Astatine *At*

General Information

Discovery

Astatine was synthesised in 1940 by D.R. Corson, K.R. MacKenzie and F. Serge in California, USA, by bombarding bismuth with alpha particles.

Source

Astatine can be obtained in various ways, but not in weighable amounts. The usual method of preparation is neutron bombardment of ^{200}Bi to produce ^{211}At.

Biological Role

Astatine has no known biological role. It is toxic due to its radioactivity.

General Information

The mass spectrometer has been used to confirm that this highly radioactive halogen behaves chemically like other halogens, particularly iodine.

Physical Information

Atomic Number	85
Relative Atomic Mass (^{12}C=12.000)	210 (radioactive)
Melting Point/K	575
Boiling Point/K	610
Ground State Electron Configuration	$[Xe]4f^{14}5d^{10}6s^{2}6p^{5}$
Electron Affinity (M-M$^-$)/kJ mol^{-1}	256

Key Isotopes

Nuclide	^{210}At	^{211}At
Atomic mass		210.99
Natural abundance	0%	0%
Half-life	8.3 h	7.21 h

Ionisation Energies/kJ mol $^{-1}$

M	- M^+	930
M^+	- M^{2+}	1600
M^{2+}	- M^{3+}	2900
M^{3+}	- M^{4+}	4000
M^{4+}	- M^{5+}	4900
M^{5+}	- M^{6+}	7500
M^{6+}	- M^{7+}	8800
M^{7+}	- M^{8+}	13300
M^{8+}	- M^{9+}	15400
M^{9+}	- M^{10+}	17700

Other Information

Enthalpy of Fusion/kJ mol^{-1}	23.8

Oxidation States

At^{-I}, At^{I}, At^{III}

Covalent Bonds/kJ mol^{-1}

At - At	110