After the denaturation treatment described in the first three columns of Table IV, the samples were adjusted to the moisture contents indicated in column 4, and then extracted as previously. The data obtained on these samples are given in Table IV. The values, calculated on a dry basis, are low as compared to those obtained by the method involving regrinding, and do not indicate any positive trends. It is remarkable that, in general, the lipids extracted decrease with increasing moisture content of the samples in which the protein was denatured.

The quantity of lipids obtained by solvent extraction appeared to have little relation to the treatments used and the moisture content of the samples studied. Other methods and conditions of pretreatment might be devised which would show some consistent effect. The data emphasize the fact that the determination of lipids in soybeans is empirical, with the methods employed, and does not necessarily represent the total amount of this group of constituents present. They also suggest that variations in the method of processing soybeans for oil and meal may influence the amount of crude lipids or oil extracted from soybean meal by petroleum ether (Skellysolve F).

Summary

Data are presented to show the effect of moisture on the quantitative determination of lipids in soybean samples which were pretreated by: (1) Conditioning to a range of moisture contents, (2) by heating in the presence of 60-40 percent mixture of benzene and methyl alcohol, and (3) by heat-denaturation of the protein in the sample in the presence of water vapor.

The wide variation in results for lipid content indicates that the lipids removed cannot be considered as either triglycerides alone, or total lipids, but an empirical value given by a rigidly controlled procedure. It is apparent that methods are needed to determine the triglycerides and the total lipid content of soybeans and soybean meal.

Abstracts

Oils and Fats

Edited by
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VEGETABLE-OIL PROSPECTS IN FRENCH NORTH AND WEST AFRICA. W. N. Small. *Foreign Commerce Weekly 10*, No. 4, 8-9, 29 (1943). In return for olive oil from Algeria and French Morocco, the United Nations will supply other fats and oils.

QUANTITATIVE SPECTRAL ANALYSIS OF FATS. J. H. Mitchell, Jr., H. R. Kraybill and F. P. Zscheile. *Ind. Eng. Chem., Anal. Ed. 15*, 1-3 (1943). A spectroscopic method is described for direct detn. of the linoleic and linolenic acid content of a fat. These acids can be detd. very simply and as accurately as standard value for the pure acids can be obtained, when the fats do not contain other acids with 2 or more double bonds. Making use of the I no., the oleic acid content can be obtained; the satd. acids are then obtained by difference. Thus an analysis can be obtained on many fats (those contg. chiefly satd. acids, oleic, linoleic and linolenic acids) with as little as 0.2 g. of sample. The method is more rapid than the Kaufmann method and involves fewer detns.

COMPARATIVE SHORTENING VALUE OF SOME COMMERCIAL FATS. L. R. Hornstein, F. B. King and F. Benedict. *Food Research 8,* 1-12 (1943). Although prime steam-rendered lard ranked first in shortening value in the present expt., hydrogenated vegetable oil No. 3 was about as good, and all 3 of the hydrogenated vegetable oils were found to equal or to excel leaf lard in shortening power. Improvement in the quality of hardened fats may be responsible for this change. The butterfats were also found to be very good shortening agents in this study, particularly at the higher temps. Because of correction of the formula for the increased water and lower fat content of butter, the pastries made from butterfats in this expt. contd. a higher proportion of fat than those reported on by Lowe, so that results are not strictly comparable. Finally, there was no correlation between the breaking strengths of pastries and either the congealing pts. or the I nos. of the fats. Of the fundamental properties of the fats, only the consistency of the worked fats, probably a measure of what has been termed "plasticity," was found to correlate with shortening power. The behavior of hydrogenated vegetable oil No. 3 as a shortening agent was in accord with its known glyceride compn. This fat was an excellent shortening agent at all temps. and showed very little change in shortening power with changes in temp. Since it consisted of about 10% of fully hydrogenated cottonseed oil dispersed in the oil, the ratio of liquid to solid glycerides was high. Owing to the high m.p. of the solid material, this ratio was subject to very little change in the temp. range used in this expt. The greatly increased shortening power of the butterfats and particularly of butter oil with increase in temp. can only be explained by their phys. structure. The large quantity of low-melting compds. present in these fats probably causes the liquid glyceride content to increase more rapidly with rise in temp. than is true of most other fats and consequently causes a greater increase in the shortening value.

COMPARATIVE NUTRITIVE VALUE OF BUTTER FAT AND VEGETABLE OILS. E. B. Hart. *Am. J. Pub. Health 33,* 265-6 (1943). Expts. with young rats indicate the superiority for growth of butter fat as compared with certain vegetable oils. This superiority rests upon a constitutional difference and is not related to the differences in vitamin content. As the sole article of nutrition a "filled milk" in which a vegetable oil has been substituted for the butter fat, based on rat expts., could give inferior growth with the infant; but no such expts. have been carried out. Until they have and an equality is established, if it exists, the burden of proof of equal value must rest with the purveyor of filled milk, and the public should be protected from a substitute for natural milk.

RAPID DETERMINATION OF OIL SAMPLES. S. Kiczales. *Soap 19*, No. 3, 57-8 (1943). The results indicate that the sapon. value of a fatty substance in the presence of large amts. of moisture can be accurately detd. if petr. ether is added to the sapong. medium. By use of the above method, the analyst is able (1) to det. the amt. of fat or oil in a mixt. of fat or oil and water (such as foots or soapstock) by a simple sapon. instead of sepg. out and weighing the fatty acids, (2) to det. the amt, of free oil on a soap or soap soln. without first drying it.

WOBURN IODINE ABSORPTION METHOD. USE IN COMBINATION WITH PARTIAL IODINE VALUES FOR THE DETERMINATION OF DIENE NUMBERS. J. D. von Mikusch and C. Frazier. *Ind. Eng. Chem. Anal. Ed. 15*, 109-13 (1943). The quant. relationship, total I value — partial I value = diene value, can form the basis for detg. the diene value of fatty acids and oils. The Woburn I method, which makes use of I bromide solns. 1.6 to 2 times the concn. of Hanus' soln., may serve to det. total I values. The partial I values may be detd. with Wijs soln., by limiting the time of contact to 2 mins. at ice-bath temp. The diene values obtained by differential I absorption for tung oil and oiticica oil compare well with maleic anhydride diene values. The total and partial I values of oiticica oil are reproducible in spite of the inapplicability of other I absorption procedures to this oil. With pure conjugated fatty acids and esters, the differential diene values, in general, are in good agreement with calcd. values. The new method is not applicable in the presence of polymerized oil and certain types of unsatn., which may cause differential I absorption due to steric hindrance.

THIOCYANOGEN ABSORPTION OF LINSEED OILS. E. P. Painter and L. L. Nesbitt. *Ind. Eng. Chem. Anal. Ed. 15*, 123-8 (1943). The (SCN) absorption of linseed oil has been studied to show the importance of controlling the concn. of reagent, the absorption time and the excess of reagent. The av. (SCN) absorption values for linoleic, 98.1, and for linolenic, 168.0, were then used in equations to obtain expressions to calc. the compn. of linseed oils. Linseed oils with I nos. from 127.8 to 202.8 were analyzed. A comparison of the results calcd. from analyses of the fat acids, obtained by sapon., with those calcd. from analyses of the original oils, showed fair agreement. The range of satd. glycerides was from 7.3 to 16.3%, of the oleic glycerides from 11.9 to 42.5%, of the linoleic glycerides from 11.7 to 24.5%, and of the linolenic glycerides from 20.5 to 61.8%. Linseed oil contains more linolenic acid, more oleic acid and less linoleic acid than formerly supposed.

STUDIES ON THE CHEMISTRY OF THE FATTY ACIDS. XII. THE PREPARATION OF ALPHA- AND BETA-LINOLEIC ACIDS BY DEBROMINATION IN VARIOUS SOLVENTS AND OBSERVATIONS ON THE CHEMISTRY OF THESE ACIDS. J. S. Frankel and J. B. Brown. *J. Am. Chem. Soc. 65*, 415-18 (1943). *a*- and *b*-linoleic acids were prepd. by debromination of solid and liquid tetrabromostearic acids, resp., in Me alc., pyridine, ether, isopropyl ether, dioxane and glacial AcOH. Ether was shown to be the best solvent for the debromination reaction, although the other solvents tried, with the exception of AcOH, were satisfactory. Yields of the *b*-acid in ether were comparable to those obtained in Me alc. for the *a*-acid. The properties of the *a*- and *b*-acids were compared and conclusions were drawn as to their chem. nature.

STUDY ON THE CHEMISTRY OF THE FATTY ACIDS. XI. THE ISOLATION OF LINOLEIC ACID FROM VEGETABLE OILS BY LOW TEMPERATURE CRYSTALLIZATION. J. S. Frankel, W. Stoneburner and J. B. Brown. *J. Am. Chem. Soc. 65*, 259-62 (1943). Linoleic acid has been prepd. from sesame, cottonseed, grapeseed and poppyseed oils by low temp. crystn. The linoleic acid from these oils, isolated by crystn., is essentially identical with corn oil linoleic acid prepd. by this method and with recrystd. *a*-linoleic acid, prepd. by reduction of tetrabromostearic acid. Analytical data on a no. of fractions from olive oil were interpreted as meaning that the linoleic acid of this soil is a mixt. of octadecadienoic acids, of which linoleic is the principal component.

FRACTIONAL DISTILLATION OF UNSATURATED FATTY ACIDS. II. THE EFFECT OF HEAT ON THE REARRANGEMENTS PRODUCED IN UNSATURATED FATTY ACID ESTERS. Frank A. Norris, Irving I. Rusoff, Elmer S. Miller, and G. O. Burr. *J. Biol. Chem. 147*, 273-80 (1943). Fatty acids contg. up to three double bonds are fairly resistant to the heat treatment involved in a vacuum fractional distillation. The more unsatd. types are less resistant to heat, the effect varying with time and temp. Only 2-double-bond conjugation was observed in heat-treated methyl linolenate, and only 3-double-bond conjugation in the more unsatd. esters of cod liver oil. As thermal polymerization proceeds, conjugation first increases and then diminishes, the decrease paralleling the increased polymerization observed. Polymers freed from all but traces of monomers exhibit only general absorption, probably resulting from cyclization. This is in agreement with Scheiber's hypothesis that polymerization occurs through some deconjugation process.

EFFECT OF STORAGE ON THIAMIN CONTENT AND ON DEVELOPMENT OF RANCIDITY IN WHEAT GERM. J. A. Pearce. *Can. J. Research 21C*, 57-65 (1943). Wheat germ samples with moisture content varying between 8.0 and 26.5% were stored in air in sealed tins at —40.0°, —26.1°, —17.8°, —9.4°, —1.1°, 15.6° and 23.9°. The appearance of organoleptic spoilage appeared to be coincident with termination of the induction period in oxidative rancidity development, as assessed by the peroxide O value of the extd. oil. Storage life was considerably extended by holding at low moisture levels and low storage temps. However, even at —40° sufficient deterioration occurred to reduce the keeping quality of wheat germ subsequently stored at higher temps. Both packing in N_2 and compressing into blocks lengthened storage life. Thiamin content, detd. by the method described, did not change during storage. Wheat germ oil expressed by pressure became rancid more rapidly than oil extd. with petr. ether. Increase in temp. markedly decreased the storage life of the oil.

INFLUENCE OF LINOLEIC AND PALMITIC ACIDS OF THE DIET ON SYNTHESIS AND STORAGE OF FATTY ACIDS IN THE WHITE RATS. Frank E. Visscher and Ralph C. Corley. *J. Biol. Chem. 147*, 291-5 (1943). The kinds of fatty acids stored by the rat were essentially the same on a diet low in lipids as on this diet supplemented with

5 per cent palmitic acid, with or without additional linoleic acid.

DERMATITIS ON A SYNTHETIC RATION ADEQUATE FOR GROWTH AND REPRODUCTION IN THE RAT. B. H. Ershoff. *Proc. Soc. Exptl. Biol. & Med. 52,* 41-3 (1943). A specific tail dermatitis is described distinct from that observed in pantothenic acid, pyridoxine or essential fatty acid defic. It is suggested that some dietary factor or factors other than the above is involved in the maintenance of normal tail epithelium.

FAT METABOLISM AND GOITER. R. E. Remington and P. L. Harris. *J. Nutr. 25,* 203-6 (1943). Since the I content of the glands, and the degree of enlargement and edema produced were within a crit. range where variations in the drain on the thyroid mechanism, if such existed, would inevitably produce a considerable change in the state of the glands, it seems assured that the function of the thyroid gland is not specifically related to the metabolism of fat, either satd. or unsatd. at least at levels lower than that which might be expected to produce ketosis.

METABOLISM OF A PARAFFIN. DeWitt Stetten, Jr. *J. Biol. Chem. 147,* 327-32. (1943). *n*-Hexadecane has been prepd. contg. an excess of deuterium, and this material has been fed to rats for a period of 9 days. At the level of feeding employed, 83 mg. per rat per day, hexadecane is very efficiently absorbed from the gastrointestinal tract and partially deposited as such in the tissue lipids. Much of the absorbed hexadecane was found to have been oxidized to fatty acid in the body, apparently largely in the liver.

PATENTS

HYDROLYSIS OF FATS AND OILS. J. F. Murphy (Lever Bros. Co.). *U. S. 2,310,986.* A means of counter flowing hot oil and water through a series of zones is described.

PURIFICATION OF TALL OIL. R. L. Brandt (Colgate-Palmolive-Peet Co.). *U. S. 2,308,431.*

ART OF STABILIZING TALL-OIL MATERIALS. T. Hasselstrom (G & A Labs., Inc.). *U. S. 2,311,386.* The process of obtaining from tall oil a material contg. resin acid comprises the step of heating the same to a temp. of 160 to 200° in the presence of substantially ½-1% I for substantially 1-2 hrs.

TALL OIL METAL COMPOUND AND PROCESS OF MAKING SAME. Harry Burrell (Ellis-Foster Co.). *U. S. 2,306,352.* The reaction product of one equiv. wt. of tall oil with at least ⅓ mole of red lead solidifies to a plastic on heating.

TREATMENT OF PAPER. H. S. Mitchell (Industrial Patents Corp.). *U. S. 2,309,079.* The method of packaging food products contg. fats and oils normally tending to develop rancidity on storage comprises wrapping said product in a paper having a phenol incorporated therein whereby such development of rancidity is substantially retarded.

TREATMENT OF FATS AND OILS. H. H. Young and H. C. Black (Industrial Patents Corp). *U. S. 2,308,848.* The method of preventing reversion of revertible oleaginous materials comprises substantially completely hydrogenating the oleaginous material, subjecting the hydrogenated product at elevated temps. to the action of air whereby oxidation of revertible materials occurs and deodorizing the resulting product.

PROCESS FOR HYDROGENATING EDIBLE OILS. W. J. Paterson (Lever Bros. Co.). *U. S. 2,307,065.* A process for hydrobleaching glyceride oils to form products having a min. of unsaponifiable components and an improved color and stability comprises hydrogenating the oil in the presence of a Ni catalyst, removing the Ni catalyst from the oil and treating the oil with H_2 at a temp. not substantially greater than 250° in the presence of a small amt. of a catalyst comprising Ag, Cr and O_2.

PREPARATION OF MIXED ESTERS OF POLYHYDRIC ALCOHOLS. C. M. Gooding (Best Foods, Inc.). *U. S. 2,309,949.* A method of rearranging the fatty acid radicals in a mixt. of substantially completely esterified fatty acid esters of polyhydric alcs. comprises maintaining the mixt. at temps. of about 200 to 275° in the presence of about .05 to 1% by wt. of an alkali metal soap and about .05 to 2% by wt. of glycerol.

PROCESS FOR PRODUCING SYNTHETIC ESTERS. W. A. Jordan (Sherwin-Williams Co.). *U. S. 2,307,794.* The process of esterification of a higher fatty acid and a polyhydric alc. includes maintaining a mixt. of said acid and alc. in liquid phase at a temp. above that of boiling water, and agitating the mixt. by the use of superheated steam.

VITAMIN CONTAINING SHORTENING. *J. G. Blaso* (Natural Vitamin Corp.). *U. S. 2,307,756.* This invention relates to cooking fats and relates particularly to hydrogenated fish oils processed for use as shortening and other cooking fat purposes.

PREPARATION OF PHYTOSTEROL GLUCOSIDES. David P. Langlois (A. E. Staley Mfg. Co.). *U. S. 2,306,547.* The method of producing glucosides comprises acidulating vegetable oil refinery foots and applying heat thereto, allowing said acidulated foots to stand to produce an upper fatty acid layer, a bottom aq. layer, and an intermediate layer, sepg. said intermediate layer, and treating said intermediate layer to precipitate phytosterol glucosides.

RAPID DRYING OIL HAVING CONJUGATED SYSTEM FROM SOYBEAN OIL. P. D. Boone. *U. S. 2,308,152.* Rapid drying oil is produced from soybeans by removing some of the oleates, oxidizing to produce OH groups and eliminating H_2O by pyrolysis.

PROCESS OF MAKING FATTY OIL PRODUCTS. John B. Rust (Ellis-Foster Co.). *U. S. 2,306,281.* The process is on heating linseed oil having no conjugated unsatd. groups with maleic anhydride in the presence of an aromatic sulphonic acid to temp. of approx. 200°C. under non-resinifying conditions, the degree of reaction being controlled to yield soft, sticky solids by correlation of reaction time with the temp, of reaction to produce a reaction product capable of being esterified.

PRODUCTION OF SYNTHETIC DRYING OILS. W. T. Walton and W. A. Jordan (Sherwin-Williams Co.). *U. S. 2,308,222.* The process of forming a synthetic drying oil includes heating castor oil with a free fatty acid having non-conjugate double bonds to thereby effect dehydration of the castor oil, thereafter adding a polyhydric alc. having more than 3 hydroxyls, and esterifying the free fatty acid present.

ANTISKINNING AND WEATHER-RESISTING AGENTS FOR DRYING OIL COMPOSITIONS. H. C. Reynolds and H. B. Kellog (Standard Oil Development Co.). *U. S. 2,307,158.* A coating compn. contg. tung oil, a phenol resin, a pos. oxidation catalyst and a neg. oxidation catalyst, obtained by adding as neg. oxidation catalyst 0.01 to 0.5% of tri-p-cresyl phosphite to the finished compn. of the other components is described.

LUBRICANT FOR TEXTILES AND THE LIKE. I. M. Colbeth (Baker Castor Oil Co.). *U. S. 2,308,355.* A lubricant for textiles and the like, comprises a synthetic oleic glyceride substantially free from hydroxyl groups and having substantially all double bonds connected to the 12th C atoms in the oleic radicals, said lubricant having a m.p. of about 26°.

PREPARATION OF IMPROVED PAINT OILS. R. S. Morse (Distillation Products, Inc.). *U. S. 2,311,681.* The process of producing an improved drying oil comprises subjecting bodied menhaden oil to high vacuum unobstructed path distn. until approx. 10% of the bodied menhaden oil has been distilled.

PROCESS OF PURIFYING FISH AND FISH LIVER OILS. J. G. Blaso (Natural Vitamins Corp.). *U. S. 2,311,633.* The process of deodorizing fish oils comprises the steps of hydrogenating the oil under conditions of normal temp, and elevated pressure ranging from 20-45° and a pressure range above 50 lbs. and below 1000 lbs. per sq. in. in the presence of a hydrogenation catalyst and blowing the hydrogenated oil with a non-reactive gas.

MAKING DRYING OILS. R. Priester (Alien Property Custodian). *U. S. 2,309,273.* A process of making a drying oil comprises heating castor oil with not more than a few percent of an alkali metal pyrosulphate to over 150° until an oil having drying properties is produced.

PROCESS OF ISOMERIZATION OF FATS AND OILS. W. R. Eipper. *U. S. 2,310,225.* A process for raising the m.p. of a natural fat contg. esters of oleic acid and its homologues comprises introducing NO into a body of said fat in a highly dispersed liquid form and agitating the fat while maintaining the temp. of the reaction mass below 50° F. by artificial cooling.

RICINOLEIC ACID DERIVATIVES. T. F. Carruthers (Carbide and Carbon Chem. Corp.). *U. S. 2,310,395.* Ricinoleic acid derivs. of alkylene and polyalkylene glycol monoalkyl and monoaryl ethers are prepd. for use as plasticizers.

OXYALKYLATED LECITHIN AND METHOD OF MAKING SAME. M. DeGroote and B. Keiser (Petrolite Corp.). *U. S. 2,310,679.*

METHOD OF PREPARING VALUABLE NITROGENOUS CONDENSATION PRODUCTS. H. Ulrich and K. Kuespert (Genl. Aniline & Film Corp.). *U. S. 2,312,135.* A fat acid halide is reacted with an alkylolamine with the addn. of an alkali.

BREAKING AGENT FOR EMULSIONS. A Moeller (Alien Property Custodian). *U. S. 2,307,058.* Breaking agent for emulsions from crude petroleum and salt water consists of the resultant product of the hydroxyethylation of castor oil with 40 mol of ethylene oxide.

OXYGEN-BEARING ORE FLOTATION. Stephen E. Erickson and David Walker Jayne (American Cyanamid Co.). *U. S. 2,312,466.* Glycerol, glycol, or butyl esters of fat acids are used in the process. The polyalc. esters used in the process contain free OH groups.

FROTH FLOTATION OF ACIDIC MINERALS. Ludwig J. Christmann and D. Walker Jayne, Jr. and Stephen E. Erickson. (American Cyanamid Co.). *U. S. 2,312,387.* Reaction products of polyalkylene polyamines with tall oil are used in the froth flotation process.

EMULSIFYING AND SCOURING ASSISTANT FOR MINERAL SULPHONATES. J. B. Holzclaw, R. and G. E. Serniuk (Standard Oil Development Company). *U. S. 2,314,450.* An emulsifying composition comprises 84% of a mineral lubricating oil, 3% of a sodium tetraisobutyl phenol sulphonate, 1% of diethylene glycol and 11% of sodium salts of oil-soluble sulphonates prepared by treating a petroleum oil with strong sulphuric acid.

METALLIC SOAP COMPOSITION. J. Nothum and F. J. Licata (Natl. Oil Products Co.). *U. S. 2,307,852.* Al ricinoleate is used to waterproof textiles.

AUTOCONDENSATION PRODUCT OF HIGH MOLECULAR ALKYL ARYL KETONES AND PROCESS FOR PRODUCING IT. E. Lieber (Standard Oil Development Co.). *U. S. 2,307,891.* An auto-condensation product of a ketone having the general formula R—CO—R′, in which R is an aromatic group and R′ is an alkyl group having at least 10 C atoms is used as a pour depressor for lubricating oils.

PROCESS FOR CONCENTRATING PHOSPHATE ORES. E. W. Greene and C. W. Head (Phosphate Recovery Corp.). *U. S. 2,303,931.* A process of concg. phosphate from an ore consisting principally of phosphate and silica particles comprises conditioning said ore in an aq. pulp with a mahogany soap, a mixt. of fatty and resin acids and a fuel oil and then subjecting the thus conditioned pulp to a concn. process dependent on the surface characteristics of the ore particles as conditioned.