almost exactly twice that of the C_{20} chain, which is the longest fatty acid usually found in lard.

This packing theory suggests an explanation for the visible difference in the crystals of ordinary lard and rearranged lard. In general, the size of a crystal is related to its free surface energy, all other factors being equal. In a perfect crystal the free surface energy approximates zero. This value increases directly with the degree of imperfection of the molecular packing. Increased free surface energy decreases the ease with which a molecule can enter the crystal lattice. Therefore crystals which can attain the largest proportions possess relatively low free surface energy, and conversely those which grow with difficulty possess relatively higher free surface energy.

By inference, ordinary lard crystals must possess a relatively low free surface energy by virtue of their more homogenous close-packed structure. The imperfect packing of the rearranged-lard crystals indicates that they possess a somewhat higher free surface energy. Consequently, as has been observed, ordinary lard crystals grow to relatively large proportions whereas the crystals of rearranged lard remain relatively much smaller.

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ABSTRACTS . . . . R. A. Reiners, Editor

• Oils and Fats

Ralph W. Planck, Abstractor
Dorothy M. Rathmann, Abstractor
R. L. Broadhead, Abstractor

The development of the European crushing industry since World War II. Anon. *Oils & Oilseeds J.* **7**(1), 5-10(1954). A review showing that European oilseed imports (and crushing) have decreased since 1938 while oil imports have increased. Factors affecting the European oil industry are political controls, trade agreements, and increased crushing in Asiatic and African countries of the oilseeds produced in those countries.

Action of dry zinc chloride at elevated temperatures on cottonseed oil. E. P. Babin and V. G. Plyusnin. *Zhur. Priklad. Khim.* **27**, 463-5(1954). $ZnCl_2$ acts as a catalyst for oxidation of the oil at elevated temperatures as indicated by a rise in the acetyl no. on heating the oil to 240° in the presence of 10% $ZnCl_2$. The iodine value declines sharply while the saponification no. drops slightly in the course of 21-hr. treatment. (*C. A.* **48**, 7917)

Reconstructing glyceride oils. G. Barsky(E. F. Drew & Co., Inc.). *Brit. 706,562.* A mixture of glyceride oil, containing fatty acids of 6-10 C atoms, was allowed to react with fatty acids having 12-18 C atoms in the presence of 0.1-0.5% boric acid or Zn oxide under vacuum at temperatures ranging from 260-290°. The fatty acids, having 12-18 C atoms, displaced the fatty acids of the glyceride oils to yield products having properties similar to coconut oil and satisfactory for candy coatings and other confectionery uses. (*C. A.* **48**, 11820)

High iodine value dehydrated castor oil. K. K. Dole and V. R. Kestar. *Paintindia* **2**(1), 65(1952). Castor oil dehydrated in the presence of a specially active catalyst (unspecified), gave dehydrated castor oils with high molecular weight and iodine values of 172-175 as against the usual 148-153. (*C. A.* **48**, 7917)

The fat and water content of the edible part of the herring. C. H. Branes and R. Dietrich(Inst. Meeresforschung, Bremerhaven, Germany). *Fette u. Seifen* **55**, 533-541 (1953). After determining the water content, the fat content can be read from a graph.

Application of Neusal solution for the determination of fat in sweetened dairy products. Paul Demont(Sta. laitière, Grangeneuve-Fribourg, Switzerland). *Mitt. Lebensm. Hyg.* **45**, 104-8 (1954)(in French). The determination of fat in sweetened dairy products by using Gerber van Gulik's butyrometer is described. The composition of Neusal solution is the same as the solution proposed by Schulz, *et al.*, *C. A.* **46**, 5218. (*C. A.* **48**, 9576)

Wool grease and wool grease fatty acids, fatty alcohols, and soaps. Croda Ltd. and Edgar S. Lower. *Brit. 706,422.* Wool grease and wool grease fatty acids, fatty alcohols, and soaps, with a low color density were prepared by the addition of H_2O_2 (80-90% concentration by weight) to the wool grease products. The amounts of H_2O_2 used were about 5% by weight of the wool grease product. (*C. A.* **48**, 11820)

Some characteristics of refining and hydrogenation of rape oil. A. A. Kaminskiĭ. *Masloboĭno-Zhirovaya Prom.* **19**(3), 10-13 (1954). Refining of rapeseed oil by the use of acid-alkali and alkali methods is described. The procedures employed are essentially those of, resp., Zharski, *et al.* (*C. A.* **48**, 388) and Z. and Romanova (*C. A.* **48**, 8562). Owing to the moisture in rapeseed oil, the hydrogenation of oil refined by the acid-alkali method produces fat which is white in color, unless the sp. g. of the H_2SO_4 used is lowered to 1.76-1.64. This prevents the formation of a dark-green coloring matter from bound chlorophyll in rapeseed oil during its acid treatment. The hydrogenated fat becomes rose-colored. This color is readily removed, however, by active C introduced into the autoclave at 32-5° prior to completion of the process. With the alkali method the bound chlorophyll in rapeseed oil is subsequently absorbed by activated fuller's earth. (*C. A.* **48**, 9721)

Improvement of cottonseed-oil quality. A. M. Goldovskiĭ. *Masloboĭno-Zhirovaya Prom.* **19**(4), 8-10(1954). Certain factors (uniformly crushed-seed, particle size, moisture content during roasting, temperature and duration of roasting and pressing) which influence the formation and passage of bound and free gossypol, resp., into the oil are discussed. (*C. A.* **48**, 11816)

Theory, computation, and design of apparatus for the process of deodorizing oils. N. I. Gel'perin and E. N. Gel'perin. *Masloboĭno-Zhirovaya Prom.* **19**(4), 12-15(1954). Equations were developed to show the consumption of live steam by batch and continuous deodorizers. The latter have an economic advantage over the former and can be designed easily and efficiently. (*C. A.* **48**, 11816)

Fats. Imhausen & C., G. m. b. H., and Karl H. Imhausen. *Brit. 694,670.* A process for preparing a hard, brittle fat of relatively low m.p. is claimed. Refined fatty acids of palm kernel or vegetable oils are steam-distilled at 3 mm., and then hydrogenated over Ni at 180° and 5 atm. to an iodine value of 0.8-3.0. The purified, hydrogenated acids are then esterified with approximately the theoretical amount of glycerol at 200° and 3 mm. in the presence of a Zn-dust catalyst. The product is refined with alkali, decolorized, and deodorized to a snow-white, hard, brittle solid m. 35-6° and showing a conchoidal surface of fracture. Ordinary hydrogenated fats also m. about 35°, but they lack hardness and brittleness. (*C. A.* **48**, 9724)

Fats. Imhausen & Co., G. m. b. H. and Karl H. Imhausen. *Brit. 694,983.* An improvement of the process of *Brit, 694,970,* by which esterified material rather than free fatty acids are used in the hydrogenation step, affords better yields and reduces the loss of hydrogenation catalyst. In one example the original oil is first converted to fatty acids by lipolysis. After a lower-boiling fraction is removed, the remaining acids are re-esterified with glycerol and then hydrogenated. In the other example, the oil is hydrogenated first. The catalyst is then removed and the product split by lipolysis. The resulting fatty acid mixture is steam-distilled, and the lower-boiling acids are removed and then re-esterified. In each case the product is a white, hard, brittle solid m. about 35°. The materials are useful as replacements for cacao butter in foods and pharmaceuticals. (*C. A.* **48**, 9724)

The influence of higher temperatures on the acrolein content of some edible oils. Miroslav Hofman(I. ústav chem. lékarskou, Prague, Czech.). *Casopis Lékarrou Ceskych* **93**, 632-3(1954). Samples of refined sunflower and soybean oil were heated for 15 min. at various temperatures up to 360° and immediately poured into a bottle. Acrolein was estimated according to Korenman. (*C. A.* 30, 5151). Amounts in the range of 20-44 mg. % (sunflower) and 20-55 mg. % (soybean) were observed. Acrolein content was plotted against temperature. Two maxima were observed, at 160 and 220°. These small amounts of acrolein cannot be made responsible for the untoward effects of heated oils. (*C. A.* **48**, 11664-5)

The melting point of cocoa butter. C. L. Hinton(Brit. Food Mfg. Ind. Research Assoc., Leatherhead, England). *Rev. intern. chocolat.* **9**, 161-4(1954). To determine the melting point of cocoa butter: Fill a small porcelain crucible with Hg and place in a tall, narrow beaker. Place the beaker on a flat porcelain dish which can be heated with a Bunsen burner. Insert a thermometer into the Hg and clamp in position. Melt cocoa butter at 40° and filter at the same temperature. Hold at 15-20° for one hr. and at 23-24° overnight. Drop small scrapings of fat onto the Hg and raise the temperature at a rate of 1°/min. Determine incipient melting as the temperature at which the edges of the scrapings soften and scrapings collapse. Determine the true or complete melting point as the temperature at which the fat becomes clear. Cocoa fat reaches a stabilization of its melting point more rapidly if kept at —18° or 23° than if kept at 0° or 10°. (*C. A.* **48**, 11675)

Production of nickel formate. N. A. Kaminskii. *Masloboĭno-Zhirovaya Prom.* **19**(4), 31-2(1954). HCO_2Na (1,000 kg.) is purified by dissolving it in 1.2 cu. m. of hot water (90-92°) and mixing (at 80-90°) with 0.55 kg. of support and 2.85 kg. crystalline $NiSO_4$ per kg. of computed soda in solution. The precipitated impurities are filtered out and eluted with 3-100 ml. portions of hot water which were added to the filtrate. The filtrate, containing 250-550 g. per l. of HCO_2Na is mixed with support in a ratio of 3:1, and 400 kg. of crystalline $NiSO_4$ is added gradually. The resulting mixture, heated to 80-90° and aerated for 1-2 hrs., is diluted with 100-200 l. of cold water and filtered, preferably at 50°. The filtered out $Ni(HCO_2)_2$ is washed with 2 100-l. portions of water (45°), air-blasted, and then dried at 90-95°. The combined filtrate and washings are usually stored prior to use (for precipitation of Cu and Ni salts) in special tanks. K. claims that $Ni(HCO_2)_2$, after regeneration, permits hydrogenation of fats and oils at a lower temperature than usual and the manufacture of this catalyst is less hazardous than conventional methods. (*C. A.* **48**, 11816)

Filtration-extraction: a new commercial continuous solvent extraction process for extraction of oleaginous materials. B. S. Kulkarni(Osmania Univ., Hyderabad, India), A. V. Graci, Jr., H. L. E. Vix(Southern Utilization Research Br., U. S. Dept. of Agr., New Orleans, La.). *Oils & Oilseeds J.* **7**(3), 5-11(1954). The history and principles of this process are reviewed and its equipment and operation described with flow diagram and photographs. Cooked meal is slurried in solvent and fed to a continuous, horizontal, vacuum filter, where the meal is filtered and washed counter-currently with miscella and solvent.

Analysis of the endocarp from olives. M. de Mingo and J. M. Romero. *Rev. real acad. cienc. exact., fis. y mat. Madrid* **47**, 557-85(1953). Endocarps from olives, manzanilla variety, were extracted with ether yielding 8.16% lipide of iodine value 90. Hexahydroxystearic acid was found in the products of alkaline permanganate treatment. Fatty acid content was: saturated 15% (palmitic, myristic, stearic), oleic 75%, and linoleic acid 10%. Squalene and cholesterol were found but not isolated quantitatively. (*C. A.* **48**, 7812)

A note on the development of rancidity of butterfat in storage under different conditions. S. N. Mitra(West Bengal Public Health Lab., Calcutta). *J. Proc. Inst. Chem.* (India) **25**, 174-6 (1953). Development of rancidity in butter stored for 6 months was investigated. Butterfat did not turn rancid, even in presence of light and moisture, when air was excluded or if an inert gas was substituted for air. Where air was present all samples, regardless of storage conditions, turned rancid. Acidity did not increase appreciably regardless of storage conditions, and it was recommended that other tests be considered for ascertaining keeping quality. Conclusion was that air should be excluded from head space of storage containers. (*C. A.* **48**, 9574)

Relative viscosity as a purity test for mustard oil. S. N. Mitra and S. C. Roy(W. Bengal Public Health Lab., Calcutta). *Current Sci.*(India) **23**, 50-51(1954). The relative viscosity (compared to that of water) of mustard oil ranged from 60.2-63.0 (100 samples). Values for other oils were lower. It was concluded that mustard oil with a relative viscosity below 59.0 is of doubtful purity. (*C. A.* **48**, 7918)

Vacuum distillation of castor oil. I. II. M. Oureshi, T. V. Subba Rao, and M. A. Rahim Khan(Tata Oil Mills Co., Ltd., Bombay). *Paintindia* **2**(6), 13-16, 38-40; (7), 29-33(1952). Distillation of castor oil at 225-250° (500 mm.) gave 18% undecylinic acid, 17% heptaldehyde, and 60-65% residue. Uses for the products and factors affecting their yields are discussed.

Treatment for oilseeds. G. Pasch. *Spanish 204,645.* The seeds are heated in a vapor to 60° and then subjected to dielectric heating to remove their moisture rapidly and efficiently. The oil is removed immediately by pressing. The dielectric heating is done in vacuum to hold the 60° evaporation temperature. Wave lengths of 10-25 m. are used to produce the dielectric heating. (*C. A.* **48**, 9725)

Solvents permitted in the extraction of cocoa butter and methods of purification. M. Polonovski. *Bull. acad. natl. méd.*(Paris) **136**, 649-50(1952). Legally permitted solvents are petroleum ether, cyclohexane, $ClCH{:}CCl_2$, EtOH, *iso*-PrOH, and CS_2. Steps in purification are centrifuging, neutralization, and deodorization with superheated steam *in vacuo.* (*C. A.* **48**, 11728)

Spectrophotometric method for estimating synthesis of butyl oleate. C. V. Ramakrishnan(Bose Inst., Calcutta). *Experientia* **10**, 308(1954)(in English). Enzymic synthesis of butyl oleate was effected with acetone-dried lipase powder from castor seed, 0.005*M* butanol and 0.005*M* oleic acid in petroleum ether. Butyl oleate has its maximum absorption at 400-405 $m\mu$; the absorption is proportional to the concentration of butyl oleate. (*C. A.* **48**, 11525)

The value of cultivating Lupinus albus for fat and protein. H. Rüther(Inst. landw. Versuchs- u. Untersuchungwesen Halle-Lauchstadt, Germany). *Z. Acker- u. Pflanzenbau* **97**, 253-60 (1953). Two varieties of nonbitter white lupine which are more productive of fat and protein than field peas, beans, or soybeans, are described. Field studies on a variety of soil types showed yields in the seed of 270 kg. of fat and 300-2,000 kg. of protein per ha. (*C. A.* **48**, 9580)

Experiment on air-blasting cookers. A. N. Semenenko(2nd Oil Plant, Saratov). *Masloboĭno-Zhirovaya Prom.* **19**(4), 25-26 (1954). The efficiency of a battery of 6 cookers was increased 10-15% by passage of dry air through the cookers during processing of crushed seeds. This allowed moisture to be drawn off at lower temperatures, resulting in better quality of soybean cake and flour and lowering the acid no. of the oil. (*C. A.* **48**, 11817)

Primary refining of oil with production of phospholipide concentrate. A. G. Sergeev. *Masloboĭno-Zhirovaya Prom.* **19**(4), 10-11(1954). The apparatus for separating phospholipides from oil is described and shown in a diagram. (*C. A.* **48**, 11816)

Oil content of seeds and properties of oil from different varieties of oil-bearing flax. E. P. Trepachev. *Masloboĭno-Zhirovaya Prom.* **19**(3), 4-6(1954). The oil content of flax seeds and drying properties of the oil produced during the past 5-8 years in different provinces of the Soviet Union, as influenced by climatic, nutritional, biological, and hereditary (selection) factors are discussed. The observations indicate that, generally, yield of oil and the accumulation of unsaturated fatty acids in oil molecules improved with the moisture content of soil, availability of P and low mean temperature during the growing season, especially at the time of seed formation and ripening. The quality and yield of oil was also improved by the selective breeding of flax in the Ukraine and Northern Caucasus. In this case the plant produced seeds containing 45-8% oil of iodine value 185-9. Early planting of seeds and selection of high oil producing varieties of flax are recommended. (*C. A.* **48**, 9719)

Changes in technology of preparation of copper-nickel catalyst. A. V. Zaks and S. D. Liberman(Fat Combine, Odessa). *Masloboĭno-Zhirovaya Prom.* **19**(4), 27(1954). Quality of catalyst was improved by the addition of Cu and Ni sulfates to Na_2CO_3 solution to insure the uninterrupted precipitation of Cu and Ni salts from an alkaline medium. This process cut by 20-30% the expenditure of metals used in hydrogenation of oils. (*C. A.* **48**, 11816)

Soybeans are not in surplus. T. A. Hieronymus(Dept. Agricultural Economics, College of Agr., Univ. Illinois, Urbana, Ill.). *Soybean Digest* **15**(1), 10-11(1954). The relative and absolute consumption of cottonseed and soybean oils are discussed in terms of government support programs for the seeds and oils. Ways to develop the potentially large export market for soybean oil are outlined.

The rheology of fats: a review. G. W. Scott Blair(National Inst. for Res. in Dairying, Shinfield, Reading). *J. Sci. Food Agr.* **5**, 401-5(1954). The lack of quantitative information on the rheology of fats and the need for such data are discussed. The discussion is divided into brief sections on physiological considerations; empirical tests and fundamental considerations on the spreading properties of fats; the miscibility, creaming and shortness of fats; and interpretation of tests. 40 references.

Ricinoleic acid conversion process. V. E. Haury(half to Simco, Inc.). *U. S. 2,693,480.* Ricinoleic acid, esters or amides are heated with water and $Ca(OH)_2$ at 225° to 350°C. The products contain 2-octanone, 2-octanol, *omega*-hydroxydecanoic acid and sebacic acid.

Mono-N-fatty citramides. K. R. Eilar(General Mills, Inc.). *U. S. 2,693,490.* A process is described for the preparation of $MOOCCH_2C(OH)(COOM)CH_2CONR'R$ in which R is a C_{8-22} aliphatic hydrocarbon, R′ is H or R, and M is ammonium or alkali metal.

Process for the decomposition of unsaturated fatty acids. W. Stein and H. Hartmann(Henkel and Cie., G.m.b.H.). *U. S. 2,694,081.* Alkali metal salts of unsaturated higher fatty acids are heated with caustic alkalies in the presence of cadmium.

Method of continuously refining fatty oils with an inorganic acid. F. T. Palmqvist (Aktiebolaget Separator). *U. S. 2,694,082.* In a continuous process, a stream of oil is passed successively through (1) a decolorizing step of short duration wherein an inorganic acid is finely dispersed through the oil while the temperature is held lower than that which would cause substantial side reaction between oil and acid; (2) a step of longer duration wherein this mixture is passed through a quiescent zone so as to permit agglomeration of an acid sludge which may be partially removed by centrifugation; (3) addition of salt or weak acid to neutralize the remaining acid sludge and inorganic acid; and (4) centrifugation to remove neutralization products.

Apparatus for separating butterfat from milk. V. O. Goument. *U. S. 2,694,520.* Description of an apparatus which includes at least two centrifugal stages.

Fat-containing base for food products and method of making same. F. E. Robinson and W. F. Bronson(Wilson and Co., Inc.). *U. S. 2,694,643.* Fat particles are encased in a coating made of a homogeneous mixture of edible sugar and gelatin. The coating is soluble in cold water. The product is dry to the touch, free flowing, and readily dispersible.

Analytical control in oil refining. M. Naudet. *Revue Française des Corps Gras* **1**, 319-330(1954). A laboratory procedure is described for determining the material balance and the purity of the refined product from the alkali-refining of vegetable oils. A sample of not less than 2 grams of the unrefined oil is dissolved in 50 ml. of chloroform and the solution is passed through a column of 20 grams of "Prolabo" alumina completely wetted with chloroform. The column is eluted with 200 ml. of the solvent, the filtrate evaporated and the residue dried to constant weight. This residue represents the glycerides present in the oil. In order to determine the size of the sample to be used on the column, the free acidity of the oil is determined and 1 to 1.5% of the weight of the sample is added to this value to account for the other non-glycerides present. The sample should not contain more than 350 milligrams of total non-glycerides. For oils containing large quantities of non-glycerides the amounts of adsorbent and solvent must be increased in order that a sample of at least 2 grams may be taken. Oils containing carotenoids must be passed through a mixed adsorbent of activated carbon and alumina since the carotenoids inhibit the retention of non-glycerides. With drying oils it is essential that the separation on the column be effected in an atmosphere of nitrogen. In the same manner the glycerides are determined on the refined oil since any soaps present are held up on the column as are other non-glycerides. The entrained glycerides in the foots can be determined directly by dissolving a weighted sample of the cake in a mixture of petroleum ether and ethanol, neutralizing any free acids and adding sufficient water to dilute the alcohol to 50%. The glycerides remain in the petroleum ether layer and can be recovered therefrom. Other entrained fats such as those in the wash water from the refining can be determined by evaporating the water under vacuum, acidifying and separating the glycerides chromatographically. From the above procedures glyceride losses from entrainment and saponification of the oil during refining can be calculated. The purity of the product with respect to soaps and other non-glycerides also can be determined. Examples of the applications of such material balances to plant operations are discussed.

Research on hydrogenation inhibitors in the oil of olive husks. J. M. Moreno and F. R. Aberbe. *Oleagineux* **9**, 697-702(1954). Tests were conducted on three samples of oil obtained by extraction with three different solvents: carbon disulfide, trichlorethylene and petroleum ether. To separate the inhibitors a 60 gram sample of the oil was dissolved in 60 grams of petroleum ether (boiling range 30-60°C.) and added to a column of 85 grams of activated silica (activity greater than 2 according to the Brockmann method). The column was developed to remove unadsorbed material and then dried with a current of hydrogen. The adsorbent was added to a flask containing a 3 to 1 solution of methanol-ether, the mixture shaken, allowed to stand for 24 hours and filtered. The solvent was evaporated from the filtrate to recover the fraction containing practically all of the inhibitors while evaporation of the solvent from the petroleum ether eluate from the column gave a yellow oil. Hydrogenations were carried out on crude oil, and on the oil percolated through the column. The inhibiting effects of the fractions eluted by the methanol-ether solution were studied by adding portions of it to 50 gram samples of olive oil. The oil eluted from the columns with petroleum ether hydrogenated more rapidly than the crude oil. The inhibitor fraction was found to contain sulfur (coming chiefly from the solvent), oxidized substances, oxidation products, glycerine, monoglycerides, fatty acids and resins extracted mainly by trichloroethylene. Of the fatty acids only the volatile short chain compounds had significant inhibiting effect on the rate of hydrogenation. Glycerine was an effective inhibitor at lower concentrations than the volatile acids while sulfur showed the greatest inhibiting power.

The deodorization of fatty materials. P. Merat. *Revue Française des Corps Gras* 1, 396-414(1954). The fundamental principles, equipment and conditions used in the deodorization of vegetable oils to be used in edible products are reviewed.

Fish and whale oils. P. Crèac′h. *Oleagineux* **9**, 675-683(1954). The origin, general chemical characteristics including fatty acid composition, separation of the glycerides, development of acidity, changes resulting from oxidation during storage or as a result of enzymatic action and the use of antioxidants to prevent such changes are reviewed.

Study of the yields and losses in a solvent extraction factory. M. Helme. *Revue Française des Corps Gras* **1**, 305-318(1954). The determination of solvent losses in vegetable oil extraction is discussed. Sample calculations for the determination of the efficiency of cooling systems and losses of solvent in the air, oil, press cake and water are given. Losses due to equipment leakage are determined by difference.

New techniques of analytical chemistry. Applications to oil processing. J. P. Wolff. *Revue Française des Corps Gras* **1**, 331-338(1954). Recent advances in the analysis of vegetable oils generally have resulted from the application of physicochemical methods. The uses of chromatography, counter-current extraction, ultra-violet and infra-red spectrophotometry and polarography in the analysis of vegetable oils are discussed.

• Biology and Nutrition

F. A. Kummerow, Abstractor
Joseph McLaughlin, Jr., Abstractor

Dietary fat, work, and growth. A. B. L. Beznák(Univ. of Birmingham, England). *Experientia.* Suppl. 1, *Present Problems in Nutrition Research 1952*, 230-8(Pub. 1953). The growth of inactive rats on a low-vitamin B_1 diet is proportional to the fat content of the diet. When the fat is reduced to 3% growth becomes stunted. Forced exercise causes resumption of growth