Gallium Ga

General Information

Discovery

Gallium was discovered by P. Lecoq de Boisbaudran in 1875 in Paris. Mendeleev predicted and described this element, and called it ekaaluminum.

Appearance

Gallium is a silvery, glass-like, soft metal.

Source

Gallium is present in trace amounts in the minerals diaspore, sphalerite, germanite, bauxite and coal. The free metal can be obtained by electrolysis of a solution of gallium (III) hydroxide in potassium hydroxide.

Uses

Gallium readily alloys with most metals, and is used especially in low-melting alloys. It has a high boiling point, which makes it ideal for recording temperatures that would vaporise a thermometer. It has found recent use in doping semiconductors and producing solid-state devices such as transistors.

Biological Role

Gallium has no known biological role. It is non-toxic.

General Information

Gallium is soluble in acids and alkalis. It has the longest liquid range of all elements, and can be liquid near room temperatures - it can melt in the hand. It also expands as it freezes, which is unusual for a metal, by 3.1%. Gallium wets glass or porcelain, and forms a brilliant mirror when painted on glass.

Physical Information

Atomic Number	31
Relative Atomic Mass (^{12}C=12.000)	69.723
Melting Point/K	302.9
Boiling Point/K	2676
Density/kg m^{-3}	5907 (293K)
Ground State Electron Configuration	$[Ar]3d^{10}4s^{2}4p^{1}$
Electron Affinity (M-M^{-})/kJ mol^{-1}	36

Key Isotopes

Nuclide	^{67}Ga	^{69}Ga	^{71}Ga	^{72}Ga
Atomic mass		68.926	70.925	
Natural abundance	0%	60.1%	39.9%	0%
Half-life	78.1 h	stable	stable	14.1 h

Ionisation Energies/kJ mol^{-1}

M - M^{+}	578.8
M^{+} - M^{2+}	1979
M^{2+} - M^{3+}	2963
M^{3+} - M^{4+}	6200
M^{4+} - M^{5+}	8700
M^{5+} - M^{6+}	11400
M^{6+} - M^{7+}	14400
M^{7+} - M^{8+}	17700
M^{8+} - M^{9+}	22300
M^{9+} - M^{10+}	26100

Other Information

Enthalpy of Fusion/kJ mol^{-1}	5.59
Enthalpy of Vaporisation/kJ mol^{-1}	270.3

Oxidation States

Main	Ga^{III}
Others	Ga^{I}, Ga^{II}

Covalent Bonds/kJ mol^{-1}

Not applicable