Cocos Pulposa Palm Kernel Oil*

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THE palm Cocos pulposa, which has been classified also as Butia capitata, var. pulposa (Barb. Rodr.) is found growing in Uruguay and in the State of Rio Grande do Sul, as well as in some other localities, in Brazil.

The present investigation was made possible through the kindness of Mr. M. Rosenberg, President of the Atlantic Forwarding Company of New York, who donated a sizeable sample of kernels and some nuts imported from Uruguay during 1939. The average weight of these nuts was 3.8 grams and they contained 37 per cent of kernels. Each nut contained three kernels and the individual weight of these ranged from 0.20 to 0.55 grams. The kernels were found to contain 4.8 per cent of moisture and 59.5 per cent of oil.

The oil which was expressed in the laboratory by means of the small Anderson oil-expeller was pale yellow. Upon cooling and holding the oil at 10°C. for 30 minutes, it began to solidify. The completely solidified oil was found to melt between 17° and 18°C.

The chemical and physical characteristics of the expressed oil are given in Table I.

TABLE I.

Chemical and Physical Characteristics of C. pulposa Palm Kernel Oil.

Refractive index at 25°	1.4554
Saponification value	260.3
Iodine number (Hanus)	24.6
Thiocyanogen value (Kaufmann)	22.4
Acid value	1.7
Reichert-Meissl value	7.1
Polenske value	24.8
Unsaponifiable matter, %	0.44
Saturated acids, %	68.02
Unsaturated acids, %	24.80

The percentages of oleic and linoleic acids which are present in the oil in the form of glycerides were calculated in the customary manner, using the iodine number and the thiocyanogen value. The calculations indicated that the oil contained 22.39 per cent of oleic acid and 2.40 per cent of linoleic acid.

For determination of the quantity of the individual saturated fatty acids, 500 grams of the expressed oil were directly esterified with anhydrous ethyl alcohol (250cc.) in the presence of dry hydrochloric acid gas. To effect esterification, this mixture, in a flask attached to a condensor by a glass joint, was heated in a hot water bath for about three hours. The isolated ethyl esters from which all solvent and moisture had been removed in the customary manner, were fractionally distilled, using an electrically heated fractionation column as previously described in some detail (ibid. 15, 172. 1938) in connection with the investigation of ouricury palm kernel oil. The first part of the present distillation was made under ordinary atmospheric pressure and continued until the temperature of the ester vapors in the uper part of the fractionation column had reached 210°C. From this point, the distillation was continued under pressures ranging from 0.5 to 0.8 mm. Eighteen fractions were collected and each one, as well as the undistilled residue, was weighed. As the first ten fractions gave no iodine numbers, which indicated the absence of esters of unsaturated acids, the proportions of the saturated acids present in each of them were calculated from their respective mean molecular weights derived from their saponification values. In order to calculate the quantity of saturated esters and the individual saturated fatty acids in each of the other eight fractions, it was necessary to take into consideration the quantity of the unsaturated esters as indicated by the iodine numbers of these fractions. An additional correction had to be made only in the case of fraction 18 as it was found to contain 0.42 per cent of unsaponifiable matter (from the original oil), the larger part of which was found in the undistilled residue. The examination of this residue failed to show the presence of a weighable quantity of any high-molecular weight saturated acid.

The identity of each of the saturated acids in the ester fractions was established either by the melting points of the isolated acids or, as in the cases of the three lower-molecular weight ones, by the melting points of their p, p-diamino diphenylmethane derivatives.

The percentages of the saturated acids in the oil, which were obtained by calculations using the analytical data, are given in Table II.

TABLE II. Saturated Acids.

Acids	Percent	Percent in Oil
Caproic	2.16	1.47
Caprylic	13.81	9.40
Capric	19.46	13.23
Lauric	50.56	34.39
Myristic	9.68	6.59
Palmitic	2.49	1.78
Stearic	1.84	1.31
	100.00	68.02

The composition of the expressed oil in terms of acids as glycerides is given in Table III.

TABLE III. Glycerides of individual acids.

	Percent
Caproic	1.6
Caprylic	10.2
Capric	14.2
Lauric	36.6
Myristic	7.0
Palmitic	1.8
Stearic	1.3
Oleic	23.4
Linoleic	2.5
Unsaponifiable	0.44

As with other palm kernel oils, this one could be used for making soap and, after refining, in the manufacture of margarin.

Summary

The kernels from the palm Cocos pulposa received from Uruguay contained 59.5 per cent of oil and 4.8 per cent of moisture. The expressed oil gave the following characteristics: Saponification value, 260.3; iodine number (Hanus), 24.6; thiocyanogen value, 22.4; Reichert-Meissl value, 71; and Polenske value, 24.8. It contained 0.44 per cent of unsaponifiable matter and the following percentages of acids: Caproic, 1.47; caprylic, 9.4; capric, 13.2; lauric, 34.4; myristic, 6.6; palmitic, 1.8 and stearic, 1.3. The chief uses for which the oil is suited are for making soap and, after refining, as an ingredient in the manufacture of margarin.

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