OIL FROM THE SEEDS OF *POINCIANA REGIA*

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Received October 23, 1953

SUMMARY

Fatty acids from the oil obtained from the seeds of *Poinciana regia* consist of palmitic (0·42%), stearic (16·63%), oleic (31·42%), linoleic (51·53%). The glyceride composition of the fat as determined by the acetone permanganate method is: trisaturated (GS_3) traces, disaturated monounsaturated (GS_2U) 15·1%, monosaturated diunsaturated (GSU_2) 21% and triunsaturated (GU_3) 63·9%.

The characteristics and composition of the oil from the seeds of *Poinciana regia*[1] (known as *gul mohur*) from Indian source, are reported in this paper. Kafuku *et al.*[2] have made a preliminary examination of a sample of the oil from Formosa but their data are not available to us.

The kernels amounting to 32% of the seeds collected from trees in Bangalore when extracted with carbon tetrachloride gave 19·2% (on the weight of the kernels) of a brownish yellow oil. The physical and chemical characteristics[3] of the oil are given in Table I.

TABLE I

Physical and Chemical Characteristics of the Oil

1.	Specific gravity	d_{25}^{25}	0·9508
2.	Refractive Index	$n_D^{29°}$	1·4522
3.	Acid Value		1·12
4.	Saponification Value		169·40
5.	Acetyl Value		6·70
6.	Reichert Miesel Value ..		7·7
7.	Polenske Value		3·1
8.	Specific Rotation (in $CHCl_3$) ..		+3·0
9.	Hehner Value		90·78
10.	Unsaponifiable Matter ..		0·5260%
11.	Iodine Value		93·65

Component acids of the oil.—The mixed acids obtained from the oil by saponification with alcoholic potash was subjected to Twitchell's lead salt separation[4] and resolved into 17·05% solid and 82·95% liquid acids.

The solid and the liquid acids were separately methylated and the esters were fractionated. The composition of the mixed fatty acids as determined by ester fractionation data is given in Table II.

TABLE II

Composition of the Mixed Fatty Acids

Acid		Weight %	Mole %
Saturated			
(*a*) Palmitic	..	0·42	0·44
(*b*) Stearic	..	16·63	16·63
Unsaturated			
(*a*) Oleic	..	31·42	31·26
(*b*) Linoleic	..	51·53	51·67

Component glycerides of the oil.—Saturated glyceride (GS_3) was determined by acetone permanganate oxidation of the neutral fat as given by Hilditch.[5] The monoazelao and diazelao glycerides in the oxidation product of the fat were estimated by the method as developed by Kartha and Menon.[6] The percentage of the different glycerides is given in Table III.

TABLE III

Component Glycerides of the Oil

Glycerides	Weight %	Mole %
1. GS_3	traces	traces
2. GS_2U	15·1	16·82
3. GSU_2	21·0	17·52
4. GU_3	63·9	65·66

So the percentage of the individual glycerides, calculated from the percentages of fatty acids present in the oil, are:

Distearo-olein	5·78
Distearo-linolein ..	9·38
Monostearo-diolein ..	7·95
Monostearo-dilinolein	13·05
Tri-olein	24·2
Tri-linolein ..	39·7

Unsaponifiable matter.—The unsaponifiable matter (0·52%) obtained from the oil was tested for the presence of sterol by the Libermann-Burchard reaction[7] but the violet colouration did not appear thus indicating absence of phytosterol.

Experimental

Extraction of the oil.—A total of 2 Kg. of seeds were crushed and 650 g. of kernel were obtained. The kernel, on extraction with carbon tetrachloride for 48 hours yielded 125 g. of a brownish yellow oil. This was used as such in further experiments. The oil could be decolourised with norite.

Saponification of the oil.—Oil (20 g.) was saponified by refluxing with alcoholic potash for 6 hours. After removal of alcohol, the soap was dissolved in a large volume of water containing a trace of alcohol and extracted thrice with ether to remove unsaponifiable matter. The aqueous solution on acidification with dilute sulphuric acid (10%), to congo red paper, extraction with ether and drying, gave 18·58 g. of fatty acids. This was used in the characterisation of the component acids.

Characterisation of the component acids.—The mixture (18·58 g.) of fatty acids (Mean Mol. Wt. 286·7 and Iodine Value 119·1) was subjected to Twitchell's lead salt separation using 20 g. of neutral lead acetate and 200 c.c. of ethyl alcohol and separated into 2·9 g. of solid and 14·1 g. of liquid acids. The constants of these fatty acids are given in Table IV.

Table IV

Constants of Solid and Liquid Acids

Acid	Nature	% in total acids	Mean molecular weight	Iodine Value
1. Solid ..	Pale red solid	17·05	284·7	..
2. Liquid ..	Red liquid	82·95	281·8	142·1

The solid and the liquid acids were separately methylated in presence of 2% concentrated sulphuric acid. The methyl esters were then fractionated under reduced pressure. The fractionation data are given in Tables V and VI.

TABLE V

Fractionation Data of the Methyl Esters (2·41 *g.*) *of Solid Acids*

Fraction	Boiling point ° C./10 mm.	Weight obtained	Saponification value
S_I ..	Upto 190°	1·87 g.	188·2
S_{II} ..	Residue	0·38 g.	189·1

TABLE VI

Fractionation Data of the Methyl Esters (14·11 *g.*) *of Liquid Acids*

Fraction	b.p.° C./15 mm.	Weight in g.	Saponification value	Iodine value
L_I	upto 200°	3·94	183·7	152·2
L_{II}	200–05°	4·78	184·9	163·3
L_{III}	205–10°	3·44	190·2	125·7
L_{IV}	Residue	1·95	189·1	112·7

The presence of oleic and linoleic acids in the liquid acids was confirmed by the method of Eibner and Muggenthaler as given by Lewkowitsch[8] and oxidation according to Sullivan and Bailey[9] of the liquid acids, when dihydroxy stearic acid (m.p. 130–1° C.), tetrahydroxy stearic acid (m.p. 165–6° C.), dibromostearic acid (liquid) and tetrabromostearic acid (m.p. 113–4° C.) were obtained. The stearic acid was identified by its anilide, m.p. 92° C. As the percentage of palmitic acid is very less its anilide is not prepared.

Characterisation of component glycerides—potassium permanganate oxidation of neutral oil.—The neutral oil (14·32 g.) in 200 c.c. anhydrous acetone was oxidised with potassium permanganate (70 g.). The ethereal solution of the acidic products of the oxidation was extracted four times with 5% solution of sodium bicarbonate and washed with water. It was then extracted four times with 10% sodium carbonate solution and finally washed with water. The ethereal solution is dried and on removing ether the trisaturated glycerides are obtained. The sodium carbonate extract and washings were

acidified to congo red paper and extracted with ether. The ether solution dried and on removing ether yielded 3·3 g. of a residue with saponification value of 308·6. A portion of this mixed azelao glyceride was dissolved in ether, washed alternately with sodium bicarbonate solution and water, the extract and washings combined and once extracted with ether and the aqueous portion acidified with dilute sulphuric acid and the liberated di-azelaoglyceride taken in ether, dried and the ether removed. The residue obtained had saponification value of 424·9 as against 432 calculated on the basis of the distribution of saturated acid. The glyceride composition is given in Table III.

References

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