

the "B" and "C" values of stearic acid which are 43.75 and 39.75 respectively (12).

The long spacing value of the higher melting form appears to be 84.4 Å. The possibility remains, however, that the true value is 42.2 Å since an apparent 9th order is the only odd order observed for 84.4 Å. The intensities of the long spacing lines, as a whole, are quite weak, and the distribution of intensity among the various long spacing orders is unusual. There is a complete absence or extreme weakness of orders between the 2nd and 9th; the common condition of strong intensity of odd orders, which was observed for the lower melting form, does not prevail. Whatever the crystal structure may be, it seems very likely that it deviates from the head to head arrangement usually observed for crystallized monocarboxylic acids.

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#### Summary

X-ray diffraction data are reported for the two polymorphic forms of oleic acid, melting respectively at approximately 13° and 16°C. The very striking differences observed in the patterns of the two forms

point to profound differences in crystalline structure.

The lower melting form, with its main short spacing of 4.19 Å, its long spacing of 40.5 Å, and its relatively strong intensity for the odd orders of long spacing, suggests similarities in structure to the "B" and "C" forms of stearic acid.

On the other hand, the higher melting form is probably unique in crystal structure among the forms of long chain monocarboxylic acids for which diffraction data have thus far been reported. This form has main short spacings of 4.65 and 3.67 Å, a long spacing of 84.4 Å (possibly 42.2 Å), and a very irregular and unusual distribution of intensity among the various orders of long spacing.

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## Abstracts

### Oils and Fats

Edited by  
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INVESTIGATION OF THE SEED OILS OF SOME SUDAN CAESALPINOIDEAE. D. N. Grindley (Sudan Med. Service, Khartoum). *J. Soc. Chem. Ind.* 65, 118-19 (1946). Analyses of seed oils of *Erythrophleon guineese*, *Parkinsonia aculeata*, *Cassia fistula*, *Tamarindus indica*, and *Cassia arereh* are given.

GRAIN STORAGE STUDIES. III. THE RELATION BETWEEN MOISTURE CONTENT, MOLD GROWTH, AND RESPIRATION OF SOYBEANS. M. Milner and W. F. Geddes (Minn. Agr. Exper. Sta., St. Paul). *Cereal Chem.* 23, 225-47 (1946). Relative humidity rather than actual moisture content of seeds determines their susceptibility to molding. It is concluded that the various "critical" moisture values for different seed species (e.g., flaxseed 10.5%, wheat 14.5%) are those moisture contents which are in hygroscopic equilibrium with a common relative humidity of about 75% which, over moderate time intervals, is the minimal humidity required for the growth of the most xerophytic mold species which contaminates the seed.

SOLVENT EXTRACTION OF COTTONSEED AND PEANUT OIL. EFFECT OF HEAT ON COTTONSEED OIL MISCELLAS. H. L. E. Vix, E. F. Pollard, J. J. Spadaro, and E. A. Gastrock (So. Regional Res. Lab., New Orleans, La.). *Ind. Eng. Chem.* 38, 635-42 (1946). Heating of cottonseed oil miscellas at various temperatures and definite time periods under appropriate reduced pressures was carried out to determine the effect of heat on the resulting refined and bleached oils. Color fixation became objectionable between 150° and 180° F., and beyond 180° increased rapidly.

Properly prepared solvent-extracted cottonseed oils from a prime lot of seed were successfully refined by slightly modified official A. O. C. S. refining methods which yielded oils of prime quality with low refining losses. Results have yielded necessary engineering information useful for design and operation of pilot plant equipment and for processing operations.

SODIUM CHLORITE IS SUCCESSFULLY USED FOR BLEACHING TALLOW. J. B. Tuttle (Theobald Industries, Inc., Kearny, N. J.), and E. R. Woodward. *Chem. & Met. Eng.* 53, No. 5, 114-15 (1946). Bleaching tallow with NaClO<sub>2</sub> is based on the production of ClO<sub>2</sub>, a powerful oxidizing gas. Commercially, this is done by adding chlorite and either of 2 activating agents to the kettle.

A SUBMICRO METHOD FOR THE DETERMINATION OF IODINE NUMBER OF LIPIDS. N. Kretchmer, R. T. Holman, and G. O. Burr (Univ. Minn., Minneapolis). *Arch. Biochem.* 10, 101-5 (1946). A submicro modification of the Rosenmund-Kuhnemann method for determination of the I value of lipids is described. The I value is determined on samples of 10-100 γ in size. The method was applied to oils, fatty acids, whole blood (total lipids), and plasma fatty acids and gave I values which were in agreement with values obtained by the Wijs method.

DETERMINATION OF SMALL AMOUNTS OF SOAPS OR FATTY ACIDS ON COTTON MATERIALS. C. L. Hoffpauir and J. H. Kettering (So. Regional Res. Lab., New Orleans). *Am. Dyestuff Repr.* 35, 265-6 (1946). An analytical method for the determination of small

quantities of fatty acids or their soaps in cotton fiber, yarn, or fabrics is described. The acids and their soaps are removed by Soxhlet extraction with Et or isopropyl alcohol, separated from extraneous material by extraction with low-boiling petroleum ether after acidification with HCl, and finally titrated with alcoholic NaOH in the absence of CO<sub>2</sub> by use of meta-cresol purple indicator.

**COLORIMETRIC DETERMINATION OF FATTY ACIDS AND ESTERS.** U. T. Hill (Inland Steel Co., East Chicago, Ind.). *Ind. Eng. Chem., Anal. Ed.* 18, 317-19 (1946). A rapid colorimetric method for determination of fatty acids and esters is based on the formation of hydroxamic acid from fatty esters by the use of hydroxylamine hydrochloride in alkaline media. On the addition of an acidified solution of alcoholic ferric perchlorate, a stable red colored complex of ferric hydroxamate is formed, proportionate in intensity to the esters present. Fatty acids are first quantitatively methylated in an anhydrous ether solution with diazomethane or thionyl chloride. The method has been applied to the quantitative determination of oil on tin plate. The results are in good agreement with a gravimetric determination.

**THE USE OF LOW-TEMPERATURE CRYSTALLIZATION IN THE DETERMINATION OF COMPONENT ACIDS OF LIQUID FATS. III. FATS WHICH CONTAIN ELEOSTEARIC AS WELL AS LINOLEIC AND OLEIC ACIDS.** T. P. Hilditch and J. P. Riley (Univ. Liverpool). *J. Soc. Chem. Ind.* 65, 74-81 (1946). The mixed fatty acids are first separated into several groups by crystallization from acetone, and then from light petroleum, at low temperatures. Each group of acids is analyzed spectrographically before and after isomerization with alkali, whence the proportions of  $\alpha$ -eleostearic and linoleic (and, if present, linolenic) acids are determined. On the mixed fatty acids, the saturated acids are determined by the Bertram method, and palmitic acid by fractionation of the hydrogenated mixed esters. Oleic acid is determined by difference, since I values cannot be reliably employed where conjugated fatty acids are involved. With fatty acid mixtures very rich in eleostearic acid, spectrographic analysis of the total fatty acids may lead to errors in the determined proportions of linoleic and other acids, and the preliminary low-temperature resolution into several groups is essential. Two specimens of tung oil and the seed oils of *Parinarium macrophyllum*, *Ricinodendron africanum*, and *Telfairia occidentalis* have been studied by this procedure.

**THE COMPLEXES OF FATTY ACIDS WITH AMYLOSE.** F. F. Mikus, R. M. Hixon, and R. E. Rundle (Iowa State Coll., Ames). *J. Am. Chem. Soc.* 68, 1115-23 (1946). X-ray and optical investigation of the complex between amylose and fatty acid reveal it to have its own particular crystalline form. Amylose with a helical chain configuration will bind fatty acid, while amylose with an extended chain configuration will not, independent of relative particle size of the 2 materials. These points are interpreted to mean that a molecular complex, rather than surface adsorption, is involved.

**PRELIMINARY NOTE ON INTERACTION BETWEEN LECITHIN AND FAT ACIDS.** D. Dervichian and J. Pillet (Inst. Pasteur, Paris). *Bull. soc. chim. biol.* 26, 454-6 (1944). Experiments on spreading of surface films on water showed that a mixture of 1 mole lecithin

with 2-10 moles oleic acid spreads over an area about 18% less than the calculated area for the quantities of the components used. This suggests a combination or association of some sort. (*Chem. Abs.* 40, 1891-2.)

**DETERMINATION OF VITAMIN A IN LIVER.** W. D. Gallup and J. A. Hoefler (Okla. Agr. Exper. Sta., Stillwater). *Ind. Eng. Chem., Anal. Ed.* 18, 288-90 (1946). A rapid procedure is described for the colorimetric determination of vitamin A in liver. Vitamin A is quantitatively recovered from saponified 1 g. samples of liver by a single extraction with petroleum ether. Negligible amounts of interfering substances permit direct evaporation of the petroleum ether and treatment of the residue in chloroform with SbCl<sub>5</sub>. Errors due to soap formation, reagent impurities, and light are briefly discussed.

**FUNCTIONAL AND FATTY CHANGES IN LIVER DURING CHRONIC VITAMIN B COMPLEX DEFICIENCY.** V. A. Drill and T. A. Loomis (Yale Univ. School of Med., New Haven, Conn.). *Proc. Soc. Exptl. Biol. Med.* 61, 374-6 (1946). A chronic vitamin B complex deficiency in dogs on a 41% casein diet produced a marked decrease in voluntary food intake, but liver function tests remained normal and liver sections showed no increase in fat. A similar chronic B complex deficiency using dogs on a 20% casein diet produced an abnormal liver function and fatty changes in liver biopsy specimens. These findings were absent in the inanition and normal control dogs. Therapy with yeast extract restored the liver function to normal and the fatty change in the liver decreased even though protein and caloric intake were restricted.

**LIPINS AND LIPIDOSES.** S. J. Thannhauser and G. Schmidt (Tufts Coll. Med. School, Boston). *Physiol. Revs.* 26, 275-317 (1946).

**FACTORS AFFECTING FAT TRANSPORT IN THE ANIMAL BODY.** C. H. Best (Univ. of Toronto). *Am. J. Dig. Diseases* 13, 155-9 (1946). An excellent review.

**CONVERSION OF LAURIC AND MYRISTIC ACIDS INTO FAT ACIDS OF HIGHER MOLECULAR WEIGHTS IN RATS.** Alf Klem (Univ. Oslo, Norway). *Hvalradets Skrifter, Norske Videnskaps-Akad. Oslo No.* 27, 26 pp. (1943). Fat acids labelled with deuterium were fed to adult rats for several weeks after which the total fat stored in the body was examined for labelled fat acids. On rations containing 10% fat including triglycerides of deuterio-C<sub>14</sub> fat acids, 9% of C<sub>16</sub> acids of the carcass originated from the dietary labelled C<sub>14</sub> acids. From 79-85% of the deposited C<sub>14</sub> acids were derived from the ingested C<sub>14</sub> acids. When deuterio-C<sub>12</sub> acids were fed, 13% of C<sub>14</sub> and 89% of C<sub>12</sub> acids deposited came from the dietary C<sub>12</sub> acids. Rations were also fed containing about 13% fat of which 1/3 of the fat acids were deuterio-C<sub>12</sub> and the remainder were C<sub>8</sub> acids. After 9 days, 2% of the C<sub>18</sub>, 5% of the C<sub>16</sub>, and 37-45% of the C<sub>14</sub> acids in the carcass were derived from the dietary C<sub>12</sub> acids. Approximately 81.5% of the C<sub>12</sub> body-fat acids came directly from the C<sub>12</sub> acid ingested. Conclusion:  $\beta$ -oxidation of fat acids is a biologically reversible process. (*Chem. Abs.* 40, 2200, 1946.)

**ACTIVATION OF PANCREATIC LIPASE BY CALCIUM CHLORIDE AT VARYING pH.** F. Schonheyder and K. Volqvartz (Biochem. Inst., Aarhus, Denmark). *Acta Physiol. Scand.* 10, 62-9 (1945). The optimum pH for pancreatic lipase increases from 7-8.8 with in-

creasing number of C in the fat acid component of the triglyceride. The addition of  $\text{CaCl}_2$  does not alter the pH for optimum activity but activates the hydrolysis in both alkaline or acid medium. This is interpreted as being due to the strong depression of pancreatic lipase activity by free higher fat acids. The strong activation by  $\text{CaCl}_2$  is supposed to result from the removal of such acids as insoluble soaps. (*Chem. Abs.* 40, 1896.)

**GREASE IN THE LIGHT LEATHER INDUSTRY. II. THE CAUSE AND PREVENTION OF GREASINESS IN GLAZED KID.** H. M. Davies and R. F. Innes. *J. Intern. Soc. Leather Trades' Chem.* 30, 104-13 (1946). The cause of greasiness in glazed kid is shown to be the presence of free fatty acids in the cured skin when it is put into work. If this is more than 1% of the weight of the hair-clipped, air-dried skin, greasiness is liable to develop in the crust, staked, or finished leather. If it is under 1% the leather will take up the dye and season evenly, so that the finished leather will be clear and bright, and free from grease or spue. Greasiness is mainly found in leather from skins which have been cured by the dry salting process (notably those from India and Egypt), and is rare in leather from wet-salted skins.

**A FACTOR ESSENTIAL FOR THE WATER REPELLENCE OF CHROME LEATHER.** T. A. Pressley. *J. Intern. Soc. Leather Trades Chem.* 30, 94-101 (1946). The outstanding result of the investigation is that, for the laboratory chrome tanning conditions employed, a small quantity of free fatty acid in the raw material is essential if the leather is to be water-repellent. The threshold value for fatty acid content is between 0.25 and 0.5% of the weight of the air-dry pelt, greater quantities do not appear to exert much further influence on the penetration pressure.

**RUST PREVENTIVE OILS. USE OF CONTACT ANGLES TO STUDY THE ACTION OF MINERAL OIL FILMS.** G. P. Pilz and F. F. Farley (Shell Oil Co., Inc., Wood River, Ill.). *Ind. Eng. Chem.* 38, 601-9 (1946). Rust preventive oils, composed of polar organic compounds in mineral oil, have been employed extensively in film applications for the temporary protection against rusting of iron and steel parts during manufacturing operations, storage, shipment, and use. The condensation of moisture in droplets on such oil-coated steel parts produces a dynamic system composed of water, oil film, and metal. A study of the contact angles formed by such a system where a drop of water rests on a horizontal oil-coated steel panel has established a relationship between contact angles and rust preventive ability.

#### PATENTS

**PROCESS OF TREATING FATTY GLYCERIDES.** W. R. Trent (Colgate-Palmolive-Peet Co.). *Reissue* 22,751 of *U. S.* 2,383,632. A process for the alcoholysis of fatty glycerides comprises reacting a fatty glyceride with a low molecular weight monohydric alcohol in the presence of an alcoholysis catalyst consisting of alkaline and neutral catalysts to produce a liquid body containing esters of fatty acids with the alcohol, glyceride, and unreacted alcohol.

**PURIFICATION OF UNSAPONIFIABLE FRACTIONS OF FATS OR OILS.** L. O. Buxton (National Oil Products Co.). *U. S.* 2,400,101. A process for producing fat-soluble vitamin concentrates from oleaginous vitamin-containing materials comprises saponifying the oleaginous material to produce a soap mass, extracting the soap mass with ethylene dichloride while maintaining the temperature of the solvent and soap between 40 and 80° and the water content of the soap at such an amount that the soap is slightly soluble in the solvent and separating the warm solvent extract from the warm soap.

**STABLE VITAMIN-CONTAINING PRODUCTS.** L. O. Buxton and H. J. Konen (National Oil Products Co.). *U. S.* 2,401,293. A process for preparing a stable fat-soluble vitamin-containing product in a dry form comprises admixing a fat-soluble vitamin-containing fatty material with finely divided vegetable material having a high affinity for fatty material, and mixing the product thus obtained with a crude vegetable oil, the amount of fatty material incorporated into the vegetable material being controlled to yield a substantially nonoily product containing not more than about 30% of fatty material.

**PHOSPHATIDE COMPOSITION AND METHOD OF PREPARING.** P. L. Julian and E. W. Meyer (American Lecithin Co.). *U. S.* 2,400,120. The process of preparing a phosphatide composition comprises mixing the vegetable phosphatide with a small amount of an oil-dispersible, acid-liberating compound to uniformly distribute the acid-forming compound throughout the phosphatide mass in an amount sufficient to increase the oil solubility of the phosphatide.

**REFINING TALL OIL.** B. M. Weston and F. F. Beall (Aristo Corp.). *U. S.* 2,399,588. The refining process comprises acidifying the crude tall oil soaps with HCl, steaming to break emulsion and vaporizing volatile compounds and separating the liberated acids after the discontinuation of steaming.

**TREATMENT OF TALL OIL.** E. Segessemann (National Oil Products Co.). *U. S.* 2,400,607. A process of treating tall oil to separate a fat fraction therefrom comprises esterifying the fat acids in tall oil with a monohydric alcohol, hydrogenating the fat acid esters in the esterified mixture, decreasing the temperature of the resulting mass in the presence of a solvent to effect precipitation of fat acid esters and removing the precipitated fat acid esters from the remaining solution.

**INSECT REPELLENT COMPOSITIONS.** H. A. Jones and B. V. Travis (U.S.A.). *U. S.* 2,400,006. An insect repellent composition comprises 1-(*p*-methoxyphenol) ethanol incorporated in a carrier selected from the group consisting of a vegetable oil, an inert powder, and water.

**DEMULSIFIER.** M. De Groote and B. Keiser (Petro-lite Corp., Ltd.). *U. S.* 2,401,055. A new composition of matter consists of an oxyalkylated drastically-oxidized dehydrated ricinoleic acid compound, in which the radicals introduced by oxyalkylation were selected from the class consisting of ethylene oxide, butylene oxide, propylene oxide, and glycidol radicals.