

# Dysprosium

**Dy**

## ***General Information***

### **Discovery**

Dysprosium was discovered by P.E. Lecoq de Boisbaudran in 1886 in Paris, France.

### **Appearance**

Dysprosium is a bright, hard metal with a silvery lustre.

### **Source**

In common with many other rare earth elements, dysprosium is found in the minerals monazite and bastnaesite, and in smaller quantities in several other minerals such as xenotime and fergusonite. It can be extracted from these minerals by ion exchange and solvent extraction. It can also be prepared by the reduction of the trifluoride with calcium metal.

### **Uses**

Dysprosium has not yet found many applications. However, it has a high thermal neutron absorption cross-section and a high melting point, and so it may be useful in nuclear control alloys. A dysprosium oxide-nickel cement is used in cooling nuclear reactor control rods, and has the property of absorbing neutrons readily without swelling or contracting under prolonged neutron bombardment.

### **Biological Role**

Dysprosium has no known biological role, and has low toxicity.

### **General Information**

Dysprosium is relatively stable in air at room temperature, and is readily attacked and dissolved by acids. It is soft enough to be cut with a knife.

## Physical Information

Atomic Number	66
Relative Atomic Mass ( $^{12}\text{C}=12.000$ )	162.50
Melting Point/K	1685
Boiling Point/K	2835
Density/kg m <sup>-3</sup>	8550 (293K)
Ground State Electron Configuration	[Xe]4f <sup>10</sup> 6s <sup>2</sup>
Electron Affinity (M-M <sup>-</sup> )/kJ mol <sup>-1</sup>	Not available

## Key Isotopes

Nuclide	<sup>156</sup> Dy	<sup>158</sup> Dy	<sup>160</sup> Dy	<sup>161</sup> Dy	<sup>162</sup> Dy	<sup>163</sup> Dy
Atomic mass	155.9	157.9	159.9	160.9	161.9	162.9
Natural abundance	0.06%	0.10%	2.34%	18.9%	25.5%	24.9%
Half-life	stable	stable	stable	stable	stable	stable

  

Nuclide	<sup>164</sup> Dy
Atomic mass	163.9
Natural abundance	28.2%
Half-life	stable

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

M - M <sup>+</sup>	571.9
M <sup>+</sup> - M <sup>2+</sup>	1126
M <sup>2+</sup> - M <sup>3+</sup>	2200
M <sup>3+</sup> - M <sup>4+</sup>	4001
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>8+</sup> - M <sup>9+</sup>	
M <sup>9+</sup> - M <sup>10+</sup>	

## Other Information

Enthalpy of Fusion/kJ mol<sup>-1</sup> 17.2

Enthalpy of Vaporisation/kJ mol<sup>-1</sup> 293

### Oxidation States

Main Dy<sup>III</sup>

Others Dy<sup>I</sup>, Dy<sup>IV</sup>

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

Not applicable