ABSTRACTS

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

• Fats and Oils

ONE-STEP CHROMATOGRAPHIC CLEANUP OF CHLORINATED HYDROCARBON PESTICIDE RESIDUES IN BUTTERFAT. II. CHROMATOGRAPHY ON FLORISIL. W. A. Moats (U. S. Dept. of Agr., Agr. Marketing Service, Market Quality Research Div., Beltsville, Md.). *J. Assoc. Offic. Agr. Chem.* **46** (2), 172–176 (1963). The procedure for chromatography on Florisil was modified by using methylene chloride-petroleum ether mixtures to improve separation of insecticides from fat. Combined with paper chromatography, it provides a screening procedure for insecticide residues in dairy products that is comparable in speed and simplicity to total chloride methods but is of superior sensitivity.

RAPID COLORIMETRIC DETERMINATION OF DDT IN MILK AND BUTTER. R. C. Blinn and F. A. Gunther (Dept. of Entomology, Univ. of Calif. Citrus Res. Center and Agr. Exp. Sta., Riverside, Calif.). *J. Assoc. Offic. Agr. Chem.* **46** (2), 191–195 (1963). Two versions of a colorimetric procedure for DDT in milk and butter were compared to determine which was more reliable. Thirteen collaborators favored the version incorporating an oxidative cleanup step with average findings of 0.89 ± 0.19 and 0.18 ± 0.05 ppm for milk fortified at levels of 0.95 and 0.18 ppm, respectively; corresponding assays by the other procedure were 0.80 ± 0.27 and 0.18 ± 0.07 ppm. Analysis time varied from 2.5 to 11 hours per lot of three unknown samples plus two control samples.

ELECTRON CAPTURE GAS CHROMATOGRAPHY FOR DETERMINATION OF DDT IN BUTTER AND SOME VEGETABLE OILS. A. K. Klein, J. O. Watts, and J. N. Damico (Div. of Food, Food and Drug Admin., Wash. 25, D. C.). *J. Assoc. Offic. Agr. Chem.* **46** (2), 165–171 (1963). The use of electron capture gas chromatography makes it possible to determine DDT in 1 g of butter and in 1 g of refined vegetable oils at the 0.1–1.0 ppm level of DDT. The precision is about 90%. The lowest limit for reliable measurements is 0.1 ppm DDT. A variable artifact, having the same retention time as *p,p'*-DDT, is the limiting factor. The presence of DDT may be confirmed by measuring and identifying DDE formed by alkaline hydrolysis.

FATTY ACIDS AND OTHER LIPIDS IN MAYONNAISE. Gertrude Eastwood, Portia Watson, M. L. Bierenbaum, and A. I. Fleischman (St. Vincent's Hospital, Montclair, N.J.). *J. Am. Dietet. Assoc.* **42**, 518–520 (1963). The lipid composition of 9 brands of mayonnaise is reported. Polyenoic acids comprised from 52–68% of the total fatty acids and saturated acids from 11 to 22%. The mayonnaises contained from 160 to 335 mg./100 gm. of total sterols (20% cholesterol and 80% mixed phytosterols). The authors suggest that mayonnaise is suitable for a diet requiring a very high concentration of polyunsaturated fatty acids.

THE COMPONENT FATTY ACIDS OF THE GLYCERIDE AND PHOSPHOLIPID FRACTIONS OF THE BAOBAB SEED (ADANSONIA DIGITATA). S. H. W. Cmelik (Agr. Res. Council of Rhodesia and Nyasaland). *J. Sci. Food Agr.* **14**, 287–291 (1963). Glycerides from the decorticated seed of the baobab tree have been extracted with acetone and the fatty acid composition investigated by reversed-phase paper chromatography. Pure lecithin and cephalin have been isolated from the alcohol-ether (3:1) extract and their fatty acids studied. All fractions contain palmitic acid as the predominant saturated and oleic acid as the main unsaturated acid. Linoleic acid is present in all fractions to the extent of 21.7 to 30.6%, but no other polyunsaturated acids have been found.

RECENT PROGRESS IN AUTOXIDATION OF MONOETHENOID FATTY ACIDS AND THEIR ESTERS. J. H. Skellon and D. M. Wharry (Brunel College, London). *Chem. Ind. (London)* **1962**, 929–932. The authors review recent literature (36 references). The theory of hydroperoxide formation in the main initial reaction of autoxidation of ethenoid esters has so far not been disproved. However, many investigators have concluded that not only are hydroperoxides formed but in addition other complex peroxide types are found in the initial products and also non-peroxidic oxygenated compounds are formed concurrently. Theories to explain the presence of carbonyl and other oxygenated monomers, dimers and polymers in the products of autoxidation of monoethenoid fatty acids and their esters are discussed.

DETERIORATION OF FRYING OILS. V. THE TYPE AND INDUCTION PERIOD OF THE DETERIORATION OF SOYBEAN OIL. Hisashi Kumazawa (Nagoya Municipal Hygienic Research Institute). *Yukagaku* **12**, 214–19 (1963). Deterioration of frying oil was classified into S and J types of deterioration (mainly the tendency of foaming). The S type oil, stored under unfavorable condition for some time, showed reversion of color quickly while J type oil showed usual tendency of deterioration. The change in iodine no., carbonyl no., viscosity and ultraviolet absorption spectra have been found to be extremely useful in evaluating the induction period and subsequent deterioration, while the changes in refractive index, color and acid no. were not characteristic for each type of oil. The absorption band of conjugated dienoic acid (at about 230 mμ), which showed a broad range and increased slowly during the induction period, developed intensely and rapidly with the progress of deterioration. On the other hand, it was also found that absorption of conjugated trienoic acid (at 259, 268, and 279 mμ) were very clearly indicated during the induction period, but tended to disappear with the advance of deterioration. VI. THE FRYING TEST TO EVALUATE THE STABILITY OF FRYING OILS. *Ibid* 288–94. Frying tests were made by two methods. A continuous frying method was used as well as a frying method in which 10% by weight of used oil was replenished with fresh oil. The oils tested were soybean oil (S), rapeseed oil (R), S with addition of 0.1 ppm dimethylpolysiloxane ($0.1S$), and that with 1.0 ppm dimethylpolysilixane ($1.0S$). The order of stability of oil by the continuous frying method was $1.0S > 0.5S > R > S$ while that by the replenish method was in the order of $0.5S > 1.0S > R \geqq S$. The iodine no., carbonyl no. and light absorbancy at 233 mμ shown at the end of each induction period were almost identical by both of these methods. Therefore, evaluation of stability should be judged from the length of induction period.

ISOLATION AND STRUCTURE OF THE EICOSENOIC, DOCOSENOIC, OCTADECATETRAENOIC, EICOSAPENTAENOIC AND DOCOSAHEXAENOIC ACID IN SKIPPER OIL. Suketaka Ito and Kazuo Fukuzumi (Nagoya Univ.). *Yukagaku* **12**, 272–7 (1963). Skipper oil is converted into methyl esters and these are separated by fractionation by gas-liquid chromatography. The structures of these acids were determined by oxidative ozonolysis with identification of fragments (as benzyl and/or methyl ester) by gas-liquid chromatography. Those acids identified were: Δ^{9}-eicosenoic acid, Δ^{11}-docosenoic acid, $\Delta^{6,9,12,15}$-octadecatetraenoic acid, $\Delta^{5,8,11,14,17}$-eicosapentaenoic acid, and $\Delta^{4,7,10,13,16,19}$-docosahexaenoic acid. These unsaturated fatty acids were found to be exactly the same as found in other fish oils.

COMPOSITIONS OF THE COMPONENT FATTY ACIDS OF SEVERAL FISH OILS. Suketaka Ito and Kazuo Fukuzumi (Nagoya Univ.). *Yukagaku* **12**, 278–81 (1963). Properties (n_D^{20}, acid no., sapon. no., iodine no., and % of unsaponifiable substance) of oils from sardine, cuttlefish, oil-flatfish *(Cynopsetta dubia)*, goby, tunny, sword-fish, cod-liver and shark-liver are listed. The compositions of these oils, as in the case of skipper oil, were composed of saturated fatty acids (in order of concentration C_{16}- followed by C_{14}- and C_{18}-, while the contents of C_{12}- and C_{20}-acids are zero or very small), unsaturated fatty acids composed mainly of monoenic acids (Δ^{9}-octadecenic acid, Δ^{9}-eicosenic acid, Δ^{11}-docosenic acid, and Δ^{13}-tetracosenic acid), polyunsaturated fatty acids (mainly of $\Delta^{6,9,12,15}$-octadecatetraenic acid and $\Delta^{5,8,11,14}$-eicosatetraenic acid), while the content of dienic and trienic acids was very small. Thus these oils contained no characteristic component specific to each kind of fish but the differences among them were only in their relative ratio of the fatty acids.

FAT SPLITTING AND FATTY ACID DISTILLATION. M. B. Narasimha, S. Z. Abideen and K. S. Chari (Reg. Res. Lab., Hyderabad-9, India). *Indian Oil Seeds J.* **7**(1), 39–45 (1963). The development of fat splitting is briefly traced and the importance of high pressure hydrolysis is explained along with the mechanism. A batch type pilot plant of 100 kg. per batch capacity is described. The results obtained on the pilot plant for splitting cottonseed and linseed oil under various conditions are reported and discussed. The pilot distillation plant of 100 kg. per batch capacity is described and the results of the distillation of cottonseed fatty acids are reported.

A SECONDARY OXIDATION PRODUCT OF THE SCISSION OF THE PEROXIDES OF UNSATURATED FATTY ACIDS AND THEIR ROLE IN THE RANCIDITY OF FAT. M. Loury and G. Lechartier (Lab. Jean Ripert, Inst. des Corps Gras). *Rev. Franc. Corps Gras* **10** (5), 273–278 (1963). By this study it has been demonstrated that

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the aldehydes formed by the scission of the peroxides of unsaturated acids can undergo a secondary autoxidation accompanied by a degradation of their chain. By means of a chain reaction there can be produced a series of acids and aldehydes of lower molecular weight. A hypothesis is presented that autoxidative rancidity is formed by the aggregation of products resulting from the double degradation of unsaturated fatty acids after scission of the initial peroxide molecule. The hypothesis has been substantiated with experimental results, taking into account the formation of small quantities of impurities.

IV. Aldehydic rancidity. *Ibid.*, 21–28. The role of aldehydes in the rancidity of foods is reviewed.

The component fatty acids of the seed fat of Bassia (Madhuca) Butyracea. P. N. Agarwal, S. C. Pandey, T. R. Sharma and Om Prakash (H. B. Technological Inst., Kanpur, India). *J. Proc. Oil Technologists' Assoc. India, Kanpur*, 18, 810 (1963). The kernels of *Bassia butyracea* seeds yield 64.1% of a nondrying oil. The oil has been found to contain 55.86% palmitic, 1.63% stearic, 38.55% oleic and 3.96% linoleic acid, confirming the results of previous workers.

A method for determining oxirane (epoxide) oxygen. L. A. Lyubavina (N. M. Knipovich Arctic Sci.-Res. Inst. and Planning Inst. of Marine Fishing and Oceanography). *Maslob.-Zhir. Prom.* 21(1), 38 (1963). The determination of oxirane oxygen by using a 0.1 *N* solution of gaseous HBr or HCl in glacial acetic acid is inconvenient because of the difficulty of preparing the solution. In order to improve the method, hydrochloric acid with a specific gravity of 1.19 was substituted for the HBr. Two samples of herring fat (oxidized and non-oxidized) were analyzed using the modified solution. Results showed that for determining oxirane oxygen the 0.1 *N* solution of concentrated HCl in acetic acid is satisfactory. The feasibility of employing this solution in the investigation of other fats should be tested on larger samples of the experimental material.

• Fatty Acid Derivatives

Potentiometric titration of acids in an N,N-dimethyl fatty amide. C. A. Reynolds, J. Little, and M. Pattengill (Dept. of Chem., Univ. of Kansas, Lawrence). *Anal. Chem.* 35, 973–976 (1963). Potentiometric titrations of a variety of acids and acid mixtures ranging in strength from mineral acids to phenols have been performed using a commercially available mixture of N,N-dimethyl fatty amides as a solvent. A conventional glass indicating electrode was used with a saturated calomel reference electrode modified by replacing the saturated potassium chloride solution with a saturated aqueous solution of lithium chloride. The solvent gave reproducible titration curves which, in all but a very few cases, had flat buffer regions. This fact, coupled with its large potential range, makes the solvent especially suitable for differentiating titrations.

Bis-cyanoethylation of fatty amines. II. Synthesis of bis-(β-cyanoethyl)-hexylamine and bis-(β-cyanoethyl)-nonylamine. Seimei Nitanai and Toru Kawamura (Toyo Koatsu Co., Ltd., Hokkaido). *Yukagaku* 12, 210–13 (1963). Reaction of amine (hexylamine and nonylamine) and acrylonitrile (1:3 molar ratio) in benzene or toluene (2 times of the weight of amine) for 2–3 days at 70C yielded 94–7% of monocyanoethyl compound, while the above reaction with methanol as the solvent yielded 94–7% of biscyanoethyl compound. The above reaction with no solvent, the yield of mono-compound was 85% and that of bis-compound 15%.

Condensation of 1-octadecene with formaldehyde. Choichiro Hirai, Seiji Matsumoto, Masami Sakamoto, and Taro Matsumoto (Faculty of Science and Engineering, Nihon University). *Yukagaku* 12, 205–10 (1963). Condensation of 1-octadecene with formaldehyde in acetic acid and periodic acid catalyst, saponification of the product and fractionation yielded 1,3-nonadecadiol, m. 75–5.5C, 3-pentadecatetrahydropyran-4-ol, m. 65–6C, and a mixture of octadecan-2-ol and octadecan-3-ol, m. 41–4C. 1-Octadecene showed no reaction with formaldehyde without acetic acid in inert solvent such as ethanol or in the presence of 50% acetic acid, also it gave no reaction with aqueous formalin even in acetic acid.

Condensation of oleic acid with formaldehyde. Choichiro Hirai, Masaru Wada, and Taro Matsumoto (Faculty of Science and Engineering, Nihon University). *Yukagaku* 12, 201–5 (1963). A mixture of 17.4 g. paraformaldehyde, 250 ml. acetic acid, 170 g. oleic acid and 1.7 g. periodic acid is refluxed 2 hours, the product extracted with ether and concentrated to give 185 g. of an oil (n_D^{20} 1.4640, I no. 39.1, acid no. 163.6 and sapon. no. 244.3). Saponification of this oil gave 4.5 g. 3-octyl-4-hydroxy-5-carboxyhexyltetrahydropyran (or 3-heptyl-4-hydroxy-5-carboxyheptyltetrahydropyran), m. 117–18C, and the mother liquor gave 25 g. of a mixture of 9- and 10-hydroxystearic acid, m. 70–1C.

Fatty acids in alkyd manufacture. Anon. (Wolf Ltd.). *Tech. Bull.* **1962**, No. 2, (2nd Ed.), 25 pp.—This is a revised enlarged edition of a manufacturer's booklet giving detailed information on the use of fatty acids in the manufacture of alkyds. Suggested formulations for the preparation of different types of alkyds are given. Also included are details of the use of dimeric acids as part replacement of saturated acids and the possibilities of upgrading alkyds modified by semi-drying fatty acids, such as tall oil fatty acids, with the help of small amounts of dehydrated castor oil fatty acids. (Rev. Current Lit. Paint Allied Ind.)

Hydroxy derivatives from castor oil. II—Preparation of alcohol, dihydroxy, trihydroxy and monoglyceride derivatives of undecylenic acid. R. Rao Subba and K. T. Achaya. *J. Sci. Ind. Res.* 21D (12), 446–8 (1962). Some hydroxy derivatives of undecylenic acid have been prepared with a view to finding out their suitability for use in ester and alkyd formulations. The derivatives prepared include (1) undecylenic alcohol, obtained by the reduction of methyl undecylenate with Na (yield 86%) or $LiAlH_4$ (yield 95%); (2) dihydroxyundecane, obtained by formoxylation of undecenyl alcohol and alkali saponification (yield 50%); (3) trihydroxyundecane, obtained by peracetic acid hydroxylation of undecenyl alcohol (yield 60%); and (4) the monoglyceride of undecylenic acid *via* isopropylidene glycerol (yield 57%). Infrared data show that formoxylation of undecenyl alcohol results in non-terminal hydroxylation, though this may or may not be exclusive. Thin-layer chromatography effects clear separation of these compounds according to the number of hydroxyl groups present in them. (Rev. Current Lit. Paint Allied Ind.)

PREPARATION OF MONOGLYCERIDES FROM VEGETABLE OILS. IV. GLYCEROLYSIS OF PEANUT, PARTIALLY HYDROGENATED PEANUT, COCONUT, MUSTARD AND LINSEED OILS. R. K. Kockhar, S. K. Dey and R. K. Bhatnagar (Shri Ram Inst. of Ind. Res. Delhi-6, India). *Indian Oilseeds J.* 7 (1), 46–54 (1963). The glycerolysis of various vegetable oils such as peanut, hydrogenated peanut, linseed, coconut and mustard oils are presented. Oils with a predominance of unsaturated fatty acids are reacted more readily. Fats with low molecular weight fatty acids such as coconut oil are conducive to high yields of monoglyerides under proper conditions. Castor oil gives the highest yield, probably because of the presence of a hydroxyl in the fatty chain. Mustard oil, probably due to the presence of allyl isothiocyanate is not only very difficult to react but also yields a dark and foul smelling product.

PROCESS FOR THE PRODUCTION OF OLEFINIC ACID ESTERS. H. Feichtinger and H. Noeske (Ruhrchemie Aktiengesellschaft). *U.S. 3,095,432.* Unsaturated aliphatic acids and 5 to 15% by weight of potassium bisulfate are placed in a reaction zone and heated to 140–180C while an alcohol having 1 to 10 carbons is continuously introduced in small portions and immediately vaporized, the vaporized alcohol passing directly through the acids. The water of reaction and unreacted alcohol are continuously removed under a vacuum.

METHOD OF PRODUCING HIGHER FATTY ACID POLYMERS. F. O. Barrett and C. G. Goebel (Emery Industries, Inc.). *U.S. 3,097,220.* In the described process unsaturated, higher fatty acids are heated in the presence of a Friedel-Crafts catalyst to form a reaction product containing fatty acid polymer. The improvement consists of increasing the acid number of the polymer by heating the reaction product in the continuing presence of water and a crystalline clay mineral at temperatures of from 180 to 260C for at least ½ hour.

• Biology and Nutrition

THE SKIN STEROLS OF NORMAL AND TRIPARANOL-TREATED RATS. R. B. Clayton, A. N. Nelson, and I. D. Frantz, Jr. (Conant Chemical Lab., Harvard Univ., Cambridge 38, Mass.). and (Depts. of Med. and Physiological Chem., Univ. of Minnesota Medical School, Minneapolis 14, Minn.). *J. Lipid Res.* 4, 166–178 (1963). The skin sterols of normal rats and of rats treated with the drug triparanol have been analyzed by means of chromatography on silicic acid followed by gas-liquid chromatography of the components of the peaks obtained from the silicic acid chromatogram. These two procedures complement each other in leading to complete separations of pairs of sterols that are poorly separated in either system alone. The results are shown to indicate the presence in rat skin of several previously undetected compounds for which molecular structures are proposed on the basis of the retention factor method. Evidence is presented for at least two effects of the drug triparanol, (1) in causing accumulation of the Δ^{24}-analogues of all the intermediates in cholesterol biosynthesis that normally occur in the 24,25-dihydro form, and (2) in causing marked alterations in the proportions of Δ^7- to Δ^8-isomers of these intermediates.

DAMAGE TO PROTEINS BY PEROXIDIZED LIPIDS. I. D. Desai and A. L. Tappel (Dept. of Food Science and Tech., Univ. of Calif., Davis). *J. Lipid Res.* 4, 204–207 (1963). The pur-

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pose of this research was to determine the mechanism of damage to protein by the free radical intermediates formed during the peroxidation of lipids. The reaction system consisted of linolenic acid, cytochrome c, and oxygen. The addition reaction of peroxidizing linolenic acid with cytochrome c was measured using linolenic acid-C^{14}. There was considerable damage to cytochrome c as measured by its decreased solubility. Paper chromatographic studies of the amino acids of the linolenic peroxy-cytochrome c product showed losses of amino acids that are labile to oxidation. Linkages between linolenic acid and cytochrome c were identified as either peroxy or ether by infrared spectra. Hydrolysis revealed that 70% of the linolenic acid was bound to cytochrome c through peroxy bonds, and the rest through ether or possibly carbon-to-carbon bonds. Measurements of thiobarbituric acid value and peroxide number substantiated the chemical nature of peroxidative damage to cytochrome c.

Metabolism of plasmalogen: II. The determination of alkenyl ethers in the presence of free aldehydes. H. R. Warner and W. E. M. Lands (Dept. of Biol. Chem., Univ. of Michigan, Ann Arbor). *J. Lipid Res.* 4, 216–220 (1963). A rapid and sensitive method for the analysis of alkenyl ethers (plasmalogens) in the presence of free aldehyde is proposed. The method is applicable over the range 0.02–0.2 μ moles of plasmalogen and is particularly useful for following the course of enzymatic or chemical reactions in mixtures containing both free aldehydes and plasmalogens in aqueous media.

Quantitative isolation of sterols. W. M. Sperry (Depts. of Biochem., New York Psychiatric Inst., and College of Physicians and Surgeons, Columbia Univ., New York 32, N.Y.). *J. Lipid Res.* 4, 221–225 (1963). Procedures are described for the quantitative gravimetric isolation of cholesterol and cholestan-3β-ol as the digitonides and for the quantitative recovery of these sterols from their digitonides in the range of 0.5–4.0 mg.

Some features of fat metabolism during stress. S. M. Leites and Chou-Su (Dept. of Pathophysiology, Central Postgraduate Med. Inst., Moscow). *Federation Proc.* 22, T244–246 (1963) Part II, (Trans. Sup.) (Voprosy Meditsinskoi Khimii, vol. 8, no. 3, p. 289, 1962) In rats subjected to stress, an increase in the content of unesterified (free) fatty acids in the blood serum is observed with stress lasting from 20 min to 17 hrs. A parallel increase in the lipolytic activity of the adipose tissue is observed after 20 min to 3 hr of stress; after 17 hr, this index decreases, while lipolysis in the liver increases. The lipolytic activity of the myocardium decreases at 3 hr and 17 hr of stress. The lipolytic activity of the aortic tissue decreases with stress lasting 1–17 hr. The depression of the lipolytic activity of the myocardium and aortic tissue under stress may be significant in the pathogenesis of the cardiovascular diseases that develop during this state.

Serum lipoproteins in patients with various circulatory disturbances. A. A. Mittel'shtedt, L. K. Bauman, V. M. Karpinskaya and G. R. Knyazeva. *Federation Proc.* 22, T240–243 (1963) Part II, (Trans. Sup.) (Zhurnal Nevropatologii i Psikhiatri imeni S. S. Korsakova, vol. 62, no. 1, p. 59, 1962). Regardless of whether at the moment of investigation there was an acute disturbance of the cerebral circulation or not, and also regardless of the character of the lesion, the protein-lipid metabolism is grossly disturbed in hypertensive patients in the sclerotic stage and in patients with generalized and cerebral atherosclerosis. This is manifested by an increase in the total lipid concentration, an increase in the β-lipoprotein fraction of the serum, and an increase in the concentration of the total cholesterol and the cholesterol in the β-lipiprotein fraction; the distribution of phospholipids among the fractions is also abnormal. The increase in the fibrinogen concentration in the patients' blood and the changes in heparin tolerance demonstrate that the clotting system of the blood is involved.

Vitamin E and essential fatty acids. F. Weber, U. Gloor and O. Wiss (Hoffman-LaRoch & Co., Basel). *Fette Seifen Anstrichmittel* 64, 1149–1153 (1962). In numerous investigations it has been shown that an increased absorption of essential fatty acids (linoleic and arachidonic acids) results in an increase in the vitamin E requirement. The author discuss the question of how far the vitamin E content of edible fats is able to cover the increased requirement caused by essential fatty acids.

Effect of feeding autoxidized soybean oils on the body fat of rats. E. Degkovitz and K. Lang. *Fette Seifen Anstrichmittel* 64, 893–900 (1962). Soybean oil was oxidized at 180C in the presence of air for ten and twenty hours. The effects of feeding this oxidized oil upon the body fat of the rat was investigated. Animals were fed the oils both with and without vitamin E supplementation. The authors report an increase in the content of oxidation products of unsaturated fatty acids in the body fat of rats as measured by their methods (TBA test and dichloroindolphenol test). Influences of the heated fat diets upon diene, triene, and total polyeneoic acid content of the body fat of the rat are also discussed.

Catalysis of unsaturated lipid oxidation by iron protoporphyrin derivatives. W. D. Brown, LeAnna S. Harris and H. S. Olcott (University of California, Berkeley). *Arch. Biochem. Biophys.* 101, 14–20 (1963). Various derivatives of hemoglobin and myoglobin, including methemoglobin and metmyoglobin, imidazole hemoglobin hemichrome and imidazole myoglobin hemichrome, carbon monoxide hemoglobin, oxyhemoglobin, and nitric oxide hemoglobin were used as catalysts for unsaturated lipid oxidation. All were active catalysts, but there were induction periods with some of the ferrous forms. Extraction of the catalyst followed by spectrophotometric analysis indicated it to be in the ferrous form during the induction period and in the ferric state once the oxidation started. Denatured methemoglobin and nitric oxide hemoglobin behaved similarly to the analogous native protein compounds.

In vitro studies on the fate of α-tocopherol in rat liver homogenates. C. R. Seward and L. M. Corwin (Walter Reed Army Medical Center). *Arch. Biochem. Biophys.* 101, 71–4 (1963). Incubation of tocopherol with rat liver homogenates under conditions which have been shown to prevent an *in vitro* metabolic, oxidative lesion does not lead to the formation of new, active metabolites of the vitamin. Other than appearing to be bound to the protein during the course of the incubation, tocopherol seems to be its own active metabolite in the *in vitro* system.

The correlation of gas-liquid chromatographic behavior and structure of steroids. C. J. W. Brooks and Leila Hanaineh (Western Infirmary, Glasgow). *Biochem. J.* 87, 151–61 (1963). Retention data, relative to cholestane, for gas-liquid chromatography of 90 steroids of the androstane, pregnane, cholane and cholestane series have been recorded for two silicone sationary phases, SE-30 and QF-1, on Gas-Chrom P at 200C. A constant separation of 1.12 was observed on both phases for 5α- and 5β-epimers of saturated steroids, either bearing no 3-substituent or with a 3-oxo group. Regularities in changes in retention accompanying the introduction of a substituent have been demonstrated for 3-, 11-, 17- and 20-hydroxyl groups and for 3-, 11-, 17-, 20-, and Δ^4-3-oxo groups. Acetylation retention factors for 3-hydroxy steroids have been correlated with the stereochemistry of rings A and B. Data have been applied to the tentative identifications of keto steroids derived from urine.

Vitamin E deficiency and ion transport in rat liver slices. A. E. McLean (University College Hospital Medical School, London). *Biochem. J.* 87, 164–7 (1963). Liver slices from rats which had been made deficient in vitamin E by feeding them on casein or yeast diets were unable to reaccumulate potassium removed by leaching in the cold. Cooled slices also showed a falling off in oxygen uptake. These defects were not prevented by feeding with selenium but were promptly reversed by giving α-tocopherol or by the addition of antioxidants to the incubation solution. The author concludes that the defect *in vitro* in oxygen uptake by vitamin E-deficient tissues follows disturbances of ionic composition due to cooling.

ALL-CIS-DOCOSA-4,7,10,13,16,19-HEXAENOIC ACID IN OX RETINA. A. R. Hands and W. Bartley (University of Oxford). *Biochem. J.* 87, 263–6 (1963). All-*cis*-docosa-4,7,10,13,16,19-hexaenoic acid has been isolated as the methyl ester from cattle retinae and its structure determined by degradation.

STUDIES ON METABOLISM OF VITAMIN A. 1. THE BIOLOGICAL ACTIVITY OF VITAMIN A ACID IN RATS. P. Malathi, K. Subba Rao, P. S. Sastry and J. Ganguly (Indian Institute of Science, Bangalore). *Biochem. J.* 87, 305–11 (1963). Vitamin A acid was biologically 48.9% as active as all *trans*-vitamin A acetate in rats when given orally, and 141% as active when injected intraperitoneally. When vitamin A deficient rats were fed with 10 μg of vitamin A acid or the acetate per day, the acid-fed rats showed a more pronounced growth response within 24 hours of the dose, drank considerably more water and excreted less urine than the acetate-fed group. A single dose of 500 μg of the acid could sustain the growth rate of deficient rats for 4 weeks. The authors suggest that the marked growth in response to vitamin A acid may be due to a more rapid correction of water imbalance in the deficient animals.

STUDIES IN CAROTENOGENESIS. 29. ATTEMPTS TO DETECT LYCOPERSENE IN HIGHER PLANTS. E. I. Mercer, B. H. Davies and T. W. Goodwin (University College of Wales). *Biochem. J.* 87, 317–25 (1963). A method for the detection and identification of lycopersene has been developed. The sensitivity is 0.05 μg. Analysis of the unsaponifiable components of excised, etiolated maize seedlings exposed to 2 C^{14}-mevalonate under conditions of light and darkness, and to $C^{14}O_2$, has failed to reveal the presence of lycopersene. Labeled CO_2 was incorporated into both squalene and phytoene by maize seedlings, but mevalonate was incorporated only into squalene. Mevalonate was incorporated into both squalene and phytoene by carrot-root slices; no lycopersene could be detected. No lycopersene could be detected in tare (*Vicia sativa*) lipid. The authors conclude that lycopersene is probably not a precursor of carotenoids.

30. THE PROBLEM OF LYCOPERSENE FORMATION IN NEUROSPORA CRASSA. B. H. Davies, D. Jones and T. W. Goodwin. *Ibid,* 326–9. A detailed analysis of the less polar hydrocarbons of the unsaponifiable fraction of *Neurospora crassa,* cultured in the presence of diphenylamine, revealed the presence of squalene, phytoene, phytofluene and β-carotene. Several unidentified hydrocarbons, less polar than squalene, have also been detected. Lycopersene, the C_{40} analogue of squalene, was absent. Labeled mevalonic acid was incorporated into squalene and phytoene and other tetraterpenes more unsaturated than phytoene. Labeled lycopersene could not be detected. According to the authors, these results indicate that phytoene and not lycopersene is the first C_{40} compound formed in carotenoid biosynthesis.

STUDIES ON THE MODE OF ACTION OF EXCESS VITAMIN A. 6. LYSOSOMAL PROTEASE AND THE DEGRADATION OF CARTILAGE MATRIX. H. B. Fell and J. T. Dingle (Strangeways Res. Lab., Cambridge). *Biochem. J.* 87, 403–8 (1963). Cartilaginous rudiments of chick embryos grown in the presence of 3.3 μg of vitamin A/ml. release an acid protease into the culture medium. The pH optimum of this enzyme is similar to that of a protease obtained from a particulate fraction of the rudiments. Vitamin A also released a protease from a particulate preparation obtained from bovine and chick cartilage. These results provide evidence that the vitamin, when added in excess of normal requirements, causes a change in the permeability or stability of intracellular particles.

DIETARY BILE ACIDS AND LIPID METABOLISM II. THE DUCTULAR CELL REACTION INDUCED BY LITHOCHOLIC ACID. R. D. Hunt, G. A. Leveille and H. E. Sauberlich (U. S. Army Med. Res. and Nutr. Lab., Fitzsimmons General Hosp., Denver, Colo.). *Proc. Soc. Exp. Biol. Med.* 113, 139–142 (1963). Dietary lithocholic acid alone and in combination with cholic acid or cholesterol has been shown to induce the ductular cell reaction in the livers of chickens. Dietary cholic acid, deoxycholic acid, or cholesterol did not alter liver structure. Removal of lithocholic acid from the diet resulted in regression of the reaction.

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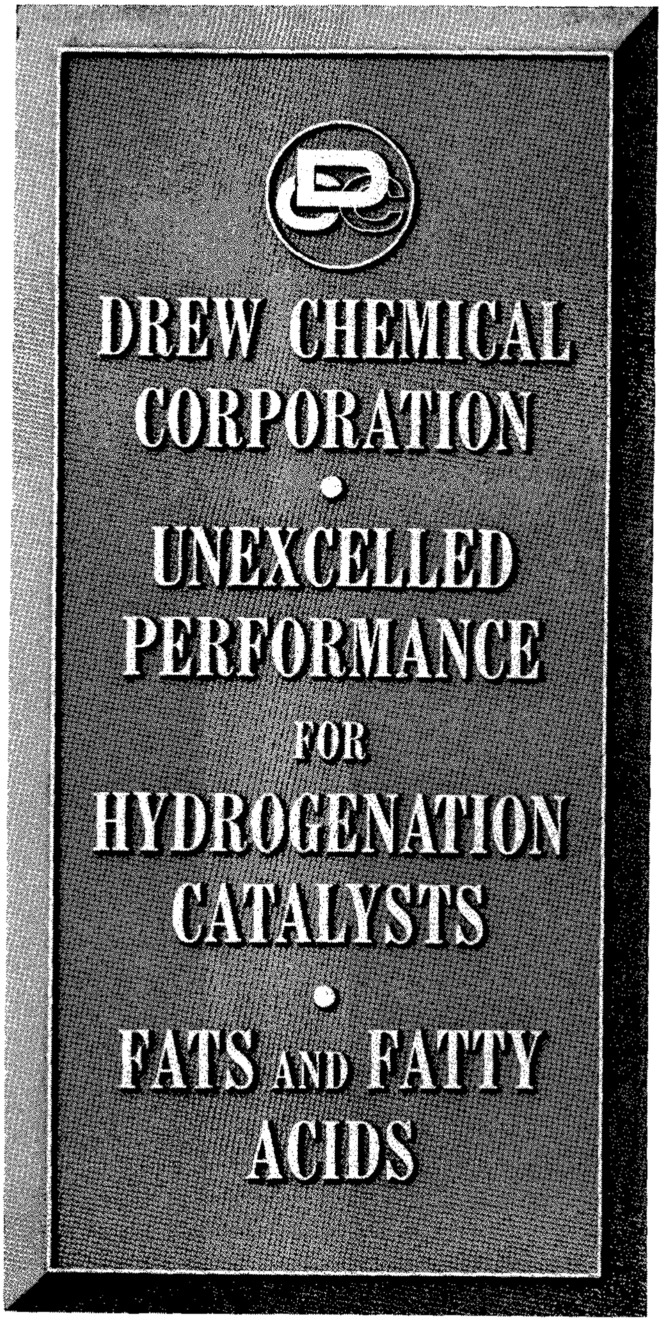

• Drying Oils and Paints

PROTECTION OF IRON BY ZINC-RICH PAINTS. Anon. *Corrosion et Anticorrosion* 10, No. 4, 148 (1962). Zinc-rich primers require no finishing coat, harden under water on account of Zn carbonate formation, possess high resistance to abrasion and to fungi, a cathodic protective action, thermal and electrical conductivity and suitability for use as welding primers. (Rev. Current Lit. Paint Allied Ind.)

HAZARDS TO HEALTH: EPOXY RESINS. L. B. Tepper. *New England J. Med.* 267, 821 (1962). In the course of a short review article the author draws attention to some harmful effects which components of epoxy resins and the resins themselves may produce. Although the cured resins are virtually non-toxic, the liquid resins prior to the addition of the catalyst are irritant to the eye and skin and are also weakly sensitizing. Hardening agents such as diethylenetriamine and triethylenetetramine may give rise to primary and allergic dermatitis. Contact with amine catalysts during manufacture may cause dermatitis and the development of a permanent state of extreme hypersensitivity to these agents. Such hypersensitive individuals may experience a return of their dermatitic condition as a result of contact with the small amounts of amines present in solid epoxy-resinous materials. Inhalation of amine hardeners may result in prolonged asthma-like wheezing and coughing which may recur even on exposure to minute traces of amine vapours. (Rev. Current Lit. Paint Allied Ind.)

CHEMICAL AND PHYSICAL PROCESSES IN VARNISH SOLUTION AND FILMS. G. Marwedel, *Ind.-Lack.-Betrieb* 30, 370–380 (1962). After an introductory historical review, the scientific foundations of developments in the varnish field and their practical implications are explained. The quoted characteristics of the individual classes of resins are based on the work of J. Scheiber. (Rev. Current Lit. Paint Allied Ind.)

PAINT THAT DETECTS RADIATION. Anon. *New Scientist* 16, No. 314, 441 (1962). A paint based on a yellow azo dye in polyvinyl chloride has been developed which can be used to detect radiation doses in the range 100,000–10 million rads. Irradiation releases HCl from the polyvinyl chloride, which turns the dye red. Painted stickers are used on boxes of surgical instruments, *etc.*, to show whether irradiation sterilisation has been carried out. (Rev. Current Lit. Paint Allied Ind.)

MEET THE URALKYD. E. R. Wells and J. C. Hixenbaugh. *Am. Paint J.* 46, No. 47, 88 (3 pp.) (1962). A description of the properties of urethane oils, for which the term ''uralkyds'' is proposed. (Rev. Current Lit. Paint Allied Ind.)

NEW RESULTS IN THE PRACTICAL APPLICATION OF ISANO OIL IN [STAND OILS AND] VARNISHES. R. Priester, *Farbe u. Lack* 68 (12), 879 (1962). A summary of a paper presented at the Düsseldorf Conference of the Deutche Ges. für Fettwissenschaft, 1962. The chemical constitution of isano oil has led to difficulties in its development in the varnish industry. The terminal vinyl group in its structure causes rapid polymerization at higher temperatures. Owing to its exothermic reaction on heating, isano oil should only be processed to stand oils below 200C. and only in small quantities. The influence of time of heating at 250C on a mixture of linseed oil and isano oil (4:1) in relation to viscosity and drying time is shown in tables. As isano oil is made from nuts grown in the formerly French Congo and at present unobtainable, its development is restricted. (Rev. Current Lit. Paint Allied Ind.)

REACTION OF DRYING OILS WITH ALKENES. H. P. Kaufmann and F. J. Büscher. *Farbe u. Lack* 68 (12), 880 (1962). A summary of a paper presented at the Düsseldorf Conference of the Deutsche Ges. für Fettwissenschaft, 1962. At elevated temperatures and pressures, in the way of the Diels-Alder synthesis with formation of cyclic systems, the lower gaseous olefins, *e.g.*, ethylene, propylene and butylene and also acetylene, add on to unsaturated fatty acid methyl esters and triglycerides. The yield from ethylene and acetylene with diolefinic acids is about 45%. This synthesis can be used to explain stand oil formation. (Rev. Current Lit. Paint Allied Ind.)

TUNG GROWERS' NEW CONCEPTS IN COOPERATIVE INTERNATIONAL RESEARCH. R. O. Austin. *Paint Ind. Mag.* 77 (9), 23–33 (1962). Research jointly financed by U.S. and Argentine tung growers is reviewed. The research programme of the Argentine Institute of Fats and Oils is first dealt with. Current work includes preparation of pure α-monoelaeostearin and its thermal polymerisation to yield emulsifying agents and the preparation and polymerisation of a range of other esters of elaeostearic acid. Work at the Development Laboratory at Picayune, Mississippi, has been concerned with the production of a water-soluble oil by reaction of tung oil (1 mole) with fumaric acid (1½ mole); the catalytic air blowing of tung oil to improve film properties; copolymerisation reactions of styrene with air-blown tung oil and the epoxidation of tung oil by new processes. (Rev. Current Lit. Paint Allied Ind.)

QUALITATIVE AND SPOT TESTS FOR POLYMERS AND RESINS. C. A. Lucchesi and D. J. Tessari. *Off. Dig.* 34, No. 447, Pt. 1, 387–398 (1962). Published qualitative and spot tests for the polymers and resins commonly found in the binder portion of surface coatings have been assembled and checked with known samples. Those test procedures which were found to be most useful and reliable are described in detail. Included are procedures for formaldehyde, *o*-phthalate, nitrate, epoxide, phenolics, cellulosics, styrene, urea, melamine and methacrylate resins, chlorinated rubber and rosin. (Rev. Current Lit. Paint Allied Ind.)

MICROBIOLOGICAL DETERIORATION OF PAINT FILMS. S. Shapiro. *Off. Dig.* 34, No. 449, 622–641 (1962). The growth of fungi on paint films is considered with particular regard to whether the fungi actually degrade the coating. Whilst microorganisms under certain conditions can cause breakdown of linseed oil and oil films, practical cases where film breakdown can be unequivocally attributed to fungi are rare. (Rev. Current Lit. Paint Allied Ind.)

ELECTRON MICROSCOPY OF ARTIFICIALLY WEATHERED PAINT FILMS. J. D. Nye and J. S. Mackie. *Off. Dig.* 34, No. 450, 716–750 (1962). The degradation on accelerated weathering (with or without water) of a series of baked acrylic enamels of differing durability has been followed by electron microscopy. The general mechanism was always the same—U.V. radiation caused depolymerisation of the vehicle, so that it shrank and allowed the pigment to penetrate the surface and be released as particles or agglomerates, cross-linking at the same time making the surface more brittle. As the concentration of degradation products increased the film became more hydrophilic, imbibed water and swelled, the stresses created sometimes causing disintegration. In absence of water, the gloss fell more slowly and only the first stage of degradation occurred. The breakdown of coloured paints and of metallic paints and the effects of pigment particle size and concentration, have been studied. (Rev. Current Lit. Paint Allied Ind.)

MEDIUM CHARACTERISTICS THAT INFLUENCE INHIBITING POWER OF ANTICORROSIVE PAINTS. V. Rascio. *Peint. Pig. Vernis* 38 (5), 254–260 (1962). Exposure results on a series of paints based on Argentine linseed and tung oils (including polymerized oils, alkyds, phenolic-modified media, etc.) are reported. (Rev. Current Lit. Paint Allied Ind.)

10-YEAR PAINT TESTS ON WEATHERED GALVANIZED ROOFING. A. J. Muehling and J. O. Curtis. *Illinois Agric. Experiment Station, Bull.* No. 676, 27 pp. (1961). A 10-year field test programme evaluated metallic Zn paints as priming and finish coats on rusty corrugated galvanised metal roofing, Al paints as finish coats over various primers and wire brushing as a pretreatment of the rusty surface. The best over-all systems were Al (Al/asphalt excepted) over red lead or grey metallic Zn (MZP) primer, many of these lasting $>$ 10 yr. As a two-coat one-paint system, grey MZP/soyabean oil was best, giving 10-yr. protection. Two coats of Al gave 8-yr. protection. Of one-coat systems, red MZP and grey MZP (about equal) performed best, giving 5-yr. protection; all MZP's were better than Al as single coats. Southward exposure was definitely more severe than northward on systems finished red or green; Al or grey MZP finished systems were little affected by direction. The rustier the substrate, the faster was paint failure. Wire brushing did not prolong life significantly but did increase effective coverage per gallon. (Rev. Current Lit. Paint Allied Ind.)

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• *Obituary*

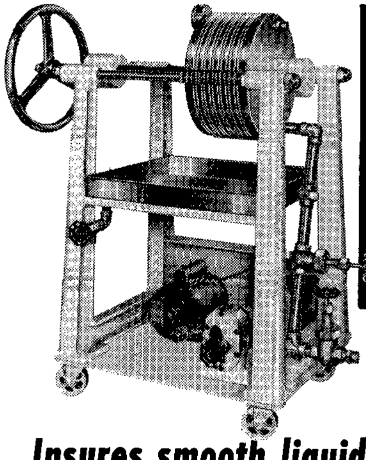
F. M. Yeiser (1954) Sales Engineer and Consultant, T. Shriver & Co., Inc., was killed in an automobile accident, July 11, 1963. Mr. Yeiser will be remembered as the inventor of the Shriver-Yeiser Tray Filter and for having contributed many improvements in filtration equipment.

BULLETIN

A symposium on biodegradable detergents will be held at the 1964 Spring Meeting in New Orleans, La. The Soap and Detergents Program Planning Committee has named Eric Jungermann, Armour Grocery Products Co., Symposium Chairman, and an impressive schedule of qualified speakers is being prepared. Latest developments in biodegradable detergents will be presented including raw materials, processing, properties and analysis. Speakers will present currently held views of the government and the detergent industry.

Those who wish to present papers or have comments or questions are invited to contact E. Jungerman, American Oil Chemists' Society, 35 E. Wacker Dr., Chicago 1, Illinois.

It is to be noted that the New Orleans Meeting will also include general topics in the area of surfactants.



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• Detergents

Classification of surface active agents. Anon. *Chim. Ind. (Paris).* 88, No. 1, 44–51 (1962). The classification is based upon the functional nature of the molecule, on one hand the hydrophilic polar character, and on the other hand, a unity with the hydrophobic apolar nature. This classification of a decimal base, comprises four sections, each divided into three parts. Rules have been established to code, without ambiquity, every surfactant.

Color stabilizing process for the manufacture of ester-type anionic surface active agents. L. M. Schenck and J. G. Papalos (General Aniline & Film Corp.). *U.S. 3,089882.* The described products are prepared by the condensation reaction of a monocarboxylic acid of 8 to 22 carbon atoms with a salt selected from the group of alkali and alkaline earth metals of a β-alkylisethionate in which the alkyl is 1–4 carbons, at a pH of 2.5–3.5 and a temperature of 140–320C in the presence of a catalytic amount of hypophosphorous acid or its metal, ammonium, or amine salts. The improvement of obtaining the surface active agents color free comprises introducing from 0.01 to 10% of an inorganic compound selected from the group consisting of halides, nitrates, sulfates, phosphates, carbonates, oxalates and citrates of metals selected from the class consisting of potassium, lithium, cesium, rubidium, beryllium, barium, calcium, magnesium, cadmium, and strontium.

Detergency of nonionic surfactant. II. Comparison with anionic surfactants. Masaharu Kame, Seichiro Kishima, Hideyuki Koda, and Yasuhiko Danjo Nippon Oil and Fats Co., Amagasaki). *Yukagaku* 12, 173–8 (1963). The relationship between detergency of a nonionic surfactant and its surface-active properties (surface tension, wetting, foaming and emulsifying power, solubilization and dispersion) was investigated in comparison with two usual anionic detergents (sodium laurylsulfate and sodium dodecylbenzenesulfonate). It was found that the same surface-active properties contributed to washing with both nonionic and anionic surfactants, but the type of those effective properties changed depending on the character of soils. Washing efficiency of nonionic surfactants was selective depending on soils.

Radiotracer studies on contamination of fruits and vegetables by synthetic detergent. Tsunetaka Sasaki and Tomoo Ito (Tokyo Metropolitan University). *Yukagaku* 12, 228–34 (1963). Contamination of fruits and vegetables, such as grape, cabbage, turnip and cucumber, by the detergent solution of sodium dodecylbenzenesulfonate has been investigated by means of radiotracer method of using labeled S^{35}. Under usual condition of dipping in 0.1% detergent solution for 5 minutes at 16–18C, followed by rinsing twice with 100 cc. water for 20 seconds, the contamination on the surface was 0.29 γ/cm^2, and 1.8 γ/cm^2 along the cracks and damaged cabbage leaf. Air-dried cabbage leaf showed more contamination than the fresh one. The contamination of grape was about the same but those of turnip and cucumber were 3 or 4 times as much more than that of cabbage on basis of unit area; however this order became reversed when the contamination was calculated on unit weight basis.

Detergency of nonionic surfactant. III. Effect of the sorption of surfactant by wool fabrics. Masaharu Kame, Yasuhiko Danjo, Seiichiro Kishima, and Hideyuki Koda (Nippon Oils & Fats Co., Amagasaki). *Yukagaku* 12, 223–8 (1963). The maximum absorption of poly(oxyethylene) nonylphenyl ether in wool was slightly lower than that of sodium dodecylbenzenesulfonate. The whiteness of wool was almost proportional to the amount of their absorption. Thus, the higher the absorption of surfactant, the greater was the detergency and retention of whiteness in case of wool.

Analytical studies on alkylbenzenesulfonate. I. Determination of ABS in toothpaste. Akira Sakuma, Norikatsu Murohashi, Koichiro Iwasaki, Shiro Hirano, Kenkichi Oba, Akinori Takahashi, Tetsuya Fujii, and Shinichi Tomiyama. *Yukagaku* 12, 198–201 (1963). The sample (1 g.) is repeatedly extracted with alcohol, the extract concentrated and the residue made up to 100 ml. with water, 5 ml. of which is refluxed 2 hours with 20 ml. concentrated hydrochloric acid and 35 ml. water for a complete decomposition of sodium alkylsulfate and other methylene blue active substances, neutralized and sodium alkylbenzenesulfonate is determined by the Abbott's method. The limit of determination is 0.05%.

APPLICATIONS OF SURFACTANTS ON WOOL INDUSTRY. I. THE EFFECTS OF NONIONIC SURFACTANTS ON WOOL SHRINKAGE. Chikaaki Sakai and Saburo Komori. *Yukagaku* 12, 299–303 (1963). The effect of nonionic surfactants containing polyoxyethyleneglycol ether group in their molecule on wool shrinkage was investigated by using shaking type felting machine and worsted yarns. In spite of increase in concentration of nonionics (polyoxyethylene octylphenol, nonylphenol, and lauryl alcohol) in the range above 0.05% in felting solution, the amount of shrinkage was almost same and became smaller with an increase in moles of ethylene oxide in polyoxyethylated surfactants. At the same ethoxy level, nonionics consisting of phenyl radicals showed more ability to felt wool than polyoxyethylene alkyl ether. As to the effect of pH on wool shrinkage in the absence and presence of polyoxyethylene octylphenyl ether, it was same in the range of pH values from 4 to 9 but below 3 or above 10, especially, in the former, rapid shrinkage took place. In the presence of polyoxyethylene octylphenylether, the amount of wool shrinkage was more than that in the absence, independent of pH. The rate of shrinkage in the absence as well as in the presence of nonionics increased with temperature in the range of 20–30C, but became constant, above 30C. The correlation between surface tension and wool shrinkage was revealed and it was confirmed that the felting solution having lower surface tension caused wool to shrink more.

THE USE OF SYNTHETIC FATTY ACIDS IN AGRICULTURE. K. F. Gromakovskii (Rostov Province Uprvinproma Agrochemical Lab.). *Maslob.-Zhir. Prom.* 29(1), 38–39 (1963). During the working up of fatty acids from paraffin for soap making and other uses, vat residues form. The Agrochemical Lab. established that these vat residues can be used for the preparation of potash soaps.

EFFECT OF THE NATURE OF ORGANIC SUBSTANCES ON THEIR SOLUBILIZATION IN AQUEOUS SOLUTIONS OF A MIXTURE OF PRIMARY AND SECONDARY ALKYL SULFATES. M. P. Bespyatov and Zh. Ya. Leshchenko (VNIISINZh). *Maslob.-Zhir. Prom.* 29(1), 23–26 (1963). The solubilizing power of aqueous solutions of alkyl sulfates obtained from alcohols from the direct oxidation of paraffin was studied. The substances to be solubilized were oleic acid with an acid number of 198.5, synthol (a motor fuel) with an average molecular weight of 239, and the narrow fraction of alcohols with a hydroxyl number of 258 obtained by the direct oxidation of paraffin, and a mixture of synthol and these alcohols. Degree of solubilization was determined by a turbidimetric method. An analysis of the experimental results shows that the degree of solubilization depends on the time of contact of the alkyl sulfate solution with the organic substances tested. The solubilization of the alcohols and oleic acid, in contrast to synthol, decreased with an increase in the concentration of the solution. In the presence of polar compounds the solubilization of the hydrocarbons increases. In the region of critical concentration of micelle formation, and somewhat above, the molecules of the wetting agent in the micelles were still dissociated to a great extent.

PREPARATION OF DIALKYL ESTERS OF ALPHA-SULFO FATTY ACIDS. J. J. McBride, Jr., and E. J. Miller, Jr. (Armour & Co.). *U.S. 3,090,794.* An alpha-sulfo fatty acid is reacted with a slight theoretical excess of an olefin having from 2 to 8 carbon atoms in the presence of at least 0.01 mole of iron pentacarbonyl per mole of acid. The ester is recovered.

AQUEOUS MIXTURE OF SURFACE ACTIVE AGENTS. J. M. Surgant (Monsanto Chemical Co.). *U. S. 3,095,353.* A homogeneous mixture of surface active agents for emulsifying and dispersing water-insoluble substances in water contains from 1 to 2 parts by weight of (a) an alkali metal alkyl sulfate water-soluble surfactant of the structure $RO.SO_2.OM$ in which R is a long chain alkyl radical containing 8 to 18 carbon atoms and M is an alkali metal; 1 to 3 parts of (b) the water-soluble condensation product of a mono-higher fatty acid ester of hexitol anhydride with 10 to 30 moles of alkylene oxide of the empirical formula $C_nH_{2n}O$ in which n is a whole number from 2 to 3 per mole of ester, and 2 to 6 parts of (c) water.

CLEANING COMPOSITIONS. J. M. Tinnon and M. W. Leeds (Air Reduction Co., Inc.). *U. S. 3,095,381.* A cleaning composition consists of: (1) 0.1 to 2.0% by volume of 3,5-dimethyl-1-hexyn-3-ol; (2) 0.02 to 0.05% of a non-soap synthetic organic surface active agent; and (3) water. The surface active agent is a nonvolatile detergent.

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