ABSTRACTS . . . . R. A. REINERS, Editor

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• Fats and Oils

THE ACTION OF SULFUR DIOXIDE ON PLANT OILS. F. Vohwinkel (Mulheim, Rhur). *Farbe und Lack* **65**, 571–573 (1959). The author reports an investigation into the published work and patents in the area of catalytic isomerization and polymerization of oils with the aid of SO_2. The reaction mechanisms involved when SO_2 is used are discussed from a theoretical point of view.

EUROPEAN CONFERENCE ON OILS: JUNE 22–25, 1959. *Spec. Number, Rev. Franc. Corp. Gras.* (1959). The reports in this volume were given at the above conference and have been published in one volume. Papers of interest to workers in the field of fat chemistry are as follows: Degumming and neutralization of oils; Decoloration of oils—theoretical and practical aspects; Deacidification of oils by distillation of fatty acids; Re-esterification as a method of deacidification of high acidity oils; and Deodorization—theoretical and practical aspects.

THE SEPARATION OF FATTY ACID METHYL ESTERS BY VAPOR PHASE CHROMATOGRAPHY. A. Jart (Danish Fat Res. Inst., Copenhagen, Denmark). *Oleagineux* **14**, 651–656 (1959). A method of separating fatty acid methyl esters by vapor phase chromatography has been reported. A catharometer type detection system was employed. The carrier gas used was nitrogen and the materials were separated on a column using silicone grease as the stationary phase. All of the homologous fatty acid methyl esters were separated, as were the esters of several dicarboxylic acids. Many analyses are reported.

UNSAPONIFIABLES: PROPERTIES, ISOLATION, AND QUANTITATIVE DETERMINATION. N. A. Khan (Div. of Foods and Nutr., East Reg. Lab. of Pakistan Council of Sci. & Ind. Res., Dacca, Pakistan). *Oleagineux* **15**, 85–90 (1960). The index of saponification of ordinary oils was found to be between 190 and 196. The author compares distillation and chromatographic separation of unsaponifiables from oils but concludes that solvent extraction is the best available method and the one preferred for large scale preparation of unsaponifiable materials from fats. The author also claims that the unsaponifiable material from hydrogenated cottonseed oil gives a positive reaction for sterols, and contains a hydroxylated material. The paper also describes the isolation of unsaponifiables in sufficient quantities for biological testing.

DETERMINATION OF HYDROXYL ACID CONTENT OF CASTOR OILS. P. Vezinet and M. Naudet (Fac. Sciences, Univ. Marseille). *Rev. Franc. Corp. Gras.* **7**, 85–88 (1960). The hydroxy acid content of castor oils was determined by column chromatography on a fixed support, employing a hydrocarbon liquid phase boiling at 100–130°. Results obtained varied from 82.7 to 87.9 per cent of the total fatty acids as hydroxy acids.

THE LIQUID RESIN OF SOUTHEAST FRANCE: ORIGIN AND COMPOSITION. L. Desalbres, L. Marie Dupaya, and R. Dubcarnes (Labs. Soc. Deriv. Resin. Terpen., Vielle Saint Gerons, Lardes). *Rev. Franc. Corp. Gras.* **6**, 597–608 (1959). The liquid resin of southeast France has the following composition and constants: Acid value—157, saponification value—168, and iodine value—85. The resin is composed of 47 per cent resin acids, 25 per cent of free fatty acids, 5.3 per cent of combined fatty acids, and about 10 per cent of unsaponifiable material. The fatty acid fraction has the following composition: 17 to 20 per cent linoleic acid, 14 to 16 per cent oleic acid, and about 6 per cent saturated acids which are mainly palmitic and myristic acids.

THE POSSIBILITIES OF GAS CHROMATOGRAPHY FOR THE STUDY OF TARS. P. Ferrero (Dir. Gen. of Researches, Soc. of Coal Chemists). *Indust. Chim. Belge.* **25**, 237–244 (1960). Gas chromatography apparatus is described which is capable of reaching temperatures of 400° using silicone grease as a stationary phase. This apparatus allows one to obtain in a short time a quantitative picture of the composition of mixtures as complex as heavy tar oils. Many analytical results are given.

QUANTITATIVE AND QUALITATIVE METHODS OF ANALYSIS FOR ANTIOXIDANTS. B. Solomon (I.T.E.R.G., Paris). *Rev. Franc. Corp. Gras.* **6**, 626–636 (1959). The author discusses in detail current thoughts on antioxidants, methods of determination, and legislation controlling their usage. 67 references.

APPLICATION OF GAS CHROMATOGRAPHY TO CONTROL OF THE PURITY OF FATS. J. P. Wolff. *Rev. Franc. Corp. Gras.* **7**, 73–80 (1960). Gas liquid chromatography has been used to determine the amount of adulterants in oils. The presence of lauric and decanoic acids were determined to detect the presence of coconut oil margarine in butter. The detection of other adulterant fats is discussed. Quantitative separation was dependant upon uniform conditions being maintained. Helium gas was preferred to nitrogen as the carrier gas, because it gave greater sensitivity. Polyglycol adipate was used as the stationary phase and gave greater separation of compounds based on chain length and unsaturation. Column temperatures used were from 200 to 235° depending on the longest chain length compound present in the sample. Sample size varied from 0.01 to 0.05 ml.

THE AUTOXIDATION OF UNSATURATED COMPOUNDS: THE CO-AUTOXIDATION OF METHYL LINOLEATE AND DIMETHYLBUTADIENE. W. Kern and H. W. Schnecko (Org. Chemical Inst., Univ., Mainz). *Die Makromolekulare Chemie* **36**, 244 (1960). Methyl linoleate and dimethylbutadiene were autoxidized together. As a result of kinetic investigations it was found that the rate of reaction for the mixture was considerably higher than the sum of the rates of reaction of both materials singly. Confirmation of these results can be found from cupric salt catalyzed studies which show that methyl linoleate and dimethylbutadiene are actually co-oxidized. The co-autoxidation was confirmed by countercurrent distribution studies. Analytical data are given to support the authors' claims.

A CONTRIBUTION TO THE THEORETICAL STUDY OF THE DRYING PHENOMENON. AUTOXIDATION OF THE CIS AND TRANS ISOMERS OF LINSEED OIL METHYL ESTERS. J. P. Helme, J. Molines, G. Boshard, and Cl. Lorin (Res. Lab., Dieppe, France). *Rev. Franc. Corp. Gras.* **6**, 609–626 (1959). The authors have reported a very detailed and comprehensive account of their work on the autoxidation of linseed oil esters in thin films at 30° under UV light. The autoxidation was reported to be essentially the same for both *cis* and *trans* isomers, but the rate of autoxidation of the *trans* isomer was more rapid than that of the *cis* isomer under the influence of high energy radiation. A difference in the course of oxidation of the irradiated esters was found. The process of oxidation was found to occur in three stages as follows: Hydroperoxide formation—in this stage the following observations were reported: optical density at 232 and 270 $m\mu$ increased, the peroxide number, index of refraction, and carbonyl value increased, while the iodine value decreased and the hydroxyl value remained constant. The second stage of oxidation, defined as the decomposition of the formed hydroperoxides, and formation of secondary oxidation products, which takes place between 89 and 185 hours of oxidation. At this stage the following changes occurred: optical density at 232 $m\mu$ decreased and that at 170 $m\mu$ increased. The peroxide, hydroxyl, acid, and carbonyl values continued to rise and the iodine values decreased. In the third and last stage of the oxidation which involves the decomposition of hydroperoxides, secondary oxidation products, scission product formation and polymerization, between 185 to 500 hours of oxidation, the following observations were made: The optical densities at 232 and 270 $m\mu$ decreased, the index of refraction becomes stabilized, the peroxide and iodine values decreased, and an increase in the acid, hydroxyl, and carbonyl values was noted.

EXPERIMENTAL RESEARCH ON THE PRESERVATION OF PEANUT OIL. H. Debruyne (Municipal Lab., Bordeaux). *Rev. Franc. Corp. Gras.* **7**, 3–21 (1960). The author reports in detail attempts to obtain information concerning the preservation of various peanut oils using the Swift test. The results obtained were analyzed mathematically and applied to the oils themselves. The physical and chemical determinations carried out are as follows. UV spectra, peroxide number, and analysis for iron, copper, and soap content.

PEROXIDES: THE MECHANISM OF DECOMPOSITION OF CERTAIN PEROXIDES. N. A. KHAN (Div. of Foods and Nutr., East. Reg. Labs., Pakistan Council of Sci. and Ind. Research, Dacca, Pakistan). *Oleaginaux* **15**, 225–227 (1960). The author discusses the mechanism of decomposition of tetralin hydroperoxide, hydrogen peroxide, and perbenzoic acid. These lead to the formation of carbonyl compounds, alcohols, and gaseous decomposition products. (27 references)

Application of ion exchange methods to wax analysis. W. Presting and S. Janicke (Inst. Verfahrenstechnik Org. Chem., Leipzig). *Fette Seifen Anstrichmittel* **62**, 81–87 (1960). The authors investigated the possibility that ion exchangers in non-aqueous solutions could be utilized for the group separation of the waxes. The investigations show that the wax acid components of natural and partially synthetic waxes in organic solvents can be separated and ultimately determined quantitatively using the adsorption chromatography technique and suitable anion exchangers. The ion exchange method thus offers a simple and exact procedure for the determination of not only free wax acids but also for the total or combined wax acids in case the mixture was saponified beforehand.

The color of oils. IV. A simple photocolorimetric study. E. Sambuc and M. Naudet (I.T.E.R.G., Marseille). *Rev. Franc. Corp. Gras.* **7**, 21–23 (1960). The authors explain in detail their work in measuring the color of oils by the use of various interference filters.

The chromatography of sterols and its application for the detection of animal and vegetable fats admixed with one another. J. W. Copius Peereboom and J. Roos (Reichsunterschungsanstalt, Molkereiproducte Nahrungsfette, Leiden, Holland). *Fette Seifen Anstrichmittel* **62**, 91–100 (1960). After saponifying the fat sample to be analyzed the sterols are isolated from it by the method of Den Herder. In order to separate cholesterol from the phytosterols, the sterol mixture is subjected to paper chromatographic separation, using the zones separation method. The paper is impregnated with paraffin and 84 per cent acetic acid is used as the mobile phase. In this way it is possible to determine small amounts of vegetable fat in animal fat or vice versa.

The epoxy acid of Chrysanthemum coronarium and Clarkia elegans seed oils. C. R. Smith, Jr., M. O. Bagby, R. L. Lohmar, C. A. Glass, and I. A. Wolff (Northern Regional Research Lab.). *J. Org. Chem.* **25**, 218–22 (1960). Coronaric acid, the constituent epoxy acid of *Chrysanthemum coronarium* seed oil is characterized as *cis*-9,10-epoxy-*cis*-12-octadecenoic acid. The epoxy acid of *Clarkia elegans* seed oil is identified as vernolic acid.

Oxidation of fat in model systems related to dehydrated foods. S. J. Bishov, A. S. Henick, and R. B. Koch (Quartermaster Food and Container Inst. for the Armed Forces, Chicago, Ill.). *Food Research* **25**, 174–82 (1960). Dehydrated fatty emulsions with an inert matrix of carboxymethyl cellulose were used to evaluate the role of proteins, phospholipids and of iron compounds in lipid oxidations under accelerated storage conditions at elevated temperatures. Phospholipids in concentrations of 0.5 to 5.0% of dry weight of fat protected against oxidation. Protein-containing fat emulsions were more stable than those with oil only and in combination with phospholipids protection was even greater. The catalytic effect of hemoglobin on acceleration of the rate of oxidative reaction resulted in spontaneous combustion within minutes in the dried emulsions stored at 85°. The oxidative reaction rates in dehydrated systems containing porphyrin compounds were significantly more rapid than in fluid systems. The pro-oxidant effects of ferric citrate were very small compared to those of porphyrin compounds. Phospholipids alone or in combination with proteins had significant antioxidant action in dehydrated emulsions containing porphyrin compounds, while the phenolic antioxidants, BHT and NDGA, at concentrations of up to 0.03% of dry fat weight, had only slight effects.

Autoxidation of milk lipids. I. Identification of volatile monocarbonyl compounds from autoxidized milk fat. E. A. Day and D. A. Lillard (Dept. of Food and Dairy Technology, Oregon State College, Corvallis). *J. Dairy Sci.* **43**, 585–97 (1960). The C_1 through C_{10} *n*-alkanals, the C_5 through C_{11} alk-2-enals, and acetone were conclusively identified, as their 2,4-dinitrophenylhydrazones, in the volatile material of milk fat oxidized to a TBA No. of 15 and a peroxide value of 14.3. In addition, presumptive evidence is presented for the identification of but-2-enal and the odd-numbered C_5 through C_{15} *n*-alkan-2-ones. Approximately 63% of the isolated monocarbonyl compounds were *n*-alkanals and 34% alk-2-enals. The possible origin of the identified compounds, their role in the oxidized flavor of milk fat, and the relationship of the results of this paper to the findings of other workers are discussed.

Gas chromatographic separation of volatile organic acids in presence of water. I. R. Hunter, V. H. Ortegren, and J. W. Pence (Western Regional Research Laboratory, Agricultural Research Service, U. S. Dept. of Agriculture, Albany, Calif.). *Anal. Chem.* **32**, 682–4 (1960). Volatile organic acids including acetic, propionic, isobutyric, butyric, isovaleric, valeric, isocarproic, carproic, and caprylic acids have been separated by gas-liquid chromatography using an adipate polyester of diethylene glycol as the liquid phase and helium as the carrier gas. Fractions emerging from the column were oxidized to carbon dioxide which was then measured in thermal conductivity cells. Nearly complete resolution of most of the acids was readily obtained, even in the presence of water in amounts up to 50% of the mixture.

Fatty oils from some insects. Tadayoshi Ono and Akemi Adachi (Kinki Univ., Fuse, Osaka). *Yukagaku* (J. Japan Oil Chemists' Soc.) **8**, 72–6 (1959). Two samples of gokiburi, or *Phyllodromia germanica* and/or *Periplaneta picea*, combined and pulverized, gave 5.37% ether extract, viscous brown oil, $n^{25/D}$ 1.4653, $d^{25/4}$ 0.9091, acid no. 54.8, sapon. no. 171.5, iodine no. 98.9, and unsaponifiable matter 11.32%. The oil contained 35.3% saturated acids, consisting of C_{12}–C_{20} fatty acids. The unsaturated acids consisted of 41.4% monoenoic, 20.7% dienoic, and 2.6% tri- and tetraenoic acids, among which octadecenoic (probably oleic), linoleic, and linolenic acids were dominant. Minomushi (bagworm) or larva of insect, *Psyche* sp. (moisture 68.8%) gave 4.80% ether extract, pale-green oil, $n^{25/D}$ 1.4717, $d^{25/4}$ 0.9363, acid no. 4.6, sapon. no. 177.8, iodine no. 109.9, unsaponifiable matter 8.62%. The saturated acids (36.4%) were similar with the oil from gokiburi. The unsaturated acids consisted of monoenoic, dienoic (little), and trienoic acids (tetraenoic acids were absent). Fukuromushi, or larva of *Sylepta balteata tabricius* (moisture 75.0%) gave 5.42% ether extract, dark-green oil, $n^{25/D}$ 1.4770, $d^{25/4}$ 0.9264, acid no. 36.1, sapon. no. 170.2, iodine no. 84.8, and unsaponifiable matter 8.86%. The saturated acids (30.8%) were again similar to the oil from gokiburi. The unsaturated acids consisted of monoenoic, dienoic (much), trienoic, and tetraenoic acids.

Seed oil from Meratia praecox. Kunio Kusunose and Akemi Adachi (Kinki Univ., Fuse, Osaka). *Yukagaku* (J. Japan Oil Chemists' Soc.) **8**, 76–80 (1959). This oil had acid no. 2.3, iodine no. 108.7, sapon. no. 169.6, $n^{25/D}$ 1.4706, $d^{25/4}$ 0.9063, and unsaponifiable matter 5.6%. Saturated acids (22%) consisted of C_{10}–C_{20}; palmitic and stearic acids were isolated and identified. Unsaturated acids consisted of 46% monoenoic (chiefly oleic with C_{14}, C_{16}, C_{20}, and higher), 25% linoleic, and 7% linolenic acids.

Chromatography. Satoru Kuwada (Takeda Pharmac. Inds., Ltd., Osaka). *Yukagaku* (J. Japan Oil Chemists' Soc.) **8**, 565–89 (1959). A review with 252 references.

Gas chromatography of fats, fatty acids, their esters, and unsaponifiable matter. Teruzo Asahara and Kenjiro Yamashita (Univ. Tokyo, Chiba). *Ibid.* 590–8. A review with 30 references.

Column and paper chromatography of fats, fatty acids, and unsaponifiable matter. Manjiro Noda (Kyoto Pref. Univ.). *Ibid.* 598–604. A review with 120 references.

Chromatography of edible oils and their additives. Minoru Terada (Shôwa Sangyô Co., Ltd., Yokohama). *Ibid.* 604–10. A review with 74 references.

Chromatography of sterols. Toshitake Tamura and Taro Matsumoto (Nihon Univ., Tokyo). *Ibid.* 610–15. A review with 62 references.

Column chromatography of conjugated lipides. Ichiro Hara (Tokyo Med.-Dent. Univ.). *Ibid.* 616–20. A review with 27 references.

Chromatography of surface active agents and their builders. Takashi Ishiwata and Masuzo Nagayama (Lion Fat & Oil Co., Ltd., Tokyo). *Ibid.* **9**, 25–9 (1960). A review with 46 references.

Physico-chemical properties of fatty oil mixture. The heat and volume of mixing of binary mixtures of fatty oils. Kazuhito Kusano (Miyazaki Univ.). *Yukagaku* (J. Japan Oil Chemists' Soc.) **8**, 57–61 (1959). The oils used in experiments were rapeseed (I), soybean (II), camellia (III), and coconut (IV) oils. By mixing 2 different oils minute increases in volume were observed except in case of mixing I and IV, where decrease in volume was observed. There occurred adsorption of heat by mixing 2 oils. The components of mixtures and experimentally observed maximum volume change and maximum heat change were, respectively, I-II, 0.027, −26.2; II-III, 0.008, −31.8; II-IV, 0.009, −29.6; and I-IV, −0.013 cc./mole, −16.0 cal./mole.

Oil of yellowtails (Seriola quinqueradiata). II. Seasonal variation of component fatty acids of viscera oil. *Yukagaku* (J. Japan Oil Chemists' Soc.) **8**, 31–4 (1959). The viscera oils were analyzed for iodine no., saponification no., and fatty acid composition. The fatty acid components of viscera oils from the fish caught in January and April, respectively, were myristic 1.63, 3.73; palmitic 10.15, 15.25; stearic 6.57, 6.06; arachidic 1.72, 1.17; behenic 0.32, 0.11; C_{14} (−2.0H) 0.11, 0.70; C_{16} (−3.6H) 8.60, (−2.4H) 9.30; C_{18} (−2.8H) 12.51, (−3.0H) 24.54; C_{20} (−4.1H) 27.03, (−4.8H) 24.68; C_{22} (−6.9H) 23.39, (−8.1H) 13.76; and C_{24} (−9.7H) 7.97, (10.7H) 0.97% In the process of gonad maturation, unsaturated acids were consumed more than saturated acids and unsaturated acids of C_{20} and higher were consumed more than those of C_{18} and lower.

Applications of ion exchangers in oil chemistry. Sadao Yoshikawa (Univ. Tokyo). *Yukagaku* (J. Japan Oil Chemists' Soc.) **8**, 509–17 (1959). A review with 44 references on the ion exchange reactions in organic solvents, separation of inorganic salts from organic liquid by ion removal, adsorption of nonelectrolytes by ion exchangers, and catalytic actions of ion exchangers.

Fatty Acid Derivatives

Higher alkyl monoethers of mono- to tetraethylene glycol. A. N. Wrigley, A. J. Stirton, and E. Howard, Jr. (Eastern Regional Research Laboratory, Philadelphia, Pa.). *J. Organic Chem.* **25**, 439–44 (1960). The mono-*n*-dodecyl, tetradecyl, hexadecyl, and octadecyl ethers of mono- to tetraethylene glycol, $R(OCH_2CH_2)_iOH$, were synthesized from alkyl halides or tosylates or by alkali-catalyzed reaction of alcohols with ethylene oxide. In the dodecyl, tetradecyl, and hexadecyl series, freezing-point minima occurred at i = 3. The distribution of products in oxyethylation of tetradecanol followed the equations of Weibull and Nycander, with a distribution constant of 3.0.

Preparation of long chain alkyl hydroperoxides. S. Wawzonek, P. D. Klimstra, and R. E. Kallio (Dept. of Chemistry and Bacteriology, State Univ. of Iowa, Iowa City, Iowa). *J. Organic Chem.* **25**, 621–23 (1960). Dodecyl, tetradecyl, hexadecyl, and octadecyl hydroperoxides have been prepared for testing as intermediates in the biological oxidation of saturated hydrocarbons. The hydroperoxides were prepared in a state of purity varying from 92–100 per cent by the alkylation of hydrogen peroxide in basic medium with the corresponding alkyl methanesulfonate.

The ozonization of methyl oleate. E. H. Pryde, D. E. Anders, H. M. Teeter, and J. C. Cowan (Northern Regional Research Lab., Peoria, Ill.). *J. Organic Chem.* **25**, 618–21 (1960). The effect of solvent on the ozonization of methyl oleate and on the reductive decomposition of the ozonolysis products has been studied. The use of a reactive solvent such as methanol or acetic acid resulted in isolated product yields of 87%. Carbonyl yields before isolation of product were on the order of 90–92%. The use of a nonreactive solvent such as ethyl acetate or heptane resulted in low yield and impure products. The results are explained on the basis of the Criegee zwitterion mechanism for ozonization.

Separation and identification of C_8 aldehydes. Use of gas-liquid chromatography, nuclear magnetic resonance, and infrared spectroscopy. J. S. Matthews, F. H. Burow, and R. E. Snyder (Gulf Research & Development Co., Pittsburgh, Pa.). *Anal. Chem.* **32**, 691–3 (1960). A method for the separation and identification of aldehyde isomers depends upon the separation of an isomer approximately 90% pure by large volume gas-liquid partition chromatography. The separated aldehyde is examined by nuclear magnetic resonance to determine the number of α-hydrogens, CH_3—, CH_2—, and CH— groups and by infrared spectroscopy to establish the presence or absence of $—(CH_2)_3—$ or $—(CH_2)_n—$ groups, where *n* is equal to or greater than 4. Finally, the aldehyde is reduced to a hydrocarbon by the Wolff-Kishner reaction and the hydrocarbon identified by comparison with API standards by gas-liquid partition chromatography.

Vinyl derivatives of fats: Production; uses in the field of plastics. A. Uzzan (Inst. Corp. Gras., Paris). *Rev. Franc. Corp. Gras.* **7**, 135–145 (1960). The author reviews progress in the field of vinyl derivatives of fats. The review is divided into three main sections which concern the preparation of vinyl esters and ethers and their uses.

A preparation of 10-hydroxy decanoic acid. F. L. Benton and A. A. Kiess (Armour and Co., Chicago 9, Ill.). *J. Org. Chem.* **25**, 470–1 (1960). The ozonide of methyl 10-undecenoate was reduced directly to methyl 10-hydroxy decanoate with sodium borohydride. 10-Hydroxy decanoic acid was thus obtained in an overall yield of nearly 60% by saponification of the ester.

Biology and Nutrition

Further proof of the C(24) α-ethyl group in stigmasterol. Y. Kishida (Takamine Lab. Sankyo Co. Ltd., Shinagawa, Tokyo, Japan). *Chem. & Ind.* **1960**, 465–6. Another proof is given for the previous report that the absolute configuration of C(24) ethyl group in the stigmasterol series should be alpha.

Toxicity of fish oil. X. Toxicity of rapeseed oil polymerized by heating in the air. Noboru Matsuo (Seikei Univ., Tokyo). *Eiyô to Shokuryô* (J. Japan Soc. Food Nutrition) **12**, 118–21 (1959–60). Rapeseed oil was compared with fish oil in order to determine the formation of cyclic ethyl ester from double bonds present in a smaller amount in the former oil. Albino rats grew well on diets containing 20% rapeseed oil, though some rats showed slow growth probably due to incomplete absorption of this oil containing much erucic acid. Rats did not grow on diets containing 20% polymerized oil by heating at 250° for 50 hrs. Cyclic ethyl esters, separated from polymerized rapeseed oil by the urea adduct method, showed toxicity to rats, though to lesser degree than those separated from polymerized cuttle-fish oil.

Biochemical studies on oils and fats. XII. Cyclization of β-eleostearic acid and toxicity of cyclic products. Noboru Matsuo (Seikei Univ., Tokyo). *Nippon Kagaku Zasshi* (J. Chem. Soc. Japan, Pure Chem. Sect.) **81**, 469–72 (1960). Four parts of ethyl β-eleostearate with 1 part of acrolein, heated 3.5 hrs. at 130–145°, gave addition products, from which a distillate (187.5–192° at 1.8 mm. Hg) was obtained, which contained cyclohexene ring, as evidenced from infrared spectra. All rats died in 4–6 days on diets containing 10% of this addition product. Ethyl β-eleostearate was heated 5 hrs. at 180–5° to give a distillate (161.5–205° at 3 mm. Hg) from which a cyclic monomer (168-174.5° at 2 mm. Hg) was separated by the urea adduct method. All rats died in 5–7 days on diets containing 10% of this cyclic monomer.

XIII. Toxicity of thermally polymerized ethyl linolenate. *Eiyô to Shokuryô* (J. Japan. Soc. Food Nutrition) **12**, 206–9 (1959–60). Ethyl linolenate, prepared from linseed oil, was polymerized by heating 40 hrs. at 250°. This product showed toxicity to rats. Cyclic ethyl ester, separated from this polymerized ethyl linolenate by the urea adduct method, showed extremely acute toxicity.

XIV. Toxicity of cyclic compounds. *Ibid.* 210–13. One mole of 4-cyclohexene-1,2-dicarboxylic acid and 2 moles of *n*-butanol were reacted to give the ester (160–5° at 3 mm. Hg), which led the rats to death in 6–11 days on diets containing 20%. The cyclohexenedicarboxylic acid itself was more toxic than the ester. Phthalic acid and diethyl phthalate were also toxic. Benzene was much less toxic.

Organic syntheses and biosyntheses of phospholipides. Ichiro Hara (Tokyo Med.-Dent. Univ., Tokyo). *Yukagaku* (J. Japan Oil Chemists' Soc.) **9**, 57–62 (1960). A review with 30 references.

The inositophosphatides of bovine brain. L. Horhammer, H. Wagner, and J. Holzl (Inst. Pharm. Artzn., Univ. Munich). *Biochem. Z.* **332**, 269–76 (1960). In animals monophosphoinositide has only been found as a component of heart and liver; this paper demonstrates it as a constituent of brain phosphatides. Identification was performed by paper chromatography on formaldehyde paper, by the formation of inosidemonophosphate after partial hydrolysis; by formation of the lyso compound and by other analytical data. Diphosphoinositide was separated from other phosphatides by multiplicative distribution. The substance was separated into three different fractions by paper chromatography. By paper chromatographic analysis of grey and white matters of the brain, monophosphoinositide was found in both fractions, whereas diphosphoinositide was found only in the white matter. Lyso compounds could be prepared and demonstrated only from phosphatidylserine and monophosphoinositide, not from diphosphoinositide.

The fatty acid composition of liver phosphatides of rats fed fat free diets. E. Klenk and K. Oette (Psysiol-Chem. Instit., Univ. Cologne). *Z. Physiol. Chem.* **318**, 86–99 (1960). The liver phosphatides of rats, fed a fat free diet, contain preponderantly polyenoic acids of the oleic and palmitoleic acid type (5,8,11-eicosatrienoic acid and 4,7,10,13-eicosatetraenoic acid). Administration of linoleic acid results in the formation of acids of linoleic acid type acids, mainly of 5,8,11,14-eicosatetraenoic acid (arachidonic acid), whereas, after the administration of linolenic acid, polyenoic acids mainly of the linolenic acid type appear (5,8,11,14,17-eicosapentaenoic acid and 4,7,10,13,16,19-docosahexaenoic acid) and are found in the liver phosphatides.

BIOLOGY OF FATS. IX. THE RESORPTION OF CONJUGATED OILS AND THE DISTRIBUTION OF CONJUGATED FATTY ACIDS IN THE FAT OF SOME EXPERIMENTAL ANIMALS. H. P. Kaufmann and H. Dransfeld (Deut. Inst. Fettforsch., Munster). *Fette Seifen Anstrichmittel* **62**, 73–80 (1960). The seed oil of *Impatiens glanduligera*, which contains parinaric acid, is not toxic. It is possible to follow the resorption of this oil with the aid of UV analysis when it is fed to animals. In administering this oil once to rats and rabbits, parinaric acid appears first in the mesenterial, then in the peritoneal and then in the subcutaneous and perigenital fatty tissues. When fed for a longer time, the above order of appearance of the acid in various tissues and the turnover rate as well is reversed.

SERUM CHOLESTEROL CONCENTRATIONS OF VARIOUS ETHNIC GROUPS IN HAWAII. Lucile F. Adamson (Foods & Nutrition Dept., Univ. of Hawaii, & Agricultural Experiment Station, Honolulu, Hawaii). *J. Nutrition* **71**, 27–36 (1960). Fats in the diets of the various ethnic groups among University of Hawaii students (Japanese, Chinese, Caucasian) provide approximately 40% of the total caloric intake by each group. The serum cholesterol and lipid phosphorus concentrations for various ancestry groups in adult Honolulu men (Caucasian, Chinese, Filipino, Japanese, Hawaiian) were essentially the same in all groups with some exceptions: in the 20 to 39 age group, Honolulu Filipinos had lower serum cholesterol and lipid phosphorus than the other groups, and the Chinese had higher serum cholesterol than the Japanese. The Chinese and Japanese values for all ages were as high or higher than the corresponding values for Caucasians.

THE RESPONSE OF MAN TO DIETARY CHOLESTEROL. J. M. R. Beveridge, W. F. Connell, G. A. Mayer, and H. L. Haust (Departments of Biochemistry and Medicine, Queen's University, Kingston, Ontario). *J. Nutrition* **71**, 61–5 (1960). Ninety-three university students were placed upon a homogenized fat-free diet for a period of 8 days at which time they were divided into 8 groups and given a ration modified by the substitution of a butter-fat fraction, low in cholesterol, for 30% of calories at the expense of carbohydrate. Cholesterol supplements varying from nil up to 1600 mg./950 Cal. were added. Sixty-seven subjects successfully completed the experiment which was terminated after a total of 16 days. Between intakes of 13 and 634 mg. of cholesterol per day, the serum cholesterol increased sharply but no further significant increases were obtained at daily intakes of 1300 to 4500 mg.

EFFECT OF VARIATIONS OF RATIONS ON THE INCIDENCE OF TERATOGENY IN VITAMIN E-DEFICIENT RATS. Dorothy Wei Cheng, T. A. Bairnson, A. N. Rao, and S. Subbammal (Department of Anatomy, State University of Iowa College of Medicine, Iowa City). *J. Nutrition* **71**, 54–60 (1960). Congenital malformations were produced in the offspring of rats reared and bred on 4 vitamin E-deficient rations. Variations in the composition of the rations influenced the yield of the abnormal as well as the normal young, the incidence of resorption and the average number of implantation sites. Increasing the level of vitamin E supplementation from 2 to 4 mg. on the 10th day of gestation resulted in a uniformly significant increase in the percentage of normal young.

STUDIES ON THE CHOLESTEROL CONTENT OF EGGS FROM VARIOUS BREEDS AND/OR STRAINS OF CHICKENS. H. M. Edwards, Jr., J. C. Driggers, Roberta Dean, and J. L. Carmon (Poultry Dept., University of Georgia, Athens, Georgia). *Poultry Sci.* **39**, 487–89 (1960). Strain differences were found to influence significantly the fat cholesterol, and iodine number of the fat of eggs. The dry matter content of eggs did not differ significantly among the strains tested. Significant differences were obtained for hens within a strain for dry matter, and cholesterol content of the fat of eggs.

DEPOSITION OF CHOLESTEROL IN EXPERIMENTAL RABBIT ATHEROSCLEROSIS. E. Schwenk and D. F. Stevens (Worcester Foundation for Experimental Biology, Shrewsbury, Mass.). *Proc. Soc. Exptl. Biol. Med.* **103**, 614–17 (1960). Cholesterol-C^{14} and cholesterol-H^3 were fed to rabbits for 1 week and cholesterol was isolated from aortae, livers, small intestines, adrenals, kidneys, brains, and blood. Isolated material from all tissues had a lower count than the material fed. It was surprising that cholesterol-H^3 counts were always comparatively lower than cholesterol-C^{14} counts. This discrepancy may be explained by a peripheral oxidation of the cholesterol-H^3 molecule, in which it loses radioactive hydrogen and therefore radioactivity. This peripheral oxidation is apparently mainly operative in blood.

THE EFFECT OF IRRADIATED VEGETABLE OILS AND ANIMAL FATTY TISSUE AND STORAGE OF THE DIET ON GROWTH AND MORTALITY IN CHICKS. S. J. Ritchey and L. R. Richardson (Dept. Biochemistry & Nutrition, Texas Agricultural Experiment Station, College Station, Texas). *Poultry Sci.* **30**, 404–8 (1960). Control and irradiated soybean oil, corn oil, beef and pork fatty tissues were each mixed in a synthetic diet at a level of 10 per cent. The diets were then fed to baby chicks after they had been stored for zero, one, two, and three weeks. Growth and mortality showed that the diets containing the control and irradiated soybean and corn oils were essentially equal in nutritive value, and storage for three weeks at ambient temperatures, did not decrease their value.

ESSENTIAL FATTY ACID PROPERTIES OF TUNA, HERRING, AND MENHADEN OILS. O. S. Privett, F. J. Pusch, R. T. Holman, and W. O. Lundberg (Hormel Institute, Univ. of Minnesota, Austin). *J. Nutrition* **71**, 66–69 (1960). Tuna, menhaden, and herring oils cured dermal symptoms of EFA deficiency and stimulated growth of EFA-deficient rats when fed at a level of 10% in the diet. It was shown that although severe dermal symptoms of EFA deficiency developed with feeding 200 mg. of the above oils in the form of their ethyl esters, the growth rate was not affected. The content of acids of the linoleate family is estimated to be approximately 2% of these oils, using dermal symptoms of EFA deficiency as the criterion.

INSECTICIDE RESIDUES IN MEAT AND MILK. DETERMINATION OF HEPTACHLOR EPOXIDE IN FAT AND MILK. C. F. Meyer, M. A. Malina, and P. B. Polen (Velsicol Chemical Corp., Chicago, Ill.). *J. Agr. and Food Chem.* **8**, 183–86 (1960). Earlier work by Davidow and others has shown that the insecticide heptachlor is altered, when ingested by dairy animals, to its epoxide (1,4,5,6,7,8,8-heptachloro-2,3-epoxy-2,3-3a,4,7,7a-hexahydro-4,7-methanoindene). As heptachlor epoxide is found primarily in the fat, methods were developed for the determination of microgram quantities in butterfat and beef fat. The Polen-Silverman reagent which was originally developed for the determination of heptachlor is also a sensitive color-forming reagent for heptachlor epoxide. Methods are presented for the separation of heptachlor epoxide from butterfat and beef fat by chemical and chromatographic techniques and for the subsequent spectrophotometric analysis of the epoxide.

EMULSIFIED OIL AS A LIQUID FEED SUPPLEMENT FOR POULTRY. B. E. March and J. Biely (Poultry Nutrition Laboratory, University of British Columbia, Vancouver, B. C.). *Poultry Sci.* **39**, 279–81 (1960). Three- to four-week old chicks were given aqueous emulsions of corn oil in place of drinking water. An emulsion containing 10% of oil was well tolerated by the chicks and was consumed in amounts to comprise 23.8 and 16.4% of the total feed intake when the basal diets contained 27.5 and 21.5% protein, respectively. The feeding of emulsions is suggested as a means of supplying high levels of oil without the difficulties associated with the mixing and storing of oily diets.

BLOOD PLASMA TOCOPHEROL AND PHOSPHORUS LEVELS IN A HERD OF BEEF CATTLE. D. C. Maplesden, J. D. Harvey, and H. D. Branion (Department of Nutrition, Ontario Agricultural College, Ontario Veterinary College, Geulph, Ontario). *J. Nutrition* **71**, 77–84 (1960). In an attempt to establish normal values, plasma total tocopherol levels and plasma acid-soluble phosphorus levels were determined in a well-fed herd of 27 beef cows over a 520-day period. The mean plasma total tocopherol levels of calves born to the cows fed barn rations or on pasture were 287 ± 147 and 301 ± 31 μg per 100 ml., respectively. Mean plasma inorganic phosphorus levels were 8.9 ± 1.18 and 9.7 ± 0.08 mg. per 100 ml., respectively. These were in a high normal range.

NUTRITIONAL MUSCULAR DYSTROPHY IN CALVES. II. ADDITION OF SELENIUM AND TOCOPHEROL TO A BASAL, DYSTROPHOGENIC DIET CONTAINING COD-LIVER OIL. D. C. Maplesden and J. K. Loosli (Dept. of Animal Husbandry, Cornell Univ., Ithaca, New York). *J. Dairy Sci.*, **43**, 645–53 (1960). Nutritional muscular dystrophy was produced experimentally in Holstein-Friesian calves. The addition of cod-liver oil to the diet caused an intensification of Zenker's degeneration in the muscles of the tocopherol-deficient calves. One p.p.m. of selenium added to the basal diet did not prevent muscular dystrophy. The addition of 200 mg. of water-dispersible d-alpha-tocopheryl acetate per calf per day completely prevented the development of muscular dystrophy in all calves so treated. All calves which were not fed tocopherol supplements developed Zenker's degeneration of the skeletal and tongue muscles and degeneration of the Purkinje fibers of the heart. Since blood serum magnesium levels declined progressively in all calves in the experiment, it is possible that low blood magnesium levels may work synergistically with low blood tocopherol levels to produce Purkinje fiber degeneration.

EFFECTS OF CHOLESTEROL AND OTHER SUBSTANCES ON ESSENTIAL FATTY ACID DEFICIENCIES. D. Gambal and F. W. Quackenbush (Dept. Biochemistry, Purdue Univ., Lafayette, Indiana). *J. Nutrition* **70**, 497–501 (1960). Cholesterol and sodium glycocholate accelerated EFA-deficiency symptoms using diets containing 3% of saturated fat; this effect was not observed on fat-free diets. Both substances retarded growth. Cholic acid did not accelerate EFA-deficiency symptoms, but retarded growth and body-fat deposition and produced diarrhea. The diarrhea was alleviated by increased supplements of a rice bran concentrate but growth was not improved. Growth was improved by dietary cholesterol and fat. When cholesterol was fed with either sodium glycocholate or cholic acid, the lipid content of the liver increased several fold. Of the two supplements, sodium glycocholate was the more effective in increasing liver lipids and accelerating EFA-deficiency symptoms.

FACTORS AFFECTING THE ABSORBABILITY OF CERTAIN DIETARY FATS IN THE CHICK. M. R. Feede, P. E. Waibel, and R. E. Burger (Dept. Poultry Husbandry, Institute of Ag., Univ. Minn., St. Paul). *J. Nutrition* **70**, 447–52 (1960). The apparent absorption coefficients of fats by chicks were similar for either 10 or 20% dietary-fat levels and were high for safflower oil, corn oil, and hog grease, and low for beef tallow. The apparent absorbability of beef tallow (a) increased from 53% at one week of age to 80% at 12 weeks of age, (b) was increased when 0.5% or more of dietary ox bile was added, (c) was not dependent upon growth rate or feed intake and (d) was decreased by high dietary calcium and increased by reducing the calcium intake.

EFFECTS OF DIET ON FISH OIL TOXICITY IN THE RAT. B. H. Ershoff (Western Biological Laboratories, Culver City, Calif.). *J. Nutrition* **71**, 45–53 (1960). Immature rats fed a purified low-fat diet supplemented with 10% of fish oil (i.e., crude or refined tuna oil, crude sardine oil, menhaden oil, or cod liver oil) showed a highly significant retardation in growth accompanied by diarrhea. These effects were largely counteracted by the concurrent administration of antioxidants.

SERUM CHOLESTEROL IN ACUTE STARVATION: A REPORT OF 20 CASES. N. Ende (Clinical Lab., Veterans Administration Hospital and the Dept. of Pathology, Vanderbilt University, Nashville, Tennessee). *J. Nutrition* **71**, 85–90 (1960). Twenty volunteers were subjected to periods of starvation ranging from 2 to 5 days. Four general groups were included: Young males between the ages of 21 to 35, young females between the ages of 20 to 32, males over 50 years of age, and patients with atherosclerosis from 49 to 70 years of age. In the data at present available, almost all the young males showed a rise in serum cholesterol. The older males had less elevation than that of the younger male subjects and the atherosclerotic group showed a completely different curve from that of the other groups. Additional data will be necessary before a complete evaluation is possible.

• Detergents

MECHANISM OF DRYING SOAPS. Keizo Ogino (Asahi Denka Kogyo Co., Ltd., Tokyo). *Yukagaku* (J. Japan Oil Chemists' Soc.) **8**, 64–8 (1959). Na soaps were prepared from aqueous solutions of saturated fatty acids of C_2–C_{18} and oleic acid. Changes of moisture contents of these soaps were observed at relative humidities of 95, 75, 52, and 0%. Even at 95% humidity Na soaps of C_{12}–C_{18} saturated fatty acids lost moisture relatively rapidly to attain equilibrium. Structural H_2O and free H_2O existed. The former was in the amounts as follows: Na stearate·H_2O, Na palmitate·$2H_2O$, Na myristate·$4H_2O$, and Na laurate·$1.75H_2O$. Surface activities were shown in soaps having such structural H_2O, i.e. in Na soaps of C_{12} or higher saturated acids. Na soap of C_{10} acid contained 3 moles of structural H_2O. Na soaps of C_8 or lower acids contained no such structural H_2O, but only free H_2O. The loss of water of Na oleate was very slow; it contained 8.34 moles of structural H_2O.

OBSERVATION OF SOAP CRYSTAL NUCLEATION BY THE ELECTRON MICROSCOPE. Keizo Ogino (Asahi Denkga Kôgyô Co., Ltd., Tokyo) and Shigeo Sakata. *Yukagaku* (J. Japan Oil Chemists' Soc.) **8**, 68–72 (1959). The incipient state of saponification of C_{18}–C_8 saturated acids and oleic acid was observed with the electron microscope. When 0.1% aqueous solution of a soap, dried on the collodion film, was examined, the result was coincident with that in the literature. Some differences were noted when dilute NaOH was sprayed with nebulizer on the fatty acid film. This method afforded the examination of the incipient state of saponification. The finest fibrils of Na soaps of C_{18}–C_{14} acids were about 200 A. wide and about 58 A. deep, while those of soaps of C_{12} and C_{10} acids were about 100 A. wide and about 58 A. deep. The drying of Na myristate·$4H_2O$ and Na caprate·$3H_2O$ took a longer time on the electron microscope and gave somewhat twisted orientation of molecules.

APPLICATION OF THE NEBULIZER METHOD ON THE ELECTRON-MICROSCOPIC OBSERVATION FOR THE INITIAL STATE OF SAPONIFICATION. Keizo Ogino (Asahi Denka Kôgyô Co., Ltd., Tokyo). *Yukagaku* (J. Japan Oil Chemists' Soc.) **8**, 197–201 (1959). Examinations were made with pure stearic and myristic acids with different solvents and saponifiers. Use of ethyl alcohol as the solvent produced finer and denser fibrils than that of H_2O. Na_2CO_3 gave lower degree of crystallization than NaOH; stearate was fragmentary and myristate was linear. NaOH–Na_2CO_3 (1:1) and NaOH containing 10% NaCl gave similar crystals for both soaps. The former gave insular crystals and the latter gave net-like crystals with harder bones than NaOH. Lower fatty acid was more easily saponified with caustic alkali than higher fatty acid. Crystallizability decreased in the order Na>K>NH_4 soaps.

II. EFFECTS OF ADDITIONAL SUBSTANCES. Keizo Ogino. *Ibid.* **9**, 175–7 (1960). Considerable effects were noted on the electron-microscopic features of Na stearate and myristate by adding glycerol, propyleneglycol, sucrose, triethanolamine, methylcyclohexanol, and *p*-cresol in the amount of 10% to NaOH. The addition of these agents made the crystals finer or inhibited the crystallization. Thus these could aid in increasing transparency of soaps.

EQUILIBRIUM WATER CONTENT OF SOAPS. Heihachi Ezaki, Kenji Owada, and Shun Noguchi (Marumiya Co., Ltd., Sumida-ku, Tokyo). *Yukagaku* (J. Japan Oil Chemists Soc.) **8**, 62–4 (1959). Equilibrium water content (I) of soaps and vapor pressure (II) were measured at 10–50° (in 10° intervals) and the results were shown graphically. In case of Na palmitate, 3 stages were evident at 40° or lower temps.; II was very near to 0 up to 3% I, it increased remarkably from 3% I, and then it was nearly constant at 5–6% I; the 1st and 2nd stages merged at 50° and I gradually increased to 4% in 0–90% relative humidity (III). In case of Na laurate the situation was similar to the case of Na stearate at 50°. In case of Na oleate, II was much lower except at 2–4% I, at 40° or lower temps. I increased gradually from 0 to 5–6% as III increased from 0 to 60–70% and I increased rapidly from III more than 70%; at 50° I was near to 0 up to 50% III and I increased rapidly from III more than 50%. In case of Na linoleate, II was lower than in case of Na oleate. In case of toilet soap prepared in the factory, II was similar to that in case of Na oleate at 10 and 20°, but it was intermediate between saturated and unsaturated soaps at 30° and higher temps.

DRUGS AND SURFACE-ACTIVE AGENTS. Jun Hasegawa (Univ. Tokyo). *Yukagaku* (J. Japan Oil Chemists' Soc.) **9**, 113–19 (1960). A review with 56 references.

ORGANIC SOLVENTS AND SURFACE-ACTIVE AGENTS, ESPECIALLY IN RELATION TO THE MICELLE FORMATION. Ayao Kitahara (Tôhô Univ., Chiba). *Yukagaku* (J. Japan Oil Chemists' Soc.) **9**, 169–74 (1960). A review with 22 references.

WETTING BY SURFACE-ACTIVE AGENTS. V. WETTING ABILITY OF THE NONIONIC SURFACE-ACTIVE AGENTS. Yoshio Nemoto (Nagoya Munic. Ind. Research Inst.). *Yukagaku* (J. Japan Oil Chemists' Soc.) **8**, 35–6 (1959). Nonionic agents were prepared by adding 10, 20, or 30 moles of ethylene oxide to nonylphenol, dodecyl alcohol, dodecylamide, dodecylamine, octadecyl alcohol, octadecyl amide, and octadecylamine. Wetting of cotton cloth by these agents were measured with hydrometers in terms of k, the reciprocal of time (sec.) to reach $V_a/V_c = 0.54$, and V_a/V_c at 100 sec., where V_c was volume of cloth and V_a was volume of residual air. The wetting velocity was higher for nonionic agents of ether and amide types than for those of amine types. It decreased as the number of moles of ethylene oxide added increased. An experimental equation was obtained: $V_a/V_c = -0.85 \log k + 1.39$

α-SULFONATION OF FATTY ACID ESTERS WITH SULFUR TRIOXIDE. I. Tetsuro Ishiguro and Teruzo Asahara (Univ. Tokyo, Chiba). *Yukagaku* (J. Japan Oil Chemists' Soc.) **8**, 27–30 (1959). SO_3 could be stabilized with $Si(OCH_3)_4$, CH_3SiCl_3, and CCl_4. When CCl_4 was used for the solvent for sulfonation, CCl_4 was best suited also as the stabilizer. Palmitic, myristic, and lauric acids were sulfonated with stabilized SO_3; it was necessary to be cautious in stirring and moisture prevention. The products were recrystallized to grey powder from a mixture of *n*-heptane and ether. The dissociation constants were 3.71×10^{-3} and 7.08×10^{-6} for α-sulfopalmitic acid. This acid had dipole moment 4.80 D (in dioxane). It tended to form ionic micelles.

INFLUENCE OF COMMERCIAL SURFACE-ACTIVE AGENTS ON THE POLYMERIZATION OF VINYL ACETATE AND STYRENE. Tadaaki Bito and Hiromi Yamakita (Nagoya Inst. Technol.). *Yukagaku* (J. Japan Oil Chemists' Soc.) **8**, 22–7 (1959). The polymerization of vinyl acetate was accelerated in the presence of alkylbenezenesulfonates, but was rather retarded in the presence of other cationic and nonionic agents. Polymerization of vinyl acetate did not occur in the presence of alkyl phosphates. The polymerizate in the presence of alkylpyridinium chloride was assumed to be of branched structure. In the case of polymerization of styrene, all the agents other than alkyl phosphates accelerated the polymerization. Addition of small amounts of NaCl, NaH_2PO_4, and Na_2CO_3 accelerated the emulsion polymerization of styrene.

PERCUTANEOUS ABSORPTION AND SURFACE-ACTIVE AGENTS. L. J. Vinson and B. R. Choman (Lever Brothers Co., Edgewater, N. J.). *J. Soc. Cosmetic Chemists* **11**, 127–37 (1960). Sodium lauryl sulfate and to a lesser extent, sodium dodecylbenzenesulfonate, applied topically to guinea pigs under the conditions of a two-stage multiple application test were observed to provoke the eczematous action of nickel sulfate and also its deep penetration into the skin. Both surface active agents have an acanthotic effect on guinea pig skin and the significance of this action on nickel penetration and irritation is discussed. It is noteworthy that soap at 8 per cent concentration also has an acanthotic effect on guinea pig skin but does not elicit a nickel response. The anionics, Igepon A and Igepon T, two nonionics, and one cationic did not elicit the skin response to nickel.

EFFECT OF SURFACE-ACTIVE AGENTS ON DRAINAGE AND PHYSICAL STRENGTH PROPERTIES OF SULFITE PULP. R. V. Touchette and L. C. Jenness (U. of Me., Orono, Me.). *Tappi.* **43**, 484–9 (1960). An investigation has been made to determine the effects of surface active agents on drainage and physical strength properties of sulfite pulp. All surfactants used facilitated water removal from the sheet. Physical strength properties were affected by the addition of surfactants. Cationic surfactants had the greatest effect on physical properties. Nonionic surfactants acted in the same way as the cationic except that the per cent changes in physical properties were not as large. Anionic surfactants increased breaking length and decreased burst and tear. The effects of surfactants on the various properties investigation are thought to be the result of surface tension and the relationship of electric charges between the surfactants and the pulp fibers.

THE PERFUMING OF VACUUM-PROCESSED SOAPS. H. Schmidt. *Soap, Perfumery, Cosmetics* **33**, 410, 412 (1960). In the continuous automatic production of fine soap by the Mazzoni process, rolling mills are discarded, and mixing with perfume and other additives is carried out in an automatic machine and finally in plodders. Spreading over large areas is avoided and efforts are made to obtain the soap in compact form after mixing. The raw soap produced by the vacuum process has a much more agreeable and at least more neutral odor, so that the perfume oils can take effect more satisfactorily in it, and the losses of perfume are less than in an open mill.

SUGGESTED SPECIFICATIONS FOR LIQUID DRYCLEANING DETERGENT. J. B. Schapiro (Dixo Co., Rochelle Park, N. J.). *Soap, Chem. Specialties* **36**(5), 71–2, 259–60 (1960). Specifications regarding the performance characteristics of drycleaning detergents are reviewed. The factors considered are: type, solubility, odor, storage stability, distillability, filterability, corrosive effect, pH range, effect on fibers, graying, concentration, and efficiency. 13 references.

ESTIMATION OF SOIL REDEPOSITION BY DETERGENTS. A. R. Martin and R. C. Davis (Whirlpool Corp., St. Joseph, Mich.). *Soap,. Chem. Specialties,* **36**(4), 49–51, 109; (5), 73–6, 255 (1960). "Soil Index" tests were made on the use of clay suspensions as a model soil in redeposition studies. The experiments with clay soil were made in a "Terg-O-Tometer" and an accurate method of measuring soil redeposition was developed which gave a yield proportional to the amount of soil deposited. Correlation between clay and natural soil at different soil concentrations were determined. Results are given in graphs.

DISINFECTANTS FOR BEDDING. M. J. Foter (U. S. Public Health Service, Cincinnati). *Soap, Chem. Specialties* **36**(4), 73–6, 103; (5), 127–33, 139–41 (1960). Types of organisms found in contaminated bedding and clothing are reviewed. Studies showed that laundry procedures were generally efficient in removing bacteria during the washing and rinsing steps but became recontaminated during the water extraction in spin drying, in drying in the laundry, and during sorting. Germicidal rinses before laundering and in the rinse cycle resulted in a significant decrease in the bacterial counts of bedding linen and clothing. Data on the efficiency of home automatic clothes washers show that good washing action, an effective detergent, water above 145°F., wash cycle of 10 to 20 min., and use of an effective germicide in the rinse cycle, will effect a 99% reduction in numbers of bacteria in bedding and clothes.

THE IRRITATING EFFECT OF SURFACE-ACTIVE AGENTS ON THE EYES OF RABBITS. K. Meinecke (Dermatological Clinic, Univ. Munich). *Fette Seifen Anstrichmittel* **62**, 107–112 (1960). The author has shown that fatty alcohol sulphates and alkyl aryl sulphonates are irritants to the eyes of rabbits. The fatty acid-protein condensates do not cause any irritating effects over the same ranges. The irritating effect of the first class of compounds can be considerably reduced by combining them with the products of protein hydrolysis or their condensation products.

THE HYDRATION OF POLYGLYCOL ETHERS. G. Boehmke and R. Heusch (Farbenfab. Bayer A.G., Leverkusen). *Fette Seifen Anstrichmittel* **62**, 87–91 (1960). A quantitative study of the mechanism of hydration of polyglycol ethers, which have obtained importance as emulsifiers, has been undertaken. The determinations were done by viscosity measurements on aqueous solutions of the substituted phenyl-glycol ethers. In order to detect various stages of hydration, the heats of mixing and hydration were followed calorimetrically. The existence of stable monohydrates is discussed in detail. In order to explain the stability of hydrated compounds it is supposed that molecules of water are taken up by the polyether chain in the form of inclusion compounds. The solubility in water is explained by the existence of a tetrahydrate form of the polyglycol ether.

THE BEHAVIOR OF SKIN TOWARDS WATER ABSORPTION AFTER THE APPLICATION OF OINTMENTS AND DETERGENTS. G. Weber (Univ., Mainz., Skinclinic). *Fette Seifen Anstrichmittel* **62**, 105–107 (1960). With the help of "quaddel resorption," it was possible to determine which of the substances tested will penetrate the epidermis and which of them would not. The experiments showed that the soap solutions tested brought about an accelerated intracutaneous quaddel resorption. Syndets affect it only slightly and the application of ointments results in a retardation of the effect. The experiments form a basis to influence the degree of water concentration in the extra cellular region of the binding tissue.

THE INFLUENCE OF SOAP SOLUTIONS ON THE SOFTENING AND SWELLING OF HAIR. II. L. Habicht (Palmolive-Binder & Ketels, GmbH., Hamburg). *Fette Seifen Anstrichmittel* **62**, 101–105 (1960). Two methods for determination of degree of softening of hair are discussed; the determination of the resistance to cutting and the determination of the work necessary to cut the hair. Cutting resistance is dependant on the temperature. Using the second method, softening was established as a function of the concentration and fatty acid composition of the soap.

HAIR CONDITIONING COMPOSITION CONTAINING N(HIGHER ACYL COLAMINO FORMYLMETHYL) PYRIDINIUM CHLORIDE AND A FATTY ACIDS MONOGLYCERIDE SULFATE ANIONIC DETERGENT. A. F. Anderson (Colgate-Palmolive Co.). *U. S. 2,928,772.* A clear liquid shampoo composition having hair conditioning properties consisting of 10 to 35% of an anionic detergent such as a fatty acids monoglyceride sulfate and 7% of a cationic such as N (lauroyl colamino formylmethyl) pyridinium chloride, and an aqueous alcoholic medium.

LAUNDERING COMPOSITIONS. E. F. Gebhardt (Procter & Gamble Co.). *U. S. 2,930,760.* A laundering composition for use in washing white fabrics and which as an effective and desirable bluing reaction without causing permanent staining consists of an active detergent such as an alkali-metal soap or anionic or nonanionic, and a bluing agent designated "CI Acid Blue T/321."