THE
QUARTERLY JOURNAL
OF THE
CHEMICAL SOCIETY.

XII.—*On the Volatile Oil of "Ptychotis Ajwan."*

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THIS umbelliferous plant grows abundantly in Rajpootana and in various other parts of Central India. The fruit is short, compressed laterally; and in shape, size, and appearance, very closely resembles that of *Conium maculatum*. It has a powerful and agreeable odour of thyme. The process of extracting its volatile oil is well known to the natives, and is practised pretty extensively in the state of Judore and the neighbouring territories. The oil is used by the native doctors as a carminative, under the name of *Ajwa ke tel*, or Ajwa oil. This, as sold in the Bombay bazaars, is of a dark amber-yellow colour, somewhat viscid, and not pouring freely, as if loaded with resin or fixed oil. It has a pure odour of thyme.

Redistilled with water, it yielded, after cohobating the water several times, a little more than one-fourth of its bulk of a limpid bright yellow oil. The residue was a dark orange-yellow, viscid, oily liquid, almost free from odour.

This residue was sparingly soluble in alcohol, even when boiling, and itself dissolved an appreciable quantity of alcohol. On evaporating the alcoholic solution, the oil was obtained unchanged in its properties. It did not appear to contain resin. It was more soluble in ether. Boiled with potash it formed a soluble soap. Under a heat gradually increasing to near redness, it was converted into volatile

liquid and gaseous products, giving off the pungent odour of acrolein. A small residue of carbon was left in the retort. Warmed with solution of pernitrate of mercury, it did not solidify or undergo any material change, beyond becoming of a darker colour and somewhat more viscid. It consisted, therefore, essentially of a siccative fixed oil,—probably poppy oil,—with which the volatile oil had been adulterated.

The rectified oil, distilled by itself, began to boil at 350° F., the boiling point slowly rose to 366° , at which about one-third came over, and then advanced more rapidly to 450° . A small dark-coloured residue was left in the retort.

The product by repeated fractional distillation was separated into two portions, one boiling at 353° , the other at 440° — 450° ; the former amounting to about two-thirds, the latter to one-third of the whole.

The more volatile portion was colourless, refracted light strongly, and had a peculiar, sweetish, smoky odour, reminding somewhat of caraway, but entirely distinct from that of thyme. Digested over powdered chloride of calcium, and re-distilled, it retained the same boiling point. Re-distilled over hydrate of soda, its boiling point was reduced to 347° , at which it remained constant. Its specific gravity at 80° was 0.845.

Burnt with oxide of copper, the following results were obtained:—

I.	6.69	grains	gave 6.43 water.			
II.	8.62	„	8.20	„	and 28.51 carbonic acid.	
III.	7.59	„	7.35	„	24.92	„

Calculated.			Found.		
			I.	II.	III.
20 C	120	89.55	—	90.20	89.54
14 H	14	10.45	10.68	10.57	10.76
	134	100.00		100.77	100.30

It is, therefore, isomeric if not identical with cymole— $C_{20}H_{14}$.

The portion which boiled at 440° — 450° had a yellowish colour, which could not be removed by repeated distillation. Its odour was that of the original oil, but more concentrated. When kept for several days, it did not crystallise; but on throwing into it a minute fragment of the stearoptene previously deposited from the oil, crystals began to form immediately, and in a few hours it had become almost wholly converted into nearly colourless crystals, forming flattish

tables of a rhomboidal shape, surrounded by a dark yellow oily liquid. By pressure between folds of blotting paper, the crystals were obtained dry and pure.

They were then found to be identical with the crystals sold in the bazaar as *Ajwa ka phūl*, or flowers of Ajwa.* They have a powerful odour of thyme, and a hot and very pungent taste; are insoluble in water, but freely soluble in alcohol, ether, and volatile oils. At 127° F. they melt to a colourless liquid, which begins to boil at 439°; but the temperature quickly rises to 447°, at which the whole comes over. The distilled liquid is colourless, not so strongly refractive as the more volatile liquid, and it may be kept for weeks in closed vessels in a fluid state, until a fragment, however minute, of its crystal is thrown in, when crystallisation instantly begins in all directions throughout the liquid. The latter was neutral to test-paper. Its specific gravity at 78° was 0.939.

Sulphuric acid combines with it without charring, forming a colourless or pinkish crystalline mass, soluble in water and yielding a soluble salt with baryta.

Nitric acid, aided by heat, oxidises it rapidly, and gives rise to the production of a gamboge-yellow, sticky resin.

A crystal thrown into nitro-muriatic acid causes the instant formation of a dark green colour, which passes after a few minutes into brown, with the formation of a resin.

It did not combine with hydrate of soda, or with a strong solution of potassa. Heated with solid potassa, it yielded no ammonia.

It was analysed by combustion with oxide of copper.

- I. 5.31 grains yielded 4.57 of water. (The carbonic acid was lost.)
 II. 5.73 " " 4.93 " and 16.75 of carbonic acid.
 III. 6.67 " " 5.72 " 19.43 " "

Its composition is, therefore, as follows :—

Calculated.			Found.		
			I.	II.	III.
20 C	120	80.00	—	79.72	79.45
14 H	14	9.33	9.56	9.56	9.53
2 O	16	10.67	—	10.72	10.02
	150	100.00		100.00	100.00

* I have not been able to discover by what method the natives contrive to obtain the stearoptene from the oil: it is probably so loaded with it as to crystallise out on dropping in a fragment ready formed, without its being necessary to re-distil the oil.

It is evidently, therefore, identical with the stearoptene of the oil of thyme, or thymole, described by M. Lallemand in the *Comptes rendus* of Sept. 26th, 1853. I could not observe, however, the property which M. Lallemand assigns to thymole,—of combining with caustic alkalies. The reaction with nitro-muriatic acid is also, I believe, new.

Oil of Ajwa, then, combines the properties of the oils of cumin and thyme, having the hydrocarbon of the one, and the oxidised oil of the other, thus :—

and it thus presents an exception to the general relation of the components of volatile oils, the stearoptene being simply the hydrocarbon *plus* oxygen, without the separation of any portion of the hydrogen.