

• Fats and Oils

RANCIDITY IN ALMONDS: SHELF LIFE STUDIES. N.E. Harris, D.E. Westcott and A.S. Henick (Food Lab., U.S. Army Natick Labs., Natick, MA 01760). *J. Food Sci.* 37, 824-7 (1972). Rancidity in almonds was studied by storing diced unroasted and roasted nuts (1969 and 1970 crops) for periods up to 6 months at 0F and 100F. Both glazed and unglazed samples were stored in hermetically-sealed cans in air packs and assayed by chemical and sensory methods. Data showed that diced unroasted almonds remained acceptable to a consumer panel for 6 months at 100F. On the other hand diced roasted almonds became unacceptable to a technical panel after 3 months at 100F. Confectioner's glaze was of little benefit in protecting diced unroasted or roasted almonds against sensory detectable rancidity. Moreover, it was found that the glaze provided no additional protection to almonds embedded in a sweet chocolate confection. Changes in free fatty acid, iodine value and moisture content were not useful indicators of rancidity in diced unroasted or roasted almonds during storage. However, oxygen content of the headspace gas of almonds stored in cans at 100F, as measured by a gas chromatographic technique, agreed well with a sensory technical panel in judging quality of almonds.

DATA ANALYSIS: INTERBLOCK AND INTRABLOCK ESTIMATES OF VARIANCE ON TASTE PANEL DATA. M.C. Gacula Jr. and J.J. Kubala (Food Res. Lab., Armour Food Co., 801 West 22nd St., Oak Brook, IL 60521). *J. Food Sci.* 37, 832-6 (1972). This work was conducted to assess the importance of interblock and intrablock information in the analysis of sensory panel scores. The data from three studies designed as a balanced incomplete block with repetitions was obtained as a model for the study. The result shows that the variance is reduced by interblock and intrablock recoveries. However, the absolute reduction in variance is not large enough to effect changes in the interpretation of result. An intrablock analysis of panel scores is therefore sufficient. A numerical illustration of the interblock and intrablock analyses of data is presented.

ANTIOXIDANT EFFECT OF PROTEIN HYDROLYZATES IN A FREEZE-DRIED MODEL SYSTEM. S.J. Bishov and A.S. Henick (Food Lab, Food Chem. Div., U.S. Army Natick Lab, Natick, MA 01760). *J. Food Sci.* 37, 873-5 (1972). Protein hydrolyzates derived from autolyzed yeast (AYP) and from acid hydrolyzed vegetable protein (HVP) alone and in combination with phenolic antioxidants, α -tocopherol or butylated hydroxyanisole (BHA), inhibited the autoxidation of antioxidant-free corn oil in a freeze-dried model system containing a carboxy methyl cellulose (CMC) matrix. Inhibition was demonstrated by measuring oxygen uptake by gas chromatography of headspace samples during incubation at 65C to the end of the induction period. Several commercial samples of both AYP and HVP were screened for antioxidant activity. Those with the greatest antioxidant activity were fractionated on a series of molecular sieves. All fractions had antioxidant activity, with those in the range below 700 and between 700 and 1500 having greater activity than those between 1500 and 5000. Antioxidant activity of hydrolyzate fractions was determined over the range of about 10 to 50% oil basis in a system composed of 1:1 corn oil and CMC. Maximal effect was observed at about 25%.

DETERMINATION OF BROMINATED VEGETABLE OIL CONCENTRATIONS IN SOFT DRINKS USING A SPECIFIC ION ELECTRODE. D.L. Turner (Sunkist Growers, Inc., R&D Div., Ontario, CA 91761). *J. Food Sci.* 37, 791-2 (1972). A method for quantitative determination of brominated vegetable oils at the 15 ppm level in soft drinks was developed. Extracts of beverages were subjected to a debromination reaction using sodium borohydride and a palladium-on-charcoal catalyst. The resulting bromide was measured with a specific ion electrode. At the 15 ppm level of brominated vegetable oil, the accuracy and precision of this method was $\pm <1$ ppm and ± 1 ppm, respectively.

ISOLATION AND IDENTIFICATION OF VOLATILE COMPOUNDS FROM POTATO CHIPS. R.E. Deck, J. Pokorny and S.S. Chang (Dept. of Food Sci., Rutgers, The State Univ., New Brunswick, NJ 08903). *J. Food Sci.* 38, 345-9 (1973). A sample of potato

chips, manufactured from Kennebec potatoes by frying in a mixture of corn and cottonseed oil, was selected by a trained panel as having a desirable flavor. The volatile compounds in this sample were isolated by vacuum steam distillation of a water slurry of the potato chips. The isolated volatile compounds were fractionated by repeated gas chromatography, and the separated components were identified by a combination of infrared and mass spectrometry. The identification was confirmed by the infrared and mass spectra, and the retention times of the authentic compounds. A total of 53 compounds was identified; these included 8 nitrogen compounds, 2 sulfur compounds, 14 hydrocarbons, 13 aldehydes, 2 ketones, 1 alcohol, 1 phenol, 3 esters, 1 ether and 8 acids. Among the compounds identified, the alkyl-substituted pyrazines and the 2,4-dienals were of great importance to the flavor of potato chips.

SORPTION HYSTERESIS AND CHEMICAL REACTIVITY: LIPID OXIDATION. H.E. Chou, K.M. Accott and T.P. Labuza (Dept. of Food Sci. & Nutr., Univ. of Minn., St. Paul, MN 55101). *J. Food Sci.* 38, 316-9 (1973). Methyl linoleate was oxidized in model gels of either cellulose or amylopectin in systems which showed sorption hysteresis. Amylopectin, which swells, exhibits a larger hysteresis loop than the nonswelling cellulose system. In the range of intermediate moisture foods, water accelerates oxidation when the trace metal content is low or is bound to the solid support. In addition, when prepared by a desorption technique the oxidation rate was much larger than the same system prepared by adsorption to a similar water activity. Most of the effect can be attributed to the diffusion limitation in the aqueous phase which affects catalyst mobility and swelling of the polymeric matrix which exposes new catalyst sites.

EVALUATION OF CHEMICAL CONFIRMATORY TESTS FOR ANALYSIS OF DIELDRIN RESIDUES. R.B. Maybury and W.P. Cochrane (Anal. Services Sta., Plant Prod. Div., Canada Dept. of Ag., Ottawa, Ontario, Canada K1A0C5). *J. Assn. Off. Anal. Chem.* 56, 36-9 (1973). Eight of the more commonly used reagents for the confirmation of dieldrin at the residue level were compared for butterfat and other agricultural products. In some instances derivatives were isolated and identified. The reactions were evaluated, using pure dieldrin and spiked sample extracts. Two reagents, aqueous HBr solution and $\text{BCl}_3/2$ -chloroethanol, were especially useful because of their application and sensitivity (0.003 ppm for a 10 gram dry sample and 0.001 ppm for a 25 gram wet sample). The ZnCl_2/HCl reagent was a practical alternative to the latter. The $\text{HBr}/\text{Ac}_2\text{O}$ reagent gave a more positive confirmation at a lower sensitivity.

COLLABORATIVE STUDY OF A SIMPLIFIED HALPHEN PROCEDURE FOR THE QUANTITATIVE DETERMINATION OF LOW LEVELS OF CYCLOPROPENE FATTY ACIDS. E.C. Coleman (Div. of Chem. & Physics, FDA, Washington, D.C. 20204). *J. Assn. Off. Anal. Chem.* 56, 82-5 (1973). A collaborative study was conducted on a simplified Halphen procedure for the quantitative determination of low levels of cyclopropene fatty acids. Twelve laboratories analyzed 9 samples, whose cyclopropene content ranged from 0.00 to 0.19%. The amount of cyclopropene fatty acids in the samples was estimated in the Associate Referee's laboratory from HBr titration data. A statistical evaluation of the collaborative data indicated good precision and accuracy. Evidence for a significant between-laboratory systematic error could not be found. It is recommended that work be continued on development of a suitable calibration procedure and/or acquisition of a reference standard.

FREE ARGININE CONTENT OF PEANUTS (ARACHIS HYPOGAEA L.) AS A MEASURE OF SEED MATURITY. C.T. Young and M.E. Mason (Dept. of Biochem., Okla. State Univ., Stillwater, OK 74074). *J. Food Sci.* 37, 722-5 (1972). The level of arginine, determined by a modified Sakaguchi methods, was used to establish the degree of immaturity in freshly harvested and cured peanuts. Precision and accuracy of the method is reported. Calibration curves were plotted to estimate the degree of immaturity in peanuts. The method was tested under field conditions and found to be an accurate measure of immaturity.

CHARACTERIZATION OF LIPIDS FROM SEEDS OF THE ROSACEA FAMILY. T. Gutfinger, S. Romano and A. Letan (Dept. of Food Eng. & Biotechnol., Technion-Israel Inst. of Technol.,

Fall '72 PAG guidelines

The following reports, statements and guidelines are available from the Protein Advisory Group of the United Nations System, Max Milner, director, PAG Secretariat, Rm. A-606, United Nations, New York, N.Y. 10017.

No.	Title	Date published in PAG Bulletin
PAG STATEMENTS		
2	PAG Recommendation on aflatoxin	1969
3	PAG Statement on the nature and magnitude of the protein problem	1971 No. 12
4	PAG Statement on single cell protein	1970 No. 11
5	PAG Statement on the marketing and distribution of protein-rich foods	1971 No. 12
6	PAG Statement on milk substitutes	1970
7	PAG Recommendation on prevention of food losses and protein-calorie malnutrition	1969
8	PAG Statement on plant improvement by genetic means	1970
9	PAG Recommendation on amino acid fortification of foods	1970
10	PAG Statement on a systems approach to the formulation and evaluation of nutrition intervention programmes	1970
11	PAG Statement on leaf protein concentrate	1970
12	PAG Statement on the world protein problem: research and development needs	1971 No. 12

Haifa, Israel). *J. Food Sci.* 37, 938-40 (1972). Composition of fatty acids, sterols and tocopherols in lipid extracts from kernels of apricot, peach and almond were determined by thin-layer and gas-liquid chromatography. All three oils were composed mainly of oleic and linoleic acids and were also similar in the composition of their sterols (β -sitosterol was the main component) and in squalene content. α -Tocopherol was the principal tocopherol in extracts from almond and peach kernels, while γ -tocopherol was the major tocopherol in the apricot oil. A small amount of δ -tocopherol was detected only in apricot oil. Similarities in the oils' composition make possible substitution of the relatively expensive almond oil with apricot or peach oils.

FATTY ACID CONTENT OF FRANCHISE CHICKEN DINNERS. W.P. Donovan and H. Appledorf (Food Sci. Dept., Univ. of Florida, Gainesville, FL 32601). *J. Food Sci.* 37, 961-2 (1972). Fatty acid composition of franchise chicken dinners was determined by gas-liquid chromatography. Five dinners were analyzed from each franchise. Five fatty acids accounted for 98% of the total fatty acids present in extracted fat. Mean values and ranges for relative percent fatty acid content were: palmitic acid 20% (17-23%), palmitoleic acid 2% (1-3%), stearic acid 7% (5-10%), oleic acid 47% (44-54%) and linoleic acid 23% (19-28%). Linoleic acid contributed an average of 10% of the total caloric content of the dinners. The average ratio of unsaturated to saturated fatty acids was 2.5 to 1.

DIETETIC MARGARINES AND EDIBLE FATS: NUTRITIONAL PROBLEMS. P. Metai and A. Bach (Lab. Chim. Biol. Faculte Pharm. Univer. L. Pasteur-Strasbourg). *Rev. Franc. Corps Gras* 19, 703-9 (1972). Margarine is a product rich in certain vitamins and essential fatty acids and is also a nutrient which may be made with different fat content. Margarine may serve as energetic nutrients designed to facilitate lipid digestion in

13a	Review of the specific proposals contained in ACAST report "International Action to Avert the Impending Protein Crisis" United Nations, 1968	1971
14	PAG Statement on marketing of conventional foods	1971 No. 12
15	PAG Statement on popular participation and community involvement in nutrition improvement programmes	1971
16	PAG Statement on the potential of fish protein concentrate for developing countries	1971 Vol. II, Nos. 2 and 3
17	PAG Statement on low lactase activity and milk intake	1972 Vol. II, No. 2
18	PAG Statement on relationship of pre- and postnatal malnutrition in children to mental development, learning and behavior	1972 Vol. II, No. 2
19	PAG Statement on maintenance and improvement of nutritional quality of protein foods	1972
21	PAG Statement on specifications for solvents	1972
23	PAG Recommendations for the promotion of processed protein foods for vulnerable groups	1972 Vol. II, No. 3

PAG GUIDELINES

2	PAG Guideline for preparing food-quality groundnut flour	1970
4	PAG Guideline for preparation of edible cottonseed protein concentrate	1970
5	PAG Guideline for edible, heat-processed soy grits and flour	1969
6	PAG Guideline for preclinical testing of novel sources of protein	1970
7	PAG Guideline for human testing of supplementary food mixtures	1970
8	PAG Guideline on protein-rich mixtures for use as weaning foods	1972 No. 12
9	PAG Guideline on fish protein concentrate	1971 No. 12
10	PAG Guideline on marketing of protein-rich foods in developing countries	1971
11	PAG Guideline for the sanitary production and use of dry protein foods	1972 Vol. II, No. 3
12	PAG Guideline on the production of single cell protein for human consumption	1972 Vol. II, No. 2
13	PAG Guideline for the preparation of milk substitutes of vegetable origin and toned milk containing vegetable protein	1972
14	PAG Guideline on the preparation of defatted edible sesame flour	1972

PAG REPORTS

1	Feeding the preschool child: report of a PAG <i>ad hoc</i> working group	1971
2	Manual on feeding infants and young children (Cameron and Hofvander)	1972

certain diseases (high content of medium and short chain triglycerides) or to reduce the caloric value (low-calorie margarines with only 40-50% fat). These kinds of margarines need legislative approval to be manufactured in France.

PRODUCTION AND UTILIZATION OF LIQUID MARGARINE. K.G. Savilova et al. (VNIIZ). *Maslozir. Prom.* 1972(9), 21-2. The baking industry, which use a large quantity of margarine, has many problems related to the consistency of margarine. Melting of margarine makes the product less stable. If a liquid margarine is used, all these problems are eliminated. The authors give formulations for the use of this kind of margarine and a process for its production. (Rev. Franc. Corps Gras)

SEPARATION OF A MONO- AND DIGLYCERIDES MIXTURE BY MOLECULAR DISTILLATION. A.A. Smidt et al. (VNIIZ). *Maslozir. Prom.* 1972(9), 22-4. From the mixture of mono-, di- and triglycerides, a monoglyceride concentrate is obtained by molecular distillation. In this paper the results of glycerolysis of hydrogenated sunflower oil, iodine value 70, are given. The obtained product contained 39% monoglycerides, 41% diglycerides, 14.5% triglycerides, 4.4% of free glycerol and 1.1% of free fatty acids. The molecular distillation was done in a semi-pilot installation. The distillate consisted of 85-88% α -monoglycerides, 5-7% β -monoglycerides, 3-4% diglycerides, 1-2% triglycerides, 1-2% glycerol and 1% free fatty acids. Melting point was 20 C higher than that of fat used for production of this product. (Rev. Franc. Corps Gras)

METHOD FOR IMPROVING THE STABILITY OF DEEP FRYING FAT. V.F. Usenko et al. *Pishchevaya Tehnol.* 1972(5), 72-4. If the frying pan is lined, the fat treated at higher temperature has better stability than the fat treated in a normal frying pan. For practical use, a stabilizer is recommended. In the lined frying pan, fat stability was very good. (Rev. Franc. Corps Gras)

FATTY ACIDS COMPOSITION OF GLYCERIDES CRYSTALLIZED FROM MELTED BUTTER. K.V. Obedkov et al. *Pishchevaya Tehnol.* 1972(5), 151-2. During cooling of melted butter, palmitic and stearic acid glycerides crystallize first. Further cooling crystallizes the glycerides containing the C₈-C₁₄ acids. The major part of unsaturated and volatile fatty acids are in the fraction liquid at 20C. (Rev. Franc. Corps Gras)

INDUSTRIAL USES OF TALLOW IN LIPOCHEMISTRY. J.P. Helme (ITERG-Paris). *Rev. Franc. Corps Gras* 19, 763-75 (1972). After a review of the principal scientific work done during the last decade in lipochemistry, the industrial uses of tallow are described. Characteristics and trading rules are reviewed. The main industrial processes for splitting, distillation and fractionation of fats are described as are the principal chemical modifications on the ester function and on the double bond of the fatty acids. Properties, characteristics and uses of the new derivatives obtained during these modifications are mentioned.

TALLOW AND LARD FOR BAKERY PRODUCTS. J.F. Gueriviere, G. Bussiere (Lab. Centre Technique Unions/C.T.U./-Paris). *Rev. Franc. Corps Gras* 19, 747-61 (1972). The data given in this paper show that animal fats were not used very much in recent past in bakery products. This situation seems to be changing now because tallow and prime steam lard have specifications in good concordance with industry requirements. For this reason animal fats may be used in the same manner as other edible fats. Bakery products prepared with animal fats have satisfactory characteristics. Stability tests have shown that the keeping quality of bakery products is correlated with the stability of tallow and lard.

GHEE, MILK AND BUTTER—A STUDY. P.C. Kar. *Indian Oil Soap J.* 37(9), 221-9 (1972). Composition, preparation, and dyes used in ghee are cited. The nutritional value of butter and its sources are compared in fatty acid content with tallows from various sources.

APPLICATION OF DTA TO EDIBLE FATS AND OILS. A REVIEW. R.M.S. Lozano (Servicio de Informacion y Documentacion, Inst. de Productos Lacteos y Derivados Grasos, Madrid, Spain). *Grasas y Aceites* 23, 324-8 (1972). A review of the literature on the application of differential thermal analysis to the study of edible fats and oils is presented. Application of DTA in the food industry is given also.

BIOCHEMISTRY OF TEA FERMENTATION: FORMATION OF T-2-HEXENAL FROM LINOLENIC ACID. J.G. Gonzalez, O. Coggon and G.W. Sanderson (Thomas J. Lipton, Inc., Englewood Cliffs,

NJ 07632). *J. Food Sci.* 37, 797-8 (1972). U-¹⁴C-Linolenic was shown to be transformed in part to t-2-hexenal during the conversion of fresh tea leaf to black tea. In fact, t-2-hexenal was the only volatile compound which was formed during the conversion process. Further, the formation of t-2-hexenal was shown to be dependent on the enzymic conversion process since no t-2-hexenal was formed when the leaf enzymes were inactivated prior to adding the ¹⁴C-linolenic acid. Since linolenic acid is the major fatty acid present in fresh tea leaf and t-2-hexenal is a prominent component of black tea aroma, it must be concluded that this reaction helps to determine the character of black tea aroma.

DEVELOPMENT OF A MATHEMATICAL MODEL FOR OXIDATION OF POTATO CHIPS AS A FUNCTION OF OXYGEN PRESSURE, EXTENT OF OXIDATION AND EQUILIBRIUM RELATIVE HUMIDITY. D.G. Quast, M. Karel and W.M. Rand (Dept. of Nutr. and Food Sci., MIT, Cambridge, MA 02139). *J. Food Sci.* 37, 673-78 (1972). The rate of oxidation of potato chips as a function of oxygen partial pressure, extent of oxidation and equilibrium relative humidity was determined. These results were used to build mathematical models with the rate of oxidation as the dependent variable and the other three factors as independent variables. A mixed approach was used in model building which included incorporation of the knowledge of kinetics of lipid autoxidation mechanisms in food products as well as empirical relations. A relatively simple model was developed with only four constants. Statistical analysis indicates a good fit of this equation to the experimental results and suggests an experimental design allowing evaluation of the constants with less experimentation. The equation developed is useful for package simulation and optimization and storage life prediction, and it is expected that the model can be applied to other food products.

COMPUTER SIMULATION OF STORAGE LIFE OF FOODS UNDERGOING SPOILAGE BY TWO INTERACTING MECHANISMS. D.G. Quast and M. Karel *Ibid.*, 679-83. A mathematical model was developed to describe the deterioration of potato chips, a model of dry food products in flexible packages. In this product, deterioration occurred by two mechanisms acting simultaneously with interaction between them. The mechanisms were: oxidation by atmospheric oxygen and textural changes due to water absorption. It was found that the extent of oxidation and the equilibrium relative humidity increase due to water absorption could be predicted as a function of time. The technique can be applied to investigate the storage life of products for different package configurations, initial conditions and environmental conditions.

DETERMINATION OF SOLID FAT INDEX OF PLASTIC FATS; ITS USE FOR CONSISTENCY EVALUATION. E. Sambue and M. Naudet (Lab. National Matieres Grasses ITERG, Univ. Provence, Marseille). *Rev. Franc. Corps Gras* 19, 785-92 (1972). Three of the most important methods for Solid Fat Index determination are reviewed: dilatometry, differential thermal analysis (DTA) and wide-line nuclear magnetic resonance (NMR). Results obtained by these three methods are compared and discussed. They are used for the solid fat content determination of blends and of the margarine. On the basis of results obtained, consistency is evaluated. The previous thermal treatment to condition the crystal form is very important and must be taken in consideration by the analyst.

INFLUENCE OF VARIOUS TECHNOLOGICAL OPERATIONS ON ANIMAL FATS CHARACTERISTICS. J.P. Wolff (Ecole Superieure d'Applications Corps Gras-ITERG, Paris). *Rev. Franc. Corps Gras* 19, 671-6 (1972). During the refining of animal fats, different changes occur not only in the free fatty acid content and peroxide value but also in some minor components. These alterations directly affect some analytical tests, especially UV spectral characteristics, Swift test and chloroplatinate color. UV spectral characteristics of prime steam lard change more during the refining than those of tallow. Changes occur in prime steam lard during bleaching and in tallow during deodorization. Hydrogenation and transesterification change the melting point and content of solid components. All these characteristics are discussed in the paper. Analytical tests, used in France, for the determination of the quality of prime steam lard and tallow are also given.

USE OF PRIME STEAM LARD AND TALLOW IN HUMAN NUTRITION. J. Hannewijk (Unilever-Vlaardingen). *Rev. Franc. Corps Gras* 19, 677-85 (1972). Use of animal fats in human nutrition is directly connected with their chemical and physical characteristics. The data about lard and tallow composition are given and discussed. Melting point, dilatometry and some

organoleptic characteristics limit use of animal fats in preparing some food products. Hydrogenation, interesterification and fractionation change some properties of animal fats and the possibilities of use, after these treatments, are better. The uses, actual and potential, are indicated to be in margarine, in frying fats and as a salad oil.

SURVEY OF PORTUGUESE OLIVE OIL—1969–1970. Anon. (Junta Nac. do Azeite, Lisbon, Portugal). *Grasas y Aceites* 23, 363–73 (1972). This is a continuation of a study of Portuguese crude olive oil which was started in the production year 1966–1967. The characteristics of identification and quality of 164 samples were treated statistically.

THE "PROFILE" EVOLUTION OF THE AROMAGRAM DURING THE OXIDATION OF OLIVE OILS. R.G. Gonzalez-Quijeno, M.N. Vega, M. Colakoglu and J.C. Martin (Inst. de la Grasa y sus Derivados, Dept. de Quimica y Microbiologia, Sevilla, Spain). *Grasas y Aceites* 23, 351–8 (1972). A study was made of the aromatic compounds of two virgin olive oils, from the Ayvalik and Havran regions of Turkey, when oxidized by the accelerated A.O.M. method. The samples were analyzed by GLC, physical and chemical methods and by an organoleptic panel at different oxidation levels to total rancidity. The panel evaluation was related to the aromagram produced.

ANALYTICAL CHARACTERISTICS OF TURKISH OLIVE OIL PRODUCED DURING THE PERIOD 1966–1969. M. Colakoglu (Dept. of Food and Fermentation Technol., Ege Univ. Faculty of Agri., Izmir, Turkey). *Grasas y Aceites* 23, 292–308 (1972). The identification and quality characteristics were determined on nearly 1000 samples of olive oil. The results are presented in the form of 77 histograms. The average value found for fatty acid composition over the three-year period was: palmitic 14.1%, stearic 2.6%, oleic 71.5%, linoleic 9.1%, and other acids 2.7%. It was concluded that the compositions of Turkish and North African oils show more significant differences than those of Turkish and Southern European oils on a comparative basis.

FOAMED MAYONNAISE COMPOSITION. M.E. Norris (SCM Corp.). *U.S.* 3,728,133. The composition has a specific gravity of 0.35–0.7 g/cm³ and comprises water, vinegar, egg yolk, spices and an emulsifier consisting of a hydroxy acid ester of a glyceride and a monoglyceride.

STABLE OIL AND WATER-SOLUBLE PROTEIN-CONTAINING EMULSION. N.B. Howard (Procter & Gamble). *U.S.* 3,729,325. A stable emulsion is formed from liquid fat, particularly acidic lipids, water, water-soluble heat-denaturable protein and, when the acidic lipid is other than a fatty acid chloride, a polyvalent metal ion salt. The emulsion is useful as a food as is or as a food additive in the preparation of products such as snack foods and synthetic meats. A process for preparing the emulsions is described.

HYDROXY-CONJUGATED FATTY ACIDS. E.A. Emken (U.S. Sec'y of Agri.). *U.S.* 3,729,379. A method is described for producing hydroxy-conjugated fatty acids from linoleic acid soaps dispersed in an aqueous medium containing dimethyl sulfoxide with the enzyme soybean lipoxygenase.

PREPARATION OF UNSATURATED FATTY ALCOHOLS. H. Rutzen and W. Rittmeister (Henkel & Cie). *U.S.* 3,729,520. The process involves selective hydrogenation of unsaturated fatty acids and esters with aliphatic alcohols at 250–330C and hydrogen pressure of 100–500 atmospheres in the presence of zinc-aluminum oxygen containing a catalyst reductively pretreated at elevated temperatures.

• Fatty Acid Derivatives

FAT-LIQUORING AGENTS FOR LEATHERS AND SKINS. W. Stein, J. Plapper and W.-D. Willmund (Henkel & Cie). *U.S.* 3,724,999. The agents contain, as an active substance, a chlorination product of an ester of a higher fatty acid having 8–24 carbon atoms. The chlorination product has a chlorine content of 10–40% and substantially no double bonds. The agents have a good absorption on leather fibers as well as an excellent resistance to light and oxidation.

STABLE WATER-IN-OIL EMULSIONS. J.T. Foley (Witeco Chem. Corp.). *U.S.* 3,728,277. The emulsions contain emulsifier compositions comprising admixtures of (a) an imidazoline or oxazoline salt of a long chain fatty acid, and (b) a salt of a long chain aliphatic amido amine and a long chain aliphatic

carboxylic acid. The emulsions exhibit excellent heat stability and metal coating properties for corrosion inhibition.

FATTY ACID LACTYLATES AND GLYCOLATES FOR CONDITIONING HAIR. L. Osipow and D. Marra (C. J. Patterson Co.). *U.S.* 3,728,447. The agents improve the texture and manageability as well as curl and wave retention of the hair.

N-SUBSTITUTED OCTADECADIENOIC ACID AMIDES TO REDUCE CHOLESTEROL LEVELS IN BLOOD. T. Seki, C. Saito, K. Toki, K. Matsuka, Y. Suzuki, and A. Kobayashi (Sumitomo Chem. Co., Ltd.). *U.S.* 3,728,459.

SYNTHESIS OF GLYCOSYL GLYCERIDES. Y. Pomeranz and H.P. Wehrli (U.S. Sec'y of Agriculture). *U.S.* 3,729,461. A method for synthesizing glycosyl glycerides from 2,5-methylene-D-mannitol acetobromogalactose and fatty acid chlorides is described. Specific fatty acids are attached at specific glyceryl positions to give such compounds as 1-0-palmitoyl-2-0-linoleoyl-3-0-(β-D-galactopyranosyl)-sn-glycerol.

NOVEL THIA-ALKANOLS. H. Lepper, W. Umbach and W. Stein (Henkel & Cie). *U.S.* 3,729,518. The thia-alkanols are useful as pesticides, lubricant additives, and intermediates for surfactants. Their formula is R-CHOH-CHR₁-SA where R is an aliphatic group of 1–22 carbon atoms, R₁ is selected from the group consisting of hydrogen and aliphatic group of 1–21 carbon atoms with the sum of carbon atoms in R and R₁ being 4–22 and R and R₁ taken together with the ethylene group to which they are attached form a cycloaliphatic ring of 6–12 carbon atoms, and A is selected from the group consisting of aliphatic and cycloaliphatic of 6–24 carbon atoms optionally substituted with one or more groups of the formula R-CHOH-CHR₁-S-.

• Biochemistry and Nutrition

DYNAMIC BEHAVIOR OF FLUORESCENT PROBES IN LIPID BILAYER MODEL MEMBRANES. R.A. Badley, W.G. Martin and H. Schneider (Div. of Biol. Sci., Natl. Res. Council of Canada, Ottawa, Canada K1A 9R6). *Biochemistry* 12, 268–75 (1973). A technique has been developed, based on polarized fluorescence intensity measurements, for studying the orientation and motion of fluorescent probes incorporated into lipid bilayers. The behavior of a series of seven such probes, chosen for their differences in rigidity, shape and size, has been studied in multibilayers prepared from a selection of phospholipids. It was found that the probes were all oriented to a greater or lesser extent. All showed a distribution of orientations which in many cases was sensitive to structural changes caused by cholesterol addition, lipid type or temperature. Most of the probes displayed a superimposed rapid, but restricted, oscillatory motion which was also sensitive to structural changes in the bilayers. However, the probe's own structure influenced its behavior in a particular lipid. The use of such molecules for studying membranes is discussed with special reference to the local perturbations thought to be caused by the probes, the application to intrinsic fluorophores and the study of single cell membranes.

CONFORMATIONAL VARIATION IN A HUMAN PLASMA LIPOPROTEIN. C.R. Harmison and C.E. Frohman (Dept. of Psychiatry, Wayne State Univ. Schl. of Med., Detroit, Mich. 48207). *Biochemistry* 11, 4985–93 (1972). A specific and homogeneous α-2 globulin (a lipoprotein) has been repeatedly isolated from plasma of individual human subjects. The α-2 globulin samples are the same in amino acid and lipid composition, in chromatographic elution properties, and in electrophoretic mobility; but they do differ in their effects on a number of intermediary metabolic processes, in their effect on intracellular tryptophan transport and in their in vivo effects on trained rats. In measurements of the optical rotatory dispersion (ORD) and circular dichroism (CD) of these lipoproteins, differences in conformation were found in a given subject from time to time, and between

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samples from paired subjects studied at the same time. Among the protein samples from patients with schizophrenia, various amounts of α -helical conformation with f_H up to 0.74 were found, with all patients having their protein in this conformation on one or more occasions. Among α -2 globulin samples from healthy control subjects, either the β and/or random-chain conformation was found. The differences in biochemical and biological activities among these α -2 globulin samples seem to be related to the differences in conformation.

CHARACTERIZATION OF SUBFRACTIONS OF TRIGLYCERIDE-RICH LIPOPROTEINS SEPARATED BY GEL CHROMATOGRAPHY FROM BLOOD PLASMA OF NORMOLIPEMIC AND HYPERLIPEMIC HUMANS. Teizo Sata, R.J. Havel and A.L. Jones (Cardiovas. Res. Inst. and Depts. of Med. and Anatomy, Univ. of Cal. Schl. of Med., and the Cell Biol. Sect., Vet. Admin. Hosp., San Francisco, Cal. 94122). *J. Lipid Res.* 13, 757-68 (1972). As judged from measurements of the diameters of particles fixed with osmium tetroxide and shadowed with platinum, gel chromatography on 2% agarose has been shown to be an effective quantitative method for separating triglyceride-rich lipoproteins according to particle size. Particles in the size range of chylomicrons, uncontaminated by lipoproteins smaller than about 700 Å or by other serum proteins, emerged in the void volume of the column, and very low density lipoproteins with diameters between 400 and 700 Å were separated into fractions with average standard deviation of 71 Å from the mean. Systematic comparison of the relationship between diameter and chemical composition of fractions obtained from subjects with various hyperlipoproteinemic disorders demonstrated a precise correlation consistent with a spherical model for these lipoproteins in which phospholipids, free cholesterol, and protein occupy a surface monolayer with an invariant thickness of 21.5 Å surrounding a liquid core of triglycerides and cholesteryl esters.

SERUM LIPOPROTEINS OF NORMAL AND CHOLESTEROL-FED RATS. N.L. Lasser, P.S. Roheim, D. Edelstein and H.A. Eder (Depts. of Med. and Physiol., Albert Einstein College of Med., Bronx, N.Y. 10461). *J. Lipid Res.* 14, 1-8 (1973). The density distribution of lipoproteins in rats fed chow or chow containing 1% cholesterol and 10% olive oil was studied. Lipoprotein fractions were prepared in the ultracentrifuge between narrow density bands within the density range of 1.006-1.21 and were analyzed by chemical, electrophoretic and immunological methods. In serum from normal rats there were three major lipoprotein fractions, with densities less than 1.006, 1.030-1.063 and 1.063-1.21. Almost no lipoprotein was found between d 1.006 and 1.030. Most of the low density lipoprotein appeared between a density of 1.04 and 1.05. In the density range 1.05-1.07, small amounts of both low density and high density lipoprotein were found. Feeding a diet high in cholesterol resulted in a marked increase in the concentration of lipoproteins of density less than 1.006, and a new lipoprotein fraction appeared between d 1.006 and 1.030; this fraction contained immunologically demonstrable low density and high density lipoproteins. In addition, there was a decrease in the high density lipoprotein fraction between d 1.070 and 1.21.

EFFECT OF ETHIONINE ON CARBOHYDRATE AND LIPID METABOLISM. H. Tani, K. Ogata and T. Itatsu (Dept. of Biochem., Schl. of Med., Nagoya Univ., Showa-ku Tsurumaicho, Nagoya, Japan). *J. Lipid Res.* 14, 32-40 (1973). In ethionine-treated rats, the ATP content of adipose tissue was not decreased whereas in liver it was drastically reduced to about one-fifth of the control level. Shortly after the injection of ethionine, hepatic glycogen was depleted and the blood glucose concentration fell from 120 to 80 mg/100 ml. This was followed by a two- to threefold elevation of the plasma fatty acid level. Hepatic glucose-6-phosphate was decreased and was not elevated by administration of 2 mmoles of glucose unless ATP was partially restored to normal levels. When hepatic ATP was decreased, the disappearance of [14 C]glucose from the blood and its incorporation into glycogen and glyceride-glycerol and the incorporation of [14 C]pyruvate into glyceride-glycerol were reduced. Six hours after ethionine injection, the plasma triglyceride level fell but there was no significant change in the liver triglyceride concentration, but by 24 hr it had increased markedly. Lipogenesis in adipose tissue was depressed in vivo, possibly due to decreased glycerol-3-phosphate concentrations. A marked decrease of glycerol-3-phosphate in both liver and adipose tissue was noted. Administration of glucose effectively depressed plasma free fatty acid concentration and elevated the glycerol-3-phosphate levels. Ethionine injection to fasted animals further depressed the blood glucose and elevated the plasma free fatty acid level.

GLYCOLIPIDS OF PERIPHERAL NERVE: ISOLATION AND CHAR-

ACTERIZATION OF GLYCOLIPIDS FROM RABBIT SCIATIC NERVE. H. Singh (Dept. of Med., N.Y. Univ. Schl. of Med. and Lipid Metabolism Lab., Vet. Admin. Hosp., N.Y. 10010). *J. Lipid Res.* 14, 41-49 (1973). Besides cerebroside and sulfate, four other glycolipids were isolated from rabbit sciatic nerve and analyzed by chemical and chromatographic methods. Three of the glycolipids were shown to be fatty acid esters of cerebrosides; the fourth was characterized as diacyl glycerol galactoside and its alkyl ether analog. In the ester linkage mainly unsubstituted acids with chain length C_{16} to C_{18} were present. Both hydroxy and unsubstituted acids were found in amide linkage. They varied in chain length from C_{16} to C_{21} and were typical of cerebrosides. The long-chain base fraction contained sphingosine and dihydrosphingosine as the main components.

BILE ACID FORMATION IN MAN: METABOLISM OF 7 α -HYDROXY-4-CHOLESTEN-3-ONE IN BILE FISTULA PATIENTS. R.F. Hanson, P.D. Klein and G.C. Williams (Gastroenterology Unit, Dept. of Med., Univ. of Minn., Minneapolis, Minn. 55455). *J. Lipid Res.* 14, 50-53 (1973). 7 α -Hydroxy-4-cholesten-3-one is thought to be an intermediate in human bile acid synthesis. This conclusion is based on in vivo experiments in animals and on in vitro studies in which homogenates of animal and human livers were used. To further establish that this compound is an intermediate in human bile acid synthesis, its metabolism was studied in subjects with complete bile fistulas. After administration of 3 H-labeled 7 α -hydroxy-4-cholesten-3-one by single intravenous injection, approximately 85% of the administered isotope was recovered in the bile during the first 12 hr. More than 96% of the radioactivity recovered in the bile was identified as either chenodeoxycholic acid or cholic acid, with only a trace amount of the radioactivity present as neutral sterols. This study gives support to the hypothesis that 7 α -hydroxy-4-cholesten-3-one is a natural intermediate in human bile acid synthesis.

STEROL METABOLISM. XX. CHOLESTEROL 7 β -HYDROPEROXIDE. J.I. Teng, M.J. Kulig, L.L. Smith, G. Kan and J.E. van Lier (Div. of Biochem., Dept. of Human Biol. Chem. and Genetics, Univ. of Texas Med. Branch, Galveston, Tex. 77550). *J. Org. Chem.* 38, 119-23 (1973). 3 β -Hydroxycholest-5-ene 7 β -hydroperoxide was isolated along with 6 β -hydroperoxycholest-4-en-3-one from autoxidation of crystalline cholesterol. Epimerization of 3 β -hydroxycholest-5-ene 7 α -hydroperoxide also provided the 7 β -hydroperoxide in low conversion yield. The structure of 3 β -hydroxycholest-5-ene 7 β -hydroperoxide was established by sodium borohydride reduction to cholest-5-ene-3 β ,7 β -diol and by spectral means. The 7 β -hydroperoxide decomposed thermally to cholest-5-ene-3 β ,7 β -diol and 3 β -hydroxycholest-5-en-7-one, thereby accounting for the ubiquitous presence of cholest-5-ene-3 β ,7 β -diol in cholesterol autoxidation products. An alternate pathway of derivation of cholest-5-ene-3 β ,7 β -diol via epimerization of cholest-5-ene-3 β ,7 α -diol was also demonstrated. Autoxidation of cholesterol 3 β -acetate afforded the acetate derivatives of the cholesterol 7 β , 20 α , and 25-hydroperoxides.

DIRECT INCORPORATION OF FATTY ACIDS INTO THE HALOSULFATIDES OF OCHROMONAS DANICA. C.L. Mooney, E.M. Mahoney, M. Pousada and T.H. Haines (Dept. of Chem., City College of the City Univ. of N.Y., New York, N.Y. 10031). *Biochemistry* 11, 4839-44 (1972). The lipids of the phytoflagellate, *Ochromonas danica*, contain large amounts of docosane 1,14-disulfates and tetracosane 1,15-disulfates with from 0 to 6 hydrogens on the chain replaced with chlorine atoms. [14 C] Acetate, [14 C] octanoate, [14 C] laurate, [14 C] palmitate, [14 C] stearate and [14 C] oleate were incorporated into these sulfatides from the media. Each of these precursors was utilized for the biosynthesis of the fourteen disulfates investigated with a virtually identical labeling pattern. Incorporation was confirmed by degradation of the product. Palmitate was most efficiently incorporated into the sulfatide fraction and stearate was least efficiently utilized for sulfatide biosynthesis. These data show that (1) the carbon chain is biosynthesized using the normal fatty acid pathway; (2) the secondary hydroxyl group is put on the chain after the chain is fully synthesized via the hydration of a cis double bond; (3) the fatty acid chains are chlorinated after the chains are fully synthesized.

SEPARATION OF PHOSPHOLIPIDS FROM GLUCOSE-6-PHOSPHATASE BY GEL CHROMATOGRAPHY. SPECIFICITY OF PHOSPHOLIPID REACTIVATION. R.C. Garland and C.F. Cori (Enzyme Res. Lab., Mass. Gen. Hosp. and the Dept. of Biol. Chem., Harvard Med. School, Boston, Mass. 02114). *Biochemistry* 11, 4712-8 (1972).

(Continued on page 285A)

(Continued from page 282A)

A particulate glucose-6-phosphatase preparation, stable as a lyophilized powder and purified about 40-fold from a rat liver homogenate, was freed of 90% or more of phospholipid by gel chromatography on a Sepharose 4B column in the presence of deoxycholate. The activity of the eluted enzyme could be fully restored by the addition of phospholipid in the presence of a low concentration of detergent. Phosphatidylcholine (monounsaturated) was the most effective phospholipid, giving full activation when about one-half of the original phospholipid content of the particles had been added back. Dipalmitoylphosphatidylcholine was inactive under all conditions tested, while dioleoylphosphatidylcholine reactivated fully without detergent when first sonicated. These observations are discussed in terms of the micellar structure of the activating phospholipid. Bile salts and nonionic detergents were found to inhibit the purified enzyme. Some preliminary results on the kinetics of this inhibition are reported.

MERCURATION OF α,β -UNSATURATED STEROIDAL KETONES AND OTHER UNSATURATED SYSTEMS. R.G. Smith, H.E. Ensley and H.E. Smith (Dept. of Chem. and Center for Population Res. and Studies in Reproductive Biol., Vanderbilt Univ., Nashville, Tenn. 37235). *J. Org. Chem.* 37, 4430-5 (1972). For the preparation of androgen and progestosterone receptor inhibitors, the oxymercuration of α,β -unsaturated ketones was studied. In contrast to a number of model compounds, steroidal α,β -unsaturated ketones were unreactive when treated with mercuric acetate in methanol at room temperature. For those 3-keto steroids with a readily abstractable allylic proton, heating of the steroid with mercuric acetate in methanol and in acetic acid resulted in the formation of mercurous acetate, presumably due to oxidation of the steroid.

DETECTION OF LIPOPOLYSACCHARIDE (LPS): AN IMPROVED METHOD FOR ISOLATION OF THE LIMULUS EXTRACT. P.A. Ward and J.H. Hill (Dept. of Pathol., Univ. of Conn. Health Center, Farmington, Conn. 06032). *Proc. Soc. Exp. Biol. Med.* 141, 898-900 (1972). A modified procedure for obtaining the *Limulus* extract is described. The main change from the earlier described method involves homogenization of amoebocytes. This results in a high yield of a potent extract useful in detection of bacterial lipopolysaccharide.

FUNCTIONAL UTILIZATION OF PALMITATE, OCTANOATE, AND GLUCOSE BY THE ISOLATED RAT HEART. R.J. Morrow, M.L. Neely and R.R. Paradise (Depts. of Phar. and Anesthesiology, Ind. Univ. Schl. of Med., Indianapolis, Ind. 46202). *Proc. Soc. Exp. Biol. Med.* 142, 223-9 (1973). The addition of palmitate, octanoate or glucose to hearts perfused with Krebs-Henseleit bicarbonate medium containing 5.56 mM glucose resulted in little, if any, change in developed tension. The same substrates, however, produced marked increases in developed tension when administered to hearts made hypodynamic with substrate-free medium. The addition of delta-4-pentenoic acid to the substrate-free medium prevented the positive inotropic actions of palmitate and glucose and partially reduced that of octanoate. These data suggest that these three substrates exert their actions on the force of contraction as a consequence of their metabolism. Palmitate produced an increase in coronary resistance in the perfused rat heart. This effect is apparently a function of the amount of palmitate which is not bound to albumin.

STUDIES ON THE STRUCTURE OF BOVINE SERUM HIGH DENSITY LIPOPROTEIN USING COVALENTLY BOUND FLUORESCENT PROBES. A. Jonas (Dept. of Biochem., Schl. of Chem. Sci., Univ. of Ill., Urbana, Ill. 61801). *J. Biol. Chem.* 247, 7773-8 (1972). Fluorescence polarization, fluorescence lifetime and sedimentation velocity measurements on fluorescent conjugates of bovine serum high density lipoprotein with 1-dimethylamino-naphthalene-5-sulfonate and 1-pyrenebutyrate provide considerable information on the structure of the lipoprotein, including its rotational diffusion, size, shape, flexibility and response to substances which alter the structure of biological membranes. Bovine serum high density lipoprotein has an average rotational relaxation time of 570 ns at 25°C; it is a relatively rigid, spherical particle with some local flexibility at the level of protein side chains and the individual lipid components. In the presence of increasing amounts of 1-octanol, the lipoprotein first expands and finally becomes disrupted. The structural changes are qualitatively similar to those produced by alcohol anesthetics on biological membranes.

VITAMIN K AND THE BIOSYNTHESIS OF PROTHROMBIN. I. IDENTIFICATION AND PURIFICATION OF A DICOUMAROL-INDUCED

ABNORMAL PROTHROMBIN FROM BOVINE PLASMA. J. Stenflo and P.-O. Ganrot (Dept. of Clinical Chem., Univ. of Lund, Malmö General Hosp., Malmö, Sweden). *J. Biol. Chem.* 247, 8160-6 (1972). An abnormal prothrombin was identified with immunological methods in the plasma from dicoumarol-treated oxen. During dicoumarol treatment this abnormal prothrombin increased in concentration, while the concentration of normal prothrombin decreased. In contrast with normal prothrombin, this abnormal prothrombin is not adsorbed to barium citrate, and it remains apparently unchanged in samples in which normal prothrombin has been "activated." After removal of normal prothrombin from the plasma by adsorption to barium citrate, the dicoumarol-induced prothrombin was purified by a procedure involving ammonium sulfate fractionation, chromatography on DEAE-cellulose, DEAE-Sephadex, and hydroxylapatite and gel filtration on Sephadex G-100. The purified material was homogenous by gel filtration and polyacrylamide gel disc electrophoresis. It has the same main antigenic determinants as normal prothrombin but no prothrombin activity. The electrophoretic mobility of the abnormal prothrombin, unlike that of normal prothrombin, does not vary with the concentration of calcium in the buffer.

CRITERIA FOR AFFINITY CHROMATOGRAPHY OF STEROID-BINDING MACROMOLECULES. J.H. Ludens, J.R. DeVries and D.D. Fanestil (Div. of Nephrology, Dept. of Med., School of Med., Univ. of Cal., San Diego, La Jolla, Cal. 92037). *J. Biol. Chem.* 247, 7533-8 (1972). When soluble fractions of rat kidney homogenates were exposed to affinity chromatography columns containing deoxycorticosterone covalently linked to an insoluble agarose matrix, aldosterone-binding activity was reduced by 92%. Similarly, when renal homogenates were exposed to affinity chromatography columns containing estriol linked to agarose, renal estradiol-binding activity was reduced by 93%. Various attempts to recover macromolecules capable of binding steroid from columns of these agarose derivatives previously exposed to cytosol have failed. Moreover, the use of competitive protein-binding techniques to examine 0.3 M KCl or renal homogenate eluted from these columns suggests that most of the reduction in steroid-binding activity which occurred when cytosol was exposed to deoxycorticosterone-agarose or estriol-agarose can be accounted for by the solubilization of steroid from the agarose by the action of cytosol on the steroid-agarose complex. The rate of release of free steroid from the agarose matrix into the eluate was increased between 5- and 7-fold when cytosol rather than 0.3 M KCl was added to the agarose derivatives. The competitive protein-binding technique provides a test for this artifact in the form of a new criterion to be examined when affinity chromatography is used with steroid-binding macromolecules or receptors.

STUDIES ON MOSS SPORES. I. THE TRIGLYCERIDES OF POLYTRICHUM COMMUNE SPORES AND THEIR MOBILIZATION AND DEGRADATION IN RELATION TO THE GERMINATION PHASES. P. Karunen (Dept. of Bot., Univ. of Turku, 20500 Turku 50, Finland). *Ann. Univ. Turkuensis. Ser. A II.* 51, 1-70 (1972). The dry spores of a moss, *Polytrichum commune*, have a high lipid content ($36.8 \pm 0.31\%$ of the dry weight), containing one large and numerous minor lipid bodies. The main lipid class was the triglycerides, which constituted $53.6 \pm 0.37\%$ of the total lipid. The major component fatty acids in the triglyceride fraction were linolenic (36.3%), oleic (23.9%), linoleic (14.7%) and palmitic (10.6%) acids. The fraction also contained some arachidonic and eicosapentaenoic acids. Thus, in mosses C-20 polyenoic acids are not restricted to the chloroplast lipid classes. The triglyceride fraction also contained some odd-numbered fatty acids. The germination of *Polytrichum commune* moss spores comprises the swelling, germ protrusion and distension phases followed by the process of growth. Some triglycerides were mobilized during the swelling phase of germination, when no digestion of lipid particles was visible in electron micrographs. The majority were, however, mobilized from the germ protrusion phase onwards, the process first being slow, then becoming rapid during the distension phase, and being accompanied with

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the degradation of the lipid particles. By the beginning of growth, the lipid particles had disappeared except for a few very small lipid droplets visible only in electron micrographs, and the triglycerides constituted $15.2 \pm 0.14\%$ of the total lipids. Only slight fluctuations were observed in the net consumption rates of the individual component fatty acids of the triglyceride fraction during the various germination phases. At the beginning of growth, the percentage of polyunsaturated C-20 fatty acids in the triglyceride fraction had increased.

KETOGENIC DIET CONTAINING MEDIUM-CHAIN TRIGLYCERIDES (MCT). J.M. Signore (Yale-New Haven Hosp.). *J. Am. Dietetic Assoc.* 62, 285-90 (1973). An MCT ketogenic diet used in the control of epileptic seizures is presented. The mechanism involved in developing such a diet and the rationale behind its use are discussed. A sample diet provides approximately 60% of the total caloric intake as MCT. Less total fat and more carbohydrate and protein are provided than on the traditional ketogenic diet. A beneficial therapeutic effect attributable to the diet was found in 6 of 12 children in whom the effects of the diet have been evaluated. Complete cessation of daily myoclonic and akinetic seizures occurred in four of these children. Advantages and disadvantages of the diet, particularly in comparison to the traditional ketogenic diet, are discussed. The exact mechanism of the anticonvulsive action of the MCT diet is under investigation.

MCT COOKIES, CAKES, AND QUICK BREADS: QUALITY AND ACCEPTABILITY. F. Bowman (Colorado State Univ., Ft. Collins). *J. Am. Dietetic Assoc.* 62, 180-5 (1973). Twenty different types of cookies, cakes, and quick breads in which normal shortenings were replaced by MCT oil (medium chain triglycerides) at different levels were prepared, analyzed, and assessed for quality and acceptability. Tenderness, grain, and texture of the MCT cookies were rated somewhat lower than similar characteristics of cookies containing hydrogenated shortening. Volume, appearance and textural quality of yellow cakes containing half MCT and half corn oil compared reasonably well with these quality characteristics of corn oil control cakes. MCT muffins and quick loaf breads were appealing, and the overall quality compared favorably with the conventional products.

PATHOLOGY AND EPIDEMIOLOGY OF ATHEROSCLEROSIS. J.P. Strong, D.A. Eggen, M.C. Oalman, M.L. Richards and R.E. Tracy (Dept. of Pathol., Louisiana State Univ. Med. Center, New Orleans, La.). *J. Am. Dietetic Assoc.* 62, 262-8 (1973). The natural history of the development of human atherosclerosis is illustrated and described in detail. The data were gathered from autopsy studies in 14 countries from 19 population groups. Each of these groups was further subdivided into 5 age categories, and the extent of development of lesions with advancing age is shown. Some discussion of risk factors and atherosclerosis together with implications for prevention is given. In all categories, no matter how homogeneously chosen, wide variations in the extent of lesion development were found.

COMPOSITIONS FOR AND METHOD OF LOWERING CHOLESTEROL LEVELS. C.A. Thiffault. *U.S. 3,721,735*. There is disclosed a method for lowering the cholesterol levels of humans suffering from hyperlipidemia and associated conditions. The method comprises the administration of effective doses of lignin. Suitable pharmaceutical compositions of lignin are also disclosed.

FLUOROMETRIC DETERMINATION OF ESTRADIOL VALERATE IN SESAME OIL OR ETHYL OLEATE INJECTABLES. II. COLLABORATIVE STUDY. T. James (FDA, 1521 W. Pico Blvd., Los Angeles, Calif. 90015). *J. Assn. Off. Anal. Chem.* 56, 86-7 (1973). A fluorometric method for determining estradiol valerate in sesame oil or ethyl oleate was subjected to collaborative study. The method utilizes a nitromethane-Celite column to isolate and purify the steroid, which is then measured fluorometrically. Four commercial samples and 3 synthetic samples, varying in concentration from 4 to 20 milligrams per milliliter, were used in the study. The collaborative results were acceptable: coefficients of variation ranged from 2.48 to 3.55%; average recoveries for the synthetics ranged from 98.6 to 102%. The method has been adopted as official first action.

FOCAL [³H]CHOLESTEROL UPTAKE IN THE PIG AORTA. PART 2. DISTRIBUTION OF [³H]CHOLESTEROL ACROSS THE AORTIC WALL IN AREAS OF HIGH AND LOW UPTAKE IN VIVO. J.B. Somer and C.J. Schwartz (Dept. of Pathol., Faculty of Med., McMaster Univ. and the Chedoke Hospts., Hamilton, Ontario, Canada).

Atherosclerosis 16, 377-88 (1972). Focal areas of increased uptake of [³H]cholesterol in vivo by the macroscopically normal young pig aorta have been identified by their ability to accumulate the protein-binding azo dye, Evans blue. The distribution of labelled cholesterol across the aortic wall in areas of dye uptake (blue areas) and no dye uptake (white areas) was determined at intervals from 10 min to 24 h after the injection of label. It is suggested that the increased focal uptake of labelled free cholesterol by blue areas reflects a higher free cholesterol turnover in these areas, and that labelled plasma cholesterol enters the pig aorta mainly through the intima in vivo.

THE EFFECTS OF STARVATION AND REFEEDING ON CARBOHYDRATE AND LIPID METABOLISM IN VIVO AND IN THE PERFUSED RAT LIVER. THE RELATIONSHIP BETWEEN FATTY ACID OXIDATION AND ESTERIFICATION IN THE REGULATION OF KETOGENESIS. J.D. McGarry, J.M. Meier and D.W. Foster (Depts. of Internal Med. and Biochem., Univ. of Texas Southwestern Med. Schl. at Dallas, Dallas, Tex. 75235). *J. Biol. Chem.* 248, 270-8 (1973). The time course of changes in a variety of physiological parameters concerned with carbohydrate and lipid metabolism has been studied both in vivo and in the isolated perfused liver during induction and reversal of starvation ketosis in the rat. The data obtained demonstrate that surprisingly brief periods of starvation and refeeding exert dramatic effects on glucose and fatty acid metabolism in the intact animal and that generally synchronous changes occur in the ketogenic and gluconeogenic capacities of the perfused liver. The data are consistent with the view that hepatic fatty acid oxidation and ketogenesis are under strict dietary and hormonal control exerted primarily by regulation of an early step in the oxidative sequence, probably the acylcarnitine-transferase reaction. The possibility is also raised that the effects of lactate and other antiketogenic agents are related to interactions at this site.

BIOLOGICAL ACTIVITY OF THE VITAMIN D METABOLITE, 1,25-DIHYDROXYCHOLECALCIFEROL, IN CHICKENS AND RATS. A.W. Norman and R.G. Wong (Dept. of Biochem., Univ. of Cal., Riverside, Cal. 92502). *J. Nutr.* 102, 1709-18 (1972). The biological activity of the vitamin D₃ metabolite 1,25-dihydroxycholecalciferol, was assessed in three experiments in the chick and two experiments in the rachitic rat. In the official rat line test 1,25-dihydroxycholecalciferol was found to be equally as active as an equivalent dose of cholecalciferol. These results collectively support the concept that 1,25-dihydroxycholecalciferol is the most highly potent form of Vitamin D₃ yet known.

ARTERIOSCLEROSIS IN THE AFRICAN ELEPHANT. PART I. INTIMAL ATHEROSCLEROSIS AND ITS POSSIBLE CAUSES. K.G. McCullagh (Dunn Nutr. Lab., Med. Res. Council and Univ. of Cambridge, Cambridge, Great Britain). *Atherosclerosis* 16, 307-35 (1972). Atherosclerotic plaques were found throughout the aorta, and in the coronary, carotid, renal and iliac arteries. They were typically fibrous thickenings in which degenerative changes such as necrosis, hyalinisation, softening, lipid accumulation, lymphocytic infiltration and calcification were common. Evidence of mural thrombosis or plaque haemorrhage was not observed. About 78% of mature plaques showed areas of histologically demonstrable lipid. The mean concentrations of serum free and esterified cholesterol, phospholipid and triglyceride were less than half their mean concentrations in human serum. No relationship was found between individual serum lipid levels and the severity of atherosclerosis. Neither was the amount of circulating low-density lipoprotein higher in those animals severely affected by atherosclerosis than in similar animals showing only mild lesions. The lipid content of atherosclerotic plaques was higher than that of normal intima and the fatty acid composition of the cholesterol esters resembled that of plasma triglycerides. The intimal lipids did not appear to play an important part in stimulating the growth of atherosclerotic plaques. Rather, the lesions appeared to arise in response to repeated trauma of the arterial endothelium.

TRITIUM ISOTOPE EFFECTS IN THE MEASUREMENT OF THE GLYCEROL PHOSPHATE AND DIHYDROXY-ACETONE PHOSPHATE PATHWAYS OF GLYCEROLIPID BIOSYNTHESIS IN RAT LIVER. R. Manning and D.N. Brindley (Dept. of Biochem., Univ. of Nottingham Med. Schl., Nottingham NG7 2RD, U.K.). *Biochem. J.* 130, 1003-12 (1972). Rat liver slices were employed to study the relative rates of incorporation of a mixture of [²⁻³H]- or [^{1,3-3}H]- glycerol and [¹⁻¹⁴C] glycerol into lipids. With 0.1 mM-glycerol approx. 82% of the newly synthesized lipid, calculated from ¹⁴C incorporation, was present as neutral

lipid, 13% as phosphatidylcholine and 5% as phosphatidylethanolamine. Increasing the glycerol concentration to 40 mM caused a decrease in the percentage of neutral lipid to 59% and a corresponding increase in the percentage of phosphatidylcholine to 36% of the newly synthesized lipid. By using this method it was shown that 40-50% of the glycerol incorporated into lipid by rat liver slices proceeded via the *sn*-glycerol 3-phosphate pathway and 50-60% was incorporated via dihydroxyacetone phosphate.

EFFECTIVENESS OF A LOW SATURATED FAT, LOW CHOLESTEROL, WEIGHT-REDUCING DIET FOR THE CONTROL OF HYPERTRIGLYCERIDEMIA. Y. Hall, J. Stamler, D.B. Cohen, L. Mojonier, M.B. Epstein, D.M. Berkson, I.T. Whipple and S. Catchings (Dept. of Community Health and Preventive Med., Northwestern Univ. Med. Schl., Chicago, Ill.). *Atherosclerosis* 16, 389-403 (1972). In 114 men, 98 of them obese and 50 hypertriglyceridemic (control value ≥ 1.80 mmole/l), an assessment was made of the long-term effect on serum lipids of the Coronary Prevention Evaluation Program diet—a diet low in saturated fat and cholesterol, moderate (not high) in polyunsaturated fat, moderate (not low) in total fat and carbohydrate, and calorie-controlled to lower weight. After one year on diet, serum triglycerides were reduced 17.3%, serum cholesterol 12.1%, weight 5.3%. Serum triglycerides fell significantly only in the 50 men with hypertriglyceridemia (with or without hypercholesterolemia). Fall from hypertriglyceridemic levels was significantly greater in men who reduced than in those who at one year had regained weight. These data—together with other reported findings—indicate that a low carbohydrate diet (defined as less than 150g per day, or less than 30-35 per cent of calories) is seldom required to achieve significant lowering of serum triglycerides in middle-aged, obese, hypertriglyceridemic men, with or without hypercholesterolemia, providing that weight loss is accomplished and sustained, and intake of saturated fat and cholesterol is low.

• Edible Proteins

FATE OF WATER SOLUBLE SOY PROTEIN DURING THERMOPLASTIC EXTRUSION. D.B. Cumming, D.W. Stanley and J.M. DeMan (Dept. of Food Sci., Univ. of Guelph, Guelph, Ontario, Canada). *J. Food Sci.* 38, 320-3 (1973). Polyacrylamide disc gel electrophoresis was employed to evaluate the changes in water soluble soy protein resulting from thermoplastic extrusion. As temperature increased and other processing parameters were held constant, the general electrophoresis pattern was altered considerably and much of the protein became insoluble. Six major fractions were designated and tentatively identified. As a result of processing, the intact soy proteins yielded breakdown products consisting of multiples of a 28,000 molecular weight subunit. For good texturization it is apparently necessary that a significant proportion of the water soluble protein becomes insoluble as a result of thermal processing.

DEVELOPMENT OF A PROCESS FOR PREPARING A FISH PROTEIN CONCENTRATE WITH REHYDRATION AND EMULSIFYING CAPACITIES. B.P. Cobb III and K. Hyder (Dept. of Animal Sci., Texas A&M Univ., College Station, TX 77843). *J. Food Sci.* 37, 743-50 (1972). A hot-solvent extraction process for preparing fish protein concentrate (FPC) with rehydration and emulsifying capacities is described. The process employed extraction at pH 2.5 in order to prevent protein-protein interaction. Equal volumes of ethanol and hexane at reflux temperatures were employed at the extracting medium. Gel formation was controlled by the addition of NaCl. The FPC produced by this method had an amino acid spectrum similar to that of the fish, formed gels when added to water and emulsions when the rehydrated material was blended with vegetable oils. Both emulsification and rehydration capacities of the FPC were pH dependent with minimum uptake of water and oil in the range of pH 5-8.

STABILIZATION OF CALCIUM SENSITIVE PLANT PROTEINS BY K-CARRAGEENAN. B.K. Chakraborty and H.E. Randolph (Dept. of Animal Sci., Texas A&M Univ., College Station, TX 77843). *J. Food Sci.* 37, 719-21 (1972). The stabilizing effect of k-carrageenan on 0.15% solutions of coconut, glandless cottonseed, peanut and soy protein isolates was investigated at neutral pH ranges. Addition of 0.01 molar calcium decreased protein stability by 75-88% in carrageenan-free solutions and only by 30% in solutions containing 0.2 g carrageenan per g protein. The order of mixing carrageenan, Ca⁺⁺ and protein solutions adversely affected stability only

when carrageenan was added last. Electron microscopy of stable fractions revealed the presence of many 100-500 Å protein globules, both complexed with k-carrageenan and free in solution. Protein stabilization appeared to be related to the formation of double helix junction zones by k-carrageenan.

WATER BINDING OF SOME PURIFIED OILSEED PROTEINS. R.D. Hagenmaier (Food Protein Res. & Dev. Ctr., Texas A&M Univ., College Station, TX 77843). *J. Food Sci.* 37, 965-6 (1972). The amount of bound water at 84% relative humidity, for a group of purified oilseed proteins, decreased in the order: cottonseed isolate I, coconut, soybean, peanut, sunflower, cottonseed isolate II. A group of animal proteins, selected for comparison, absorbed more water than the oilseed proteins. Results suggest that the large amount of amide nitrogen in oilseed proteins is responsible for their low water binding.

FILM OBSERVATIONS AT AN OIL-WATER INTERFACE. J.C. Acton & R.L. Saffle (Dept. of Food Sci., Univ. of Georgia, Athens, GA 30601). *J. Food Sci.* 37, 795-796 (1972). An experimental technique was utilized which allows the observation and photographic recording of film formation at an oil-water interface. Salt soluble protein of cow meat and beef hearts, sodium caseinate and gum acacia showed extensive interfacial film development. No films were observed from solutions of soy sodium proteinate or propylene glycol alginate.

PALATABILITY OF PANCAKES AND COOKED CORN MEAL FORTIFIED WITH LEGUME FLOURS. D.G. Guadagni and D. Venstrom (USDA, Western Regional Res. Lab., ARS, Berkeley, CA 94710). *J. Food Sci.* 37, 774-7 (1972). Various types of laboratory preparations of navy and pinto beans and commercial soy flours were used as fortifying agents to improve the nutritional quality of some relatively low protein foods—corn meal products and pancake mixes. The detectable level of legume products in these foods by a trained laboratory panel varied from about 10-25%. Sensory evaluation of the fortified and unfortified foods by paired comparison and hedonic scale methods indicated that up to 50% of some legume products could be added without significant loss in palatability.

EVALUATION OF A PROTEIN CONCENTRATE PRODUCED FROM GLANDLESS COTTONSEED FLOUR BY A WET-EXTRACTION PROCESS. J.T. Lawhon, L.W. Rooney, C.M. Cater and K.F. Mattil (Food Protein R&D Center, Texas A&M Univ., College Station, TX 77843). *J. Food Sci.* 37, 778-82 (1972). Wet-extracted concentrate, spray dried at two pH levels, was evaluated for use in protein-fortified bread and as a component in meat loaf to reduce juice and fat cook-out during baking and to reduce meat requirement. Bread loaves containing air-classified glandless concentrate, 100% wheat flour and LCP glanded flour were significantly larger in volume than loaves from other blends, but there was no real difference among loaf volume of breads containing these three treatments. pH of spray drying had a marked effect on baking properties of the wet-process concentrate; pH 4.5 yielded a poor quality loaf while at pH 6.8 loaf volume was equal at bread containing glandless cottonseed flours. Taste panel evaluations showed meat loaves containing 25% wet-extracted protein concentrate to be quite acceptable: milder or more bland than all-meat loaves and somewhat softer or smoother in texture.

NITROGEN EXTRACTABILITY AND MOISTURE ADSORPTION CHARACTERISTICS OF SUNFLOWER SEED PRODUCTS. A. Kilara (Dept. of Dairy & Food Sci., Univ. of Saskatchewan, Saskatoon, Canada), E.S. Humbert and F.W. Sosulski. *J. Food Sci.* 37, 771-3 (1972). Diffusion-extracted (DE) sunflower meal and protein isolate were compared with untreated samples for their nitrogen extractability and moisture adsorption. Nitrogen extractability values of 90% were found at pH 7 or above in the untreated meal, whereas a maximum solubility of only 70% was achieved at pH 9.0 in the DE meal prepared at 60°C. Moisture adsorption values for the samples held at 5, 20 and 30°C indicated little difference in moisture contents at relative humidities of 11-55%. At higher levels, however, the untreated meal adsorbed more moisture than the DE meal. A reverse trend was noticed for the isolates as the moisture content of the DE isolate was higher than the untreated sample.

FUTURE OF MILK REPLACERS. J. Coleou and J.L. Paruelle (Inst. Nat. Agronomique, Paris-Grignon). *Rev. Franc. Corps Gras* 19, 687-701 (1972). Some elements which explain the very fast growth of milk replacers during the last ten years are examined as are perspective developments in the next ten years. Different factors which influence on this development

are mentioned. The knowledge about milk protein substitution by various proteins (other animal proteins, vegetable proteins, yeast protein, etc.) is reviewed.

MINERAL COMPOSITION OF PROTEINS FROM SUNFLOWER SEEDS. V.N. Sirko. *Pishchevaya Tehnol.* 1972(5), 24-5. Phosphorus is present in all protein fractions of sunflower seed and also is present as a phytic acid-protein complex. Manganese is found in all soluble proteins. All fractions, except these soluble in sodium chloride solution, contain aluminum, which is an activator of the ascorbinoxidase existing in sunflower seed. Calcium is present in the fraction soluble in NaCl solution and also in the insoluble residue. Nickel and molybdenum have been found only in water soluble fraction. (Rev. Franc. Corps Gras)

FLAVOR OF NEW PROTEINS PRODUCTS AND UTILIZATION IN HUMAN NUTRITION. N. Pikielna. *Przem. spoz.* 26, 381-5 (1972). If non-conventional proteins are to be accepted in human nutrition, two problems must be solved: neutral products must be produced, regarding taste and odor, and these neutral products must have desirable functional characteristics. The odor and taste of soybean, colza, sunflower, cotton, peanut, coconut and some other proteins are discussed. (Rev. Franc. Corps Gras)

DEGOSSYPOLISATION OF COTTONSEED MEAL. II. CHEMICAL AND NUTRITIONAL EVALUATION OF HYDRAULIC PRESSED MEAL. A.S. El-Nockrashy, S. Fiad and A.M. Gad (Fats and Oils Lab., National Research Centre, Dokki, Cairo, U.A.R.). *Grasas y Aceites* 23, 359-62 (1972). Hydraulic pressed cottonseed meal was subjected to several degossypolisation treatments. Chemical analysis and nutritional evaluations of the meal were carried out. Chicks were used as experimental animals. Ethanolamine treatment of the pressed cake after grinding and n-hexane extraction resulted in a superior quality meal suitable for unrestricted feeding of monogastric animals. Feeding this meal resulted in improved weight gain, protein efficiency ratio and chemical index figure due to improvement in protein quality and low free gossypol content.

PROTEIN AND METHOD FOR EXTRACTING IT FROM SOYBEANS EMPLOYING REVERSE OSMOSIS. D.R. Frazier and R.B. Huston (Grain Processing Corp.). *U.S. 3,728,327*. An aqueous homogenized slurry of soybean particles is subjected to a separation so as to separate insoluble materials from the liquid. The liquid is then subjected to reverse osmosis to obtain as a retentate soy proteins including those which are insoluble and soluble in water at the protein isoelectric point.

• Drying Oils and Paints

VEHICLE CPVC. R.E. Wiita (PPG Ind., Inc., Chem. Div., Columbia Court, Barberton, OH 44203). *J. Paint Technol.* 45(578), 72-79 (1973). Latex, alkyd and oil paint systems were evaluated for their change in CPVC when prepared with identical, varying, pigment compositions. Traditional oil absorption CPVC values were determined for these pigment compositions as well as actual CPVC values of complete paints using some standard and unique paint tests. Evidence is developed demonstrating that CPVC is not only a function of pigment composition but is also dependent on vehicle systems as well as other variables.

QUALITY EVALUATION OF LECITHIN IN THE PAINT INDUSTRY. H. Heller (Hamburg). *Farbe u. Lack* 79(3), 230-3 (1973). The common statistical parameters are insufficient for characterizing the quality of the commercial lecithins for their use in the paint industry. These parameters can only be used for phosphatides (lecithins) standardized by the supplier.

RUBBERY POLYMERIZED MIXTURES COMPRISING A MALINIZED TYPE OIL. W.J. Blank (American Cyanamid Co.). *U.S. 3,719,623*. A composition is disclosed comprising a rubbery polymeric mixture of unsaturated glyceride oil, ranging from 30 to 60% of the total resin solids, and a copolymer of: (A) 10-55% of a half ester reaction product of an α,β -monothetically unsaturated dibasic acid and an alcohol containing 4-22 carbon atoms, and (B) a mono-ethylenically unsaturated compound ranging from 10-50% of the total solids.

DRYING OIL COMPOSITION CONTAINING COBALT DRIER. A. Alkatis and G.A. Thomas (Mooney Chemicals, Inc.). *U.S. 3,723,152*. Basic cobalt salts of neodecanoic acid are oil soluble and

function as driers in drying oil compositions. The process for making the salts involves reacting an excess of the metal with an acid in the presence of water and an oxygen-containing gas for a time longer than required to neutralize the acid with metal. Water is then removed.

OXIDATIVE CURING RESIN COMPOSITION. S. Enomoto, H. Wada, M. Fujioka, and M. Koguro (Kureha Kagaku Kogyo Kabushiki Kaisha). *U.S. 3,726,318*. There is disclosed an oxidative curing resin composition containing an oil modified alkyd resin or drying oil and a polycyclic naphthenic hydrocarbon compound having a molecular weight of 200-1000 and having less than 10% of an aromatic ring-forming proton density.

• Detergents

BULK WEIGHT AND ITS TECHNICAL PROCESS INFLUENCE ON WASHING POWDER PRODUCTION. H. Zilske (Wolfenbüttel). *Tenside* 10(1), 17-20 (1973). Besides the composition of a washing powder and the technique used for spraying, the apparent density plays an important part. There are always variations within certain limits, but major variations can result in continuous deviations in the filling height of packages. The washing powder industry is making efforts to overcome this discrepancy by completely filling the packages irrespective of variations in the weight of the package contents, but this is an expensive measure because all packages are overweight, those containing less washing powder not passing the control checks.

HEATS OF SOLUTION, SOLUBILITIES AND SOLUTION DENSITIES OF N-OCTYL TRIOXYETHYLENE GLYCOL MONOETHER IN WATER. D.E. Clarke and D.G. Hall (Unilever Res., Port Sunlight Lab., Port Sunlight, Wirral, Cheshire, L624XN (England)). *Koll.-Z. u. Z. Polymere* 250, 961-3 (1972). Cited were measurements of the enthalpy of solution and of solubility in water of the non-ionic surfactant, n-octyl trioxyethylene glycol monoether, together with measurements of the densities of its aqueous solution.

MICROELECTROPHORETIC STUDIES ON POLYSTYRENE LATICES IN THE PRESENCE OF POLYOXYETHYLENE GLYCOL ETHERS OF N-ALKANOLS. J.B. Kayes (Dept. of Pharmacy, U. of Aston, Gosta Green, Birmingham, 4, England). *Koll.-Z. u. Z. Polymere* 250, 939-44 (1972). The electrophoretic mobilities of monodisperse polystyrene latex particles of mean diameter 0.761 μ have been investigated and shown to be dependent on pH. The effect of certain polyoxyethylene n-alcohol ethers on the mobility at pH 7.5 has been studied. Results suggest that only monolayer adsorption of these non-ionic surface active agents occurred. It appeared that the molecules looped themselves around the polystyrene particle surface with two points of attachment—both alkyl head and ethylene oxide chain—and that further adsorption was not then possible even after the critical micelle concentration had been reached. Temperature had little or no effect upon adsorption, the changes in mobility found apparently being due to changes in the physical constants of the bulk medium. The effect of length of ethylene oxide chain, and hence the size of the molecule, was to slow mobility, suggesting that as molecular size increased the shear plane was displaced further from the particle surface. No apparent increase of adsorption was found with time.

INVESTIGATIONS ABOUT SHORTENING OF RINSING PROCESS AT THE WASHING AUTOMATION. O. Viertel and H. Carlhoff (Wäschereiforschung Krefeld e. V.). *Seifen-Öle-Fette-Wachse* 99(2), 29-33 (1973). Presented are various propositions for water savings during the rinsing processes with automatic washers, based upon admixtures and variations of rinsing operation.

STABILITY OF SOLUBILIZED SOLUTIONS IN QUATERNARY SYSTEM IN THE PRESENCE OF SODIUM OLEATE AND PHENOL. B. Swaroop (Chem. Dept., Lucknow U., Lucknow (India)). *Koll.-Z. u. Z. Polymere* 250, 964-6 (1972). Specific conductivity of solutions has been measured in the quaternary system containing water + sodium oleate + phenol + benzene at 30, 40 and 50°C. The results have been compared both with the heat of solubilization and the depression in freezing point. During solubilization, changes in specific conductivity are not regular; inflexion points are obtained. Clusters or loose combinations of molecules may be formed due to interaction. Hence such solubilized solutions may be unstable in a strictly thermodynamical sense, and are unsuitable for industrial or pharmaceutical purposes.

THE EVALUATION OF HAND-CARE PREPARATIONS. I.M. Gibson (Unilever Res. Lab., 455 London Road, Isleworth, Middlesex). *J. Soc. Cosmet. Chem.* 24, 31-41 (1973). A method is described in which an expert observer assesses changes in hand condition using a subjective scoring system. A trial is reported in which the performance of a hand lotion containing a plant extract was compared with a control lotion. Regular use of a hand lotion improves skin condition, especially for people whose hands are initially in poor condition. Changes in the weather also affect hand condition. Panel members' own opinion of product performance showed that they noticed an improvement in hand condition, which was of value for assessing overall product acceptability to the consumer.

A CRITICAL LOOK AT A NEW SURFACTANT FOR LAUNDRY DETERGENTS. R.P. Langguth, T.C. Campbell, and H.R. Alul (Montanto Co.). *Soap/Cosmetics/Chemical Specialties* 49(2), 50-62 (1973). The detergency performance of a nonphosphate laundry detergent containing sodium dodecylbenzene sulfonamidoethylsulfate (DBSES), a new surfactant proposed recently in the literature, is compared with that of a leading detergent built with sodium tripolyphosphate over a range of wash conditions. Additionally, the performance of DBSES is compared with that of commercial LAS in both phosphate-based and non-phosphate detergent formulations. The results indicate that DBSES is inferior to LAS in both types of formulations. A proposed non-phosphate formulation containing DBSES had substantially poorer detergency than a leading phosphate detergent. DBSES is also unstable to chlorine bleach. The authors concluded on the basis of these performance findings that further development effort on DBSES or the non-phosphate detergent formulation would not be justified. A detailed procedure for synthesis of DBSES, and the proposed non-phosphate formulation, are given.

THE RELATIONSHIP BETWEEN AEROSOL EMULSIONS AND FOAMS. I. TRIETHANOLAMINE MYRISTATE/FREON PROPELLANT SYSTEMS. P.A. Sanders ("Freon" Prods. Lab., E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., 19898). *J. Soc. Cosmet. Chem.* 24, 87-101 (1973). Two aqueous triethanolamine myristate/Freon propellant emulsions with different degrees of stability were studied in conjunction with their corresponding foams to determine if any relationship existed between the properties of the emulsions and those of the foams. A glass pressure cell was developed for microscopic observations of the emulsions. Microscopic and visual observations of the two systems showed that the surfactant system producing emulsified propellant droplets with the smaller diameters also produced foams with an initially smaller bubble size and a slower increase in bubble size after discharge. The systems with the smaller emulsified droplets were the most stable and produced the most stable foams. The average diameter of the emulsified propellant droplets and their corresponding foam bubbles decreased with product discharge. However, the range of the diameters of the foam bubbles increased near the end of the discharge.

ANIMAL, HUMAN, AND MICROBIOLOGICAL SAFETY TESTING OF COSMETIC PRODUCTS. M.J. Thomas and P.A. Majors (Hill Top Res. Inc., Miami, Ohio 45147). *J. Soc. Cosmet. Chem.* 24, 135-46 (1973). The three principal areas of testing pertinent to cosmetics are discussed. These include safety determination in animals, safety and efficacy studies in humans, and microbiological studies for safety and product stability. Products must be shown safe to animals prior to use on humans. Most animal studies include for the most part, acute and subacute studies. The former are done in accordance with the Federal Hazardous Substances Act (FHSA) requirements. There are a number of patch tests applicable to human safety testing of products. The modified Draize technique appears to be the preferred procedure. It serves as a good predictor of sensitizing potential and supplies information on the primary irritant characteristics and cumulative primary irritant properties of the test materials. A test program is also presented for determination of adequacy of preservatives in new and current cosmetic products.

THE RAPID DETERMINATION OF CARBOXYMETHYLCELLULOSE AND ALLIED MATERIALS IN DETERGENTS. B.M. Milwidsky (Zohar Detergent Factory, Kibbutz Dalia, Israel). *Tenside* 10(1), 14-16 (1973). The procedure described gives a rapid method for the determination of carboxymethylcellulose (CMC) in detergents with an accuracy of better than 95%, results being available within three minutes of bringing the material into solution. The method depends on the determination of the optical density at 490 m μ of dilute solutions of CMC to which phenol and concentrated sulfuric acid is added.

NEW BIODEGRADABLE SURFACTANTS DERIVED FROM STARCH:

PREPARATION AND PROPERTIES. P.E. Throckmorton, D. Aelony and R.R. Egan (Ashland Oil Inc., Res. Dev. Labs., Columbus, Ohio 43216) and F.H. Otey. *Tenside* 10(1), 1-7 (1973). This work was designed to determine the feasibility of developing a series of biodegradable surfactants by reacting starch-derived glycol and glycerol glycosides with ethylene oxide, propylene oxide and long-chain lipophilic materials, and to evaluate the products as surfactants and detergents.

SURFACTANT RESIDUES ON THE SURFACE OF RINSED CROCKERY. J. Schmitz (Gesellschaft für Kernforschung mbH, Karlsruhe). *Tenside* 10(1), 11-13 (1973). The amounts of detergent remaining on the surface of washed pieces of crockery were quantitatively determined, using the tracer technic in conjunction with radioactively marked compounds. The amount of residual detergent was shown in these tests to depend not so much on the nature of the substrate (i.e. glass, porcelain, polystyrene, polycarbonate) and its surface roughness, but rather on the detergent concentration of the wash liquor.

INDUSTRIAL USES OF TALLOW IN SURFACE ACTIVE AGENTS. A. Uzzan (ITERG-Paris). *Rev. Franc. Corps Gras* 19, 777-84 (1972). After giving data on the production and utilization of inedible tallow, some economic and technical reasons for increasing the use of tallow in surface active agents are reviewed. Both primary and secondary tallow derivatives are described. Possibilities of further development of soap, fatty acids and fatty alcohols (primary derivatives) are pointed out. Then the secondary derivatives are reviewed: sulfofatty acids, their esters, salts and amides, sulfated and polyethoxylated derivatives; nitrogen compounds including amines, amides, their sulfated and polyethoxylated compounds, quaternary ammonium salts, amine oxides; polyol esters of tallow fatty acids such as monoglycerides, diglycerides and others. The concurrence between petrochemical and lipochemical derivatives is discussed.

PHASE DIAGRAMS OF THE SYSTEMS (I) SODIUM DODECYL SULFATE-OCTYL TRIMETHYL AMMONIUM BROMIDE-WATER, (II) SODIUM DODECYL SULFATE-DODECYL TRIMETHYL AMMONIUM BROMIDE-WATER. D.H. Chen and D.G. Hall (Unilever Res. Port Sunlight Lab. Unilever Ltd., Port Sunlight, Wirral, Cheshire L62 4 X N England). *Koll.-Z. u. Z. Polymere* 251, 41-44 (1973). Ternary phase diagrams of the pseudo three component systems sodium dodecyl sulfate (SDS) + octyl trimethyl ammonium bromide + water (I) and SDS + dodecyl trimethyl ammonium bromide + water (II) at 298.2 K are presented. In (I) the liquid crystal region stretches continuously between the two surfactant/water axes and (for a 1:1 surfactant ratio) penetrates very deeply into the water corner. There also appears to be a two liquid region near this corner. In (II) solid, probably a 1:1 complex, is formed over much of the diagram. An explanation of the transition between neat and middle phases at constant water content is forwarded.

LLIQUID WATER SOLUBLE DETERGENT COMPOSITIONS. R.L. Fetty. *U.S. 3,717,590*. The compositions have improved adhesion to verticle surfaces without the tendency to evaporate, yet they are easily removed with water under pressure. They are useful in removing grease and oil from the surfaces of automobile engines.

DETERGENT FORMULATIONS. M.T. Lang (Ethyl Corp.). *U.S. 3,717,591*. Non-phosphorus detergent builders are disclosed. They are the water soluble salts (e.g., the trisodium salts) of taurine-N,N-diacetic acid, nitrilodiacetic acid-monomethylene sulfonic acid or mixtures of these compounds. Conventional detergent additives may be used with these builders.

MONO- AND DIPHTHALIMIDYL DERIVATIVES. G.E. Booth (Procter & Gamble). *U.S. 3,717,630*. There is disclosed mono- and diphtalimidyl derivatives of fluorescent, aromatic amines and their use in laundry detergent compositions which contain an organic detergent and an alkaline builder salt and also in aqueous and granular hypochlorite bleach compositions.

WASHING, BLEACHING, AND CLEANSING AGENT. A. Werdehausen, U. Jahnke, G. Jakobi, and G. Walther (Henkel & Cie). *U.S. 3,718,597*. The agent contains 0.1-50% of salts of at least one copolymeric N-alkylcarboxylic acid-alkyleneimine. The copolymer has an average molecular weight of 500-500,000, and the recurring N-alkylcarboxylic acid-alkyleneimine units are of different structures.

LIQUID DETERGENT COMPOSITIONS. D.R. Weimer (Continental Oil Co.). *U.S. 3,718,609*. The composition contains an aqueous layer and a layer of a liquid water-immiscible oily material.

When it is shaken, the composition forms a temporary oil-in-water emulsion. The aqueous layer contains a foam producing water soluble organic detergent and a non-emulsifying foam stabilizer.

DETERGENT COMPOSITION. H. Marumo. *U.S. 3,719,613.* The composition comprises a water insoluble metal salt of amphoteric surface active agent and a substance capable of dispersing and solubilizing this metal salt in water. When combined with a known detergent, this composition improves foaming and duration of the foam as well as imparting to pieces cleaned with the composition antistatic properties, resistance to re-soiling and improved soil-releasability.

PREPARATION OF BIODEGRADABLE GLYCIDOL SURFACTANTS. J.A. Wojtowicz and M. Lapkin (Olin Corp.). *U.S. 3,719,636.* The surfactants are prepared by reacting selected aliphatic alcohols with glycidol in the presence of a polar, non-reactive miscible solvent.

AQUEOUS DETERGENT COMPOSITIONS. A. Smeets (Citrex, S.A.). *U.S. 3,720,621.* There is provided a homogeneous liquid composition containing 14-35% of sodium tripolyphosphate, 0.1-50% of a potassium and/or ammonium salt of an inorganic or organic acid and 15-85.9% water. The composition is especially useful for non-porous surfaces and textiles.

DETERGENT COMPOSITION. S.H. Sharman (Chevron Res. Co.). *U.S. 3,720,629.* High performance detergent compositions consist of straight chain hydrogenated olefin sulfonates, an alkali metal or ammonium group pentavalent phosphoric acid salt and a primary alcohol.

BUILDER FOR PHOSPHATE-FREE DETERGENT COMPOSITIONS. J.W. Adams and H.W. Hoftiezer (American Can Co.). *U.S. 3,721,627.* The composition includes an anionic or nonionic surfactant and a hydrophilic but water-insoluble building agent comprising natural cellulose fibers. These fibers have an alkali salt of polyacrylic acid or polymethacrylic acid bonded onto them by in situ polymerization.

AQUEOUS BUILT LIQUID DETERGENTS. H.J. Ranaut (Atlas Chemical Inds.). *U.S. 3,721,633.* The detergent compositions are an aqueous solution of an alkyl glycoside and a builder selected from the group consisting of potassium nitrilotriacetate, sodium nitrilotriacetate and a potassium polyphosphate. The compositions do not require the presence of a hydrotrope to prevent phase separation.

DETERGENT COMPOSITIONS CONTAINING CARBOXYLATED POLYSACCHARIDE BUILDERS. F.L. Diehl (Procter & Gamble). *U.S. 3,723,322.* Detergent and laundering compositions comprising an organic, water soluble synthetic detergent and a water soluble carboxylated alginic acid builder in proportions of 10:1-1:20 are disclosed. The builder has a degree of substitution of 1.3-2.0, an equivalent weight of 97-185, a degree of polymerization of 20-30,000, and a molecular weight of 4000-5,000,000.

FABRIC TREATING SHAMPOO COMPOSITIONS. L.W. Morgan and S.N. Desai (S.C. Johnson & Son). *U.S. 3,723,323.* The compositions comprise a copolymer and at least one surface active agent. The ratios of the two constituents range from 0.1:1 to 1:1.

DETERGENT COMPOSITIONS CONTAINING PARTICLE DEPOSITION ENHANCING AGENTS. J.J. Parran, Jr. (Procter & Gamble). *U.S. 3,723,325.* The compositions contain water insoluble

particulate substances, such as antimicrobial agents, and certain cationic polymers which serve to enhance the deposition and retention of the particulate substances on surfaces washed with the detergent composition.

DETERGENT COMPOSITIONS. W.M. Cheng, J.F. Davies and L.W. Stuttard (Lever Bros.). *U.S. 3,723,326.* The antibacterial detergent composition, e.g., a toilet bar, contains a synergistic mixture of 4,2',4'-trichloro-2-hydroxydiphenylether, 3,4,4'-trichlorocarbanilide and 4,4'-dichloro-3-trifluoromethylcarbonilide.

GRANULAR PROTEOLYTIC ENZYME COMPOSITION. D.M. van Kampen and F.P. nee Rozzo (Lever Bros.). *U.S. 3,723,327.* An improvement in the storage stability of granular proteolytic enzyme compositions is described. The enzymes are contained in granules to which an acidic substance has been added. The granules comprise a neutral or alkaline carrier material, e.g., an alkali metal phosphate; a gluing agent, e.g., a nonionic surface active agent; a proteolytic enzyme, and an acidic material, e.g., citric acid.

LIQUID DETERGENT COMPOSITION. C. Pelizza. *U.S. 3,723,328.* The composition consists of one or more fatty acid soaps having 8-22 carbon atoms, the cations of these soaps being potassium and a cation selected from sodium, ethanolamine or mixtures of these two; a solvent comprising water and a hydrotropic substance such as lower saturated monohydric alcohol having 1-4 carbon atoms, potassium paratoluenesulfonate, and mixtures of these two; wetting or fluidifying agent such as glycerol, ethylene glycol, and polyethylene glycol with a molecular weight of 200-600; and also sequestering agents, emulsifying agents and defoaming agents, and inorganic and organic salts.

FABRIC TREATING SHAMPOO COMPOSITIONS. L.W. Morgan and J.R. Rogers (S.C. Johnson and Son). *U.S. 3,723,358.* The compositions comprise an aqueous solution of at least one anionic or nonionic surfactant, and a copolymer of 50-60% styrene and 33-43% acrylic or methacrylic acid and up to 13% of a viscosity modifying monomer such as isobutyl acrylate. The copolymer has a molecular weight of 5000-50,000 and is water soluble at alkaline pH values.

SHAMPOO COMPOSITION. G.T. Hewitt (Colgate-Palmolive). *U.S. 3,723,360.* There is disclosed an aqueous shampoo composition of improved foaming and lathering power. It includes a major proportion of aqueous solvent medium and minor proportions of higher fatty alcohol sulfate and of 1-hydroxy-lower alkyl-2-higher alkyl imidazoline, at a slightly basic pH.

DETERGENT COMPOSITIONS. R. Pettigrew (Lever Bros.). *U.S. 3,725,286.* Fabric washing detergent compositions incorporating as detergency builders, water soluble or water dispersible salts of dicarboxylic acids are disclosed.

SOAP COMPOSITION. C.L. Bechtold (Colgate-Palmolive). *U.S. 3,725,288.* A soap composition useful as an impregnant for scouring pads comprises sodium nitrite, potassium carbonate, polyglycol, sodium high lauric acid oil soap, sodium tallow soap and a foam builder.

OXYACETIC ACID COMPOUNDS AS BUILDERS FOR DETERGENT COMPOSITIONS. D.C. Nelson and E.A. Knaggs (Stepan Chem. Co.). *U.S. 3,725,290.* A phosphate-free, biodegradable detergent builder compatible with various synthetic detergent and soap formulations to produce generally non-eutrophic detergent products is disclosed. The builder is a water soluble salt of an aliphatic oxyhydrocarbon carboxylic compound having carboxylic radicals separated from internal oxygen atoms by at least one unsaturated hydrocarbon radical. A preferred builder is an alkyl metal salt of triglycolic acid. The builders are combinable with detergent active surfactants in ratios from 20:1 to 1:10.

N-(2-HYDROXYHYDROCARBONYL) IMIDIDICARBOXYLATES. B. Sundby, E.J. Kenney and H.E. Wixon (Colgate-Palmolive). *U.S. 3,725,473.* These compounds are surface active and substantive to fibrous materials such as cotton, wool and synthetics. They are useful in detergent compositions and function as softening agents. Additionally, they may be used as starting materials for the manufacture of corresponding N-oxides, which may also be employed as detergents and textile softeners.

DETERGENT COMPOSITIONS. B. Sundby, E.J. Kenney and H.E. Wixon (Colgate-Palmolive). *U.S. 3,726,797.* Built synthetic organic detergent compositions comprising N-(2-hydroxy hydrocarbyl) iminodicarboxylates or the corresponding carboxylic

This Issue's Index to Advertisers

BallestraCover 2
 Bendix Corp.261A
 Extraction de SmetCover 3
 French Oil Mill Machy.253A
 Hahn Laboratories267A
 Harshaw Chemical Co.263A
 Peter Kalustian Assoc.285A
 Peter Jowett & Co.259A
 LurgiCover 4
 Parkson Corp.265A
 Pope Testing Laboratories281A
 Southwestern Laboratories274A
 U.S. Filter Corp.273A

acids are disclosed. Usually the iminodicarboxylate comprises 3-30% of the composition and the inorganic builder salt 10-70%. The iminodicarboxylate can be used without organic builder salts, in which case it functions primarily as a softening agent and is preferably used in the rinse water.

TERNARY EMULSIFYING AGENT. K.L. Johnson and H.T. Anderson (Swift & Co.). *U.S. 3,726,807*. A ternary emulsifying agent capable of forming optically transparent oil and water emulsions is disclosed. The agent comprises (1) a condensate of a fatty acylating substance having 12-22 carbons and an alkylolamine, (2) a polyoxyethylene derivative and (3) a lower alkyl or aryl ether of a glycol.

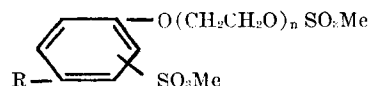
PARTICULATE DETERGENT COMPOSITION. G. Borrello. *U.S. 3,726,813*. The particles comprise (a) 10-40% of higher alkyl aryl sulfonate detergent salt, (b) 10-40% of a lower alkyl benzene sulfonate, (c) 5-50% of at least one water soluble inorganic salt, and (d) 2-20% of water. The ratio of (a) to (b) is between 1:4 and 6:1.

LIQUID LAUNDRY DETERGENTS. A.J. Lanza (Colgate-Palmolive). *U.S. 3,726,814*. The clear liquid detergent comprises a solubilized stilbene brightener system, a surfactant, sodium nitrilotriacetate and a hydrotrope. The process of preparing the brightener system, comprising solubilizing the stilbene brighteners with a water miscible solvent and heat, is also described.

COMPOSITIONS CONTAINING AMINOPOLYUREYLENE RESIN. P. Sheldon (Colgate-Palmolive). *U.S. 3,726,815*. The compositions comprise a mixture of an aminopolyureylene resin and an active material selected from the group of antibacterial materials, tarnish inhibitors, ultraviolet absorbers, fluorescent brighteners, bluing agents and skin treating materials. The ratio of resin to active material is such as to improve the properties of the active material. Preferred compositions comprise 2-99% of a water soluble organic detergent, 0.05-5% of aminopolyureylene resin and 0.05-5% of active material.

LIQUID DETERGENT COMPOSITION. Y. Komeda and Y. Nakagawa (Kao Soap Co., Ltd.). *U.S. 3,728,266*. The composition comprises an aqueous solution of (A) 0.1-80% of a compound

of the formula



in which R is an alkyl of 8-22 carbon atoms, Me is an alkali metal, and n is between 1 and 40, and (B) 1.0-60.0% of a water soluble inorganic compound.

N-OXIDE-IMINODICARBOXYLATES. B. Sundby and H.E. Wixon (Colgate-Palmolive). *U.S. 3,728,385*. Novel oxides of aminocarboxylates or aminocarboxylic acids are described. These compounds possess surface activity and are substantive to fibrous materials, e.g., cotton and wool. They may be used as detergents or components of detergent compositions and serve as softeners for fibrous materials.

LIQUID RINSING AGENT COMPOSITIONS. J. Bruning, H.-W. Eckert and A. Heins (Henkel & Cie). *U.S. 3,729,416*. The compositions, useful for washed textiles, contain in the rinse liquid 0.1-2 g/l of an unsaturated carboxylic acid ester. Liquid compositions containing from 1 to 25% of the carboxylic acid esters and the process of softening washed textiles are also disclosed.

MILDEWSTATIC LAUNDRY SOUR. W. Lozo (BASF Wyandotte Corp.). *U.S. 3,729,422*. A mildewstatic laundry sour wherein para-halo-meta-xylene and zinc silicofluoride are the active ingredients is disclosed.

DETERGENT COMPOSITION. H.C. Smitherman (Procter & Gamble). *U.S. 3,729,431*. A detergent composition is formulated to be relatively insensitive to calcium ions and useful with many builders. It consists of the water-soluble salts of 40-55% alkene-1-sulfonate, 20-40% 2-alkoxy alkane-1-sulfonate with the alkoxy radical containing 1-4 carbon atoms, 10-20% of 3- and 4-hydroxy alkane-1-sulfonate and 2-15% alkene disulfonate. The alkene double bonds are distributed between the terminal and the fifth and seventh carbon atoms in the alkene-1-sulfonate and alkene disulfonate, respectively. A preferred composition consists of the above detergent and a builder salt in ratios of 10:1 to 1:10. ■

ACS dedicates addition to Chemical Abstracts headquarters

National officers of the American Chemical Society joined with state and local officials in Columbus, Ohio, on May 31, to dedicate a new \$7 million addition to the quarters of the Society's Chemical Abstracts Service Division.

Robert W. Cairns, executive director of the ACS, presided at the dedication ceremonies for the new five story office tower, which rises next to the original Chemical Abstracts Service building on a 50 acre tract adjacent to the Ohio State University campus. Alan C. Nixon, ACS president, cut the ribbon.

Chemical Abstracts Service is the Society's secondary information division. Its Columbus staff seeks out, digests and indexes all of the world's new published information on chemical science and technology. Condensed and indexed information is published in *Chemical Abstracts*, a 600 page weekly publication that goes out to universities and industrial and governmental research organizations throughout the world, and in some 20 other publications and information services for chemists and chemical engineers.

Chemical Abstracts Service, which had fewer than 600 full-time employees when the original building at the Columbus site was completed in 1965, now employs more than 1000 in its Columbus offices. The growth in staff and facilities reflects the growing volume of new chemical and chemical engineering information published in the world. The organization this year will abstract and index ca. 400,000 papers, patents and reports, as compared with 195,000 in 1965.

The new building is expected to meet Chemical Ab-

stracts Service's space needs into the 1980's. With future expansion in mind, it has been designed so that additional buildings can be connected directly to it through a common core area housing elevators, stairwells and other service facilities.

The American Chemical Society has published *Chemical Abstracts* since 1907. The editorial offices, first housed at the National Bureau of Standards in Washington, were moved to Columbus in 1909. They were located on the Ohio State University campus until 1965.

Since World War II, Chemical Abstracts Service has become the principal secondary information service in chemistry for much of the world. More than 60% of the subscribers to its publications and services now are overseas.

Over the past decade CAS, with financial assistance from the National Science Foundation, has been developing a computer-based system for processing and disseminating condensed and indexed chemical and chemical engineering information. Many CAS publications and services now are organized and composed for printing through this system, and much of the information handled in the Columbus center is now available in a form that can be manipulated and searched by computer.

Recently the Columbus operations have become the focal point of a developing international chemical information network. In 1969, the chemical societies of the United Kingdom and West Germany became partners with the American Chemical Society in the operation of the Columbus-based computer system. These organizations now prepare information originating in their nations for processing by the computer in Columbus and, along with groups in 11 other nations, use the magnetic tapes produced by the CAS computers to provide information to scientists in their nations. ■