CHEMISTRY

Redox Reactions

31. (1)

Calculating the oxidation number of central atom in the given species.

$\overset{+3}{Cr}O_2^-,\ \overset{+5}{Cl}O_3^-,\ \overset{+6}{Cr}O_4^{2-},\ \overset{+7}{Mn}O_4^-$

32. (2)

Reaction balance by oxidation number method

$\overset{+7}{Mn}O_4^- \to \overset{+2}{Mn^{2+}};\ 5e^-$ gain

$\overset{+3}{C}_2O_4^{2-} \to \overset{+4}{C}O_2;\ 2e^-$ loss

Multiplying (i) by 2 and (ii) by 5 to balance electrons

$2MnO_4^- + 5C_2O_4^{2-} \to 2Mn^{2+} + 10CO_2$

On balancing charge;

$2MnO_4^- + 5C_2O_4^{2-} + 16H^+$

$\to 2Mn^{2+} + 10CO_2 + 8H_2O$

33. (3)

$\overset{+6}{Cr}O_4^{2-} \to \overset{+6}{Cr}_2O_7^{2-}$

Since, oxidation state of Cr in both reactant and product is same.

34. (3)

SO_4^- cannot be oxidised since the oxidation stat (+6) of S is highest.

35. (2)

Reaction II is disproportionation, while I, III and IV are not

(I) $\overset{-}{N}H_4 + \overset{+5}{N}O_3 \xrightarrow{heat} \overset{+1}{N}_2O + H_2O$

Comproportionation

(II) $\overset{0}{P}_4 \xrightarrow{heat} \overset{-3}{P}H_3 + H\overset{+2}{P}O_2^-$

Disproportionation

(III) $\overset{+5}{P}Cl_5 \xrightarrow{heat} \overset{+3}{P}Cl_3 + Cl_2$ reduction

(IV) $H_2\overset{-1}{O}_2 \to \overset{0}{O}_2 + 2e^-$ oxidation

Redox Reactions and Electrode Processes

36. (2)

37. (4)

$\overset{-3}{Cu}_3P + Cr_2O_7^{2-}$

$\to \overset{+5}{Cu}^{2+} + H_3PO_4 + Cr^{+3}$

$\text{Equivalent weight} = \dfrac{\text{Molar mass}}{\text{Valency}} = \dfrac{M}{8}$

38. (1)

Hydrogen is present as hydride ion in these molecule i.e., oxidation state is –1.

39. (2)

$2Cl^- \to Cl_2 + 2e^-$

$W = \dfrac{E}{96,500} \times t$

$0.1 \times 71 = \dfrac{35.5}{96500} \times 3 = 6433.33\ \text{sec}$

$= 107.22\ \text{min} = 110\ \text{min}$

40. (2)

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