Halide Encyclopedia Article

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Halides are defined as binary compounds containing a halogen. Because **halogens** are highly electronegative, their atoms normally retain negative charge in these compounds. The magnitude of this negative charge depends on the difference in the two constituent's electronegativities.

The nature of the bonds between molecules determines the physical properties of the halides, and the distinction between ionic and covalent halides provides a basis for understanding these molecules. In the *ionic* halides, such as **sodium** chloride, all of the **bonding** electrons are transferred to the halogen, producing a halide **ion**. Interionic forces are large, so these halides have high melting and boiling points. In *covalent* halides, such as **carbon** tetrachloride, the bonding electrons are localized in the carbon-chlorine bonds of the individual molecules. The **intermolecular forces** in covalent halides are so weak that these molecules usually exist as **gases**, **liquids**, or low melting-point **solids**. Many elements form fluorides, however, that cannot be labeled covalent or ionic; these halides exhibit the characteristics of polymeric compounds.

The group IA elements (lithium, sodium, **potassium**, **rubidium**, cesium) readily lose their single **valence electron** to form singly charged cations. All of the halides of these elements are ionic compounds, and they all have high melting points. Examples include LiF, NaCl, and NaI.

The group IIA and IIB elements (beryllium, **magnesium**, **calcium**, **strontium**, **barium**, **zinc**, **cadmium**, mercury) also tend to form ionic halides. Examples include $MgCl_2$, and $CaBr_2$.

The group III and IV elements (boron, **aluminum**, **gallium**, **indium**, carbon, **silicon**, **germanium**, tin), on the other hand, tend to form covalent halides. Examples include BF_3 and $SiCl_4$.

The group V and VI elements (nitrogen, phosphorous, **arsenic**, **antimony**, **oxygen**, **sulfur**, **selenium**, tellurium) form covalent halides exclusively. Examples include NF_3 and SCl_2.

The group VII elements (fluorine, **chlorine**, **bromine**, and iodine) can form simple halides like I_2, but also more complex molecules like ClF_3.