Topic Page: Fluorine

Definition: **fluorine** from *Dictionary of Energy*

Chemistry. a nonmetallic element having the symbol F, the atomic number 9, an atomic weight of 18.998, a melting point of -219°C, and a boiling point of -188°C; a member of the halogen family, the most electronegative element and the strongest oxidizing agent. Used in the enrichment of uranium and manufacture of refrigerants and plastics.

Image from: **Amblygonite** in *Guide to Minerals, Rocks and Fossils*

Summary Article: **fluorine**
From *The Columbia Encyclopedia*

(flō'ərēn, –rĭn), gaseous chemical element; symbol F; at. no. 9; at. wt. 18.9984; m.p. −219.6 degrees Celsius; b.p. −188.14 degrees Celsius; density 1.696 grams per liter at STP; valence −1. Fluorine is a yellowish, poisonous, highly corrosive gas. It is the most chemically active nonmetallic element and is the most electronegative of all the elements. It is a member of Group 17 (the halogens) of the periodic table.

Fluorine readily displaces the other halogens from their salts. It combines spontaneously with most other elements—exceptions are chlorine, nitrogen, oxygen, and the so-called inert gases (helium, neon, argon, krypton, xenon, and radon), but it even combines with most of these when heated. Fluorine reacts with most inorganic and organic compounds. With hydrogen it forms hydrogen fluoride gas, whose water solution is called hydrofluoric acid.

Because of its extreme reactivity, fluorine does not occur uncombined in nature. Fluorine gas is produced commercially by electrolysis of a solution of hydrogen fluoride containing potassium hydrogen fluoride. The mineral fluorite, or fluorspar (calcium fluoride), is the chief commercial source. Cryolite and apatite are other important natural compounds.

The importance of fluorine lies largely in its compounds. Fluorite is used as a flux in refining iron; cryolite serves as the electrolyte in the production of aluminum. Compounds of fluorine are also used in the ceramic and glass industries; hydrofluoric acid is used to etch glass and in the manufacture of light bulbs. The addition of one part per million of soluble fluorides to public water supplies has reduced the incidence of tooth decay in many communities, but water with naturally occurring levels as low as four parts per million can damage teeth and bones. In even larger amounts fluorine and fluoride compounds are poisonous. Sodium fluoride is employed as an insecticide.

Halocarbons (compounds of carbon, fluorine, chlorine, and hydrogen) are used extensively in refrigeration and air-conditioning systems. They were widely used as aerosol propellants; but, since they cause depletion of the ozone layer, government restrictions have nearly abolished such use. The linking of fluorine and carbon has created some of the most chemically inert compounds known. Fluorocarbons such as Teflon have found extensive use as lubricants and bearing materials because of their low friction. Because of their inertness and heat resistance they may be used, for example, as a coating on cooking ware. Because they are not wetted by water or oils, they are sometimes used to add antisoil properties to textiles.

The use of fluorite as a flux was described in 1529 by Georgius Agricola. Many early chemists

experimented with hydrogen fluoride gas, among them Scheele, Davy, Lavoisier, and Gay-Lussac. Fluorine gas was first prepared in 1886 by Henri Moissan after nearly three quarters of a century of effort. There was no commercial production of fluorine before World War II, when the use of the gas in a process for refining uranium ores prompted its manufacture.

 *The Columbia Encyclopedia, © Columbia University Press 2018*

APA

fluorine. (2018). In P. Lagasse, & Columbia University, *The Columbia encyclopedia* (8th ed.). New York, NY: Columbia University Press. Retrieved from https://search.credoreference.com/content/topic/fluorine

Chicago

"fluorine." In *The Columbia Encyclopedia*, by Paul Lagasse, and Columbia University. 8th ed. Columbia University Press, 2018. https://search.credoreference.com/content/topic/fluorine

Harvard

fluorine. (2018). In P. Lagasse & Columbia University, *The Columbia encyclopedia*. (8th ed.). [Online]. New York: Columbia University Press. Available from: https://search.credoreference.com/content/topic/fluorine [Accessed 12 November 2019].

MLA

"fluorine." *The Columbia Encyclopedia*, Paul Lagasse, and Columbia University, Columbia University Press, 8th edition, 2018. *Credo Reference*, https://search.credoreference.com/content/topic/fluorine. Accessed 12 Nov. 2019.