

A NOTE ON THE ESSENTIAL OIL FROM GINGER SCRAPINGS

THE gingers of commerce are chiefly obtained from India, China and Jamaica. Though ginger is cultivated in many parts of India, the best ginger is obtained from the Malabar Coast. In Travancore alone, about 25,000 acres are under ginger and the quantity exported is about 3,000 to 4,000 tons.

The rhizomes are submitted to an elaborate process of cleaning and bleaching before marketing in several grades like white ginger, rough unbleached, rough bleached, etc. In preparing the best quality ginger, the rhizomes are scraped to remove the outer skin. Large quantities of these scrapings accumulate and these are generally wasted. These scrapings have been reported to give an essential oil.¹

Rao, Sudborough and Watson² as well as Moudgill³ have distilled the scrapings and reported the constants and yield but data about the distillation under reduced pressure and constituents are not available. The oil is now shown to resemble ginger oil since it contains camphene, β -phellandrene and Zingiberene, all of which are present in ginger oil.

EXPERIMENTAL

50 Lbs. of the air-dry scrapings were obtained fresh, from North Travancore and distilled in a copper still with water (hydro-distillation). The distillate gave a light yellow oil (yield 0.8 per cent. on air-dry material).

Physical and chemical constants of the oil are given in Table I.

TABLE I

Author's Sample	Rao, Sudborough and Watson	Moudgill	Pure ginger oil
Yield	0.8% air dry	3.45 (on dry basis)	0.9% (air dry)
Density (30° C.)	0.8905	0.8822 (at 15° C.)	0.8816
Ref. Index (30° C.)	1.4859	1.4988 (25° C.)	0.875— 0.886 1.4795— 1.4855
(a) D	-5.2	-39.2	-9.85
Acid value	0.90	2.1	1
Ester value	6.10	7.7	10
Acetyl value	72.2	49.8	103
			-28 to 50° C.
			0—2
			0—15
			33.42

Distillation under reduced pressure.—60 c.c. of the oil were distilled under reduced pressure (8-10 mm.). The physical constants and

other details of the fractions are given in Table II.

TABLE II

Fraction No.	Temperature	Weight in gm.	Density 30° C.	Refractive index	Rotation in 5 cm. tube
1	80-90°C.	8.2	0.8670	1.4670	+25.72
2	90-100°C.	6.0	0.873	1.4700	+19.32
3	100-110°C.	2.20	0.8800	1.4750	+5.10
4	110-120°C.	2.40	0.8840	1.4756	+4.00
5	120-130°C.	4.8	0.8860	1.4825	+1.57
6	130-140°C.	6.8	0.8890	1.4910	+16.93

Fractions 1, 2 and 3.—These were mixed together and distilled at atmospheric pressure and separated into four fractions (Table III).

TABLE III

Fraction No.	Temperature °C.	Weight in gms.	Density 30° C.	Ref. index 30° C.
A	30-160	4.2	0.862	1.4640
B	160-165	3.6	0.864	1.4651
C	165-170	3.0	0.876	1.4660
D	170-175	2.1	0.883	1.4690

Fractions A and B were separately tested for camphene by conversion into isoborneol⁴ by heating with glacial acetic acid and 50 per cent. of sulphuric acid and then converting the acetate by alcoholic potash. They gave isoborneol (m.p. 212° C.).

Fraction C, after another distillation, gave β -phellandrene-nitrate (m.p. 101-102° C.)⁵ with sodium nitrite and glacial acetic acid.

Fraction D did not give any crystalline products.

Fractions 4 and 5 were treated for alcohols but none has been identified.

Fraction 6 contains Zingiberene. This fraction was distilled under reduced pressure (10 mm.) and the portion distilling over 128-132° C. (over 75 per cent.) gave the nitrosite (m.p. 97-98° C.) and hydrochloride (m.p. 168-169° C.).⁶

Further work is in progress.

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1 and 2. Rao, Sudborough and Watson, *Jourl. Ind. Inst. Sci.* 3. Moudgill, K. L., *J. Ind. Che. Soc.* 4, 5 and 6. Parry, "The Chemistry of Essential Oils and Artificial Perfumes". 3rd Edn. 2, pp. 40, 60 and 72.