Stable isotopes of bromine available from ISOFLEX

Isotope	Z(p)	N(n)	Atomic Mass	Natural Abundance	Enrichment Level	Chemical Form
Br-79	35	44	78.918338	50.69%	>99.00%	Sodium Bromide
Br-81	35	46	80.91629	49.31%	>99.00%	Sodium Bromide

Bromine was discovered in 1825 and 1826 by Carl Jacob Löwig and Antoine-Jérôme Balard, respectively. It takes its name from the Greek word *bromos,* meaning "stench." Its compounds were used well before it was recognized as an element: a purple dye called "Tyrian purple" was produced using an organobromine compound as well as an excretion from a particular kind of mussel.

Bromine is a dark reddish-brown liquid with a strong, disagreeable odor. It is the only nonmetallic element that remains a liquid at ambient temperatures; it solidifies at -7.2 ºC. It is sparingly soluble in water and soluble in common organic solvents. Most reactions of bromine are similar to those of other halogens, and its reactivity falls between those of chlorine and iodine. It readily attacks a number of metals, including alkali and alkaline earth metals, palladium, platinum, aluminum, copper, antimony and tin, forming their bromides, which are normally vigorous-to-violent reactions. It oxidizes a number of substances, including metal carbides, carbonyls, hydrides and organic substances. Bromine combines with fluorine at room temperature, forming bromine trifluoride. The reaction produces a luminous flame.

Combination reactions occur with several nonmetals. In aqueous solutions, bromine hydrolyzes slightly, forming unstable hypobromous acid, which decomposes to hydrobromic acid and oxygen, causing the bleaching action of bromine water. The decomposition is accelerated by light.

Bromine is used in bleaching fibers and as a disinfectant for water purification. Other applications are in organic synthesis as an oxidizing or brominating agent; in the manufacture of ethylene dibromide, methyl bromide and other bromo compounds for dyes and pharmaceutical uses; as a fire retardant for plastic; and in chemical analysis. Ethylene dibromide is used in anti-knock fluids in motor fuels. Over 80% of the bromine produced is consumed in the manufacture of this compound.

Most reactions of bromine are highly exothermic, which can cause incandescence or a sudden increase in pressure and rupture of reaction flasks. Reactions of liquid bromine with most metals (or any metal in finely divided state, metal hydrides, carbonyls and nitrides) can be explosive. Many oxides and halides of nonmetals, such as nitrogen triiodide or phosphorus trioxide, react explosively or burst into flame in contact with liquid bromine. Bromine is moderately toxic by all routes of exposure. It is an irritant to the eye and respiratory tract. Inhalation can cause dizziness, headache, coughing and lacrimation. A short exposure (to 1000 ppm for 15 minutes) can be fatal to humans. Ingestion produces nausea, abdominal pain and diarrhea. The liquid is corrosive to skin.

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Properties of Bromine

Name	Bromine
Symbol	Br
Atomic number	35
Atomic weight	79.904
Standard state	Liquid at 298 °K
CAS Registry ID	7726-95-6
Group in periodic table	17
Group name	Halogen
Period in periodic table	4
Block in periodic table	p-block
Color	Red-brown, metallic luster when solid
Classification	Non-metallic
Melting point	-7.3 °C
Boiling point	59 °C
Thermal conductivity	0.12 W/(m·K)
Electrical resistivity	1×10^{-8} Ω·m
Electronegativity	2.96
Heat of vaporization	14.80 (per mole bromine atoms) $kJ \cdot mol^{-1}$
Heat of fusion	5.80 (per mole bromine atoms) $kJ \cdot mol^{-1}$
Density of liquid	(Br_2, liquid) 3.1028 g/cm^3
Electron configuration	$[Ar]3d^{10}4s^24p^5$
Electron affinity	3.36359 eV
Most stable oxidation states	-1, +5
Less stable oxidation states	+1, +3
Critical temperature	315 ºC
Critical pressure	102 atm
Critical volume	127 cm^3/mol

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