## REACTIONS.

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flame-border which originates during the fusion of a chloride with a bead of phosphor-salt coloured by oxide of copper. The fusion may be performed on a loop of platinum wire, the phosphor-salt being first fused with some black oxide of copper into a somewhat deeply coloured glass, and the test-substance, in the form of powder, being then added. Or the fusion may be made on a thin copper-wire with phosphor-salt alone, the end of the wire being cut off after each experiment. By this treatment, chlorides become decomposed, and chloride of copper is formed. The latter compound rapidly volatilizes, and imparts a remarkably vivid bright-blue colour to the flame. The coloration soon passes, but can, of course, be renewed by the addition of fresh test-matter to the bead. Care must be taken to use pure phosphor-salt, as that reagent, unless carefully made, is frequently found to contain traces of chloride of sodium.

Oxidized chlorine-compounds do not occur as minerals, but it may be stated that chlorates produce the same flame-reaction as chlorides, when fused with phosphor-salt and copper oxide. All chlorates, however, detonate like nitrates, only more violently, when ignited in contact with carbonaceous bodies; and they turn yellow, decrepitate, and emit greenish fumes when warmed with a few drops of sulphuric acid (or fused with bisulphate of potash) in a test-tube. The fumes smell strongly of chlorine, and bleach moistened litmus paper. Chlorides, when thus treated with sulphuric acid, effervesce and give off white fumes of hydrochloric acid.

(7) Bromine.—Only known, among minerals, in some rare silver bromides. Its blowpipe reactions closely resemble those of chlorine, but the flame-coloration of bromide of copper is a bright blue with green streaks and edges. A small sharply-pointed flame is required to shew the reaction properly; and care must be taken not to add the test-matter to the cupreous phosphor-salt bead until all traces of the green coloration, arising from the oxide of copper, have disappeared. Heated in a test-tube with sulphuric acid (or fused with large excess of bisulphate of potash) bromides yield brownish or yellowishred, strongly smelling vapours of bromine. Bromates produce the same reaction, but this is accompanied by sharp decrepitation; and when fused on charcoal they detonate more or less violently. (See Appendix, No. 20).