DPP–3 SOLUTIONS (EQUIVALENT WEIGHT)

Chapter: Redox Reactions

"Jab tera dimaag bole 'baad mein karenge' — ussi waqt likhna shuru kar."

Q1. Equivalent weight of N_2 in $N_2 \rightarrow NH_3$

Eq. wt. = Molecular wt. / electrons transferred.

$N : 0 \rightarrow -3$ (per atom) Total electrons gained $= 2 \times 3 = 6$
Eq. wt. $= 28/6$

Correct Option: (1)

Q2. Equivalent weight of NH_3 in $N_2 \rightarrow NH_3$

Use same electron change for nitrogen.

One mole NH_3 involves gain of 3 electrons.
Eq. wt. $= 17/3$

Correct Option: (4)

Q3. In $A^{-n_2} + xe^- \rightarrow A^{-n_1}$, value of x

Electron gain equals change in oxidation number.

$x = n_1 - n_2$

Correct Option: (3)

Q4. Equivalent weight of sulphur when O.S. $= -2$

Lowest O.S. means sulphur can lose electrons.

n–factor $= 2$
Eq. wt. $= 32/2 = 16$

Correct Option: (1)

Q5. Eq. wt. of H_2SO_4 in $H_2SO_4 \rightarrow H_2S$

Check sulphur oxidation state change.

$S : +6 \rightarrow -2$ Electrons gained $= 8$
Eq. wt. $= M/8$

Correct Option: (4)

Q6. n–factor of $Ba(MnO_4)_2$ in acidic medium

Permanganate in acidic medium.

$Mn : +7 \rightarrow +2$ (5 e^- each) Two Mn atoms $\Rightarrow$ 10 electrons

Correct Option: (2)

Q7. Oxidising product of Na_3AsO_3

As(III) oxidises to As(V).

Oxidation product $= AsO_4^{3-}$

Correct Option: (4)

Q8. Eq. wt. of $Na_2S_2O_3$ in $2S_2O_3^{2-} + I_2 \rightarrow S_4O_6^{2-}$

Thiosulphate loses 1 electron.

n–factor $= 1$
Eq. wt. $=$ Molecular weight

Correct Option: (1)

Q9. Eq. wt. of iodine in $I_2 + 2S_2O_3^{2-} \rightarrow 2I^- + S_4O_6^{2-}$

Iodine is reduced.

$I_2 + 2e^- \rightarrow 2I^-$
Eq. wt. $=$ Mol. wt./2

Correct Option: (2)

Q10. Eq. wt. of $KBrO_3$ for $BrO_3^- \to Br^-$

Check oxidation state of bromine.

$Br : +5 \to -1$ Electrons gained $= 6$
Eq. wt. $= M/6$

Correct Option: (3)

Q11. Eq. wt. of reductant in $[Fe(CN)_6]^{3-} + H_2O_2 \to [Fe(CN)_6]^{4-}$

Reductant is oxidised species.

$H_2O_2 \to O_2$ n–factor $= 2$
Eq. wt. $= 34$

Correct Option: (3)

Q12. Eq. wt. of $Na_2S_2O_3$ as reductant in $Na_2S_2O_3 + Cl_2 \to Na_2SO_4 + S$

Total electrons lost by sulphur.

n–factor $= 6$
Eq. wt. $=$ Mol. wt./6

Correct Option: (3)

Q13. Eq. wt. of FeC_2O_4 in $FeC_2O_4 \to Fe^{3+} + CO_2$

Total electrons lost.

n–factor $= 6$
Eq. wt. $= M/6$

Correct Option: (2)

Q14. Eq. wt. of $MnSO_4$ is half of its molar mass when converted to

Half molar mass $\Rightarrow n = 2$.

$Mn^{2+} \to MnO_2$
n–factor $= 2$

Correct Option: (2)

Q15. Eq. wt. of V_2O_5 in $VO + Fe_2O_3 \rightarrow FeO + V_2O_5$

Oxidation state of vanadium.

$V : +4 \rightarrow +5$ (2 V atoms)
Eq. wt. $= M/4$

Correct Option: (4)

Q16. Eq. wt. of Fe in $3Fe + 4H_2O \rightarrow Fe_3O_4 + 4H_2$

Average oxidation state in Fe_3O_4.

Average O.S. $= +8/3$
Eq. wt. $= 56/(8/3) = 21$

Correct Option: (2)

Q17. Eq. wt. of reductant in $Cr_2O_7^{2-} + I^- \rightarrow Cr^{3+} + I_2$

I^- is oxidised.

n–factor $= 1$
Eq. wt. $= 127$

Correct Option: (2)

Q18. Eq. wt. of reactant in $[Fe(CN)_6]^{4-} \rightarrow Fe_2O_3 + CO_2 + NO_2$

Use total electrons transferred.

Total electrons $= 45$
Eq. wt. $= M/45$

Correct Option: (3)

Q19. Moles of oxalate oxidised by 1 mole of MnO_4^-

Electron balance.

MnO_4^- : $5e^-$ accepted $C_2O_4^{2-}$: $2e^-$ donated
Moles = 5/2

Correct Option: (3)

Q20. Moles of $KMnO_4$ reduced by 1 mole ferrous oxalate

Total electrons donated.

Total = $3e^-$
Required = 3/5

Correct Option: (4)

Q21. Moles of $KMnO_4$ reduced by 1 mole KI in alkaline medium

Alkaline oxidation of iodide.

$I^- \rightarrow IO_3^-(6e^-)$
Equivalent to 1 mole $KMnO_4$

Correct Option: (1)

Q22. Mass of $CuSO_4 \cdot 5H_2O$ to liberate 2.54 g I_2

Use equivalent concept.

Eq. of $I_2 = 2.54/127 = 0.02$
Mass = $0.02 \times 249.5 \approx 4.99$ g

Correct Option: (2)

Q23. If 4 moles of electrons are transferred to 1 mole HNO_3, product is

Oxidation state of nitrogen.

$+5 \rightarrow +1$
Product = N_2O
Amount = $\frac{1}{2}$ mole

Correct Option: (2)