

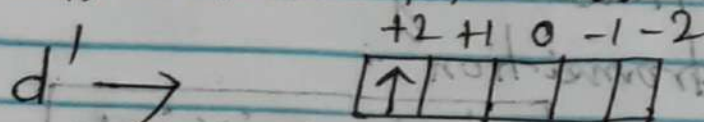
Date :- 02/07/2020

* Calculation of 'L' values for single & multielectron system :-

(Restricted our discussions for 1st row transition metal series)

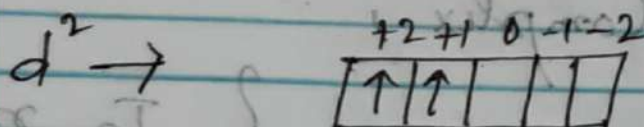
Free ions terms

only Ground state term



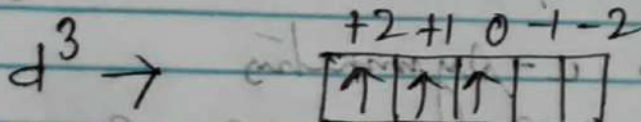
$L = 2$

~~State~~ **D** Term



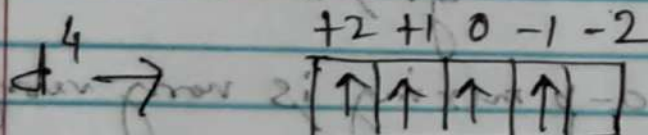
$L = 2 + 1 = 3$

F



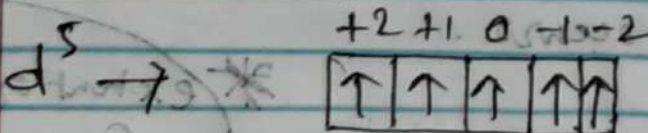
$L = 2 + 1 + 0 = 3$

F



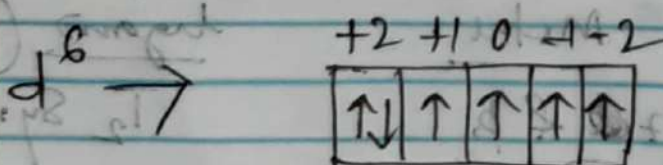
$L = 2 + 1 + 0 - 1 = 2$

D



$L = 2 + 1 + 0 - 1 - 2 = 0$

S



$L = 2 \times 2 + 1 + 0 - 1 - 2 = 2$

D

* We are taking $|L|$ value.

$d^7 \rightarrow$ $\begin{array}{|c|c|c|c|c|} \hline \uparrow\downarrow & \uparrow\downarrow & \uparrow & \uparrow & \uparrow \\ \hline \end{array}$

$$L = 2 \times 2 + 1 \times 2 + 0 - 1 - 2$$

$$= 4 + 2 + 0 - 1 - 2 = 3, \boxed{F}$$

$d^8 \rightarrow$ $\begin{array}{|c|c|c|c|c|} \hline \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow & \uparrow \\ \hline \end{array}$

$$L = 2 \times 2 + 2 \times 1 + 0 - 1 - 2$$

$$= 4 + 2 + 0 - 1 - 2 = 3, \boxed{F}$$

$d^9 \rightarrow$ $\begin{array}{|c|c|c|c|c|} \hline \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow \\ \hline \end{array}$

$$L = 2 \times 2 + 1 \times 2 + 0 + 1 \times 2 + 2$$

$$= 2, \boxed{D}$$

$d^{10} \rightarrow$ $\begin{array}{|c|c|c|c|c|} \hline \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow \\ \hline \end{array}$

$$L = 2 \times 2 + 0 = 2, \boxed{S}$$

$d^1, d^4, d^6, d^9 \rightarrow$ $\begin{array}{|c|} \hline \uparrow \\ \hline \end{array}$

$$\boxed{D}$$

$d^5, d^{10} \rightarrow$ $\begin{array}{|c|} \hline \uparrow\downarrow \\ \hline \end{array}$

$$\boxed{S}$$

$d^2, d^3, d^7, d^8 \rightarrow$ $\begin{array}{|c|} \hline \uparrow\downarrow \\ \hline \end{array}$

$$\boxed{F}$$

Ground term is Free ions

Home tasks :- Calculate the Ground term symbol for $p^1, p^2, p^3, p^4, p^5, p^6$
 $f^1 \rightarrow f^{14}$