

Stable Isotopes of Fluorine

Isotope	Z(p)	N(n)	Atomic Mass	Natural Abundance	Nuclear Spin
F-19	9	10	18.9984033	100.00%	1/2+



Fluorine, first isolated in 1886 by Nobel Prize chemist Ferdinand Frederic Henri Moisson, is named for the Latin word *fluere*, meaning "to flow." It is the most electronegative element in the periodic table, the most reactive nonmetal, and the most powerful oxidizing agent. Because of fluorine's high reactivity, many of its reactions are violent and may cause explosions if not carried out under controlled conditions. Reactions with hydrogen, acetylene, ammonia, chlorine dioxide, sulfur dioxide and a number of organics can be explosive. Also, it forms shock-sensitive products with a number of compounds including perchloric acid, nitric acid, alkali metal nitrates and nitrites, azides and sodium acetate. Reaction with water is violent even at low temperatures. A large number of inorganic and organic substances ignite in a fluorine atmosphere.

Fluorine is used in the separation of uranium, neptunium and plutonium isotopes by converting them into hexafluorides followed by gaseous diffusion. It is used as an oxidizer in rocket-fuel mixtures. Other applications include the production of many fluoro compounds of commercial importance, such as sulfur hexafluoride, chlorine trifluoride and various fluorocarbons.

Fluorine gas is a severe irritant to eyes, skin and mucous membranes. Acute exposure can cause respiratory tract irritation to pulmonary edema. Chronic exposure can cause mottling of teeth and injury to lungs, liver and kidneys.

Properties of Fluorine

Name	Fluorine
Symbol	F
Atomic number	9
Atomic weight	18.9984033
Standard state	Gas at 298 °K
CAS Registry ID	7782-41-4
Group in periodic table	17
Group name	Halogen
Period in periodic table	2
Block in periodic table	p-block

Properties of Fluorine (continued)

Color	Pale yellow
Classification	Nonmetallic
Melting point	-219.62 °C
Boiling point	-188.12 °C
Thermal conductivity	0.0277 W/(m·K)
Electronegativity	3.98
Heat of vaporization	3.27 (per mole fluorine atoms) kJ·mol ⁻¹
Heat of fusion	0.26 (per mole fluorine atoms) kJ·mol ⁻¹
Density of gas	No data available
Density of liquid	1.505 g/cm ³ at -188 °C
Density of solid	1.696 g/L at 0 °C
Electron configuration	[He]2s ² 2p ⁵
Oxidation state	-1
Critical temperature	-129.02 °C
Critical pressure	51.04 atm
Critical volume	66 cm ³ /mol