

beginner. In length, the blowpipe varies from about seven-and-a-half to nine inches, according to the eyesight of the operator.

### § 2.

#### ACCESSORY APPLIANCES AND REAGENTS.

In addition to the blowpipe itself, and the forceps described above, a few other instruments and appliances are required in blowpipe operations.\* The principal of these comprise: Some well-burnt, soft-wood charcoal, and a thin narrow saw-blade to saw the charcoal into rectangular blocks for convenient use; a few pieces of platinum wire, three or four inches in length, of about the thickness of thin twine, to serve as a support in fusions with borax, &c. (see below); some pieces of open glass-tubing of narrow diameter, and two or three small glass flasks, or, in default, a narrow test-tube or two—the latter used chiefly for the detection of water in minerals (see below); a small hammer and anvil, or piece of hard steel, half-an-inch thick, polished on one of its faces; a triangular file; a bar or horse-shoe magnet; a pen-knife or small steel spatula; a small agate pestle and mortar; a small spirit-lamp; a platinum spoon; a small porcelain capsule with handle; and eight or ten turned wooden boxes or small stoppered bottles to hold the blowpipe reagents. These latter are employed for the greater part in the solid state, a condition which adds much to their portability, and renders a small quantity sufficient for a great number of experiments. The principal comprise: Carbonate of soda (abbreviated into *carb. soda*, in the following pages), used largely for the reduction of metallic oxides and detection of sulphides and sulphates, manganese, &c., as explained below; biborate of soda, or borax, used principally for fusions on the platinum wire, many substances communicating peculiar colours to the glass thus formed; and phosphate of soda and ammonia, commonly known as microcosmic salt or phosphor-salt, used for the same purposes as borax, and also for the detection of silicates and chlorides, as explained further on. Reagents of less common use comprise: nitrate of cobalt (in solution); bisulphate of potash; black oxide of copper; chloride of barium; metallic tin; bone ash; strips of yellow turmeric paper, and blue and red litmus paper; with a few other substances of special employment, mentioned under § 5, below.

\* Only the more necessary operations, instruments, &c., are here alluded to.

STRUCTURE

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FIG. 6.

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