

# Ytterbium

**Yb**

## ***General Information***

### **Discovery**

Ytterbium was discovered by J.C.G. de Marignac in 1878 in Geneva, Switzerland.

### **Appearance**

Ytterbium has a bright, silvery lustre. It is soft, malleable and quite ductile.

### **Source**

In common with many rare earth elements, ytterbium is found principally in the mineral monazite, from which it can be extracted by ion exchange and solvent extraction.

### **Uses**

Ytterbium is little used outside research.

### **Biological Role**

Ytterbium has no known biological role, and is non-toxic.

### **General Information**

Ytterbium is slowly oxidised by the air, and reacts with water. It is readily attacked and dissolved by acids.

## Physical Information

Atomic Number	70
Relative Atomic Mass ( $^{12}\text{C}=12.000$ )	173.04
Melting Point/K	1097
Boiling Point/K	1466
Density/kg m <sup>-3</sup>	6965 (293K)
Ground State Electron Configuration	[Xe]4f <sup>14</sup> 6s <sup>2</sup>
Electron Affinity (M-M <sup>-</sup> )/kJ mol <sup>-1</sup>	50

## Key Isotopes

Nuclide	<sup>168</sup> Yb	<sup>169</sup> Yb	<sup>170</sup> Yb	<sup>171</sup> Yb	<sup>172</sup> Yb	<sup>173</sup> Yb
Atomic mass	167.9		169.9	170.9	171.9	172.9
Natural abundance	0.14%	0%	3.06%	14.4%	21.9%	16.1%
Half-life	stable	31.8 days	stable	stable	stable	stable
Nuclide	<sup>174</sup> Yb	<sup>175</sup> Yb	<sup>176</sup> Yb			
Atomic mass	173.9		175.9			
Natural abundance	31.8%	0%	12.7%			
Half-life	stable	101 h	stable			

## Ionisation Energies/kJ mol<sup>-1</sup>

M - M <sup>+</sup>	603.4
M <sup>+</sup> - M <sup>2+</sup>	1176
M <sup>2+</sup> - M <sup>3+</sup>	2415
M <sup>3+</sup> - M <sup>4+</sup>	4220
M <sup>4+</sup> - M <sup>5+</sup>	
M <sup>5+</sup> - M <sup>6+</sup>	
M <sup>6+</sup> - M <sup>7+</sup>	
M <sup>7+</sup> - M <sup>8+</sup>	
M <sup>9+</sup> - M <sup>10+</sup>	

## Other Information

Enthalpy of Fusion/kJ mol <sup>-1</sup>	9.2
Enthalpy of Vaporisation/kJ mol <sup>-1</sup>	159

### Oxidation States

Yb<sup>II</sup>, Yb<sup>III</sup>

### Covalent Bonds/kJ mol<sup>-1</sup>

Not applicable