

Chapter 7: Quantum Numbers for (Electrons in) Orbitals--Memorize!

QN	Name	Allowed Values	What It Determines
n	principal	1, 2, 3,...	Total number of nodes = $n - 1$ $\Rightarrow E = -2.179 \times 10^{-18} \text{ J} \frac{Z^2}{n^2}$ for a 1-electron atom or ion
l	angular momentum [$L^2 = l(l + 1) h^2/4\pi^2$]	0, 1, 2, ..., $n - 1$	Number of angular nodes = l \Rightarrow shape of ψ \Rightarrow Number of radial nodes = $n - l - 1$
Note: $l = 0 \Rightarrow s$ $l = 1 \Rightarrow p$ $l = 2 \Rightarrow d$ $l = 3 \Rightarrow f$ $l = 4 \Rightarrow g$ $l = 5 \Rightarrow h$			
m_l	magnetic	$-l, -l + 1, \dots, 0, \dots, l$	Orientation of ψ [with respect to a magnetic field] $\Rightarrow 2l + 1$ possible orientations
m_s	spin	$+\frac{1}{2}, -\frac{1}{2}$	Orientation of an electron's intrinsic angular momentum (with respect to a magnetic field)