experimental values for the refractive index change of the mixtures of Halowax oil and olive oil.

Summary

A new standardization of the rapid refractometric method of determining oil in olives has been devised. A theoretical discussion of all the factors involved and the introduction of the use of the Waring blendor in making the treatment with Halowax oil have also been presented.

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ABSTRACTS . . . . E. S. Lutton, Editor

• Oils and Fats

R. A. Reiners, Abstractor
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Fatty alcohols. P. Blaizot and M. Servant. *Oleagineux* **8**, 267-271(1953). The commercial preparation of fatty alcohols from natural fatty materials by catalytic hydrogenation and by sodium reduction as well as synthetic methods which include the oxidation of Fischer-Tropsch paraffins and the "Oxo" and "Synol" processes are discussed.

Better utilization of rice bran oil. C. Carola. *Olii Minerali-Grassi e Saponi-Colori e Vernici* **30**, 56-61(1953). The uses, methods of extraction and refining, composition, constants, and the storage of rice bran oil are discussed.

The conservation of fats, oils, and soaps. H. J. Henk. *Seifen-Öle-Fette-Wachse* **79**, 249-50(1953). The effectiveness of antioxidants in preventing rancidity in fats, oils, and soaps is discussed.

The autoclave splitting of fat. H. Radfang. *Seifen-Öle-Fette-Wachse* **79**, 250-52, 273-74(1953). After an historic retrospect the autoclave splitting of fat is described with special consideration being given to the preliminary purification of the material to be treated and the manipulation of the autoclave.

Chemical composition of molds. II. Fatty material of penicillium chrysogenum. Y. Abe. *Proc. Fac. Eng. Keiogijuku Univ.* **2**, No. 7, 15-20 (129-34)(1949). *Penicillium chrysogenum* contains water 9, crude fat 2.67, crude protein 33.98, and ash 3.62%. The fat from *P. chrysogenum* melts at 10-12°; specific gravity is 0.9175, acid value 58.8, saponification value 176.7, and iodine value 89.0. Composition of these fatty acids was found to be: saturated acids 19.0% (myristic 3.2, palmitic 10.3, stearic 4.9, and *N*-tetracosanic 0.6%); unsaturated acids 67.2% (oleic 46.2, linoleic 17.5, others 3.5%); unsaponifiable 3.9% (ergosterol 0.62%). (Chem. Abs. **47**, 4949)

Fatty acids from Indian cottonseed-oil foots. B. Bhushan, J. P. Phillips and K. C. Gulati (Central Labs. Sci. Ind. Research, Hyderabad). *J. Sci. Ind. Research* (India) **12B**, 38-9(1953). A 3-kg. sample of commercial cottonseed-oil foots, containing 66.2% fatty acids, heated for 6-7 hrs. at 100-110 lb./sq. in., and distilled at 240-60° at 400-420 mm., gave 1.4 kg. of fatty acids of acid value 198; and a distillation residue of 0.77 kg. (*Chem. Abs.* **47**, 5138)

Synthetic liquid fuel from Indian cottonseed-oil foots. B. Bhushan, J. P. Phillips, and K. C. Gulati (Central Labs. Sci. Ind. Research, Hyderabad). *J. Sci. Ind. Research* (India) **12B**, 39-40(1953). Pyrolysis of cottonseed-oil foots 100 with lime 10-20 g. at 450-480° produced 16-21% crude oil. Ca and Na soaps from refined cottonseed oil gave 84 and 82% crude oil, respectively. About 18% wax settled from both oils on standing. They yielded by distillation 31-35% gasoline (70-200°), and 43-50% kerosene (225-325°). (*Chem. Abs.* **47**, 5138).

Sunflower-seed oil. Brit. Standards Inst., London, S. W. 1. *Brit. Standard* **1939**: **1953**, 15 pp. Specifications are given for the volatile matter, color, specific gravity, *n*, iodine no., saponification value, unsaponifiable matter, acidity, and polybromides for crude and semirefined oil. Methods of determination are described. (*Chem. Abs.* **47**, 5139)

Chemical composition of the seed oil of Ilex paraguariensis (yerba mate). P. Cattaneo, Germaine K. de Sutton, and Maria L. Rodriguez. *Anales direc. nacl. quim.* (Buenos Aires) **5**, No. 9, 9-12(1952). The seed, before and after extraction with ligroin (boils 30-70°) contained, respectively, water 7.2 and 8.6, ash 1.3 and 1.5, protein 6.4 and 7.6, fiber 52.0 and 61.9, pentosans 17.0 and 20.2, and petroleum-ether extract 16.1 and 0.2%. The oil had acetyl no., 8.0; specific gravity ^{25} 0.9152; n^{25} 1.4720; saponificatoin no., 192.7; (Hanus) iodine no., 116.7; acid no. 4.4; Halphen test, negative; unsaponifiable 0.55%. The composition of the fatty acid was: lauric 0.87, palmitic 10.05, stearic 3.79, arachidic 0.58, oleic 34.46, palmitoleic 1.47, and linoleic 49.15%. (*Chem. Abs.* **47**, 5139)

Utilization of tensioactive compounds for the extraction of oils. H. Debruyne (Lab. munic., Bordeaux, France). *Bull. mens. inform. ITERG* **7**, 56-64(1953). Surface-active compound solutions of, respectively, 2, 0.5, 0.1% concentration on incorporation into test samples of 200 g. of dried peanut-meal in such a quantity as to replace 6-8% of the moisture did not improve oil extraction over that of controls by a laboratory hydraulic press. Actually at short pressing times the oil yield was less with surface-active treatment. (*Chem. Abs.* **47**, 5138)

Effect of varying the urea concentration on the efficiency of the extraction of unsaturated fatty acids from corn oil. A. T. Ericson and R. E. Clegg (Kansas State Coll., Manhattan). *Trans. Kansas Acad. Sci.* **55**, 493-8(1952). A study was made of the adducts formed from corn-oil fatty acids in diisopropyl ketone as a solvent with increasing amounts of urea. Increasing the concentration of urea increased the probability that the unsaturated fatty acids would form the adduct. Decreasing the temperature increased the formation of adduct with the unsaturated fatty acids at lower urea concentrations. In the case of saturated urea solutions containing a large excess of solid urea, the adduct formed contained the unsaturated fatty acids present in the original sample, and a satisfactory separation from the pigments was possible. (*Chem. Abs.* **47**, 5137)

Most suitable solvent for extraction of oils from bagasse (grape, cottonseed, olive, etc., refuse). H. Fontana. *Ion* **13**, 574-7(1952). $CHCl$: CCl_2 is favored over CS_2 as an oil-extraction solvent because of favorable insurance rates, lower heat of vaporization (steam saving), does not leave trace of S in the oil, and is more efficient on undried material. (*Chem. Abs.* **47**, 5138)

Antioxidants of lipid products. H. Funabashi. *Koryo* (Aromatics) No. 22, 38-45(1952). The 6 antioxidants for food, nordihydroguaiaretic acid, *n*-propyl gallate, ethyl protocatechuate, sustane, and isosafroeugenol are principally discussed. (*Chem. Abs.* **47**, 5139)

Composition of the body fat of small green chironomids. D. N. Grindley (Wellcome Chem. Labs., Khartoum, Sudan). *J. Exptl. Biol.* **29**, 440-4(1952). The body fat of *Tanytarsus lewisi* (Chironomidae) consists of a mixture of the glycerides of palmitic, stearic, oleic, palmitoleic, linoleic acids, and a polyethenoid acid containing 4 or 5 double bonds. The fat is closely similar to that usually occurring in fresh-water fish. The insect does all its feeding while in the larval stage on the bed of the river, and the body fat resembles that of algae and plankton, which probably are the main sources of food, and differs considerably from that of most terrestrial insects hitherto studied. (*Chem. Abs.* **47**, 5032)

The occurrence of *n*-decanoic acid in mutton fat. R. P. Hansen and N. J. Cooke (Dept. Sci. Ind. Res., Wellington, N. Z.). *Biochem. J.* **54**, 14-16(1953). *n*-Decanoic acid has been isolated in trace amounts from the external fatty tissue of sheep.

Selective esterification of tall oil with pentaerythritol. P. Kirjakka and E. Turunen. *Teknillisen Kemian Aikakausilehti* **9**, 161-3(1952). Esterification of oleic acid with pentaerythritol in mixtures with resin acids was complete in 5 hrs. at 130-140° with 0.7% *p*-toluenesulfonic acid and in 5 hrs. at 106° with 1.2% *p*-toluenesulfonic acid; at less than 125° esterification of the resin acids was negligible. Commercial tall oil gave similar results, but at 80% of the reaction rate of oleic acid. (*Chem. Abs.* **47**, 5139)

Determination of the melting point of cacao butter and hydrogenated fats (edible fats). J. Kleinert (Linth & Sprungli A.-G., Zurich, Switz.). *Rev. intern. chocolat.* **7**, 302-5(1952). A modified Wiley melting point procedure in which both solutions are stirred electromagnetically and heated so that the temperature in the beaker is not more than 2° higher than in the test tube is described. (*Chem. Abs.* **47**, 5139)

The lipids of fish. I. Content and condition of the lipids in the flesh of the haddock (Gadus aegle finus). J. A. Lovern (Torry Res. Station, Aberdeen). *Biochem. J.* **54**, 126-8(1953). Haddock flesh contains a total of about 1% lipide, but only about 0.1-0.2% of "free" lipide, the rest being probably "bound" to protein. Extraction with a series of solvents suggests the presence of more than one type of linkage between lipide and protein.

The lipids of fish. II. The acetone-soluble lipids of the flesh of the haddock. J. A. Lovern and June Olley (Torry Res. Station, Aberdeen). *Biochem. J.* **54**, 128-37(1953). An acetone extract of haddock flesh was analyzed by the countercurrent distribution technique. Lecithin was the chief component with free cholesterol, free fatty acids, cholesterol esters, waxes, and triglycerides being present in lesser quantities.

Determination of fat in chhana by the Gerber milk butyrometer. S. N. Mitra (W. B. Public Health Lab., Calcutta). *Science and Culture* (India) **18**, 150-1(1952). The Jacobs modification of the Gerber method is used for determining fat in soft curd cheese. The values are compared with those of the more lengthy Werner-Schmidt method. Fairly close agreement is demonstrated, although the modified Gerber method gives slightly lower results in each case. (*Chem. Abs.* **47**, 5037)

Humpback oil and the milk and milk fat from the sperm whale. T. Pedersen. *Norwegian Whaling Gaz.* **7**, 375-8(1952). Analytical characteristics for pipeline samples drawn during the unloading at Sandar Fabrikker A/S, of humpback oil from the 1949 and 1950 production at Cap Lopez, Congo, were, respectively, as follows: free fatty acids, 1.62 and 1.30%; iodine value 134.4, 135.8; saponification equivalent 287.0, 283.0; nonsaponifiable 0.88, 0.64%; saturated acids 26.7, 27.0% (equivalent weight, 249.0, 250.9). A sample of humpback milk gave the following values (%): fat 38.5, water 46.7, dry matter 14.8, ash 1.33. There were no reducing sugars present. Milk fat gave: iodine value 161.7, saponification equivalent 289.6, nonsaponifiable 0.40, acid value 0.37, saturated acids 32.9%, (equivalent weight 250.1). (*Chem. Abs.* **47**, 4989)

Formation of complexes of lecithin with urea. A. Rouhi, Judith Blass, and M. Macheboeuf (Inst. Pasteur, Paris). *Compt. rend. soc. biol.* **146**, 847-8(1952). Preliminary experiments indicate that urea forms an unstable additional complex with lecithin in petroleum ether solution. (*Chem. Abs.* **47**, 4926)

The kinetics of the fatty acid esterification of polyalcohols. W. Rubin. *J. Oil & Colour Chemists' Assoc.* **35**, 418-30(1952). A study of the rate of esterification of polyalcohol resin with fatty acids indicates a second-order reaction. The relation between activation energy and collision frequency is discussed. (*Chem. Abs.* **47**, 5137)

The reactions of aliphatic acid chlorides. N. O. V. Sonntag (Colgate-Palmolive-Peet Co., Jersey City, N. J.). *Chem. Rev.* **52**, 237-416(1953). An excellent review.

Preparation of milk fat. II. Properties of butteroils prepared by the use of surface active agents. C. M. Stine and S. Patton (Penna. Agr. Exp. Station, State College). *J. Dairy Sci.* **36**, 516-19(1953). By use of an appropriate surface active agent to de-emulsify cream, a butteroil can be prepared which is practically identical to butteroil obtained from butter. Butteroil obtained by de-emulsification of cream had a lower phospholipide content than that prepared from butter.

The determination of lipid inositol in animal tissues. Wanda E. Taylor and J. M. McKibbin (Syracuse Univ., Syracuse, N. Y.). *J. Biol. Chem.* **201**, 609-13(1953). A yeast bioassay method for inositol was applied to the determination of total lipid inositol in animal tissues. Inositol phosphatides were found to be minor components of tissue phosphatides.

Industrial purification of wool grease and its transformation to lanolin. Yolanda E. Torres R. *Anales fac. farm. y bioquim., Univ. nacl. mayor San Marcos* (Lima, Peru) **1**, 508-14(1950). The bleaching of wool grease with O_3, $KClO_3$, $NaHSO_3$, NaOCl, and other agents is discussed. (*Chem. Abs.* **47**, 5138)

The induction period as an index of stability of butter. Ya. Zaikovskii, N. Korobova, and L. Ryabushko. *Molochnaya Prom.* **14**, No. 2, 29-30(1953). The fat isolated from a butter specimen is spread on a glass plate and exposed at room temperature to normal sunlight or to ultraviolet light. Periodic weighing (every 16 hrs. in the 1st case, 15 min. in the 2nd case) and determination of aldehyde content, or determination of thermal stability by heating to 102° and observation of color, odor, and weight, were examined as possible methods for establishing the stability. The simplest method is the determination of thermal stability. (*Chem. Abs.* **47**, 5037)

Production of technical unpressed olein and its physico-chemical properties. L. P. Bezzubov, V. A. Vol'nova, and G. B. Ravich (Kazan Oil-Fat Trust). *Masloboino Zhirovaya Prom.* **18**(1), 11-15(1953). The technical problems in connection with production of olein are outlined. A ternary diagram of stearic, palmitic, and oleic acids is given, and its significance is discussed. A suitable olein product is produced from olein if I no. 102-105 by addition of naphthenic acids until the I no. is lowered to 80-90. The desired naphthenic acids fraction freezes at 0°, has an I no. of 2-5, and a neutralization no. of 210-220. Modification of other oils with naphthenic acids is discussed. Naphthenic acids alone or mixed with fatty acids tend to supercool and form glassy solids; they also aid the formation of a microcrystalline structure in the melts. (*Chem. Abs.* **47**, 5701)

The thiobarbituric acid test for butterfat oxidation. D. A. Biggs and L. R. Bryant. *Can. J. Tech.* **31**, 138-145(1953). The method for oxidative deterioration in fat products proposed by Dunkley and Jennings has been investigated and modified. Time of reaction, pH of reaction mixture, presence of oxygen in the reaction chamber, and presence of an emulsifying agent in the reaction mixture influence the amount of color produced. The modified method has been applied to the determination of oxidation in powdered whole milk, Cheddar cheese, and butter without separation of the fat. Interferences from colored materials in the sample can be eliminated by running blank determinations. Correction can be made for interference caused by lactose in milk powder by reference to a predetermined correction chart. Results are reproducible and those on milk powders correlated with organoleptic flavor scores and indicated that the method will measure degrees of oxidation below the level of organoleptic sensitivity.

Fat in the meat industry. R. Grau (Bundesforschungsanst. Fleischwirtschaft, Kulmbach, Germany). *Fette u. Seifen* **55**, 25-26(1953). Mutton tallow-olive oil mixtures no longer have the typical mutton tallow odor and are useful for cooking purposes; mixtures of mutton tallow (40) and olive oil (60) or of mutton tallow (40), olive oil (55), water (4.8) and emulsifier (0.2) were used. Winter-produced bacon pickled with the addition of carbohydrates had better keeping qualities than the same product prepared without carbohydrates. Summer-produced bacon did not show these differences. (*Chem. Abs.* **47**, 5574)

Autoxidation of fats and oils. II. A simple method to demonstrate the presence of different antioxidants in fats and oils. A. R. S. Kartha (Maharajas Coll., Ernakulam, India). *J. Sci. Ind. Research* (India) **12B**, 35-37(1953). The technique is based on the assumption that an antioxidant added to an oil containing natural antioxidants acts as a synergist, and if the original antioxidant is being destroyed by oxidation the synergist response of the added antioxidant is altered. Method: A no. of samples of an oil are aerated at 100° for 0.0, 1, 2, 3, etc., hrs. to rancidity, resp., antioxidant is added to each, and they are aerated to rancidity to obtain the induction periods. The induction periods plotted are said to indicate when an original antioxidant disappears as revealed through loss of synergistic action by added antioxidant. A multiple of horizontal and sloping sections of the curve are interpreted to indicate several antioxidants are present.

III. A new instance of first-order rate destruction of antioxidant during autoxidation of fats. *Ibid.* 37-38. The antioxidant of licorice root *(Glycyrrhiza glabra)* is destroyed according to a unimolecular reaction rate. (*Chem. Abs.* **47**, 5699)

Hydrolytic method of production of vitamin-bearing fish fats. L. L. Lagunov, V. N. Bukin, N. T. Berezin, and M. K. Prozorovskaya (A. N. Bakh Biochem. Inst., Moscow). *Akad. Nauk S.S.S.R., Inst. Biokhim. im. A. N. Bakha, Vitaminnye Resursy i Ispol'zovanie, Sbornik* **1**, 22-70(1951). A detailed account with experimental details is given of the method of isolation of vitamin A concentrates in fish oils by means of alkaline hydrolysis which serves to liberate the vitamin from its complexes with proteins. The method is particularly useful for working up low grades of fish products. Essentially the final method consists of maceration of the fish liver and a 2-step hydrolysis in the 1st step of which the material is treated at pH 8.5-10.0 with an amount of NaOH equivalent to 1.5% by weight of the liver mass; material from salted fish must be treated at pH up to 13-14 with 3-4% by weight of NaOH. The process is carried out with good stirring and heating. When the saponification begins to slow down a 2nd portion of NaOH is added and the process continued to completion indicated by formation of 2 clear and distinct layers. The process can be used to supplement and improve the vitamin yields obtained by centrifugal or extraction methods. (*Chem. Abs.* **47**, 5629)

Spontaneous autocatalytic hydrolysis of triglycerides. M. Loncin (Indus. aliment. CERIA, Brussels, Belgium). *Fette u. Seifen* **55**, 7-9(1953). The speed of autocatalytic hydrolysis varies directly with the free fat acid content. The lower fat acids are more pronounced in their catalytic activity on a percentage basis. The autocatalytic reaction develops diglyceride plus free fat acids, at least until a concentration of approximate 10% fat acids is reached. (*Chem. Abs.* **47**, 5700-5701)

Determination of stabilities of crude peanut oil by accelerated aeration methods. Nelle J. Morris and A. F. Freeman. *Food Tech.* **7**, 227-228(1953). Measurements on 22 crude peanut oils show that stabilities determined at 110° by Mehlenbacher's modification of the active oxygen method correlate satisfactorily with those determined by the active oxygen method at 97.8°. Since stabilities at 97.8° are 2.5 times those at 110° the latter can be determined in 40% the time required for the former. There are described experimental procedures which include several recent improvements in the technique of determining stabilities of oils.

The autoxidation of shark-liver oil. I. General considerations and procedures. P. V. Nair and T. A. Ramakrishnan. *Bull. Central Research Inst. Univ. Travancore,* Trivandrum Ser. A., **1**, 1-9(1950). Peroxide values of 0.5-g. samples of shark-liver oil were determined after storage at 29-30° in specimen tubes 4 in. long and 0.75 in. in diameter. A modified Wheeler titrimetric procedure was employed. While it could be observed that the orange-colored oils on storage would start to lose color when reaching a peroxide value of 60 and bleach out at a peroxide value of 100, coincidental with the perception of organoleptic rancidity and the approximate termination of the induction period, no such relation is found in closed storage or bulk samples.

II. Progression of peroxides in shark-liver oils with reference to their iodine values. *Ibid.* 10-27. The effect of I value on the development of peroxides was studied on shark-liver and sawfish-liver oils of I values in the range of 87-145. It is possible to diminish or enhance the period of induction without affecting the I value by refining the samples or by treating the sample with foreign antioxidants. The degree of active autoacceleration is largely governed by the degree of unsaturation. The appearance of organoleptic rancidity is also a function of the I value, the more unsaturated samples becoming organoleptically rancid only at higher peroxide values. Addition of rancid oil to fresh oil results in an abrupt enhancement of peroxides which decreases the range of the induction period. Foreign peroxides thus do not catalyze the reaction but effect a reduction in the initial induction period in proportion to the initial peroxide content of the peroxidized oil. Experimental results on an oil free of rancidity reveal that there is no relation between the age of the oil and the length of the induction period under ideal conditions of storage.

III. Viscosity of rancid and fresh oils. P. V. Nair, S. Ramachandra Varier, and T. A. Ramakrishnan. *Ibid.* 28-29. From the determination of kinematic viscosities of a sample each of fresh oil, rancid oil, and a 1:1 mixture of both, it was observed that the viscosity of a rancid sample is greater than that of either the fresh oil or that of the mixture. I values of both fresh and rancid oils were 90.

IV. Species specificity of induction period of shark-liver oil. P. V. Nair and T. A. Ramakrishnan. *Ibid.* 30-34. A notable difference in induction periods between tiger-shark-liver oil and sawfish-liver oil indicates that different kinds of trace substances are present, and it is further evidenced by their differing responses to antioxidants. The difference in response to antioxidants can also be explained by the presence of vitamin E and tocopherols in shark-liver oils and the absence of tocopherols and presence of vitamin A in sawfish-liver oil. Because of the improvement in response to antioxidants of sawfish-liver oil to which tiger-shark oils have been added, it can be indicated that this is a better means of standardization than the addition of large bulks of vegetable oil to shark-liver oil for the same purpose. (*Chem. Abs.* **47**, 5699-5700)

Some problems in the production of synthetic fatty acids. A. Yu. Rabinovich and E. S. Skripchenko (All-Union Sci. Research Inst. Fats, Moscow). *Masloboino Zhirovaya Prom.* **18** (1), 16-18(1953). In the production of synthetic fatty acids from petroleum best results were obtained by submitting petroleum fractions boiling above 450° to oxidation at 110-115° in the presence of catalytic quantities of $KMnO_4$. The oxidation product has acid no. 67-80, saponification no. 95-111, with color scale 20-30. Yields of water-insoluble acids can reach 30%. (*Chem. Abs.* **47**, 5699)

Relation between the content of phosphorus-bearing substances in vegetable oils and their ash content. V. P. Rzhekhin and M. A. Chudnovskaya. *Masloboino Zhirovaya Prom.* **18**(1), 22-3 (1953). Tests on crude and refined oils indicate that there is a linear relation between P_2O_5 content and the ash content of vegetable oils. For each type the values group around an average level characteristic of that particular group. For sunflower oil the content of P-bearing substances (in % calculated as lecithin) is given by $y = 9.3x - 0.06$, where x is the total ash in %. For soybean oil it is: $y = 9.0x - 0.04$; for linseed oil $y = 6.0x$; for cottonseed oil it is $y = 6.5x$. Carefully run alkaline refining procedures can almost completely dephosphorize the above 4 oils, bringing the lecithin level to 0.02%. (*Chem. Abs.* **47**, 5701)

Reactions of combined alcoholysis and hydrogenation. Andrea Scipioni and Duilio Greppi (Univ. Padova). *Ann. chim.* (Rome) **41**, 785-795(1951). The object was to combine the hydrogenation of unsaturated natural glycerides with alcoholysis so as to obtain the monoesters of the saturated fatty acids in one operation. The starting materials were a glyceride-alcohol mixture or a glyceride and a carbonyl compound. Separate experiments on alcoholysis and on hydrogenation were made in order to determine conditions most favorable to each process which would not interfere with the other process when the two were combined in one operation. For alcoholysis, NaOH and NaOEt were the best catalysts. The less alcohol used the greater should be the concentration of catalyst. High temperatures favored mono- and diglyceride formation. Hydrogenation was effected in a 1500-ml. autoclave, 76 mm. in diameter, oscillating 40 times per minute with Raney Ni as catalyst at 150° and 50 atm. The Me and Bu esters of the fatty acids present in peanut, soybean, coconut, castor, whale, and grape-seed oils were prepared by the combined operation. The yields were 80-98%. By combined alcoholysis and hydrogenation of Me_2CO, the glyceride and NaOEt were obtained the iso-Pr esters of the saturated acids of the glycerides. The furfuryl and tetrahydrofurfuryl esters of peanut and coconut oils were also prepared. Raney Ni to reduce the double bonds and Cu oxide to reduce the carbonyl compound were used simultaneously. Boiling (1-5 mm. Hg) and melting ranges are tabulated for the Me, Bu, and iso-Pr esters of the six oils named above. (*Chem. Abs.* **47**, 5701-5702)

Stabilization of edible fats by spices and condiments. I. S. C. Sethi and J. S. Aggarwal (Natl. Chem. Lab. India, Poona). *J. Sci. Ind. Research* (India) **11B**, 468-470(1952). Twenty-five spices and condiments in varying concentrations were heated to 220-225° in the oils in which they were to be tested, and the oil was filtered, cooled, and a sample used in the Swift stability test along with a control. The oils tested were peanut, safflower, sesame, mustard, coconut, and ghee. Heating the oils to 220° partially decomposed the peroxides present in them. The effectiveness of a given spice as antioxidant varied according to the fat tested, and a possible explanation is that the unsaponifiable fraction in each fat reacts differently with the active principle of the spice. The most effective additives are: red chili, cinnamon leaf, tumeric, clove, black pepper, nutmeg fruit, betel leaf, and dry ginger. As a process for adoption by industry it is considered uneconomical. (*Chem. Abs.* **47**, 5573-5574)

Fatty acid composition of fish oils. Lyle A. Swain (Pacific Fisheries Experimental Sta., Vancouver, B. C.). *Fisheries Research Board Can., Prog. Repts. Pacific Coast Stas.* No. **93**, 3-6 (1952). The Me esters of the fatty acids in a herring oil crystallized from Me_2CO at —13°F. were mostly the esters of saturated fatty acids. The crystals separated at —103°F. were the esters of the remaining saturated fatty acids and of most of the fatty acids containing one double bond. The esters of the fatty acids (38%) having more than one double bond remained in solution. The fractions had I nos. 9.4, 84.3, and 213.2, respectively. (*Chem. Abs.* **47**, 5702)

Studies in the field of hydrogenation of fats. B. N. Tyutyunnikov and B. Fraĭer (Kharkov Polytech. Inst.). *Masloboĭno Zhirovaya Prom.* 18(1), 7-10(1953). A test for evaluation of the activity of a hydrogenation catalyst is proposed. The activity of a catalyst is recorded as the average volume of H_2 uptake per hr. by a standard fat when it is hydrogenated under standard conditions to the same degree as is conventional in practice. (*Chem. Abs.* 47, 5699)

Whole-wheat oil. Kleiner Piuma Velloso and Horst Beck (Ind. comércio Rio Grande do Sul, Porto Alegre). *Anais assoc. quim. Brasil* 10, 230-235(1951). Wheat grain of a no. of varieties (Lageadinho, Peladinho, Frontana, Sincana, Sinvalocho, Ventana), all from Encantado, R. G. S., was found to have oil 1.52-2.47%, a ratio of oil/protein 0.11-0.24, a ratio of oil/ash 0.86-1.45, and a ratio of oil/hydrating capacity 2.34-3.99. The oil content decreases as the quality of the grain increases. Extraction tests were made with Et_2O. The wheat oils are thin, dark amber to red oils of greenish cast, partially soluble in cold MeOH or EtOH and in hot MeOH, but soluble in hot EtOH, and in cold or hot PrOH, BuOH, AmOH, Et_2O, $CHCl_3$, CCl_4, CH_2Cl_2, toluene and AcOH. The Et_2O-extracted oil has saponification nos. 174-182, I no. (Hübl) 113-123, d^{25} 0.9190-0.9231, n^{20} 1.4758-1.4822, n^{50} 1.4633-1.4698. (*Chem. Abs.* 47, 5702)

Separation of major-component fatty acids of lespedeza-seed oil by low temperature crystallization. Richard H. Wiley and Joseph P. Burns (Univ. of Louisville, Louisville). *Trans. Kentucky Acad. Sci.* 14, 10-16(1953). The mixture of fatty acids obtained on saponification of lespedeza-seed oil has been separated into fractions by low-temperature crystallization. The I nos. for the fractions indicate a composition of saturated acids 14, oleic acid 27, linoleic acid 46.5, and linolenic acid 12.5% if it is assumed that only C_{18} acids are present. Hexa- and tetrabromostearic acids have been isolated to confirm the presence of linoleic and linolenic acids. Acid values for the fractions indicate the presence of some acids of chain length over C_{18}. (*Chem. Abs.* 47, 5702)

PATENTS

Extraction of fats and oils by use of a chlorine- and fluorine-containing hydrocarbon having 2 carbon atoms or less. I. Kageyama, *et al.* (Osaka Metal Industries Co.). *Japan. 7039 ('51).* The extraction apparatus uses CF_2Cl_2. (*Chem. Abs.* 47, 5141)

Treatment for waste decolorizing earth. S. Ueno. *Japan. 7040('51).* Waste fuller's earth, used for the decolorization of fats, oils, waxes, or fat acids is hydrogenated with above 10 atmospheres of H, and the hydrogenated product is separated. (*Chem. Abs.* 47, 5142)

Dewaxing of rice oil. R. Koyama. *Japan. 7225('51).* Crude rice oil is extracted with hydrated methanol (5-10% water for oil with acid no. >80 and 10-20% water for oil with acid no. 30-50) to decrease the acid content of the oil to acid no. <20; the methanol is removed; the oil is heated at 50°, filtered, cooled, and dewaxed. (*Chem. Abs.* 47, 5141)

Refining of rice oil having high acid numbers. R. Koyama. *Japan. 7226('51).* Crude rice oil is decolorized, extracted with hydrated methanol according to its acid no., and the extraction is repeated. The methanol is removed, and the oil is dewaxed, deodorized, and decolorized with benzoyl peroxide. (*Chem. Abs.* 47, 5141)

Hydrogenation of fats, oil, and waxes. S. Ueno. *Japan. 7227 ('51).* Soybean oil (100 g.) is saponified with 10 ml. of 20% NaOH by heating and placed in an autoclave; 100 ml. of water and 3 g. of $NiCO_3 \cdot CuCO_3$ catalyst are added, and the mixture is hydrogenated at 150-230°. The product is treated with dilute H_2SO_4 and washed with water to give a product, m.p. 54.8-8.1°, acid no. 168.7 and saponification no. 189.3. (*Chem. Abs.* 47, 5140)

Apparatus for separation of fat acids from fats and oils. S. Ybuta, *et al. Japan 7531('51).* An apparatus is described for the countercurrent application of a solvent, e.g. ethanol or methanol, in a continuous process where 2 or more washing towers are used. (*Chem. Abs.* 47, 5140)

Hydrogenation of salt of unsaturated fatty acid. S. Ueno. *Japan 128('52).* Soybean-oil foots (100 g.) containing about 50% neutral oil is treated in an autoclave with 100 ml. of water, 2 g. of Ni catalyst, and 30-50 atmospheres of H, and heated for 3 hrs. at 160-250°. The product is treated with H_2SO_4 to give a mixture of hydrogenated oil and fat acid. (*Chem. Abs.* 47, 5140)

• Biology and Nutrition

R. A. Reiners, Abstractor
Ralph W. Planck, Abstractor

A method for study of the effects of heat on the nutritive value of soybean oil meal. H. J. Almquist and S. Maurer (The Grange Co., Modesto, Calif.). *Poultry Sci.* 32, 549-50(1953). Preliminary data indicate a correlation between formaldehyde titration results on soybean oil meals and nutritive value in rats.

Reaction between carotenoids and copper. S. D. Balakhovskii, N. N. Drozdova and V. N. Fedorova. *Doklady Akad. Nauk S.S.S.R.* 87, 453-5(1952). Oxidation of ascorbic acid in the presence of $CuSO_4$ was inhibited by small amounts of carotene. (*Chem. Abs.* 47, 4928)

The application of counter-current methods to the fractionation of lipid material from brain. P. G. Cole, G. H. Lathe, and C. R. J. Ruthven (Bernhard Baron Mem. Res. Labs. London, W. 6). *Biochem. J.* 53, vi(1953). A solvent system (62% chloroform, 35% methanol and 3% water (v/v/v) was devised to minimize emulsion formation. There was considerable overlapping of many components.

Laboratory estimation of the nutritive value of soybean oil meals. S. L. Balloun, E. L. Johnson, and L. K. Arnold (Iowa State College, Ames, Iowa). *Poultry Sci.* 32, 517-27(1953). The growth-inhibiting factor in raw soybean oil meal was progressively inactivated by autoclaving, with substantially complete inactivation when the meal had been autoclaved 20 minutes at 15 lbs. steam pressure. Either more or less heat produced a meal of sub-optimum nutritive value. A determination of fluorescence is an adequate measure of overheating in solvent extracted meals, but is of little value in detecting overheated expeller meals.

The influence of heating codliver oil to 230° on the growth of young rats. I. E. H. Groot and H. J. Kleinobbink (Univ. Amsterdam). *Voeding* 14, 123-36(1953). A diet consisting of 66 ground rice, 10 casein, 10 dried yeast and 4 parts salt mixture was used. When 10% of codliver oil of peroxide value <24 was added, normal growth occurred. When the peroxide value was >54, a significant decrease of growth occurred. Female rats were used. Growth was practically normal again when the oil of peroxide value >54 was heated previously for 3 hrs. at 230° *in vacuo*. The peroxide value dropped considerably; about 2% distilled off. The distillate was not toxic. α-Tocopherol had no effects on the decreased growth with the oil of peroxide value >54. (*Chem. Abs.* 47, 4973)

Cottonseed meal extracts. Electrophoretic patterns of buffer extracts of different nutritive value. M. L. Karon, Mabelle E. Adams and A. M. Altschul (So. Reg. Res. Lab., New Orleans, La.). *J. Agr. Food Chem.* 1, 314-18(1953). As heat stress during processing increases, the nutritive value declines and the electrophoresis patterns of the soluble protein fraction of the meal changes. A new fast-moving component develops and the original two major components become more difficult to resolve.

Polarographic estimation of tocopherols in vegetable oils. E. Knobloch, F. Macha and K. Mnoucek (Pharm. Biochem. Research Inst., Prague, Czech.). *Chem. Listy* 46, 718-21(1952). Half-wave potentials of α-, β-, γ-, and δ-tocopherylquinones, obtained from the corresponding tocopherols by oxidation with $Ce(SO_4)_2$, were determined. α-Tocopherol, the sum of β- and γ-tocopherols, and δ-tocopherol are directly determinable. (*Chem. Abs.* 47, 5039)

The effect of heat treatment on the nutritive value and hemagglutinating activity of soybean oil meal. I. E. Liener and E. G. Hill (Univ. Minn., St. Paul). *J. Nutrition* 49, 609-20(1953). A procedure for determining the hemagglutinating activity of soybean oil meals is described. This rapid, qualitative technique proved reliable in assessing the adequacy of heat treatment of the 6 samples of commercial soybean oil meal which were tested.

Evaluation of protein quality in cottonseed meals by chick growth and by a chemical index method. C. M. Lyman, W. Y. Chang and J. R. Couch (Texas A. and M. College System, College Station). *J. Nutrition* 49, 679-90(1953). A chemical index which takes into account both total gossypol content and nitrogen solubility in 0.02 *N* NaOH was found to give good correlation with chick growth rates. Low processing temperatures did not always produce high quality meals. Lysine supplementation of the poorer meals resulted in increased growth rate of chicks amounting to over 100%.

The distribution of some of the essential lipids in beef heart muscle and conducting tissue. S. Mallov, J. M. McKibbin and Jane S. Robb (Syracuse Univ., Syracuse, N. Y.). *J. Biol. Chem.* **201,** 825-38(1953). The anthrone colorimetric procedure for the determination of carbohydrates was developed into a method for lipide sugar determination and shown to be more satisfactory than other reduction and colorimetric procedures. Beef heart muscle was found to contain 0.01 to 0.02% and beef heart connecting tissue 0.030% of cerebroside on the basis of fresh tissue weight.

Effect of processing variables on the nutritive value of sunflower seed oil meal. A. B. Morrison, D. R. Clandinin, and A. R. Robblee (Univ. Alberta, Edmonton). *Poultry Sci.* **32,** 492-96(1953). Sunflower seed oil meal of equivalent nutritive value to solvent extracted soybean oil meal was produced by lowering the processing temperatures from 240°F. in the cooker and 260°F. in the conditioner to 200°F. in the cooker and 220°F. in the conditioner, and opening the choke on the expeller.

A supplementary value of sunflower seed oil meal in practical chick starting rations. A. B. Morrison, D. R. Clandinin, and A. R. Robblee (Univ. Alberta, Edmonton). *Poultry Sci.* **32,** 542-47(1953). Sunflower seed oil meal was successfully used to replace a large part of the meat or soybean oil meal in practical chick starters.

Effect of feeding graded levels of fat with and without choline and antibiotic B_{12} supplements to chicks. A. J. Siedler and B. S. Schweigert (Univ. Chicago, Chicago, Ill.). *Poultry Sci.* **32,** 449-54(1953). Performance of chicks fed 2-8% added fat (choice white grease) was equal to that of chicks fed the basal diet without added fat. Supplementation with choline or choline plus antibiotic and vitamin B_{12} offered no advantages.

Determination of vitamin A in the presence of tocopherols. D. T. Ewing, L. H. Sharpe and O. D. Bird (Parke, Davis & Co., Detroit 32, Mich.). *Anal. Chem.* **25,** 599-604(1953). Vitamin A is separated from tocopherols by chromatographing the mixture on activated alumina. The recovered vitamin A is measured spectrophotometrically.

Effects of nicotinamide on the ketogenesis from triolein. Luciano Adezati (Univ. Genoa, Italy) and Gianni Ghigliotti. *Arch. "E. Maragliano" patol. e clin.* **7,** 851-853(1952). When guinea pigs were given 100 mg. niacin parenterally daily for 3 days and then were given 1 g. emulsified olive oil per kg. body weight parenterally, the acetone bodies in liver, muscle, and blood were, resp., 5.40, 4.05, and 2.35 mg./100 g. or cc. (controls: 5.20, 3.90, and 2.40). (*Chem. Abs.* **47,** 5502).

The oxidative fate of parenterally administered triolein. Luciano Adezati (Univ. Genoa, Italy) and Gianni Ghigliotti. *Arch. "E. Maragliano" patol. e clin.* **7,** 267-272 (1952). In dogs parenterally injected with 1 g. neutral olive oil (emulsified in H_2O with a stearate) per kg. body weight, the average ketone content (as mg. acetone/100 cc. or g.) of blood decreased from 1.37 to 1.26 after 30 min., increasing thereafter up to 4.05 at the 6th hr. In the liver, muscle, and blood of similarly treated rats, the ketone content, 4 hrs, after the injection, was, resp., 7.15, 4.20, and 2.80 (controls 5.95, 4.35, and 1.95, resp.). Similar values were observed in guinea pigs. All these results show that the ketone increase in the blood is not proportional to the liver ketogenesis because of the oxidative utilization by the muscle. (*Chem. Abs.* **47,** 5502)

Metabolism in the animal body of aliphatic hydrocarbons with 8-18 carbon atoms. Karl Bernhard, Urs Gloor, and Erwin Scheitlin (Univ. Basel, Switzerland). *Helv. Chim. Acta* **35,** 1908-1913(1952) (in German). The following dideuterium (di-D) compounds were obtained by hydrogenation with D_2 of the corresponding unsaturated hydrocarbons in the presence of Raney nickel: $Me(CHD)_2C_5H_{11}$ or CH_2DCHDR, where $R = C_6H_{13}$, C_8H_{17}, $C_{10}H_{21}$, $C_{12}H_{25}$, $C_{14}H_{29}$, or $C_{16}H_{33}$. Rats (groups of 10 animals) were fed daily during 6 days 5 g. of one of the di-D-compounds, dissolved in 15 cc. olive oil. The excretions during the feeding period, as well as the liver, intestinal contents, and the remainder of the body of the sacrificed animals were analyzed for fatty acids containing D. When C_{18} and C_{16} compounds were fed, the D content of the fatty acids found in the liver and body fats was higher than after feeding of the lower M. W. compounds. D-containing oleic, stearic, and palmitic acids were isolated after feeding C_{18} compounds, and palmitic acid was isolated after feeding C_{16} compounds. The metabolism of the di-D-hydrocarbons with C_{14} and less yielded fatty acids in the urine. (*Chem. Abs.* **47,** 5499)

Oxidation of vitamin A in tunny-liver oil and its stabilization by antioxidants. Aldo Buffa. *Conserve e deriv. agrumari* (Palermo) **1**(1), 10-12(1952). The strongest protective effect was obtained with nordihydroguaiaretic acid which was still enhanced by the addition of citric acid. Et and Pr gallates were less efficacious and α-tocopherol was without influence. (*Chem. Abs.* **47,** 5577)

Apparatus for irradiation in production of vitamin D. V. N. Bukin (A. N. Bakh Biochem. Inst., Moscow). *Akad. Nauk S.S.S.R., Inst. Biokhim. im. A. N. Bakh, Vitaminnye Resursy i Ispol'zovanie, Sbornik* **1,** 278-282(1951). A tubular irradiator is described, which is constructed of 3 concentric quartz tubes, the inner one acting as a jacket for a quartz ultraviolet lamp, while the outer one serves as the outer cooling jacket for the water circulation. The oil to be irradiated is passed between the 1st and 2nd jackets (2 mm. is recommended). High efficiency is claimed, as 1.1 min. exposure is sufficient for the given mass of oil as it circulates through the apparatus. (*Chem. Abs.* **47,** 5630-5631)

Biological method of determination and the results of evaluation of fish fats and other products of marine commerce in respect to vitamin D. V. N. Bukin and N. N. Erofeeva (A. N. Bakh Biochem. Inst., Moscow). *Akad. Nauk S.S.S.R., Inst. Biokhim. im A. N. Bakha, Vitaminnye Resursy i Ispol'zovanie, Sbornik* **1,** 250-265(1951). Some sea fish have moderate deposits of vitamin D. The highest is found in the fat obtained by mild alk. hydrolysis of whale liver (700 I. U./g.), in the fat from the internal organs of *Cyprinus carpio* and *Abramis brama* (both about 325 g. I. U./g.), and subcutaneous dolphin fat (108-165 I. U.). Cod liver showed 70-216 I. U./g. Many of the fish are devoid of the vitamin. Mild alkaline hydrolysis is most satisfactory for isolation from the body fats. Irradiation of the fats lacking vitamin D, but containing the provitamins, results in high levels of activity (up to 16,000-32,000 I. U./g.). (*Chem. Abs.* **47,** 5630)

Liver of whales as raw material for production of vitamin A. V. N. Bukin and E. P. Skorobogatova (All-Union Sci. Research Inst. Vitamins, Moscow). *Akad. Nauk S.S.S.R., Inst. Biokhim. im. A. N. Bakha, Vitaminnye Resursy i Ispol'zovanie, Sbornik* **1,** 207-215(1951). The highest vitamin level is found in the liver fat of sperm whale: 400,000 I. U./g., followed by finwhale (200,000 I. U./g.). Smaller species carry much lower levels of the vitamin (15-25% of the above figures). The ordinary salt method of rendering the whale liver causes vitamin losses of about 15%, although, it is simplest to apply under the field conditions. Usually smaller specimens have lower content of vitamin A in the liver than do the large specimens (on relative size basis). (*Chem. Abs.* **47,** 5630)

Adjustment of milk in production of milk preserves. L. Chekulaeva and V. Demidov (Milk Inst., Vologda). *Molochnaya Prom.* **14**(3), 30-32(1953). A nomogram relating milk density, fat content, fat content in defatted milk, and the amount of defatted milk to be produced from a stated amount of whole milk is presented. (*Chem. Abs.* **47,** 5572)

Alimentary production of gallstones in hamsters. II. Frede Christensen, Henrik Dam, and Inge Prange (Polytech. Inst., Copenhagen). *Acta Physiol, Scand.* **27,** 315-320(1953). Gallstones of high cholesterol content occur in hamsters reared on a nearly fat-free and cholesterol-free diet. Vitamins A and D were administered in aqueous solution stabilized with Tween 80. It was found that gallstones may be formed without Tween 80. The addition of linoleic acid up to 20 mg. per day, or lard (2% of diet) does not protect against formation of gallstones. Neither does the addition of 0.2% cholic acid result in protection, and addition of 0.3% of cholesterol does not affect the results. Replacements of sucrose in the basic diet by 6% alfalfa gave no protection, but high degree of protection against gallstones was obtained by replacing the sugar with ground durra (seeds of *Sorghum vulgare*) or ground rolled oats and to a lesser degree by ground whole wheat. A study of blood cholesterol (total and free) in hamsters with and without gallstones revealed no relation between them. (*Chem. Abs.* **47,** 5501)

Rate of turnover of liver phosphatides in the rat given a diet rich in cholesterol, continuously and intermittently. Guy Clément, Éliane Le Breton, Marc Pascaud, and Maurice Tubiana. *Compt. rend.* **236,** 412-415(1953). A diet containing 5% cholesterol, given to rats of the Wistar strain weighing 180-200 g. for 10 months, resulted in a gross fatty infiltration of the liver. The rate of phosphatide turnover, as determined by P^{32}, was comparable to that observed by Perlman and Chaikoff (*Chem. Abs.* **33,** 8757) after feeding a high cholesterol diet for only 30 hours. In both instances cholesterol in the diet diminished the rate of turnover significantly. Returning the rats to a normal diet for periods of up to 35 days did not result in a normal phosphatide turnover in spite of a progressive reduction in liver steatosis. (*Chem. Abs.* **47,** 5502-5503)

The role of some enzymes from fish raw material in production of vitamin A. A. A. Dmitrovskiĭ (A. N. Bakh Biochem. Inst., Moscow). *Akad. Nauk S.S.S.R., Inst. Biokhim. im A. N. Bakh, Vitaminnye Resursy i Ispol'zovanie, Sbornik* 1, 266-277 (1951). The internal organs mass of many of the commercial fish (pike and *Lucioperca lucioperca*) carry sufficient proteolytic enzyme concentrations to make them useful materials as a source of such enzymes as an aid in isolation of vitamin A. The loss of vitamin B in such treatment is very low. However, the use of such enzymes causes development of high acidity and loss of vitamin A values in the material being treated: hence, for the present the method is not recommended. The lipolytic enzymes present in fish material are undesirable since they prevent proper storage of the material. Thermal treatment up to 80° appears to be the best method of inactivation of the lipase system. (*Chem. Abs.* **47**, 5630)

Alimentary competition of mother and child.; chronological sequences of needs. Raymond Jaquot (Lab. chimie nutrition, Bellevue, France). *Ann. nutrition et aliment.* **7**, 39-65 (1953). Toward the end of pregnancy the blood of the expectant mother becomes rich in lipides and cholesterol as well as in mineral P, but it is impoverished in vitamin C. Umbilical blood is richer than maternal blood in proteins. Thirty references. (*Chem. Abs.* **47**, 5499-5500)

The technology of shark-liver oil. I. Extraction, refining, and storage of therapeutic oils. C. C. John, P. V. Nair, and T. A. Ramakrishnan. *Bull. Central Research Inst. Univ. Travancore,* Trivandrum Ser. A, 1, 35-39 (1950). It is suggested that livers from known species of sharks be kept in separate lots because of differences in vitamin A content. The use of metal in pilot-plant extractions is discouraged because of proöxidant action. Destearination is best accomplished by holding the oils of 10° for a few hours and then raising the temperature to 23°, at which temperature the stearins can be removed by centrifugation. Alkali washing is essential in oils derived from livers on the verge of autolysis and improves edibility and palatability of the oils. Standardization should be effected by blending oils of differing vitamin A content. Stabilization is best effected by addition of 30 p.p.m. of Antoxyl preferably with tocopherols as synergists. In storage and bottling care should be taken to assure air- and light-tight conditions. (*Chem. Abs.* **47**, 5625-5626)

Content of vitamin A in fish of the Far East. I. Content of vitamin A in Far-Eastern cod, shark, and rays. I. V. Kizevetter and E. A. Lagovskaya (Pacific Sci. Research Inst. Fisheries and Oceanog., Vladivostok). *Akad. Nauk S.S.S.R., Inst. Biokhim. im. A. N. Bakha, Vitaminnye Resursy i Ispol'zovanie, Sbornik* **1**, 71-93 (1951). In the fish specimens examined vitamin A is found mainly in the liver with secondary deposits in the pyloric appendages. The female cod had a higher vitamin A content in the liver than did the male. Cod gave average values of vitamin A/g. of liver fat ranging from 80 to 15,860 international units (I. U.). The *Theragra chalcogramma* gave values from 1190 to 260,000 I. U. which is the most prolific supply source among the fish of this group. *Eleginus gracilis* is poor, its vitamin A level being 50-720. *Squalus acanthias* is a moderately good source: 50-19,480, and rays (Trygonidae) range from 110 to 60,940 I. U.

II. Vitamin A content in Pacific Ocean salmon family fish. *Ibid.* 93-112. In specimens of Oncorhynchus and Salvelinus fish the relative weight of the liver and its fat content decline with increase in the size of the fish. Thus the relative content of vitamin A also declines. Most of the vitamin is concentrated in the carcass tissues and a relatively small proportion is found in the liver and other organs. Females are more pronounced vitamin A carriers than the males. Their roe is relatively low in vitamin A. *Oncorhynchus nerka* is the most prolific source of the vitamin carrying most of it in the liver and gastrointestinal tract tissues.

III. Content of vitamin A in Far-Eastern flounders. *Ibid.* 113-128. The flounder family is characterized by progressively higher content of vitamin A with increased size of the fish. The richest source of the vitamin in this group is *Pleuronectes stellatus* whose vitamin A level may run as high as 7730 I. U./g. of liver tissue, particularly in the early fall. The flounders from cold water regions deposit larger proportions of vitamin A in the liver than do the warm water varieties.

IV. Content of vitamin A in the liver of goby fish and other species of marine fish. *Ibid.* 128-138. Cottida liver carries from 480 to 1770 I. U. of vitamin A/g. depending on the season (highest in March). Female *Pneumatophorus japonicus* accumulate 47,500-57,300 I. U. of the vitamin/kg. of body weight; most of the vitamin (72-3%) is located in the liver. *Pleurogrammus azonus* in locations off Kamchatka carries up to 56,600 I. U. of the vitamin/g. of liver tissue and up to 36,000 I. U./g. of intestinal tract tissue. The *Osmerus* genus carries about 2300 I. U./g. of liver fat, while the *Sebastodes* genus up to 12,600 I. U./g. of liver fat. Kamchatka crab (*Paralithodes comschatica*) liver contains 7-8% fat, which contains 130-140 I. U. of vitamin A/g. Other crab species are even poorer sources. (*Chem. Abs.* **47**, 5629)

Lipid composition of diabetic and nondiabetic coronary arteries. Knud Lundbaek and V. Posborg Petersen (Munic. Hosp., Aarhus, Denmark). *Acta Med. Scand.* **144**, 354-9 (1953). In patients with long-standing diabetes it is found that the arteries have a low Ca content while the cholesterol and total phospholipide content is not significantly affected. The arteries of diabetic patients have a higher cephalin but probably lower lecithin content than those from nondiabetics. (*Chem. Abs.* **47**, 5540)

Toxic liver dystrophy in swine. Anna Lisa Obel (Statens Veterinärmed Anst., Stockholm). *VI Nord. Veterinärmötet* **1951**, 40-57. In toxic liver dystrophy in swine, changes of the liver cells resemble in some respects the changes in rats lacking in S-containing amino acids and vitamin E. The dystrophy could be provoked by a diet of wheat starch 73, yeast 18, cod-liver oil 6, and minerals 3%. α-Tocopherol acetate (150 mg. twice a week) had no effect, but addition of 15% casein prevented liver damages. A high percentage of unsaturated fatty acids, and deficiency of S-containing amino acids and vitamin E had a deleterious effect. (*Chem. Abs.* **47**, 5504)

Content of vitamin A in the liver and other internal organs of commercial fish and porpoises of Baltic and Azov-Black Sea basins. I. Content of vitamin A in fish of Baltic basin. R. R. Perepletshik (All-Union Sci. Research Inst. Marine Fish Ind. and Oceanog., Moscow). *Akad. Nauk S.S.S.R., Inst. Biokhim. im. A. N. Bakha, Vitaminnye Resursy i Ispol'zovanie, Sbornik* 1, 139-158 (1951). The vitamin A content/g. of liver can be arranged in the following descending order of the various fish species from the Baltic Sea: *Coregonus lavaretus* (290-1500 I. U.), *Gadus morhua* (270-7100), *Lucioperca lucioperca* (480-2400), *Perca fluviatilis* (109-580), *Pleuronectes flesus* (50-317).

II. Content of vitamin A in fish of Azov-Black Sea basin. *Ibid.* 158-181. The highest vitamin A content among all fish in the Azov-Black Sea area is found in *Silurus glanis* (average 1050 I. U./g. of liver) and *Rhombus maeoticus* (1000); the others have the following average values: *Abramis brama* 170, *Lucioperca lucioperca* 480, *Cyrinus carpio* 550, *Acipenser gludenstadti* 260, *Huso huso* 230, *Acipenser stellatus* 230, *Esox lucius* 120, *Raja clavata* 240, *Trygon pastinata* 60, *Sarda sarda* 100, *Mugil auratus* 430, *Delphinus delphis* 200, (400 in body fat), *Tursiops tursio* 100. (*Chem. Abs.* **47**, 5629-5630)

Content of vitamin A in basic commercial fish and seal of Volga-Caspian Sea basin. V. V. Kolchev (All-Union Sci. Research Inst. Marine Fish Ind. and Oceanog., Moscow). *Akad. Nauk S.S.S.R., Inst. Biokhim. im. A. N. Bakha, Vitaminnye Resursy i Ispol'zovanie, Sbornik* 1, 182-206 (1951). The highest vitamin A level is found in *Huso huso:* 11,330 I. U./g. of intestinal fat and 7630 I. U./g. of liver fat. *Silurus glanis* liver contains 11,100 I. U./g. of fat, and the other fish range from 1500 to 3300 I. U./g. of fat. (*Chem. Abs.* **47**, 5630)

Vitamin A content of fish of Siberia. I. V. Kizevetter and E. A. Lagovskaya (Pacific Sci. Research Inst. Fisheries and Oceanog., Vladivostok). *Akad. Nauk S.S.S.R., Inst. Biokhim. im. A. N. Bakha, Vitaminnye Resursy i Ispol'zovanie, Sbornik* 1, 216-221 (1951). Examination of various sturgeon, salmon, carp, pike, and cod groups of fish showed that only the salmon family carries high levels of vitamin A (in the liver fat), and to 28,000 I. U./g. of liver fat is found during the late summer months. *Lota lota* species are a promising source despite low concentrations of the vitamin in the liver fat, the weight per kg. is appreciable (up to 19,560 I. U.) *Stenodus leucichthys* has the highest concentration (up to 28,000 I. U.) in the liver fat. (*Chem. Abs.* **47**, 5630)

Proteolytic and lipolytic properties of a strain of Torula rhodense in butter. Ernst Miklik (Hochschule, Vienna). *Milchwissenschaft* **8**, 23-26 (1953). Bacteriological studies combined with organoleptic tests on 3 samples of faulty butter showed that contamination with *Sarcoma lutea* and *Torula rhodense* resulted from contact with impure air. The yeast was shown to be responsible for the early manifestation of rancidity. A study of its proteolytic properties showed that in the presence but not in the absence of *Streptococcus lactis,* proteolysis of a meat extract, gelatin, skim milk, and agar medium took place, a phenomenon which was shown to be associated with the high acidity of a medium containing *S. lactis*. The optimum pH was found to be 5.8. Further tests on sterile artificial butter, prepared from sterile skim milk, and sterile butter oil confirmed the view that rancidity was due to the action of *Torula rhodense* in a medium made acid by the presence of lactic acid bacteria. It seems the intensified proteolysis brought about by an increase in acidity is related to an increased need for additional energy, and this is met by an increase in the lipolytic function of the organism. (*Chem. Abs.* 47, 5572)

Content of vitamin A in commercial fish of Enisei River and in the fat of Delphinapterus leucas. T. N. Mironova (Inst. Epideminol. and Microbiol., Krasnoyarsk). *Akad. Nauk S.S.S.R., Inst. Biokhim. im. A. N. Bakha, Vitaminnye Resursy i Ispol'zovanie, Sbornik* 1, 222-232(1951). High concentration of vitamin A is found in the liver fat of *Stenodus leucichthys* (about 90,000 I. U./g.), *Hicho taimen* (about 55,000), and *Coregonus autumnalis* (up to 6200 I. U.). Some 12 other species have very much lower vitamin content. The above mentioned species generally increase their vitamin concentration with age and size. *Delphinapterus leucas* carries up to 230 I. U./g. of liver fat. It was noted that the high vitamin A content of *S. leuchichthys* and *H. taimen* can cause difficulties when used as food (human or experimental animals) by producing vitamin A hypervitaminosis. (*Chem. Abs.* 47, 5630)

Norms for the chemical-biological evaluation of the nutrition of the domestic fowl. Nicanor Gálvez Morales. *Anales fac. vet. univ. Madrid y inst. invest. vet.* 4, 45-178(1952). With 60 Leghorn hens the digestible protein, fat, and carbohydrate/kg. fowl/day necessary were 4.44, 1.20, and 23.98 g., resp., for a maintenance ration and 6.17, 2.24, and 23.98 g., resp., for a production ration (27% egg laying). Other data are given on Ca and P requirements and coefficients of digestibility of *Phalaris canariensis* (canary seed). For fat the coefficient is 89.70%. (*Chem. Abs.* 47, 5503)

The nutritive value of milk products. I. Fresh milk. Lucie Randoin and Jean Causeret (Inst. natl. recherche aliment., Paris). *Bull. soc. sci. hyg. aliment.* 40, 223-255(1952). A review with 165 references. (*Chem. Abs.* 47, 5572)

• Drying Oils

Stuart A. Harrison, Abstractor

The use of phthalic alkyd resins in artistic painting. G. Balbi and S. Gagliardo. *Ind. Vernu* 6, 241(1952). While phthalic alkyds were not satisfactory substitutes for oils in pigment pastes because of the undesirable "spreading" they give to the brush stroke, they were very successful in glazing. Solutions of modified alkyds (55 and 65% drying oil) with cobalt, manganese, lead or even calcium driers, as such or blended with oils or hard resins, gave quick-drying, hard, glossy, and non-yellowing films. Pigments ground in such resins are excellent for the restoration of paintings. (*Chem. Abs.* 47, 5136)

Isomerization produced during catalytic heydrogenation of drying oils. G. N. Catravas. *Compt. rend.* 236, 716(1953). The migration of ethylenic bonds during the partial hydrogenation of linseed oil has been studied. In operating under atmospheric pressure and 175-180° and by using pure nickel (0.2% based on weight of oil) supported on diatomaceous earth as catalyst, a max. of 3.8% isomerization was attained in 20 minutes. Addition of nickel sulfate (corresponding to 1% sulfur) to the catalyst before its reduction gave a maximum of 9.8% isomerization in 30 minutes. (*Chem. Abs.* 47, 5696)

Alkyd modified latex paints. J. J. Clark. *Paint Oil Chem. Rev.* 116, No. 12, 20(1953). The effect of the addition of certain alkyds to butadiene-styrene copolymer-based latex paints is discussed. The addition of alkyds improves the following properties: (1) washability of dry film, (2) adhesion of films, (3) color stability, and (4) freeze-thaw stability of latex. Method of incorporating alkyd into latex is described.

Measurement of the drying time of varnishes based on Synresinate 314D. J. F. H. van Eijnsbergen. *Chem. peintures* 15, 406 (1952). The through-drying time and surface hardness after drying of a linseed oil (62% fatty acid)-pentaerythritol alkyd in admixture with metal napthenates, castor oil-alkyd bodied linseed oil, tung oil-alkyl phenolic resin varnish, chlorinated rubber, nitro cellulose, modified diphenyl propane resin and pentaerythritol-maleic resin were determined. Details are given. The best drier combination is 0.5% lead and .05% cobalt (*Chem. Abs.* 47, 5135)

The study of the weather resistance test of oil based paints. F. P. Filho. *Anais. Assoc. Quim. Brasil* 10, 301 (1951). Attempts made to correlate the effect of Weatherometer tests with those of outside weathering tests during several different periods were not successful, but 14 Weatherometer cycles did not exceed the effect of 90 days in Porto Allegre (*Chem. Abs.* 47, 5696).

New developments in driers for the paint industry. C. Gardner. *Official Digest Federation Paint and Varnish Production Clubs* No. 341, 350(1953); *Am. Paint J.* 37, No. 36, 72 (1953); *Paint Varnish Production* 43, No. 6, 38 (1953). A number of the rare earths make excellent driers, particularly for baking finishes. For example a solution of a 50-50 mixture of the napthenates of cerium and lanthanum is an excellent drier for white refrigerator enamels. Though zirconium salts alone have little drier activity, when they are used with a complex metal carrier, they become effective driers.

The effect of driers. K. Meier and K. Ohm. *Farbe u Lack* 59, 50(1953). The view is supported that drying oils take up oxygen to form hydroperoxides (exothermic) which in turn break down to hydroxy compounds, and active oxygen (endothermic). The metallic driers enter into the secondary reaction lowering the activation energy it requires. The effect of equivalent amounts of oil soluble peroxy compounds on oxygen absorption of linseed oil was studied. Of those studied chromic oxide had the strongest effect followed by oxidized linseed oil, acetyl peroxide, perbenzoic acid, benzoyl peroxide and hydrogen peroxide. The most reactive peroxy compounds were the most effective. The oxidation of diphenylamine with different peroxy combinations was followed colorimetrically. (*Chem. Abs.* 47, 5133)

Epoxide resins. R. N. Wheeler. *J. Oil and Colour Chemists' Association* 36, 305(1953). A general discussion of structure, properties and uses of epox resins is given.

High viscosity alkyd resins. *Paint, Oil Chem. Rev.* 116, No. 11, 14 (1953). Methods of preparing high viscosity alkyd resins are described. They include the following methods: (1) Use of a polyhydric alcohol of higher functionality than glycerine, e.g. pentaerythritol; (2) Use of maleic anhydride; (3) Use of bodied oils. Graphs showing the effect of the use of these materials to increase viscosity are given.

Polyhydric alcohols. *Paint, Oil Chem. Rev.* 116, No. 10, 12 (1953). This is the fourth in a series of review papers discussing the preparation and evaluation of coating materials.

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Oil modified alkyd resins from degummed soybean oil and monopentaerythritol. P. E. Marling and A. R. Hempel. *U. S. 2,637,707.* Degummed soybean oil can be used to prepare oil modified alkyds free of suspended matter by first reacting with a portion of substantially pure pentaerythritol (p.e.) in the presence of calcium hydroxide. After a short reaction period (20 minutes) the remainder of the p.e. is added and heating continued, at 480°F. for 25 minutes. The phthalic anhydride and maleic anhydride are added and the mixture heated at 450°F. for 3.5 hours. A small amount of triphenyl phosphite is added 18 minutes after the temperature reaches 450°F. The alkyd produced is clear, has a Gardner color of 8 and viscosity of U.

Process for pentaerythritol degummed soybean oil-modified alkyd resins. P. E. Marling and A. R. Hempel. *U. S. 2,637,708.* Similar to *U. S. 2,637,707.*

Hydrogenated phenolic resin esters. D. H. Wheeler. *U. S. 2,638,458.* A phenol formaldehyde resin or a substituted phenol-formaldehyde resin is hydrogenated to convert the aromatic rings into cyclohexyl rings. The resulting resin is esterified with the unsaturated acids from semi-drying oils. A resin oil is obtained which with drier gives films which dry quickly. The dried film is tough and alkali resistant.

Styrene modified alkyd resins. G. A. Griess and C. V. Strandskov. *U. S. 2,639,270.* Styrenated alkyds are prepared by first reacting the polyunsaturated fatty acids or oil with a mixture of styrene and α-methyl styrene. The reaction product is then converted to an alkyd by one of the conventional procedures. The styrene or α-methyl styrene may have one or two alkyl groups in the ring.

Styrene, alpha-methyl styrene, drying oil modified alkyd resins. G. A. Griess and C. V. Strandskov. *U. S. 2,639,271.* Similar to *U. S. 2,639,270.*

Styrene, alpha-methyl styrene, drying oil fatty acid interpolymers. G. A. Griess and A. S. Teot. *U. S. 2,639,272.* Drying oil fatty acids are interpolymerized with mixtures of styrene and alpha-methyl styrene by heating the mixture to about 150°C. in the presence of a small proportion of a peroxide such as benzoyl peroxide. The styrene or alpha methyl styrene may be substituted with one or two alkyl groups in the ring.

Drying oil. G. M. Mouchiroud. *Fr. 873,750.* Castor oil and other oils containing hydroxyl groups are dehydrated rapidly by passing a film of the oil containing a dehydration catalyst, e.g. 1% sulfuric acid, over a series of tubes heated to 300° and at 6-mm. pressure for 2-10 seconds. The product has an iodine value of 130 and dries within 3 hours. (*Chem. Abs.* **47**, 5698)

Waxes

R. L. Broadhead, Abstractor

Modern metal polishes. Milton A. Lesser. *Soap Sanit. Chemicals* **29**, No. 3, 157, 159, 161, 165, 171, 173(1953). A review, discussing polish requirements, chemical action, odor, and types of polishes with formulas. 26 references. (*Chem. Abs.* **47**, 4523)

The occurrence of tetracosane in certain natural sources. H. A. Schuette, M. Hanif Khan, and S. W. Nicksic (Univ. of Wisconsin, Madison). *J. Biol. Chem.* **200**, 319-24(1953); cf. *C.A.* **44**, 857i. Tetracosane (I) was identified in the unsaponifiable matter of ouricuri wax and oat oil; it provides an exception to the prevailing view that the paraffin hydrocarbons in most waxes and fatty oils contain an odd number of C atoms. Chromatography rather than the transition point is a dependable criterion for establishing the purity and the homogeneity of a hydrocarbon. Natural I or I synthesized from lauryl iodide and xylene in the presence of Na melt at 51.5-1.3°. (*Chem. Abs.* **47**, 3907)

Plant Wax. V. Conifer wax. Hisanori Watanabe (Fujisawa Pharm. Inds., Kyoto). *J. Pharm. Soc. Japan* **73**, 176-9(1953); cf. *C.A.* **46**, 5868i. Based on examination of saponification products the leaf-waxes of 38 coniferales are classified into two groups, I and II, respectively. I came from *Juniperus, Chamaecyparis, Thujopsis, Thuja, Cunninghamia, Cryptomeria, Taiwania, Pinus, Cedrus, Abies, Tsuga, Picea,* and *Torreya,* and II came from *Sciadopitys, Larix, Pseudolarix, Pseudotsuga, Cephalotaxus, Podocarpus,* and *Taxus.* I have a large ester number and the chief component consists of estolides of juniperic and sabinic acids, while the II does not contain these estolides as a main component or entirely lacks them. There is no instance that two groups are present in 1 genus. 1,12-Dodecanediol, 1,16-hexadecanediol, 10-nonacosanol, and myricyl alcohol were detected in unsaponifiable matter. (*Chem. Abs.* **47**, 4634)

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Water-resistant gypsum compositions. Wallace C. Riddell and Geo. B. Kirk (to Henry J. Kaiser Co.). *U. S. 2,604,411.* In forming a water-resistant gypsum product, such as wallboard, 0.5-2.0% of a wax in the form of a water emulsion is added to a water slurry of calcined gypsum along with 2-10% of an oil or tar, such as residual fuel oil, coal tar, and pine tar, or mixtures of these materials. Slack wax may be used, but microcrystalline wax is preferred. As emulsifying agents proteins, sulfonated oils or alcohols, starch, clay, and gums may be employed. The product absorbs 5-7% as much water as the product made without the use of the additions. Cf. *C.A.* **46**, 9824i; **47**, 844i. (*Chem. Abs.* **47**, 4060)

Weather-resistant concrete. Patrick J. Keating, Jr. (to Texas Co.). *U. S. 2,625,489.* An air-entraining agent for addition to portland cement is prepared by treating oxidized paraffin wax with NaOH to form an emulsion. From 0.005% to 0.014% wax emulsion, by weight of cement, is used in the concrete. Cf. *C.A.* **47**, 1913c. (*Chem. Abs.* **47**, 4578)

Dry carrier for fat-soluble vitamins. NOPCO Chemical Co. *British 681,930.* Superior stabilization of vitamin A in a dry carrier preparation was accomplished by melting 18.05 parts esparto wax (melting at 70-5°) and 8.02 parts hydrogenated fish oil (melting at 65°) at 80°. To this was added a mixture of vitamin A concentrate 5.42, polyoxyethylene sorbitan monopalmitate 9.71, wheat germ flour 17.6, butylated hydroxy anisole 0.36, and soybean lecithin, 0.89 part, all of which were preheated to 80°. By a centrifugal process, the hot liquid was transformed into small solid spheroidal particles which were dusted with 1 part wheat-germ flour for each 20 parts of particles. The product was used for stock and poultry feeds and for foods. *British 681,931.* A stable dry carrier of vitamin A was prepared by melting 22.5 parts microcrystalline wax (melting at 88-90°), mixing therewith fish-liver oil 30, ground expeller soybean meal 20, nordihydroguaiaretic acid 0.13, and soybean lecithin 0.33 part. Small spheroidal particles were formed by a centrifugal process, and 40 parts particles were mixed with 42 parts expeller soybean meal. Mixing of the product with a vitamin A-destroying mineral mixture for two months at 37° in contact with the atmosphere gave no loss in potency. (*Chem. Abs.* **47**, 4522)

Bleaching and hardening of waxes. Centre d'etudes pour l'industrie. *French 886,061.* The process consists of distillation in vacuo at 150-400° in the presence of a gas diluent or steam. (*Chem. Abs.* **47**, 4111c)

Waxes of greater hardness and absorbency. Centre d'etudes pour l'industrie. *French 896,787,* March 2, 1945. Animal or vegetable waxes (200 g.) are treated with 30-6 g. of a 50% NaOH solution for 7 hours at 160° at 15 lb./sq. in. pressure. After washing with dilute acid and water to neutrality, a hard wax is obtained which has greater absorbency for turpentine. (*Chem. Abs.* **47**, 4111)

Improved waxes. Centre d'etudes pour l'industrie. *French 897,018.* Plant or animal waxes are catalytically hydrogenated at 100-200° for 3-10 hours at 110-220 lb./sq. in. pressure in the presence of Ni, Ni-Cr, Ni-Cu on charcoal, pumice, or alumina carriers. The hydrogenated product is bleached by a charcoal treatment. (*Chem. Abs.* **47**, 4111d)

Protecting metals against corrosion. Standard francaise des petroles (J. Balvay and C. Jouandet, inventors). *French 977,348.* Hydrocarbon oils are mixed with 5-25%, preferably 5%, pentaerythrityl monoöleate, dioleate, or trioleate; triethanolamine naphthenate; monoethanolamine oleate, pentaerithrityl stearate, triethanolamine sulfonaphthenate, phenol, polyphenol, or amino phenols alone or mixed with Japan wax, lanolin, or wool fat, and the mixture is coated onto Fe, Cu, light metals, or their alloys, to protect them against corrosion, e.g. by sea water. (*Chem. Abs.* **47**, 3786)

Detergents

Lenore Petchaft, Abstractor

Hexachlorophene and D.C.M.X. as disinfectants for soaps. William S. Gump and Arthur R. Cade (Givaudan Corp., Delawanna, N. J.). *Manuf. Chemist* **24**, 143-6(1953). D.C.M.X. (2,4-dichloro-sym-m-xylenol) and G-11 have been evaluated in aqueous and soap solutions for their antibacterial action. In vitro and in vivo methods were used. It was found that while D.C.M.X. in aqueous media is as effective against *M. aureus* as G-11, and superior to it against *S. typhosa,* it is distinctly inferior to G-11 when added to soaps in small amounts. This is true for the bacteriostatic and bactericidal properties of soaps containing D.C.M.X. against *M. aureus* in vitro, as well as for their skin degerming effects when tested on humans.

Syntheses of nonionic surface-active agents. II. Koichi Isoda, Hiroshi Kishikawa, and Ryohei Oda (Kyoto Univ.). *J. Chem. Soc. Japan Ind. Chem. Sect.* **54**, 419-20(1951). Lauric acid monoethanolamide and diethanolamide, respectively, prepared from crude lauric acid have been condensed with ethylene oxide in various proportions at 130-140° and the surface tensions of aqueous solutions of the products are determined. Coconut oil and soybean oil have been transesterified with triethanolamine with anhydrous Na_2CO_3 as catalyst. The surface tension of the aqueous solutions of the products is recorded.

III. Transesterification between soybean oil, coconut oil, and pentaerythritol. *Ibid.* 474-5. Surface-active agents are made by transesterifying soybean and coconut oils with pentaerythritol and condensing the products with ethylene oxide by using an alkaline catalyst produced by adding Na. The surface tension and interfacial tension with C_6H_6 of aqueous solutions of the products are recorded. (*Chem. Abs.* **47**, 5703)

Tall oil in soap. Dr. Arthur Pollak. *Soap, Sanit. Chem.* **29**, No. 5, 42-5, 81 (1953). The advantages of using tall oil in soap are reviewed. Tall oil reacts completely and immediately with alkalies. Soaps of any neutrality can be made. There is no need for any purification steps such as salting out or graining out processes. There is no glycerine or impurities to be removed. Tall oil soaps are more soluble in water than those of tallow or coconut oil, and have good cleaning properties. Tall oil may be used in hard soaps, jelly soaps, liquid soaps, soap powders, disinfectants, and miscellaneous soap products. Formulations are given for these various products.