

§ 3.

STRUCTURAL PARTS AND CHEMICAL PROPERTIES OF FLAME.

The effects produced by the blowpipe cannot be properly understood without a preliminary knowledge of the general composition and structural parts of Flame. If the flame of a lamp or candle, standing in a place free from draughts, be carefully examined, it will be seen to consist of four more or less distinct parts, as shewn in the annexed

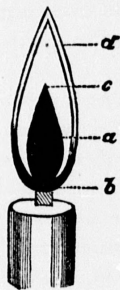


FIG. 6.

diagram, Fig. 6. A dark cone, *a*, will be seen in the centre of the flame. This consists of gases, compounds of carbon and hydrogen, which issue from the wick, but which cannot burn, as they are cut off from contact with the atmosphere. A bright luminous cone surrounds this dark central portion, except at its extreme base. In this bright cone the carbon, or a portion of it, separates from the hydrogen of the gaseous compounds pumped up by the wick. The carbon becomes ignited in the form of minute particles, and these, with the liberated hydrogen and undecomposed gas, are driven partly outwards, and partly downwards, or into the blue cup-shaped portion which lies at the base of the flame. At this latter spot, the carbon, meeting with a certain supply of oxygen, is converted into carbonic oxide, a compound of equal combining-weights of carbon and oxygen. Finally, in the flame-border or outer envelope, of a pale pinkish colour, only discernible on close inspection, complete combustion, *i.e.*, union with oxygen, of both gases, carbon and hydrogen, takes place. The carbon burns into carbonic acid, a compound of two combining weights of oxygen with one of carbon; and the hydrogen, uniting with oxygen, forms aqueous vapour. If a cold and polished body, for example, be brought in contact with the edge of a flame of any kind, its surface will exhibit a streak or line of moisture.

These different parts of flame, possess, to some extent, different properties. The dark inner cone is entirely neutral or inert. Bodies placed in it become covered with soot or unburnt carbon. The luminous or yellow cone possesses *reducing powers*. Its component gases, requiring oxygen for their combustion, are ready to take this from oxidized bodies placed in contact with them. This luminous cone, however, in its normal state, has not a sufficiently high temperature

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