$$t = [0.0158 + 0.0074/(1) + 0.0216/(1)(1)]/0.02$$

$$t = \frac{0.0448}{.02} = 2.24.$$

The choice of 2 or 3 is a decision that must be made by the sampler since t = 2 will yield a mean variance slightly larger than 0.02 and a t = 3, a mean variance slightly smaller than 0.02.

Conclusion

The following sampling scheme was decided upon. Three process units were to be selected at random each day. From each unit one random sample would be analyzed for T.O.B. The average of these three T.O.B. results would determine whether the process was adhering to specifications. This sampling scheme cost $8.10 per day; it guarantees that the variance of the mean $\leqslant 0.02$.

Note

1. Other refinements of sampling scheme determinations have been proposed. R. A. Fisher proposed the criterion: minimum cost (effort) per unit of information (3). Summaries and critical analyses of the various methods for the selection of optimum sampling plans can be found in an unpublished M.S. thesis by F. E. Free (4).
2. The experimental design suggested by the Fat Analysis Committee of the American Oil Chemists' Society for determining inter- and intralaboratory variation is this same "nested design." If one translates the elements of the design as follows: a) process units become laboratories; b) samples become laboratory technicians; and c) analyses remain the same, then the estimation of the variance components are obtained in a similar fashion shown below for the general case of "p" laboratories, "q" technicians in each lab, "n" analyses done on each test material.

Analysis of Variance

Source of variation	d.f.	s.s.[a]	m.s.[a]	E(m.s.)
Between laboratories	p-1			$\sigma_A^2 + n\sigma_T^2 + nq\sigma_L^2$
Between technicians within laboratories	p(q-1)			$\sigma_A^2 + n\sigma_T^2$
Between analyses within technicians within laboratories	pq(n-1)			σ_A^2

[a] Omitted for convenience.

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2. Cameron, S. M., Biometrics, *1*, 83–96 (1951).
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4. Free, F. E., "Optimum Allocation of Aliquots Within Routine Chemical Analyses," unpublished M.S. Thesis, N. C. State College Library, Raleigh, N. C., 1952.

[Received October 2, 1957]

ABSTRACTS . . . R. A. REINERS, Editor

ABSTRACTORS: Lenore Petschaft Africk, S. S. Chang, Sini'tiro Kawamura, F. A. Kummerow, Joseph McLaughlin Jr., and Dorothy M. Rathmann

• Oils and Fats

Protection of fats and oils from oxidation. Z. K. Lebedeva and A. G. Sergeev. *Masloboǐno-Zhirovaya Prom.* 23(9), 17–20 (1957). Factors responsible for the oxidative processes occurring during storage, clarification, filtration, and collection of refined oil, as well as the protective methods involved are discussed. (*C. A.* 52, 3365)

Continuous contact splitting of fat. M. P. Bespyatov, V. I. Polstyanoe, I. S. Vitsenko, P. N. Sukhobrusov, V. K. Shvedov, and Yu. A. Kulik (Polytech. Inst., Kharkov). *Masloboǐno-Zhirovaya Prom.* 23(9), 22–3 (1957). The amount of the fat split and glycerine content of water during a stepwise continuous contact splitting of fat were found to be the factors controlling the rate of the reaction and the efficiency of the process. From 96 to 97% of fat was hydrolyzed when fat split and glycerine content were maintained at 76–80 and 20–25%, 86–88 and 8–10%, 90–92 and 3–5%, 93–95 and 2% and 96–97 and 1% levels in the course of first, second, third, fourth and fifth splittings, respectively. (*C. A.* 52, 3365)

Iron in the copper-nickel catalyst. B. N. Tyutyunnikov and I. I. Novitskaya (Polytech. Inst., Kharkov). *Masloboǐno-Zhirovaya Prom.* 23(9), 21–2 (1957). With an increase in the iron content of copper-nickel catalyst from 3 to 10% the acid coefficient of hydrogenated fat increased from 0.4 to 0.7%, and the productivity of catalyst decreased from 43 to 34. (*C. A.* 52, 3365)

Trace elements in edible fats. V. Separation and determination of iron by means of ion-exchange resins. A. Vioque and M. del Pilar Villagrán (Inst. Grasa y sus Derivados, Seville). *Grasas y aceites* (Seville, Spain) **8**, 152–4 (1957). Trace amounts of iron in olive oils are determined by dissolving olive oils in anhydrous acetone (1:3) and passing the solution through a cation-exchange column (similar to Amberlite IR-1) which has been previously made to react with hydrogen ion and washed with water to neutrality. The iron is washed out with 4 *N* hydrochloric acid and determined colorimetrically. The velocity of 4 *N* hydrochloric acid should not exceed 0.5 milliliter per minute. In samples containing 1–16 parts per million of iron, 95–113% was recovered; this indicates that all the iron in olive oils was in an ionized form. (*C. A.* 52, 3365)

Dilatometry for the investigation of fats and fatlike substances. M. Kh. Gluzman and B. I. Dashevskaya (Sci. Research Chem.-Pharm. Inst., Kharkov). *Zhur. Priklad. Khim.* **30**, 1345–51 (1957). Dilatometric measurements were found useful in the investigation of fats. The coefficient of expansion at any one temperature can be determined, the melting point interval can be narrowed, and the tendency of 2-phase (liquid or solid) formation can be detected. (*C. A.* 52, 3365)

Peroxide values of oxidized linseed oil. M. Taniewski and L. Bulczyńska (Inst. Farb i Lakierów, Gliwice, Poland). *Przemyst Chem.* 13, 290–1 (1957). The highest amount of peroxides of linseed oil were formed at 60° when blowing a refined linseed oil with air. The optimum temperature for the decomposition of the above oxides was 80–100°. It was also found that at 20° the peroxides of linseed oil are unstable. (*C. A.* **52**, 3359)

Lipides in dental pulp. A. Todescan and W. da Silva Sasso (Univ. São Paulo). *Anais fac. farm. e odontol. univ. São Paulo* 13, 123–8 (1955). Lipide was found in human dental pulp and in the cytoplasm of the odontoblasts of 1-day old albino rats. The lipides contained fatty acids and neutral lipides but no phospholipides. It is believed that the odontoblast is the only element active in the metabolism of the lipides in the dental pulp. (*C. A.* **52**, 3076)

Rapid determination of serum lipide. III. Phosphatides (phospholipides). W. Weigel(Charité Hosp., Berlin). *Pharmazie* **12**, 612–13(1957). A simple method adaptable to routine performance is based on the separation of the phospholipides from the other lipide constituents of the blood serum by taking up in dimethyl ketone-calcium chloride solution, followed by a phospholipide fatty acid determination with formaldehyde, using photometric procedure. (*C. A.* **52**, 2997)

Fat hydrolysis and cheese flavor. I. Enzymes responsible for the hydrolysis. J. Stadhouders and H. Mulder(Agr. Univ., Wageningen). *Neth. Milk Dairy J.* **11**, 164–83(1957). Results from organoleptic examination and degree of fat hydrolysis measured by the acidity of the fat indicated free fatty acids as essential constituents of cheese flavor. Sources of lipases were investigated. (*C. A.* **52**, 3189)

Phospholipide content of sweet-cream butter. A. Godel. *Molochnaya Prom.* **18**(10), 36(1957). Butter made by batch and continuous processes, respectively, contained the following: lecithin, 0.22 and 0.24%; inorganic phosphorus as P_2O_5, 0.008 and 0.020%; phospholipides, 0.019 and 0.021%; and total phosphorus as P_2O_5, 0.032 and 0.050%. (*C.A.* **52**, 3189)

Seasonal and regional variations in the unsaturated acids of Alberta butterfat. F. W. Wood and W. Haab(Univ. Alberta, Edmonton). *Can. J. Animal Sci.* **37**, 1–7(1957). Monthly samples of butterfat taken during 1953-4 from creameries in Edmonton and Lethbridge showed that total unsaturated-acid content, as measured by iodine vaues, was higher in the Edmonton butterfats and reached a maximum in September at the end of the grazing season. Minimum values occurred in December. Maximum oleic acid occurrence did not coincide with the peak of the grazing season. Conjugated tetraenoic acids were present in all butterfats in trace amounts only (*C. A.* **52**, 3188)

Factors affecting quality of prepackaged meat. III. Chemical tests associated with organoleptic quality factors other than color. H. Broumand, C. O. Ball, and Elizabeth F. Stier(Dept. of Food Tech., Rutgers Univ., New Brunswick, N. J.). *Food Tech.* **12**, 159–63(1958). Free amino nitrogen, free acid of lean samples, peroxide value, free fatty acid and iodine value of fat samples were determined. A significant negative correlation between free fatty acid and flavor of fat samples was observed. Using the results of chemical analyses, performances of various films for packaging fresh meat were evaluated.

The aliphatic oil from anise seed (Pimpinella anisum). G. Rankov, D. Chobanov, and G. Zagorski(Chem. Inst. Bulgare Akad. Wiss., Sofia). *Compt. rend. acad. bulgare sci.* **10**, 185–8(1957) (in German). A dark-green, fluid, aliphatic oil was extracted from anise seed. The extraction process was described, and the oil (about 23.5% in the seed) was characterized as follows: n_D^{30} 1.4737, acid number 7.1, saponification number 185, iodine number (Kaufmann) 98.3, thiocyanogen number 77, hexabromide number 0, and Reichert-Meissel number 1.65. The total fatty-acid components were oleic 43.5, linoleic 25.0, petroselinic 17.5, and saturated fatty acids 14%. (*C.A.* **52**, 3370)

A continuous-action distillator of miscella from fish oil. V. P. Novikov. *Trudy Moskov Tekhnol. Inst. Ryknoe Prom. i Khoz.* **1945**, No. 6, 152–61. The equipment, distillation technique, and calculations for continuous recovery of oil from fish-oil miscella are described. Vacuum should be used without heating in the final stripping-off of the solvent. (*C.A.* **52**, 3369)

Stabilizing refined soybean, olive, and cottonseed oils with citric acid. M. Gimeno Villacampa(Inst. Grasa y sus Dervados, Seville). *Grasas y aceites* (Seville, Spain) **8**, 162–5(1957). The use of citric acid and its degradation products as antioxidants for oils is reviewed. (*C.A.* **52**, 3368)

Oils and fats in Japan. VII. Kurohamo liver oil. Tomotaro Tsuchiya, Osamu Okubo, and Takuji Endo(Govt. Chem. Ind. Research Inst., Tokyo). *Tokyo Kôgyô Shikensho Hôkoku* **52**, 275–6(1957). The liver oil of *Kurohamo or Synaphobrancus pinnatus* contained 10.00–17.61% of oil with density at 15° 0.9247–0.9269, n_D^{15} 1.4714–1.4754, acid value 2.85–4.05, saponification number 183.2–6.8, iodine number 94.7–101.0, unsaponification matter 2.63–4.69%, and vitamin A 19040–28160 I.U. From the oil after methylation and fractionation under ten millimeters of Hg were obtained highly unsaturated culpanodonic and (probably) moroctic acids, and saturated stearic and palmitic acids. (*C. A.* **52**, 3368)

Factors affecting linolenic and linoleic acid content of soybean oil. R. W. Howell and F. I. Collins(U. S. Regional Soybean Lab., Urbana, Ill.). *Agron. J.* **49**, 593–7(1957). Soybean oils from location and variety composites contained: linolenic acid 5–8.5 and linoleic acid 46–54%. Levels of both acids were closely but inversely correlated with temperature. Changes in environmental factors such as photoperiod, light intensity and quality, nitrogen, phosphorus, potassium, and sulfur nutrition, or the addition of manure or plant residues had little effect on the levels of the two fatty acids. (C. A. **52**, 3368)

Adsorption properties of trass from deposits near Kârdzali, Bulgaria. D. Mirev and St. Kuyumdzhiev. *Compt. rend. acad. bulgare sci.* **10**(2), 145–8(1957). The trass was activated by heating to 400° and then digesting in 0.5 *N* hydrochloric acid on a water bath for 4 hours. It is suitable for bleaching cottonseed, rape, and sunflower oils. (*C. A.* **52**, 3368)

Rapid method for determination of oil in seeds, cake, grist, and hulls. A. Ya. Naab(Fat-Oil Combine, Fergana). *Masloboĭno-Zhirovaya Prom.* **23**(9), 16–17(1957). The time required for the solvent-extraction of seeds, cake, grist, and hulls was reduced from twelve to two hours, from four to one hour, from four to one half hour, and six to one half hour, respectively, when the pulverized sample was first moistened with a volatile solvent and then heated at 100–105° for fifteen minutes prior to extraction. The solvent absorbed by the cells expands upon heating and breaks the cell wall; this facilitates the extraction process. Likewise, the passage of air at 115–120° through oil in a specially designed apparatus for 5–10 minutes resulted in the reduction of the total time required for determination of oil to three hours fifteen minutes for seeds, two hours thirty minutes for the cake, and one hour thirty minutes for both the grist and hulls. The modified methods were recommended for the use in the cottonseed-oil mills by the All Union Scientific Research Instiute for Fats. (*C. A.* **52**, 3368)

Examination of vegetable oils by infrared absorption. J. Hires and János Balog(Tudományegyetem Álatalános Fiz.-Kém. Intézete, Szeged, Hung.). *Magyar Kém. Folyóirat* **60**, 50–4 (1954). Components of vegetable oil mixtures were determined by infrared absorption on the basis of Beer's law according to which the total absorption equals the sum of the individual components' absorption provided there is no chemical reaction. The background absorption was hitherto considered to be linear; however, it is preferable to consider it as a function of the wavelength. Thus, it is necessary to know the extinctions of the components having established more than one component in a mixture by extending the primary-line method. (*C. A.* **52**, 3367)

Storage of oil cake from expellers prior to extraction. A. A. Lesyuis and N. P. Kovalenko. *Masloboĭno-Zhirovaya Prom.* **23**(9), 13–14(1957). The quality of cake with high oil content was affected but slightly when the temperature of the cake during prolonged storage was maintained at 40–45°. (*C. A.* **52**, 3367)

Storage of oil cake prior to extraction. F. A. Vishnepol'skaya. *Masloboĭno-Zhirovaya Prom.* **23**(9), 10–12(1957). Certain changes in the physical-chemical properties of oil cake and oil as influenced by the processing and storage conditions are reviewed (*C. A.* **52**, 3367)

Effect of refining of the infrared spectrum of olive oil. Federico Minutilli(Univ. Rome). *Rass. chim. per chim. e ind.* **9**(4), 13–15(1957). The hexane extract of olive pulp (containing a high percentage of free acids) was treated with glycerol and subsequently neutralized with sodium hydroxide, decolorized, and deodorized. The only change produced on the infrared absorption curve was disappearance of the maximum at 5.85 and 10.72 microns (free acids) and intensification of the maximum of 5.73 microns (ester carbonyl). (*C. A.* **52**, 3367)

Investigation of ramie-seed oil (Boehmeria mivea). II. Changes in the oil during ripening and storage of the seeds. As. Popov and St. Ivanov. *Compt. rend. acad. bulgare sci.* **10**, 221–4 (1957). Changes in the oil of ramie seed were studied during ripening of the seeds, at the time of harvest, and after storage. The acid numbed decreased gradually during ripening, but was still fairly high (22.8) at harvest. During storage it decreased initially and then rapidly increased. The iodine number increased during ripening, reached a maximum after two months of storage, and then slowly decreased. The changes were attributed to lipase and lipoxidase activities. (*C. A.* **52**, 3367)

Oil from seeds of Xanthium. As. Popov and St. Ivanov. *Compt. rend. acad. bulgare sci.* **10**, 229–32(1957). Oils from the seeds of *Xanthium strumarium, Xanthium spinosium,* and *Xanthium italicum* were studied and data were recorded for their index of refraction, acid number, saponification number, iodine number, thiocyanogen number, hexabromide number, nonsaponifiable matter, linoleic acid, oleic acid, and saturated acids. Results were, respectively: iodine number 138.9, 140.0, 140.6; saturated acids 3.8, 3.4, 4.6; oleic acid 28.0, 26.5, 24.5; and linoleic acid 63.3, 64.6, 65.5. No linolenic acid or other unsaturated acids were found; thus these oils belonged to the semidrying group. (*C. A.* 52, 3367)

Effect of refining on ultraviolet absorption of olive oil. A. Foschini and F. Minutilli (Univ. Rome). *Rass. chim. per chim. e ind.* 9(4), 10–12(1957). The following refining operations cause a progressively higher general absorption level, in this order: deodorizing with steam at 100 and 265°, decolorizing with carbon and activated clay. Concomitantly, the 269 millimicrons peak, attributed to a conjugated triene group, becomes more prominent. The absorption curve is not significantly affected by the carbon disulphide extraction process, sulphuric acid treatment, and deacidification. (*C. A.* **52**, 3367)

Physical chemical studies on ground olive pastes. V. Affinities between solid and liquid phases. J. M. Martínez Moreno, C. Gómez Herrera, and C. Janer del Valle (Inst Grasa y sus Derivodos, Seville). *Grasas y aceites* (Seville, Spain) **8**, 155–61 (1957). The ease of separation of oil from ground olive pastes is increased by making the solids in the paste more hydrophilic. This can be done by treatment with enzymes. (*C. A.* **52**, 3367)

Physical properties of common waxes. T. C. Patton (Baker Castor Oil Co., New York, N.Y.). *Soap Chem. Specialties* **33**(12), 140–1, 275(1957). A compilation of physical properties of common waxes is presented. Test procedures used for obtaining these data are described. (*C. A.* **52**, 3369)

Modification of retamo wax. S. M. Leppert and C. F. Duran. *Ind. y quím.* (Buenos Aires) **18**, 223–5(1957). Modification of retamo wax to render it more easily emulsifiable is described. This operation can be done in one of three ways: (a) esterification with a fatty alcohol, or compound containing alcoholic groups, by using a catalyst, (b) heating the wax alone with a catalyst, or (c) heating the wax alone to a higher temperature without a catalyst. (*C. A.* **52**, 3369)

Drying fish and beef prior to solvent extraction. L. K. Arnold and Pong R. Hsia (Iowa Engineering Experiment Station, Iowa State College, Ames, Iowa). *J. Agr. and Food Chem.* **6**, 231–232(1958). The fat in fresh meat, such as beef or fish, containing a normal amount of moisture is extracted very slowly by solvents. Both fresh beef and fish were freeze dried and solvent extracted in glass, extraction-rate apparatus at four temperatures. Ethyl alcohol dehydrated beef was similarly extracted. The meat dehydrated, by both freeze drying and ethyl alcohol, extracted much more readily than either fresh meat or meat dried in a conventional laboratory drying oven.

A new synthesis of unsaturated acids. I. α, β-Acetylenic acids. L. A. Carpino (Department of Chem., University of Massachusetts). *J. Am. Chem. Soc.* **80**, 599–601(1958). A new synthesis of α,β-acetylenic acids is described which involves conversion of a β-keto ester (or alternatively an α, β-olefinic acid) to the corresponding pyrazolone, then by halogenation and treatment of the resultant 4,4-dihalopyrazolone with dilute aqueous alkali. The reaction was examined initially as a possible route to cyclopropenones.

II. α, β-olefinic acids. *Ibid.*, 601–604. A new synthesis of α, β-olefinic acids is described which involves treatment of a 4-substituted-4-halo-2-pyrazolin-5-one with aqueous sodium hydroxide. While the yield of mixed acids is not exceedingly high (40–65%), the reaction promises to be useful since the labile isomer of the *cis, trans* pair predominates in the mixture. A simple method of separating the isomeric acids, fractional extraction with sodium bicarbonate solution, is described.

Thermal diffusion fractionation of industrial fat and oil derivatives. C. W. Seelbach and F. W. Quackenbush (Dept. of Biochemistry, Purdue University, Lafayette, Ind.). *Ind. Eng. Chem.* **50**, 353–358(1958). Liquid phase thermal diffusion was investigated for separating mixtures of industrial materials derived from natural fats and oils. Mixtures of acids, esters, alcohols, amines, nitriles, and related materials were studied. Fractionations resulted with mixtures of n-alkyl fatty acids, resin and fatty acids, polybasic acid esters, polyol esters, or fatty acids and polyol esters. Polymeric alcohols including carbohydrates were concentrated in aqueous solution. Mixtures of aliphatic esters, alcohols, amines, or nitriles did not separate. The technique seemed promising for polyol ester fractionation, as fully esterified esters of higher molecular weight concentrated in the overhead fraction. Molecules with functional groups tending to associate resisted separation from other associative molecules but were susceptible to separation from nonassociative molecules.

Some factors influencing the efficiency of gas-liquid partition chromatography columns. W. J. de Wet and V. Pretorius (Univ. Pretoria, Pretoria, South Africa). *Anal. Chem.* **30**, 325(1958). A study has been made of effect of following parameters on efficiency of a gas-liquid partition chromatographic column: nature and velocity of carrier gas, column temperature, particle size of solid support, density of packing and amount of liquid phase used. Results agree well with rate theory of van Deemter, Zuiderweg, and Klinkenberg.

''Ajonjoll'' (sesame) oil. F. Mazuelos Vela. *Grasas y Aceites* **8**, 267–8(1957). A brief report on production and properties of this oil.

Natural antioxidants in the leaves from olive tree (Olea Europea L.). A. Vazquez Roncero and F. Mazuelos Vela. *Grasas y Aceites* **8**, 247–9(1957). Addition of leaves to the olives during the milling process improves the resistance to rancidity of the extracted oil. Several extracts were prepared from the leaves by solvent extraction and they were fractionated by chromatography on a silica gel column. The activity of the extracts was tested by addition to the samples of oil and determination of their stability by the Swift test.

Refining of Spanish cottonseed oils. I. Their behavior during neutralization and decoloration. R. de Castro Ramos and J. M. R. de la Barbolla y Alcala. *Grasas y Aceites* **8**, 250–7(1957). This is the first of a series of papers on the behavior of Spanish cottonseed oils in the refining process. The neutralization loss and the effect thereon of several variables, such as concentration and excess of soda lye, velocity of stirring, etc. are measured. Data are also given for the color of neutralized and decolorized oils using the Lovibond Tintometer. Relationships between free acidity of the crude oil and color of the neutralized oil, and between colors before and after decoloration of the neutral oil were determined.

Organoleptic tests as auxiliary means for research. II. Method for the analysis and report of differences. R. Gutierrez Gonzalez-Quijano. *Grasas y Aceites* **8**, 269–276(1957). The introduction to the subject made in the first paper of this series is continued here with a description of the several types of organoleptic test which are commonly used. A schematic outline of the procedure followed is given.

Ethanol: a potential solvent for the extraction of vegetable oils. R. K. Rao and L. K. Arnold (Iowa Engr. Expt. Station, Iowa State College, Ames, Iowa). *Soybean Digest* **18**(5), 22–3 (1958). The advantages and disadvantages of using ethanol for extraction of oilseeds are discussed.

Dairy products. *J. Assoc. Official Agr. Chemists* **41**, 40-2(1958). The first action method is described in detail for determination of sterol acetate as a means of detecting vegetable fats or oils in butterfat. Revisions are reported in the official method for the chromatographic determination of butyric acid in butterfat.

Dairy products. F. A. Vorhes, Jr. (Food & Drug Admin., Washington 25, D.C.), A. H. Robertson and S. Alfend. *J. Assoc. Official Agr. Chemists* 41, 23–4(1958). The report of Subcommittee C includes recommendations of referees concerning methods for ice cream and frozen desserts, butterfat, milk and cheese.

Oils, fats and waxes. *Ibid.*, 27. Recommendations are made concerning methods for peanut oil, antioxidants and color in oleomargarine.

Eggs and egg products. *J. Assoc. Official Agr. Chemists* **41**, 42(1958). A first action method for the determination of carotene color in egg products is described in detail.

Nutritional adjuncts. *J. Assoc. Official Agr. Chemists* **41**, 57-9 (1958). A new first action method for the determination of vitamin A in mixed feeds is described in detail.

A review of water-insoluble fatty acids (WIA) in cream and butter. F. Hillig (Div. Food, Food & Frug Admin., Dept. Health, Education & Welfare, Washington 25, D. C.). *J. Assoc. Official Agr. Chemists* 41, 151-9(1958). This topic is reviewed under the following headings: authentic churns of butter, progressive decomposition studies, cultured cream, factors affecting quantity of WIA in cream, rapid method for estimating WIA, criticism of the WIA method, effect of feed on WIA in cream, effect of neutralization of cream on WIA and butyric acid, butter manufactured by the ''continuous process'', influence of the type of separation on WIA, storage of butter, and WIA in commercial butter. 45 references.

Hectograph composition. W. G. Drautz (General Aniline & Film Corp.). *U. S. 2,824,812.* The preferred hectograph ink vehicle consists essentially of a mixture of oils and waxes of which about 20 to 35% by weight consists of sugar cane wax having a melting point of 160° to 185° F.

Refining triglyceride oils. G. C. Cavanagh(Ranchers Cotton Oil). *U. S. 2,824,885.* A process is described for removing traces of soapstock from alkali refined oil miscella by a treatment with dilute aqueous acid.

Branched-chain fatty acids. A. G. Ruhrchemie. *Brit. 785,296.* Intermediate fractions of narrow boiling range containing branched-chain primary alcohols and saturated hydrocarbons from which the alcohols cannot be distilled and obtained from the production of primary alcohols by the catalytic addition of carbon monoxide and hydrogen to mixtures of oelfins are subjected to treatment with a molten alkali metal hydroxide at superatmospheric pressure at 250-350°. The hydrocarbons are separated by distillation, and the molten oxygen-containing product is injected with water under superatmospheric pressure with agitation to yield a paste-like mass of soap. The mass is dissolved in water, and the solution is treated with a mineral acid to release branched-chain fatty acids suitable for commercial uses. (*C. A.* **52**, 3373)

Separation of fats from water-soluble and gel-forming albuminous- and fat-containing plant or animal products. (K. Nerger and V. Jessen). *Ger. 929,169.* When the rind is separated from fatty material, e.g., lard, it is necessary to remove adherent fat to prevent rancidity or mold formation. Solvent extraction is too expensive, and treatment with hot water or dilute salt solutions results in extraction of undesirable albuminous material which may cause gelation of the extracting solution. If the extraction is carried out with concentrated salt solutions, however, the solubility of the albuminous matter is sharply reduced. (*C. A.* **52**, 3372)

Wax composed mainly of fatty acid amides. Shunji Aoki, Tadahei Hinaji, Tadashi Itokawa, Yoshihide Nakaya, and Kazumi Susuki(Nippon Hydrogen Industries Co.). *Japan. 640('57).* Commercial stearic acid (20 kilograms), acid number 200.9, melting point 60°, was treated at 180° with ammonia for six hours at 0.8 liter per second to obtain an amide with acid number 43.2; this was treated with 400 grams calcium oxide and with ammonia at 100-40° for two hours to give wax composed of the amide and calcium stearate, acid number 0, penetration 10°. (*C. A.* **52**, 3374)

Ibid. Japan. 641('57). Hydrogenated oil (20 kilograms), acid number 10, melting point 52°, and 10 kilograms liquid ammonia was heated in a closed container for eight hours at 100°. The by-product glycerin was washed out with water. The residue was suspended in water, treated with 200 grams calcium hydroxide in 500 grams water, and the product dried to obtain a wax composed of the amide and calcium soap, melting point 92-3°, penetration 20°. (*C. A.* **52**, 3374)

Dehydrated castor oil. Jiro Yanagisawa and Ikuo Sugihara (Ito Oil Manufg. Co.). *Japan. 778('57).* Castor oil (450 kilograms) is heated in a stainless-steel kettle with 8 kilograms of 7 mesh sodium sulfate-sodium acid sulfate (51.6:49.4) catalyst for three hours at 200-50° with removal of water to give dehydrated castor oil. (*C. A.* **52**, 3363)

Cacao butter-like product. T. Takatsuki. *Japan 779('57).* Palm-kernel oil (100 grams) is dissolved in 300 grams methyl-ethyl ketone, the solution cooled to 8° at the rate of one degree per minute, the crystalline deposit filtered off, and washed with one kilogram methyl-ethyl ketone to give 28.5 grams of a product melting point 33.5-6°, iodine number 5.61. (*C. A.* **52**, 3199)

Emulsified oil. Minaya Shimizu. *Japan. 1534('57).* A transparent mixture composed of Turkey-red oil 20, fluid paraffin 80, nonionic surface-active agent 8, and fatty acid ester of glycerol or polyglycerol is mixed with a suitable amount of water to make a stable emulsion. (*C. A.* **52**, 3373)

FATTY ACID DERIVATIVES

Synthesis of unsaturated α,β-diglycerides. I. D-α-,β-diolein and L-α-,β-diolein. Erich Baer and DMytro Buchnea(Banting and Best Department of Medical Research, Univ. of Toronto, Toronto, Ontario, Canada). *J. Biol. Chem.* **230**, 447-456 (1958). A procedure for the synthesis of D-and L-α, β-diolein of assured structural and optical purity has been developed, consisting of the following sequence of reactions: glyceryl-α-benzyl ether→α,β-diolein benzyl ether→α,β-(bis-9, 10-*cis*-dibromo) distearin benzyl ether→α,β-(bis-9,10-*cis*-dibromo) distearin→α,β-diolein, or an alternative one in which the preparation of α, β-diolein benzyl ether is omitted. D- and L-α, β-(bis-9,10-*cis*-dibromo) distearins, both intermediates in the snythesis of D and L-α, β-diolein, are the first diglycerides of established structure and configuration to contain halo fatty acids.

Infrared identification of some sulfur derivatives of long-chain fatty acids. Heino Susi, N. H. Koenig, W. E. Parker and Daniel Swern(U. S. Depart. of Agriculture, Philadelphia 18, Pa.). *Anal. Chem.* **30**, 443(1958). Infrared absorption spectra of some long-chain fatty acid derivatives containing sulfide, sulfoxide, and sulfone groups have been studied to determine effects of such substitutions on characteristic bands of fatty acids. Closely related sulfur derivatives of fatty acids can be distinguished by studying the 1350-1180-cm.$^{-1}$ region of solid-state spectra.

The molecular structure in surface films of saturated monoglycerides on water as related to three-dimensional states. D. R. Merker and B. F. Daubert(Depart. of Chemistry, University of Pittsburgh, Pittsburgh, Pa.). *J. Am. Chem. Soc.* **80**, 516–519(1958). The relationship of the molecular structure in monolayers of saturated 1- and 2-monoglycerides to three-dimensional states is discussed. Cross-sectional areas per molecule were calculated from density and X-ray data for the three-dimensional crystals and hypothetical liquid crystals. The areas for the latter were in agreement with the limiting areas obtained for the liquid condensed state of the monolayers. A correlation was found between the stabilities of the condensed monolayers and the stabilities of the three-dimensional crystals. The results indicate that the orientation of the molecules in the condensed monolayers approximates the orientation in the anhydrous three-dimensional crystals.

Elaidinization of unsaturated fatty acids. G. Rankov, A. Iovchev and N. Goranov(Chem. Inst. Bulgare Akad. Wiss., Sofia). *Compt. rend. acad. bulgare sci.* **10**, 129–32(1957). Experiments showed that elaidinization by the use of sodium pyrosulfite depends upon decomposition at 220-5°, according to the equation $2Na_2S_2O_5 \rightarrow 2Na_2SO_4 + SO_2 + S$, to form elemental sulfur as the elaidinization catalyst. Direct use of sulfur rather than sodium pyrosulfite is cheaper, the process can be carried out in a shorter time in an open vessel, and the product is not as dark and contains no sodium sulfate. Other compounds such as ammonium pentasulfide effect elaidinization because of thermal decomposition to sulfur. (*C. A.* **52**, 3366)

Elaidinization of oleic acid with alkyl nitrites. G. Rankov and As. Popov(Chem. Inst. Bulgare Akad. Wiss., Sofia). *Compt. rend. acad. bulgare sci.* **10**, 189–91(1957). Elaidinization of oleic acid in the presence of ethyl, propyl, iso-propyl, butyl, iso-butyl, amyl, and iso-amyl nitrite was studied. Oleic acid was treated with equal quantities by weight and also with equimolecular quantities of the nitrites in a closed vessel at room temperature for 48 hours, and then held under vacuum at 40-50° to constant weight. Iso-propyl nitrite had the strongest elaidinizing effect, the iso-alkyl nitrites were more effective than the normal nitrites. Increasing molecular weight decreased the effects. (*C. A.* **52**, 3365)

Micellar dispersion of α-monoglycerides in benzene and chlorobenzene. P. Debye and W. Prins(Dept. Chemistry, Cornell Univ., Ithaca, N. Y.). *J. Colloid Sci.* **13**, 86–98(1958). The α-monoglycerides of normal saturated C_{10}, C_{12}, C_{14}, C_{16} and C_{18} fatty acids were prepared. Light scattering measurements show that these compounds form small micelles in benzene and chlorobenzene but in chloroform they exhibit molecular dispersion. Small amounts of impurities (free fatty acid or free glycerol) enhance the scattering. The systems are not sensitive to traces of water. Infrared spectra indicate intermolecular hydrogen bonding in the micelles in benzene and intramolecular bonding in chloroform. Micellar size decreases with increasing chain length. Micelles are smaller in chlorobenzene than in benzene.

Corrosion inhibitor. F. Ross and C. Mellick(Dearborn Chemical Co.). *U. S. 2,824,782.* A packaging material for inhibiting rusting and corrosion of metallic articles is prepared from an inert porous solid carrier and an acid salt having the formula:

$$RCOOH—RCOOM$$

wherein M is an alkali metal and each RCO is a long chain fatty acyl group in one of which R is C_5 to C_{11} and in the other R is C_5 to C_{17}.

Textile lubricating compositions. H. F. Leupold and C. H. Lighthipe(Nopco Chemical Co.). *U. S. 2,824,832.* A textile lubricating composition is a blend containing (1) 10 to 35% by wt. of a blown semi-drying or drying oil, (2) 45 to 65% of a mineral oil having a viscosity of about 50 to 300 Saybolt seconds at 100°F., (3) 8 to 25% of a product obtained by condensing an alkyl phenol with ethylene oxide, (4) 3 to 17% of a fatty material selected from the group of C_8 to C_{22} fatty acids and mixtures of fatty acids with their lower alkyl esters.

Unsaturated alcohols. N. V. Olieraffinaderij "Zuillen." *Dutch 83,379.* Unsaturated fatty acids, e.g., oleic acid, are reduced to the corresponding alcohols with hydrogen under pressure in the presence of a catalyst consisting of a mixture of soaps of copper and cadmium (60–90% copper soaps and 10–40% cadmium soaps). With these catalysts, the C:C bonds are not attacked. The soaps are prepared by dissolving the acetates or the carbonates in fatty acids, e.g., oleic acid. The pressure varies from 200 to 300 atmospheres and the temperature from 250 to 320°. Copper and cadmium are first formed in metallic, finely divided form, and they are active as such. The reaction products are treated with diluted sulfuric acid or nitric acid, causing the particles of metal to agglomerate, so that filtration is made possible. (*C. A.* **52**, 3373)

Glycidyl esters. M. J. Viard. (Société anon. des manufactures des glaces et produits chimiques de St.-Gobain, Chauny & Cirey). *Fr. 1,011,410*). Glycidyl esters are prepared by treatment of chloroglycol esters with alkali under conditions, such that saponification of the ester is inappreciable. For example, butyl α-chloropropylene glycol phthalate is prepared by the reaction of epichlorohydrin and butyl acid phthalate. (*C. A.* **52**, 3375)

• Biology and Nutrition

Interaction of gossypol with albuminous matter and free amino acids. V. P. Rzhekhin. *Masloboino-Zhirovaya Prom.* **23**(9), 6–9(1957). Dark orange, green, and black nitrogen containing derivatives of gossypol devoid of free aldehyde groups have been prepared by heating gossypol together with glycine in sealed ampules at 100, 115, and 130° for two hours. They analyzed, respectively, molecular weight 594, 937, and 994; carbon 63.73, 64.00, and 64.00; hydrogen 6.57, 5.90, and 5.80; nitrogen 4.92, 1.51, and 1.98. Heating of gossypol with ether-extracted cottonseed meats in ampules at 65–130° for two hours resulted in the formation of intermediate-unstable and stable derivatives of gossypol. Gossypol was liberated by hot aniline and oxalic acid from intermediate-unstable only. Heat-denaturation of globulin in seed meats and its interaction with reducing sugars and gossypol during the heat-treatment were thought to be mainly responsible for denaturation and loss in the solubility of this protein. (*C. A.* **52**, 3368)

Specificity of pancreatic lipase. N. Tryding(Univ. Lund, Swed.). *Acta Physiol. Scand.* **40**, 232–40(1957). Substrate specificity of rat pancreatic lipase was studied with a series of labeled methyl-branched fatty acids. Incorporation of a fatty acid into glyceride ester bonds by rat pancreatic lipase is hindered by a methyl group in the α- or β-position of the acid. One methyl branch in the γ-position or two methyl branches in the δ-position do not influence rat pancreatic lipase synthesis of ester bonds. Rat pancreatic lipase was capable of incorporating 5,5-dimethylcaproic acid and hexacosanoic acid into glycerides. (*C. A.* **52**, 2974)

Utilization of fat by the growing chick. N. T. Rand(Univ. Illinois, Urbana). *Univ. Microfilms* (Ann Arbor, Mich.), Publ. No. 23374, 110 pp.; *Dissertation Abstr.* **17**, 2364–5(1957). (*C. A.* **52**, 3068)

Absorption and digestibility of saturated triglycerides of animal origin. Luciana Morisio-Giodetto(Univ. Turin, Italy). *Patol. sper.* **44**, 498–503(1956). The saturated triglyceride fraction of ox fat (melting point 55°; composition, chiefly myristic acid with small amounts of lauric and palmitic acids) showed a coefficient of digestibility of 41.5 in rats. The saturated triglyceride fraction was well tolerated, both orally and parenterally, by rats, dogs, guinea pigs, and rabbits. (*C. A.* **52**, 3065)

Fat in high-energy rations. C. H. van den Noortgaete(École offic. meunerie belge, Ghent, Belg.). *Bull. école meunerie belg.* **19**, 29–36(1957). Experiment on poultry, swine, and cattle show that when natural fat is lacking in the diet, addition of 3% animal fat is very useful, especially with milking cows. (*C. A.* **52**, 3063)

Fats in high-energy rations. C. H. van den Noortgaete(École offic. meunerie belge, Ghent, Belg.). *Bull. école meunerie, belg.* **19**, 9–14(1957). The benefits of adding stabilized fat to the diet of poultry, swine, and cattle are discussed. To establish rations favorable to maximum growth, one must have an increased amount of productive energy, a high amount of digestible proteins, a small amount of cellulose, and adequate vitamins. An increase in reproductive energy raises the alimentary efficiency, but an exaggerated amount of energy in relation to the amount of proteins produces bad growth and gives a bad yield. Supplementary addition to the diet of 3–6% fat is beneficial. (*C. A.* **52**, 3062)

Effect of insulin on clearance of emulsified fat from the blood in depancreatized dogs. Wm. R. Waddell and R. P. Geyer (Harvard Med. School, Boston, Mass.). *Proc. Soc. Exptl. Biol. Med.* **96**, 251–5(1957). Emulsified fat infused into pancreatectomized dog is cleared from the blood at a normal rate if the dog is receiving insulin; without insulin it is cleared slowly. It thus appears that clearance of fat from the blood is dependent on normal carbohydrate utilization. After infusion of fat, serum cholesterol rises in diabetic dogs deprived of insulin, but falls in those receiving insulin. Observations on fat metabolism in which the fat is given intravenously give data comparable to those obtained after oral administration of fat and the mechanisms of clearance seem identical by the two methods. (*C. A.* 52, 3060).

Atherosclerotic response of aggressive and passive groups of chickens to a cholesterol-enriched diet. H. Uhley, M. Friedman, C. Avello, C. Omoto, and W. Hayashi(Mount Zion Hosp., San Francisco, Calif.). *Proc. Soc. Exptl. Biol. Med.* **96**, 244–6 (1957). A group of growing male chickens exhibiting aggressive and another group exhibiting passive behavior were studied during and after a period of several weeks of high cholesterol and fat feeding. Although the aggressive groups showed more pronounced evidences of androgen activity, their plasma and aortic cholesterol contents were perhaps less than those of the passive group. The extent and degree of coronary atherosclerosis were the same in both groups. (*C. A.* **52**, 3060)

Growth-depressing factors in rapeseed oilmeal. II. Counteraction by dietary supplements. J. M. Bell and Elinor Baker (Univ. Saskatchewan, Saskatoon). *Can. J. Animal Sci.* **37**, 21–42(1957). From 17 to 50% of the diet of mice consisted of rapeseed oil meal. Growth, tissue composition, and lactation data confirmed the deleterious nature of high feeding levels. Addition to the diets of iodized casein or potassium iodide failed to counteract the growth-depression factor. Males were more seriously affected than females. (*C. A.* **52**, 3058)

III. Counteraction by steam processing, extraction, and dietary supplements. J. M. Bell. *Ibid.* 31–42. Neither Aureomycin and Terramycin nor steam cooking at up to 15 pounds steam pressure neutralized the toxic factor. Vitamin B_{12} effected some improvement. Hot-water extraction reduced the growth-inhibitor effect. The feeding of 0.01% iodine depressed growth, but 0.003% gave no response. Sodium fluoride, silver nitrate, cupric sulfate, vitamin B_{12} and 3-nitrophenylarsonic acid had no effect on toxicity. (*C. A.* **52**, 3059)

IV. Comparative feeding values of Argentine and Polish types and the effects of supplementary Aureomycin, fishmeal, lysine, iodide, and thyroid-active substances. *Ibid.* 43-9. No marked differences in growth-depressing activity were found between Argentine and Polish rapeseed-oil meals. They contained, respectively, 0.4 and 0.3% allylisothiocyanate equivalent. Neither linseed oilmeal, skim-milk powder, fishmeal, nor lysine proved beneficial at the levels of rapeseed oilmeal fed, i.e., 25 and 50% of the protein in the ration. Iodinated casein, thyroxine, and iodide were likewise ineffective against the growth-depressing factor in the rapeseed oilmeal. (*C. A.* **52**, 3059)

Determination of unoxidized tocopherols in milk fat. R. L. Handwerk and E. W. Bird(Dairy Industry Department, Iowa State College, Ames, Iowa). *J. Dairy Sci.* **41**, 28–33(1958). This procedure was evolved in order to follow tocopherol degradation in oxidizing milk fat. It combines saponification in the presence of pyrogallol to destroy tocoquinones and essentially all fat peroxides, chromatography on $SnCl_2 + HCl$-treated Floridin (Kjolhede) to remove carotenoids, possible residual peroxides, steroids, etc., and color development in benzene-ethanol with ferric chloride and bipyridyl in acetic acid solution (Devlin and Mattill). Pyrogallol was effective in preventing tocopherol destruction during saponification and was superior to saponification under nitrogen. Complete saponification was effected by using 17 ml. of 3.5 *N* KOH per 10 g. fat. If saponification was eliminated, the treated Floridin column reduced tocopheryl-*p*-quinones but not tocopheryl-*o*-quinones.

Dietary saponin, a factor which may reduce liver and serum cholesterol levels. H. A. I. Newman, F. A. Kummerow and H. M. Scott(Departments of Food Technology and Animal Science, University of Illinois, Urbana, Illinois). *Poultry Sci.* **37**, 42–46(1958). A study with chicks on equalized feeding of a synthetic diet supplemented with cholesterol, saponin, or cholesterol and saponin in a factorial design indicated that *Quillaja* saponin, when fed with cholesterol, depressed liver cholesterol levels more than 100 mg.%. An analysis of variance showed that this degree of depression was significant at less than the 1% level when saponin and cholesterol were fed. Saponins may therefore become a non-controlled factor in experimental atherogenesis in chicks if diets composed of grain and natural components instead of synthetic diets are used to study the relationship of dietary factors to liver cholesterol levels. A significant depression in growth was noted whenever saponin was fed. A further growth depression took place when saponin and cholesterol were fed.

Secretion of intravenously administered tripalmitin-l-C^{14} and octanoate-l-C^{14} into milk by the lactating rat. W. J. Lowwos and I. L. Chaikoff (Department of Physiology of the Univ. of Calif. School of Medicine, Berkeley, Calif.). *J. Biol. Chem.* **230**, 149–156 (1958). Palmitic acid-1-C^{14} in the form of its triglyceride and sodium octanoate-1-C^{14} were injected intravenously into lactating rats. Milk was collected at intervals, and at the end of the experiment the mammary glands, plasma, and the livers were removed for study. In the experiment with tripalmitin-1-C^{14}, as much as 45 per cent of the injected C^{14} was recovered in the fatty acids of milk and mammary tissue in 22 hours. Practically all of this C^{14} was found in the nonphospholipide fatty acids and, in the case of milk, practically all of the C^{14} was located in the carboxyl carbon of the 16-carbon fatty acids. It is concluded that a long or short chain fatty acid, intravenously injected into lactating rats, can be readily transported into milk, with its carbon chain intact. Phospholipides are synthesized from these fatty acids either to a negligible extent or not at all in the mammary gland, whereas in the livers of these rats, the process readily occurs.

Effect of animal fat, arsonic acid and range vs. confinement rearing on egg quality. H. L. Orr, E. S. Snyder and S. J. Slinger (Department of Poultry Husbandry, Ontario Agricultural College, Guelph, Ontario, Canada). *Poultry Sci.* **37**, 212–214 (1958). Egg quality studies were made using 18,270 eggs from Rhode Island Red pullets, one half of which were raised on range and the remainder in confinement. Six diets differing with respect to level of animal fat and the absence or presence of 3-nitro were used.

The esterification of cholesterol with palmitic acid by rat liver homogenates. Supravat Mukherjee, G. Kunitake and Roslyn B. Alfin-Slater (Department of Biochemistry and Nutrition, Univ. of Southern Calif. School of Medicine, Los Angeles, Calif.). *J. Biol. Chem.* **230**, 91–96 (1958). The presence of an enzyme in the rat liver capable of esterifying cholesterol with long chain fatty acids has been demonstrated with labeled cholesterol and labeled fatty acids. The esterification of 1-C^{14}-palmitic acid with cholesterol (or palmitic acid with 4-C^{14}-cholesterol) requires the presence of the cofactors coenzyme A (CoA) and adenosine triphosphate (ATP). A mechanism for this esterification is presented. The esterification is thought to proceed in two steps: (1) the activation of the fatty acids by ATP to form the acyl CoA derivative and (2) a transesterification reaction in which the fatty acid exchanges its CoA group for the hydroxyl of cholesterol to form the cholesterol ester.

Growth and reproduction of rats on diets of evaporated milks and a vegetable fat milk product. L. F. Ney (Biology Department, Stanford Research Institute, Menlo Park, Calif.). *J. Agr. and Food Chem.* **6**, 223–227 (1958). Growth and reproduction studies were carried out with rats to compare the nutritive value of an experimental vegetable fat milk product with a conventionally processed and a high-temperature, short-time processed evaporated milk. Weanling rats maintained on the milk diets with minerals added grew well for 12 weeks. Second and third generations were successfully reared on the milk diets. Judged by the criteria of weight gain and reproduction performance, the milk product made from nonfat milk solids, vegetable fats, and water, and fortified with vitamins, was somewhat better nutritionally than the other two milks. The poorest performance was shown by the rats fed the conventional evaporated milk, which appeared to be inadequate to meet the needs of female rats during repeated gestation and lactation.

Deficiencies in the lipoprotein lipase system in atherosclerosis. L. O. Pilgeram (Depart. of Chemistry, Stanford University, Stanford, Calif.). *J. Gerontology* **13**, 32–42 (1958). A significant deficiency of cofactor activity in the lipoprotein lipase system has been found in the plasma of atherosclerotic patients. The deficiency sustains a progressive decline in activity with progressive chronologic age. The role of cofactor activity is discussed in reference to its serving as an index of biochemical age. For a given age group the atherosclerotic patient sustains a deficiency in cofactor activity which is in addition to the age deficiency of the clinically normal. The relationship between biochemical aging and atherosclerosis is discussed.

Effect of trichloroethylene-extracted meat scrap on young cattle. C. E. Rehfeld, V. Perman, J. H. Sautter and M. O. Schultze (School of Veterinary Medicine and Department of Agricultural Biochemistry, Institute of Agriculture, University of Minnesota, St. Paul 1, Minn.). *J. Agr. and Food Chem.* **6**, 227–230 (1958). Calves fed meat scrap produced by azeotropic extraction-dehydration with trichloroethylene developed a moderate to severe thrombocytopenia and relative lymphocytosis and, in one instance, leucopenia. These effects are similar to those induced in young cattle by feeding certain specimens of trichloroethylene-extracted soybean oil meal. Development of toxic properties in cattle feeds processed with trichloroethylene is not restricted to soybeans.

Coupled oxidation of carotene and linoleate catalyzed by lipoxidase. H. L. Tookey, R. G. Wilson, R. L. Lohmar and H. J. Dutton (Forage and Agricultural Residues Section, Northern Utilization Research and Development Division, Peoria, Illinois). *J. Biol. Chem.* **230**, 65–72 (1958). A novel substrate for lipoxidase has been devised which allows the simultaneous measurement of oxygen uptake, diene conjugation, and carotene destruction. The aqueous substrate shows spectral characteristics for carotene similar to those of carotene in hexane. The enzymatic coupled oxidation of carotene is a function of carotene concentration; however, carotene concentration has but little effect on diene conjugation and oxygen consumption. An anomalous maximum in enzymatic activity at low concentrations of sodium linoleate has been related to the critical micelle concentration.

The effect of protein and fat levels and calorie to protein ratio upon performance of broilers. R. M. Vondell and R. C. Ringros (Department of Poultry Husbandry, University of New Hampshire, Durham, N. H.). *Poultry Sci.* **37**, 147–151 (1958). Three, eight-week experiments were conducted with chicks in batteries to study the effects of varying protein and fat levels and calorie to protein ratios upon growth and feed conversion of broilers. The ranges in protein levels was from 16.5 to approximately 22.5 percent and that for fat from 0 to 15.75 percent added fat. Examination of growth and feed conversion data indicate a closely similar pattern for each of the protein and fat levels that were studied. It is concluded, therefore, that a specific calorie to protein ratio applies irrespective of level of dietary protein. Calories from fat do not differ from calories from other nutrients in their effect upon calorie to protein ratios.

Effect of fat in diet of unsaturated fatty acids in phospholipid, cholesterol ester and glyceride fractions in serum of dogs. Hilda F. Wiese, A. E. Hansen and Marjorie A. Baughan (Dept. Pediatrics, Univ. Texas School of Medicine, Galveston). *J. Nutrition* **63**, 523–537 (1957). The distribution of the essential fatty acids in blood serum as influenced by diet has been determined in the phospholipid, cholesterol ester and glyceride fractions for 10 healthy control and 12 fat-deficient dogs. In the diet of healthy animals, dietary fat and linoleic acid constituted 30% and 4% of the calories, respectively. In the fat-deficient group, these were 1% and 0.1%, respectively. Spectrophotometric analysis was used for determination of the 2, 3, 4, 5, and 6 double-bond fatty acids. In control animals, there were appreciable amounts of di- and tetraenoic acids present in the phospholipides and cholesterol esters with tetraenoic (arachidonic) acid predominating in the former and dienoic (linoleic) predominating in the latter fraction. There was very little tri-, penta- and hexaenoic acid in the serum of healthy dogs. In fat-deficient dogs, serum levels were low for di-, tetra-, penta-, and hexaenoic acids in all fractions, but were high for trienoic acid in the phospholipide and cholesterol ester fractions.

Rate of absorption of carotene and of Vitamin A from the alimentary tract of dairy calves. II. Effects of methods of dispersion and of administration. G. W. Wise, N. L. Jacobson, R. S. Allen and S. P. Yang (Iowa State College, Ames, Iowa). *J. Dairy Sci.* **41**, 143–151 (1958). Different dispersions and methods of administration of vitamin A-active supplements on their apparent absorption by calves were studied. Vitamin A in an oily menstruum, an homogenized emulsion, and an aqueous dispersion—and carotenoids—in an oily solution and an emulsion—were mixed in a filled milk and fed via nipple. Vitamin A supplements, as an oily medium and as an aqueous dispersion, also in milk, were administered by a stomach tube. The rate of administration was 1,000 I.U/lb body weight. Changes in concentrations of vitamin A and of carotenoids in blood plasma, collected at 3-hr. intervals during a 15-hr. period after feeding the supplements were the criteria of absorption. Concentrations of vitamin A in blood plasma increased and subsequently decreased more rapidly than did those of carotenoids. Emulsifying oily supplements in milk by homogenization significantly enhanced the apparent absorption of carotenoids but did not improve markedly the absorption of vitamin A.

Effects of protein per calorie ratio and dietary level of fat on calorie and protein utilization. A. Yoshida, A. E. Harper and C. A. Elvehjem (Dept. of Biochem., College of Ag., Univ. of Wis., Madison). *J. Nutrition* **36**, 555–569 (1957). The effects of changes in the protein to calorie ratio of the diet and in the level of dietary fat on growth, body gain per calorie consumed and body gain per gram of nitrogen consumed have been examined using young rats fed on diets containing casein as the source of protein. The evidence obtained indicated that the fat content of the diet influenced neither the percentage of ingested nitrogen retained nor the efficiency of calorie utilization. There did appear to be some transitory beneficial effect of additional fat in stimulating food consumption and growth during the first week of the experiment when the protein to calorie ratio was held constant. It has been concluded that calorie utilization and nitrogen utilization in the growing rat are not affected appreciably by the fat content of the diet but that protein to calorie ratio is an important factor to be considered in interpreting such measurements.

Nutritional research in atherosclerosis—A progress report. T. B. Van Itallie (Dept. Nutrition, Harvard Sch. Public Health, Boston). *J. Am. Dietetic Association* **34**, 248 (1958). The author discusses nutritional research in atherosclerosis from the following viewpoints: role of linoleic acid; mechanism in lowering of serum cholesterol; where does the cholesterol go?; application of present knowledge; protein-fat relationships; decreasing linoleate content of foods. In general the author concludes that not enough actual data are present to make a definite interpretation of the role of fats in atherosclerosis.

Phospholipids. V. The effect of cod-liver oil in the diet on the composition of hen's egg phospholipids. D. N. Rhodes (Low Temp. Sta. for Res. in Biochem. & Biophys., Univ. Cambridge). *Biochem. J.* **68**, 380–384 (1958). The addition of 10 g. of cod-liver oil/day to the diet of a laying hen increased the unsaturation of the neutral fat and more particularly of the phospholipides of the egg yolk. The increase in unsaturation of the egg phosphatidylcholine and phosphatidylethanolamine was entirely confined to the fatty acids esterified in the α'-position of the glycerophospholipides, the β-acid remaining mainly saturated. The polyethanoid acids of the fish oil were selectively incorporated into the phospholipides apparently at the expense of the monoethenoid and diethenoid acids normally present. An average unsaturation of 4.8 double bonds/mol. was reached in the α'-acids of phosphatidylethanolamine.

Essential fatty acids in infant feeding. A. E. Hansen (Dept. Pediatrics, Univ. Texas Sch. of Med., Galveston, Texas). *J. Am. Dietetics Association* **34**, 239–241 (1958). A discussion is given of some factors in infant feeding such as: infant eczema and fat intake; studies on serum fatty acids; relation of fat intake and calorie intake; and calorie intake related to linoleic acid.

Fatty Acids in Foods. Callie M. Coons (Human Nutrition Res. Div., Inst. Home Ec., Agri. Res. Serv., U. S. Dept. Agri., Washington, D. C.). *J. Am. Dietetics Association* **34**, 242–7 (1958). Sources of fats and fatty acids in diets are shown over the periods 1903–13, 1935–39, and 1955, as well as household diets in U. S. in 1955, with food groups, food energy, fats and linoleic percentages given. Problems in lowering fat intake are discussed. On the basis of data from the 1955 study of food brought into kitchens in the United States, it is estimated that the average linoleic acid content of all fats was about 10%.

• Drying Oils and Paints

Improved tall oil fatty acids. C. S. Nevin and C. R. Young (Res. Div., A. E. Staley Manufacturing Co., Decatur, Ill.). *Paint & Varnish Production* **48**, 46 (1958). A chemical process has been developed for treating distilled tall oil fatty acids which reduces the color to a Gardner value of 1–2 and improves considerably the drying characteristics. The process consists of reacting tall oil fatty acids with 0.3% zinc dust at 235° for 30–40 min. under an atmosphere of nitrogen. The unreacted zinc is removed and the treated fatty acids are vacuum distilled. A yield of 97% product and 3% residue is obtained. Analyses show that the treated product is superior to the untreated tall oil fatty acids.

Spectrophotometric examination of linseed oil under an inert gas atmosphere during the heat bodying process. F. Minutilli (Instituto di Merceologia dell' Universita di Roma). *Olii Minerali-Grassi e Saponi-Colori e Vernici* **35**, 2–3 (1958). The changes have been examined of the ultraviolet absorption spectra of a linseed oil during a laboratory heat-bodying experiment in nitrogen atmosphere.

Fish oils in the paint industry. II. J. Huesa. *Grasas y Aceites* **8**, 277–80 (1957). A report on the application of fish oils to the manufacture of paints and of the means for improving their drying properties.

Epoxidation of liquid polybutadiene. C. E. Wheelock (Research Division, Phillips Petroleum Co., Bartlesville, Okla.). *Ind. Eng. Chem.* **50**, 299–304 (1958). Resins with epoxide functional groups are versatile; epoxidation of unsaturated polymers for preparation of novel, valuable polymers was investigated. Reaction time, reaction temperature, acid catalysts, and the amount of organic acid present influence the course of reaction. Polymers containing up to 9.1% epoxide oxygen were obtained; some hydroxylation also occurs. Coating formulations based on epoxidized liquid polybutadiene cure rapidly and provide films of superior chemical resistance. Ethylenic unsaturation in these novel materials promises greater versatility.

Determination of alpha-glycol content of epoxy resins. G. A. Stenmark (Shell Development Co., Emeryville, Calif.). *Anal. Chem.* **30**, 381 (1958). A method for determination of α-glycol groups in epoxy resins uses chloroform as the solvent and an alcoholic solution of a quaternary ammonium periodate as reagent. Method gives accurate results with pure glycols and is sensitive to small concentrations of glycol groups in epoxy resins.

Maleic modification of acid-refined tall oil varnishes. E. E. McSweeney, R. K. Brandt, and E. R. Mueller (Battelle Memorial Institute, Columbus, Ohio). *Ind. Eng. Chem.* **50**, 327–328 (1958). Formation of insoluble agglomerates in maleinized tall oil vehicles has often been a problem. Two methods of overcoming it were devised: pre-esterification of tall oil with polyol before maleic acid addition, and addition of maleic acid to tall oil at 450°F. prior to esterification. The second method is somewhat faster. Formation of insoluble material is not directly related to abietic acid content of the tall oil.

Some aspects of the esterification of epoxy resins. R. Martin (Shell St. Gobain), J. E. Loible and R. J. Turner. *Paint Technol.* **22**, 7–10 (1958). The production of satisfactory varnishes based on epoxy resin esters depends on a correct combination of esterification and thermal polymerization. Suitable equipment is discussed briefly. The importance of adequate stirring, preheating of the fatty acids, and rapid heating of the mixture are emphasized. Under normal circumstances, acid catalysts are not recommended and additives such as triphenyl phosphite should not exceed 0.1% by wt. of the total charge. Cooking to a very low acid value and high viscosity should be avoided.

Polyamide resin suspensoids. H. Wittcoff (General Mills, Inc.). *U. S. 2,824,848.* By the addition of acid a stable aqueous suspensoid is prepared from a mixture of (a) 20 to 90% of a polyamide melting between 130 and 210°C. and derived from the reaction of an aliphatic diamine with a mixture of 85 to 98% polymeric fatty acids and 2 to 15% polycarboxylic acid, and (b) 10 to 80% of a polyamide melting below 100°C. derived from polymeric fatty acids and an aliphatic polyamine.

• Detergents

Rinse additives for machine dishwashing. J. L. Wilson, W. G. Mizuno and S. B. Crecelius (Economics Laboratory, Inc., St. Paul, Minn.) *Soap & Chem. Specialties* **34**(2), 48–52, 170–71 (1958). Rinse additives promote quicker and more complete draining and drying of utensils, reduce "water spots," and result in brighter and cleaner appearance of the utensils. So far the only successful materials are nonionic surfactants, primarily Pluronics and Triton CF-10.

Ethylene oxide condensation products in the soap industry. H. E. Tschakert (Chemische Werke Huls, A. G., Marl, Germany). *Soap, Perfumery, Cosmetics* **31**, 265–6 (1958). Attempts have been made to overcome common faults in toilet soaps such as cracking and brittleness, by the addition of a small percentage of various ethylene oxide condensation products. Results of long-term tests to date show improved consistency and texture, improved color stability, increase in surface luster, marginal translucency, inhibition of rancidity, improved detergency through increased lime soap dispersion power, better fragrance retention, and possibly greater ease of milling.

Artificial soiling in the evaluation of detergents. L. Teichmann. *Deut. Textiltech.* **8**, 462–6 (1957). A recommended standard soil is prepared with 100 g. kaolin, 60 g. fine powdered slate, 10 g. black Fe oxide and 30 g. lampblack, mixed together to form a homogeneous powder, with not more than 5% of the particles exceeding 7.5 μ in diameter. A second mixture containing 30 g. Estamol G or other suitable fatty material and 10 g. wool grease is stirred and warmed together to form a homogeneous paste. Dried India ink (120 g.) is divided between the 2 mixtures, and when it has been fully incorporated the mixtures are combined and 140 g. water is added. The resulting paste is stored in stoppered bottles holding 1 g. each, as it is stable for at least 10 months. In evaluating a detergent, the test cloth, preferably cotton, is treated at 50° for 10 min. while under constant rotation at 60–120 r.p.m. with a solution containing 1 g. of the soil material in 750 g. water. Without drying, the cloth is washed with 1000 ml. of solution containing the desired detergent used in the amount and under the conditions specified. The test cloth is rinsed with 20 rinses, first with warm, then with cold water. It is extracted, dried, and pressed with a flatiron between cloths. (*C. A.* **52**, *1654*)

Heat capacity of aqueous solutions of some soaps. V. I. Solnyshkin. *Kolloid Zhur.* **19**, 629–32 (1957). The heat capacity (I) of Na oleate (II) solutions at 20° decreases from 0.98 to 0.93 when the concentration increases from 0 to 0.2*M*, is independent of II between 0.25 and 0.65*M*, and decreases from 0.92 to 0.89 when II increases from 0.65 to 0.9*M*. In Na ricinoleate solutions the region of constant I (= 0.80) occurred between 2.25 and 2.85*M*. In this region spheric micelles are transformed into cylindrical micelles which crystallize at higher concentrations. (*C. A.* **52**, 3370)

Soap and perfume—an examination of factors affecting the odor yield. J. Sfiras and A. Demeilliers (Roure Bertrand Fils et Justin DuPont, France). *Soap, Perfumery, Cosmetics* **30**, 1133–8 (1957). A procedure is described which evaluates quantitatively and relatively, the odor yield of perfume in soap. It has also been shown that there is a lack of balance of the intensity of the odor between the surface layers and the deeper layers of the soap cakes.

Germicidal ampholytic surface-active agents. A. Schmitz (Th. Goldschmidt A.G. Essen, Ger.), and W. S. Harris. *Manuf. Chemist* **29**, 51–4 (1958). The development of ampholytic surface-active agents is outlined and their differences as compared with cationic compounds described. It is pointed out that the increased bactericidal activity of these ampholytic compounds results from increase in the number of nitrogen groups in the molecule.

Interaction of anionic detergents and certain polar aliphatic compounds in foams and micelles. W. M. Sawyer and F. M. Fowkes (Shell Development Co., Emeryville, Calif.). *J. Phys. Chem.* **62**, 159–66 (1958). The addition of non-ionic surface-active compounds to solutions of a variety of anionic detergents has been shown to enhance foam stability. It is found that detergents increase in "susceptibility to foam stabilization" in the order (1) branched alkylbenzene sulfonates, (2) n-alkylbenzene sulfonates, (3) secondary alkyl sulfates, (4) 2-n-alkane sulfonates, and (5) primary alkyl sulfates. This is also the order of increasing surface tension of the detergents (without additives) at concentrations greater than that of the CMC. The polar aliphatic additives with *straight* hydrocarbon chains of 8–14 carbon atoms were the more effective foam-stabilizers and among these effectiveness increased in the order (1) primary alcohols, (2) glycerol ethers, (3) sulfolanyl ethers, (4) amides, and (5) N-polar substituted amides. Monolayer compositions calculated from surface tension and CMC measurements show that increasing foam stability in a series of detergent additives pairs corresponds to an increasing mole fraction of additive in the adsorbed monolayer.

Hexachlorophene in the surgical scrub. Isabelle Havens, R. S. Benham, and D. E. Clark (Univ. of Chicago). *Am. J. Med. Technol.* **23**, 76–86 (1957). The use of hexachlorophene (I) for washing the hands by the serial scrub technique for several days resulted in a decrease in the number of viable bacteria which could be removed from the hands. The results obtained with a single scrub with I in the soap was no better than that found with soft soap. The optimum amount of I in the soap for daily washing was 0.7–0.9%. This concentration reduced the bacterial count more than 90% for a 4 min. daily scrub. An 82% reduction in the count was obtained after a standard 10 min. scrub with a Zephiran soap. (*C. A.* **51**, 18486)

Quantitative estimation of a nonionic detergent. June C. Griffith (Univ. Technol., Sydney). *Chem. & Ind.* (London). **1957**, 1041–2. Triton X-100, $MeCMe_2CH_2CMe_2C_6H_4(OC_2H_4)_nOH$, can be analyzed in detergents through its 278 mμ absorption peak, assuming the absence of other absorbing substances in this region. As little as 0.005% can be determined. (*C. A.* **51**, 17204)

Sulfonation with sulfur trioxide. E. J. Carlson, G. Flint, E. E. Gilbert and H. R. Nychka (General Chem. Div., Allied Chemical & Dye Corp., Morristown, N. J.). *Ind. Eng. Chem.* **50**, 276–84 (1958). Sulfur trioxide is a relatively new reagent for preparing organic sulfonates and sulfates. To facilitate its industrial use, this pilot plant study was undertaken with several raw materials previously sulfonated on a laboratory scale. The plant processed 180 pounds of organic compound per batch. Commercial grades of dodecylbenzene detergent alkylate were sulfonated and lauryl alcohol sulfated. Results of the sulfonation of a toluene and a petroleum lubricant raffinate, and the sulfation of an ethylene oxide condensate paralleled those obtained in the laboratory. All these sulfonates are made commercially using sulfur trioxide.

Flash drying of soap. Anon. *Soap & Chem. Specialties* **34**(2), 155, 157 (1958). A flash drier for soap, said to effect considerable economies in power requirements and space, has been developed by Meccaniche Moderne, Italy. It is designed to concentrate soap leaving the crutcher with 53 per cent fatty acid content to 78 to 80 per cent soap chips of desirable color properties and good uniformity.

Improvements in detergents. R. C. Dickie and R. Fell (Marchon Products, Ltd.). *Brit. 783,778.* A detergent product with stable foam consists of sodium tripolyphosphate, a non-ionic detergent made by condensing from 1 to 4 molecules of ethylene oxide with each molecule of the monoethanolamide of lauric, myristic or palmitic acid, and a foaming agent such as the alkali metal salt of a primary alkyl acid sulfate, the proportion of non-ionic to foaming agent being between 2 to 1 and 1 to 2 and the proportion of sodium tripolyphosphate to foaming agent being at least 5 to 1.

Improvements in detergents. P. Maurice and J. Payne (Monsanto Chemicals, Ltd.). *Brit. 786,285.* A solid detergent comprising an anionic or non-ionic dispersing agent having effective detergent action and a germicidal phenol together with an acidic substance such as citric acid is formulated so that on dissolving in water at an appropriate concentration, an acidic solution is obtained in which the phenol is maintained in solution by the dispersing agent.

Plant for the continuous cooling of laundry soap. R. Pisoni. *U. S. 2,816,344.* A plant is described for continuously transforming soap in a liquid warm state into a compact chilled bar by quick cooling and compression.

Soap manufacture. E. B. Coyle (Fels & Company). *U. S. 2,823,187.* A naphtha soap in bead form of low moisture content is produced by saponifying with a mixture of caustic in water glass to eliminate the large amount of water usually found in the end product and cut down the volatility of the naphtha.

The production of solid non-ionic surface active agents. D. H. Desty and C. L. A. Harbourn (The British Petroleum Co., Ltd.). *U. S. 2,824,091.* A non-ionic surface-active agent in solid form is prepared by treating a non-ionic surface-active agent having a chain of ethylene oxide units in the molecule with an excess by weight of solid urea in the presence of a small amount of an acid anhydride capable of reacting with water to form free acid and in the presence of water and a reaction diluent, maintaining the mixture until urea adduct formation has taken place and separating the solid product, the pH of the reaction mixture being initially between 2.5–7.0.