Passion Fruit Seed Oil

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Interest in the preparation of passion fruit juice as a drink directed attention to the possibility of utilizing the seed for its oil. No reference to the oil could be found in the literature. A sample of the seed and 630 grams of the cold expressed oil were sent to the authors for investigation by E. M. Chace, in charge of the laboratory of Fruit and Vegetable Chemistry, Bureau of Chemistry and Soils, at Los Angeles, California.

The seeds (from the fruit of Passiflora edulis) were found to contain 7.92 per cent of moisture and 18.17 per cent of oil. The expressed oil, which had been clarified by means of a silicious filter aid at the Los Angeles laboratory, was a brilliant pale-yellow limpid liquid. When cooled and held for some hours at about 10° C. it showed no tendency to deposit "stearine." It has a very mild, pleasant taste.

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

Table I. Chemical and Physical Characteristics

Table 1

Specific gravity at 25/25°	0.9207
Refractive index at 25°	1.4737
Iodine number (Hanus)	140.4
Thiocyanogen value	81.2
Saponification value	190.4
Reichert-Meisel value	0.11
Polenske number	0.21
Acetyl value (Andre-Cook)	8.10
Unsaponifiable matter, %	0.62
Iod. No. unsaponifiable matter	146.2
Saturated acids (corrected) %	8.88
Unsaturated acids (corrected) %	84.31

The iodine number indicates that the oil belongs in the lower range of the drying-oil class.

Unsaturated Acids

The percentages of oleic, linoleic and linolenic acids in the oil were calculated in the customary manner, using the iodine and thiocyanogen values. The results are given in Table 2.

Table 2

	Unsaturated Acids Percent	Acids in Oil Percent
Oleic acid	22.54	19.0
Linoleic acid	71.06	59.9
Linolenic acid	6.40	5.4
	100.00	84.3

The saturated acids, which were separated from the saponified oil by the lead-salt ether method, were esterified with anhydrous ethyl alcohol in the presence of dry hydrogen chloride gas (J. Amer. Chem. Soc., *42*, 1200, 1920). The esters, amounting to 52.85 grams, were freed from solvent and moisture, and fractionally distilled under a pressure of 2 mm. from a Ladenburg fractionation flask. Five fractions were obtained, and from the results of their analysis the composition of each was determined by the method previously described (J. Amer. Chem. Soc, *46*, 775, 1924). The results calculated from the analytical data are given in Table 3.

Table 3

	Saturated Acids Percent	Acids in Oil Percent
Palmitic	76.38	6.78
Stearic	19.86	1.76
Arachidic	3.76	0.34
	100.00	8.88

The acids were recovered from the ester fractions and the small undistilled residue by saponifying them with alcoholic potash and decomposing the soaps with hydrochloric acid. The acids were collected and completely separated from potassium chloride and any hydrochloric acid by remelting them with hot distilled water in the usual manner. The acids obtained from the various distilled ester fractions and the residue were subjected to fractional crystallization from ethyl alcohol. No myristic acid could be detected, nor was any indicated by the mean molecular weight of the saturated esters in fraction one. The identity of each of the individual acids separated by fractional crystallization from alcohol was established by its melting point and by the fact that this melting point was not lowered when the acid was mixed with an equal quantity of the respective acid, the composition of which had been determined by elementary analysis. The acids which are isolated in each case confirmed the deductions previously made from the mean molecular weights of the saturated acid esters.

The composition of the oil in terms of glycerides is given in Table 4.

Table 4.—Percentages of Fatty Acids as Glycerides

Glycerides of:	*Percent*
Oleic	19.9
Linoleic	62.3
Linolenic	5.6
Palmitic	7.1
Stearic	1.8
Arachidic	0.4

If produced commercially in sufficient quantity, the oil could be used for either edible or technical purposes.

Report of Refining Test Committee for the Year 1933-34

The committee planned to investigate four points: first, the procedure for refining coconut oil; second, a method for determining traces of soap in refined coconut oil; third, investigate the method for refining expeller oils to determine if changes are necessary in order to refine some expeller oils more efficiently; fourth, develop a method for testing filter paper to be used in filtering oils.

1. Coconut Oil: About 50 samples of coconut oil were refined by the proposed new procedure in comparison with the present official procedure and uniformly better results were obtained. The following are the changes used in the new method:

Reduce the amount of 20° lye from 1.25 times the free fatty acid to 1.10 times the free fatty acid.

Change the amount of salt from 1% as now specified for all cases to an amount equal to .1% for each 1.0% free fatty acid.

Change the time and temperature of agitation from 15 minutes cold and 12 minutes hot as at present, to 5 minutes at 30-35° C. and 5 minutes in bath at 50-53° C. Loss and color were found to be at least equally good as by the present method, and there was practically no separation of excess water solution or lye.

The average results are as follows:

	F.F.A.	Color	Loss	Bleach	Lye Per Cent	Baume
Old	5.5	1.2	9.1	.4	6.9	20
New	5.5	1.3	8 2	.4	6.0	20

2. Traces of soap in refined coconut oil: No methods were suggested for this determination, hence no tests were made.

3. Expeller Oil: No expeller oils were found which could not be satisfactorily refined by the official procedure.

4. Filter Paper: Tests were made to develop a method for testing filter paper by filtering oil containing certain finely divided precipitates such as phosphomolybdate and bleaching carbon, but no satisfactory procedure was developed that would give results comparable to the filtering of refined oil containing colloidal matter.

Attention was called to the fact that in the cooperative work on refining cottonseed oils a 0.3% limit of error is allowed in the refining loss, while remelting the foots is discontinued when the amount of oil recovered at any one remelting does not exceed 2.5 grams. The suggestion was made that remelting of the foots be continued until the amount of oil recovered at any one remelting does not exceed 1.5 grams.

RECOMMENDATIONS

The committee recommends:

1. That in the method for refining procedure on cottonseed oils the remelting of the foots be continued until the recovered oil from the last remelting amounts to not over 1.5 grams.

2. That the incoming refining test committee continue a study of the past season's program.

Respectfully submitted,

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