparing the wetting power of wetting agents. W. Gückel and G. Synnatschke (B.A.S.F., Limburgerhof, Germany). *Tenside* 7, 75–80 (1970). A method of determining the wetting power of wetting agents is described, which is based on the measurement of equilibrium surface tensions and angles of contact of wetting agent suspensions and emulsions. The test is carried out against a standard (paraffin).

A new method of determining the activity of detergent enzymes directly on textile fabrics. H. R. Jaag and A. Frei (Ciba A. G., Basel, Switzerland). *Tenside* 7, 70–5 (1970). A reactively stained milk albumen, applied and fixed to textile substrates, is suggested as a measurable reaction component for the determination of proteolytic enzymes in washing products. The test method, which is discussed in detail also in relationship to external factors such as pH, temperature, etc., is simple, sufficiently accurate and has the advantage of being carried out under realistic conditions.

Difference in the action of surfactants adjusted to acidic and alkaline conditions on human skin. H. Tronnier, G. Schuster and H. Hampe (Univ. Skin Clinic, Tubingen, W. Ger.). *Fette Seifen Anstrichmittel* 72, 381–85 (1970). The results of the examination of synthetic washing agents, which exhibit optimum washing action at pH 6–8, are reported. The side-effects which are associated with the determination of wetting and water removal of skin are directly proportional to values between pH 6 and 8, depending on whether alkali soaps or surfactants of the type sodium lauryl sulfate are employed. Unexpectedly, the roughness of the skin increased with increased alkalinity of the solutions.

Two-phase titration of anionic and cationic surfactants. E. Heinerth (Anal. Lab., Henkel and Cie., Gmb.H. Dusseldorf). *Fette Seifen Anstrichmittel* 72, 385–88 (1970). For the two-phase Epton titration of anion-active detergent material, the mixed indicator Dimidium Bromide-Disulphine Blue VN is most suitable and for the cation-active surfactants, Hyamine 1622 is most suitable. Standardization of the Hyamine 1622 solutions is recommended using the type of anionic surfactant to be determined. Alkyl sulphates containing less than 10 C-atoms per molecule are best titrated using methylene blue rather than the mixed indicator.

Influence of skin cleansing agents and textile washing agents on the surface lipids of skin. Determinations using a new method. R. Haensch and M. L. Fasshauer (Univ. Skin Clinic, Dusseldorf, W. Ger.). *Fette Seifen Anstrichmittel* 72, 407–11 (1970). The hitherto known methods do not permit the repeated sampling of lipids. A combined absorption and diffusion method was therefore evolved. The lipid removal is most pronounced with textile washing agents and generally lesser (but not in all cases) with skin cleansing agents. The skin surface lipid is hardly affected by bathing with bran. Following a bathing with oil, the lipid content exceeds the initial value. The regeneration of lipids is dependent on the intensity of the preceding lipid removal, requiring longer periods in the case of textile washing agents. The amount of lipid that can be removed immediately after bathing is generally larger than before. This important fact was overlooked until now. Soaking of the epidermis layers and emulsifier action must account for this phenomenon.

Micro emulsions. L. M. Prince (Lever Bros. Co., Res. Center, Edgewater, N.J. 07020). *J. Soc. Cosmetic Chemists* 21, 193–204 (1970). Recent advances concerned with the theory of micro emulsions are reviewed. A theoretical interpretation of the hydrophilic-lipophilic (HLB) scheme for rating emulsifiers

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is offered. HLB measures the partitioning of emulsifier between oil phase and interphase rather than between the oil phase and the water phase of an emulsion. Under these circumstances, the interrelation between the flat film pressure, oil/water interfacial tension and HLB determines the character of the emulsion to be formed.

A NEW APPROACH TO THE ANALYSIS OF FATTY ALKANOLOMIDES. J. J. Hejna and D. Daly (Helene Curtis Ind., 4401 W. North Avenue, Chicago, Ill.). *J. Soc. Cosmetic Chemists* 21, 107–18 (1970). Column chromatography in conjunction with infrared spectroscopy can be used to elucidate the composition of the superamide type and Kritchevesky amide type alkanolamides. The method is quantitative and yields information pertaining to the secondary products.

NONIONICS IN THE 70'S. L. J. Garrison (Jefferson Chem. Co., Houston, Texas). *Detergents and Specialties* 7, 33–36 (1970). It is predicted that nonionics will continue to grow at a rate of 7.5% per year compared with the overall surfactant market growth of 4.6% per year.

SULFONATION OF OLEFINS—INFLUENCE OF REACTION CONDITIONS AND STRUCTURE OF OLEFINS ON THE PRODUCTS OF SULFONATION. H. Bauman, W. Stein and M. Voss (Lab. Henkel and Cie., Gmb. H. Dusseldorf, W. Ger.). *Fette Seifen Anstrichmittel* 72, 247–53 (1970). Sulfonation of n-α-olefins with SO_3, which is not bound as complex, and the products resulting from these reactions are reported. Based on the course of sulfonation and the composition of the product, a reaction mechanism has been derived. The composition of the products obtained by sulfonation of α-olefins can be varied within certain limits by adjusting the conditions of sulfonation and treatment of the reaction products. Sulfonations of unbranched nonterminal olefins, olefins having monoalkyl branching at the double bond and of technical oligo-olefins have been reported.

SURFACTANTS IN DRY-CLEANING PROCESSES. W. Grunewalder (Henkel & Cie. Gmb. H, Dusseldorf, W. Ger.). *Fette Seifen Anstrichmittel* 72, 189–99 (1970). Properties and composition of such surfactants are treated in detail. Processes are discussed for the dry-cleaning of textiles, for disinfecting and for rendering them antistatic and water-repellant.

MANUFACTURE OF SOAP BASES BY A COMPLETELY CONTINUOUS PROCESS. G. R. Plott. *Soap Perfumery and Cosmetics* 43, 233–39 (1970). The Alfa-Laval "Centripure" plant will produce soap base at 62–63 percent F.A. at 6 tons per hour continuously and automatically. Fat changes can be made continuously and consist of neutral oil, fatty acids or mixtures of both. The conversion of fat into finished soap takes just 15 minutes.

PREDICTION AND EVALUATION OF EMULSION STABILITY WITH ULTRACENTRIFUGAL STRESS. E. R. Garrett (College of Pharm., J. Hillis Miller Health Center, Univ. of Florida, Gainesville, Fla. 32601). *J. Soc. Cosmetic Chemists* 21, 393–415 (1970). Nonstratified creams demonstrate an initially apparent first-order process of large particle drainage from the cream concomitant with continuous drainage of heavier surfactant. The final rate of oil separation is constant and shows that the rate-determining coalescence occurs at the cream-oil interface and that the ultimate cream is a tightly packed, homogeneously particulate mass with minimum continuous phase. This was substantiated by microscopic examination. In addition to reproducible preparative methods, sensitive analytical methods have been developed to assay the surfactant and oil concentrations in various emulsions.

SURFACTANT LOCATION AND REQUIRED HLB. T. J. Lin (Max Factor, Hollywood, Calif.). *J. Soc. Cosmetic Chemists* 21, 365–75 (1970). Previous studies indicate that the location of the surfactant at the time of emulsification plays a very important role in determing the physical properties of the emulsions formed. In this investigation, the HLB required to form an O/W emulsion was studied as a function of the initial surfactant location in the oil and aqueous phases prior to emulsification. Placing the surfactant blend in the aqueous phase prior to emulsification generally resulted in an apparently lower value of required HLB than the same system prepared by initially dispersing the surfactant blend in the oil phase. The initial surfactant location also showed a marked effect on emulsion stability. In the systems studied, using the emulsification technique described, placing the surfactants in the oil phase produced more stable emulsions than the same systems prepared by initially placing the surfactants in the aqueous phase.

CONTINUOUS ALKOXYLATION OF FATTY ACIDS, FATTY ALCOHOLS AND FATTY AMINES. W. Umbach and W. Stein (Lab. of Henkel & Cie., Dusseldorf, W. Ger.). *Fette Seifen Anstrichmittel* 71, 938–47 (1969). A continuous process for the alkoxylation of long chain carboxylic acids, alcohols and amines in the presence of alkaline catalysts in a pilot scale is reported. The reactions were carried out in a short-time reactor. Parameters used were, temperature 250C–350C, pressure 50–100 atmospheres and time 10 to 80 seconds. The process with a high space-time yield is especially suitable for the manufacture of low alkoxylated products.

CONTINUOUS MANUFACTURE OF ENZYME-CONTAINING WASHING AGENTS. H. Zilshe (Wolfenbittel, W. Ger.). *Fette Seifen Anstrichmittel* 71, 975–81 (1969). A detailed review of current manufacturing practices is given. Owing to their operational and commercial advantages, aggregates like air-lift and mixing sections are attaining increasing significance recently in the manufacture of washing powders as against the spraying tower. As shown by the author, considerable progress has been achieved recently in the manufacture of modern non-dusty and easily soluble products in this field. During the manufacture of such items, a separation of the individual powdery components must be prevented.

FLUORINE CHEMICALS AND THEIR APPLICATIONS AS WETTING AGENTS. R. Gritzky (Minnesota Mining & Manuf., Dusseldorf, W. Ger.). *Fette Seifen Anstrichmittel* 71, 971–75 (1969). Fluorinated chemical compounds are suitable as wetting agents. They possess excellent chemical and thermal stability and are effective at very low concentrations. Preparation, structure and application of these substances are given.

A NEW PROCEDURE FOR THE DETERMINATION OF ACTIVITY OF ENZYMES USED IN WASHING AGENTS. H. R. Jaag (CIBA AG, Basel, Switzerland). *Fette Seifen Anstrichmittel* 71, 961–66 (1969). The enzyme has become an integral part of a modern washing agent. The properties of such enzymes are determined by a suitable testing procedure, which leads to the application of these biologically active preparations under optimum conditions. In the present paper the mode of action of the enzyme preparations is described, followed by a

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Self-Destruct Chemicals Aid Pollution Control

After three years of research, CESCO, Inc., Lake Charles, La., announced the marketing of more than a hundred specialized chemical cleaning compounds that self-destruct to aid in pollution control.

Dick Krajicek, president of the chemical cleaning company servicing heavy industries, described the results of an extensive research and field testing program: "We have developed and fully tested more than 110 specialized detergents formulated for accelerated biodegradability; also, we are marketing more than 20 other compounds that reduce or eliminate detrimental effect of phosphates in effluents, and a series of emulsion cleaners that complete the cleaning jobs and are then changed into harmless waste."

Another feature of the special emulsion cleaners is the liberation of free oil from the spent emulsion prior to API oil separator systems and removal from the plant effluent; this eliminates oil slicks in receiving waters.

The self-destruct cleaning compounds are part of the full-scale pollution control program being offered for the first time by CESCO in products and services, as part of chemical cleaning control services, Krajicek declared.

In anticipation of a build-up in national demands for pollution control, CESCO laboratory technicians started a research and field testing program three years ago, Krajicek said, to achieve a 100% degradability of cleaning chemicals within five days after disposal. Governmental standards require only 70%, he said.

On specific service contracts, CESCO has been performing in situ treatment of spent chemicals to render them non-polluting and in some cases to recover valuable chemicals from the wastes at the same time. In a few instances, the reclamation of valuable residuals has more than paid for the entire cost of the pollution control program, he declared.

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New Mexican Subsidiary for Hodag Chemical Corporation

Hodag Chemical Corporation, Skokie, Illinois, announces the establishment of a new Mexican subsidiary, Productos Quimicos Anahuac S.A. de C.V., Mexico City, Mexico, under the management of Cuatemoc Carbajal. The new subsidiary is now handling the distribution of all Hodag products in Mexico and Central America, some of which it is already manufacturing. Eventually it plans to expand its manufacturing facilities to include the entire Hodag line of surface active chemicals. These include emulsifiers, surfactants, antifoam agents and other additives for such industries as paint, adhesives, pulp and paper, pharmaceutical, cosmetics, food processing, chemical specialties, sugar refining and others.

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critical consideration of the testing procedures which are currently employed. As a major topic a testing system especially suitable for the washing agent industry is chosen, which takes into account the important characteristics such as range of measurement, choice of substrate, concentration, temperature- and pH-dependence, as well as the compatibility of the enzymes with other components of the washing agent. Two practical examples are given.

GAS CHROMATOGRAPHY OF PRIMARY ALKYL SULFATES. P. Bore and F. Degremont (Res. Labs., Societe l'Oreal). *Rev. Franc. Corps Gras* 17, 315–24 (1970). A rapid and accurate method for the direct determination of the alkyl portion of primary alkyl sulfates has been developed. A 2.5% aqueous solution of the alkyl sulfates is injected directly into the gas chromatograph. The salts are hydrolyzed in the injector oven (maintained at 180C) to the primary alcohols which are easily separated on an Apiezon L column. With the alkyl portion of the molecule thus characterized, the percentage of active material can be determined by the modified Epton-Barr method. In addition, several factors which can potentially affect the accuracy of the method, *e.g.*, injector temperature, concentration, *pH*, have been investigated.

SUPERFATTED SOAP BAR CONTAINING A SYNERGISTIC PRESERVATIVE MIXTURE OF EHDP AND EDTA. J. W. Waring (Lever Bros. Co.). *U.S. 3,511,783.* A detergent bar is preserved against deterioration of odor and color by incorporation of a synergistic mixture of EHDP and EDTA.

GERMICIDAL NONIONIC DETERGENT-IODINE COMPOSITIONS. A. Cantor and M. W. Winicov (West Laboratories, Inc.). *U.S. 3,513,098.* Aqueous nonionic detergent-iodine compositions providing enhanced iodine color in high use dilution are claimed. The detergent is a water-soluble secondary alcohol-ethylene oxide condensate having an alcohol moiety with a C_{14}-C_{15} average carbon content and 8–13 mols of ethylene oxide, the ratio of detergent to available iodine is 5:1 or higher and a source of iodide is present at a level in excess of 0.25 part per part of available iodine.

LAS DETERGENT CONTAINING PRIMARY AND SECONDARY ALKOXY ALKANOL AMMONIUM SULFATES. H. B. Hans and L. J. Lofdahl (Purex Corp.). *U.S. 3,513,099.* The use of a mixture of primary and secondary alkoxy alkanol ammonium sulfates in a wt. ratio of 1:2 to 2:1 in combination with a sodium linear dodecylbenzene sulfonate (LAS) in a wt. ratio of 0.2 to 1.0 sulfate to sulfonate, results in a lowering of the cloud point (relative to the use of ether sulfate by itself), improved viscosity characteristics and adequate detersive strength at lower cost through elimination of the additional alcoholic solvent.

CHELATING AND CLEANING COMPOUND AND METHOD. P. W. Kersnar and S. Taormina (Progressive Products Co.). *U.S. 3,515,673.* A chelating and cleaning composition is claimed, containing an alkali metal salt of the carboxymethylated reaction product of 1 mol of ethylene diamine and 2–3.5 mols of propylene oxide. There are at least two terminal beta hydroxy propyl groups, the remaining terminal group or groups being acetate. These products exhibit markedly improved metal chelating properties, especially for ferric ions in high pH environments, and are advantageously used in preventing ion precipitation on fabrics during laundering, in removing precipitated iron stains from fabrics, as well as other iron sequestering applications. They are also useful, in combination with other chelates, as improved detergency boosters.

COATING COMPOSITIONS COMPRISING ALPHA-SULFO LOWER ALKYL ESTER OF A C_7 TO C_{18} FATTY ACID. E. S. Mackey, R. L. Mayhew and G. M. Gantz (GAF Corp.). *U.S. 3,516,835.* Coating compositions, suitable for use in light-sensitive photographic elements, comprise a water-permeable colloid, e.g. gelatin, and as a coating aid, a small amount of at least one alpha-sulfo lower alkyl ester of a fatty acid having from 7 to 18 C atoms.

SUSTAINED ACTION DETERGENT PRODUCT CONTAINING ENCAPSULATED SODIUM TRIPOLYPHOSPHATE. J. R. Story, A. B. Herrick and E. Jungermann (Armour and Co.). *U.S. 3,516,937.* A light duty detergent composition in the form of granules or tablet, providing a lotion-like feel in solution and having sustained cleaning action is described. The composition includes an anionic or nonionic detergent, a fatty alkanolamide or amine oxide suds booster, and sodium tripolyphosphate, a portion of the tripolyphosphate being encapsulated by a polymeric film forming material relatively insoluble in water.

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