nickel in inhibiting the reaction. These indications that copper, iron, and nickel affect the polymerization rate are in accordance with present knowledge (2), and the apparent overwhelming effect of nickel must be due almost entirely to the relatively large proportions contained in most of the samples.

A plot of the adjusted conversion data of Table I versus nickel content of the soaps would obviously not yield a straight line although as stated above a relatively high correlation coefficient between these sets of data was found. However these conversion values can be corrected for the influence of copper and iron by use of equation (2) and the data of Table I so that only the influence of nickel remains. A plot of conversions so corrected versus nickel content of soap is shown in Figure 1. The correlation coefficient between these corrected conversions and the nickel content of the soaps is —0.736, which is appreciably higher than that cited above (—0.665) for the adjusted conversions of Table I. Considerable scattering of points remains and might be expected since data originated from different rubber plants, but a high correlation is evident. There is some indication from inspection of Figure 1 that better individual lines could be drawn through the data of each rubber plant, but application of the z test for homogeneity of population indicates that all data fit the same population.

These findings warrant the conclusion that steps should be taken to prevent contamination of emulsifying agents, to be used in polymerizations, with nickel and other heavy metals.

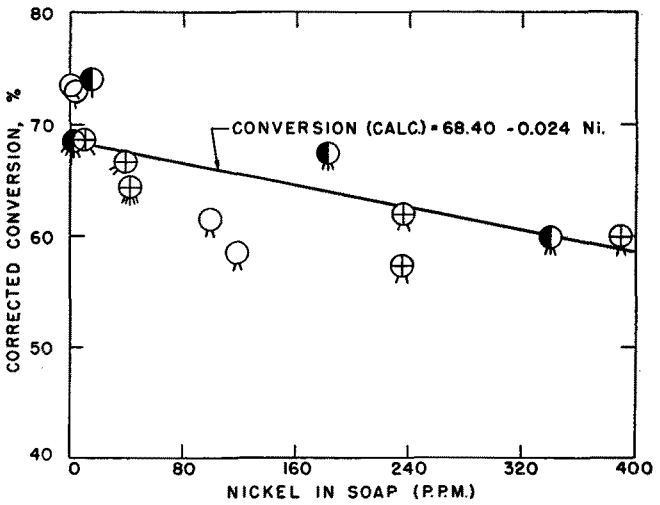

FIG. 1. Observed conversion, corrected for polyunsaturation, modifier differences, and influence of copper and iron content of soap, plotted against nickel content of soap. The circles with crosses represent data originating from rubber plant A, the open circles from plant B, the shaded circles from plant C. The line is calculated from equation (2). Soap supplier indicated by number of radial marks.

Summary

A number of soaps from hydrogenated fat stocks having good and bad characteristics as emulsifiers in plant production of GR-S were analyzed for nickel, copper, and iron. A statistical study of the data on polymerization and metal contents indicated that variability in conversion was associated with variations in the metal content of the soap.

Acknowledgment

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The Analysis and Characterization of the Oil From the Seed of Stillingia Sylvatica[1]

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THE *Stillingia sylvatica* shrub of the Euphorbiaceae family is found growing from Florida to Texas and from Missouri to Virginia (6). The shrub grows best in dry sandy soils. *Stillingia sylvatica* is commonly called Queen's Delight and also Queen's Root (4). It is a shrub which attains a height up to four feet. "The leaves are alternate, irregularly serrulate, somewhat coriaceous, shining on the upper face and paler underneath. The flowers are in a terminal spike and are sterile, with interposing cupulate glands" (2). The fruit are three-lobed capsules from 12-15 millimeters in diameter.

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[2] Deceased, Nov. 17, 1950.

It is fleshy when green but dry when ripe. The seed are from 7-9 millimeters long and have a fiber coating and a dark brown shell and a kernel containing the oil and meat. Upon ripening the seed are forceably ejected from the capsule.

The shrub is quite sturdy and should be cultivated readily in suitable soil, and the seed could probably be collected by mechanical means. The root of the plant is similar to that of the perennial gourd. It is a long, flesh root, an extract of which has been used for many years for medicinal purposes (2, 4).

The seed for this investigation were obtained in and around Bryan, Tex. The oil was obtained from the seed by rolling the kernels in a roll mill and extracting the oil with "Skellysolve F," according to the procedure of Potts and Bolley (5). The solvent was then removed by distillation. The oil obtained was of a light yellow color; the seed contained between 30 and 33% oil. Characteristics reported in the table were determined by "The Methods of the Association of Official Agricultural Chemists."

TABLE I

Characteristics

	Stillingia sylvatica
Refractive index at 20°	1.4833
Iodine value	189.9
Specific gravity at 25°	0.9263
Acid value	16.1
Acetyl value	37.5
Unsaponifiable residue	0.76
Reichert-Meissl value	1.4
Polenski value	0.11
Saturated acids	5.7
Unsaturated acids	91.7
Saponification value	189.2
Oleic acid percentage	18.5
Linoleic acid percentage	25.0
Linolenic acid percentage	48.6
Palmitic acid percentage	3.4
Stearic acid percentage	1.8

The fatty acids in the oil were determined by separation of the methyl esters, according to the procedure of Hilditch (3). The methyl esters were separated into the different ester fractions by fractional distillation on a Todd column under reduced pressure. The percentages of the acids were calculated from the iodine number and the saponification values of the individual fractions along with the ultra-violet absorption data.

The ultra-violet absorption spectra were obtained on the original oil and on the isomerized oil. The curves are shown on Figure 1. The curve for the unisomerized oil indicates no conjugation and the curve for the isomerized oil indicates the presence of both diene and triene conjugation. The total percentages of linoleic and linolenic acids were calculated from the ultra-violet absorption spectra of the isomerized oil. The specific extinction coefficients,

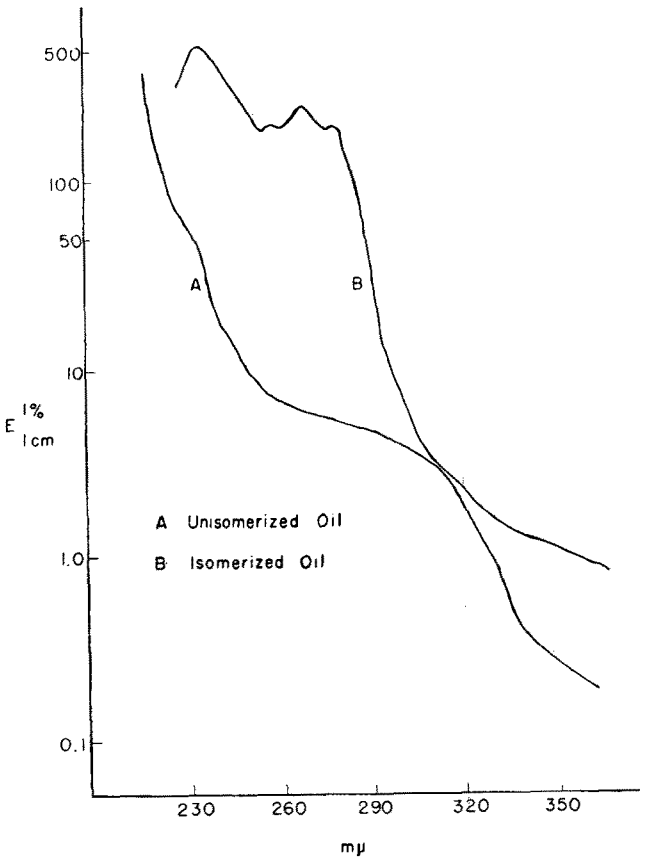

FIG. 1. Ultra-violet absorption spectra.

according to Brice and Swain (1) for linoleic acid at 234 millimicrons, are 860. The extinction coefficients for linolenic acid at 234 millimicrons are 609 and at 268 millimicrons, 534.

Summary

The characteristics and composition of the oil characterize it as a drying oil. Its high iodine value indicates that it may be suitably used for paints and varnishes and other products requiring a drying oil. The oil dried readily when spread on a glass plate in from 4-6 hours.

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