

LXXXVIII.—*Certain Products from Teak.* Preliminary Notice.

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It is commonly stated in works on Indian forestry that teak yields an oil by distillation which is used as a varnish. Last year a specimen of this varnish was required for a collection of forest products, but it was found that the natives of the country know nothing of it, and there can be little doubt that the statement referred to originated in a confusion between the teak tree and the kanyin, a species of *Dipterocarpus* which yields gurjun oil and a fine timber.

I was desired to ascertain if the oil could not be extracted in any other way. On examination, I found that alcohol extracts about

6 per cent. of a soft resin from teak but no oil or varnish. This resin is a mixture of several substances. When extracted from freshly cut teak, it is entirely soluble in chloroform, but the resin from wood that has been long exposed to the air is only partly soluble; this change is due to oxidation. A specimen of the resin which had been long exposed to the air gave the following results on combustion:—

C.....	60·91
H.....	6·81
O.....	32·28

Whilst the substance insoluble in chloroform gave—

C.....	60·20
H.....	6·98
O.....	32·82

The substance soluble in chloroform gave results which varied with the time it had been prepared and the temperature at which it was dried.

	I.	II.	III.
C	75·20	74·91	73·48
H	9·25	7·17	9·38
O	15·55	17·92	17·14

It was found that the resin melts below 100°, and gives off volatile products, principally a substance that sublimes in dendritic forms and crystallises from alcohol in spirals or in stellate groups of prismatic crystals. It is also found as an efflorescence in soft feathery crystals on the surface of the resin when this is kept for a few months.

When the resin is distilled, the distillate is a felted mass of crystals having a sweet smell like that of myrrh or incense, whilst a black shining coke is left in the retort; the crystalline substance may be purified from adhering oil by recrystallisation from hot alcohol, but it seems to retain the last traces with great obstinacy. When teak is exposed to destructive distillation the following products are obtained:—

Heavy tar	10·6 p.c.
Watery distillate.....	36·0 „
Light oil	3·4 „
Charcoal	35·0 „
Uncondensed	15·0 „
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	100·0

The tar contains the crystalline substance in considerable quantity; it may be extracted by adding an excess of caustic soda, when much

heat is evolved and the substance is precipitated as a curdy mass which soon becomes crystalline. It is purified from the soda solution by washing and crystallisation from hot alcohol. The analysis points to the formula C_9H_8O as the lowest possible. Burnt with oxide of copper in a stream of oxygen it gave the following results. I give the whole series:—

	I.	II.	III.	IV.	V.	VI.	VII.	VIII.
C	81.18	81.58	81.52	81.67	80.20	81.22	80.47	80.82
H	9.70	7.33	7.28	6.05	6.47	6.28	6.12	6.54

The first three must obviously be rejected, as the oxide of copper had not got into working order. No. IV was I believe the purest preparation. The hydrogen is naturally high, as the work was performed in an atmosphere saturated with moisture at 30° C. C_9H_8O requires C 81.8, H 6.06. This substance is partially decomposed on heating, hence its vapour-density could not be determined by V. Meyer's method, which gave results ranging from 86 to 50. Among the products of decomposition was an oil with the odour of beeswax.

The crystals dissolve in sulphuric acid with a yellow colour, and are precipitated on dilution. Nitric acid acts in a similar way, but on heating it with a mixture of the two acids, and diluting with water, a yellow nitro-derivative was precipitated. On washing the precipitate with hot alcohol, a crimson substance with a golden surface colour was extracted.

The yellow nitro-derivative dissolves when heated with strong sulphuric acid, forming a red solution from which water precipitates purple flocks, soluble in alkali with a bright blue colour.

The yellow compound gave on analysis—

	I.	II.	III.
C	57.71	57.69	58.27
H	4.70	4.0	4.12

The crimson substance—

C	57.35
H	5.13

The purple substance—

C	42.0
H	4.56

I had only very small quantities at my disposal and I have not been able to repeat the analysis. On making a second preparation of the nitro-derivative the action was stopped after half an hour instead of

allowing it to go on one and half hours ; in this case, as at first, a product was obtained which gave 65.40 per cent. C and 5.91 H.

From these reactions it may be inferred that the new compound is a quinone, $C_{18}H_{16}O_2$, and that the products obtained by the action of nitric acid were in the first case a dinitro- and in the second a mixture in equal parts of the di- and mono-nitroquinone, and the coloured products are analogous to those obtained from anthraquinone under similar conditions. When treated with sodium amalgam in alcoholic solution, the liquid in contact with the amalgam first turns crimson, but as it mixes with the solution it becomes green and then yellow, and the original substance is reproduced. Sodium amalgam acting on the crystals under the surface of ether turns them into a green mass, which on exposure to the air rapidly decomposes into caustic soda and the original compound.

The quinol corresponding with this compound, which may be named *tectone*, is therefore very unstable. There are other coloured derivatives which have not yet been examined, but I have set up apparatus for the destructive distillation of teak on a larger scale, and hope soon to be able to communicate the results to the Society.
