

LXXVIII.—*The Action of Nitrogen Peroxide on Cuprous Oxide.*

By JAMES RIDDICK PARTINGTON.

IN a recent communication (Park and Partington, this vol., p. 72), it was shown that the action of nitrogen peroxide on copper is primarily represented by the equation $2\text{Cu} + \text{NO}_2 = \text{Cu}_2\text{O} + \text{NO}$,
A A* 2

followed by adsorption of nitrogen peroxide on cuprous oxide. The second phase of the process has now been investigated separately, and it has been shown that cuprous oxide freed from water by ignition takes up more than 30 per cent. of its weight of nitrogen peroxide gas without the slightest indication of the occurrence of chemical change. No reduction of nitrogen peroxide occurs. The results also show that the cuprous oxide formed in the primary reaction between copper and nitrogen peroxide is not in any peculiarly active form, since the ignited crystalline oxide adsorbs nitrogen peroxide equally well.

Cuprous Oxide.—This was prepared by several methods, but the most satisfactory product was obtained by reduction of Fehling's solution with glucose. The product was washed and dried at 130° . The method described by Russell (*Chem. News*, 1894, 68, 308) was not found satisfactory, as the cuprous chloride, which precipitates when a solution of cupric sulphate and sodium chloride saturated with sulphur dioxide is warmed, is attacked only slowly and incompletely by sodium carbonate solution.

The cuprous oxide dried at 130° contains water which is not driven off below a red heat. The oxide was heated to redness for half an hour in porcelain boats in a silica tube in a stream of pure dry nitrogen, and kept in a desiccator over phosphoric oxide. The product was in friable pieces, bright red in colour. It was rapidly transferred to a boat and weighed inside a closed tube.

Apparatus.—This consisted of the portion *LNQPAS* shown in Fig. 1 of the previous paper (p. 75) with the addition of a supply of pure dry nitrogen at *P* and the condensing vessel α attached to *S*. Nitrogen bubbled from this through a tube containing sulphuric acid. The boat containing the cuprous oxide was introduced into *A*, previously filled with nitrogen. The small amount of air which entered was displaced by nitrogen, and *A* was then filled up with nitrogen peroxide. In the first experiment, a slow current of this gas was kept up for half an hour, the bulb α being kept in a freezing mixture. In the second experiment the whole apparatus was filled with nitrogen peroxide, the exit from α was sealed off, and the cuprous oxide exposed to the gas for forty-eight hours. In both cases, the gas in the tube was finally displaced by nitrogen, the bulb α being in a freezing mixture.

In experiment 1, 1.6537 grams of cuprous oxide increased in weight by 0.3946 gram after half an hour, representing an absorption of 23.86 per cent. of nitrogen peroxide. The liquid condensed in α had only a slight green tinge, due to slight action on the grease of the ground joints. No change in appearance of the cuprous oxide occurred and no rise of temperature was noticed. In experi-

ment 2, 1.0153 grams of cuprous oxide increased in weight by 0.3235 gram, representing an absorption of 31.86 per cent. of nitrogen peroxide. No change in appearance of the cuprous oxide, beyond the appearance of a few green specks due to traces of moisture, taken up in transferring the oxide, was noticed; there was no rise in temperature, and the liquid nitrogen peroxide condensed in α was pure yellow, indicating complete absence of nitric oxide.

In both cases, the product gave off small amounts of nitrogen peroxide on keeping in a closed tube. It reacted violently with water in exactly the same way as nitro-copper. Cuprous oxide was found to be without visible action on liquid nitrogen peroxide. No change of colour or rise of temperature occurred.

EAST LONDON COLLEGE,
UNIVERSITY OF LONDON.

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