

# Report of the Oil Characteristics Committee 1944-45

THIS committee collects data on the various oils and fats dealt with in this country for the purpose of setting up, whenever possible, such standards of purity as can be recommended to the trade as useful guides in its activity.

Since 1937 we have published informative data on Cottonseed Oil of various types, Rice Bran, Kapok, Acorn and Stillingia Oils. In addition, standards have been established on most of the common oils and fats: North American cottonseed oil, castor, cod liver, corn, peanut, rapeseed, sesame, tung, soybean, perilla, linseed, palm kernel, sunflower, coconut, palm, whale, teaseed, and oiticica oils and cocoa butter.

Recently we have drawn up specifications for neatsfoot oil, North American lard and beef tallow, which are however still subject to further consideration.

The values for neatsfoot oil, lard, and tallow returned to this committee for further revision have been changed slightly to meet several objections and as finally passed upon, are as in Table I.

The values given in Table II for Babassu Kernel and Patua Palm Oils and for Chinese Vegetable Tallow have been approved for "Informative Data" and not as recommended standards.

TABLE I

	Neatsfoot Oil	Beef Tallow	North American Lard
Spec. Gravity @ 99/15.5 C.....	0.860-0.865	0.860-0.870	0.858-0.864
@ 25/25 C.....	0.906-0.912	0.903-0.907	0.908-0.913
nD @ 40 C.....	1.458-1.461	1.454-1.458	1.461-1.459
Iodine Value (Wijs).....	69.76	40-48	55-75
Saponification Value.....	190-199	190-199	190-199
Unsaponifiable Matter (FAC).....	Max. 0.8%	Max. 1.0%	Max. 0.8%
Titer (°C.).....	20-30	40-46	36-43*
Pour Point (ASTM) (°F.).....	20-40		

\*Some lards from the southern United States may run somewhat lower in titer.

TABLE II

	Babassu Palm Kernel	Patua Palm	Chinese Vegetable Tallow
Spec. Gravity @ 25/25 C.....	0.916-0.918	0.916-0.918	0.856-0.860 @ 99/15.5 C 1.454-1.457
nD @ 40 C.....	1.449-1.451	1.464-1.468 (@ 25)	
Iodine Value (Wijs).....	14-18	75-80	18-38
Saponification Value.....	247-251	190-193	199-207
Unsaponifiable Matter (FAC).....	Max. 0.8%	Max. 0.8%	Max. 1.5%
Titer (°C.).....	22-23	17-19	44-54
R. M. Value.....	5.8-6.2		
Polenske Value.....	10-12		
Setting (solid) Point (°C.).....	22-24		

M. F. LAURO, *Chairman.*

## Abstracts

### Oils and Fats

Edited by

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EXTREME ULTRAVIOLET ABSORPTION SPECTRA OF THE FATTY ACIDS. I. I. Rusoff, J. R. Platt, H. B. Klevens and G. O. Burr. *J. Am. Chem. Soc.* 67, 673-8 (1945). A study of naturally occurring fatty acids and their isomers and derivs. shows the large effects of the no. and position of double bonds on absorption spectra. Geometric isomerism and esterification exert smaller effects. The absorption of light by oils at very short wave lengths is directly dependent upon the fatty acid compn. of the oil.

THE SPECTROGRAPHIC DETERMINATION OF LINOLEIC, LINOLENIC AND ELEOSTEARIC ACIDS. T. P. Hilditch, R. A. Morton and J. P. Riley. *Analyst* 70, 68-74 (1945). The technic of Mitchell, Kraybill *et al.* was applied to the detn. of linolenic and/or linoleic acid in the presence of eleostearic acid, and the authors have illustrated the proposed application of the technic to sunflower seed oil, niger seed oil, linseed oil, tung oil and a mixt. of the 2 last-named oils.

SEPARATION OF CHOLESTEROL FROM DEGRAS. L. Yoder, O. R. Sweeney and L. K. Arnold. *Ind. Eng. Chem.* 37, 374-7 (1945). Wool fat (degras) was sapond. in 52.5 lb. batches by NaOH, and the unsapond. material was extd. from the wet soaps by gravity sepn. with ethylene dichloride. Cholesterol of 97% digitonin precipitability was prepd. from the unsaponifiable ext. in 4-lb. yields per batch by a pilot process based on the formation of the oxalic acid addn. product insol. in ethylene dichloride solns. By-products obtained per batch were 37 lbs. of fatty acids, 14 lbs. of oily unsaponifiable material and 9 lbs. of isocholesterol wax.

THE POLYMORPHISM OF TRISTEARIN AND SOME OF ITS HOMOLOGS. E. S. Lutton. *J. Am. Chem. Soc.* 67, 524-7 (1945). Manifestation of different crystal structures by a given triglyceride was clearly established by the classical work of Malkin *et al.*, as the underlying cause of the multiple melting of triglycerides. The names of polymorphic forms were based by Malkin upon X-ray diffraction patterns in a manner to relate logically the triglyceride forms to corresponding forms of other long chain compds. It resulted that the forms for tristearin, etc. were called (by Malkin)  $\gamma$  (glassy),  $\alpha$  and  $\beta$  in order of increasing m.p. Unfortunately, according to the present study, there appears to have been a faulty association of X-ray diffraction pattern with m.p. in the work of Malkin. This association was correct in the case of the highest melting  $\beta$  form. However, the lowest melting form (called  $\gamma$ , glassy or vitreous by Malkin) actually exhibits Malkin's  $\alpha$  pattern and in accordance with Malkin's original intention is therefore named the  $\alpha$  form. The intermediate form (called  $\alpha$  by Malkin) actually exhibits Malkin's  $\beta'$  pattern (not reported by him for tristearin, etc., but for mixed glycerides). It is therefore named the  $\beta'$  form. The  $\gamma$  name and pattern and the concept of the glassy state of triglycerides should be eliminated.

MODERN FAT SYNTHESIS. W. Wittka. *Seifensieder-Ztg., Allgem. Öl- u. Fett-Ztg.* 1943, 50-1, 68-9. The production of fat acids from CO, hydrocarbons, alcs., aldehydes, ketones, nitro compds., and metal alkyls is discussed. The problem of fat acid synthesis by oxidation of paraffins has already been solved. Ac-

ording to W. the following 3 processes should be considered for com. production: (a) potash fusion of chlorinated hydrocarbons, (b) high pressure hydrogenation of CO, and (c) sapon. of aliphatic nitro compds. The advantage to these is that the raw materials are of the gas oil type and are by-products which are cheaper than paraffins. In addn., they do not form nonusable by-products, as the distn. tars produced in paraffin oxidation. (*Chem. Abs.*)

THE CHEMISTRY OF THE SPOILING OF FATS. XVII. THE MECHANISM OF AUTOXIDATION OF FOOD FAT. K. Täufel. *Fette u. Seifen* 50, 387-92 (1943). Theories have been proposed for the addn. of O<sub>2</sub> to the double bond: formation of a peroxide, addn. of O<sub>2</sub> in the double bond neighboring a methylene group with formation of a CH·OOH group, addn. of O<sub>2</sub> to one of the groups of a double bond with eventual peroxide formation and the formation of a loose molperoxide. In addn. to these there appears the possibility of combined autoxidation with other material. Here the effect of chlorophyll and hemin appear in question. These are represented by (a) formation of active H(HH-chlorophyll + H<sub>μ</sub> = H chlorophyll + H), (b) formation of active O as O<sub>2</sub>H or HOOH and (c) formation of fat peroxide. Hence, oxidation is prevented at the beginning by the active H formed or, per b, by secondary formation of active O or finally by the decompn. of the peroxide formed. Examples of these are illustrated. The primary O<sub>2</sub> uptake is either for mol. building up or mol. decompn. Mol. building up plays a subordinate role with food fats. Here it can only be a condensation process. This can lead through dioxane ring formation and eventually in a round about way to epoxy compds. or to dioxine rings. The gaps in our knowledge of fat decompn. are large. The identification of decompn. products as yet was investigated only in isolated instances. Those identified were: H<sub>2</sub>O, CO<sub>2</sub>, aldehydes: epihydrin, heptyl, nonyl, formaldehyde, caproic, caprylic, azelaic, and pelargonic; acids: suberic, sebacic, ketostearic, oxystearic, dioxystearic and oxyketonic acids, and products of peroxide character. Reference is made to some investigations on the mechanism of mol. decompn. (*Chem. Abs.*)

THE EFFECT OF ANOXIA ON FAT ABSORPTION IN RATS. P. L. MacLachlan and C. Woodrow Thacker. *Am. J. Physiol.* 143, 391-5 (1945). Adult albino rats, previously fasted 48 hrs. were fed 1.5 cc. of corn oil and subjected to the following partial pressures of O<sub>2</sub>: 117, 80, 63 and 53 mm. Hg (corresponding approx. to altitudes of 8,000, 18,000, 24,000, and 28,000 ft., respectively). Four hours after feeding the amt. of fat absorbed was detd. by measuring the amt. of fat remaining in the alimentary tract. The amt. of fat absorbed by rats subjected to partial pressures of O<sub>2</sub> of 117 and 80 mm. Hg was not significantly different from that for the control animals. On the other hand, at partial pressures of O<sub>2</sub> of 63 and 53 mm. Hg the amt. absorbed was significantly less than for the corresponding controls. The difference, statistically, was highly significant. Apparently the threshold for the absorption of fat in the rat lies between partial pressures of O<sub>2</sub> of 80 and 63 mm. Hg. The results of this study indicate that ranges of anoxia compatible with life would not interfere, as far as the absorption of fat is concerned, with the proper nourishment of the body.

THE EFFECT OF CHAIN LENGTH OF THE DIETARY FATTY ACID UPON THE FATTY LIVER OF CHOLINE DEFICIENCY. D. Stetten and J. Salcedo. *J. Nutr.* 29, 167-70 (1945). Each member of the homologous series of even-numbered fatty acids from butyric to stearic, has been fed as Et ester, at a 35% level in the diet, to young male rats receiving no choline. The degree of fatty liver was found to increase markedly as the chain length of the dietary fatty acid decreased successively from 18- to 16- to 14-C atoms. No severe fatty livers were encountered when the Et esters of fatty acids of less than 12-C atoms were fed. Renal hemorrhage and necrosis occurred in several of the rats fed Et caprylate and a fatal myocarditis was encountered when Et laurate was fed.

FATAL MYOCARDITIS IN CHOLINE DEFICIENT RATS FED ETHYL LAURATE. H. D. Kesten, J. Salcedo and D. Stetten. *J. Nutr.* 29, 171-7 (1945). The feeding of Et laurate, at a 35-40% level in the diet, to young rats receiving no choline resulted in death from heart failure in from 3 to 6 days. The pathol. process was an acute diffuse interstitial myocarditis. It was preventable by the adequate administration of choline, betaine or methionine. The disease did not occur in rats fed the Et esters of other fatty acids and was not fatal when the quantity of Et laurate was reduced to 25% of the diet. Though histologically similar, the disease is apparently not identical with the myocarditis of K deficiency.

#### PATENTS

ANTIOXIDANTS. W. M. Lauer (United States Secretary of Agriculture). *U. S.* 2,373,192. Nordihydroguararetic acid, also known as β, γ-dimethyl-α, δ-bis (3,4-dihydroxyphenyl) butane is used as an antioxidant for edible fats.

EMULSIFYING MILL. W. A. McLean (Geneva Processes, Inc.). *U. S.* 2,370,978. This invention relates to mixing devices, and more particularly to devices for mixing emulsions such as mayonnaise, salad dressings and insecticides.

PREPARATION OF LECITHIN. R. H. Sifferd (Armour and Co.). *U. S.* 2,371,476. The process of purifying crude aq. lecithin emulsions contg. at least 10% of water comprises extg. the aq. emulsion with ethylene dichloride.

PURIFICATION OF ORGANIC COMPOUNDS. J. E. Mitchell (Colgate-Palmolive-Peet Co.). *U. S.* 2,371,307. The process comprises treating tall oil in a liquid state with stannic chloride at a temp. not greater than 40° in order to improve the fatty acids in the tall oil.

ART OF OBTAINING STABLE PRODUCTS FROM TALL OIL. R. G. Dressler, R. E. Vivian and T. Hasselstrom. *U. S.* 2,371,230. The method of producing from tall oil a stable product contg. fatty acid and resin acid components comprises heating the tall oil to 150-240° in the presence of finely divided Ni for 15 mins. to 6 hrs. and essentially in the absence of hydrogenation and decarboxylation of resin acid components, sepg. the Ni and thereafter hydrogenating the treated tall oil under heat and pressure and in the presence of a hydrogenating catalyst.

TALL OIL COMPONENT SEPARATION. A. L. Osterhof (Hercules Powder Company). *U. S.* 2,372,446. In the method for the sepn. of the fat acid component from tall oil there are steps which comprise heating tall oil and a phenol in the presence of an aromatic sulfonic acid to form a phenol condensate with the resin

acid component and sepg. the fat acid component from said condensate by vacuum distn.

**SHELLAC MODIFIED WITH PRIMARY ALIPHATIC POLY-AMINES.** H. Bassford and W. H. Gardner. *U. S. 2,371,212*. A method of making a modified shellac capable of yielding substantially flexible films from its solns. in non-alk. aq. media comprises reacting shellac with at least 10% of its wt. of a primary aliphatic polyamine at 100-200° in the presence of a condensation catalyst.

**RESIN PURIFICATION.** John Ross (Colgate-Palmolive-Peet Company). *U. S. 2,369,409*. The rosin is converted to soap, soap of fat acids added and the mixt. is blown with inert gas at about 350° to remove unsaponifiable.

**ROSIN ESTERS AND METHOD OF PRODUCING.** G. R. Anderson (Hercules Powder Co.). *U. S. 2,369,125*. The method of producing a rosin ester of high oxygen resistance which comprises heating a reaction mixt. consisting of a natural rosin and an alc. at a temp. of 290-300° in excess of 10 hrs. and until an ester is formed having an oxygen absorption value below 1%.

**ANTICORROSIVE.** E. R. Barnum (Shell Development Company). *U. S. 2,369,640*. A corrosion-preventive compn. comprises predominantly a fat and finely dispersed therein a small corrosion inhibiting amt. of a free dicarboxylic acid having at least 16 C atoms, the COOH radicals in said acid being linked through an ether group, said ether joining C atoms no further removed than the beta position from the COOH radicals.

**CORROSION PROTECTION OF METALS.** E. R. Barnum (Shell Development Company). *U. S. 2,369,641*. Method of protecting a solid metal corrodible by salt soln. from corrosion comprises spreading over its surface a fine dispersion in a substantially neutral vehicle of a dicarboxylic acid having at least 16 C atoms to deposit on said metal a protective coating of said acid, the COOH in said acid being linked through an ether radical not further removed from the COOH than the  $\beta$  C atoms.

**LUBRICATING COMPOSITION.** B. H. Lincoln and G. D. Byrkit (The Lubri-Zol Development Corp.). *U. S. 2,368,670*. Ethylxanthylechlorostearate is added to lubricants to improve film strength and stability and reduce corrosiveness.

**GREASE.** F. E. Woodward and J. W. Arkis. *U. S. 2,369,705*. The grease comprises an oil, a metal soap, and a stabilizer consisting substantially of a mixt. of about 25% diparamethoxydiphenylamine, about 25% diphenylparaphenylene diamine and about 50% phenyl beta naphthylamine.

**CORROSION PROTECTION OF METALS.** E. R. Barnum and E. W. Zublin (Shell Development Co.). *U. S. 2,371,143*. A structural, normally corrodible metal is coated with a corrosion-preventive film of a succinic acid di thio ester of a fat acid.

**HYDRAZIDES CONTAINING HYDROXYALKYL RADICALS AND PROCESS OF MAKING SAME.** C. Graenacher, R. Sallmann and J. Frei (Soc. Chem. Ind. in Basle). *U. S. 2,371,133*. A process for the manuf. of hydrazine derivs. contg. hydroxyalkyl radicals comprises condensing 1 mol. of stearic acid hydrazide with at least 1 mol. of ethylene oxide. The prepn. are wetting agents.

**PREPARATION OF SULPHATED FATTY ESTERS.** A. A. Cook, C. Tjorn and J. Zaparaniek (Ark. Co., Inc.).

*U. S. 2,371,284*. A process of prepg. sulphated fatty acid esters comprises first combining high mol. wt. fat acids with a low mol. wt. aliphatic alc. in the presence of an aromatic sulphonic acid and then combining the reaction product with an alkanolamine in the presence of a sulphating agent.

**FLOTATION REAGENT.** E. H. Hoag. *U. S. 2,371,292*. A flotation reagent for the conen. of barite ores comprises talloel, lauric-acid-ester-diethylene-glycol-ammonium sulphate and an alc. selected from the group consisting of hexanols, heptanols, octanols, nonanols, decanols and dodecanols.

**LUBRICANT COMPOSITIONS.** H. G. Smith and T. L. Cantrell (Gulf Oil Corp.). *U. S. 2,371,655*. A house lubricating oil comprising chiefly mineral oil contains castor oil to improve oiliness, sperm oil as a gum inhibitor, an amine salt of an org. phosphate to reduce corrosiveness and an antioxidant.

**LUBRICANT COMPOSITIONS.** H. G. Smith and T. L. Cantrell (Gulf Oil Corp.). *U. S. 2,371,656*. This mineral lubricating oil contains a small admixt. of dehydroxylated castor oil, sperm oil and 2,4,6-tritertiary Bu phenol addn. product of 3-Me-Bu-2-Et-hexyl acid phosphate.

**LUBRICATING OIL.** H. G. Smith and T. L. Cantrell (Gulf Oil Corp.). *U. S. 2,371,851-4*. Special org. phosphates and fatty amines are used to reduce corrosiveness of lubricating oils.

**ORGANIC DETERGENTS FOR LUBRICATING OIL.** F. L. Johnston (Shell Development Co.). *U. S. 2,371,333*. Fat acid esters of polyhydroxy ales. e.g. pentaerythritol stearate, are added to motor lubricants to retard piston ring sticking.

**REACTION OF UNSATURATED ORGANIC COMPOUNDS WITH NITROSYL CHLORIDE.** L. J. Beckham and J. A. Crowder (Solvay Process Co.). *U. S. 2,371,418*. In the manuf. of nitrosyl chloride adducts of hydrocarbons contg. 1 alkenyl radical and between 10 and 30 C atoms, the improvement comprises reacting the hydrocarbon with NOCl in a reaction mixt. contg. at least 1/5 mol. of a normal alkali-metal carbonate per mol. of said hydrocarbon. Fats may be used in the prepn. The products are intermediates for manuf. of wetting agents and other compds.

**WAX COMPOSITION.** A. H. Sanford (Hercules Powder Co.). *U. S. 2,371,473*. An improved waxy coating and impregnating compn. comprises 75% wax, 20% pentaerythritol rosin ester and 5% Et cellulose.

**COATING COMPOSITIONS.** F. Rostler and L. Bornstein (Wilmington Chem. Corp.). *U. S. 2,371,652*. This coating compn. contains a petroleum distn. by-product and drying oil, resin or other film former.

**MANUFACTURE OF SPUN TEXTILE FIBERS.** J. B. Speakman (Cefoil Ltd.). *U. S. 2,371,717*. The process of spinning alginic yarns consists in spinning an aq. soln. of an alginate into a soln. of a coagulating agent so as to coagulate spun material and preventing adherence between the coagulated threads by bringing them, while still wet by coagulating soln. into contact with a vegetable oil held in emulsified form by an emulsifying agent.

**TERPENE RESINS.** A. L. Rummelsburg (Hercules Powder Co.). *U. S. 2,370,688*. A resinous copolymer consists of a product resulting from the copolymerization of a mixt. consisting of a terpene hydrocarbon having the empirical formula  $C_{10}H_{16}$  and a material

selected from the group consisting of the acyclic unsatd. monobasic fat acids and the glyceryl esters thereof, carried out in the presence of a catalyst capable of polymerizing the reaction and an inert organic solvent, at a temp. between about  $-20^{\circ}$  and about  $300^{\circ}$

PERMANENT FINISH FOR TEXTILES. J. M. Hood (Am. Cyanamid Co.). *U. S.* 2,371,892. A compn. for finishing textiles comprises essentially a mixt. of an alc. reacted melamine-aldehyde condensation product and a salt of an alkoxypropylamine contg. at least 11 C atoms.

## Abstracts

### Soaps

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LANOLIN SOAPS. Milton A. Lesser. *Soap* 21, No. 4, 41-4, 86 (1945). The chemical properties, structure and requirements for use of lanolin are discussed. The history of the use of lanolin as a superfatting agent in soaps is reviewed. Superfatting, it was first thought, would eliminate the possibility of free alkali remaining in the finished soap and might combine with the alkali formed by hydrolysis when the soap was dissolved in water. The modern concept is that the use of superfatting materials in soap seems to be directed toward decreasing its defatting effect on the skin rather than toward counteracting its alkalinity.

There is a marked resemblance in both composition and function between wool fat and sebum of the human skin. This makes it a logical additive to soap. It also has excellent emollient effects, does not become rancid in soap, does not induce rancidity, does not hinder the homogeneous preparation of soaps, acts as a solvent for perfumes and does not deepen the tint of soaps. However, it does lower the lathering ability of the soap, but this may be counteracted by use of increased amounts of coconut oil. From the manufacturers' point of view lanolin prevents excess free alkali, reduces the tendency to split or crack, and makes the milling process easier.

THERMAL TRANSITIONS OF THE ALKALI PALMITATES. Robert D. Vold and Marjorie J. Vold. *J. Phys. Chem.* 49, 32-42 (1945). The transition points were detd. for the complete series of the alkali salts between  $25^{\circ}$  and the respective melting temps., together with their approx. changes of heat content. In all instances, one of these points indicates the change of microscopic external crystal form to a fluid medium. With the Li compd., this corresponds to the m.p. of  $223^{\circ}$ , at which an isotropic liquid is obtained. In the other compds., the above-mentioned transition occurs at lower temps. The temp. of formation of neat soap, and for all soaps having this form, is almost independent of the nature of the alkali ion and of the length of the fatty acid radical, as judged on the basis of a comparison of palmitates and stearates.

A NEW APPROACH TO THE EVALUATION OF WETTING, GRINDING AND DISPERSING AIDS. A. E. Bartlett. *Paint Ind. Mag.* 60, 48, 50-1; *Official Digest*, Federation Paint & Varnish Production Clubs No. 243, 76-83 (1945), an address. An apparent simplification of the possibilities of surface-active agents is evident if one disregards their effect on dispersion alone and considers their effects on wetting formations, such as faster mixing or getting more pigment in the mix, and their grinding function. If these differences are noted, surface-active agents can be divided into 3 classes: wetting, grinding and dispersing aids, each of which is capable of quick, accurate lab. evalua-

tion. Use of this evaluation method prevents missing any important incidental characteristic of the agent. (*Chem. Abs.*)

DEVELOPMENT OF A GERMICIDAL SOAP. PART II. William S. Gump. *Soap* 21, No. 4, 50-1, 85, (1945). The results of various tests on toilet soap containing the compound G-11 as an active germicide have been reviewed. Handwashing experiments were carried out for one week and bacterial flora counts were made. These tests showed that the addition of a small amount of G-11 would produce an effective germicidal soap for many purposes.

THE FORMULATION OF PHENOLIC DISINFECTANTS. Paul A. Wolf. *Soap* 21, No. 4, 116-21, 141 (1945). This article discusses the effect of soap itself on germicidal effectiveness and the effect of soap on germicidal properties of phenols. Coconut oil soap, the unsaturated fatty acid soaps, sodium oleate and sodium resinate, potassium laurate and potassium castor soap have been cited as particularly germicidal. On the other hand soaps such as sodium oleate, sodium myristate, potassium palmitate and stearate have a marked inhibitory action on the bactericidal properties of phenols. Therefore in making successful disinfectant formulations these properties should be taken into consideration.

GLYCERINE DISTILLATION GREATLY IMPROVED BY HIGH VACUUM. G. J. Stockman. *Chem. & Met. Eng.* 52, No. 4, 100-1 (1945). Now that steam jet high vacuum equipment is available, glycerine distillation at pressures in the range of 6 to 12 mm. Hg absolute and temperature of about  $315^{\circ}$  deg. F. has increased yields, eliminated sweet-water production and greatly reduced losses due to thermal decomposition. One distillation now suffices for the production of all grades of glycerine including commercial and high gravity.

EMULSION POLYMERIZATION OF ACRYLIC ESTERS. W. C. Mast, Lee T. Smith and C. H. Fisher. *Ind. & Eng. Chem.* 37, 365-9 (1945). Effects of various agents on the emulsion polymerization of acrylic esters are described, and directions are given for preparing several types of resin emulsions. Moderately stable emulsions may be obtained with Tergitol Penetrant No. 4 and ammonium persulfate or Triton K60 and hydrogen peroxide. Emulsions remarkably stable to electrolytes can be made with Triton 720 as emulsifier. Triton 720 and Tergitol Penetrant No. 4 can be used together in various proportions to produce emulsions of almost any desired stability to electrolytes. The viscosity of acrylic resin emulsions can be controlled over a wide range by using various quantities of ammonium alginate, modified casein, and Tergitol Penetrant No. 4.