Arsenic As

General Information

Discovery

Arsenic was discovered in 1250 A.D. by A. Magnus, and first prepared by Schroeder in 1649.

Appearance

Arsenic is a steel grey, brittle, crystalline metalloid.

Source

The most common arsenic-containing mineral is mispickel, and others include realgar and orpiment. Arsenic can also be found in the native state. It can be obtained from mispickel by heating, which causes the arsenic to sublime and leaves the iron(II) sulfide.

Uses

Arsenic is used in bronzing, pyrotechnics and for hardening shot. It is increasingly being used as a doping agent in solid state devices.

Biological Role

Arsenic may be an essential element, but it is certainly toxic in small doses and also a suspected carcinogen. Calcium and lead arsenic compounds are used as poisons for vermin.

General Information

Arsenic has several allotropes. The most common is grey arsenic, which tarnishes and burns in oxygen. It resists attack by acids, alkalis and water but is attacked by hot acids and molten sodium hydroxide. When heated, it sublimes.

Physical Information

Atomic Number	33
Relative Atomic Mass (^{12}C=12.000)	74.923
Melting Point/K	1090 (alpha form under pressure)
Boiling Point/K	889 (sublimes)
Density/kg m^{-3}	5780 (293K) (alpha form)
Ground State Electron Configuration	$[Ar]3d^{10}4s^{2}4p^{3}$
Electron Affinity ($M-M^{-}$)/kJ mol^{-1}	-77

Key Isotopes

Nuclide	^{73}As	^{74}As	^{75}As	^{76}As
Atomic mass	72.924	73.924	74.922	75.922
Natural abundance	0%	0%	100%	0%
Half-life	80.3 days	17.9 days	stable	26.5 h

Ionisation Energies/kJ mol^{-1}

$M - M^{+}$	947
$M^{+} - M^{2+}$	1798
$M^{2+} - M^{3+}$	2735
$M^{3+} - M^{4+}$	4837
$M^{4+} - M^{5+}$	6042
$M^{5+} - M^{6+}$	12305
$M^{6+} - M^{7+}$	15400
$M^{7+} - M^{8+}$	18900
$M^{8+} - M^{9+}$	22600
$M^{9+} - M^{10+}$	26400

Other Information

Enthalpy of Fusion/kJ mol^{-1}	27.7
Enthalpy of Vaporisation/kJ mol^{-1}	31.9

Oxidation States

Main	As^{+3}, As^{+5}
Others	As^{-3}

Covalent Bonds/kJ mol^{-1}

As - H	245
As - C	200
As - O	477
As - F	464
As - Cl	293
As - As	348