

tained indicated that the *explosion* was transmitted from charge to charge at the rate of between 450 and 640 metres (1500 and 1800 feet) per second. These experiments with tubes showed that, when the relations between the amount of explosive material, the diameter of the tube, and the space intervening between the charges are such as to ensure the transmission of detonation, its rate is about one third of that at which it travels along a continuous mass, or continuous row of distinct masses, of the same material.

The concluding part of this memoir deals with a subject only incidentally referred to in the former memoir on explosive agents, and which has since that time acquired considerable importance—namely, the manner in which the accumulation of heat in a mass of explosive material, and other conditions, may operate in bringing about or promoting violent explosion or detonation.

February 12, 1874.

JOSEPH DALTON HOOKER, C.B., President, in the Chair.

The Presents received were laid on the table, and thanks ordered for them.

The following communications were read :—

I. "Note on the Synthesis of Formic Aldehyde." By Sir B. C. BRODIE, Bart., F.R.S. Received February 5, 1874.

In a former note I communicated to the Society the result of an experiment in which a mixture of equal (or nearly equal) volumes of hydrogen and carbonic oxide had been submitted, in the induction-tube, to the electric action. My expectation in making the experiment had been that the synthesis of formic aldehyde would be thus effected according to the equation  $\text{CO} + \text{H}_2 = \text{COH}_2$ . The only permanent gas, however, other than the gases originally present in the induction-tube, which appeared in the result of the experiment was marsh-gas. When a mixture of hydrogen and carbonic acid gas was similarly operated upon, the same hydrocarbon, together with carbonic oxide, was formed. I have now, however, succeeded, by a modification in the conditions of the latter experiment, in attaining the object which I originally had in view. Evidence of this is afforded by the following analysis :—The gas analyzed was the result of submitting to the electric action about equal volumes of hydrogen and carbonic acid. After removal from the gas of carbonic acid and carbonic oxide, and also of a trace of oxygen, 191·2 volumes of gas remained, in which were found, at the conclusion of the analysis, 2·6 volumes of nitrogen. Deducting this amount of nitrogen, 188·6 volumes of gas remain, containing the residual hydrogen in the gas, together with

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any gases besides carbonic oxide formed in the experiment. This gas was analyzed by the addition of oxygen and subsequent detonation by the electric spark, the absorption of the carbonic acid by potash, and the removal of the oxygen over by pyrogallate of potash. The results of the analysis entirely concur with the assumption that the 188·6 volumes of gas were constituted of hydrogen, marsh-gas, and formic aldehyde in the proportions given below:—

Hydrogen .....	183·2
Marsh-gas .....	0·2
Formic aldehyde.....	5·2
	<hr/>
	188·6

The composition of 100 volumes of the gas being,

Hydrogen .....	97·14
Marsh-gas .....	0·10
Formic aldehyde.....	2·76
	<hr/>
	100·00

Another experiment was attended with similar results, only that the proportion of marsh-gas was somewhat greater.

The result of this experiment may be considered to be given in the equation  $\text{CO}_2 + 2\text{H}_2 = \text{COH}_2 + \text{H}_2\text{O}$ . I have reason to believe that formic aldehyde is also formed in the reaction of hydrogen and carbonic oxide, and that the marsh-gas found (in both experiments) results from the decomposition of this substance, possibly according to the equation  $2\text{COH}_2 = \text{CO}_2 + \text{CH}_4$ . I do not now dwell upon this subject, as it is my intention very speedily to lay before the Society, together with other matters, the details of the various experiments which I have made in reference to it.

## II. "On the Influence of Brandy on the Bodily Temperature, the Pulse, and the Respirations of Healthy Men." By E. A. PARKES, M.D., F.R.S., Professor of Hygiene, Army Medical School. Received November 29, 1873.

In the Proceedings of the Royal Society (Nos 120, 123, and 136) the details of experiments are given which show that in two healthy men pure ethyl alcohol, brandy, and claret, given at intervals during the day, produced no effect on the temperature of the body as measured in the axilla and rectum.

This result is in accordance with the experiments of several other observers, while there are some experimenters who have noticed a decrease in temperature in healthy men after the use of alcohol. In some cases of disease in men and in some healthy animals alcohol has caused, it would seem, a decided lessening of temperature.