Solutions

S1. Ans. (c)

(1) $\overset{+5}{K}\overset{+5}{Cl}O_3 + I_2^0 \longrightarrow 2K\overset{+5}{I}O_3 + Cl_2^0$,

Reduction

Oxidation

Redox Reaction

(2) $H_2^0 + Cl_2^0 \longrightarrow 2H\overset{+1}{Cl}^{-1}$,

Reduction

Oxidation

Redox Reaction

(3) $\overset{+2}{Ba}Cl_2^{-1} + \overset{+1}{Na}_2SO_4^{-2} \longrightarrow \overset{+2}{Ba}SO_4 + 2\overset{+1}{Na}Cl^{-1}$

This is not a redox reaction as there is no change in oxidation state

(4) $Zn^0 + \overset{+2}{Cu}SO_4 \longrightarrow \overset{+2}{Zn}SO_4 + Cu^0$,

Reduction

Oxidation

Redox Reaction

S2. Ans.(c)

Redox couples is both the reduced and oxidised form involve same element.

S3. Ans.(d)

Reaction has to be balanced in acidic medium 'O' atoms are balanced by adding H_2O and then H-atom is balanced by adding H^+ ions and charge is balanced by e^-.

Oxidation: $S0_3^{2-} + H_2O \longrightarrow S0_4^{2-} + 2H^+ + 2e^- \times 3$

Reduction: $Cr_20_7^{2-} + 14H^+ + 6e^- \longrightarrow 2Cr^{3+} + 7H_2O$

$Cr_20_7^{2-} + 3S0_3^{2-} + 8H^+ \longrightarrow 2Cr^{3+} + 3S0_4^{2-} + 4H_2O$

a = 1

b = 3

c = 8

S4. Ans.(b)

Decomposition redox reaction leads to breakdown of a compound into two or more compounds at least one of which must be in the elemental state with change in oxidation number.

$2Pb(N0_3^{2-})_2(s) \longrightarrow 2PbO(s) + 4NO_2(g) + 0_2^{\circ}(g)$

S5. Ans.(a)

Aluminium is more electropositive than Cr, so it displaced chromium from Cr_2O_3.

$Cr_2O_3 + Al \overset{\Delta}{\rightarrow} Al_2O_3 + Cr$

S6. Ans.(b)

$CH_4(g) + 4Cl_2(g) \rightarrow CCl_4(l) + 4HCl(g)$

In the given reaction

Let Carbon oxidation number assumes to be x

H oxidation state is +1

In CH_4

x + 4 × 1 = 0

x = –4

In CCl_4

Cl oxidation state is –1

x + 4 × (–1) = 0

x = +4

Thus, Change in oxidation state of carbon is from –4 to +4.

S7. Ans.(d)

(a) $\underline{Cl}O_3^-$

x + 3 (–2) = –1

x = +5

(b) $K_2\underline{Cr_2}O_7$

2(+1) + 2x + 7(–2) = 0

X = +6

(c) $H\underline{Au}Cl_4$

(+1) + x + 4(–1) = 0

x = +3

(d) $Cu_2\underline{O}$

2(+1) + x = 0

x = –2

S8. Ans.(a)

A. $\overset{+1}{2Cu^{+}} \longrightarrow \overset{+2}{Cu^{2(+)}} + \overset{0}{Cu}$ } Disproportionation

(red: $Cu^{+} \rightarrow Cu$; oxd: $Cu^{+} \rightarrow Cu^{2(+)}$)

B. $3\overset{+6}{Mn}O_4^{2(-)} + 4H^{(+)} \longrightarrow 2\overset{+7}{MnO_4^{-}} + \overset{+4}{MnO_2} + 2H_2O$ } Disproportionation

(red: $Mn^{+6} \rightarrow Mn^{+4}$; oxd: $Mn^{+6} \rightarrow Mn^{+7}$)

C. $2\overset{+7}{K}\overset{+7}{Mn}O_4^{-2} \longrightarrow K_2\overset{+6}{Mn}O_4 + \overset{+4}{Mn}O_2 + \overset{0}{O_2}$ }

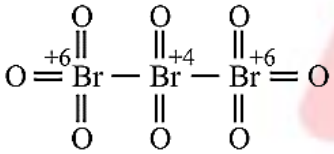
$\therefore$ not a disproportionation

D. $2\overset{+7}{Mn}O_4^{-} + 3\overset{+2}{Mn^{2(+)}} + 2H_2O \longrightarrow 5\overset{+4}{Mn}O_2 + 4H^{\oplus}$ }

S9. Ans.(a)

The correct structure of Br_3O_8.

The oxidation no of bromine is $\frac{16}{3}$ in this structure



Tribromooctaoxide

S10. Ans.(b)

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

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

S11. Ans.(b)

$CaF_2 + H_2SO_4 \rightarrow CaSO_4 + 2HF$

This reaction is not a oxidation reaction as none of the atom in the reaction is showing any change in the oxidation number. H_2SO_4, here in the reaction is not acting as a reducing nor an oxidizing agent.

S12. Ans.(b)

$Fe(NO_2)_2 \rightarrow Fe^{3+} + 2NO_3^{-}$

$Fe^{2+} \rightarrow Fe^{3+}$ change in oxidation state = 1

$2NO_2^{-} \rightarrow 2NO_3^{-}$ change in oxidation state = 4

Total change in oxidation state = 5

So, $Fe(NO_2)_2$ will have maximum number of moles.

$Fe(NO_2)_2$ will need maximum amount of acidic $KMnO_4$

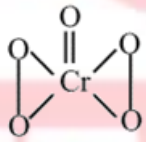
For $FeSO_4$

$Fe^{2+} \rightarrow Fe^{3+}$ change in oxidation state = 1

$FeSO_4$ will need least amount of $KMnO_4$.

S13. Ans.(b)

CrO_5 has a very famous butterfly structure



x + 4 (–1) + 1 (–2) = 0

x = +6