

# Neptunium

**Np**

## ***General Information***

### **Discovery**

Neptunium was discovered by E.M. McMillan and P. Abelson in 1940 in California, USA.

### **Appearance**

Neptunium is a radioactive silvery metal.

### **Source**

Neptunium is obtained as a by-product from nuclear reactors. Trace quantities occur naturally in uranium ores.

### **Uses**

Neptunium is little used outside research.

### **Biological Role**

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

### **General Information**

Neptunium is attacked by oxygen, steam and acids, but not by alkalis.

## Physical Information

Atomic Number	93
Relative Atomic Mass ( $^{12}\text{C}=12.000$ )	237.05
Melting Point/K	913
Boiling Point/K	4175
Density/kg m <sup>-3</sup>	20250 (293K)
Ground State Electron Configuration	[Rn]5f <sup>4</sup> 6d <sup>1</sup> 7s <sup>2</sup>

## Key Isotopes

Nuclide	<sup>237</sup> Np
Atomic mass	237.05
Natural abundance	0%
Half-life	2.14x10 <sup>6</sup> yrs

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

M	- M <sup>+</sup>	597
M <sup>+</sup>	- M <sup>2+</sup>	
M <sup>2+</sup>	- M <sup>3+</sup>	
M <sup>3+</sup>	- M <sup>4+</sup>	
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>	9.46
Enthalpy of Vaporisation/kJ mol <sup>-1</sup>	336.6

### Oxidation States

Main	Np <sup>V</sup>
Others	Np <sup>II</sup> , Np <sup>III</sup> , Np <sup>IV</sup> , Np <sup>VI</sup> , Np <sup>VII</sup>

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

Not applicable