# ABSTRACTS

**R. A. REINERS, Editor. ABSTRACTORS: J. G. Endres, J. Iavicoli, K. Kitsuta, F. A. Kummerow, Gladys Macy, E. G. Perkins, T. H. Smouse, J. A. Thompson and R. W. Walker**

## • Fats and Oils

Vegetable oil pigments: Carotenoids and phaeophytins in soybean, rapeseed and linseed oils. J. A. G. Box and H. A. Boekenoogen (Lab. for Chem. Tech. of the Tech. High School Eindhoven, Holland). *Fette Seifen Anstrichmittel* **69**, 724–729 (1967). The pigments in raw soybean, rapeseed and linseed oils were identified and determined semiquantitatively. They comprise of 25 to 50 ppm carotenoids, mainly lutein (xanthophyll) and partly esterified neo-luteins and 20 ppm chlorophylls, which occur mainly as phaeophytin A. The contribution of other pigments to the color of these three oils is very little.

Reduction of unsaturated fatty acids and their esters to unsaturated fatty alcohols by selective catalytic hydrogenation under high pressure. II. The isomerization and the saturation of double bonds: Part 2. Polyenoic acids and ozonization experiments. H. Bertach, H. Reinheckel and E. Konig (Inst. for Fat Chem. of the Ger. Acad. of Sci., Berlin-Adlershof, Ger.). *Fette Seifen Anstrichmittel* **69**, 731–736 (1967). The side reactions which takeplace along with the main reaction during the selective catalytic reduction with hydrogen to the corresponding unsaturated fatty alcohols, are studied by investigating the behavior of definite unsaturated fatty acids. The relationship was found between the structure of an unsaturated fatty acid and the selectivity of the hydrogenation process carried out in the presence of a special catalyst.

Current aspects of vegetable oil filtration. R. DeVita. *Riv. Ital. Sostanze Grasse* **45**, 3–6 (1968). Current technology for vegetable oil filtration is reviewed.

Content of polycyclic hydrocarbons in crude vegetable oils. G. Grimmer and A. Hildebrandt (Univ. of Hamburg, Germany). *Chem. Ind. (London)* **47**, 2000–2 (1967). Investigation of 64 samples of various crude vegetable oils and copra shows these raw materials to have strongly different contents of polycyclic hydrocarbons. A clear distinction can be made between three groups. Coconut oil from smoke-dried copra is especially contaminated (up to 2000 $\mu$g/Kg of 13 different hydrocarbons, with phenanthrene as the most important constituent), sunflower-seed oil and palm kernel oil to a smaller extent (up to 600 $\mu$g/Kg), while the other oils examined appear to be only slightly contaminated (up to 100 $\mu$g/Kg).

A new process for the simultaneous refining and deodorization of fats and oils. G. B. Martinenghi (Univ. of Milan, Milan, Italy). *Chem. Ind. (London)* **43**, 1815–20 (1967). A new process for the simultaneous refining and deodorization of fats and oils is described. In this process, fatty acids and volatile bodies are stripped off simultaneously from the oil by using steam under a residual pressure of 0.4–0.8 mm. Hg. A system, based on a vacuum pump and freezing condenser, is used to maintain the required vacuum and to condense the steam and the volatile bodies of the odor cut. No steam jets, boosters or barometric condensers are needed, so that only a small quantity of cooling water is used. The dangers of oxidation and polymerization are minimized through the complete deaeration of the oils entering the process and of the water used to generate the stripping steam. Other advantages of the process lie in the fact that fatty acids instead of soapstock are produced as by-product and in the substantial steam savings in comparison to other processes.

Paper sizing lubricant composition comprising a fatty acid and nonionic lubricant. R. L. Wood, C. Galusha and H. F. Mader (Crown-Zellerbach Corp.). *U.S. 3,357,844.* A method is claimed for adding lubricity to a paper coating composition during the process of its manufacture from an aqueous mixture of a mineral pigment and an organic binder. The method comprises preparing a non-emulsified blend of a hydrogenated fatty acid and a nonionic dispersant in the form of a hard, *particulate solid at room temperature.* The aqueous mixture is heated to a temperature above the melting point of the blend so as to promote its melting and thorough blending on addition. The fatty mixture is added in an amount corresponding to 2.5-6% by wt. of the binder.

Apparatus for neutralizing fatty oils. L. O. Bergman (Aktiebolaget Aritmos). *U.S. 3,362,794.* An apparatus for neutralizing fatty oils by bubbling the fat upwards through a vertical column of aqueous alkaline solution comprises a stationary standing tank having a perforated horizontal partition dividing it into an upper compartment, holding the alkaline aqueous solution, and a lower compartment with an inlet for the oil feed. The upper compartment comprises a number of vertical partitions for suppressing turbulent motion of the alkaline aqueous solution which might be caused by the upwards bubbling of the fat. A basic arrangement and a number of modified forms are described.

Method for producing Halphen-negative cottonseed oil. F. C. Magne, A. V. Bailey, E. L. Skau and R. A. Pitman (U.S. Sec'y of Agr.). *U.S. 3,362,973.* A new low temperature process removes the cyclopropenoid moiety of cottonseed oils by treating either crude or refined oils with selected metallic-salt inactivators which destroy the cyclopropenoid moiety. The inactivator may then be removed by washing with an aqueous solution of a dilute acid and drawing off the wash water, then washing to remove the acid. Another method for removing the metallic-salt inactivator is to precipitate the metallic salt as a hydroxide by washing with water and separating the precipitated hydroxide by filtration. The end products are useful in the diet of laying hens.

Separation of gossypol from cottonseed oil. R. J. Johnson and F. A. Norris (Swift & Co.). *U.S. 3,364,242.* A process for treating gossypol-containing cottonseed oil products to remove gossypol from them comprises contacting the oil with an aldehyde free from alpha hydrogen substitution in an amount sufficient to form an oil-insoluble gossypol-aldehyde complex and separating this complex from the substantially *gossypol-free oil.*

Stabilization of salad oils. E. S. Lutton and N. B. Tucker (Procter & Gamble Co.). *U.S. 3,367,782.* A salad oil contains, as an inhibitor of stearin deposition, 0.001–1% of 3,3,5,5-tetrakis-(hydroxy-methyl)-4-hydroxy-tetrahydropyran, Esterified with $C_{14}$–$C_{22}$ fatty acids, $C_{28}$–$C_{44}$ dimerized fatty acids, $C_{14}$–$C_{22}$ hydroxy fatty acids with 1–8 hydroxyl groups, and mixtures of such acids. The molar ratio of straight chain saturated fatty acids to other fatty acids is at least 0.25:1.

Process for separating saponifiables and unsaponifiables in marine animal oils. W. Chalmers and A. J. Shaw (Eversharp, Inc.). *U.S. 3,369,034.* Saponifiable and unsaponifiable matter in marine animal oil can be separated more efficiently following saponification and the first solvent extraction if the subsequent solvent extractions are carried out in the presence of an alkali metal salt of phosphoric acid.

Studies of cyclic compound separated from heated oils and fats. II. Confirmation of aromatic compound in the cyclic monomer obtained from heated ethyl $\beta$-eleostearate. Hyōzi Kusaka, Akio Hashimoto and Noboru Matsuo (Seikei Univ., Tokyo). *Yukagaku* **17**, 65–69 (1968). Ethyl $\beta$-eleostearate was heated 10 hours at 250C in carbon dioxide and separated into non-urea adduct forming ester and urea adduct forming ester. Cyclic monomer was obtained by vacuum distillation of non-urea adduct forming ester and this was found to be identical with the cyclic monomer obtained from heated linseed oil. This indicated that heated linseed oil in the presence of alkali caused isomerization of linolenic acid in linseed oil to conjugated triene, followed by cyclization and disproportionation reaction for formation of aromatic *o*-substituted compound.

Studies on the utilization of concentrate containing tocopherols. II. A.O.M. stability of lard treated with the concentrate and antioxidant ability of reducing substances. Toyokazu Tatsukawa and Takahiro Takeuchi (Ind. Research Inst., Hyogo Pref.). *Yukagaku* **17**, 77–82 (1968). Several concentrates were prepared by mixing of a condensate obtained from deodorization of rice bran oil (4.8% tocopherol content). The concentrate containing 42.6% tocopherol was separated into A-1 and A-2 fractions. Addition *of these to lard in an amount equivalent to 0.05% of α*-tocopherol was effective for increasing of A.O.M. stability. Both A-1 and A-2 fractions were equally effective as antioxidants.

Determination of copper in fats by neutron activation analysis. Hisao Hirai (Miyoshi Oil & Fat Co., Tokyo). *Yukagaku* **17**, 72–77 (1968). A neutron activation method is proposed for determination of trace quantity to submicrogram level of copper in fats. The sample and standard are irradiated 5 hours at a neutron flux of $1.7 \times 10^{12}$ N. cm$^{-2}$ sec$^{-1}$. The radiochemical separation consists of extraction of Cu in hydrochloric acid from toluene solution of the irradiated fat, followed by the anion exchange in hydrochloric acid media. The activity is finally mounted as copper (II) sulfide. The activity measurement is taken on a NaI crystal coupled with 256 channel pulse analyzer. The agreement is good between the results of a colorimetric method (preceded by dry ashing with magnesium nitrate) and the neutron activation method. This method is applicable to the routine analytical work.

Relationship between nutritive value and the structure of polymerized oils. I. Takehiko Ohfuji and Takashi Kaneda (Tohoku Univ., Sendai). *Yukagaku* **17**, 69–72 (1968). In order to compare the nutritive values of polymerized oils and their esters, soybean and linseed oils were blown with air or nitrogen 12 hours at 275C and a part was esterified. Both rats fed with thermally oxidized oil (TO) and polymerized oil (PO) showed less growth than those fed with original oil. The nutritive value of TO was less than that of PO. Ethyl ester prepared from TO depressed growth slightly more than original TO, whereas the ethyl ester from PO showed almost the same growth as that of original PO. Thus, the ethyl ester from PO can be used for comparison of nutritive value with polymerized oil but the ethyl ester from TO cannot be used.

Chemical syntheses of neutral lipids. Shizuyuki Ohta. *Yukagaku* **17**, 89–93 (1968). A summary of lecture made by W. O. Lundberg before International Biochemical Conference in August, 1967.

Studies on the deterioration of frying oils in continuous water-spraying and heating system. IX. Frying quality of oils used for frying in Japan. Etsuji Yuki (Food Ind. Expl. Sta., Hiroshima Pref.). *Yukagaku* **17**, 61–64 (1968). Thermal oxidative changes in such parameters as viscosity, carbonyl and iodine values of soybean oil, corn oil, cottonseed oil, rice oil, rapeseed oil, lard, palm oil and coconut oil showed close relation with the initial iodine value. Coconut oil, in spite of its low iodine value, increased in carbonyl value very rapidly, suggesting oxidation of the saturated fatty acid in coconut glyceride. Hydrolytic changes as judged by observation of acid value were great in rapeseed oil, lard and palm oil and very small in coconut oil and cottonseed oil. In case of coconut oil, this result may depend on high volatility of fatty acid liberated from the oil. In case of cottonseed oil, the high stability may be related to its cyclopropenoid fatty acid (0.3%) content which is similar to that of kapok seed oil. Lowering of oxidative stability was observed with the progress of deterioration and this was different with the various kinds of oil. Cottonseed and rice oils showed the least autoxidation. The stability of lard was low and this was due to low γ-tocopherol content.

Chemical investigations on Egyptain vegetable fats and oils. X. The chemical constitution of some Gramineae seed ols. H. M. El-Khalafy, Z. E. Shoeb and A. M. Gad (Nat. Res. Center, Dokki, Cairo, Egypt, U.A.R.). *Grasas y Aceites* **18**, 291–295 (1967). The chemical characteristics and fatty acid composition of five grain oils of the Gramineae family were determined. Both paper chromatography and ultraviolet spectrophotometry have been used in the elucidation of fatty acid composition. The protein content of the meal of the five samples ranged from 13.8 to 19.5%. The iodine value of the oil from these seeds is higher than Egyptian cottonseed oil. Linoleic acid comprised 50% of the fatty acids. The other fatty acids consisted of stearic, palmitic and oleic.

The influence of the temperature of the condenser water on the Polenske and Reichert-Meissl values in the determination of the purity of butterfat. S. K. Rale, R. S. Dhavlikar and N. N. Godbole (Maharashtra Assoc. for the Cultivation of Sci., Poona, India). *Indian Oil Soap J.* **32**(9), 249–52 (1967). It has been observed in India that low values of the Polenske value have been reported for butter fat. No country has adopted a fixed average Reichert-Meissl value alone as a standard for determining the purity of butterfat as is being done in India. In the official method, everything pertaining to the apparatus is defined, except the temperature of the condenser water and the barometric pressure at the place of the experiment. It has now been shown that as the condenser water temperature is varied from 15C to 40C, the Reichert-Meissl value increases, while the Polenske value decreases. The change in Reichert-Meissl value is about 2%, but the Polenske value changes 20%. The Reichert-Meissl and Polenske values also vary depending upon the elevation. Both the Reichert-Meissl and Polenske values increase with pressure.

Extraction of total lipids from yeast. H. P. Kaufmann and A. K. S. Ahmad (Inst. for Fat Res., Munster (Westf.), Ger.). *Fette Seifen Anstrichmittel* **68**, 731–734 (1966). Investigations on the solubility of lipids both in dimethylsulfoxide (DMSO) and mixtures of DMSO and chloroform for the extraction of yeast lipids are reported. DMSO denatures protein. In contrast to solvents containing methyl alcohol, DMSO does not form methyl esters when free fatty acids are present. DMSO also inactivates enzymes such as lipase.

Calculation of continuous fat splitting plant. Th. Vaeste and H. J. Schmidt (Lurgi Co., Frankfurt/M, Ger.). *Fette Seifen Anstrichmittel* **68**, 743–745 (1966). Continuous countercurrent fat splitting can be considered as a countercurrent extraction on which a slow chemical reaction is superimposed. A graphical method of calculation commonly used for countercurrent extraction is modified for the mixture of the 4 substances present in the case of fat splitting. The method can be used to present the mass and concentration proportions occurring in continuous fat splitting.

The possibilities of refining sunflower oil with molecular distillation. J. Hallo, F. Kurucz and A. Borodi (Tech. Univ., Budapest, Hungary). *Fette Seifen Anstrichmittel* **68**, 719–725 (1966). Sunflower seed oil can be refined by molecular distillation, in a one step process, at 40C to 50C. The acid value of the oil is below 1 and the peroxide value is below 10. As part of the experiment the elimination curve of cold pressed oil and the region of deacidification were determined. The distillate and residue after distillation were analyzed. The vitamin E content of both distillate and residue was determined.

Study of the ultra violet spectrum of the volatile products formed by the thermal oxidation and autoxidation of fats. B. A. J. Sedlacek (Res. Inst. for Human Nut., Prague, Czech.). *Fette Seifen Anstrichmittel* **68**, 725–731 (1966). The recently developed ultra violet spectroscopic distillation method was used to study the changes occurring in fats heated to a high temperature, and also during the autoxidation of fats. It was shown that steam distillation can be used to isolate saturated and unsaturated aldehydes from both heated and autoxidized fats. The ultra violet spectra of strongly oxidized fats shows the presence of keto acids and, in one case, malondialdehyde.

A new method for the detection of antioxidants in fats. E. Viogue, V. Abe and J. Martel (Inst. of Fats and Their Derivatives, Anal. Sec., Seville, Spain). *Grasas y Aceites* **18**, 310–311 (1967). Antioxidants are separated by thin-layer chromatography. The plates are sprayed with linoleic acid and exposed under UV light. The plate is then sprayed with N,N-dimethyl-*p*-phenylendiamine. The antioxidants appear as white dots on a pink background. When viewed under UV light, the spots appear blue on a yellow background.

New differential thermo analysis apparatus for the testing of organic substances. R. Perron, A. Mahtieu and C. Paquot (Lab. of Lipochem. of C.N.R.S., Thiais, Fr.). *Fette Seifen Anstrichmittel* **68**, 530–535 (1966). A new heating and regulating apparatus for the differential thermal analysis of organic substances in the range of −100C to +300C is described. The apparatus has a contact thermometer whose range can be changed by a right-left changeable synchronmoter. The heating capacity is changed by an automatically controlled regulating transformer which receives the regulating impulses apart from a contact thermometer from a R–C part as well. It is possible to divide heating and cooling in separate time and thermal steps. Control gives the amount of correction for the regulation of heating so that reproducible thermal and time cycles are run. A circuit diagram and functional diagram are given. Examples of thermograms are given to illustrate the usefulness of the procedure and apparatus.

TRIGLYCERIDE OXIDATION BY LIPOXIDASE. I. INFLUENCE OF THE POSITION OF LINOLEIC ACID. E. Vioque and M. Calderon (Inst. of Fats and Derivatives, Anal. Sec., Seville, Spain). *Grasas y Aceites* 18, 296–301 (1967). The influence of the position of linoleic acid within the triglyceride molecule, alpha or beta position, upon the oxidation rate of linoleic acid by lipoxidase was studied using synthetic triglycerides. Glycerides having the linoleyl group in the alpha position were oxidized more readily than when the linoleyl group is in the beta position. The Michaelis-Menten constant of several natural and synthetic triglycerides has been determined.

QUANTITATIVE CHROMATOGRAPHIC ANALYSIS OF OILS CONTAINING PETROSELINIC ACID. D. Chobanov, E. Chooparova, A. Papov and D. Kamenova (Inst. for Org. Chem., Bulg. Acd. of Sci., Sofia, Bulg.). *Fette Seifen Anstrichmittel* 68, 447–449 (1966). A method is described for the analysis of the component fatty acids of oils containing petroselinic acid, using column partition chromatography both on the natural acids and the von Rudloff oxidation products. The method is illustrated by the analysis of the seed oils of *Foeniculum vulgare* L., *Coriandrum sativum* L., and *Pimpinella anisum* L.

PHYSICAL PROPERTIES OF TRIGLYCERIDES. I. DENSITY AND REFRACTIVE INDEX. T. H. Gouw, J. C. Vlugter (Dept. Chem. Eng. Tech. Univ., Delft, The Netherlands). *Fette Seifen Anstrichmittel* 68, 544–549 (1966). The densities and refractive indices of the $Na_D$, $H_\alpha$, $H_\beta$ and the $H_\gamma$ lines have been measured for a number of triglycerides at 20C and 40C. Using the additivity principle, relations have been developed between the refractive index, density, iodine value and the other physical properties of triglycerides. Quantification of these relations was carried out based on the data obtained from the model triglycerides and from data on fatty acid methyl esters.

ISOLATION AND STRUCTURE DETERMINATION OF THE POLYBRANCHED FATTY ACIDS FROM FISH OIL. A. K. Sen Gupta and H. Peters (Unilever Res. Lab., Hamburg, Ger.). *Fette Seifen Anstrichmittel* 69, 349–360 (1967). From a sample of sea fish oil, three saturated polymethyl branched fatty acids were separated in a pure state as methyl esters by using urea adduct, column chromatographic and distillation methods. The polymethyl branched fatty acids were identified as 4,8,12-trimethyltridecanoic acid, 2,6,10,14-tetramethylpentadecanoic acid and 3,7,11,15-tetramethylhexadecanoic acid. Molecular weight, ultimate analysis, IR, NMR and mass spectroscopy were used to prove structure. Structures were further proved by synthesis. Many other branched chain fatty acids were synthesized for comparison. The synthesis and infrared spectra of the synthetic branched chain fatty acid is given in detail.

THE FLOW PROPERTIES OF EMULSIONS. W. Fluikiger (Hamburg, Ger.). *Fette Seifen Anstrichmittel* 69, 449–452 (1967). The resistance of emulsions to flow is decreased by a temporary shearing strain (i.e. stirring). This phenomenon, called thixotropy, is due to the internal structure built by the emulsified particles. The structure is reversibly destroyed by the application of force. Sufficiently strong skeleton-formation gives a pasty consistency to the emulsion. A definite force (yield point) is required to make it flow. A practical example of this is mayonnaise. The strength of the structure formation is essentially dependent on four factors: 1. The concentration of dispersed phase, 2. The degree of dispersion, 3. The nature of the emulsifying agent and 4. The nature of the external phase. For the measurement of flow properties, a rotary-viscometer is used.

STUDIES ON CASHEW OILS I: PREPARATION AND ANALYSIS. H. P. Kaufmann and J. Barve (Inst. for Ind. Fat. Res., Munster (Westf.)., Ger.). *Fette Seifen Anstrichmittel* 69, 437–441 (1967). The fatty acid composition of the cashew kernel oil, determined by gas chromatography was found to be, palmitic 8.2%, palmitoleic 0.4%, stearic 4.2%, oleic 67.4% and linoleic acid 19.8%. The cashew nut shell liquid contains mainly mono- and dihydroxyalkylbenzenes and alkylphenolic acid. Because of their large polarity differences, these compounds of the cashew nut shell liquid can be separated by partition between 80–90% methanol and low boiling petroleum ether. Silica gel column chromatography can be used for the preparative separation of these components.

ATTAINMENT OF EQUILIBRIUM IN THE GLYCEROLYSIS OF TRIGLYCERIDE. R. Schollner and L. Labisch (Inst. for Chem. Tech., Karl Marx Inst., Leipzig, Ger.). *Fette Seifen Anstrichmittel* 69, 426–431 (1967). The quantitative determination of the amounts of glycerine, mono, di and triglyceride which are formed during the glycerolysis of triglycerides was carried out with the help of column, thin-layer and gas chromatography in order to study the formation of these substances as a function of the temperature, molar composition of the starting materials, glycerine and triglycerides, as well as the chain length of the fatty acid components. Equilibrium between 1 and 2-monoglycerides as well as between 1,2 and 1,3-diglycerides was also determined quantitatively. The reactivity of the primary hydroxyl groups between each other is not the same and the equilibrium constant K does not permit the calculation of the particular equilibrium such as the 1 and 2-monoglyceride or 1,2 and 1,3-diglyceride.

REFINING AND BLEACHING OF PEANUT MISCELLA. M. M. Chakrabarty, D. Bhattacharyga and A. Basu (Dept. of Applied Chem., Calcutta Univ., Calcutta, India). *Fette Seifen Anstrichmittel* 69, 403–407 (1967). The effects of the type of crude miscella, oil content in miscella, concentrations of caustic soda solutions, method of mixing and temperature on the refining of high free fatty acid, dark-colored peanut miscellas were investigated. Very effective removal of free fatty acids and decoloration of the peanut miscellas were achieved by treating at 45–60% oil content with 16° to 20° Bé caustic soda solution at room temperature (32 ± 1C). Good bleaching of refined miscella samples at room temperature with commercial acid treated earth and active charcoal was possible. Refined oils had 0.02 to 0.06% free fatty acid with 94 to 99% of the color removed. Successful commercial possibilities are indicated.

ANALYSIS OF THE CARBONYL COMPOUNDS AND HYDROPEROXIDES FORMED BY THE AUTOXIDATION OF OLEFINIC FATS. II. DETERMINATION OF CARBONYLS IN THE PRESENCE OF HYDROPEROXIDES IN ACETIC ACID MEDIUM. F. Linow, M. Raloff and K. Taufel (Agr. Inst. Potsdam-Rehbrucke, Ger.). *Fette Seifen Anstrichmittel* 68, 866–869 (1966). Carbonyl compounds have been determined in the presence of hydroperoxides by reacting the sample contained in an acetic acid solution in benzene with 2,4-dinitrophenylhydrazine and then determining the color spectrophotometrically. In a model experiment, the method was applicable with sufficient sensitivity and fair reproducibility without any interference from hydroperoxides. Alkanals, alkenals, and alkdienals were determined quantitatively. In natural substrates, the non-aldehydric carbonyls are also partially measured by this method and their influence on the value of "actual" carbonyl content is discussed.

COMMINUTED MEAT EMULSIONS: DIFFERENTIAL THERMAL ANALYSIS OF FAT TRANSITIONS. W. Townsend, L. Witnauer, J. Riloff and C. Swift (East. Util. Res. Dev. Div., USDA, Philadelphia, Pa. 19118). *Food Technol.* 22, 319–23 (1968). Differential thermal analysis was employed in analyzing raw materials and meat emulsions, with interest in any relation of fat melting to the stability of emulsions comminuted to temperatures up to 38C. There were two primary ranges of melting of fats in either raw materials or emulsions, with variations reflecting animal and carcass sources of the fats and treatments. The instability of emulsions prepared with standard materials and comminuted to over 18.5C coincided with the onset of melting of high-melting fats.

PROTON MAGNETIC RESONANCE SPECTRA OF ACETYLENIC FATTY ACIDS. J. Purcell and H. Susi (Eastern Regional Res. Lab., U.S. Dept. of Agr., Philadelphia, Pa., 19118). *Anal. Chem.* 40, 571–75 (1968). The proton magnetic resonance spectra (PMR) of carbon tetrachloride solutions of $C_{18}$ fatty acids were studied. The types of compounds include those in which the methylene chain is interrupted by one or two carbon-carbon triple bonds. Such bonds in long-chain acids tend to cause the appearance of anomalous lines in the PMR spectra. These lines are not expected *a priori*, especially because they do not appear in the spectra of the unsaturated fatty acids. No assignment of these lines has been made. The spectra presented are discussed from two points of view: the spectral effects produced by the triple bonds, and the possibility of using the line positions and multiplet structure of the anomalous lines to determine the position of a triple bond in a long-chain molecule.

# • Fatty Acid Derivatives

STEREOCHEMICAL RELATIONSHIPS BETWEEN EPITHIO, HALOMERCAPTO AND HYDROXYMERCAPTO DERIVATIVES OF OLEIC AND ELAIDIC ACID. M. W. Roomi, M. R. Subbaram and K. T. Achaya (Reg. Res. Lab. of Hyderabad, India). *Fette Seifen Anstrichmittel* 69, 778–780 (1967). Inversion takes place both on opening and restoring an epithio ring, and likewise when halomercapto-octadecanoic acids are derived from hydroxymercaptostearic acids. No change in configuration occurs when an epoxy acid is converted into a *trans* epoxy acid via the hydroxymercapto and halomercaptooctadecanoic acids. These stereochemical changes conform to Walden inversion and double bond addition reactions. The stereochemical behavior of the sulfur compounds closely resembles that of their oxygen analoges.

DETECTION OF THE METHYL ESTERS OF SATURATED CYCLOALIPHATIC AND AROMATIC FATTY ACIDS WITH THIN-LAYER AND GAS CHROMATOGRAPHY. Th. Wieske and H. Rinke (Unilever Res. Lab., Hamburg, Ger.). *Fette Seifen Anstrichmittel* 69, 503–507 (1967). Homologous series of methyl esters of saturated cycloaliphatic (CFA) and aromatic fatty acids (AFA), which were prepared by the alkali isomerization of fish oil followed by hydrogenation and fractionation of the cyclized mixture as well as with the help of cyclizing hydrogenation, were analyzed by thin-layer and gas chromatography. Even 0.4% CFA and AFA, which do not form urea-adducts, can be detected in the fractions by thin-layer chromatography. The equivalent carbon numbers (stearic acid equals 18) of the principal isomers of CFA and AFA homologues (C18 to C22), which were obtained as a class in the thin-layer chromatographic separation, were determined by gas chromatography.

STUDIES OF GLYCERYL MONOSTEARATE. R. M. Cornish (A. D. Little Inc., Cambridge, Mass. 02140). *J. Soc. Cosmetic Chemists* 19, 109–117 (1968). The properties of commercial glyceryl monostearate have been investigated in order to understand more fully its long term behavior as a raw material and as an emulsion component. Emphasis has been on physical properties as studied by X-ray diffraction, differential thermal analysis and optical microscopy. Several manifestations of slow changes in the crystalline state which are time- and temperature-dependent have been observed. Application of these analytical techniques to a specific emulsion problem is discussed.

HYDRATION OF ACETYLENIC FATTY ACIDS. R. Kannan, M. W. Rooni, M. R. Subbaram and K. T. Achaya (Reg. Res. Lab., Hyderabad, India). *Fette Seifen Anstrichmittel* 69, 644–646 (1967). Hydration of 9,10-stearolic and 13,14-behenolic acids with concentrated sulfuric acid produces almost equal amounts of the corresponding oxo acids. On the other hand, 6,7-stearolic acid yields a mixture of 74.5% of C7 and 25.5% of C6 oxostearic acids, perhaps because of the proximity of the acetylenic bond to the carboxyl group. Undec-10-ynoic acid yields 10-ketoundecanoic acid as the sole product thus exhibiting Markownikoff addition during hydration of a terminal triple bond.

EFFECT OF IONIZING RADIATIONS OF FAT. VII. FORMATION OF MEDIUM CHAIN KETONES AND HYDROCARBONS. H. Luck, Q. Nahar Rahman and R. Kohn (Ger. Inst. for Food Res., Munchen, Ger.). *Fette Seifen Anstrichmittel* 68, 851–863 (1966). Investigation of the volatile compounds from the unsaponifiable matter of irradiated fatty acids and fatty acid esters (100 M rad) have shown that on irradiation in vacuum hydrocarbons are formed by the splitting of the free or esterified carboxyl groups and short chains were formed by chain splitting. On irradiation in the presence of air, ketones are also formed.

EPOXIDATION WITH PERACETIC ACID. II. COMPARATIVE EPOXIDATION OF LINSEED OIL FATTY ACIDS. G. Schiemann, W. Schneider and K. H. Magosch (Inst. for Tech. Chem., of Tech. Inst., Hannover, Ger.). *Fette Seifen Anstrichmittel* 69, 845–850 (1967). Using pre-prepared peracetic acid, linseed oil fatty acids were converted to epoxy compounds in good yields, whereby the addition of dry peracetic acid was found to be of special advantage. *In situ* epoxidation with 50% hydrogen peroxide, acetic acid and different acidic catalysts gave satisfactory products only on using larger quantities of acidic ion exchange resin. An improvement in the yield could be obtained by an *in situ* method with 60% hydrogen peroxide and phthalic anhydride.

# • Biochemistry and Nutrition

FATTY ACIDS OF RBC GHOSTS, LIVER MITOCHONDRIA AND MICROSOMES OF COLD-ACCLIMATED HAMSTERS. R. Chaffee, W. Platner, J. Patton and C. Jenny (Univ. of Missouri Dept. of Zoology, School Med., Dept. Physiol. and Space Sci. Res. Center). *Proc. Soc. Exp. Biol. Med.* 127, 102–106 (1968). When hamsters were exposed to cold, the relative percentage of various fatty acids in mitochondrial and microsomal membranes of liver cells changed. In mitochondria, the percentage of oleic acid increases, and in microsomes the percentages of oleic increased and palmitic acid decreased. These findings are in contrast to results of earlier studies on whole livers, which showed that under similar conditions, the percentage of stearic acid decreases. There were no changes in fatty acid percentage composition in RBC ghost cells after 5–9 weeks of exposure. These studies also indicate that there were striking differences in the fatty acid composition of membranes of various organelles in the cell.

INHIBITION OF INTESTINAL CHOLESTEROGENESIS IN VITRO. M. Cayen and D. Dvornik (Dept. Biochem., Ayerest Res. Lab., Montreal, Quebec, Canada). *Proc. Soc. Exp. Biol. Med.* 127, 117–20 (1968). AY-9944, SKF 525-A, triparenol, and 22,25-diazacholestanol, agents known to inhibit hepatic cholesterol synthesis, suppressed the incorporation of acetate-2-$^{14}$C and mevalonate-$^{3}$H into cholesterol by sections of everted rat intestines. Clofibrate had no effect on the conversion of acetate-2-$^{14}$C into cholesterol. The results indicate the presence in rat intestine of enzyme systems involved in the saturation of the $\Delta^{24}$-bond in lanosterol and its metabolites and the conversion of 7-dehydrocholesterol into cholesterol. Hence, the pathway of intestinal cholesterol synthesis is similar to that of the liver.

ALTERNATE PATHWAYS OF METABOLISM OF SHORT-CHAIN FATTY ACIDS. W. S. Wegener, H. C. Reeves, R. Rabin and S. J. Ajl (Albert Einstein Med. Center, Phil., Pennsylvania 19141). *Bacteriol. Revs.* 32, 1–26 (1968). The relationships and mechanisms of the glyoxylate bypass synthetic pathway are reviewed. Properties of the two enzymes (isocitrate lyase and malate synthase) involved in this pathway are discussed.

A DOUBLE-LAYERED PLATE METHOD FOR THE DETECTION OF MICROBIAL LIPOLYSIS. J. A. Alford and E. H. Steinle (Meat Lab. Eastern Util. Res. and Dev. Div., A.R.S., U.S.D.A., Beltsville, Md.). *J. Appl. Bact.* 30, 488–494 (1967). A double-layered plate is used for demonstrating microbial lipolysis. The bottom layer, 2–3 mm. thick, consists of the oil or fat to be tested, Victoria blue B dye and agar which has been mixed in a blender. This layer is allowed to solidify and is overlayed with the appropriate nutrient medium. Lipolysis is detected by the presence of a deep blue zone on a light blue background.

CHANGES IN THE ESTERIFIED FATTY ACIDS AND CHOLESTEROL IN SERUM AND LIVER OF RATS AFTER APPLICATION OF OROTIC ACID AND HEPATOTOXIC SUBSTANCES. F. Musil and J. Suva (Cen. Lab. of Skoda-Werke-Hospital, Plzen, USSR). *Fette Seifen Anstrichmittel* 68, 748–750 (1966). Using female rats, changes in the content of esterified fatty acids and cholesterol in serum and liver were found after the application of ethionin and carbon tetrachloride. The therapeutic and preventative application of orotic acid was in some cases able to normalize the relation between the levels of these lipid fractions. The mechanism of action of all the substances involved on the metabolism of the lipids and proteins is discussed.

CHANGES IN LIVER LIPID COMPOSITION WITH OVERNIGHT FASTING. M. Williams, D. McIntosh, K. Tamai and I. Hincensbergs (Dept. of Nutr. Sci., Univ. of Calif., Berkeley, Calif. 94720). *Proc. Soc. Exp. Biol. Med.* 127, 36–8 (1968). Fasting rats overnight from 8 p.m. to 8:30 a.m. produced significant changes in liver weight and liver fatty acid composition in comparison with fed rats killed at 8 p.m. and 8:30 a.m. Feeding and fasting procedures and time of sacrifice of animals should be carefully standardized in studies of liver lipid composition to minimize variations related to the eating patterns of the animals.

PROPHYLACTIC EFFICACY OF VITAMIN A AND CERTAIN COMPOUNDS AGAINST HISTOMONIASIS IN TURKEYS. J. Whitmore, T. Sullivan and O. Grace (Univ. of Nebraska, Lincoln, Nebraska 68502). *Poultry Sci.* 47, 159–64 (1968). Two experiments were conducted to study the effect of dietary vitamin A level on histomoniasis mortality and morbidity in turkeys receiving different preventive compounds. The data obtained indicate or suggest the following: 1. Increasing vitamin A level tended to decrease histomoniasis mortality and morbidity, especially in the presence of *p*-UBAA, dimetridazole and acetyl-ANT. Based on composite averages from two experiments, mortality was 12% less with the highest vitamin A level than with the lowest level. However, this difference was not significative ($P < 0.025$ based on Chi-square) in either experiment. 2. Liver vitamin A storage was not significantly influenced by histomoniasis infection. 3. The amount of liver vitamin A increased significantly ($P < 0.055$) with each dietary increment of the vitamin. 4. Histomoniasis mortality was significantly ($P < 0.025$) reduced by 4-NPAA, dimetridazole, *p*-UBAA and acetyl-ANT. However, 4-NPAA afforded greater protection than dimetridazole and *p*-UBAA when the disease challenge was very severe. In one experiment histomoniasis morbidity was significantly greater with 0.015% acetyl-ANT than with three other preventive compounds.

Interrelationship among plasma cholesterol, blood pressure, blood coagulation and spontaneous avian atherosclerosis. H. Weiss, H. Fisher and P. Griminger (Environmental Physiol. Lab., Ohio State Univ., Res. Center, Area 4, Columbus, Ohio 43212). *Poultry Sci.* **47**, 137–47 (1968). A multi-correlation analysis has been carried out in a population of 251 adult chicken, 20–38 months of age, between the severity of spontaneous aortic atherosclerosis and the following presumed atherogenic factors: systolic blood pressure, plasma cholesterol, whole blood clotting time and prothrombin time. The highest multiple R for the averaged independent variables was 0.36 ($P < 0.01$), indicating that systolic pressure, plasma cholesterol, clotting time, and prothrombin time (and also including body weight) together account for only 13% of the variability in the lesions evaluated in the abdominal aorta of the adult chicken.

Absorption of lipids from mixed micellar bile salt solutions. A. Thornton, G. Vahouny and C. Treadwell (Dept. Biochem., School of Med., George Washington Univ., Washington, D.C. 20005). *Proc. Soc. Exp. Biol. Med.* **127**, 629–32 (1968). Data are presented on the absorption of cholesterol and other lipids by everted rat intestinal sacs from micellar solutions of sodium taurodeoxycholate. It appears that neither simple, two-component nor complex, multiple-component micelles penetrate the intestinal mucosal walls intact, but rather that the lipids and the bile salts are absorbed individually by rat intestine.

Cerebral $G_{M1}$-gangliosidosis: Chemical pathology of visceral organs. S. Suzuki (S. R. Korey Dept. Neurology, A. Einstein Coll., Bronx, New York). *Science* **159**, 1471–2 (1968). The livers and spleens from three patients with cerebral $G_{M1}$-gangliosidosis contained greatly increased concentrations of a mucopolysaccharide tentatively identified as keratan sulfate. The concentration of a very soluble sialomucopolysaccharide was also increased. Concentrations of these compounds were not increased in the viscera of patients with Tay-Sachs disease ($G_{M2}$-gangliosidosis). $G_{M1}$-gangliosidosis appears to be a combined cerebral gangliosidosis and visceral mucopolysaccharidosis.

Release of prostaglandin from rat epididymal fat pad on nervous and hormonal stimulation. Jane Shaw and P. Ramwell (Worcester Found. for Exp. Biol., Shrewsbury, Mass. 01545). *J. Biol. Chem.* **243**, 1498–1503 (1968). Acidic lipids with smooth muscle-stimulating properties were extracted from rat epididymal fat pads and were shown to co-chromatograph with prostaglandin $E_1(PGE_1)$, $PGE_2$, and $PGF_{1\alpha}$. Further chemical identification was not possible with the small amounts of material available. A basal efflux of PGE and PGF compounds was observed following incubation of adipose tissue *in vitro*. Increased efflux of prostaglandin was detected under conditions reported to enhance free fatty acid release, i.e. addition of lipolytic hormones or drugs to the incubating medium, prior fasting of the animal, or stimulation of the epididymal nerve. These results, together with a decreased release of prostaglandin-like material in the presence of insulin, suggested that the efflux may be associated with lipolysis resulting from activation of a hormone-sensitive lipase. Since the prostaglandins are known to affect the concentration of cyclic adenosine 3′,5′-monophosphate in adipose tissue, and this nucleotide is an intermediary in hormone-stimulated lipolysis, it is possible that the prostaglandins released may serve to maintain the homeostasis of adipose tissue by way of a physiological feedback control mechanism.

Mechanisms of steroid oxidation by microorganisms. XIII. $C_{22}$ Acid intermediates in the degradation of the cholesterol side chain. C. Sih, K. Wang, and H. Tai (School of Pharmacy, Univ. Wisc., Madison, Wisc. 53706). *Biochemistry* **7**, 796–807 (1968). Experimental evidence is herein presented to show that $C_{22}$ acids are key intermediates in the microbiological degradation of the cholesterol side chain. Exposure of 19-hydroxycholest-4-en-3-one to microorganisms of the genus *Nocardia* produced four new $C_{22}$ acids besides estrone. From radioactive tracer experiments, it was established that the three-carbon side chain of $C_{22}$ acid can be cleaved under anaerobic conditions to yield propionic acid and 17-keto steroids.

XIV. Pathway of cholesterol side-chain degradation. C. J. Sih, H. H. Tai, Y. Y. Tsong, S. S. Lee and R. G. Coombe. *Ibid.*, 808–18. Cells of *Nocardia restrictus* are capable of cleaving the side chain of cholesterol to yield propionic acid and $C_{24}$ acid. Carrier experiments revealed the incorporation of 6% of the cholesterol-25,27-$^{14}C$ isotope into propionic acid, which was characterized by preparation of S-benzylisothiuronium salt. Degradation of the isolated propionic acid demonstrated that only C-1 and -3 contained $^{14}C$. Incubation of cholesterol-4-$^{14}C$ in the presence of 3-oxochol-4-enic acid and *o*-phenanthroline permitted the recovery of labeled 3-oxochola-1,4-dienic acid. The results of the present investigation favor the conclusion that the hydrocarbon side chain of cholesterol is degraded via conventional fatty acid oxidation to $C_{22}$ acids, involving carbon-carbon bond fission at C-24-C-25 and C-22-C-23, resulting in the formation of 1 mole of propionic acid and 1 mole of acetic acid.

The binding of some long-chain fatty acid anions and alcohols by bovine serum albumin. Jacqueline Reynolds, Sarah Herbert and J. Steinhardt (Dept. of Chem., Georgetown Univ., Washington, D. C. 20007). *Biochemistry* **7**, 1357–61 (1968). The binding isotherms of three aliphatic long-chain carboxylates (dodecanoate, decanoate, and octanoate) and a long-chain alcohol (decanol) to native bovine serum albumin have been measured. None of these ligands induces massive disruption of protein structure such as has been observed with dodecyl and tetradecyl sulfates. A summary of the number of sites and association constants for the 13 ligands studied to date in this laboratory (homologous sulfates, sulfonates and alcohols) is presented and offers support for the previously proposed model for ligand-induced unfolding in proteins. An unexpected difference between carboxylates and the other ligands studied is that the ultraviolet difference spectra resulting from carboxylate binding show *red* rather than blue shifts in the $\pi \rightarrow \pi^*$ transition of the aromatic chromophores. Carboxylates conform to the other ligands, however, in producing red shifts in the short-wavelength region (230 mμ). It is suggested that the red shifts are produced by tyrosine side chains, and that the sign of the shift is characteristic of protein complexes in which the higher energy trytophan-associated sites are not also engaged.

Lipofuscin pigment accumulation as a function of age and distribution in rodent brain. W. Reichel, J. Gollanger, J. Clark and B. Strehler (Gerontology Res. Center, Nat. Inst. of Child Health and Human Dev., Nat. Inst. of Health, PHS, U.S. Dept. of Health, Educ., Welfare Bethesda, Md.). *J. Gerontol.* **23**, 71–8 (1968). The hippocampus of the old Wistar rat and C57BL/6J mouse selectively accumulate more pigment per section volume than the cerebral cortex and the Purkinje layer of the cerebellum. Moreover, in the rat hippocampus, pigment accumulation begins at an earlier age than in other areas. By contrast, in the granular cell layer of the cerebellum in rat and mouse of all age groups, less than 0.6% of section volume is occupied by pigment. The observed differences in pigment accumulation among these areas is not solely a function of the cellularity of these areas.

LIPOFUSCIN PIGMENT ACCUMULATION AND DISTRIBUTION IN FIVE RAT ORGANS AS A FUNCTION OF AGE. W. Reichel. *Ibid.*, 145–153. In the senescent male and female Wistar rat, the parenchymal cells of the zona reticularis of the adrenal cortex, the ovarian macrophages, and testicular interstitial cells of the Leydig accumulated much more pigment per cell than other cell types or zones studied in five organs. The estimated fraction of intracellular volume in the cells of the zona reticularis of the senescent adrenal cortex was 19.2–22.6%; in ovarian macrophages, 53.5%; and in the interstitial cells of Leydig, 15.1%. All other cell types studied contained less than 4.5% pigment per intracellular volume, and a total absence of pigment was *noted in the maturing ovaian follicles*, in the seminiferous tubules of the testis, and in the renal glomeruli. In the interventricular septum of the heart, in the four zones of the adrenal cortex, and in renal cortex exclusive of glomeruli significantly more pigment was noted in the male than in the female senescent animals.

LIPOPROTEIN STAINING FOLLOWING POLYACRYLAMIDE DISC ELECTROPHORESIS OF CHICK SERUM. L. Prosky, R. O'Dell, S. Libby and D. Flick (Div. of Nutr., Bureau of Science, Food and Drug., U.S. Dept. Health, Educ., and Welfare, Washington, D.C. 20204). *Poultry Sci.* **47**, 185–9 (1968). A procedure is described for the staining of lipoproteins fractions after separation of chick plasma proteins in 7% acrylamide disc gels by electrophoresis. This method eliminates prestaining techniques which complicate the procedure as well as interfere with the migration of proteins. Several lipid stains were employed and showed similar staining properties. The best stains were Oil Red O, Sudan Orange, Bleu BZL and Sudan Green.

SELF-ASSOCIATION OF CHOLESTEROL AND ITS INTERACTION WITH TRIGLYCERIDES. AN INFRARED STUDY. F. Parker and K. Bhaskar (Depart. Biochem., New York Medical College, N.Y., N.Y. 10029). *Biochemistry* **7**, 1286–90 (1968). The self-association of cholesterol due to hydrogen bonding has been studied by infrared measurements of its OH-stretching band. At concentrations below 0.014 M in $CCl_4$, cholesterol exists only as a monomer. As the concentration is increased it associates to form a dimer and at a concentration of ~0.06 M a higher aggregate begins to form which becomes the predominant *species at a concentration of ~0.2 M. The dimerization* constant has been determined ($K_d$, 23 = 2.4–3.7 1.mole$^{-1}$) at different temperatures from which the enthalpy of dimerization has been evaluated ($\Delta H = -1.8$ kcal mole$^{-1}$). The $V_{max}$ of the OH-stretching bands of the dimer and trimer have also been reported. Infrared spectra of mixed solutions of cholesterol and the triglycerides gave evidence of formation of 1:1 hydrogen-bonded complex. The equilibrium constants and enthalpies of formation of the complexes of cholesterol and triacetin, tributyrin and trilaurin have been reported ($K_{23°}$ = 2.4–3.7 1. mole$^{-1}$; $\Delta H = -3.5$ to $-5.4$ kcal mole$^{-1}$). The hydrogen-bonding properties of cholesterol are suggested as factors in the mechanism of plaque formation in atherosclerosis.

ESTIMATION OF PLASMA ANDROGENIC AND PROGESTATIONAL STEROIDS IN THE LAYING HEN. B. O'Malley, M. Kirschner and C. Bardin (Endocrinology Branch, Nat. Cancer Inst., National Inst. of Health, Bethesda, Md. 20014). *Proc. Soc. Exp. Biol. Med.* **127**, 521–3 (1968). Preliminary studies using double-isotope and electron-capture methods revealed the presence of progesterone, 20α-hydroxy-pregn-4-en-3-one, 20β-hydroxy-pregn-4-en-3-one, *testosterone, and $\Delta^4$-androstenedione in the plasma* of the mature laying hen.

SYNTHESIS OF PHOSPHOLIPIDS IN ARTERIAL WALLS. PART 1. INCORPORATION OF $^{32}P$ INTO PHOSPHOLIPIDS OF AORTAS AND CORONARY ARTERIES OF VARIOUS ANIMALS. M. Nakatani, T. Sasaki, T. Miyazaki and M. Nakamura (Res. Instit. of Angiocardiology, Kyushu Univ. Med. School, Fukuoka (Japan)). *J. Atheroscler. Res.* **7**, 747–57 (1967). Incorporation of inorganic phosphate into rat aorta was studied *in vitro*. Phospholipids were separated by silicic acid impregnated paper chromatography and distribution of radioactivity was measured. Lecithin and phosphatidylinositol (and/or lysolecithin) were shown to be highly labeled. Phosphatidic acid was rapidly labeled, though the amount of this substance was too small to be determined. On the other hand, sphingomyelin was large in amount but there was less incorporation of radioactivity. Incorporation into phosphatidylethanolamine occurred to approximately the same degree as sphingomyelin. The rate of $^{32}P$ incorporation into phospholipids of aorta varied with animal species and differed from that of coronary artery, especially in phosphatidylinositol and lecithin.

EFFECT OF REDUCED GLUTATHIONE ON ERYTHROCYTE LIPID. W. Meriwether, C. Mengel and H. Kann (Dept. Med., Ohio State Univ., Coll. Med., Columbus, Ohio 43210). *Proc. Soc. Exp. Biol. Med.* **127**, 60–2 (1968). The data presented demonstrate that as normal cells incubated with GSH *assume in vitro* lytic features usually considered typical of PNH eythrocytes, they also lyse excessively and form greater than normal quantities of lipid peroxides when incubated with $H_2O_2$. The results suggest that GSH in creating the PNH-like cell ultimately affects erythrocyte lipid. These observations are consistent with our hypothesis that peroxidation of red cell lipid may be involved in PNH corpuscular lesion.

MONODISPERSITY AND QUATERNARY STRUCTURE OF GLYCERALDEHYDE 3-PHOSPHATE DEHYDROGENASE. R. Jaeniche, D. Schmid and S. Knof (Dept. Biophy. and Microbio., Univ. of Pittsburgh, Pittsburgh, Pa. 15213). *Biochemistry* **7**, 919–26 (1968). The molecular weight of glyceraldehyde 3-phosphate dehydrogenase (GPD) has been reported to be in the range between 117,000 and 150,000 suggesting a dissociation-association equilibrium between the native enzyme and its protomers. To check this hypothesis the monodispersity of yeast and rabbit muscle (GPD) has been estimated comparing the mean values of M from sedimentation analysis, light scattering and osmotic pressure. On the other hand, the influence of pH, ionic strength, solubilizing additives, etc., *on the dissociation behavior has been investigated* to analyze the interprotomer forces stabilizing the native quaternary structure. The results confirm a molecular weight of 144,700 ± 3000 in accordance with a tetrameric quaternary structure. No anomalous dependence on protein concentration or temperature is observed in the entire pH range of enzymic activity. The values for the weight, number, and s, D average of M are identical within the limits of error. The enzyme, therefore, may be assumed to be strictly monodisperse. It is evident from ultraviolet difference spectra, optical rotatory dispersion and circular dichromism that dissociation into subunits in principle is accompanied by conformational changes. Therefore, no distinct indication regarding the interprotomer binding sites can be given. Qualitatively, the dissociation parameters lead to the conclusion that ion pairs and hydrogen bonds predominate as association sites while hydrophobic interactions seem to be of minor importance.

RESOLUTION AND RECONSTITUTION OF THE MITOCHONDRIAL ELECTRON TRANSPORT SYSTEM. I. RECONSTITUTION OF THE SUCCINATE UBIQUINONE REDUCTASE. A. Bruni and E. Racker (Dept. Biochem. and Molecular Biol., Cornell Univ., Ithaca, New York 14850). *J. Biol. Chem.* **243**, 962–71 (1968). Succinate dehydrogenase formed a complex with coupling factor 4 ($F_4$) from beef heart mitochondria, either in the presence or in the absence of phospholipids. Succinate dehydrogenase bound to $F_4$ remained insensitive to 4,4,4-*trifluoro*-1-(2-thienyl)-1,3-butanedione and did not react with ubiquinone. If cytochrome *b* was included in the complex, a succinate-ubiquinone reductase activity sensitivity to 4,4,4-trifluoro-1-(2-thienyl)-1,3-butanedione was reconstituted. Although required, cytochrome *b* did not appear to undergo oxidation-reduction. Phospholipids were essential for the succinate-ubiquinone reductase activity.

RADICAL REACTION ON THE THERMAL TREATMENT OF OLEIC ACID METHYL ESTER UNDER EXCLUSION OF OXYGEN. A. K. Sen Gupta (Unilever Res. Lab., Hamburg, Ger.). *Fette Seifen Anstrichmittel* **68**, 475–482 (1966). Oleic acid methyl ester was heated under argon at 250C ± 5C. The main reaction products were dimers, but also 9-octadecene, 9,17-hexacosadiene, decanoic acid methyl ester, 9,17-hexacosadienoic acid methyl ester, 9-octadecene-1,18-dicarboxylic acid dimethyl ester and 9,17-hexacosadiene-1,26-dicarboxylic acid dimethyl ester are formed. The mechanism of reactions which lead to these products is discussed.

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## • *Fats and Oils Report*

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and the Stabilization Corporation finds itself with abundant supplies to be marketed in competition with all export countries. Charges for carrying are cumulative at about 1½ cents per bushel per month, and the operation, to break even, must include these charges when the grain is sold."

Secretary of Agriculture Hyde said, in his annual report of 1930:

"By this time it is evident that supply and demand conditions cannot be set aside by legislation, that the dumping of surpluses abroad is not feasible, that the indefinite storing of surpluses tends to prevent rather than cause a rise in prices, that tariff duties are not effective on commodities produced largely for export and that subsidies would increase rather than restrain production."

James M. Beck, Representative from Pennsylvania, said on November 10, 1931:

"The Farm Board sought to minimize speculation and became the greatest speculator in grain and cotton; it sought to stabilize prices and it drove them downward until they fell below the cost of production; it sought to prevent a surplus and only increased the surplus; it sought to decrease the planting acreage and only increased it; it sought to secure orderly marketing and with the government as the biggest speculator in wheat and cotton with unlimited means, the orderly marketing became disorderly past precedent. It sought to prevent depression in agriculture and it has contributed to the greatest depression in our history; it sought to prevent wasteful methods of distribution and only succeeded in imposing upon the people of the United States at least one-half of the present governmental deficit.

The Grain Committee on National Affairs, a group representing the grain trade industry, summed up the attempt to support prices as follows:

This was an attempt to find farm relief through a price setting commodity approach and was the most pretentious effort to reverse currents of commerce through legislative enactment in all the world's history. Invested with responsibility, authority and resources beyond anything ever before conferred upon a civil organization aimed to benefit a class of citizens, the Federal Farm Board was favored by a combination of circumstances such as no other government agency ever enjoyed. It was created without serious opposition. Aside from the grain trade, small in number and financially unimportant, it was approved by business. Bankers were on its advisory board and an outstanding industrial leader was at its head. The time was propitious for such a trial. Agricultural liquidation from war-time price inflation had been accomplished. It operated in years of serious crop losses, either at home or abroad.

When the Farm Board so equipped, with such support, resources and power, starting under such circumstances and meeting such crop developments, has completely failed it seems the inevitable conclusion that all such efforts at legislation must fail. If in addition to its complete failure to advance farm price levels, it has brought about world conditions under which prices have sunk to a lower level than prevailed when farm land sold for less than it is now taxed, the conclusion is inevitable that the only power such legislation has over commerce is the power to destroy it. The whole of the accomplishment of this ill-starred effort to create value by law may be summed up in this tragic loss; millions to the grain trade and transportation lines; hundreds of millions to tax payers; a billion or more to agriculture and a degree of responsibility for an industrial and financial collapse that has carried in its train a political revolution and a sum of human misery beyond any precedent in America.

The failure of this effort is not to be sought in mistakes of the men charged with administration of the law, though the personal equation may have contributed to the speed of the debacle. The failure was inherent in the plan itself. There was no individual intention to destroy established business; to ruin established farmer cooperative ventures; to undermine the price level of commodities, nor to waste the taxpayers funds, but the whole process was inevitable as it must be in all legislation which seeks to supplant the distributing tides of a profitable commerce with the stagnating waters of a government monopoly.

The fundamental error in this, as in all similar plans yet suggested, is the effort to artificially enhance the selling price of a selected product instead of an effort to seek out and treat the cause of the growing disparity between farm and general commodity prices.

It is especially interesting to note current thinking on the topic of government purchases as a price supporting mechanism. On April 23, 1968, the dialogue in a House Agriculture Committee hearing went like this:

Rep. Page Belcher, (Rep., Okla.) accused proponents of a commodity reserve of sacrificing future farm prices, when demand might outstrip available supply, in order to bolster current prices.

Chairman W. R. Poage (Dem., Tex.) also expressed reservations about the reserve idea as an aid to farmers prices, but he indicated that his recent trip to Taiwan and Japan on a trade mission convinced him that there were other reasons to favor the bill.

"It is important to say to our foreign customers that we have the goods and ability to deliver the goods at any time." Rep. Poage said. But, he added that "We are fooling ourselves if we think we can help farmer bargaining power by collecting surpluses."

Witnesses, however, disagreed. Clifford Daleness, a South Dakota wheat farmer and representative of the National Association of Farmer Elected Committeemen, told the committee members that locking away excess grain "is preferable to leaving it in farmers hands so you never know when it will hit the market."

David M. Bartholomew, Commodity Analyst, Merrill Lynch, Pierce, Fenner & Smith Incorporated.

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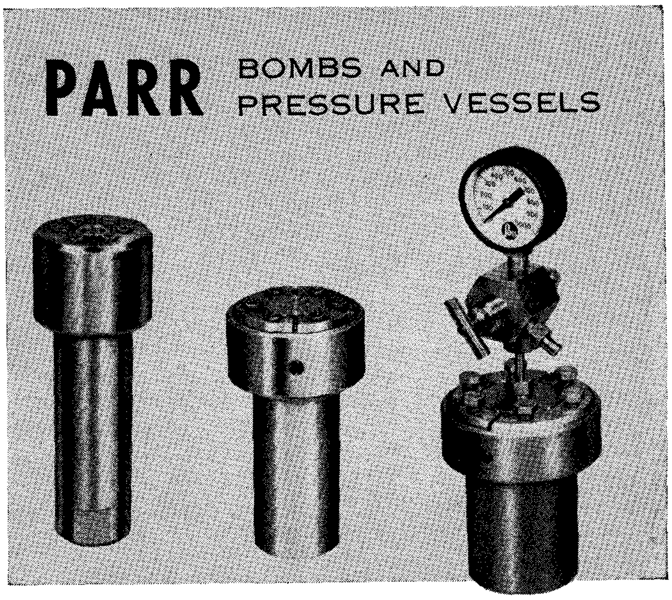

# NEW BOOKS

edited by f w quackenbush

The Practice of Gas Chromatography, edited by L. S. Ettre and A. Zlatkis (Interscience Publishers, 591 p., 1967, $14.95).

The editors' objectives were to provide a basic practical guide to those contemplating the use of gas chromatographic methods of analysis. They attempt to bridge the gap between detailed theory and practical applications and to summarize the art of gas chromatography.

The book is organized into 10 chapters, written by 16 authors with recognized expertise in their fields. The first chapter on basic principles is an excellent introduction to more detailed chapters on mobile phases, sample preparation, columns, detectors and interpretation of results. There are more advanced chapters on digital electronic systems, reaction gas chromatography and automatic process gas chromatography. A chapter on ancillary systems introduces the advanced methods of positive identification, i.e., ultraviolet, infrared, mass spectrometry and proton magnetic resonance.

The chapter on ancillary systems may be beyond the scope of the original objectives. The chapter on columns could have been simplified and possibly more space could have been allotted to identification.

The book should be helpful to those in laboratories contemplating gas chromatographic methods of analysis. It would also make a good supplementary reference to detailed theoretical textbooks. This book should help bridge the gap between theory of gas chromatography and practice of gas chromatography.

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Motor Fuels: Performance and Testing, by William A. Gruse (Reinhold Publishing Corp., New York, N. Y., 280 p., 1967, Price $12.00).

This is a hard-covered, cloth-bound book printed on a good grade of semigloss white paper. The subject matter is divided into ten chapters entitled "The Source and Nature of Motor Fuels," "Gasoline and Its Combustion," "Cleanliness in Gasoline Engines," "Volatility," "Liquefied Petroleum Gas as Motor Fuel," "Diesel Engine Fuels," "Diesel Engine Deposits," "Aviation Turbine Fuels," "Burning Qualities," and "Physical and Accessory Properties of Aviation Turbine Fuels, Hydrocarbon-Type Ramjet and Rocket Fuels." The book has a subject index of test methods, and is one of two companion volumes planned to cover the performance and evaluation of motor fuels and motor oils.

The subject matter accomplishes the aim set forth by its author in the preface: namely, it relates in simple and readable form useful information as to how fuels work in automative engines of today, as well as how one determines by testing whether a fuel is suitable for the service required. It also outlines whether a given fuel is better than another for the purpose used. The chapters on liquefied petroleum gas as motor fuel and aviation turbine fuels are timely because of increasing importance of these applications. All the subject matter is backed up by extensive references to the original literature.

Although the average reader of the Journal of the American Oil Chemists' Society probably would not be especially interested in its contents, since his interest lies primarily in the field of vegetable and animal oils, the book nevertheless should be in the library of all industrial, educational and commercial laboratories as a concise reference on motor fuels and motor fuel tests and evaluations.

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Guide to Gas Chromatography Literature, Vol. 2, by Austin V. Signeur (Plenum Press Data Division, 379 p., 1967, $15).

This volume is a compilation of about 8,000 literature references to gas chromatography. In the preface the author states that it supplements and brings up-to-date his first volume by the same title which was published in 1964. Volume 2 consists of three sections; a 270-page bibliography, a 70-page author index, and a subject index of 36 pages. All three sections are printed in a very usable two-column format on pages 8½ by 11 inches in size.

References in the bibliography are listed alphabetically by senior author and the information provided includes authors, title, original literature or other reference and, where applicable, the Chemical Abstracts reference. The bibliography includes technical papers and articles which are primarily concerned with gas chromatography as a technique, as well as those in which gas chromatography was utilized merely as a tool to accomplish some other major objective. The volume includes references to papers in both well-known and rather obscure foreign and domestic journals and books as well as otherwise unpublished papers presented at symposia and meetings of various scientific societies. Articles which have appeared in literature distributed by manufacturers of instruments and other supplies have also been included. The most valuable aspect of this work seems to be the completeness of coverage and the inclusion of many reports not normally covered by the usual abstracting services.

The period of time actually covered by the references in Volume 2 predates publication of the first volume and it appears to extend in rather complete form to the summer of 1965. A check of the first several hundred references indicated that about 85% of the papers were presented or published in the years 1963 through 1965, the bulk having appeared in 1964. Most of the remaining 15% were dated prior to 1963, although an occasional reference to 1966 was also found. Although timeliness does not appear to be the strong point of this volume, use of both volumes of this work together with Chemical Abstracts dating from 1965 would cover the field quite well for most investigators and would provide a useful and time-saving key to the literature.

The type of compilation presented in this volume is of maximum usefulness only if the indices are adequate. The reviewer found the author index to be complete; however, the subject index was a disappointment in some respects. Papers familiar to the reviewer were usually found listed under only one of several possible subject headings. The subject index is useful in that there ap-

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## • *M. E. Stansby Symposia . . .*

(Continued from page 316A)

The Technical Program Committee is actively soliciting research and development papers in any areas of lipids, fats and oils. Please submit two copies of a 100 to 300 words abstract with title, authors, and speakers to Dr. Stephen S. Chang, Department of Food Science, Rutgers, The State University, New Brunswick, New Jersey 08903, if you wish to present a paper at this meeting. Abstract forms are available from the same address. Please remember that the deadline for receiving technical papers is *JULY 1ST, 1968.*

### Additional Symposia Named

In addition to the Marine Oil Symposium the following titles have been added to the program to come: 1) Higher Molecular Weight Lipids—V. Babayan, Chairman; 2) New Detergent Additives; 3) Hard Surface Detergents; 4) Water Pollution; 5) Plant Safety; 6) Drying Oils.

This is possibly the most diversified field of subject matter any technical meeting will have presented. The theme of the meeting, "Progress On All Frontiers in Fats and Oils" is truly a reality.

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## • *Statler Hilton . . .*

(Continued from page 316A)

New York State Theatre, is adding other buildings, such as the Juilliard Music School. The Coliseum, which is a short walk from the Hilton, usually has an interesting trade exhibit such as the Auto Show or Motor Boat Show.

If you are museum-minded, there are literally hundreds of these in the city. Notable are the Guggenheim and Whitney, two of the newest. The Metropolitan Museum of Art is open one evening a week. The Cloisters, on the upper tip of Manhattan Island, is a Medieval building transported to the United States and rebuilt here. A No. 4 Fifth Avenue bus will take you directly to it and at the same time provide a rewarding tour of parts of the city you might not otherwise see. At the other end of the island you can still ride the Staten Island Ferry for a nickel and see the Statue of Liberty, Governors Island and the Verrazano-Narrows Bridge. Another boat ride, which gives a different view of the city, is the Circle Line. It is a three-hour trip which takes you completely around the island.

Restaurants of nearly every country in the world can be found in New York: Greek, Polynesian, Japanese, Russian, French, etc. The classified telephone directory lists these by the type of cooking, and they are usually located in areas where the natives are of the country represented by the cuisine. Having tried your favorite native dish, take a ride around Central Park in a horse-drawn buggy.

The nontechnical side of this meeting promises to be, as can be seen, most rewarding. It is hoped that it will encourage AOCS' wives to bring their husbands to this most outstanding meeting.

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## Intensive Promotion of Japan Margarine Market Noted

The second year of an intensive multimedia market promotion for vegetable oil margarine in Japan has been launched through the team-work of the USDA's Foreign Agricultural Service, the Japanese margarine industry, and the American Soybean Association.

Japan's traditional use of whale and fish oil in the production of margarine has, unsurprisingly, given the spread an unsavory image. But a nation of 100 million increasingly affluent citizens is a highly attractive potential market and the impetus for the current 26 million yen ($72,000) vegetable oil margarine promotional effort.

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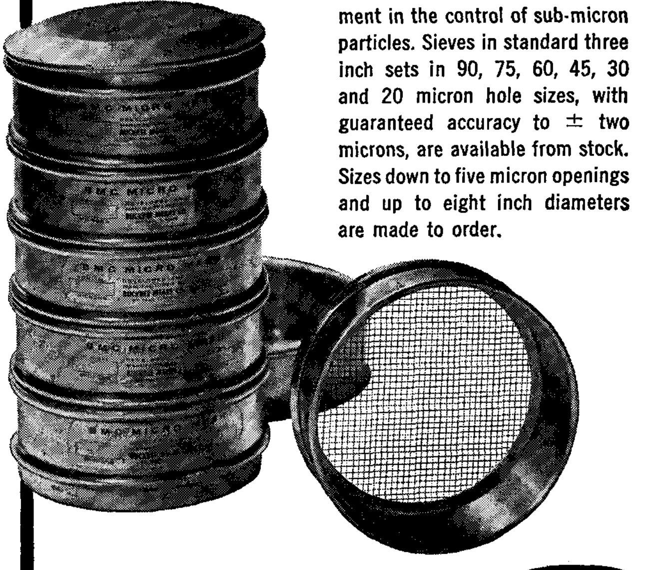

## • *Industry Item*

The European Organization for Nuclear Research (CERN), located near Geneva, Switzerland, has awarded to a European subsidiary of Varian Associates the largest vacuum pump contract ever placed. The order calls for delivery of 270 VacIon pumps at a total cost of approximately one-half million dollars. Varian was selected out of 13 prospective suppliers. Varian S.p.A. of Turin, Italy, will produce the pumps for CERN.

Ashland Chemical Company, a division of Ashland Oil & Refining Company, announced today it will construct office, warehouse and tank farm facilities in Indianapolis in a move designed to consolidate regional operations of the former Bronoco Solvents & Chemicals Company and Globe Chemical Company. Both Bronoco and Globe are now part of the Industrial Chemicals & Solvents Division of Ashland Chemical.

Successful start-up of a major Ethylene Amine Plant in Freeport, Texas, has been announced by The Dow Chemical Company. When the plant reaches full stream at the end of March, it will signal a doubling of Dow's ethylene amine production capacity. Ethylene amine is a major chemical intermediate used in the production of chelating agents, resins for wrinkle-proof finishes on cotton goods, and carbamates for use in fungicides.

The Dow Chemical Company is increasing the production capacity of its Dowicil 100 bactericide by 800,000 lb/yr. The additional capacity, on which construction began in November, should be on stream in August at Dow's Freeport, Texas, location. Dowicil 100, a water-soluble bactericide with fungicidal properties, was introduced commercially four years ago. Since then, it has found extensive use as a preservative in latex paints, floor polishes, adhesives, raw latex, joint cements, soluble cutting oil, inks, starches and numerous other systems.

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# Cumulative Index to Advertisers

* *Advertisement not in this issue.*

## • *New Books . . .*

(Continued from page 360A)

pears to be at least one reference listed for almost any conceivable topic, but a rapid, exhaustive search for the literature for reports concerned with a particular subject would probably not be possible by use of these volumes alone. Perhaps a complete listing of papers under all related topics would have been a physical impossibility, but the reviewer found this inadequacy to be the most serious shortcoming of the volume.

A laboratory investigator who uses gas chromatography for purposes other than very routine analyses would probably find this volume a useful addition to his own collection of reference books, particularly if the first volume is on hand or is acquired with the current volume. A good library supporting several investigators who frequently use gas chromatography should find this work a welcome addition.

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A Handbook of Laboratory Solutions by M. H. Gabb and W. E. Latchem, edited by Philip Kogan (Chemical Publishing Co., Inc., New York, 116, p., 1968, $6.50).

This is the first American edition of a handbook published in 1967 by Andre Deutsch Ltd. The table of contents presents 11 chapters plus an appendix. Some thumbing back and forth is required between chapters but the basic grouping is fairly clear.

The reader's attention is quickly drawn to the use of terms which are unfamiliar in the United States. There is of course the recognizable interchange of spelling, e.g., litre for liter, and the placing of decimal points up off line. Reference is made to analytical reagents (A. R.) using "AnalaR" or Pronalys."

The chapter on indicators covers 14 pages, includes many tables, and appears excellent. The appendix carries a table of tolerances on glassware which contains several discrepancies from the commonly accepted standards of our Class A accuracy or Class B accuracy.

The authors state, "The purpose of this book is to provide a concise and handy reference guide to the numerous 'recipes' for the making up of chemical solutions used in laboratories." They fairly well achieve their purpose and present materials gathered into one short volume that might be found partially in books such as *Practical Physiological Chemistry* by Hawk, Oser and Summerson or more completely in the current *Pharmacopeia of the United States.* They also present a very brief listing of basic definitions for chemical terms. This book might be of value where a large variety of solutions is required as it provides a quick survey of the field for making them.

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## • *New Products*

New Cyanatex Softener HP, combines the best properties of most softening agents for textiles, according to the April 1968 issue of "Dye-Chemlines." It is economical, disperses in cold water, is nonionic and therefore compatible in most finishing baths. It softens fabric as well as a pure finish or with other finishing products. When used with soil-release agents, it frequently improves antisoil redeposition properties. (American Cyanamid Company, Dyes and Textile Chemicals Department, Bound Brook, N. J.)

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(Continued from page 358A)

## • Detergents

Deodorant efficacy of toilet bars. H. A. Whitehouse and O. Carter (Procter & Gamble Co.). *Soap Chem. Specialities* 44(2), 64–8, 75–6, 102–4 (1968). A practical and realistic procedure for evaluating the deodorant effectiveness of toilet bars is described, which is based on direct quantitative assessment of the intensity of axillary odor by a panel of trained judges. The technique is capable of a relatively high degree of discrimination and reproducibility and can be adapted to a variety of problems relating to the development of axillary odor and its control. Examples are given to illustrate some of the kinds of investigations in which this basic procedure has been applied.

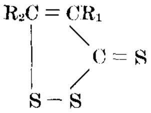
New methods for the production of fatty acids and glycerine from tallow. A. Gianazza (Gianazza S.p.A., Legnano, Italy). *Riv. Ital. Sostanze Grasse* 44, 471–4 (1967). A survey is offered of the technological improvements introduced in recent years for the purpose of obtaining tallow fatty acids destined for soap-making and glycerine for various industrial uses.

Technical and economical criteria for selecting tallow and tallow fatty acid quality for use in soap-making. L. J. Monticelli (G. Mazzoni S.p.A., Busto Arsizio, Italy). *Riv. Ital. Sostanze Grasse* 44, 475–82 (1967). A review is given of technical and economical factors affecting the selection of tallow and saponifying equipment in the context of competitive modern soap-making practices.

Environmental disinfectant cleaners. L. S. Stuart (U.S. Dept. of Agr.). *Soap Chem. Specialties* 44(2), 88-95, 189–91 (1968). The formulation criteria for disinfectant cleaners are reviewed.

Continuous process for producing detergent grade alcohols and glycerine. S. C. Schuman and R. H. Wolk (Hydrocarbons Res., Inc.). *U.S. 3,363,009.* A process for converting inedible tallow to a mixture of fatty alcohols having at least a 10% content of $C_{10}$–$C_{14}$ fatty alcohols comprises passing molten tallow together with hydrogen at a rate of 2.0 to 4.0 lbs. of $H_2$ per 100 lbs. of tallow upwardly through a contact zone containing a catalytic bed of a sulfur resistant catalytic contact agent (alumina or a combination of silica and alumina), promoted with elements from Groups VI-B and VIII of the periodic table. The reaction temperature is 600–850F, the total pressure 500–2,000 psig and the $H_2$ partial pressure 250–1,800 psi. The velocity of the gas and liquid is such as to expand the catalytic bed by at least 10% over its original volume and to create an interface below which catalyst density is greater than 5 lbs/cu. ft. and above which it is less than 0.1 lbs/cu. ft. without using disengaging devices. The particulate catalyst is replaced at a rate of 0.001 to 1.0 lbs. of catalyst per 100 lbs. of feed and the liquid product is drawn from above the interface.

SULFUR CONTAINING PSEUDOAROMATIC DETERGENTS. D. J. Anderson (Chevron Res. Co.). *U.S. 3,364,232.* A composition is claimed, having a molecular weight in the 750–3,000 range and of the formula:



where $R_1$ and $R_2$ are either alkyl or hydrogen, at least one of $R_1$ and $R_2$ being alkyl.

PROCESS FOR PRODUCING CLEANING TABLETS. R. R. Keast, A. R. Wirth and J. S. Thompson (FMC Corp.). *U.S. 3,367,876.* A process is claimed for producing strong, fast-dissolving cleansing tablets containing 35–65% by wt. of sodium tripolyphosphate. The dissolving rate of the tablets is increased by using sodium tripolyphosphate which is all in the Form II crystalline configuration and has a bulk density of 0.7–1.0 g./cc. The tablets also may include bleaching agents such as sodium or potassium dichloroisocyanurate.

DISPERSING AGENTS AND THEIR SELECTION. Noriaki Ohba (Nihon Surfactant Co., Tokyo). *Yukagaku* **17**, 55–60 (1968). A review.

ON THE ADHERING STATES AND ANALYTICAL RESULTS OF NATURAL SOILS. Teruo Tsunoda and Yoichi Oba (Hitachi Central Research Lab., Tokyo). *Yukagaku* **17**, 82–88 (1968). Adhering states of soils on fiber surface were observed with optical and electron microscopes. The amount of large particles of diameter above 10μ in the soiled cloth was comparatively low. Electron micrographs indicated the presence of number of small flat particles having the diameter less than 1μ, which cannot be detected by the optical microscope, adhering on the fiber surface. The spectroscopic analysis of inorganic soils gave the spectra of Si, Al, Ca, Mg and Fe as the strongest lines and the intensities of other lines were very weak. The electron and x-ray diffraction were also examined for the composition of inorganic soils. Analyses of organic soils extracted from naturally soiled cloth were carried out by IR spectroscopy, gas chromatography, thin-layer chromatography (TLC) and gel filtration. The existence of triglyceride, cholesterol and its ester and hydrocarbons such as paraffin and squalene in organic soil was identified by TLC. In the gel filtration, two peaks were found in elution diagrams of the detergent solution after washing naturally soiled cloths.

ANIONIC INTERFACIALLY ACTIVE AGENTS FROM AMINO ACIDS AND GLYCID ETHERS. E. Ulsperger (Inst. for Fat. Chem., Ger. Inst. for Sci., Berlin-Adlerhof, Ger.). *Fette Seifen Anstrichmittel* **68**, 964–967 (1966). After reviewing the preparation of interfacially active agents using amino carboxylic acids especially sarcosine, experiments concerning the reaction of alkylene oxides as well as glycid ethers with amino carboxylic acids are described. Saturation concentrations, critical micelle concentrations and corresponding surface tensions (dyne/cm) of aqueous solutions are given for the adducts from glycine or sarcosine with octylene-1,2-oxide and n-octyl- or lauryl glycid ether.

BACTERIAL, FUNGICIDAL AND ANTI-VIRIAL AMPHOTERIC DETERGENTS AND THEIR USES. F. Kornfeld (Th. Goldschmidt AG, Essen, Ger.). *Fette Seifen Anstrichmittel* **68**, 563–569 (1966). The disinfecting and surface active properties of amphoteric detergents are described, especially dodecyl-di(aminoethyl)-glycine. The uses and apparatus are adequately presented.

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