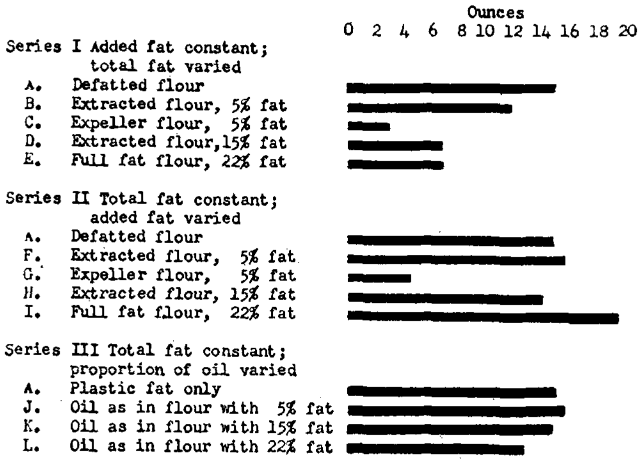

FIG. 1. Mean breaking strengths of 100 soy flour wafers for each variant.

pastries was the same, the tenderness of the different lots of pastries was approximately the same. None of the differences in mean breaking strengths of these pastries was statistically significant. This indicated that the fat in the extracted soy flours containing 5% and 15% fat had approximately the same shortening value as equivalent amounts of plastic fat.

The fat in the extracted soy flours containing 5% and 15% fat shortened as effectively as equivalent amounts of soybean oil mixed with the plastic fat. There were no significant differences in the mean breaking strengths of pastries made with the extracted soy flours containing 5% or 15% fat and the pastries in the third series made with the defatted flour and soybean oil equivalents when the total fat in the pastries was constant.

In comparing a soy flour of the expeller type containing 5% fat with extracted type soy flours, it was found that the pastries made with the expeller flour were much more tender than with the extracted flour of either the 5% or the 15% fat content or even than pastries made with the full fat soy flour containing 22% fat. The differences in mean breaking strengths were highly significant. It seemed that this difference in tenderness must have been caused by some factor other than the fat in the different types of flour.

Abstracts

Oils and Fats

Edited by
M. M. PISKUR and SARAH HICKS

THE COMPONENT ACIDS OF THE TESTA AND KERNEL FATS OF THE OIL PALM. H. A. Carsten, T. P. Hilditch and M. L. Meara. *J. Soc. Chem. Ind. 64,* 207-9 (1945).

SYNTHETIC TRIACID TRIGLYCERIDES OF SATURATED FATTY ACIDS. C. Chen and B. F. Daubert. *J. Am. Chem. Soc. 67,* 1256-8 (1945). Physical data are reported for several series of synthetic triacid triglycerides.

N.D.G.A. Editorial. *Ind. Eng. Chem. 37,* No. 8, 12, 14 (1945). Historical developments.

THE COEFFICIENT OF CUBIC EXPANSION OF DOGFISH LIVER OIL, RATFISH LIVER OIL, SALMON OFFAL OIL AND HALIBUT LIVER OIL. P. J. Frost. *Prog. Repts. Pacific Biol. Sta. No. 63,* 43-4 (1945). As pointed out in previous articles and as upheld in this investigation, the universal use of the coefficient of cubic expansion, 0.000404/°F., will lead to considerable error when calculating the volume change of fish liver and body oils in bulk. The coefficient of cubic expansion per degree F. was measured for fish oils in various temperature ranges between 14 and 120°F. These varied between 0.000413 and 0.000922.

THE USE OF LOW-TEMPERATURE CRYSTALLIZATION IN THE DETERMINATION OF COMPONENT ACIDS OF LIQUID FATS. I. FATS IN WHICH OLEIC AND LINOLEIC ACIDS ARE MAJOR COMPONENTS. T. P. Hilditch and J. P. Riley. *J. Soc. Chem. Ind. 64,* 204-7 (1945). Preliminary separation of mixed fatty acids by crystallization from solvents at low temperatures, according to the technic of J. B. Brown and his colleagues, is preferable to lead salt separation in the cases of fats which contain only small proportions of saturated acids. The procedure, coupled with subsequent ester-fractionation, has been applied to the acids of sunflower seed, sesame and groundnut oils (all of which have oleic and linoleic acids as their major components). The results agree well with earlier analyses in which lead salt separation had been employed.

COMPARISON OF VARIOUS METHODS USED FOR DETERMINATION OF FAT IN POWDERED MILK, CONDENSED MILK, CHEESES AND ICE CREAM. Jose Luis Andrade. *Rev. sanidad y asistencia social* (Venezuela) *7,* 561-72 (1942). The method of Weibull, which is applicable in all cases and which gave uniformly satisfactory results, follows: Boil 2.5 g. of the material to be analyzed for 30 min. with 20 ml. HCl (d. 1.19) and 30 ml. distilled water in presence of some pieces of pumice, filter hot through a wet filter and wash the residue with hot (90°) water until filtrate and wash water are free of acidity. Dry the filter and its contents at 105°, place the dried residue in a paper thimble, submit it to the solvent action of ether in a Soxhlet extractor, dry and weigh the residue remaining after the extraction. The fat content is obtained by difference. The Gerber method or simple Soxhlet extraction is applicable only to cheeses. The Babcock method gives approximate results with powdered milk and cheeses. (*Chem. Abs. 39,* 2352.)

STABILITY OF WIJS' SOLUTION IN THE TROPICS. R. Child. *Ind. Eng. Chem., Anal. Ed. 17,* 530 (1945). The writer's experience in Ceylon, where the mean temperature is about 81°F. and relative humidity about 84%, is tabulated. In general the drop in factor has been reasonably regular at approximately 0.00006 *N* per day—that is, the solution during normal use loses about 1% of its strength in a month. Iodine values determined on the same samples of oils using a fresh solution side by side with one 10 months old gave concordant results and the writer is of the opinion that there is no risk in keeping a solution in use for that length of time, if blanks are run each time it is used.

APPARATUS FOR DETERMINATION OF RATE OF OXYGEN ABSORPTION. WITH SPECIAL REFERENCE TO FATS. M. H. Menaker, M. L. Shaner and H. O. Triebold. *Ind. Eng. Chem., Anal Ed. 17,* 518-9 (1945). This new apparatus comprises a constant temperature oven, pressure regulator, pressure control system, O_2 reservoir, recording apparatus, absorption chamber and electric circuit. The units are designed to allow O_2 to flow from the O_2 reservoir into the absorption system under the influence of a pressure regulator without allowing leakage either from or to the surrounding atmosphere.

Determination of glycerol. In the presence of large concentrations of gelatin. C. J. Wessel, Stanley W. Drigot and G. W. Beach. *Ind. Eng. Chem., Anal. Ed. 17,* 440-2 (1945). In a convenient method for the determination of glycerol in gelatin the gelatin is precipitated with Na_2WO_4 in an acid medium and the filtrate analyzed for glycerol by the official method of the A.O.A.C. An arithmetic mean of 99.62% recovery and a standard deviation of $\pm$ 0.43 were found for representative determinations.

The stabilization of fats for baked goods. R. H. McKinney and W. Jacobson. *Bakers' Digest 19,* 97-9, 112 (1945). Stability, methods of testing and antioxidants are discussed. It is interesting to note that the authors' laboratory have set 20, 40, 60 and 80 milli-equivalents of peroxide per 100 g. as the respective endpoints for lard, hydrogenated lard, oleo oils and hydrogenated vegetable fats in the Swift stability method.

Experiments on the use of antioxidants in spray-dried whole-milk powder. J. D. Findlay and J. A. B. Smith. *J. Dairy Res. 14,* 165-75 (1945). Of a number of substances tested for antioxidant activity in laboratory-made spray-dried milk powder, ascorbic acid and Et gallate proved most promising. Both of these substances materially increased the resistance of the powder to the development of tallowiness without producing any foreign flavor in the milk. The activity of both substances has been confirmed in factory-made spray-dried powder, Et gallate being much the more powerful of the two. Et gallate at a concentration of 0.07% increased the storage life of powder in the accelerated tests 2½-3 fold. Et gallate remained unchanged during storage of the powder, but the concentration of ascorbic acid decreased, rapidly at first and then more slowly.

Eighteen mistakes in the use of lecithin. I. L. R. Cook. *Food Industries 17,* 740-1, 866, 868, 870 (1945). II. *Ibid.* 900-1. Errors made in using lecithin in cooking oils, lard, shortening, margarine, mayonnaise, peanut butter, sherbets and ice cream mixes are discussed. A table shows how it should be employed and why in 32 items.

South African fish products. XVIII. The liver oils of some elasmobranch fishes of South African waters. C. J. Molteno, W. S. Rapson, E. R. Roux, H. M. Schwartz and N. J. Van Rensburg. *J. Soc. Chem. Ind. 64,* 172-7 (1945). The chemical characteristics and industrial importance of the liver oils of a number of sharks and rays of South African waters are discussed, with particular reference to their value as sources of vitamin-A.

Examination of the unsaponifiable matter of marine animal oils. II. Dogfish liver oil. L. A. Swain. *Prog. Repts. Pacific Biol. Sta. No. 63,* 32-4 (1945). Saponification followed by extraction of unsaponifiable gives about 20% yield or a 5-fold increase in vitamin A. Selective adsorption can concentrate this 5-50 times and therefore 25-250 times concentrated as the original oil. Removal of cholesterol from this material readily accomplished by crystallization would result in a possible further doubling of the concentration.

State of vitamin A in fish liver oils. H. M. Kascher and J. G. Baxter. *Ind. Eng. Chem., Anal. Ed. 17,* 499-503 (1945). A study has been made of the proportion of the vitamin A in a number of fish liver oils and distilled vitamin A ester concentrates which occurs in the ester and free alcohol form. The analytical methods used included distribution between petroleum ether and 83% aqueous ethanol by the procedure of Embree and Kuhrt, and analytical molecular distillation. The assays indicated that 95% or more of the vitamin A was present as esters. Little or no free vitamin A alcohol was found. The fluorescence method for estimating vitamin A esters, proposed by Sobotka, Kann, and Winternitz, has been examined. Their procedure indicated that large amounts of free vitamin A alcohol are present in fish liver oils and distilled concentrates. The authors' results indicate that this conclusion is incorrect because the fluorescence method described is unsuitable for this determination in fish liver oils and distilled concentrates. The possibility of developing an improved fluorescence procedure is discussed.

Comparison of the growth-promoting value for rats of butter fat, of margarine fat and of vegetable oils. K. M. Henry, S. K. Kon, T. P. Hilditch and M. L. Meara. *J. Dairy Res. 14,* 45-58 (1945). The following results were obtained by incorporating fats in liquid skim milk: (a) No differences were detected between the growth-promoting properties of butter and margarine or of butter fat and deodorized arachis oil; in the latter comparison the arachis oil was more economically used than the butter fat. (b) No differences were found between butter fat and corn oil alone or containing the solid or liquid fractions of butter fat in the approximate proportions in which they occur in the original fat. The less saturated oils, i.e., corn oil and corn oil + the liquid butter fraction, were more economically used than butter fat and its solid fraction mixed with corn oil. (c) No differences were observed between the growth-promoting values of butter fat, arachis oil, cottonseed oil or soybean oil. The butter fat was rather less well utilized than the less saturated oils, but the differences were not significant. (d) Poorer growth was observed with the more saturated fraction of butter fat than with the original fat or the liquid fraction. When butter fat, margarine fat or arachis oil was incorporated in a dry basal diet, no differences were observed in the growth-promoting value of these fats, but the arachis oil was more economically used than the other fats. This finding was not confirmed in a second experiment of longer duration in which poorer growth was observed with the arachis-oil diet, though the economy of gains was the same with all diets. It is concluded from these experiments that it is unlikely that butter fat possesses superior nutritive properties to those of other fats, and that the more saturated fraction of butter fat is certainly not superior in growth-promoting value to that of the more unsaturated fraction or to more unsaturated vegetable oils.

The effect of heating, the presence of antioxidants and the level and melting point of the fat component on the nutritional value of diets as indicated in rat feeding tests. E. W. Crampton and M. F. Mills. *Can. J. Res. 23E,* 131-7 (1945). Male white rats were fed baked and unbaked diets containing blended cottonseed oil of two different melting points (45° and 57°) with and without antioxidant. The fat was incorporated in the diets at 4 and 16% levels. The relative nutritive value of the diets was measured by growth of rats, digestibility of the diet and the proportion of fat deposited in the livers and carcasses. The digestibility of the fat decreased as the melting point increased from 45°-57°. The addition of 0.1% nordihydroguairetic acid to the fat showed no effect on the nutritive value of the diets. Increasing the fat content of the diet from 4-16% resulted in a decline in body weight that can be accounted for only on the assumption of poor utilization of fat. Heating the diet lowers its efficiency for rats.

NUTRITIVE VALUE OF RAPESEED OIL AND SOME RAPESEED OIL PRODUCTS. A. Beznak, M. Beznak and I. Hajdu. *Ernährung 8,* 236-44 (1943). When used as the only fat in the diet of growing rats, crude rapeseed oil, steamed rapeseed oil (I No. 98), hardened rapeseed oil (hydrogenated to an I No. of 88), and rapeseed oil margarine (I No. 91) permitted weight gains closely approaching those promoted by cow butter. A commercial product known as rapeseed oil 713 (refined by treatment with H_2SO_4) had a somewhat toxic action and inhibited growth (*Chem. Abs. 39,* 2544.)

THE EFFECT OF FAT UPON THE UTILIZATION OF GALACTOSE BY THE RAT. L. P. Zialcita, Jr., and H. H. Mitchell. *J. Nutr. 30,* 147-50 (1945). The results obtained in this study fail to confirm the reported influence of fat, as such, on the metabolism of galactose. Neither is there any reasonable expectation from the available facts of animal nutrition that dietary fats should favor the utilization of galactose in animal metabolism. Under the conditions of this experiment, corn oil, but not butterfat, decreases the urinary loss of galactose on a diet containing 48% lactose, by about one-fourth. This may be an effect of some non-glyceride constituent of corn oil.

THE INTERMEDIARY METABOLISM OF FATTY ACIDS. W. C. Stadie. *Physiol. Revs. 25,* 395-441 (1945). The intermediary metabolism of fatty acids in mammalian tissue is reviewed under the following heads: Enzyme concerned with fat metabolism. Ketone body production: site of formation; precursors. Chemical mechanisms of ketone production from fatty acids. Ketone formation from acetic acid. Lower fatty acids. Proportion of acetoacetate to β-hydroxybutyrate. Lag in ketone production by liver. Miscellaneous factors. Omega oxidation. Utilization of ketone bodies. Mode of oxidation of fat in muscles. Integration of carbohydrate and fat metabolism. Fat to carbohydrate. Intermediary pathway of fatty acid derivatives. Succinic acid. Fe.

CIRRHOSIS OF THE LIVER IN "DONOR" DOGS FED A HIGH-FAT DIET AND SUBJECTED TO REPEATED BLEEDINGS. R. L. Holman. *J. Exptl. Med. 81,* 399-404 (1945). The experimental data suggest that repeated bleedings in dogs fed a relatively high fat diet results in cirrhosis of the liver, whereas neither diet nor repeated bleeding alone produces changes in the liver. The simplest explanation for this combined effect is that the repeated bleedings led to more marked lipemia and this augmented the fatty changes in the liver from the high-fat diet. (*Chem. Abs. 39,* 2564-5.)

THE EFFECT OF UNSATURATED FATTY ACIDS ON LACTOBACILLUS HELVETICUS AND OTHER GRAM-POSITIVE MICRO-ORGANISMS. E. Kodicek and A. N. Worden. *Biochem J. 39,* 78-85 (1945). Oleic, linoleic and linolenic acids can cause complete inhibition of the growth and lactic acid production of *L. helveticus.* The extent of this inhibition depends on the concentration of bacteria, the time of incubation, the amount and nature of the fatty acid added, the presence of other lipids in the medium. Linoleic and linolenic acids exhibit this effect when added to an unextracted medium of the type used for the microbiological assay of riboflavin. Me esters of these acids do not show this inhibition. Lecithin, cholesterol, calciferol (but not ergosterol), lumisterol, α-tocopherol and α-tocopherol acetate all reverse this inhibition.

PATENTS

METHOD OF PRODUCING OIL FROM OIL-BEARING MATERIALS. C. W. Kaufman (General Seafoods Corp.). *U. S. 2,380,847.* A process of producing oil from oil-bearing protein material of animal origin which is normally subject to relatively rapid spoilage, comprises forming an aqueous mixture of the fresh raw material with alcohol, the concentration of alcohol being 3-12% by weight of the mixture, storing the mixture until substantial digestion of said material has taken place, and then recovering the oil from said mixture.

PROCESS FOR EXTRACTING OIL FROM AVOCADOS. H. T. Love (People of U. S.). *U. S. 2,383,398.* A process of extracting oil from avocados comprises forming a pulpy mixture of the avocados with lime, to disintegrate the cell walls of the avocados and to cause the oil-water emulsion to break and then separating the oil from the mixture.

PROCESS OF SEPARATING AND RECOVERING CONSTITUENTS OF TALL OIL. J. F. Loughlin. *U. S. 2,382,890.* The system of separating fat acids from rosin acids depends on converting the fat acids into n-Bu esters, removing rosin acids by saponification with NaOH; fat acid esters and sterols are stripped of rosin with hexane extraction; the fat acid and sterol fraction is saponified and pitch and sterols are removed with acetone.

PROCESS FOR TREATING MARINE OILS. L. O. Buxton (National Oil Products Co.). *U. S. 2,380,408.* A process of refining a vitamin-containing oil and improving its taste and odor comprises contacting a fat-soluble vitamin-containing marine oil with H_2 in the presence of an active hydrogenation catalyst at a temperature between 90° and 200° under a pressure of about 1-20 mm. for a period of time insufficient to affect the I value thereof.

PRODUCTION OF VITAMIN CONCENTRATES. L. O. Buxton (National Oil Products Co.). *U. S. 2,380,409.* A process of producing vitamin concentrates, one rich in vitamin esters and one rich in vitamin alcohols comprises dissolving a fish liver oil in isopropanol, cooling the solution to induce oil separation, separating the isopropanol solution of a potent vitamin semiconcentrate, and adding water to the isopropanol solution to cause separation of a vitamin ester concentrate.

FAT-SOLUBLE VITAMIN ESTER CONCENTRATION PROCESS. L. O. Buxton (National Oil Products Co.). *U. S. 2,380,410.* A process of producing a fat-soluble vitamin ester concentrate comprises saponifying 10-60% of the glycerides present in a fat-soluble vitamin-containing marine oil, separating the unsaponified fraction from the saponified matter, contacting the unsaponified fraction with isopropanol, cooling the mass to a temperature within the range of 0° to —70° to cause layer formation and separating the isopropanol layer containing the extracted vitamins from the isopropanol-insoluble portion of said fraction.

PROCESS OF REFINING MARINE OILS. L. O. Buxton (National Oil Products Co.). *U. S. 2,380,411.* A process of refining a fatty material comprises the steps of saponifying all of the free fatty acids and 10-30% of the glycerides present in a fish liver oil, separating the unsaponified oil from the resulting soap and extracting the soap-free oil at a relatively low temperature with isopropanol containing at least 9% water to remove odor, taste and color bodies.

HIGH IODINE VALUE OILS. L. O. Buxton (National Oil Products Co.). *U. S. 2,380,412.* The process of producing high I value oils from fish oils comprises selectively saponifying 30-90% of a fish oil by means of an alkali to split saturated glycerides and separating the unsaponified fraction from the resulting soap mass.

TREATMENT OF ANIMAL AND VEGETABLE OILS. L. O. Buxton (National Oil Products Co.). *U. S. 2,380,413.* The process of increasing the I value of animal and vegetable oils comprises partially and selectively saponifying 25-95% of an oil selected from the group consisting of animal and vegetable oils by means of an alkali to split saturated glycerides and separating the unsaponified fraction from the resulting mass.

FAT-SOLUBLE VITAMIN CONCENTRATION. L. O. Buxton (National Oil Products Co.). *U. S. 2,380,414.* The process of producing an improved fat-soluble vitamin concentrate comprises contacting a fat-soluble vitamin-containing marine oil with aqueous acetone, heating the mixture to dissolve at least a major portion of the oil in the aqueous acetone, cooling the mass to a temperature within the range of 0° to —70° whereby layers are formed, separating the aqueous acetone-insoluble fraction from the mass, saponifying said insoluble fraction and recovering the unsaponified matter therefrom.

PREPARATION OF TOCOPHEROLS. J. G. Baxter and C. D. Robeson (Distillation Products, Inc.). *U. S. 2,379,420.* The process of increasing the concentration of a tocopherol preparation comprises dissolving the preparation which contains the tocopherol in free form to be concentrated in a relatively weak eluting solvent to form a solution containing approximately 1-20% tocopherol, passing this solution through the body of a weak adsorbent and then eluting the vitamin E from the body of adsorbent with an eluting solvent.

ANTIOXIDANT FOR FOOD. C. W. Lindow and J. J. Thompson (Kellogg Co.). *U. S. 2,382,242.* The method of stabilizing a glyceride oil containing food composition against oxidative deterioration comprises incorporating therewith a relatively small proportion of an agent selected from the group consisting of hops and a water and alcohol soluble extract of hops.

ANTIOXIDANTS. W. I. Patterson and M. B. Williamson (S.M.A. Corp.). *U. S. 2,380,546.* The process of preparing an antioxidant from rice bran concentrate comprises extracting said concentrate with a halogenated hydrocarbon solvent having a boiling point below 100°, extracting the resulting extract with an aqueous medium under alkaline conditions, re-extracting the thus obtained aqueous extract under acidic condition with said halogenated hydrocarbon solvent and distilling off said solvent from the resulting extract.

INSECTICIDES. T. W. Evans and P. H. Williams. (Shell Development Co.). *U. S. 2,379,223.* An insecticidal composition comprises a carrier and a diallyl amide of a fat acid.

LOW TEMPERATURE GREASES. J. D. Morgan (Cities Service Oil Co.). *U. S. 2,383,147.* A low temperature grease comprises from 63-88% of a mineral lubricating oil, from 5-30% of an alkyl acetyl ricinoleate, approximately 6% of Li stearate and approximately 1% of Al stearate.

Abstracts

Drying Oils

Edited by
HOWARD M. TEETER

SOME OILS AND OIL SUBSTITUTES. P. H. Faucett. *Paint, Oil, Chem. Rev. 108,* 11, 12, 14, 16, 18, 20, 22-3 (1945). An extensive descriptive discussion of the preparation and properties of synthetic drying oils. (*Chem. Abs. 39,* 3254.)

ALKALI-REFINING OF LINSEED OIL. H. R. Touchin. *J. Oil Colour Chem. Assoc., 28,* No. 297, 49-54 (1944). The excess of NaOH added to the oil, multiplied by the time required to get a break-free oil raised to a constant power, was found to be roughly constant. It is suggested that the break is absorbed by the soap formed and that the amount of break present rather than the acid number should be used in determining the amount of NaOH to be added for refining. (*Chem. Abs. 39,* 3254.)

HEAT POLYMERIZATION OF OILS. N. L. Phalnikar and B. U. Bhide. *J. Indian Chem. Soc. 21,* 313-317 (1944). Safflower, niger seed and olive oil were heated *in vacuo* at 360°-400°. Some of the products present in the distillate and residue were identified. (*Chem. Abs. 39,* 3254.)

SPECTROPHOTOMETRIC STUDIES OF THE OXIDATION OF FATS. I. OLEIC ACID, ETHYL OLEATE, AND ELAIDIC ACID. R. T. Holman, W. O. Lundberg, W. M. Laner, and G. O. Burr. *J. Am. Chem. Soc. 67,* 1285-92 (1945). When lard is allowed to oxidize in air the ultraviolet absorption increases greatly, and the absorption near 2700 Å is roughly proportional to the peroxide value. However, decomposition of the peroxides by steam caused an increase in absorption in this region. A study of the absorption spectra of individual unsaturated fatty acids was undertaken to determine if any of these are involved in the change of absorption occurring on oxidation of natural fats. The absorption of oleic acid, ethyl oleate and elaidic acid was determined before and after oxidation both in neutral alcohol and in alkaline solution. These substances showed similar behavior, absorption in the region of