Date Planned : __ / __ / __	Daily Tutorial Sheet-10	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	Level-2	Exact Duration :_____

116. In a balanced equation $H_2SO_4 + x\,HI \longrightarrow H_2S + y\,I_2 + z\,H_2O$, the values of x, y, z are :

(A) x = 3, y = 5, z = 2 **(B)** x = 4, y = 8, z = 5

(C) x = 8, y = 4, z = 4 **(D)** x = 5, y = 3, z = 4

Paragraph for Question No. 117 – 121

Pyrolusite is the main ore of manganese in which it is present as MnO_2. Its Mn content is determined by reducing it under acidic condition to Mn^{2+} with the help of oxalate ($C_2O_4^{2-}$) ion which in turn gets oxidized to CO_2. The analytical determination is carried out by adding a known excess volume of $C_2O_4^{2-}$ solution to a suspension of the pyrolusite and digesting the mixture on a hot water bath until all the MnO_2 has been reduced. The excess unreacted oxalate solution is then titrated with standardized $KMnO_4$ solution. Thereby Mn content of ore can be calculated. $KMnO_4$ solution is also standardized under acidic condition against oxalate ion wherein MnO_4^- ion is reduced to Mn^{2+} and $C_2O_4^{2-}$ ion is oxidized to CO_2.

117. An alternative method for this analysis may be the replacement of oxalate with Fe^{2+}. But this is less frequently used because it requires some special care otherwise we get low analytical results. The probable reaction responsible for this fact is :

(A) presence of oxygen can cause oxidation, $Fe^{2+} \longrightarrow Fe^{3+}$

(B) presence of oxygen can cause reduction, $Fe^{3+} \longrightarrow Fe^{2+}$

(C) the oxidation of $Fe^{2+} \longrightarrow Fe^{3+}$ is difficult in the presence of $C_2O_4^{2-}$

(D) formation of CO_2 reduces $Fe^{3+} \longrightarrow Fe^{2+}$

118. If a student prepared a standard solution of $Na_2C_2O_4$ by dissolving 3.2 g of dry anhydrous salt into distilled water and making the solution upto 500 mL. The Normality of oxalate solution is

(A) 0.085 **(B)** 0.096 **(C)** 0.054 **(D)** 0.032

119. 3 g of pyrolusite ore were treated with 20 g of pure ferrous ammonium sulphate ($FeSO_4 \cdot (NH_4)_2SO_4 \cdot 6H_2O$) and dil. H_2SO_4. After the reaction solution was diluted to 500 mL. 50 mL of dilute solution required 10 mL of 0.1 N $K_2Cr_2O_7$ solution. What is the amount of ferrous ammonium sulphate in 500 mL of solution, which is neutralized by $K_2Cr_2O_7$ solution ?

(A) 16.08 g **(B)** 3.92 g **(C)** 19.08 g **(D)** 5.62 g

120. What is the percentage of pure MnO_2 in the above question ?

(A) 50.9% **(B)** 62.5%

(C) 59.4% **(D)** 75.4%

121. 0.5 g sample containing MnO_2 is treated with HCl liberating Cl_2. The Cl_2 is passed into a solution of KI and 30 cm^3 of 0.1 M hypo is required to titrate the liberated iodine. What is the percentage of MnO_2 in the sample ?

(A) 22.64% **(B)** 26.1% **(C)** 62.2% **(D)** 72.5%

Paragraph for Question No. 122 to 125

The solution of oxalic acid and sulphuric acid reacts with NaOH according to the reactions

$$H_2C_2O_4 + NaOH \longrightarrow Na_2C_2O_4 + H_2O$$

$$H_2SO_4 + NaOH \longrightarrow Na_2SO_4 + H_2O$$

While the same mixture of acid solution is titrated with $KMnO_4$ solution which will react with oxalic acid (redox titration) in the presence of H_2SO_4 as

$$H_2C_2O_4 + KMnO_4 + H_2SO_4 \longrightarrow K_2SO_4 + MnSO_4 + H_2O + CO_2$$

The reaction of oxalic acid with $KMnO_4$ is very slow therefore the oxalic acid solution is heated to 70°C initially. Once the reaction has started, its rate automatically increases due to the formation of Mn^{2+} ions which catalyze the reaction.

$KMnO_4$ behaves as an oxidant in all three mediums

$$MnO_4^- \xrightarrow{\text{Acidic}} Mn^{2+}$$

$$MnO_4^- \xrightarrow{\text{Alkaline}} MnO_4^{2-}$$

$$MnO_4^- \xrightarrow{\text{Neutral}} MnO_2$$

122. In the permanganate titration, the solution of reductant is always made acidic by adding H_2SO_4 rather than HCl or HNO_3 because :

(A) HCl is a reducing agent and it may get oxidized itself resulting into decrease in the volume of $KMnO_4$ equivalent to the reducing agent under estimation.

(B) HNO_3 is an oxidizing agent and it may get reduced into consumption of more volume of $KMnO_4$ for the end point.

(C) H_2SO_4 (dil.) is neither oxidizing nor reducing agent.

(D) HCl and HNO_3 are more costlier than H_2SO_4 .

123. If 1.34 g $Na_2C_2O_4$ is dissolved in 500 mL of water and this solution is titrated with $\frac{M}{10}KMnO_4$ solution in acidic medium, the volume of $KMnO_4$ used is :

(A) 200 mL **(B)** $\frac{200}{3}$mL **(C)** 40 mL **(D)** none of these

124. In acid base titration using the above mentioned acids 100 mL $\frac{M}{10}NaOH$ is used which of the following is correct ?

(A) 5×10^{-3} moles of $H_2C_2O_4$ **(B)** 5×10^{-3} moles of $H_2C_2O_4 + H_2SO_4$

(C) 5×10^{-3} moles of H_2SO_4 **(D)** All of the above

125. 10 g of oxalate was dissolved in 300 mL of solution. This solution required 250 mL of $\left(\frac{M}{10}\right)KMnO_4$ in acidic medium for complete oxidation. The percentage purity of oxalate ion in the salt is :

(A) 55% **(B)** 57.8% **(C)** 45% **(D)** None of these