GENERAL CHEMISTRY

1. The number of orbitals with n = 5, m_1 = + 2 is _____. (Round off to the Nearest Integer).

2. What is the spin-only magnetic moment value (BM) of a divalent metal ion with atomic number 25, in it's aqueous solution?

(1) 5.92 (2) 5.0

(3) zero (4) 5.26

3. In the ground state of atomic Fe(Z = 26), the spin-only magnetic moment is _____$\times 10^{-1}$ BM. (Round off to the Nearest Integer).

[Given : $\sqrt{3}$ = 1.73, $\sqrt{2}$ = 1.41]

SOLUTION

1. Official Ans. by NTA (3)

Sol. For, n = 5

ℓ = (0, 1, 2, 3, 4)

If $\ell = 0$, m = 0

$\ell = 1$, m = {–1, 0, +1}

$\ell = 2$, m = {–2, –1, 0, +1, **+2**}

$\ell = 3$, m = {–3, –2, –1, 0, +1, **+2**, +3}

$\ell = 4$, m = {–4, –3, –2, –1, 0, +1, **+2**, +3, +4}

5d, 5f and 5g subshell contain one-one orbital having $m_\ell = +2$

2. Official Ans. by NTA (1)

Sol. Electronic configuration of divalent metal ion having atomic number 25 is

$Mn^{+2}_{(aq)} \Rightarrow$ $1s^2$ $2s^2$ $2p^6$ $3s^2$ $3p^6$ $3d^5$

Total number of unpaired electrons = 5

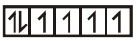
μ (Magnetic moment) = $\sqrt{n(n+2)}$ BM

where n = number of unpaired e^-

$\therefore \mu = \sqrt{5(5+2)} = \sqrt{35}$ BM = 5.92 BM

3. Official Ans. by NTA (49)

Sol. Fe $\rightarrow$ [Ar] $4s^2 3d^6$



Number of unpaired e^- = 4

$\mu = \sqrt{4(4+2)}$ B.M.

$\mu = \sqrt{24}$ B.M.

μ = 4.89 B.M.

$\mu = 48.9 \times 10^{-1}$ B.M.

Nearest integer value will be 49.