<u>**Total Orbital Angular Momentum**</u>

C: $2p^2$ $\boxed{\uparrow}\boxed{\uparrow}\boxed{\ }$ or $\boxed{\uparrow\downarrow}\boxed{\ }\boxed{\ }$

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

$2p^2$: $1 + 1, \ldots, |1 - 1| = 2, 1, 0$
$2p^2$: D, P, S

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

$+1\ \ 0\ \ -1$	$M_L = \Sigma m_\ell$	$+1\ \ 0\ \ -1$	$M_L = \Sigma m_\ell$
$\boxed{\uparrow\downarrow}\boxed{\ }\boxed{\ }$	2		
$\boxed{\uparrow}\boxed{\downarrow}\boxed{\ }$	1	$\boxed{\uparrow}\boxed{\uparrow}\boxed{\ }$	1
$\boxed{\uparrow}\boxed{\ }\boxed{\downarrow}$	0	$\boxed{\uparrow}\boxed{\ }\boxed{\uparrow}$	0
$\boxed{\ }\boxed{\uparrow\downarrow}\boxed{\ }$	0	$\boxed{\ }\boxed{\uparrow}\boxed{\uparrow}$	-1
$\boxed{\ }\boxed{\uparrow}\boxed{\downarrow}$	-1	^3P	
$\boxed{\ }\boxed{\ }\boxed{\uparrow\downarrow}$	-2		
$^1D + {}^1S$			

Singlets: $L = |M_L|_{max} = 2$ for a ^1D with $M_L = 2,1,0,-1,-2$, leaving $M_L = 0$ to give a ^1S term.
Triplets: $L = |M_L|_{max} = 1$ for a ^3P with $M_L = 1,0,-1$.

These diagrams don't take into account electron indistinguishability. Schematically for example:

$\boxed{\ }\boxed{\uparrow\downarrow}\boxed{\ } \sim \frac{1}{\sqrt{2}}\left(\boxed{\ }\ \boxed{\uparrow\downarrow}\ \boxed{\ } - \boxed{\ }\ \boxed{\downarrow\uparrow}\ \boxed{\ }\right)$ and <u>all</u> electrons take their turns in p_x, p_y, and p_z.

In addition, all degenerate configurations mix as linear combinations (e.g. all the $M_L = 0$ configurations).

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configuration: $d^1\ p^1$ for which $\ell_1 = 2$ and $\ell_2 = 1$ $L = 2+1,\ldots,|2-1| = 3, 2, 1$ or F, D, P

$+2\ +1\ 0\ -1\ -2$		$+2\ +1\ 0\ -1\ -2$		$+2\ +1\ 0\ -1\ -2$		$+2\ +1\ 0\ -1\ -2$		$+2\ +1\ 0\ -1\ -2$	
$\boxed{\uparrow}\boxed{\ }\boxed{\ }\boxed{\ }\boxed{\ }$		$\boxed{\ }\boxed{\uparrow}\boxed{\ }\boxed{\ }\boxed{\ }$		$\boxed{\ }\boxed{\ }\boxed{\uparrow}\boxed{\ }\boxed{\ }$		$\boxed{\ }\boxed{\ }\boxed{\ }\boxed{\uparrow}\boxed{\ }$		$\boxed{\ }\boxed{\ }\boxed{\ }\boxed{\ }\boxed{\uparrow}$	
$+1\ 0\ -1$	$M_L =$	$+1\ 0\ -1$	$M_L =$	$+1\ 0\ -1$	$M_L =$	$+1\ 0\ -1$	$M_L =$	$+1\ 0\ -1$	$M_L =$
$\boxed{\uparrow}\boxed{\ }\boxed{\ }$	3	$\boxed{\uparrow}\boxed{\ }\boxed{\ }$	2	$\boxed{\uparrow}\boxed{\ }\boxed{\ }$	1	$\boxed{\uparrow}\boxed{\ }\boxed{\ }$	0	$\boxed{\uparrow}\boxed{\ }\boxed{\ }$	-1
$\boxed{\ }\boxed{\uparrow}\boxed{\ }$	2	$\boxed{\ }\boxed{\uparrow}\boxed{\ }$	1	$\boxed{\ }\boxed{\uparrow}\boxed{\ }$	0	$\boxed{\ }\boxed{\uparrow}\boxed{\ }$	-1	$\boxed{\ }\boxed{\uparrow}\boxed{\ }$	-2
$\boxed{\ }\boxed{\ }\boxed{\uparrow}$	1	$\boxed{\ }\boxed{\ }\boxed{\uparrow}$	0	$\boxed{\ }\boxed{\ }\boxed{\uparrow}$	-1	$\boxed{\ }\boxed{\ }\boxed{\uparrow}$	-2	$\boxed{\ }\boxed{\ }\boxed{\uparrow}$	-3

overall: 3,2,2,1,1,1,0,0,0,-1,-1,-1,-2,-2,-3 $L = |M_L|_{max} = 3$ with $M_L = 3,2,1,0,-1,-2,-3$
leaving: 2,1,1,0,0,-1,-1,-2 $L = |M_L|_{max} = 2$ with $M_L = 2,1,0,-1,-2$
leaving: 1,0,-1 $L = |M_L|_{max} = 1$ with $M_L = 1,0,-1$

Degenerate individual configurations combine in the final terms and electron indistinguishability is maintained in the final spin-orbitals, through the use of Slater determinants.