DPP – 3

SOLUTIONS

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1. Size, shape and orientation

n, l and m are related to size, shape and orientation respectively.

2. The orbitals having the same energy but different in orientation, are called degenerate orbitals.

e.g. 3d-orbital, l=2,m=−2,−1,0,+1,+2,

i.e. there are five different orientations represented by d_{xy}, d_{yz}, d_{zx}, d_{x2-y^2} and d_{z^2}.

3. The maximum electrons can be described by the quantum numbers $n = 5, l = 2$ in a particular atom is 10 Here,

$n = 5$

$l = 2$

$m = (2 \times 2) + 1$

$(2l + 1) = 5$

maximum $e^- = 5 \times 2 = 10e^-$

$l = 2$ means d-subshell which can accommodate maximum 10 electrons.

Hence, the option C is correct.

4. s orbital has one subshell which means it has only one magnetic quantum number possible. l=0

m = – 1 is not possible for s-orbital

5. When the quantum number n, I, m, s are represented by 3,3,2,+123,3,2,+12, the correct representation is impossible set of quantum number

The answer option with an impossible set of quantum numbers has a second quantum number that is negative. Always larger than or equal to zero are the first and second quantum numbers.

6. For a 6 s electron the values of n, I, m, s respectively could be $6{,}0{,}0, +\frac{1}{2}$

For 6s following information is given,

$n = 6$

$l = 0$

$m = 0$

$S + \frac{1}{2}, \frac{-1}{2}$

$6{,}0{,}0, +\frac{1}{2}$

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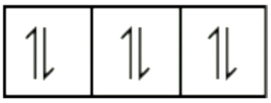
7. Any orbital of any subshell can accommodate a maximum of two electrons with opposite spins.

' p′ subshells have 3 orbitals $\left(p_x, p_y, p_z\right)$.

Each orbital can accommodate two electrons with opposite spins.



8. n n lm s

$3\ 2\ -3\ \frac{1}{2}$

For a given value of n, possible values of I are 0 to $(n-1)$, possible values of m are -1 to +I and possible values of $s=\frac{1}{2}$ or $\frac{-1}{2}$

(a) For

n n m s

$3\ 2\ -2\frac{1}{2}$

all n, l, m and s values are fine as fir $n=3, l=2, m=-2$ and $s=\frac{1}{2}$ is possible.

(b) For $n=4,1=0, m=0$ and and $s=\frac{1}{2}$ is possible.

(c) n n m s

$3\ 2-3\ \frac{1}{2}$

This is the wrong set of quantum number because $|m|$ can not be greater than l as values of m are from -1 to +l so, m can't be -3 .

(d)

n	I	m	s
5	3	0	$-\frac{1}{2}$

For, $n=3$, value of $I=3$ is possible, for $l=3$, $m=0$ is possible and $s=\frac{-1}{2}$

9. None of these type of orbital is designated by $n=2, \ell=3,\ m_l-2$.

n value =2 that means only 2 subshell case is possible either s or p & ℓ = 3 that is d-orbital which is not possible according to value of n=2.

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10. I = 2 refers to the d orbital, which has 5 sub shells, m value goes from -2 to +2 The number of ' I ' values is equal to the principal quantum number.

'I' goes from 0 to n − 1 where n is the principal quantum number. ' m ' takes values from -1 to +1 through zero.