

dioxide solution (carbon dioxide and nitrogen dioxide), 252.2 cc. was nitrous oxide (corresponding to about 84% of the ammonium nitrate), 6.4 cc. oxygen (corresponding to about 8.5% of the ammonium nitrate), and 28.4 cc. nitrogen (calculated on the basis of the oxygen, 29.6 cc.).

In a similar experiment, 258.8 cc. of gas was collected, 29.1 cc. absorbed by potassium hydroxide, 258.8 cc. nitrous oxide (about 86.3%), 6.9 cc. oxygen (about 9.2%), and 33.6 cc. nitrogen (calculated on the basis of oxygen 32.2 cc.).

In another experiment the solution of ammonium nitrate in sulfuric acid was allowed to stand for two hours before it was heated. At the end of this time it smelled strongly of nitric oxide. It gave off its gas between 158° and 250°, a total of 213.5 cc. of which 28.3 cc. was absorbed by potassium hydroxide, 157.7 cc. was nitrous oxide (about 53.6%), 6.9 cc. oxygen (about 9.2%), and 20.6 cc. of nitrogen (calculated on the basis of oxygen, 32.2 cc.). The disproportion between the volumes of oxygen and nitrogen indicates some other reaction than those mentioned above. In another experiment in which the solution was allowed to stand overnight before it was heated, only 5% of the calculated amount of nitrous oxide was obtained.

When 1 g. of ammonium nitrate and 30 cc. of 85% orthophosphoric acid were heated together in an apparatus swept out before and after the experiment with oxygen, 70.0 cc. of gas was obtained between 182° and 300°, of which 3.0 cc. was nitric oxide, 17.0 cc. nitrous oxide (about 5.7%), 11.5 cc. nitrogen, and the remainder oxygen. In a similar experiment with 35 g. of metaphosphoric acid, the gas, 254.9 cc., came off between 195° and 270°; 2.2 cc. was nitric oxide, 112.7 cc. nitrous oxide (about 37.6%), 56.7 cc. nitrogen, and the remainder oxygen. With the phosphoric acids the tendency toward dehydration is apparently less and that toward other reactions apparently greater.

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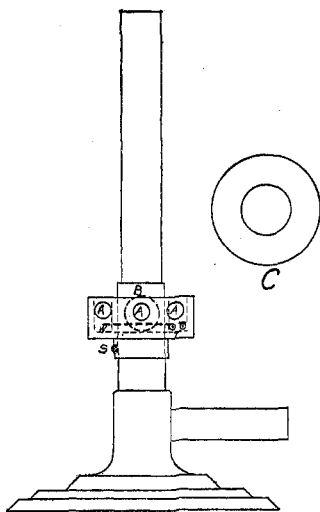
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A Monochromatic Illuminator for Gas Flames.—When it is desired to examine the spectrum of a metal it is customary to dip a platinum wire into a salt of the metal and then hold it in the flame, repeating the action as need may arise. In making some spectrum photographs the writer recently found a more efficient means of illumination necessary. The essentials of the illuminator which was developed are indicated in the accompanying sketch.

The illuminator consists of a circular trough, made from porcelain or

other non-conductor of electricity, of such a size as to slip easily over the tube of a Bunsen burner. It is placed at such a height on the burner as to cover the air inlet, B, completely. The set screw, S, serves to hold the attachment at the desired point. A wire, W, of platinum, Nichrome, or other metal of high melting point, lies in the trough encircling the burner, its ends passing through the outer wall of the trough at T.



The outer wall is pierced by a number of small holes, A, and the inner wall by larger ones which correspond to the air inlet of the burner.

The ends of the wire at T are connected, through a variable resistance, with the lighting circuit. The resistance is so adjusted that when the current is passing, the wire is heated to a bright red. The salt whose spectrum is to be examined is placed in the trough, covering the wire. It is vaporized by the heat from the wire and the vapor is drawn into the burner, becoming thoroughly mixed with the gas to be burned. The intensity of illumination may be increased by increasing the current, thus raising the temperature of the wire and increasing the amount of salt vaporized.

It is best to cover the trough with a disk, C, which has a hole of such size that it slips easily over the tube of the burner, tightly covering the trough. This compels the air for the flame to enter by A, insuring its mixture with a maximum amount of salt vapor.

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