

Protactinium

Pa

General Information

Discovery

Protactinium was discovered in 1917 by Hahn and Meitner in Berlin, Fajans in Germany and Fleck in Glasgow. It was initially named brevium, as the first isotope identified was very short-lived.

Appearance

Protactinium is a radioactive, silvery metal.

Source

Protactinium is found naturally in uranium ores and produced in gram quantities from uranium fuel elements.

Uses

Protactinium is little used.

Biological Role

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

General Information

Protactinium is attacked by oxygen, steam and acids, but not by alkalis. It is the third rarest of the natural elements.

Physical Information

Atomic Number	91
Relative Atomic Mass (¹² C=12.000)	231.04
Melting Point/K	2113
Boiling Point/K	4300
Ground State Electron Configuration	[Rn]5f ² 6d ¹ 7s ²

Key Isotopes

Nuclide	²³¹ Pa	²³³ Pa	²³⁴ Pa
Atomic mass	231.04	233.04	234.04
Natural abundance	trace	0%	trace
Half-life	3.26x10 ⁴ yrs	27 days	6.75 h

Ionisation Energies/kJ mol⁻¹

M - M ⁺	568
M ⁺ - M ²⁺	
M ²⁺ - M ³⁺	
M ³⁺ - M ⁴⁺	
M ⁴⁺ - M ⁵⁺	
M ⁵⁺ - M ⁶⁺	
M ⁶⁺ - M ⁷⁺	
M ⁷⁺ - M ⁸⁺	
M ⁸⁺ - M ⁹⁺	
M ⁹⁺ - M ¹⁰⁺	

Other Information

Enthalpy of Fusion/kJ mol⁻¹ 16.7

Enthalpy of Vaporisation/kJ mol⁻¹ 481

Oxidation States

Main Pa⁺⁵

Others Pa⁺³, Pa⁺⁴