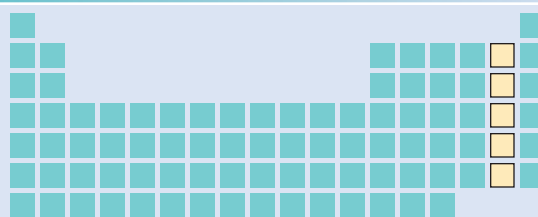


GROUP 17 HALOGEN FAMILY

CHARACTERISTICS

- are all nonmetals and occur in combined form in nature, mainly as metal halides
- are found in the rocks of Earth's crust and dissolved in sea water
- range from fluorine, the 13th most abundant element, to astatine, which is one of the rarest elements
- exist at room temperature as a gas (F_2 and Cl_2), a liquid (Br_2), and a solid (I_2 and At)
- consist of atoms that have seven electrons in their outermost energy level
- tend to gain one electron to form a halide, X^- ion, but also share electrons and have positive oxidation states
- are reactive, with fluorine being the most reactive of all nonmetals



9
F
Fluorine
18.998 4032
[He] $2s^2 2p^5$

17
Cl
Chlorine
35.453
[Ne] $3s^2 3p^5$

35
Br
Bromine
79.904
[Ar] $3d^{10} 4s^2 4p^5$

53
I
Iodine
126.904 47
[Kr] $4d^{10} 5s^2 5p^5$

85
At
Astatine
(210)
[Xe] $4f^{14} 5d^{10} 6s^2 6p^5$

Atomic radius
increases

Ionic radius
increases

Ionization energy
decreases

Electronegativity
decreases



Halogens are the only family that contains elements representing all three states of matter at room temperature. Chlorine is a yellowish green gas; bromine is a reddish brown liquid; and iodine is a purple-black solid.

Iodine sublimates to produce a violet vapor that recrystallizes on the bottom of the evaporating dish filled with ice.