

## Quantum Numbers

Principal quantum number - energy level (periods 1-7)

Angular momentum quantum number - Shape of orbitals (s, p, d, f).

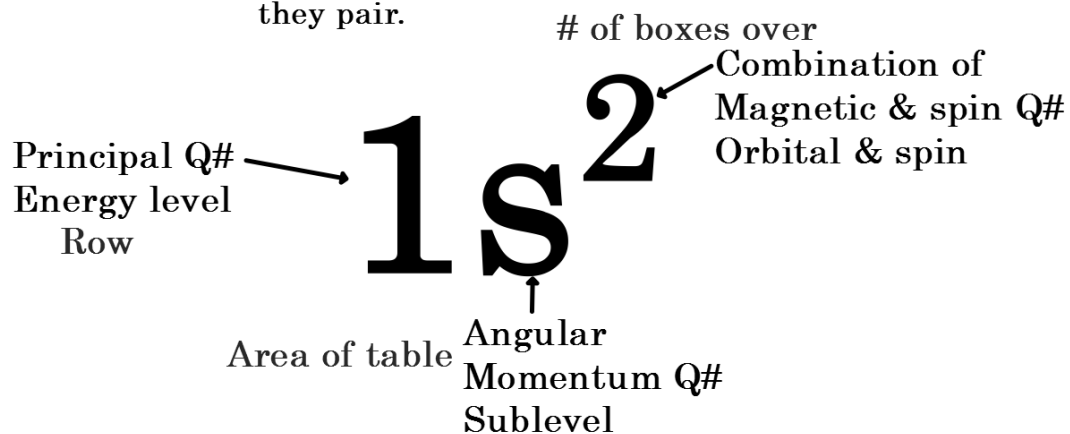
Magnetic quantum number - orientation of orbital x, y, z axis  
(orbitals - "s" has 1, "p" has 3, "d" has 5, "f" has 7).

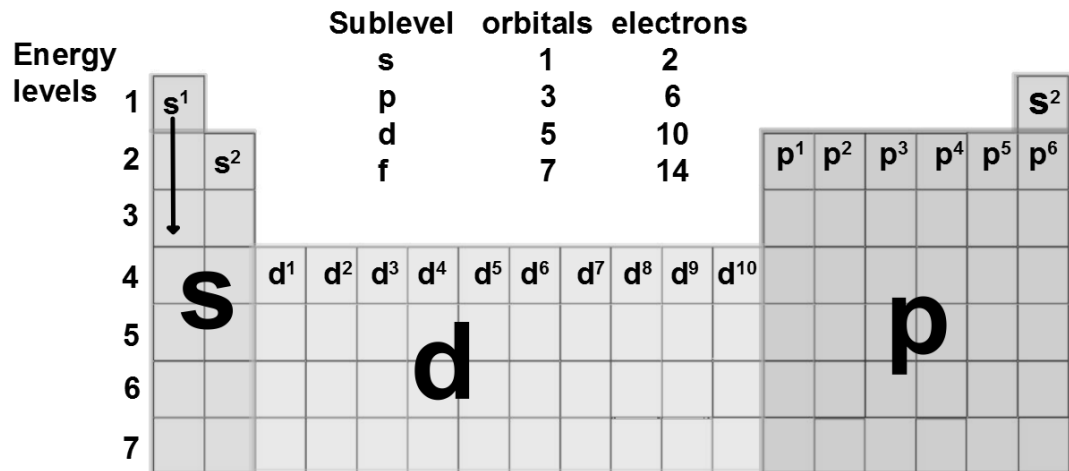
Spin Quantum number - clockwise and counter clockwise spins

Aufbau principal - Electrons occupy lowest-energy orbitals first

Pauli exclusion Principle - no 2 electrons have same 4 quantum numbers

Hund's rules - orbitals in a sublevel have 1 electron in each orbital before they pair.





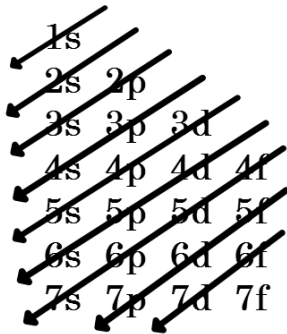
Energy level	#	Sublevels
1	1	f <sup>1</sup>
2	2	f <sup>2</sup>
3	3	f <sup>3</sup>
4	4	f <sup>4</sup>


A table with 4 rows and 3 columns. The first column is 'Energy level' (1, 2, 3, 4), the second is '#', and the third is 'Sublevels'. The sublevels are f<sup>1</sup>, f<sup>2</sup>, f<sup>3</sup>, and f<sup>4</sup>. A large 'f' is placed in the f<sup>4</sup> box.

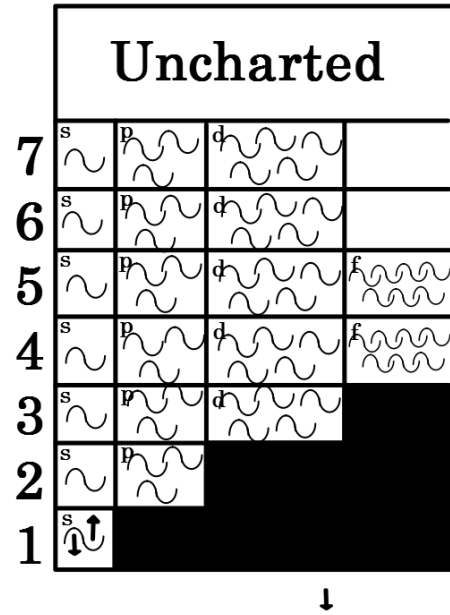
$1s^1$																	$1s^2$		
$2s^1$	$2s^2$													$2p^1$	$2p^2$	$2p^3$	$2p^4$	$2p^5$	$2p^6$
$3s^1$	$3s^2$													$3p^1$	$3p^2$	$3p^3$	$3p^4$	$3p^5$	$3p^6$
$4s^1$	$4s^2$	$3d^1$	$3d^2$	$3d^3$	$3d^4$	$3d^5$	$3d^6$	$3d^7$	$3d^8$	$3d^9$	$3d^{10}$	$4p^1$	$4p^2$	$4p^3$	$4p^4$	$4p^5$	$4p^6$		
$5s^1$	$5s^2$	$4d^1$	$4d^2$	$4d^3$	$4d^4$	$4d^5$	$4d^6$	$4d^7$	$4d^8$	$4d^9$	$4d^{10}$	$5p^1$	$5p^2$	$5p^3$	$5p^4$	$5p^5$	$5p^6$		
$6s^1$	$6s^2$	$5d^1$	$5d^2$	$5d^3$	$5d^4$	$5d^5$	$5d^6$	$5d^7$	$5d^8$	$5d^9$	$5d^{10}$	$6p^1$	$6p^2$	$6p^3$	$6p^4$	$6p^5$	$6p^6$		
$7s^1$	$6d^1$											$7p^1$							

$4f^1$	$4f^2$	$4f^3$	$4f^4$	$4f^5$	$4f^6$	$4f^7$	$4f^8$	$4f^9$	$4f^{10}$	$4f^{11}$	$4f^{12}$	$4f^{13}$	$4f^{14}$
$5f^1$													



  
 this represents an orbital  
 the "love seat" holds two  
 electrons.



1s  
2s 2p  
3s 3p 3d  
4s 4p 4d 4f  
5s 5p 5d 5f  
6s 6p 6d 6f  
7s 7p 7d 7f

~~1s~~  
~~2s 2p~~  
~~3s 3p 3d~~  
~~4s 4p 4d 4f~~  
~~5s 5p 5d 5f~~  
~~6s 6p 6d 6f~~  
~~7s 7p 7d 7f~~