CHAPTER 8

Redox Reactions

1. Which of the following is a redox reaction? **[2002]**

(a) $NaCl + KNO_3 \rightarrow NaNO_3 + KCl$

(b) $CaC_2O_4 + 2HCl \rightarrow CaCl_2 + H_2C_2O_4$

(c) $Mg(OH)_2 + 2NH_4Cl \rightarrow MgCl_2 + 2NH_4OH$

(d) $Zn + 2AgCN \rightarrow 2Ag + Zn(CN)_2$.

2. Several blocks of magnesium are fixed to the bottom of a ship to **[2003]**

(a) make the ship lighter

(b) prevent action of water and salt

(c) prevent puncturing by under-sea rocks

(d) keep away the sharks

3. Which of the following chemical reactions depict the oxidizing beahviour of H_2SO_4? **[2006]**

(a) $NaCl + H_2SO_4 \longrightarrow NaHSO_4 + HCl$

(b) $2PCl_5 + H_2SO_4 \longrightarrow 2POCl_3 + 2HCl + SO_2Cl_2$

(c) $2HI + H_2SO_4 \longrightarrow I_2 + SO_2 + 2H_2O$

(d) $Ca(OH)_2 + H_2SO_4 \longrightarrow CaSO_4 + 2H_2O$

4. In the following balanced reaction,

$$X\,MnO_4^- + Y\,C_2O_4^{2-} + Z\,H^+ \rightleftharpoons X\,Mn^{2+} + 2Y\,CO_2 + \frac{Z}{2}H_2O$$

values of X, Y and Z respectively are **[Online May 12, 2012; 2013 Offline]**

(a) 2, 5, 16 (b) 8, 2, 5

(c) 5, 2, 16 (d) 5, 8, 4

5. The molecular formula of a commercial resin used for exchanging ions in water softening is $C_8H_7SO_3^-\,Na^+$ (Mol. wt. 206. What would be the maximum uptake of Ca^{2+} ions by the resin when expressed in mole per gram resin? **[JEE M 2015]**

(a) $\frac{2}{309}$ (b) $\frac{1}{412}$

(c) $\frac{1}{103}$ (d) $\frac{1}{206}$

6. Which of the following reactions is an example of a redox reaction? **[JEE M 2017]**

(a) $XeF_4 + O_2F_2 \rightarrow XeF_6 + O_2$

(b) $XeF_2 + PF_5 \rightarrow [XeF]^+ PF_6^-$

(c) $XeF_6 + H_2O \rightarrow XeOF_4 + 2HF$

(d) $XeF_6 + 2H_2O \rightarrow XeO_2F_2 + 4HF$

Answer Key														
1	2	3	4	5	6									
(d)	(b)	(c)	(a)	(b)	(a)									

SOLUTIONS

1. **(d)** $\overset{0}{Zn} + 2\overset{+1}{Ag}CN \xrightarrow{-2e^-} \overset{0}{Ag} + \overset{+2}{Zn}(CN)_2$ ($+2e^-$)

The oxidation state shows a change only in (d)

2. **(b)** Magnesium provides cathodic protection and prevent rusting or corrosion.

3. **(c)** $2HI^{-1} + \overset{+6}{H_2SO_4} \longrightarrow I_2^0 + \overset{+4}{SO_2} + 2H_2O$

in this reaction oxidation number of S is

decreasing from +6 to +4 hence undergoing reduction and for HI oxidation Number of I is increasing from –1 to 0 hence underegoing oxidation therefore H_2SO_4 is acting as oxidising agent.

4. (a) $X\ MnO_4^- + Y\ C_2O_4^{2-} + Z\ H^+ \rightleftharpoons$

$$X\ Mn^{2+} + 2Y\ CO_2 + \frac{Z}{2}H_2O$$

First half reaction

$MnO_4^- \longrightarrow Mn^{++}$ .... (i)

On balancing

$MnO_4^- + 8H^+ + 5e^- \longrightarrow Mn^{++} + 4H_2O$ .... (ii)

Second half reaction

$C_2O_4^{--} \longrightarrow 2CO_2$ .... (iii)

On balancing

$C_2O_4^{--} \longrightarrow 2CO_2 + 2e^-$ .... (iv)

On multiplying eqn. (ii) by 5 and (iv) by 2 and then adding we get

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

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

5. (b) 2 mole of water softner require 1 mole of Ca^{2+} ion

So, 1 mole of water softner require mole of Ca^{2+} ion

Thus, will be maximum uptake

6. (a) In the reaction

$$\overset{+4}{XeF_4} + \overset{+1}{O_2}\overset{}{F_2} \rightarrow \overset{+6}{XeF_6} + \overset{0}{O_2}$$

Oxidation

Reduction