

The Actinides: Actinium to Nobelium

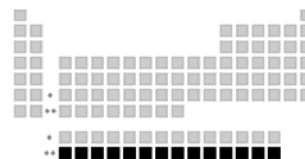


Table An.1 Ground electronic configurations of the actinides (and lawrencium).

Element	Symbol	Atomic number	Electronic Configuration
Actinium	Ac	89	[Rn] 6d ¹ 7s ²
Thorium	Th	90	[Rn] 6d ² 7s ²
Protactinium	Pa	91	[Rn] 5f ² 6d ¹ 7s ²
Uranium	U	92	[Rn] 5f ³ 6d ¹ 7s ²
Neptunium	Np	93	[Rn] 5f ⁴ 6d ¹ 7s ²
Plutonium	Pu	94	[Rn] 5f ⁶ 7s ²
Americium	Am	95	[Rn] 5f ⁷ 7s ²
Curium	Cm	96	[Rn] 5f ⁷ 6d ¹ 7s ²
Berkelium	Bk	97	[Rn] 5f ⁹ 7s ²
Californium	Cf	98	[Rn] 5f ¹⁰ 7s ²
Einsteinium	Es	99	[Rn] 5f ¹¹ 7s ²
Fermium	Fm	100	[Rn] 5f ¹² 7s ²
Mendelevium	Md	101	[Rn] 5f ¹³ 7s ²
Nobelium	No	102	[Rn] 5f ¹⁴ 7s ²
Lawrencium	Lr	103	[Rn] 5f ¹⁴ 6d ¹ 7s ²

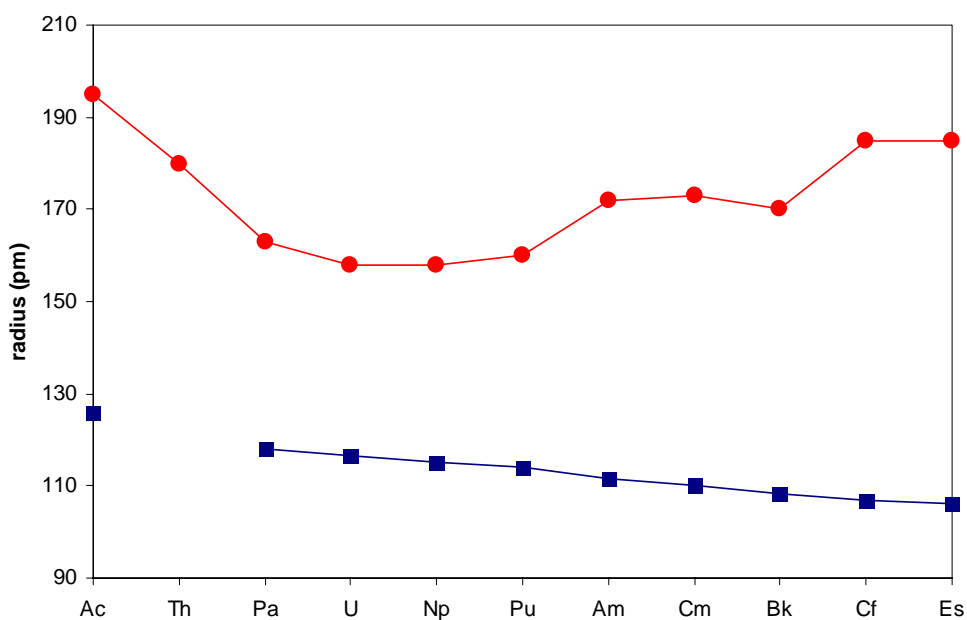


Figure An.1 Metallic and An³⁺ radii for the actinides

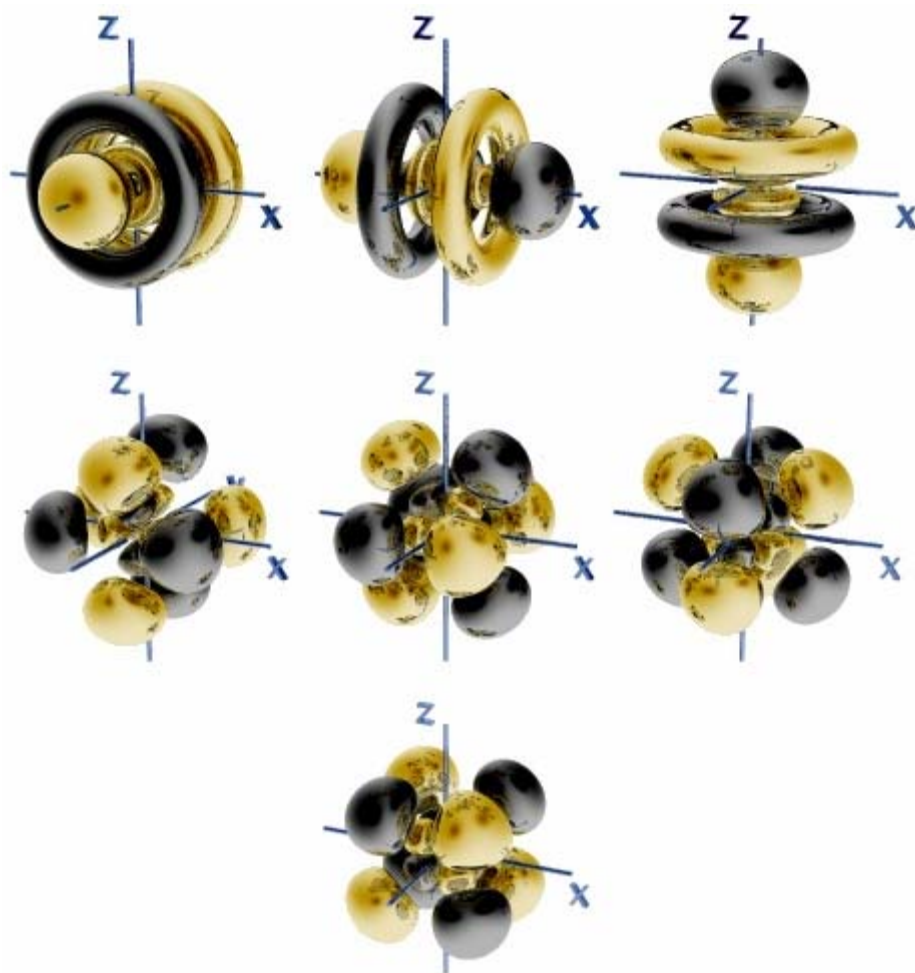


Figure An.2 The shape of the seven 5f orbitals (cubic set). From left to right: (top row) $5f_y^3$, $5f_x^3$, $5f_z^3$, (middle row) $5f_{x(z-y)^2}$, $5f_{y(z-x)^2}$, $5f_{z(x-y)^2}$, and (bottom row) $5f_{xyz}$.

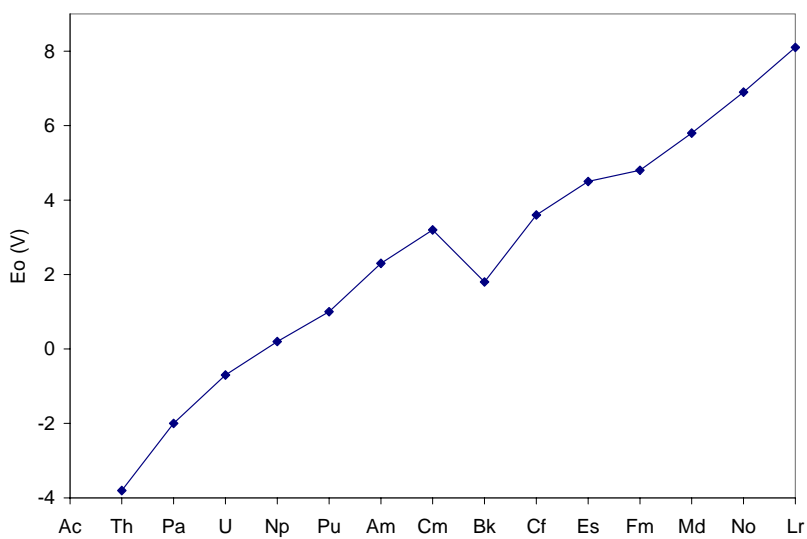


Figure An.3 Electrode potentials for An^{4+}/An^{3+} (a guide to the ionization energies).

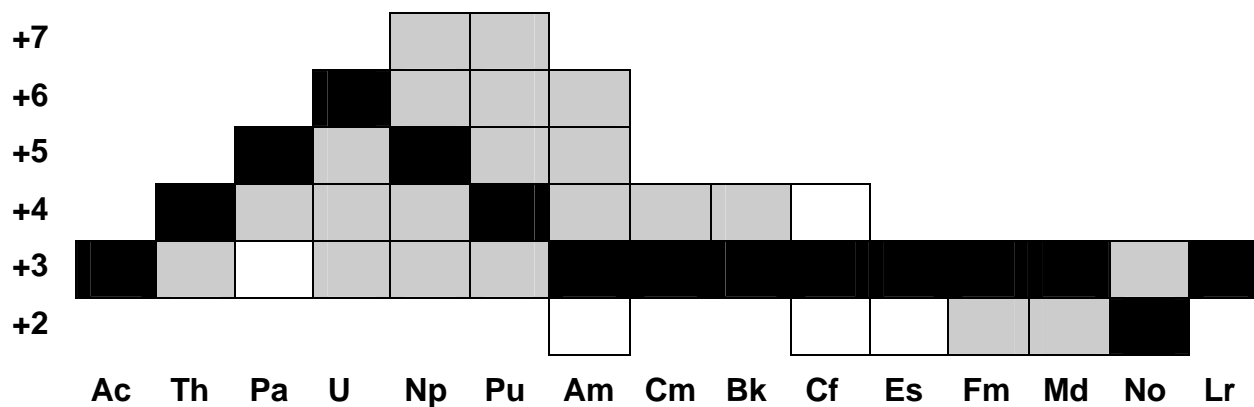


Figure An.4 Actinide oxidation states; most stable in aqueous solution shown in black, others grey, those found only in solids shown in outline.

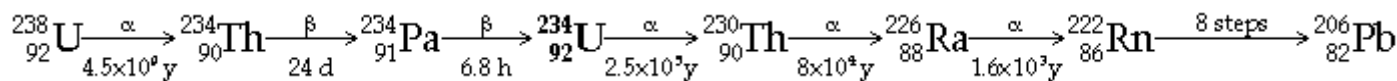


Figure An.5 The naturally occurring decay series from ${}^{238}\text{U}$ to ${}^{206}\text{Pb}$.

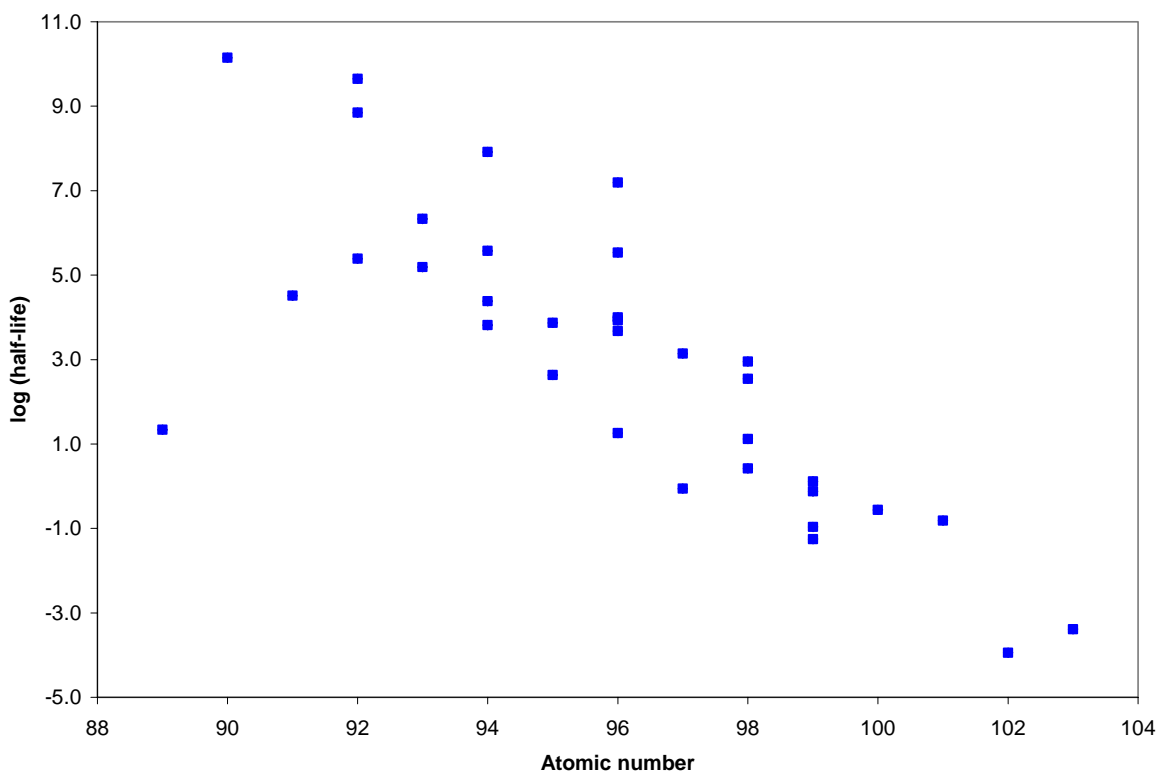


Figure An.6 Actinide half-lives in years (note logarithmic scale). Range from ${}^{232}\text{Th}$, 14 billion years to ${}^{259}\text{No}$, 1 hour.