a conclusion later confirmed when identification of the unsaturated fatty acids was attempted by means of their permanganate oxidation products.

The hydroxy acids formed in the aforementioned reaction, after having been thoroughly dried, were washed with a liberal volume of ethyl ether. From the ether solution, after concentration, there crystallized a small quantity of material of neutralization equivalent 184 and melting point 130.7°. Since the corresponding values for pure dihydroxy-stearic acid are 184° and 137, respectively, it is evident that the product was slightly contaminated notwithstanding the fact that the parent compound was obviously oleic acid. From the ether-insoluble residue, after crystallization from hydro-alcohol (30%) solution, there were obtained four fractions; of these three melted in the range 155.6°-157°, the fourth, which constituted approximately one-tenth of the whole, at 167°-169°. The melting points of the two forms of sativic acid (tetrahydroxy stearic acid) are 162°-163° and 173°. It seems not improbable, therefore, that linoleic acid occurs in this oil in two isomeric forms.

The saturated acids were found to be composed entirely of stearic acid (neutralization equivalent 196, required for stearic acid 197). Crystallization from alcohol yielded no arachidic acid. The absence of homologues of this acid containing less than C_{12} has already been accounted for.

Because of the elimination of the several acids, as above indicated, and for the added reason that by the lead-salt-ether procedure the content of solid fatty acids was found to be approximately 5.9 per cent and that of the liquid acids 86.4 per cent, the assumption may very well be made that the Hehner number of this oil, or 91.97, represents in this case its content of total fatty acids. Using, therefore, as a basis for calculation this value, and the iodine and thiocyanogen numbers of the total fatty acids, which were found to be 155 and 85.6, respectively, the composition of this oil in terms of its constituent fatty acids is saturated acids (stearic) 4.90 per cent, oleic acid 16.50 per cent and linoleic acid 70.40.

CONCLUSIONS

It does not follow, from this examination of the seed oil of the hackberry, that genetic relationships within the plant family here in question are reflected in the composition of the seed oil of two of its members. Elm seed oil is characterized by its large content of a low-molecular weight saturated fatty acid (capric) whereas, similarly, that of hackberry seed oil is a high-molecular unsaturated one (linoleic) which, apparently, exists here in two isomeric forms.

The relative scarcity of the tree, the low yield of oil from its fruit and the uncertainty of the crop stand in the way of a commercial exploitation of this oil. It might, however, have a nutritional interest because of its high content of linoleic acid.

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ABSTRACTS

Oils and Fats

Edited by

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Research on obtaining fats by means of micro-organisms with special consideration to the work by the Institute of Fermentation Industries. H. Fink, H. Haehn and W. Hoerburger. *Chem.-Ztg.* **61**, 689-693, 723-6, 744-7 (1937).

Antioxygens of fatty oils. XV. Action of carotene on the oxidation of fatty oils. XVI. Ultraviolet rays as a cause of inversion of oxidation catalysts for fatty oils. N. Nakamura. *J. Soc. Chem. Ind. Japan* **40**, Suppl. binding 203-5, 205-6 (1937).—The action of carotene on the oxidation of fatty oils varies with the kind of fatty oil in which it is dissolved and, in some cases, with the concns. of carotene added. The stability of carotene varies with the kind of oils in which it is dissolved, viz., it is most unstable in tsubaki oil, moderately stable in linseed and most stable in maize oil. Moderate unsatn. in fatty oils is considered necessary for the highest stability of carotene. (*Chem. Abs.*)

Pressure cooking contributes increased cottonseed processing profits. R. B. Taylor. *Chem. & Met. Eng.* **44**, 478-81 (1937).—Apparatus, technic and av. results of 275 test runs are described. With cooking temps. of 270° F. or higher, and proper moisture content control, it was found possible to maintain an av. "standard" (ratio of oil to NH_3 in the cake) of 55 as compared with "standards" of 65 to 70 for av. oil mill practice. On the basis of "prime" seed (3.5% NH_3 and 18.5% oil), 10 to 15 points reduction in the "standard" is equivalent to from 6⅔ to 10 lb. increase in oil yield per ton of seed, a gain of 67c to $1 per ton of oil at 10c per lb. The quality of cake and oil was uniformly equal to or better than that produced in the best mill practice.

Reducing the oil lost through deacidifying. R. Dieterle. *Seifen-Ztg.* **64**, 632-3 (1937).—A prominent problem for fat refiners is the choice of either deacidifying with dilute caustic at high temps. or concn. caustic at low temps. Coco and babassu fats, good palm fat, sesame and peanut oil and some types of whale oil are in general refined with caustic of 2 to 6° Be and at 98° C. and a caustic factor of 1.1 to 1.4 being used. The amt. of caustic used is that necessary to neutralize the free fat acids multiplied by the caustic factor. Poor quality train type oils, certain types of peanut oil and palm fat and about all types soy, rape and cottonseed oils require concd. caustic. In this case the caustic factor is 2 to 5, temp. 60-80° and concn. of caustic 10 to 20° Be.

Rancidity and mold in cured bacon retarded. S. Bull. Natl. Prov. **97**, No. 13, 13, 46 (1937).—Value of oat flour in retarding rancidity in cured meats, and mold and rancidity in sliced bacon, was tested at the Univ. of Ill. and found to be effective. Comparative

ABSTRACTS

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tests were made in dry-curing one side from selected experimental hogs in the usual way, and curing the other side from each hog in the same way, but with the addition of a specified amt. of oat flour. Keeping quality of the meat in which oat flour was added to the cure was greater than that cured without the oat flour. Other experiments made in the keeping quality of sliced bacon by comparing time of development of rancidity and mold in bacon dusted with 1% oat flour when sliced, and bacon not so treated, also gave gratifying results.

Edible fat obtained from Xymenia americana. *Ind. & Eng. Chem. News Ed.* **15,** 419 (1937).—The following characteristics of the fat have been determined: moisture in kernels 3.6%, total oil in kernels, by solvent extraction 49.0%, color yellow-orange, sp. gr. at 20° C. 0.9262, refr. index at 20° C. 1.4710, sapon. value 169.2, I value (Hanus) 82.5, acid value 2.3; chemical constants of mixed fatty acids of the fat: mean mol. wt. 319.8, I value 85.0.

Composition of the tail fat of fat tail sheep. J. Grossfeld. *Z. Untersuch. Lebens.* **74,** 191-2 (1937).—The characteristics of the fat are: melting point 41.8°, sapon. no. 198.8, I no. (Hanus) 53.0, SCN no. (Kaufmann) 47.7, total fat acids 95.4%, unsapon. 0.105%, oleic acid 47.1%, linoleic acid 5.8%, isoöleic acid (Grossfeld & Peter) 2.5%, the same crystallized only once 5.3%, total no. of lower fat acids 2.0, butyric acid no. 0.4, residue no. 1.6.

Hydrogenation of vegetable oils. V. A. Rush, I. L. Dvinyaninkova and E. I. Lyubarskiĭ. *J. Applied Chem.* (U. S. S. R.) **10,** 702-8 (in French 708) (1937).—Sunflowerseed oil (150 g.) was hydrogenated in the presence of a catalyst (prepd. by the reduction of Ni formate) contg. 35.5% Ni, in the Lyubarskiĭ autoclave (described), with PrOH (24 g.) as a H donor, at 260°, for 15 min. The product contained satd. compds. 12.5-12.8, oleic acid 50.8-54.5, isoöleic acid 33.1-27.4 and linoleic acid 3.6-5.3%. To prevent an excessive destruction (35.7%) of the aldehyde formed from PrOH, the hydrogenation may be carried out in the presence of a Ni-kieselguhr catalyst. Under these conditions, only 16.8% of the aldehyde is destroyed, and the compn. of the product is satd. compds. 12.8-14.8, oleic acid 53.2-56.3, isoöleic acid 22.0-26.8 and linoleic acid 4.7-10.3%. Thirteen references. (*Chem. Abs.*)

Esters of castor oil fat acids. I. Glycerides of ricinoleic acid, liquid fat acids of castor oil and oleic acid. Yoshiyuki Toyama and Tokuzo Ishikawa. *J. Soc. Chem. Ind. Japan* **40,** Suppl. binding 172-3 (1937).—Comparison with tsubaki oil showed that the f. p. of castor oil is lowered by removing its satd. solid acids while that of tsubaki oil is not affected markedly. Heating of ricinoleic acid or castor oil liquid fat acids with glycerol causes the formation of estolides and glycerides of polyricinoleic acid of high viscosity from a part of ricinoleic acid. **II. Ethylene glycol ester of castor oil fat acids, glycerol and ethylene glycol esters of polymerized castor oil fat acids.** *Ibid.* 173.—The ester of castor oil liquid fat acids and $C_2H_4(OH)_2$ obtained by heating them for a long time and contg. esters of polyricinoleic acids has a lower f. p. than castor oil. The viscosity at 100° is approx. the same as that of castor oil but at room temp. is considerably lower. The polymerized product contg. polyricinoleic acids from the thermal polymerization of castor oil fat acids when heated with $C_2H_4(OH)_2$ or $C_3H_5(OH)_3$ yields a polymerized ester having a very high viscosity. This ester mixes well with mineral oils and its change of viscosity with the change in temp. is small. **III. Esters of castor oil fat acids or castor oil liquid fat acids and various low-molecular monohydric alcohols.** *Ibid.* 173.—Me, Et, Bu, Am (isoamyl), cyclohexyl and methylcyclohexyl esters of castor oil fat acids were prepd. Each of these esters mixes well with mineral oils. When the Am ester of castor oil liquid fat acids was distd. *in vacua*, the f. p. of the distillate became higher than that of the undistd. ester. But an addn. of a small amt. of castor oil to the main distillate caused a lowering of the f. p. The addn. of 5-10% of Am, Et or Me ester of castor oil fat acids to castor oil caused a 10% lowering of the f. p. of castor oil. **IV. Esterification by heating of methyl or ethyl ester of castor oil fat acids and castor oil fat acids.** *Ibid.* 173-4.—The main reaction is an esterification between the castor oil fat acids and the OH group of ricinoleic acid which is present as a glyceride in castor oil. The reaction proceeds best at 200-220°. (*Chem. Abs.*)

Chemistry of drying oil films. R. S. Morrell. *J. Soc. Chem. Ind.* **56,** 795-8 (1937). A review.

A partial dechlorination of chlorinated soybean oil. Ri-ichi Yamaguchi and T. Matsushima. *Bull. Waseda Applied Chem. Soc.* **31,** 10-13 (in English 53) (1937).—Chlorinated oil contg. 28.21-32.50% Cl is dechlorinated by the H_2SO_4 or ZnO-glacial AcOH method to the extent of 8.66-19.17% Cl. The product thus obtained indicates 20% polymerization from the extn. of the I no. and Cl. content. Also brominated oils contg. 47.45-50.47% Br were obtained; debromination gave a product contg. 0.33-2.26% Br and with I no. 109.2-127.7. Debromination of tetrabromostearic acid was also carried out as a contrasting expt. (*Chem. Abs.*)

Partial hydrogenation of fish oil. VI. Reexamination of unsaturated fat acids of linolenic series produced on hydrogenating methyl clupanodonate. M. Takano. *J. Soc. Chem. Ind. Japan* **40,** Suppl. binding 165 (1937). A reexamn. of a newly prepd. sample gave evidence that it may consist of 2 isomeric acids, the one giving tetrarhodanate and the other dirhodanate. **VII. Ozonide decomposition of the acid of the linolenic series produced on hydrogenating methyl clupanodonate.** *Ibid.* 165-6. By the ozonide decompn. of the linolenic acid series produced on hydrogenating Me clupanodonate, the following substances were found: propaldehyde, propionic acid, succinic acid, succinic acid monomethyl ester, capric and adipic acids, nonanedicarboxylic and pimelic acids and either enanthic or caprylic acid. (*Chem. Abs.*)

Vitamin value (A and D) of premier jus in comparison with beef tallow and lard. J. Krizenecky.

ABSTRACTS

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Chem. Listy Vedu Prumysl **31**, 88-93, 114-20 (1937); *Chem. Zentr.* **108**, II, 313.—Premier jus contains a relatively large amt. of vitamins A and D. In winter the vitamin A content of premier jus is ⅓-½ as great as in winter butter and the vitamin D is ½. In summer premier jus is equivalent to butter in vitamin D and it is ⅓ less than butter in vitamin A. Lard is poor in vitamin A. The vitamin D value of lard is less than ⅓ that of tallow in winter and ⅖ in summer.

Assay procedure for vitamin K (anti-hemorrhagic vitamin). H. J. Almquist and E. L. R. Stokstad. *J. Nutr.* **14**, 235-240 (1937).—A rapid procedure for assay of vitamin K supplements is described. Determination of hemoglobin levels is unnecessary in such assay, since avitaminosis K is not a primary cause of anemia in chicks. Vitamin K is present in soybean oil.

Lecithinaemia following the administration of fat. G. Hevesy and E. Lundsgaard. *Nature* **140**, 275-6 (1937).—By feeding a dog with oil and with radioactive phosphorus and then determining the proportion of "labelled" phosphorus in the lecithin of the blood and of the intestine, the authors found that the additional lecithin found in the blood contains only a small amt. of the active phosphorus, and conclude that during the absorption of neutral fats lecithin is formed outside the intestinal tract.

PATENTS

Emulsifying agents, emulsion and process of manufacture. W. F. Schanzle and A. S. Richardson (to the Procter and Gamble Co.). U. S. 2,091,886-7. —Partially esterified polyhydric alcohols (mono- and di-glycerides) are used as emulsifying agents.

Process of purifying oil and vitamin fractions thereof. A. O. Tischer (to Eastman Kodak Co.). U. S. 2,090,738.—Free fatty acids and other impurities are removed from an oil by shaking it with furfural and then allowing it to separate in two layers; the bottom layer contains an emulsion of furfural, free fatty acids, amine bodies and other impurities.

Fat splitting. Rus. P. 48,962; *Chem. Zentr.* **108**, 316 (1937).—One half of the fat is split with acid; the other half with alkali; whereafter both split products are mixed for the separation of free fat acids and neutral glycerin water.

Hydrolysis of fats. Henkel & Cie. G.m.b.H. Fr. 808,069, Jan. 28, 1937.—Water is passed in uninterrupted circulation through a column of molten fat also in circulation, at a temp. sufficiently high and under sufficiently high pressure to liberate the fat acid and glycerol. The glycerol liberated is constantly washed by the flowing water and is evacuated as glycerol contg. water while the fat is evacuated at the other end. (*Chem. Abs.*)

ABSTRACTS

Soaps

***Edited by* M. L. SHEELY**

Analysis of toilet soap. *Oil & Colour Trades J.* **92**, 692 (1937).—The method for detg. the free alkali in soaps mentioned in most standard methods is that of finding the total and combined alkalis. This, however, does not always give the correct result. Bauschinger (*Fette u. Seifen*, **1937**, 250), cites a case where a sample of soap was tested by an official method, and there was only a trace of free caustic alkali as detd. by the titration and $BaCl_2$ method. As none of the usual filling agents was present, it was assumed that the alkali present was either combined with fatty acids or present as carbonate. The soap was then treated with a known excess of H_2SO_4 and the total alkali estimated as usual. The soap, which contd. 86.32% of total fatty acids, had a total alkali content of 17.59% as Na_2CO_3. The alkali required to neutralize the fatty acids represented 16.95% as Na_2CO_3. Free alkali according to this was 0.64% as Na_2CO_3. Actually the soap contd. 0.5% of ZnO used as a clouding agent. This was insoluble in H_2O and yet by the above method it was returned as free alkali carbonate. Subsequent tests showed that ZnO increases the % of total alkali but hardly affects the detn. of the combined alkali. Another point is that results for the combined alkali may be affected by the volatilizing of low mol. wt. fatty acids, i.e., caprylic acid. In the test as described in the Wizeoff methods, the fatty acids are heated until clear. (Wizeoff, 1930, Section 496.) The decompn. of a toilet soap always requires at least half an hr. It is, therefore, necessary to use a reflux condenser which is washed down with ether after the acid splitting. In 1 expt. 0.671 gm. of caprylic acid was heated for half an hr. in a 250 c.c. flat-bottomed flask on a H_2O bath, and the loss was 15% although the water in the bath merely touched the base of the flask. Many toilet soaps contain some low mol. wt. fatty acids, and the point mentioned above is important.

Solid potash soaps. *Seifensieder-Ztg.* **64**, 409-10 (1937).—Solid potash soaps for use in the textile industries are intermediate between hard soda soaps and the ordinary soft potash soaps. As hitherto made they have suffered under the disadvantage of being extremely hygroscopic, and although several attempts have been made to overcome this defect by the incorporation in the soap of special materials, such as beeswax for example, these have not proved entirely satisfactory. It has now been found that by using a fat charge consisting for the most part of satd. fatty acids or hardened fat, together with a small addn. of a suitable solvent, a satisfactory hard potash soap can be obtained which is very useful in the textile industries. The following is a suggested fat charge: 30% coconut oil fatty acids, 20% peanut oil fatty acids, 50% tallow fatty acids; or the charge may contain from 25 to 50%