ABSTRACTS

Oils and Fats

Edited by
W. F. BOLLENS and M. M. PISKUR

Copper-nickel Catalyst (for the Hydrogenation of Oils). K. Butkovskiĭ and A. Kol'yu. *Masloboĭno Zhirovoe Delo* **12**, 249-50 (1936).—The influence of various factors on the catalytic hydrogenation of oils was studied by treating sunflower oil with H at 220-30° for 2 hrs. The compn. of catalysts given is based on the Ni in the mixt. The best results in hydrogenation were obtained with the catalysts contg. 1 part of Cu to 4.5 and 8 parts of Ni. The presence of 5 per cent Fe in Cu-Ni (regenerated) does not affect the hydrogenation, while that of 10 and 20 per cent increasingly retards it. The presence of 0.03-1.5 per cent NaCl affects the catalytic activity slightly and that of 3-6 per cent NaCl sharply, while the harmful effect of sulfates begins only at a concn. of 27 per cent Na_2SO_4. The reduction of Cu-Ni in oil is effected with equally good results at temps. of 180-230°, and is practically completed at 180°. In the expts. with hydrogenation at 220°, 260° and 280°, the best results were obtained at 260°. Catalysts obtained from the formates of Cu-Ni and Ni gave equally good results. The use of Cu-Ni and Ni pptd. on kieselguhr in various amts. showed no improvement. The prepn. of Cu-Ni and Ni by pptn. at 80° and at room temp., washing the ppt. with hot and cold water, and drying it in air and at 100°, produced equal results. (*Chem. Abs.*)

The American balance sheet in fats and oils. *Chem. Indus.* **39**, 473, 480 (1936). The charts in this article were designed to show a complete statistical study graphically of the significant changes in the fats and oils in the last five years and were drawn to be as self-explanatory as possible. All data have been taken from the Bureau of the Census publication, "Animal and Vegetable Fats and Oils." Charts may be divided into three broad groups. In the first group, comprising production, consumption, imports, and exports, the movement of each oil is comparable with others on the chart so that displacement may be gauged. In the second group, which includes individual oils, changes in trends of consumption and types of outlet for each oil may be judged. Finally, the third group illustrates changing demands for oils and replacements within certain industrial groupings.

Antioxidants and the preservation of edible fats. Colin H. Lea. *J. Soc. Chem. Ind.* **55**, 293-302T (1936). Oxidation of oils was followed at room temp. by detns. of peroxide oxygen content. All results are presented in charts. The oxidation of lard in glass vessels in contact with water is much more rapid at an alkaline than at an acid pH. It is suggested that this effect is due to dissolution of Cu from the glass. At pH values below 5 nitrite is a powerful pro-oxidant. Its action at a concn. of 0.03% is not inhibited by 5% of various antioxidants. Cu and Fe in aqueous soln. accelerate the oxidation of lard. Cu is approximately 20 times as active as Fe, its effect being perceptible at concs. as low as 0.01 p.p.m. Fe in neutral or alkaline soln., i.e., colloidal ferric hydroxide, is inactive. Aliphatic polyhydroxy-compounds such as glycerol and the sugars are weak antioxidants. Aliphatic hydroxy-acids, e.g., lactic and glycollic, the ethanolamines, and maleic acid are moderate, and polybasic hydroxy-acids, e.g., tartaric and citric, powerful, antioxidants. Malonic acid is also effective. Aliphatic amino-acids, e.g., glycine, aspartic and glutamic acids, and asparagine, are all powerful antioxidants. Protein has also considerable antioxidant activity and may be partly responsible for the stabilization of crude natural oils and fats. The pro-oxidant effect of Cu at low concns. (up to approx. 1 p.p.m. under the conditions here employed) is completely inhibited by protein, cyanide, and other antioxidants. At higher concns. of the metal, even 4% of protein fails to prevent a powerful acceleration of oxidation. Orthophosphoric acid is a fairly good, and pyrophosphoric a very good antioxidant. Phosphorous acid is also effective. These water-soluble antioxidants still inhibit oxidation when the water content of the fat is as low as 0.25%. They are active at pH 7, certainly in more acid and probably in more alkaline solns. In the latter case the effect obtained in glass vessels will be reduced by Cu. Under the conditions of these experiments the more powerful of the antioxidants examined were effective at concns. as low as 0.01%, producing an extension of the induction period, measured at 20° in complete absence of Cu, of from 2 to 6 times. The magnitude of the factor obtained varied with the sample of fat, and in presence of traces of Cu was sometimes as high as 20. For some of the substances used, increase in the concn. in the acqueous phase beyond 0.01% produced an increased effect; for others it did not. These inhibitors produce an effect over and above that of the natural antioxidant, and in two cases examined an appreciable advantage was secured by using mixture of two antioxidants. This, however, did not appear to be the case when protein was one component of the mixture. It has been shown that a number of these antioxidants do not function by inhibiting the pro-oxidant effect of traces of copper. An exception is cyanide, which has no antioxidant properties in the absence of active metal. Whether or not Cu and other pro-oxidants function only by destroying natural antioxidants is not known.

Antioxidants and the autoxidation of fats. VII. Preliminary classification of inhibitors. H. S. Olcott and H. A. Mattill. *J. Amer. Chem. Soc.* **58**, 2204-2208 (1936). The crude esters of hydrogenated cottonseed and other vegetable oils, prepared of refluxing the oil with absolute methyl or ethyl alcohol containing dry hydrogen chloride, are protected to a remarkable degree by oxalic, malonic, maleic, citric and other aliphatic dibasic acids, by phosphoric and sulfuric acids and cephalin, and by some phenolic inhibitors. Hydroquinone is only slightly effective and inhibitol concentrates prepared from the unsaponifiable fraction of vegetable oils are inactive. When the esters are partially purified by fractional distillation in vacuo, they are only slightly protected by the acids or cephalin, but are protected by hydroquinone and the inhibitols. The acid inhibitors and inhibitol concentrates have a pronounced synergistic effect when used together in the distilled ester preparation; the protection afforded by

ABSTRACTS

Oils and Fats

Edited by
W. F. BOLLENS and M. M. PISKUR

the mixture is much greater than by either alone. This phenomenon can also be demonstrated in lard, and in purified fatty acids and esters, and also with certain mixtures of phenolic and acid type inhibitors. Based upon these observations, a tentative classification of inhibitors into three groups is proposed: Group 1, acid type inhibitors; Group 2, inhibitols and hydroquinone; Group 3, other phenolic inhibitors.

The relative value of various lards and other fats for the deep-fat frying of potato chips. F. B. King, R. Loughlin and R. W. Riemenschneider, and N. R. Ellis. *J. Agri. Res.* **53**, 369-381 (1936). Nine fats, including three kettle-rendered lards from animals fed on rations consisting largely of (1) peanut, (2) corn, and (3) brewer's rice, a standard prime steam lard, a hydrogenated lard, and hydrogenated cottonseed oil, and three highly refined oils from corn, cottonseed, and peanuts, resp., were studied for use in the frying of potato chips. The averaged values of the palatability tests made upon the potato chips showed that from the standpoint of general desirability, the oils were preferable for frying to the lards. Desirability of flavor was the most important item in forming the general opinion, and in the tests made peanut oil was judged to impart the most desirable flavor to the chips. In general desirability, cottonseed oil ranked next to peanut oil. Of the lards, peanut and hydrogenated were the best for frying chips. Further analysis indicated that the slight differences between the desirability of prime steam, corn, and rice, lards for frying were not significant.

The higher saturated fatty acids of butter fat. G. E. Helz and A. W. Bosworth. *J. Biol. Chem.* **116**, 203-208 (1936). Hexacosanoic (cerotic) acid has been isolated from butter fat. This acid crystallizes as nacreous crystalline plates from acetone and has a melting point of 80.5°. The methyl ester distils at 286° at 15 ± 0.1 mm. pressure and at 261° at 5 ± 0.1 mm. pressure. The melting point of the methyl ester is 62°. The amide melts at 105-107°.

Extraction of cottonseed oil. I. E. C. Koo and Shiu-Ming Cheng. *Ind. Research* (China) **5**, 71-5 (1936). Benzine and C_6H_6 are suitable solvents for the extn. of cottonseed oil. Acetone and CCl^4 are not so good, the former because of its extn. of proteins along with the oil, and the latter on account of its possible decompn. to give HCl. II. E. C. Koo and Pei-Sung King, *Ibid.* 137-41. The following procedures were used: (1) ext. 400 g. cottonseed with 500 cc. C_6H_6 + 500 cc. alc., using heating; (2) heat the seed with 95% alc. for about 10 min., filter and ext. the residue with C_6H_6; (3) steam the seed and then ext. as in (1); (4) steam the seed and ext. as in (2); (5) treat with alc., distil, wet with H_2O and then ext. with C_6H_6. Method (5) gives oil with the lightest color. III. E. C. Koo and Shiu-Ming Cheng. *Ibid.* 338-43. Operation on a larger scale (1500 g. cottonseed at a time) with a home-made extn. app. gave 92% extn. with C_6H_6 and 87% with benzine. (*Chem. Abs.*)

The Hoffmann Fat Splitting. Erich Hoffmann. *Ole, Fette, Wachse, Seife, Kosmetik* **1936.** No. 13, 4-6. The new method is a continuous combination of fat splitting and distn. of fat acids. The fat is first refined by mechanical methods, i.e., addn. of earth and filtered. It is then emulsified with water and passed through a splitting zone. The temp. in this zone is between 220-260 and press from 20 to 60 atm. In a continuous manner the split products are forced into a high vacuum expansion zone where the split products are converted to the gas phase, the unsplit oil and unsaponifiable remain in the liquid phase and can be drained off. The remainder of the process pertains to fractionation of products. The glycerin fraction contains 80 to 90% glycerin and the water fraction 6% glycerin. Advantages of the process are: no chemicals necessary for refining or splitting; it requires no accessory reaction, yields good quality fat acids and concd. glycerin, splits about 99% of the fat and requires less labor, room and upkeep. (*Chem. Abs.*)

The Problem of Preparing Fat Acids Through Oxidation of Aliphatic Hydrocarbons. R. Strauss. *Fette u. Seifen* **43**, 200-3 (1936). A review.

Drying Animal Oils. R. Burstenbinder. *Fette u. Seifen* **43**, 185-6 (1936). Discussion on the applicability of fish oil in the lacquer and linoleum industry.

The Action of Sulfur Monochloride on Fatty Oils. Giuseppe Rossi. *Ann. chim. applicata* **26**, 251-8 (1936). The change in viscosity of olive, cottonseed, sesame, peanut and linseed oils on addn. of S_2Cl_2 has been measured. All increase in viscosity with increasing amts. of S_2Cl_2 (6.7 g. S_2Cl_2 per 60 cc. oil was the max. tried); olive oil increases from 78.9 centipoises for the oil alone, to 3422.07 for that treated with the max. amt. of S_2Cl_2. Similarly, cottonseed oil increases from 68.02 to 549.60, sesame from 68.02 to 779.72, peanut from 134.20 to 2654.80, linseed from 77.7 to 1651.17. Olive oil shows the greatest increase, 43.3 times, cottonseed the smallest, 8.1. When 10 cc. of any of these oils is added to 90 cc. olive oil they all show very great increases in viscosity, i.e., with cottonseed 4271.58, sesame 4214.04, peanut 4030.38 and linseed 3631.13 centipoises. Thus, even cottonseed has about as much effect as the others. Although olive oil shows the most marked increases in viscosity, pure oleic acid does not gelatinize with S_2Cl_2, whereas the other oils do gelatinize. The viscosity does not vary with the drying properties. All viscosity measurements were made at 20°. (*Chem. Abs.*)

Survey of the Oil Content and Iodine Value of Western Canadian Flaxseed, 1935 Crop. W. F. Geddes. Can. Dept. Trade & Com., Dominion Grain Research Lab., *9th Ann. Rept.* **1935**, 77-80. The oil content of all samples ranged from 38.3 to 45.2% and averaged 42.1%. The I values ranged from 172 to 201.7 and averaged 190.2. Samples originating in the Park belt averaged significantly higher in I value, but not in oil content, than samples from the Prairie zone. The data indicated, in general, that the highest-quality flaxseed is produced under environmental conditions

ABSTRACTS

Oils and Fats

Edited by
W. F. BOLLENS and M. M. PISKUR

which favor low protein content in wheat. (*Chem. Abs.*)

PATENTS

Controlled Oxidation of Organic Compounds Such as Oils. Andre E. Briod (to National Oil Products Co.). U. S. 2,050,689, Aug. 11. About 0.1 per cent of methoxyhydroquinone is added to an oil such as cod-liver oil or linseed oil to produce a practically straight oxidation line. (*Chem. Abs.*)

Process for Treating Fatty Oils to Remove Off Taste and Stabilize Same Against Rancidity. C. E. Macke. U. S. 2,058,162. Oils and fats are stabilized against rancidity by treatment with the aqueous extract of sage or celery which has solubility preference to the said oils and fats.

Bleaching and Deacidifying Fats and Oils. Ger. 634,043, Cl. 23*a* Gr. 3. Oils and fats are bleached and deacidified by treatment with zinc dust at temps. over 150° C.

Refining Oils and Fats. "Elact" Ges. für elektr. Apparate G. m. b. H. Austrian 146,506, July 10, 1936 (Cl. 23*a*). Oils and fats are deacidified, bleached and freed from unpleasant odor and taste by emulsifying them in skim milk or like dairy product, and subjecting the emulsion to electrolysis. An alkali may be added to the dairy product when oils or fats of high acid content are treated. The electrolysis may be effected between Pt electrodes at 50 v. and a c. d. of 10-25 milliamps. per sq. cm. (*Chem. Abs.*)

Splitting Wool Fat. Metalgesellschaft A.-G. Brit. 449,451. A predistillation by steam to 400° is carried to remove unsapon. and fat acids and until the residue resembles pitch. This treatment splits the fat, and the alcs. and unsapon. undergo a change to hydrocarbons. A final distn. in vacuum is performed. The process yields hydrocarbons which are useful as lubricants and fat acids.

Splitting Oils and Fats. Metallgesellschaft A.-G. Fr. 799,274, June 10, 1936. The hydrolytic splitting of oils and fats under 25-50 atm. pressure is carried out in the presence of a certain amt. of a mixt. of split oil and glycerinated water, e.g., left from a previous operation, whereby the time required is shortened. (*Chem. Abs.*)

Rendering Fish Livers. J. F. Ward. Brit. 449,246. About 5% caustic potash is added to minced livers in water and the material is allowed to set one or more days at 40°. The scum which rises to the top is removed, taken up in hot water, the pH is adjusted to 8 with HCl and the oil which then separates may be washed and dried.

Method for the Production of Vegetable Phosphatide Preparations. A. Schwieger (to American Lecithin Co.). U. S. 2,057,695. Process of production of vegetable phosphatide products which includes the steps of adding a fat solvent to raw vegetable phosphatide, removing the fatty constituent with the bulk of solvent, emulsifying the residue of phosphatide and solvent in water, evaporating the remainder of solvent and incorporating in said emulsion a carrier material in aqueous emulsion.

Polymerizing Oils. Robert A. Carleton. Brit. 448,956, June 18, 1936. Unsatd. vegetable, animal and marine oils are polymerized by passage in a continuously and rapidly flowing stream through a heated and restricted conduit of small cross section to heat the oil rapidly to polymerizing temp. and then through a conduit adapted to maintain the oil at polymerizing temp. sufficiently long to effect the desired polymerization, the oil being then rapidly cooled to arrest polymerization. App. is described. (*Chem. Abs.*)

ABSTRACTS

Soaps

Edited by **M. L. SHEELY**

The Properties of Soaps Containing Starch. W. Kröner and G. Steinhoff. *Seifensieder-Ztg.* **63**, 272-5 (1936). Additions of starch reduce the tendency of soap cakes to lose weight during storage. The foaming power passes through a maximum when the starch addition amounts to 15%. Soaps containing starch have good washing power and do not reduce vat dyes unless the wash water is excessively alkaline. (*Chem. Abs.*)

The Technic of Preparing Caustic Potash Solutions for Making Soft Soap. Heinz Zilske. *Seifensieder-Ztg.* **63**, 576-8, 595-6 (1936). A number of practical suggestions are given as to apparatus and procedure for preparing KOH solutions and their use in preparing soft soaps both with and without filling. (*Chem. Abs.*)

Distillation of Fatty Acids in High-Vacuum Apparatus. Heinz Sallentien. *Rev. brasil, chim.* (Sao Paulo) **1**, 269-70 (1936). Fatty acids for candles should be distilled with steam superheated to 200-250° at the highest possible vacuum. (*Chem. Abs.*)

Myristic Acid. Julius Schaal. *Seifensieder-Ztg.* **63**, 695-6 (1936). The properties, uses and industrial production of myristic acid from fats in which it is present, e.g., coconut oil, are reviewed. (*Chem. Abs.*)