XL.—*The Maximum Pressure of Camphor Vapour.*

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In the preceding paper were recorded the results of some experiments on the maximum vapour pressure of naphthalene at moderate temperatures both by the "evaporation" and "barometric" methods, and the values found by the two methods were seen to be identical. The following experiments with camphor were made with the view of further testing the accuracy of the "evaporation method," and as the numbers obtained differ somewhat from those usually accepted, it seemed desirable to communicate them to the Society. Camphor was selected for experiment because its maximum vapour pressure at moderate temperatures was as uncertain as that of naphthalene, as may be seen from the adjoined table, which contains the two sets of values found by Ramsay and Young (*Phil. Trans.*, 1884, Part I, 45), the first set measured in the barometric vacuum, the second in the apparatus they devised and described in the paper quoted.

Table I.

Temperature.	Vapour pressure found in barometric vacuum.	Vapour pressure found by Ramsay and Young.
20°	1 mm.	
35	1·8 ,,	
41·2		1·7 mm.
62·4	6·4 ,,	
68·9		7·2 ,,
78·4	9·5 ,,	
92·4		15·4 ,,
100	22·6 ,,	
101		27·2 ,,

The agreement between the two sets of values is by no means perfect, as is very evident when they are plotted out as curves.

The camphor for my experiments was purified by sublimation, and the light, feathery crystals thus obtained were dried over strong sulphuric acid. The apparatus and method of working were the same as with naphthalene.

The results obtained by the "evaporation method" are given in table II (p. 414).

TABLE II.

Temperature.	Duration of experiment.	Weight of camphor carried over.	Limit value.
15·6°	1 hour	0·0355 gram	0·038 gram
,,	3 hours	0·0357 ,,	
35°	1 hour	0·0930 ,,	0·101 ,,
,,	1½ hours	0·0933 ,,	
,,	3 ,,	0·0942 ,,	
,,	4½ ,,	0·0950 ,,	
45°	3 ,,	0·2600 ,,	0·278 ,,
,,	6 ,,	0·2616 ,,	
49°	1½ hours	0·345 ,,	0·374 ,,
,,	3 ,,	0·350 ,,	
75°	3½ ,,	1·717 ,,	2·01 ,,
,,	5 ,,	1·738 ,,	
,,	7 ,,	1·748 ,,	

These results give for the vapour pressure of camphor at the several temperatures as calculated by Ostwald's formula ("Physico-Chemical Measurements," 114)

$$\text{vapour pressure} = \frac{62290\, gT}{m \quad v}\text{mm.}$$

the following values (Table III).

TABLE III.

Temperature.	Weight of camphor carried over.	Corresponding vapour pressure.
15·6°	0·038 gram	0·14 mm.
35·0	0·101 ,,	0·33 ,,
45·0	0·278 ,,	0·91 ,,
49·0	0·374 ,,	1·23 ,,
75·0	2·01 grams	6·59 ,,

The values found by the evaporation method were now confirmed, as in the case of naphthalene, by the "barometric method"; the method of working, being exactly the same as before, need not be described again. As in the case of naphthalene, it was found impossible to prevent a minute quantity of air passing up the tube; the depression of the mercurial column due to it was determined and allowed for in the same way as before.

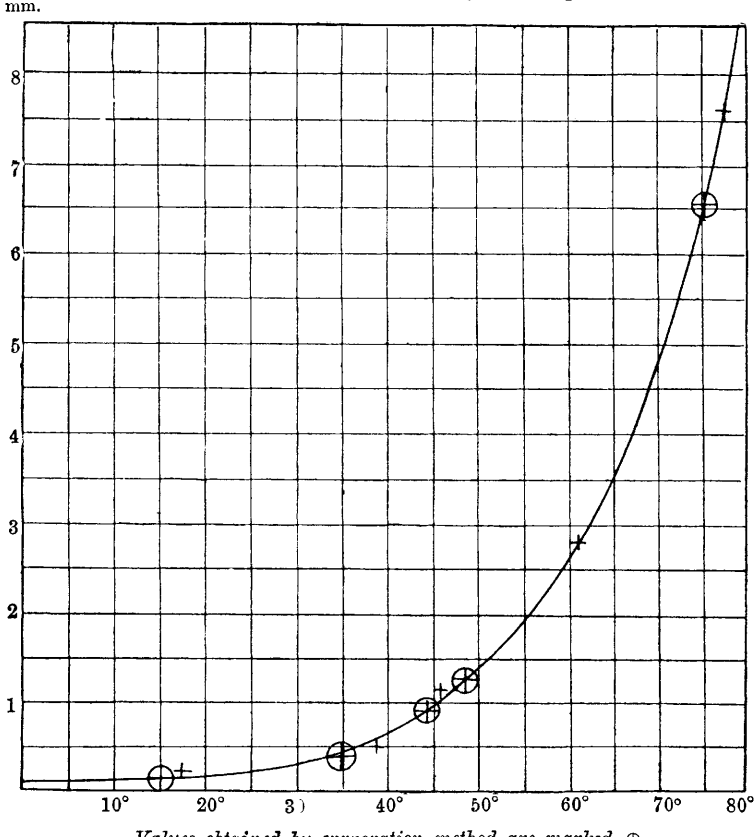
In table IV are given the results now obtained by the "barometric method."

TABLE IV.

Temperature.	Corresponding vapour pressure.
17·0°	0·15 mm.
39·0	0·53 ,,
46·6	1·11 ,,
61 8	2·82 ,,
78·2	7·62 ,,

The numbers found by the two methods when plotted out were all found to lie exactly on the same curve, and consequently are identical at the same temperatures.

Curve of Vapour Pressures for Camphor.



Values obtained by evaporation method are marked ⊕.
Values obtained by barometric method are marked +.

The exact concordance of the two sets of results is a further proof of the value of the "evaporation" method in the measurement of very low vapour pressures.

In the following table are given the maximum vapour pressures of camphor for every five degrees from 0° to 80° as read off from a curve where 20 divisions = 1 mm. of vapour pressure.

TABLE V.

Temperature.	Corresponding vapour pressure.	Temperature.	Corresponding vapour pressure.
0°	0·06 mm.	45°	0·90 mm.
5	0·08 ,,	50	1·30 ,,
10	0·10 ,,	55	1·85 ,,
15	0·12 ,,	60	2·55 ,,
20	0·15 ,,	65	3·40 ,,
25	0·19 ,,	70	4·60 ,,
30	0·26 ,,	75	6·50 ,,
35	0·38 ,,	80	9·15 ,,
40	0·60 ,,		