Anatomy of a Term Symbol

A **term symbol** is a unique "nickname" for an electronic state

Total orbital angular momentum: $\vec{L} = \Sigma\, \vec{\ell}_i$ degeneracy $g_L = 2L + 1 : M_L = -L, \ldots, 0, \ldots L$

Total spin angular momentum: $\vec{S} = \Sigma\, \vec{s}_i$ degeneracy $g_S = 2S + 1 : M_S = -S, \ldots, 0, \ldots S$

Total angular momentum: $\vec{J} = \vec{L} + \vec{S}$ $\vec{J} = \Sigma\, \vec{j}_i$ degeneracy $g_J = 2J + 1 : M_J = -J, \ldots, 0, \ldots, J$

L:	0	1	2	3	4	5
Term:	S	P	D	F	G	H

Clebsch-Gordan Series: $L = \ell_1 + \ell_2, \ell_1 + \ell_2 - 1, \ldots, |\ell_1 - \ell_2|$ $M_L = \Sigma\, m_L$ $L = |M_L|_{max}$

$J = L + S, L + S - 1, \ldots, |L - S|$

Term Symbol: *multiplicity* $^{2S+1}L_J$ *Orbital angular momentum* *total angular momentum*

Example: C : p^2 $\ell_1 = 1,\ \ell_2 = 1 :\ L = 2, 1, 0$ gives D, P, and S terms

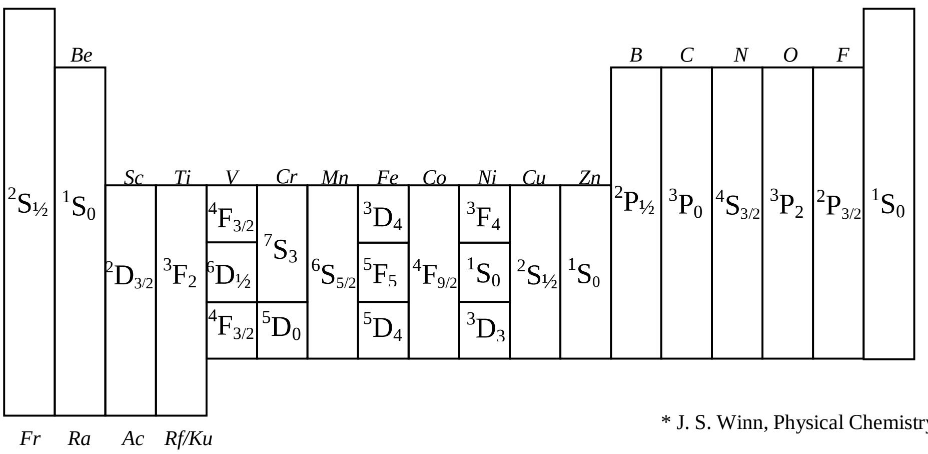
$s_1 = ½, s_2 = ½ : S = 1, 0$ gives triplet and singlet states

^1D: L = 2, S = 0: J = 2 : $^1D_2$
^3P: L = 1, S = 1: J = 2, 1, 0: $^3P_2$, $^3P_1$, $^3P_0$
^1S: L = 0, S = 0: J = 0: $^1S_0$

Term Symbols for Selected Configurations*

s^1	^2S	s^2, p^6, d^{10}	^1S		
s^1p^1	$^{1,3}P$	s^1d^1	$^{1,3}D$	p^1d^1	^{1,3}P,D,F
p^1, p^5	^2P	p^2, p^4	^{1}S,D; ^{3}P	p^3	^{2}P,D; ^{4}S

d^1, d^9	^{2}D
d^2, d^8	^{1}S,D,G; ^{3}P,F
d^3, d^7	^{2}P,D,D,F,G,H; ^{4}P,F
d^4, d^6	^{1}S,S,D,D,F,G,G,I; ^{3}P,P,D,F,F,G,H; ^{5}D
d^5	^{2}S,P,D,D,D,F,F,G,G,H,I; ^{4}P,D,F,G; ^{6}S



* J. S. Winn, Physical Chemistry, Harper Collins, 1995