

(5) There is a close analogy between ozone and ammonia with regard to their synthesis and decomposition; both are formed by sparking, and both are completely decomposed by heat.

In conclusion, I wish to express my thanks to Mr. G. A. S. Atkinson, B.Sc., and to Mr. J. H. Davies, B.Sc., for valuable assistance rendered during the earlier and later portions of the work respectively.

### *Determination of Vapour-pressure by Air-bubbling.*

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It was shown recently by one of us\* that the vapour-pressure of water can be determined with a considerable degree of accuracy by bubbling a current of air through water in a thermostat, and estimating the amount of water evaporated by absorbing it in strong sulphuric acid.

The accuracy of the method has since been questioned,† supersaturation being specially suggested as likely to cause error. We have therefore made experiments in order to discover what error (if any) is introduced by supersaturating the air with moisture before it enters the water in the thermostat. The effect of dust in the air and of electrification have also been investigated. In each case the arrangement of the apparatus was as described in the previous paper.

*Supersaturation.*—Before passing into the flasks in the thermostat, which was maintained at 70°, the air was bubbled through a large wash-bottle containing water at about 85°. The wash-bottle was connected by a short rubber tube with the flasks at 70°. Otherwise the experiment was conducted as already described. The following results were obtained:—

W.	P.	T.	V.	p.	Vapour-pressure.
gramme.	mm.	° C.	litres.	mm.	mm.
0.6757	753.2	286.1	2.005	736.4	234.7
0.6706	749.3	288.1	2.005	730.2	234.8

The numbers obtained in the previous experiments were 234.2, 233.2, 234.5, 235.0, 233.5, and 233.5, while Regnault's number (corrected as described

\* 'Roy. Soc. Proc.,' vol. 72, p. 72, 1903.

† 'Journ. Phys. Chem.,' vol. 8, pp. 299 and 313, 1904.

in the former paper) is 234.0. The supersaturation of the air with moisture caused, therefore, no appreciable effect, the air assuming the normal state of saturation on passing through the four flasks in the thermostat. An explanation of the erratic results obtained by Carveth and Fowler\* has already been offered by one of us.†

*Dust in the Air.*—A thick smoke was made by burning pieces of phosphorus near the inlet tube of the apparatus described in the former paper. The smoke was maintained during the whole of the experiment. The result was as follows:—

W.	P.	T.	V.	p.	Vapour-pressure.
gramme.	mm.	° C.	litres.	mm.	mm.
0.3347	751.8	288.9	1.003	732	235.2

Although a little high, the result can hardly be taken to indicate that the fumes of phosphorus pentoxide had any effect on the amount of water carried off. No doubt there was such an effect in the first flask, but the state of the air became normal before it left the last one. The experiment was not repeated owing to its disagreeable character.

*Electrification of the Air.*—1. The air was made to pass through a large flask in which hydrogen was being rapidly evolved from zinc and dilute sulphuric acid; the air was thus mixed with electrified hydrogen; it was filtered from the acid spray by a plug of cotton-wool. The result was:—

W.	P.	T.	V.	p.	Vapour-pressure.
gramme.	mm.	° C.	litres.	mm.	mm.
0.3395	763.4	283.4	1.002	747.5	234.7

The effect of the electrification was probably limited to the first or first and second flasks, the result obtained again being normal.

2. One terminal of an induction-coil, capable of giving (with the battery power used) a 6-inch spark, was connected with a wire passing into the first (nearest the inlet) flask in the thermostat; the other terminal was connected with the bath, so that the silent discharge passed through the flasks and the air inside. The result was normal.

W.	P.	T.	V.	p.	Vapour-pressure.
gramme.	mm.	° C.	litres.	mm.	mm.
0.3365	763.4	283.8	1.002	747.3	233.6

\* *Loc. cit.*

† 'Journ. Phys. Chem.,' vol. 9, p. 36, 1905.



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3. The X-rays from an ordinary focus-tube were allowed to fall on the flasks in the thermostat, and were specially directed on to the last (nearest outlet). A wire from one of the terminals of a Wimshurst machine was passed down the gauge-tube into the last flask, the other terminal being connected with the bath. With this double arrangement it was thought that the air in the last flask must be strongly electrified and produce a fog. It was impossible to see whether there was a fog or not, but the effect on the vapour-pressure was as expected.

W. gramme.	P. mm.	T. ° C.	V. litres.	<i>p</i> . mm.	Vapour-pressure. mm.
0.3473	761.9	232.3	1.002	746.7	237.5
0.3473	761.4	282.9	1.002	745.8	238.0

The greatest deviation from the normal value obtained in these experiments—with the exception of the last two—is slightly over 0.5 per cent., which is almost exactly the same as that obtained in the original investigation.

It may safely be concluded, therefore, that no naturally occurring supersaturation, or dust, or electrification of the air would have any appreciable effect on the result.