

meats dry-cooked at high temperatures. However, the significance of the results of this test may be questionable since the great variation in the free fatty acid content of the oils indicated that they were obtained from very different seed.

In the second series of mill-scale experiments ground and rolled meats, wetted and unwetted, were cooked for 45 minutes at high and low temperatures. It was found that cooking non-wetted rolled or ground meats at low temperature resulted in low initial bleach color of the screw-pressed oils which reverted very little during storage at room temperature. The absorption spectra of these crude oils differed from those of other screw-pressed oils and hydraulic-pressed oils.

Widely varying amounts of gossypol were found in oils and meals produced from meats cooked under various conditions, but no direct relation was noted between any of the processing variables and the content of gossypol in the meals and oils or between the amount of gossypol in the expressed oils and their bleach colors before and after storage.

As previously reported, it was found that elevated temperatures during storage accelerated the increase in the bleach color of the expressed crude oils.

#### Acknowledgment

The authors wish to acknowledge their indebtedness to A. K. Schwartz, South Texas Cotton Oil Company, for his cooperation and many helpful suggestions made during the course of these investigations. They are indebted to Mildred Murray of Southern Regional Research Laboratory for the spectrophotometric measurements.

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☆                      ☆                      ☆                      **ABSTRACTS**                      ☆                      ☆                      ☆

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## Oils and Fats

Edited by  
M. M. PISKUR and MARIANNE KEATING

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A NEW METHOD FOR THE DETERMINATION OF FATTY ACIDS IN REFINING FOOTS AND SETTLINGS. J. M. Moreno. *Olii minerali, grassi e saponi, colori e vernici* **25**, 56-8 (1948). The method comprises saponification, refining the soap, transferring into a Gerber bottle with  $H_2SO_4$ , and determining fatty acid similarly to a milk fat analysis.

SOME PROPOSALS TO SIMPLIFY THE DETERMINATION OF THE IODINE NUMBER ACCORDING TO THE GERMAN DISPENSATORY (DAB. 6). W. Awe, B. Skroch, and F. Demelius. *Suddeut. Apoth-Ztg.* **88**, 155-8 (1948). The German dispensatory uses the method of Winkler for the determination of the I number. Use is made of an I flask with a hollow stopper to hold HCl solution. The sample is weighed into the flask and dissolved in 2 cc.  $CCl_4$ . Ten cc. 0.5 N  $KBrO_3$  solution and 1 g. KBr are added, and the hollow stopper is filled with 5 cc. of 25% HCl. The flask is closed tightly, the HCl being allowed to run into the mixture. The reaction is:  $5KBr + KBrO_3 + 6HCl = 6Br + 6KCl + 3H_2O$ . The flask is shaken almost constantly throughout the reaction time. (I number from 0-50, 5 minutes; from 50-100, 10 minutes; over 100, 15 minutes). Ten cc. of 10% KI is allowed to enter the flask slowly. The free I can be titrated with 0.1 N  $Na_2S_2O_3$ . If desired, 10 cc. 0.5 N arsenious acid can be used instead of the 10% KI, followed by two 5-cc. portions of 25% HCl, and the excess titrated with 0.1 N  $KBrO_3$  solution. Designs for I flasks are given. (*Chem. Abs.* **42**, 7658.)

COLOR REACTION OF HIGHER FATTY ACIDS. R. Goiffon. *Ann. biol. clin.* (Paris) **6**, 282 (1948). The sulfate or chloride of Nile blue (I) produces a red color with neutral fats and a blue color with soaps. At pH 12, I turns red, but in the presence of soaps, such as the oleates, a complex is formed which raises the point of

color change to pH 13. This reaction detects as little as 0.2 mg. Na oleate in a volume of 10 cc. It does not take place in the presence of alcohol or acetone. The color is proportional to the amount of oleic acid present and can be used for colorimetric determinations. It does not work for free fatty acids having one or more double bonds. (*Chem. Abs.* **42**, 8110-11.)

COLORIMETRIC DETERMINATION OF PEROXIDE IN FATS AND OILS. H. Erdmann and F. Seelich. *Z. anal. Chem.* **128**, 303-12 (1948). Unfortunately any unsaturated compounds react with  $I_2$  and cause error as do certain ketones, diketones, and oxy compounds. For this reason, E. and S. have proposed a method in which the sample is dissolved in water + methanol + benzene, the peroxide is made to react with  $FeSO_4$  and the resulting  $Fe^{3+}$  is determined colorimetrically with  $NH_4CNS$ . The  $FeSO_4/NH_4CNS$  system has been proposed by a number of others for determining peroxides. Detailed directions are given for preparing the color scale and for carrying out the analysis. The results obtained in the analysis of  $H_2O_2$ , succinic monoper acid, old butter, and old olive oil were very satisfactory. (*Chem. Abs.* **42**, 6135-36.)

THE NATURAL INHIBITORS (OF OXIDATION OF OILS). K. Weber. *Archiv. Chem.* **19**, 1-8. In order to determine the mechanism of the antioxidant effect of the tocopherols, the action of an oat-meal extract and of a commercial preparation of vitamin E on the autoxidation of iodoform in benzene solution in light of the wave length ranging between 623 and 334  $m\mu$  was studied. The action is attributed to negative catalysis. It is experimentally shown not to be due to light-filtering action or to chemical interaction of the inhibitor with the iodine liberated during the autoxidation. (*Chem. Abs.* **42**, 7808.)

FURTHER STUDY OF THE ANTIOXYGEN PROPERTIES OF CERTAIN CAROTENOIDS. A. Herisset. *Bull. soc. chim.*

*biol.* 30, 187-95(1948).  $\beta$ -carotene and vitamin A were shown to inhibit the spontaneous oxidation of oils and fats and also to inhibit the action of oxidases of fungi on various substrates under certain conditions. (*Chem. Abs.* 42, 8224.)

USE OF GLYCEROL 1,3-DICHLOROHYDRIN AS REAGENT IN THE DETERMINATION OF VITAMIN A IN OIL CONCENTRATES. C. Antoniana, L. Federico, and A. Artom (Univ. Milan, Italy). *Olearia* 1948, 405-7. The reaction of vitamin A with glycerol 1,3-dichlorohydrin was found to be negative with an oil containing 598,000 spectrographic units of vitamin A per g., but the reagent can be used to improve the intensity and permanence of the color obtained with  $SbCl_3$ . To 0.2 ml. of a solution of the oil concentrate of vitamin A in anhydrous  $CHCl_3$  add 3.0 ml. glycerol 1,3-dichlorohydrin and 1.8 ml. of a 30% solution of  $SbCl_3$  in  $CHCl_3$  and take the spectrophotometer reading after 3 minutes. Beer's law is obeyed between concentrations of 64 and 497 spectrographic units of vitamin A in 5.0 ml. solution. (*Chem. Abs.* 42, 8244.)

THE ORIGIN OF FROTHING OF MIXTURES OF PEANUT OIL AND COPRA OIL. M. Naudet, O. Micaelli, and P. Desnuelle (Faculte de sci., Marseille, France). *Bull. mens. I.T.E.R.G.* (Inst. tech. etudes et recherches corps gras) 1948, No. 6, 32-5. The frothing of oils during frying is usually attributed to bad demucilagination. There must be other reasons, since well-refined peanut oil (I) and copra oil (II), neither of which frothed if tested separately, did froth when mixed in proportions comprised between 10% and 95% of II. The soap content of the samples, being less than 0.002%, furnishes no plausible explanation. A possible source of the phenomenon was sought in the presence of partial glycerides, but frothing persisted after the elimination of the latter according to the chromatographic method of Kaufmann. The theory is advanced that the frothing takes place if oils containing carbon chains of considerably different length are mixed. To test the theory, 2 typically short-chained compounds: tricaprylin (III) and dilauromyristin (IV), were prepared and admixed with the long-chain I. Frothing was obtained with 2 parts of III or 5 parts of IV admixed with 98 and 95 parts, respectively, of I and with 5 parts of I admixed with 95 parts of III or IV. III, which has a shorter carbon chain than IV, was more efficient. (*Chem. Abs.* 42, 7999.)

FORMATION OF PARTIAL GLYCERIDES DURING HYDROLYSIS OF TRIGLYCERIDES BY PANCREATIC LIPASE. P. Desnuelle, M. Naudet, and J. Rouzier (Univ. Marseille, France). *Compt. rend. soc. biol.* 141, 1242-4(1947). When pancreatic extract acts on olive oil at pH 7 in the presence of bile salts, in vitro, the formation of diglycerides is very rapid, formation of monoglycerides is much slower, and liberation of free glycerol is very slow and incomplete. (*Chem. Abs.* 42, 7349.)

SYNTHETIC FAT AS A FOODSTUFF. A. Krautwald (Universitäts-Klinik, Berlin). *Deut. Gesundheitsw.* 3, 354-6(1948). The synthetic fat (I) consisted of glycerides of saturated fatty acids, of which 50% had an odd number of C atoms. I looked like butterfat, was solid at room temperature and had practically no taste or odor. Its melting point was 36.5°, saponification number 235, and I No. 11. It could be stored for 2 years without apparent change in taste or odor. Persons in good health were able to digest 100 g. per

day. It was well tolerated even by patients with liver or stomach ailments in amounts up to 50 g./day. I was absorbed from the intestines and easily metabolized. Ingestion of a 50-g. dose produced a fall in respiratory quotient in a manner similar to butter. Experimentally induced ketosis in healthy persons could be reduced by administration of I. (*Chem. Abs.* 42, 7897-8.)

THE FATTY ACIDS OF CHLORELLA. Harold W. Milner. *J. Biol. Chem.* 176, 813-17(1948). Through control of environmental factors, four lots of *Chlorella pyrenoidosa* were grown, which contained 23, 33, 63, and 76% lipide. The fatty acid content varied from 6 to 66% of the dry weight of the cells. Analysis of the fatty acid mixtures showed that saturated acids, mostly palmitic, comprise 12 to 16% of the total, and that the liquid acids are highly unsaturated.

THE FUNCTIONS OF SPECIAL HIGHER FATTY ACIDS. B. v. Euler and H. v. Euler (Univ. Stockholm, Sweden). *Z. Vitamin-, Hormon- u. Fermentforsch.* 1, 474-9(1948). New experiments with vaccenic acid fed to 16 male and 16 female rats for 25 days failed to indicate any growth-promoting activity of this compound, in contradiction to Boer and Jansen. (*Chem. Abs.* 42, 7391.)

THE MEASUREMENT OF TURNOVER OF THE VARIOUS PHOSPHOLIPIDES IN LIVER AND PLASMA OF THE DOG AND ITS APPLICATION OF THE MECHANISM OF ACTION OF CHOLINE. D. B. Zilversmit, C. Entenman, and I. L. Chaikoff (Univ. California Med. School, Berkeley). *J. Biol. Chem.* 176, 193-208(1948). The specific activity-time relations of liver lecithin, liver cephalin, and liver sphingomyelin were compared with those of 2 acid-soluble fractions, namely alkali-stable and alkali-hydrolyzable phosphorus. The specific activity-time relations of a liver fraction rich in glycerophosphate met the requirements for a lecithin precursor. Choline increased the turnover of liver lecithin but not of plasma lecithin or of plasma sphingomyelin. In view of these findings it is proposed that choline does not act by increasing fat transport *via* plasma phospholipides but rather by stimulating the utilization of fats within the liver itself.

THE TURNOVER RATES OF PLASMA LECITHIN AND PLASMA SPHINGOMYELIN AS MEASURED BY THE DISAPPEARANCE OF THEIR RADIOACTIVE PHOSPHORUS FROM THE CIRCULATION. D. B. Zilversmit, C. Entenman, and I. L. Chaikoff (Univ. California Med. School, Berkeley). *J. Biol. Chem.* 176, 209-12(1948). The rates of turnover of plasma lecithin and of plasma sphingomyelin have been measured in the dog. The rate for lecithin is more than 5 times as great as that for sphingomyelin.

FURTHER OBSERVATIONS ON THE LIPOTROPIC NEED FOR INOSITOL. M. L. MacFarland and E. W. McHenry (Univ. Toronto, Canada). *J. Biol. Chem.* 176, 429-34(1948). Fatty livers occurring in choline-fed rats and susceptible to inositol have been produced in animals maintained on a fat-free, high-carbohydrate diet by supplying (a) crude beef liver fraction, (b) liver fractioneluate, or (c) biotin and folic acid with abnormal amounts of other B vitamins. Biotin and folic acid did not exhibit this effect unless the amounts of other B vitamins were abnormal. The action of the first 2 supplements is apparently explained by the third. The combined supplements have a specific effect which is augmented by an increased food consumption.

AN EXPERIMENTAL SYNDROME OF FATTY LIVER, URIC ACID KIDNEY STONES, AND ACUTE PANCREATIC NECROSIS PRODUCED IN DOGS BY EXCLUSIVE FEEDING OF BACON. J. Groen. *Science* 107, 425-6(1948). Nine dogs were fed on bacon exclusively. Two of these died after 2.5 and 3 months, respectively. On postmortem examination they showed a severe fatty degeneration of the liver without significant changes in other organs. Supplementation with vitamin A and thiamine did not modify the effects. One dog provided with 25 g. of raw liver daily for 13 months was in perfect condition at the end of this time. When the liver was replaced with the same quantity of pancreas, the animal died after 5 months.

FURTHER STUDIES ON A FAT-SOLUBLE MATERIAL FROM PLASMA HAVING BIOTIN ACTIVITY. W. Trager (The Rockefeller Inst. Med. Res., Princeton). *J. Biol. Chem.* 176, 133-45(1948). The concentration of the fat-soluble biotin-active material, as measured by microbiological assay in the plasma of ducks and chickens, shares in the general increase in lipides which occurs with the onset of egg-laying activity. The distribution of the material in the tissues of birds roughly parallels the distribution of biotin, except in the liver and kidney, which contain relatively very large amounts of biotin. Much of the bound fat-soluble biotin-active material in the plasma of egg-laying hens may be concentrated in a protein fraction precipitated by dilution of the plasma with water. Partial purification of the active material from hydrolyzed horse plasma has been effected by counter-current distribution in separatory funnels and by chromatographic adsorption. Fractions have been obtained which have as high a specific activity for *Lactobacillus casei* as oleic acid but which differ from oleic acid in physical properties. A somewhat similar fraction prepared by gross adsorption and elution has been shown to have the biotin-like activity when injected into chicks on an egg white diet.

STUDIES ON THE CYCLOPHORASE SYSTEM. II. THE COMPLETE OXIDATION OF FATTY ACIDS. A. L. Grafflin and D. E. Green (Columbia Univ., New York). *J. Biol. Chem.* 176, 95-115(1948). The complete oxidation of normal, odd numbered, branched chain hydroxy fatty acids and derivatives were oxidized to CO<sub>2</sub> and H<sub>2</sub>O in kidney and cyclophorase preparations and time and O<sub>2</sub> up-take was recorded. The data is consistent with complete oxidation and with Knoop's theory of successive  $\beta$ -oxidation.

STUDIES ON THE CYCLOPHORASE SYSTEM. III. OBLIGATORY SPARKING OF FATTY ACID OXIDATION. W. E. Knox (Northwestern Univ., Chicago, Ill.), B. N. Noyce and V. H. Auerbach. *J. Biol. Chem.* 176, 117-22(1948). Oxidation of fatty acids and their derivatives by the enzymes from rabbit kidney can occur only if a small amount of cyclophorase substrate is first oxidized to initiate the reaction. This sparking effect by compounds of the citric acid cycle consists of a primary activation of the fatty acid which is not duplicated by ATP or acyl phosphates, and of a later condensation between a cyclophorase substrate and the "acetate" leading to complete oxidation through the cycle. IV. DIRECT DEMONSTRATION OF  $\beta$ -OXIDATION. W. A. Atchley (Columbia Univ., New York). *Ibid.* 123-31. Valeric acid and isocaproic acid are oxidized in the kidney fatty acid oxidizing system to propionic acid and isobutyric acid, respectively. Part of the isobutyric acid formed is further

converted to propionic acid. The end-products were identified by counter-current distribution.

ENZYMATIC HYDROLYSIS OF 2,4-DIKETO ACIDS. A. Meister and J. P. Greenstein (Nat'l Inst. Health, Bethesda, Md.). *J. Biol. Chem.* 175, 573-88(1948). It has been found that extracts of liver and kidney catalyze the hydrolysis of 2,4-diketovaleric acid, yielding nearly equivalent amounts of pyruvic and acetic acids. This reaction occurs aerobically and anaerobically, and without detectable acetoacetate formation. The effects of substrate and liver extract concentration on the rate of hydrolysis have been studied. Formation of pyruvic acid from 2,4-diketovaleric acid has also been demonstrated in liver slices. Implications of these findings in terms of intermediary metabolism are discussed.

FAT METABOLISM. XII. THE INFLUENCE OF CARBOHYDRATE ON DIACIDURIA. P. E. Verkade, J. van der Lee, and M. Elzas (Tech. Hoogeschool, Delft, Netherlands). *Biochim. et Biophys. Acta* 2, 38-56(1948). Simultaneous administration of triundecylin (I) and carbohydrate (II) causes greater excretion of undecanedioic acid (III) in urine than I alone. Additional administration of II at regular intervals after simultaneous feeding of I and II produces further increase in excretion of III. Daily administration of 100 g. I as part of a low-carbohydrate diet causes a regular and rapid decrease in excretion of III. This decrease in diaciduria has an endogenic cause. The degree of diaciduria is related to the glycogen store of the liver as both increase and decrease conjointly. Ketosis and dioic acid acidosis, ketonuria, and diaciduria are considered antagonistic processes with reference to the glycogen store of the liver. (*Chem. Abs.* 42, 6431-32.)

FURTHER INVESTIGATIONS ON THE GROWTH-PROMOTING FACTOR IN BUTTER. J. Boer, E. H. Groot, and B. C. P. Jansen (Lab. Physiol. Chem., Amsterdam, Netherlands). *Voeding* 9, 60-2(1948). Vaccenic acid was made in sufficient purity and quantity by partial hydrogenation of tung oil, and China wood oil. The spectroscopically pure acid had no nutritive effect. Therefore, other impurities must be responsible for the growth-promoting qualities of summer butter. (*Chem. Abs.* 42, 7847.)

OBSERVATIONS ON EXPERIMENTAL DENTAL CARIES. THE EFFECT OF PURIFIED RATIONS WITH AND WITHOUT DIETARY FAT. H. Granados, J. Glavind, and H. Dam (Polytech. Inst., Copenhagen, Denmark). *Acta Path. Microbiol. Scand.* 25, 453-9(1948). Two groups of young hamsters were reared for 105 days on purified diets with and without lard. The hamsters receiving the fat-containing diet showed a lower incidence and extent of caries although the difference was of low statistical significance. The group on the lard-containing diet exhibited a healthier appearance and a higher growth rate than those on a fat-free ration. (*Chem. Abs.* 42, 7848.)

MODIFICATION OF FAT ABSORPTION IN THE DIGESTIVE TRACT BY THE USE OF AN EMULSIFYING AGENT. C. M. Jones, P. J. Culver, G. D. Drumme, and A. E. Ryan (Harvard Univ.). *Ann. Internal Med.* 29, 1-10(1948). It was possible to demonstrate increased absorption of fat and fat-soluble substances in human beings by the addition of an emulsifying agent to the diet. It is probable that the agent used, polyoxyethylenesorbitan monooleate, accomplishes this result because of its ability to lower surface tension. The effect primarily

is that of a substance capable of modifying opposing interfaces, with resulting improvement of emulsification, "wetting," spreading, or dispersion. Hence such an agent increases the surface area of lipid material presented to the intestinal villi by reducing the size of the fat globules. This should be of value in conditions where fat absorption is decreased. (*Chem. Abs.* 42, 7803.)

THE EFFECT, IN RATS, OF HIGH-FAT DIETS ON THE RENAL EXCRETION OF WATER AND ANTIDIURETIC SUBSTANCES. S. H. Leslie and E. P. Ralli (New York Univ. Coll. Med., New York). *Endocrinology* 41, 1-11(1947). Rats placed on high fat-low protein diets with or without a crude liver extract had decreased rates of urine excretion during water-tolerance tests. The urine output was not as depressed when a 1% NaCl solution was given and was least affected when both 1% NaCl solution and the crude liver extract were administered. The urine of the animals on the experimental diet with or without NaCl solution exerted a marked diuretic effect when injected into normal hydrated animals. (*Chem. Abs.* 42, 8895.)

LIPOTROPIC ACTION OF CASEIN. S. M. Leites and M. L. Mirer (Acad. Med. Sci., Moscow). *Biokhimiya* 13, 264-72(1948). In white rats casein has powerful lipotropic effect in cases of fat accumulation in the liver caused by a diet rich in fat. The casein lipotropic action is mild in fat infiltration caused by a diet rich in carbohydrates and poor in fats, or during toxic fat infiltration of the liver. The introduction of small amounts of cholesterol in the diet completely checks the lipotropic action of casein. Other lipotropic agents besides casein are necessary to bring the liver fat content back to normal. (*Chem. Abs.* 42, 8285.)

SODIUM NUCLEINATE AS A LIPOTROPIC FACTOR. S. M. Leites and I. M. Rossinskaya (Acad. Med. Sci., U.S.S.R.). *Biokhimiya* 13, 152-7(1948). A dehydrogenase found in ox liver oxidizes lecithin, stearic, and palmitic acids. Xanthine and hypoxanthine are activators. Since the latter can form in the process of nucleic acid metabolism, the question arises as to whether or not the salt of nucleic acid possesses lipotropic action; i.e., whether it can check the development of fat infiltration of the liver, in a manner similar to choline, inositol, and other lipotropic factors. In experiments with white rats, Na nucleinate was found to possess lipotropic properties when present in a diet to the extent of 5-7%. The Na nucleinate lipotropic action was effective when the liver fat infiltration was caused by a diet poor in proteins, rich in fat, or poor in proteins and fats but rich in carbohydrates. The retardation of fat accumulation in the liver by the action of Na nucleinate was accompanied by an increase of phospholipides. (*Chem. Abs.* 42, 8285.)

LIPIDES AND KETONEMIA. I. KETONES IN BLOOD AFTER ADMINISTRATION OF PALMITIC ACID. L. Viale (Univ. Genova, Italy). *Fisiol. e med.* (Roma) 15, 149-57 (1947). Acetone (I), acetoacetic acid (II), and hydroxy-butyric acid (III) were determined in the blood of 10 persons after administration per os of 20 g. palmitic acid. I and II gave no big variations (max. 0.936 and 1.069 mg. % after 8 and 12 hours, respectively); III increased (from 2,450 to max. 4,262 mg. % after 8 hours). On an average, bodies absorbed two-thirds of the administered palmitic acid. (*Chem. Abs.* 42, 8970.)

THE EFFECT OF FEEDING PROPYLTHIOURACIL AND CHOLESTEROL ON THE BLOOD CHOLESTEROL AND ARTERIAL INTIMA IN THE RAT. L. Horlick and L. Havel (Michael Reese Hosp., Chicago, Ill.). *J. Lab. Clin. Med.* 33, 1029-36(1948). Cholesterol (5 or 10% in diet) and propylthiouracil (0.5 to 0.6%) alone or combined failed to produce arteriosclerotic vascular lesions in the rat. Cholesterolemia of 2-3 times normal values resulted with cholesterol or propylthiouracil feeding and approximately 6 times normal with combined feeding. (*Chem. Abs.* 42, 8974.)

THE PREPARATION AND PROPERTIES OF SOME  $\beta$ -CHLORO FATTY ACID ESTERS. I. G. Rodier (Faculte Sci., Poitiers, France). *Bull. soc. chim. France* 1948, 637-9(1948). Esters,  $H(CH_2)_nCO_2CH_2CH_2Cl$ , were prepared in order to study their structure by means of x-rays. Direct esterification in the presence of HCl gas was carried out by treating a 10% excess of  $ClCH_2CH_2OH(I)$  with the fatty acid in  $CCl_4$  3-5 hours in the cold, neutralizing the excess HCl with 7% aqueous  $NaHCO_3$ , discarding the upper aqueous and intermediate salt layers, washing the  $CCl_4$  layer, drying over  $CaCl_2$ , concentrating until the product crystallized, and recrystallized the product. The following esters of I were thus prepared: pelargonate, hendecanoate, laurate, myristate, palmitate, and stearate. The caproate, heptanoate, and caprylate could be prepared thus only in poor yield, while the formate (II) could be prepared at 90-95° in low yield. Esterification by means of the acid chloride in the presence of HCl gas was used to prepare the following: III, 70-80% yield, 30-minute reaction time in the cold; propionate, butyrate, valerate, caproate, heptanoate, caprylate, caprate. (*Chem. Abs.* 42, 8158-9.)

## PATENTS

EXTRACTING VEGETABLE OIL. L. L. Ford. *U. S.* 2,451,081. The improvement is designed to inhibit solvent vapor losses.

DECOLORIZING VEGETABLE OILS WITH FERRIC SALTS AND SILICATES. A. Greentree (Lyle Caldwell). *U. S.* 2,450,549. Specially prepared mixtures of  $Fe^{+++}$  salts and Mg silicate are used.

PETROLEUM DEMULSIFIERS. M. DeGroot (Petrolite Corp.). *U. S.* 2,450,332-3. The products are partial esters of polycarboxy acids and dimerized 9,10-linodiricinolein.

LITHIUM BASE GREASE AND METHOD OF PREPARING THE SAME. O. P. Puryear and H. V. Ashburn (The Texas Co.). *U. S.* 2,450,254-5. The grease contains petroleum oil, Li soaps of castor oil, other soaps, fatty acids, antioxidant, etc.

TEXTURE-STABLE LITHIUM BASE GREASE. H. V. Ashburn and O. P. Puryear (The Texas Co.). *U. S.* 2,450,219-20. The improved lubricating grease contains special proportions of Li soaps of hydroxy fatty acids.

FRACTIONAL SEPARATION OF FATTY OIL SUBSTANCES. W. P. Gee (Texaco Development Corp.). *U. S.* 2,450,235. Fractionation is by crystallization from polar solvent. By means of special filtration equipment the process was made continuous.

DISTILLATION APPARATUS FOR TREATING FATTY ACID CONTAINING STOCK. R. H. Potts (Armour & Company). *U. S.* 2,450,611-12.

OXIDATION INHIBITOR FOR FATS AND OILS. R. H. Kraybill and B. W. Beadle. *U. S.* 2,451,748. Small amounts of special mixtures of NDGA and phosphoric acid are used.

POLYHYDRIC ALCOHOL ESTERS. M. DeGroot and A. F. Wirtel (Petrolite Corp.). *U. S.* 2,450,124. An acidic partial ester contains at least one polyhydric alcohol radical, at least one diglycolic acid radical, and some hydroxy fatty radicals.

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## Drying Oils

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Edited by  
ROBERT E. BEAL

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INDUSTRIAL UTILIZATION OF VIRGINIA TOBACCO-SEED OIL. M. Narasimka Rao (Andhra Vegetable Oil Products, Ltd., Bezwada, India) and S. V. Ramanayya. *J. Sci. Ind. Research (India)* 7b, 87-9(1948). Use of the oil in the paint industry or as an edible oil or linseed oil substitute is reviewed. (*Chem. Abs.* 42, 7994.)

STYRENE IN PAINT VEHICLES. J. Rinse. *Verfkroneik* 21, 188-9(1948). The reaction of styrene with drying oils is reviewed and the properties of resins produced in the reaction are discussed. Styrenated oils may replace bodied oils, varnishes, and alkyds for some uses.

STYRENE IN PROTECTIVE AND DECORATIVE COATINGS. Detroit Club, Federation of Paint and Varnish Production Clubs. *Am. Paint J.* 33, Convention Daily No. 6B, 33-4(1948). The reaction time for preparing a resin from dehydrated castor oil and styrene was reduced 80% by introducing PbO<sub>2</sub> into the reaction as a catalyst. Of the metallic oxides investigated, only PbO<sub>2</sub> and CoO gave homogeneous films. The best results were obtained when the metallic oxide catalyst was supplemented by the usual benzoyl peroxide catalyst in the reaction. Films of the resin dried most rapidly with Co drier but Co in combination with Pb or Mn reduced the drying rate of the resin.

GLOSS AND GLOSS RETENTION OF BODIED LINSEED OIL PAINTS MADE WITH STAND OILS OF DIFFERENT VISCOSITIES. I. R. Dooper and F. J. Hermann. *Verfkroneik* 21, 210-1(1948). The viscosity of the bodied oil did not influence the initial gloss of the paints made therefrom but paints made with low viscosity oil lost their gloss more rapidly than those made from high viscosity oil. Durability tests have not been completed.

THICKENING OF LINSEED OIL UNDER THE INFLUENCE OF LIGHT. J. Rinse and S. C. Dierdorp (Chem. & Verf-techn. Lab. Haarlem). *Verfkroneik* 17, 85 (1944). Linseed oil containing driers, sealed in tubes under N and exposed to sunlight for 12 months did not increase in viscosity. Oxygen must be present for thickening to occur. (*Chem. Abs.* 42, 7064.)

FASTNESS TO LIGHT AND LINSEED-OIL DRYING. H. Anderson. *Festskr. J. Arvid Hedvall 1948*, 13-19. Studies with pigmented films of bleached and unbleached linseed oil indicate that the fast color fading during drying is due to the formation of peroxide in the oil with sunlight catalyzing peroxide formation. The slow fading of S-treated linseed oil-stand oil confirms this. Pigmented paraffin oil films containing benzoyl peroxide also faded in sunlight and faded completely without exposure to sunlight at a high

catalyst concentration to further substantiate the peroxide theory. (*Chem. Abs.* 42, 7547.)

THE HEAT-BODYING OF OILS. II. Koln. *Farbe, Lacke, Anstrichstoffe* 2, 83-4 (1948). Pale linseed stand oils of low acid number may be prepared in closed Al kettles under CO<sub>2</sub>, or in open kettles over which a "floating" aluminum cover has been provided. China wood oil is preferable bodied at 280° to prevent wrinkling and gas checking and the resin should not be added until after bodying is complete. (*Chem. Abs.* 42, 7547.)

TALL-OIL VARNISHES. Northwestern Club, Federation of Paint & Varnish Production Clubs. *Am. Paint J.* 33, Convention Daily No. 7A, 24-8(1948); *Paint, Oil, Chem. Rev.* 111, 42-6(1948). Refined tall oil (resin acids 40.5%, fatty acids 54.2%, unsaponifiable matter 5.3%) was reacted with a number of polyalcohols and polyalcohol-dibasic acid mixtures to produce the corresponding esters. Two parts of each ester were reacted with one part tung oil to give a series of varnishes. A paint and an enamel were made from each ester and from each varnish, respectively. The use of dibasic acids gave products with better drying, color, and exposure properties than those not containing such acids while the higher polyhydric alcohol products were inferior to those prepared from glycerol and monopentaerythritol. Accelerated exposure tests indicated that the tall oil varnishes were comparable with a tung-soybean oil control varnish but outdoor tests have not been completed. Material costs for each ester are listed.

TALL OIL IN THE COATING INDUSTRY. H. Kemmer. *Farben, Lacke, Anstrichstoffe* 1, 20-1(1947). Good coatings can be obtained from vacuum-distilled tall oil by treatment with CaO or ZnO followed by esterification with suitable polyhydric alcohols; by incorporation into alkyd resins, or by reaction with China wood or oiticica oil followed by esterification. (*Chem. Abs.* 42, 8489.)

A STUDY OF SOYA-TUNG OIL. Technical Committee, Pittsburgh Club, Federation of Paint & Varnish Production Clubs. *Am. Paint J.* 33, Convention Daily No. 6B, 24-6, 28, 30(1948); *Paint, Oil, Chem. Rev.* 111, 73-7(1948). A combination of 67% soybean oil and 33% tung oil, bodied at 550°F. and dried at the same rate as bodied linseed oil, as was expected from previously reported studies. In varnishes, it is slightly slower drying than linseed and has lower hardness but equal water resistance and good resistance to gas checking. Prebodying the soybean oil before it is cobodied with the tung oil improves the drying rate but blending the unbodied oils and holding at 425°F. to promote ester interchange before bodying at 550°F. produced no improvement.

THE SYNTHESIS OF LALLEMANTIA OIL. J. D. Von Mikush. *Farbe u. Lack* 1947, 23, 24. Lallelantia seed yielded 30% of oil [saponification value 188.7 specific gravity (20°) 0.9259, unsaponifiable matter 0.9%, iodine value 179.4] having an apparent linoleic acid content of about 90%. The oil is expected to compare favorably with linseed oil with respect to binding, drying, weather resistance, and non-yellowing. (*Chem. Abs.* 42, 7064.)

DRIERS. C. A. Klebsattel (Advance Solvents and Chemical Corp.) *Paint-Varnish Production Mgr.* 28, 332-40(1948). A review of practical applications of several drying oil catalysts.

## PATENTS

COATING COMPOSITION OF FATTY DRYING OILS REACTED WITH FATTY ACID MODIFIED POLYHYDRIC ALCOHOL ESTERS OF CYCLOPENTADIENE-MALEIC ADDUCT. W. H. Butler (Bakelite Corp., Bloomfield, N. J.). *U. S. 2,452,992*. A complete or partial polyhydric alcohol ester, of a cyclopentadiene-maleic adduct and sufficient of a monbasic fatty acid having 5 to 22 C atoms to render the ester soluble in a drying oil, is reacted with at least 10 per cent of a fatty drying oil. The product is more rapidly polymerizable than the original drying oil.

POLYAMIDES FROM POLYMERIC FAT ACIDS. J. C. Cowan, L. B. Falkenburg, H. M. Teeter, and P. S. Skell (U. S. Sec'y of Agriculture). *U. S. 2,450,940*. Polymerized drying oil fatty acids, their esters or anhydrides, are reacted at 160-225° with ethylene diamine to form a hard, fusible resin having a molecular weight of 3,000 to 5,000 and a melting point of at least 70°.

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**Soap**


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Edited by  
LENORE PETCHAFT

CENTRIFUGAL SEPARATION PERMITS CONTINUOUS PRODUCTION OF SOAP. Julian C. Smith (Cornell University, Ithaca, N. Y.). *Chem. Ind. 63*, 786-90 (1948). The new centrifugal process is compared with the old kettle process. This Sharples process consists of four continuous stages, with soap and lye traveling counter-currently. The spent lye from each stage, with some additional caustic, becomes the "reagent" for the preceding stage. The first stage accomplishes about 95% of the saponification; the second stage completes the reaction and does some washing; the last two stages are washing steps to adjust the caustic and salt contents to the desired values. Detailed description of operation and flow sheets are included.

BLEACHING OF SOAPS. Josef Hetzer. *Seifensieder-Ztg. 72*, 35-7 (1946); *Chem. Zentr. 1947*, I, 278. Peroxol, Blankit, Decrolin, and Decrolin AZA are recommended for the bleaching of soft and curd soaps. Directions are given for bleaching with persulfate and with hypochlorite. Cost estimates are reported. (*Chem. Abs. 42*, 9208.)

MERSOL AND MERSOLATE. III. Herbert Manneck. *Seifen-Ole-Fette-Wachse 74*, 73-6 (1948). Soft soaps are produced from Mersol and Mersolate (paraffin sulfonates derived from mixtures of n- and iso-paraffins) with builders and fillers, by partial replacement of fatty acid in soap by Mersol, or with small quantities of hard fatty acids. IV. *Ibid.* 124-6. Filled soaps, grain soap, and ground soaps are produced from various proportions of Mersol, fatty acids, NaOH builders and fillers (water glass, metasilicate, bicarbonate, tylose). V. *Ibid.* 148-50. Mersol replaces fatty acids in soap powders partly or completely; the hygroscopic nature of Mersol prevents the production of powders containing 30% or more active ingredients. (*Chem. Abs. 42*, 8499.)

AN EVALUATION OF SOAPS AND SYNTHETIC DETERGENTS. Margaret S. Furry, Verda I. McLendon, and Mary E. Aler. *Am. Dyestuff Reprtr. 37*, 751-9 (1948). In this study of the efficiency of soaps and synthetic detergents for use in the home laundering of fabrics 15 soaps, 1 soap powder, and 35 synthetic detergents were evaluated for their effectiveness in removing

soil under standardized conditions. The detergents were analyzed chemically and classified according to the type of active ingredient present. The change in light reflectance which the detergents produced in the laundering of artificially soiled cotton fabric was used as a measure of their soil-removing efficiency. Samples of the test fabric were laundered in the launder-ometer with 3 soaps and 5 synthetic detergents, representative of the various classes, at 60° and 40°C. for 15 minutes in distilled water and in water of 150 p.p.m. and 300 p.p.m. hardness at 5 different concentrations of the detergent. The additional detergents were evaluated at one temperature and one concentration in both distilled and hard water. One soap was used as the standard and all detergents compared to it. Under the conditions of this study the soaps removed considerably more soil at 60°C. in both distilled and hard water than at 40°C. In general, the synthetic detergents were also more effective at 60°C. than at 40°C. and less effective in distilled water than the soaps. On the other hand, in hard water the synthetic detergents in a majority of cases were more effective than the soap, especially at concentrations lower than 0.35 per cent. 38 references.

SOAP IN FRUIT WASHING. Anon. *Soap Sanit. Chem. 24*, No. 11, 73 (1948). It has been found that neither the use of soap or synthetic detergents in washing oranges has any significant effect in eliminating stem-end rot or mold on fruit during the marketing season.

UTILIZATION OF MEASUREMENTS OF SURFACE TENSION FOR THE DETECTION OF ALKALINE SOAPS. APPLICATION TO THE STUDY OF THE STABILITY OF THEIR LINKAGE WITH SERUM PROTEINS. R. Goiffon and N. Larthe. *Ann. Biol. Clin. (Paris) 6*, 245-50 (1948). In solutions sufficiently concentrated certain compounds have a typical minimum surface tension ( $\gamma$ ) and a higher concentration no longer lowers it. These compounds have a variability of their dilution curves that is independent of their minimum tension. For alcohol and acetone the addition of small amounts of water raises  $\gamma$ , but for Na oleate (I) the  $\gamma$  is indifferent to the dilution and remains constant even in very low concentration. The difference between the dynamic and static tension is greater when the dilution is closest to the part of the curve that approaches the  $\gamma$  of water. A solution of I at a 0.001 dilution has a  $\gamma$  of 25 dynes and its  $\gamma$  does not change on further one-half dilution. Na palmitate has a  $\gamma$  of 32 dynes at this concentration and K palmitate of 22.5 at 0.002 dilution. Na stearate has a  $\gamma$  of 23.5 at 0.01 dilution but rises rapidly on further dilution. Pepsin peptone at 0.001 dilution has a  $\gamma$  of 56 dynes, glucose 61 dynes. The presence of soap is shown by a  $\gamma$  of the order of 25 dynes and especially by the possibility of diluting the solution to twice its volume without appreciably changing its  $\gamma$ . Soaps are the only compounds studied that possess this characteristic. (*Chem. Abs. 42*, 8047.)

USE OF MICROMETHODS IN THE FAT FIELD. XII. ANALYSIS OF SOAP. G. Gorbach (Tech. Hochschule, Graz, Austria). *Mikrochemie ver. Mikrochim. Acta 34*, 30-8. Detailed directions are given for carrying out the usual determinations of fatty acids, unsaponifiable material, total and combined alkali, free and carbonated alkali, water, salt, and filler, with very small quantities of sample. (*Chem. Abs. 42*, 9208.)

MEASUREMENT OF RATES OF SPREAD OF SOLUTIONS OF SURFACE ACTIVE AGENTS. Jorma Hyypia (Oakite Prod-



ucts, Inc., New York). *Anal. Chem.* 20, 1039-43 (1948). An apparatus is described for measuring the rate of spreading of liquids on various surfaces. A measured volume of liquid or solution is placed upon the surface and automatically photographed at definite time intervals. Any plane surface, whether transparent or opaque, may be used. Measurements of the resulting series of photographic images are plotted against elapsed times to obtain curves which indicate the relative rates of spread of the solutions under comparison. The rate of spreading is shown to be a function of the nature of the surface on which spreading takes place. This is demonstrated by a comparison of the spreading behavior of typical anionic, cationic, and nonionic wetting agents on two types of surfaces. Surface active agents of similar ionic type have been found to exhibit characteristic spreading when they are compared on the same type of surface.

SOAP MICELLES THAT SOLUBILIZE DIMETHYL PHTHALATE, A LIQUID INSOLUBLE IN WATER AND IN HYDROCARBON. J. W. McBain and Harriette McHan (Stanford University, Palo Alto, Calif.). *J. Am. Chem. Soc.* 70, 3838-40(1948). Potassium laurate in decinormal solution solubilizes twenty times as much dimethyl phthalate as could be dissolved in the same weight of hydrocarbon. This, therefore, cannot be attributed to solubility in the hydrocarbon tails of the soap, nor in the hydrocarbon interior of spherical micelles. Its solubility is therefore ascribed to adsorption on exterior polar groups of the small micelles.

SOAP AS A LUBRICANT. C. J. Boner (Battenfeld Grease & Oil Corp., Kansas City, Mo.). *Petroleum Processing* 3, 1193-4, 1196(1948). Experimental work and theory are presented to justify the conclusion that the soap in lubricating greases is a primary lubricant, rather than merely a thickener for the mineral oil. This is due to the bonding to the bearing metal of certain types of soap molecules which separate out of the grease to form a monomolecular film which clings to the bearing surface long after a hydrodynamic film has been squeezed out. The physical state of the soap and its dispersion in the mineral oil have an important effect on this lubricating characteristic. This theory of the mechanism of grease lubrication would call for changes in currently accepted specifications.

ROLE OF THE HYDROXYL GROUP IN THE GELATION OF ALUMINUM SOAPS IN HYDROCARBONS. T. S. McRoberts and J. H. Schulman (Univ. of Cambridge, Eng.). *Nature* 162, 101-2(1948). Experiments directed toward determining the effect of adding H<sub>2</sub>O to soaps prepared under anhydrous conditions by mixing Al alcoholate and fatty acids in benzene are described. The soaps are formed exothermically, are extremely soluble, and do not gel. Curves are given for the change in viscosity as H<sub>2</sub>O is added for the butyrate, caproate, decanoate, laurate, and palmitate. The viscosity rises to a steep maximum at the equivalent of one H<sub>2</sub>O per aluminum, and then falls sharply until, at about the equivalent of two H<sub>2</sub>O, precipitation of soap begins. The position of the maximum is independent of the relative or total amounts of fatty acid and alcoholate. However, in the region of 1.0 mole of acid per mole of alcoholate, precipitation and hetero-

geneity make the results unreliable. The highest maximum is produced by two moles of acid per mole of alcoholate. Reproducible, rather unstable solid monolayers are obtained by spreading a benzene solution of soap on H<sub>2</sub>O. These compressed monolayers show an area of 19 sq. Å per molecule of fatty acid, provided the molecular ratio of acid to alcoholate exceeds 1.5. The results indicate that the Al tri-soap does not exist and that at the most two fatty acid molecules react with one of alcoholate. Use is made of the coordination theory and the conclusion is that Al soap-hydrocarbon-gel is composed of very large molecules loosely held together by hydroxyl bonds, and van der Waals attraction of long hydrocarbon chains. (*Chem. Abs.* 42, 8499.)

## PATENTS

RAPID MANUFACTURE OF SOAP. Andre Razis. *British* 605,653. A method for the rapid production of soap in which a mixture of fatty substances with an aqueous alkaline solution is transformed in the cold into a very fine emulsion by mechanical means, stirring after saponification to prevent solidification, and carrying on the entire reaction in the emulsifying apparatus to aid soap discharge from this apparatus.

SOAP FROM LOWER ALKYL ESTERS OF HIGHER FATTY ACIDS. George B. Bradshaw. *U. S.* 2,452,724-5. Fatty materials such as the lower alkyl esters of higher fatty acids are continuously saponified at a temperature of about 105°C. under agitation and pressure and, after reducing the vapor pressure by heat interchange and by addition of cold liquor, are separated into neat soap and nigre under atmospheric pressure conditions.

SURFACE-ACTIVE LINEAR POLYESTERS. Louis H. Bock and James L. Rainey (Rohm & Haas Company). *U. S.* 2,454,546. Surface-active agents which have high detergent action under a variety of conditions are prepared by esterifying a long-chain unsubstituted glycol with maleic acid and then reacting the linear polyester thus formed with a water-soluble bisulfite.

METHOD OF COOLING HOLLOW GLASS ARTICLES. Theodore C. Baker (Hartford-Empire Co.). *U. S.* 2,443,674. A wetting agent such as soap, sodium oleate, or Drene is added to water to be atomized in forming a water spray glass cooling fluid for use in tempering bottles or other hollow glass articles.

COLD PROCESS FOR PRODUCING SOAP. W. G. Elliott. *Brit.* 575,947. Improved cold process soaps are prepared by mixing rosin, oils, and fats with quantity of caustic potash insufficient for complete saponification and when mixture becomes liquefied adding sufficient alkali to complete saponification before the soap is discharged from the vessel.

POLYMERIC DETERGENTS. Louis B. Bock and James L. Rainey (Rohm & Haas Company). *U. S.* 2,454,541-5. A new type capillary-active or surface-active agent consists of water-soluble macromolecules not affected by such factors as concentration and temperature is produced by condensing hydrocarbon-substituted phenols with formaldehyde and then introducing hydrophilic groups primarily by means of alkylene oxides.