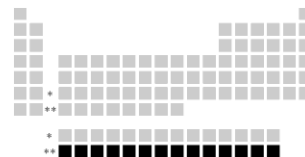
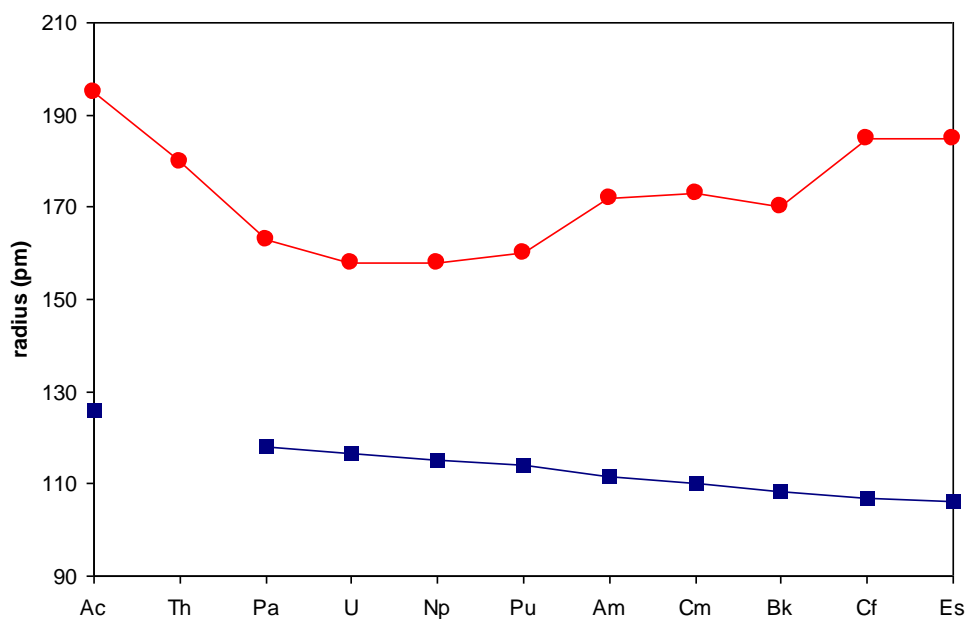


# The Actinides: Actinium to Nobelium

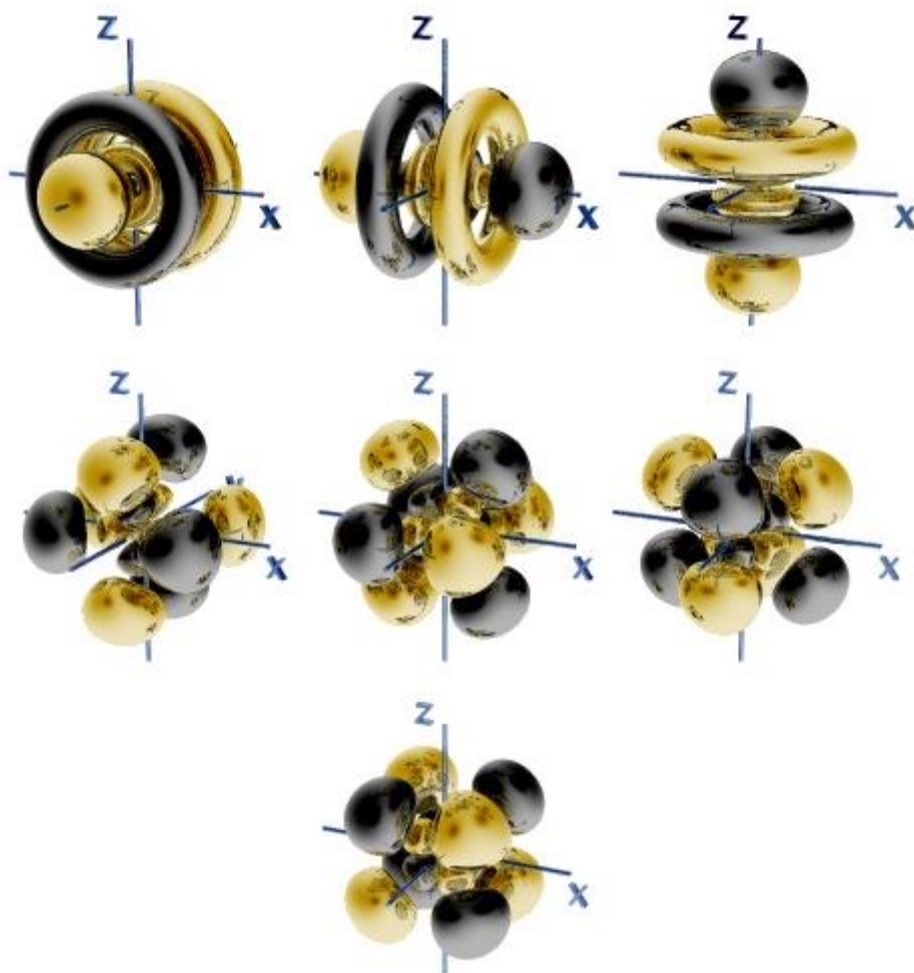


**Table 1** Ground electronic configurations of the actinides (and lawrencium).

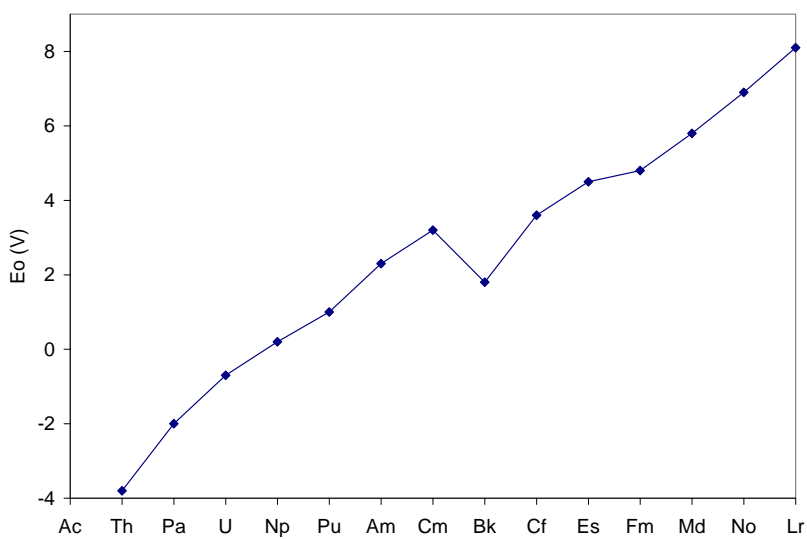
Element	Symbol	Atomic number	Electronic Configuration
Actinium	Ac	89	[Rn] 6d <sup>1</sup> 7s <sup>2</sup>
Thorium	Th	90	[Rn] 6d <sup>2</sup> 7s <sup>2</sup>
Protactinium	Pa	91	[Rn] 5f <sup>2</sup> 6d <sup>1</sup> 7s <sup>2</sup>
Uranium	U	92	[Rn] 5f <sup>3</sup> 6d <sup>1</sup> 7s <sup>2</sup>
Neptunium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



Metallic and An<sup>3+</sup> radii for the actinides

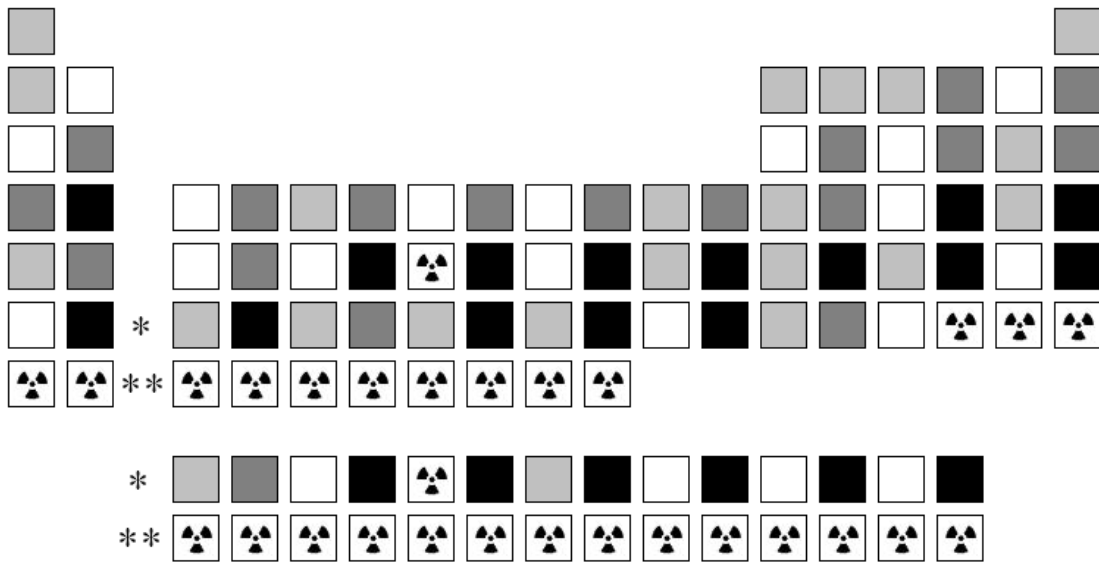


The shape of the seven 5f orbitals (cubic set). From left to right: (top row)  $5f_y^3$ ,  $5f_x^3$ ,  $5f_z^3$ , (middle row)  $5f_{x(z-y)^2}$ ,  $5f_{y(z-x)^2}$ ,  $5f_{z(x-y)^2}$ , and (bottom row)  $5f_{xyz}$ .

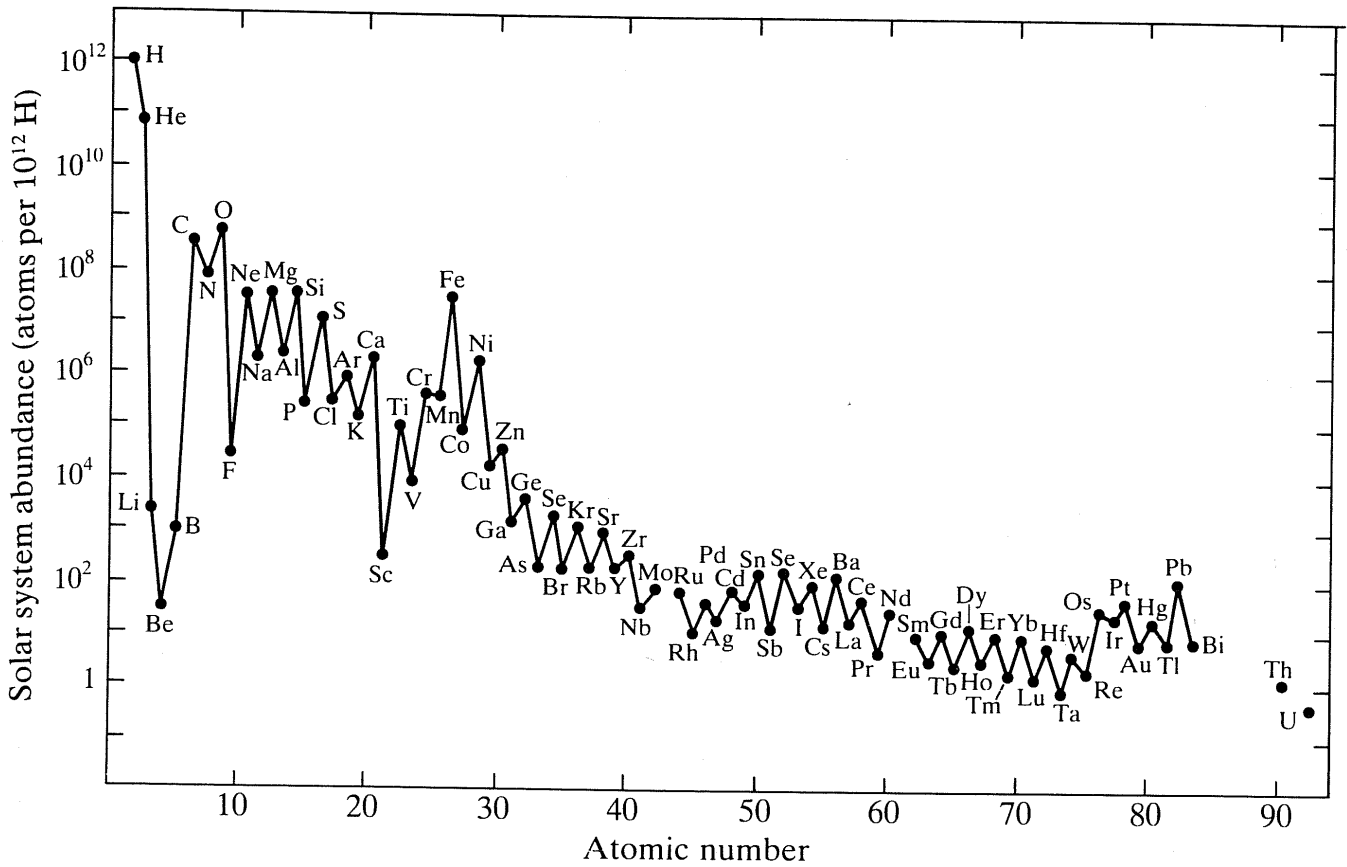


Electrode potentials for  $An^{4+}/An^{3+}$  (a guide to the ionization energies).





The periodic table of the elements colored by number of isotopes (white = 1 isotope, grey = 2, dark grey = 3-5, black = 6+; symbol = all isotopes are radioactive)



Solar system abundances of the elements, showing the relative number of atoms based on a logarithmic scale, normalized to the value  $10^{12}$  for H.