

QUANTUM NUMBERS

Principal	Shell; as n increases, the orbital gets larger (energy level)	$n = 1, 2, 3, \dots$
Secondary (azimuthal)	Subshell; Shape of the orbital (type – s, p, d, f)	$l = 0, 1, 2, \dots (n - 1)$
Magnetic	Orientation of the orbital in space	$m_l = -l, \dots 0, \dots +l$
Spin	Two electrons in each orbital	$m_s = +1/2, -1/2$

SHELL	SUBSHELL	ORIENTATION	SPIN
$n = 1$ OR $n = 1$	$l = 0$ 1s	$m_l = 0$ } 1	$m_s = +1/2$
	$l = 0$ 1s	$m_l = 0$ } 1	$m_s = -1/2$
$n = 2$	$l = 0$ 2s	$m_l = 0$ } 1	$m_s = +1/2$ $m_s = -1/2$
	$l = 1$ 2p	$m_l = -1$ } $m_l = 0$ } 3 $m_l = +1$ }	
$n = 3$	$l = 0$ 3s	$m_l = 0$ } 1	$m_s = +1/2$ $m_s = -1/2$
	$l = 1$ 3p	$m_l = -1$ } $m_l = 0$ } 3 $m_l = +1$ }	
	$l = 2$ 3d	$m_l = -2$ } $m_l = -1$ } $m_l = 0$ } 5 $m_l = +1$ } $m_l = +2$ }	

SHELL	SUBSHELL	ORIENTATION	SPIN
n = 4	$l = 0$ 4s	$m_l = 0$ } 1	$m_s = +1/2$ $m_s = -1/2$
	$l = 1$ 4p	$m_l = -1$ $m_l = 0$ $m_l = +1$ } 3	
	$l = 2$ 4d	$m_l = -2$ $m_l = -1$ $m_l = 0$ $m_l = +1$ $m_l = +2$ } 5	
	$l = 3$ 4f	$m_l = -3$ $m_l = -2$ $m_l = -1$ $m_l = 0$ $m_l = +1$ $m_l = +2$ $m_l = +3$ } 7	

For all possible quantum numbers:

	$[n, l, m_l, m_s]$	
1s	$[1, 0, 0, +1/2]$	$n = 1, l = 0, m_l = 0, m_s = +1/2$
2s	$[2, 0, 0, +1/2]$	$[2, 0, 0, -1/2]$
3 different orientations	2p $[2, 1, -1, +1/2]$	$[2, 1, -1, -1/2]$
	2p $[2, 1, 0, +1/2]$	$[2, 1, 0, -1/2]$
	2p $[2, 1, +1, +1/2]$	$[2, 1, +1, -1/2]$

Orbital Diagrams:

