COMMON REACTIONS*

Chlorine combines readily with iron wool, which ignites in chlorine gas to form $FeCl_3$.

With Metals to Form Halides

Example: $Mg(s) + Cl_2(g) \longrightarrow MgCl_2(s)$

Example: $Sn(s) + 2F_2(g) \longrightarrow SnF_4(s)$

The halide formula depends on the oxidation state of the metal.

With Hydrogen to Form Hydrogen Halides

Example: $H_2(g) + F_2(g) \rightarrow 2HF(g)$

Cl_2, Br_2, and I_2 also follow this pattern.

With Nonmetals and Metalloids to Form Halides

Example: $Si(s) + 2Cl_2(g) \longrightarrow SiCl_4(s)$

Example: $N_2(g) + 3F_2(g) \longrightarrow 2NF_3(g)$

Example: $P_4(s) + 6Br_2(l) \longrightarrow 4PBr_3(s)$

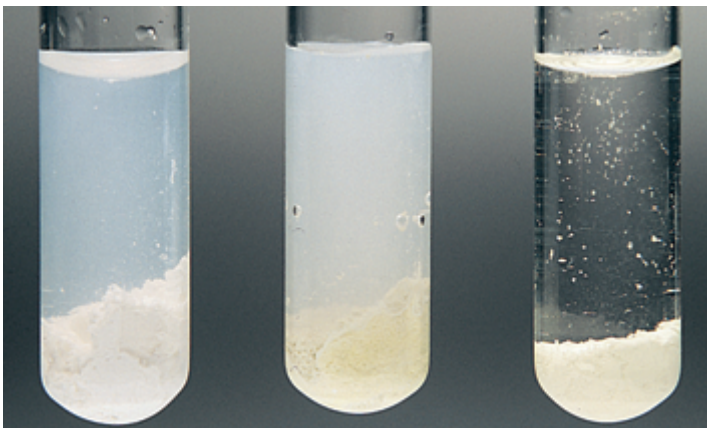
The formula of the halide depends on the oxidation state of the metalloid or nonmetal.

With Other Halogens to Form Interhalogen Compounds

Example: $Br_2(l) + 3F_2(g) \longrightarrow 2BrF_3(l)$

* Chemists assume that astatine undergoes similar reactions, but few chemical tests have been made.

Hydrofluoric acid is used to etch patterns into glass.



Shown here from left to right are precipitates of AgCl, AgBr, and AgI.

ANALYTICAL TEST

As with most elements, the presence of each of the halogens can be determined by atomic absorption spectroscopy. Fluorides react with concentrated sulfuric acid, H_2SO_4, to release hydrogen fluoride gas. Three of the halide ions can be identified in solution by their reactions with silver nitrate.

$Cl^-(aq) + Ag^+(aq) \longrightarrow AgCl(s)$

$Br^-(aq) + Ag^+(aq) \longrightarrow AgBr(s)$

$I^-(aq) + Ag^+(aq) \longrightarrow AgI(s)$