77	99.483
39	99.388
60	99.190

TABLE No. IV.—SPECIAL TABLE

Determination of Oil

Analyst No.	Points Off	Percent Efficiency
28	67	99.641
35	75	99.598
79	82	99.561
38	86	99.538

Determination of Ammonia

28	21	99.918
35	22	99.914
79	68	99.732
38	109	99.572

Determination of Oil and Ammonia

28	99.780
35	99.756
79	99.647
38	99.555

Personnel of Committee:

Thos. C. Law
E. H. Tenent
B. L. Caldwell
T. B. Caldwell
F. Paquin
J. N. Pless
W. C. Moor
M. E. Whitten
J. J. Vollertsen, Chairman

ABSTRACTS

Oils and Fats

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

Breeding research and oil seed cultivation. W. Rudorf. *Fette u. Seifen* **44**, 129-36 (1937). Review.

The refractometric fat determination on oil seeds (benzine process). W. Leithe and H. Lamel. *Fette u. Seifen* **44**, 140-2 (1937). The method is described. Data for use when testing linseeds, soybeans, rape seed, peanuts and coconuts are tabulated.

Refractometric fat acid determination in turkey red oils. W. Leithe and H. Lamel. *Fette u. Seifen* **44**, 111-113 (1937).

Determination of the hydroxyl number of hydroxy fat acids. K. Hinsberg. *Biochem. Z.* **289**, 294 1937); c. *C. A.* **30**, 4888^3.—Measure 1.0-1.6 g. fat into a 25-cc. vol. flask provided with a glass stopper and a ground in tube and add an *exact* 20.0 cc. 5 *N* Ac_2O-pyridine mixt. Add 20 cc. of the mixt. to a second flask. Set both flasks on the water bath and reflux for 7 hrs. Cool, make up to vol. with pyridine. The calcn. is made on the basis of the difference between the 2 titrations. (*Chem. Abs.*)

Research on detection of cruciferae oils in food oils. J. Grossfeld. *Z. Untersuch Lebensm.* **73**, 409-26 (1937). The method depends on the presence of erucic acid. To a 500 mg. sample of oil are added 500 mg. of lauric acid and 10 cc. alco.—KOH (40 cc. H_2O soln. of KOH, sp. gr. 1.5, plus 40 cc. H_2O with 96% alc. to 1 L.). The mixt. is saponified 10 min. under reflux condenser; then 50 cc. Pb-acetate soln. (50 g. Pb-acetate + 5cc. HAc with 80 vol.—% alc. to 1 L.), 2.5 cc. 96% HAc and 10 cc. H_2O are added. The soln. is heated and allowed to stand several days at 20° to crystallize. The I uptake of the ppt. is detd. and expressed in cc. of 0.1 N thiosulfate soln. In tests on graded mixt. of erucic acid with olive oil, the relation between the titration (x) and mg. of erucic acid (y) was found to be $y = 52.1x - 0.9x^2 - 217.2$. When y = O, the amt. of erucic acid can be as high as 4.52. The calculation to erucic acid is accurate to ± 11 mg. or ± 2.2%. A table for converting titration to mg. erucic acid is presented. The author also proposed that crucifierae oils be characterized by a new characteristic which he named the "erucic acid value." Values for several oils are presented.

The detection of animal fats and oils especially hardened train (marine animal) oil in fat mixtures. S. H. Betram. *Ole, Fette, Wachse, Seife, Kosmetik* 1937, No. 2, 13-14. In an investigation on the Tortelli-Jaffe reaction the author noted that (1) the green color reaction with hardened train oil occurred when the prescribed AcOH was omitted; and (2) when the prescribed $CHCl_3$ was replaced with CCl_4, CH_3CHCl_2, or MeI, the reaction was negative; when it was replaced with MeBr or C_6H_5COCl the color reaction was weak; while replacing the $CHCl_3$ with perchloroethylene (C_2Cl_4) or $C_2H_2Cl_2$ the reaction was significantly stronger. With a purified $C_2H_2Cl_2$ the reaction was weak. Because of the weaker reaction in this purified solvent, a check was made to ascertain whether $CHCl_3$ acted similarly. When pure $CHCl_3$, prepd. from alc., was used in the test on train oil, the reaction was negative. Use of impure $CHCl_3$ solvents, *i.e.*, contg. aldehydes yielded excellent positive reactions. A new procedure proposed for the detection of animal oils (except hog fat) was: 1 cc. of oil or fat is mixed with about 3 g. crystd. trichloroacetic acid in a test tube and heated 5 mins. at 60° in an oil bath. The tube is removed from the oil bath and 10 cc. $CHCl_3$ are added. Development of a violet color indicates the presence of animal oil or fat except for hog fat, for which the reaction is negative. An intense violet color is obtained with whale, seal, herring, pilchard, shark and egg oils; the reaction being equally good for the partially hardened and unhardened oils. Beef fat, butter fat, sperm oil and horse fat give weak reactions. A green color with strong fluorescence occurs with ergosterol. Pure cholesterol and pure phytosterol yield no color with the procedure. (*Chem. Abs.*)

Less-known constituents of milk and their examinations. Some minor component acids of milk-fats and their possible significance. T. P. Hilditch. *Analyst* **62**, 250-258 (1937). The fat acid compn. of milk fat of various localities are tabulated.

The lipids of steer hide. IV. The effect of liming on the lipids of steer hide. R. M. Koppenhoefer. *J. A. L. C. A.* **32**, 210-230 (1937). This work presents the results of a detailed study of the effect of straight liming on the lipids of a 30 day cured steer hide. Liming does not effect either the saponification or the removal of the corium triglycerides. Liming results in the almost complete neutralization of the free fatty acids of both the corium and epidermal regions. Through the action of the soak solution and by washing and saponification in the lime, the quantity of epidermal wax in the limed hide was reduced to one-third its quantity. Analyses of lipids extd. by several solvents and fractions of these and analyses of remaining lipids in the various hide layers are tabulated.

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A rapid method for the determination of triethanolamine. C. J. Eastland, N. Evers and T. F. West. *Analyst* **62**, 261-266 (1937). A method is described whereby triethanolamine is isolated from the water-soluble substances of emulsions and similar preparations, after acidification, advantage being taken of the insolubility of triethanolamine hydrochloride in isopropyl alcohol. Triethanolamine intereferes with Middleton's test for ethylene glycol, but the base can be precipitated by phosphotungstic acid from a mixture of the two compounds, and the ethylene glycol obtained from the filtrate by the method described.

The oxidation of butterfat. II. The composition of the fat in relation to its susceptibility toward oxidation. V. C. Stebnitz and H. H. Sommer. *J. Dairy Sci.* **20**, 265-280 (1937). There is considerable variation in the stability of the butterfat toward oxidation from different cows and from an individual cow at different times. The fat from cows receiving grass as part of their ration is less saturated and more susceptible to oxidation. It appears that the amount of linoleic acid rather than the oleic acid governs the stability of butterfat. There is no relation, between the carotene content, as evidenced by the color of the fat, and the stability of the fat toward oxidation.

The lipolytic action of staphylococci on some pure triglycerides. R. E. Trussell and L. A. Weed. *J. Bact.* **33**, 381-388 (1937). The data secured from measuring the action of 38 different strains of staphylococci and 2 strains of micrococcus tetragenus on eight different pure triglycerides are tabulated and indicate that they exhibit considerable lypolytic activity.

The quantitative extraction of fat from oil seeds and drugs by a cold method. Károly Száhlender and Gyözö Sulyok. *Ber ungar. pharm. Ges.* **13**, 185-8 (1937).—Extn. is complete only if the material is thoroughly rubbed with the solvent. Rub to a pulp 2-5 g. of the substance with the solvent with a pestle. Transfer the pulpy mass to a funnel 185 mm. long and 30 mm. in diam. filled with a cotton filter according to L. W. Winkler and wash 4-5 times. About 100-120 cc. solvent is required for each detn. (*Chem. Abs.*)

Experiments on expression of cottonseed. Eugene C. Koo and Shiu-Ming Cheng. *Ind. Research* (China) **6**, 9-14 (1937).—Exptl. data during the expression of cottonseed oil with a hand-operated lab. hydraulic press are reported. The factors which affect the oil yield during the pressing are: (1) pressure, (2) temp., (3) time of pressing, and (4) moisture content in the cottonseed. The cottonseed used for the expt. contains about 32% oil (by Et_2O method) and 8.2% moisture after delinting and removal of fat. Increasing the pressure from 2000 to 4000 lb./sq. in. increases the oil yield from 10 to 14% by wt. of seed. Increasing the temp. increases the oil yield on account of the decrease in viscosity of the oil with rise in temp. The oil yields increase from 13% at 18° to 24% at 125°. The time of pressing is a comparatively unimportant factor, especially when hot pressing is used. The moisture content of the seed is an important factor which is unfortunately frequently neglected in oil mills. The optimum range seems to lie between 5 and 11% of moisture. Below this range oil cannot be pressed out readily from the seed; above this range the product is often contaminated with H_2O. (*Chem. Abs.*)

Individual adapting various bleaching earths for bleaching various oils. E. Erdheim. *Ole, Fette, Wachse, Seife, Kosmetik* **1937**, No. 2, 24-7. The bleaching capacities of 4 bleaching earths were tested on 3 samples of rape oil and a sample of mineral oil. The order of the activity of the various bleaching earths tested differed with the oil used and also with the amount used in the tests. The author claimed that no standard oil or amt. of earth sample can be selected for rating bleaching capacity of bleaching earths. He recommends running bleaching tests on various oils and prepg. curves on the bleaching capacity of various proportions of the individual earths on each oil. The curves can be used as a basis for evaluating the bleaching earths. (*Chem. Abs.*)

Fat in nutrition. *Ont. Res. Foundation Bull.* **4**, No. 4, 5-7 (1937). The subject is discussed under the following headings: what are fats?, source of fats in food, value of fats in foods, effect of rancidity, digestion and absorption of fat, is fat absolutely essential in our diets?, digestibility of fats, the edible fat industries, how much fat should we eat?

Food Investigation. *Dept. of Sci. and Indus. Res. Report* **1935-36.** 41 (1937). When pigs had 1 oz. of cod-liver oil a day, the deposited fat was adversely affected, and oxidized too rapidly during curing and became rancid. The carcasses were thus unsuitable for the manufacture of Midland bacon and York hams. Even when the cod-liver oil was discontinued at 100 lb. live-weight and the pigs killed at 200 lb. live-weight, the quality of the fat was still adversely affected.

The effect of low fat diets on serum lipids of rats. A. E. Hansen and W. R. Brown. *J. Nutr.* **13**, 351-357 (1937). The serum lipids of rats reared on a fat-free diet have a lower degree of unsaturation than do the serum lipids of rats on stock diet. Young animals tend to have a lower iodine number of the serum lipids than do normal adult animals on the same diet. When the food intake of the animals on stock

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diet was so restricted as to hold their weight to the level of the average of the fat-free group, it was found that the degree of unsaturation of the total lipids of the serum was greater than in the normal animals on the same diet unrestricted. Animals given small quantities of the methyl esters of linolic acid sufficient to effect a clinical cure of the unsaturated fatty acid deficiency disease were found to have a slight but definite increase in the iodine number of the total lipids. Esters of oleic acid given in fairly large quantities to animals on the fat deficient diet were able to cause a definite increase in the iodine values of the total lipids, even though they effected only a partial clinical cure.

Observations on human subject subsisting six months on a diet extremely low in fat. W. R. Brown, A. E. Hansen, I. McQuarrie and G. O. Burr. *Proc. Soc. Exptl. Biol. Med.* **36**, 281-283 (1937). Objective findings: There was no significant change in the physical condition of the subject throughout the course of the study. Physical examinations made following resumption of normal diet were essentially negative. Subjective findings: The most noticeable feature was the marked absence of fatigue. Migraine attacks, which had been occurring at 7- to 10-day intervals, ceased after the subject had been on the diet for about 6 weeks.

How to use lard in making bakers' cakes. Part II. Yellow cakes. VeNona Swartz. *Bakers Helper* **50**, 1082 (1937).

Changes in properties of castor oil on blowing with carbon dioxide. II. Tung-Pao Jen. *Chiao-Tung Univ. Research Inst. Ann. Rept. Bur. Chem.* **3**, 36-9 (1936).—The expt. is carried out with both synthentic and natural ricinolein. Synthetic ricinolein having an acid value of 9.94 is obtained by heating pure ricinoleic acid (acid value 175, obtained from castor oil by successive sapon., purification and acidification) with ⅔ its equiv. amt. of glycerol at 230° for 5½ hrs. in a current of CO_2. On distg. under atm. pressure in a current of CO_2, this product is changed into a drying oil when the temp. reaches 295°, polymerization occuring at 320°. Natural ricinolein is obtained by washing Chinese castor oil 6 times with petroleum ether. On distg. in a current of CO_2 under barmeotric pressure, the oil is transformed into a drying oil, the max. temp. that can be used being 315°. Further heating causes polymerization. (*Chem. Abs.*)

Chemical microscopy of fats and waxes. III. Castor oil. L. Wilson Greene. *Am. J. Pharm.* **109**, 67-71 (1937).—A satd. soln. of KOH in BuOH appears to be a specific reagent for the microidentification of castor oil. A small drop of the specimen under examn. is mixed with an equal quantity of reagent and observed under the microscope at a magnification of 430 times. The reaction product always assumes the shape of small rosette-like aggregates with crystn. centers. Only castor oil, among over 200 specimens of fats examd. with the reagent, produced this type of crystn. soap. The procedure has been uniformly successful with all samples of castor oil tested, regardless of age or purity, but it is not applicable to the various grades of sulfonated castor oil nor to mixed castor fatty acids. The utility of the method for identifying blown castor oil is doubtful. It has not been applied to mixts. of castor oil with other fats. (*Chem. Abs.*)

New methods for pretreating linseed oil.. A. V. Blom. *Fette u. Seifen* **44**, 107-111 (1937). A review of theories on polymerization of oils.

A study of the properties of eleostearic acid esters from polyhydric alcohols. Tze-Hui Shen and Chung-Fu Kuo. *Chiao-Tung Univ. Research Inst. Ann. Rept. Bur. Chem.* **3**, 40-51 (1936).—Pentaerythritol eleostearate is made by heating equimol. proportions of freshly prepd. α eleostearic acid and pentaerythritol with 0.05-0.06 g. litharge as catalyst at 190° for 3.5 hrs. a current of CO_2. Mannitol eleostearate is prepd. in a similar manner, except that mannitol is used in place of pentaerythritol and the heating is carried out at 180° for 8.5 hrs. A synthetic resin is also prepd. by heating 112 g. tung oil, 18.4 g. glycerol and 0.5 cc. NaOEt to 250° for 1.5 hrs. an oil-bath in a current of CO_2, then cooling to 150°, adding 44.4 g. phthalic anhydride and reheating to 170° for ¾ hr. in a current of CO_2. The phys. and chem. consts. of this resin, as well as those of the 2 esters described above, were detd. Paints and varnishes were made from these 3 products. All 3 products are superior to tung oil in alk. test and dry more rapidly than tung oil. (*Chem. Abs.*)

Tall-oil fat acids. Fr. Kolke. *Farben-Ztg.* **41**, 1186 (1936).—The usefulness as a paint component of esterified tall-oil fat acids is limited by (1) their odor, dark color and slow drying properties and (2) the unsatisfactory elasticity and weather resistance of paint films contg. excessive amts. of tall-oil esters. (*Chem. Abs.*).

Cashew-nut shell oil and a study of the changes produced in the oil by the action of heat. N. M. Patel and M. S. Patel. *J. Univ. Bombay* **5**, Pt. 2, 114-31 (1936).—The sap. value (117) and acid value

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(109) of the oil decrease on heating until they become almost nil. The rate of decrease is higher at higher temps. This decrease is mainly due to the decarboxylation of *anacardic acid*. On heating, the I value (266) increases initially owing to the splitting off of CO_2, and the decompn. of the oil into unsatd. substances (I). A subsequent observed decrease is thought to be due to the condensation or polymerization of I. The sp. gr. (0.996) of the oil first decreases and then slightly increases on further heating. The mean mol. wt. (470) decreases to a min. after which it again gradually increases. (*Chem. Abs.*)

Cutting linseed oil consumption by improving quality. Erich Asser. *Ferbe u. Lack* **1936**, 521-3; *Farben-Ztg.* **14**, 1059-62 (1936).—Linseed oil, when heated to 280-305° and blown with air until the hexabromide no. has just reached zero ("Bisöl" process), is about 3.5 times more viscous than the starting material and is therefore particularly well suited as a vehicle for paints to be used on porous surfaces, e.g., pine wood. By processing the oil in the same way, but for a shorter period, it is possible to prep. a less viscous product ("Olo" oil) which, like "Bisöl," has an improved wetting power for pigments; i.e., the demand of a pigment for "Olo" oil is less than for untreated linseed oil. "Olo" and "Bisöl" oil when used for primer and finishing coats, resp., produce paint of superior resistance to weathering. It is thus possible to reduce the amt. of oil needed for paints by $\frac{1}{4}$ to $\frac{1}{3}$ and simultaneously to improve the quality of the latter. (*Chem. Abs.*)

Drying oils and resins. Influence of molecular structure upon oxygen and heat convertibility. T. F. Bradley. *Ind. & Eng. Chem.* **28**, 579-584 (1937).—A considerable number of simple and of more complex esters of the fatty acids of linseed and of tung oils were prepared and evaluated with respect to their oxygen and heat convertibility. The heat-nonconvertible systems were also oxygen-nonconvertible, and the oxygen-convertible or "air-drying" compounds were generally restricted to the heat-convertible systems. The ability to undergo conversion is governed by the molecular structure of the reactants, requiring as in the case of heat convertibility, the use of polyfunctional reactants, at least one of which must be more than bifunctional. As a secondary requirement, at least one of the reactants must contain functional groups which are capable of being activated and caused to react by means of oxygen, thus differing from the heat-convertible systems only in the form of reactivity of the functional groups, which obviously is then related to the specific nature of these groups.

PATENTS

Shortening compound and process of preparing the same. A. W. Ralston and V. Conquest (to Armour & Co.). U. S. 2,079,336. The invention comprises a shortening compd. contg. normally solid glycerides in quantities sufficient to develop "graininess" in the shortening and contg. small quantities of ammonium soaps to inhibit such grain formation; and it further comprises processes of preventing loss of plasticity and preventing brittleness from developing in such compds.

Filter for fats. A. G. Geirnaert. Belg. 417,392, Oct. 31, 1936. Steam-jacketed tubes, about 12 cm. in diam. and 2 m. long, are filled with decolorizing earth and connected in series. Instead of sep. tubes, a large tank may be used in which heating tubes are spaced about 12 cm. apart. (*Chem. Abs.*)

Catalytic hydrogenation process. Rohm & Haas Co. Brit. 457,358. Alcohols are produced from glycerides by hydrogenation in the presence of a hydrogenating catalyst comprising an oxide of Cr, Mn, V or Mo and an oxide of one of the group consisting of alkali and alkaline earth metals at temps. of from 190° C. to 400° C. and pressures over 400 lbs. per sq. in.

Baking fat. L. C. Brown, D. P. Grettie and R. C. Newton (to Indus. Pats. Corp.). Brit. 458,581, addn. to 413,343. When the mono and/or di-acid glycerides of hydrogenated soybean oils are used according to patent 413,343 they induce stability against rancidity to the shortening in addn. to the features described in the early patent.

Retardation of rancidity. A. K. Epstein and B. R. Harris. U. S. 2,075,806-7, Apr. 6. Oils and fats are retarded from oxidation by incorporating into them an unneutralized or partially neutralized phosphoric acid ester of a polyhydroxy substance of the class consisting of glycols, polyglycols and polyglycerols, wherein at least one hydroxy group of the polyhydroxy substance is replaced by a relatively high molecular weight aliphatic lipophile radical.

Emulsifying agents. C. E. Sando. U. S. 2,076,794. Apr. 13. The emulsion comprises water, a substance of an oily nature difficultly soluble in water and immiscible therewith and a sapogenin such as ursolic acid, oleanolic acid or betulin.

Composition of coal tar and higher fatty acids and process of making the same. A. W. Ralston and C. W. Christensen (Armour & Co.). U. S. 2,077,068. Coal tar fractions having a boiling point range of about 432° C. to about 500° C. are reacted with fatty acids having at least 6 C. atoms in the presence of $AlCl_3$ and an inert solvent for the reactants to form an intermediate aluminum chloride complex and hydrolyzing the complex to liberate an Al-free reaction product. The products may be used as constituents of lubricating oils.