Q1 - 25 July - Shift 1

SO_2Cl_2 on reaction with excess of water results into acidic mixture

$SO_2Cl_2 + 2H_2O \rightarrow H_2SO_4 + 2HCl$

16 moles of NaOH is required for the complete neutralisation of the resultant acidic mixture. The number of moles of SO_2Cl_2 used is :

(A) 16 (B) 8

(C) 4 (D) 2

Space for your notes:

Q2 - 25 July - Shift 2

In base vs. Acid titration, at the end point methyl orange is present as

(A) quinonoid form (B) heterocyclic form

(C) phenolic form (D) benzenoid form

Space for your notes:

Q3 - 26 July - Shift 1

Which of the given reactions is not an example of disproportionation reaction ?

(A) $2H_2O_2 \rightarrow 2H_2O + O_2$

(B) $2NO_2 + H_2O \rightarrow HNO_3 + HNO_2$

(C) $MnO_4^- + 4H^+ + 3e^- \rightarrow MnO_2 + 2H_2O$

(D) $3MnO_4^{2-} + 4H^+ \rightarrow 2MnO_4^- + MnO_2 + 2H_2O$

Space for your notes:

Q4 - 26 July - Shift 1

The dark purple colour of $KMnO_4$ disappears in the titration with oxalic acid in acidic medium.
The overall change in the oxidation number of manganese in the reaction is :

(A) 5 (B) 1

(C) 7 (D) 2

Space for your notes:

Q5 - 26 July - Shift 2

Given below are two statements : one is labelled as Assertion A and the other is labelled as Reason R.

Assertion A : Phenolphthalein is a pH dependent indicator, remains colourless in acidic solution and gives pink colour in basic medium

Reason R : Phenolphthalein is a weak acid. It doesn't dissociate in basic medium.

In the light of the above statements, choose the most appropriate answer from the options given below :

(A) Both A and R are true and R is the correct explanation of A

(B) Both A and R are true but R is NOT the correct explanation of A.

(C) A is true but R is false

(D) A is false but R is true

Space for your notes:

Q6 - 26 July - Shift 2

20 mL of 0.02 M hypo solution is used for the titration of 10 mL of copper sulphate solution, in the presence of excess of KI using starch as an indicator. The molarity of Cu^{2+} is found to be _____ $\times 10^{-2}$ M [nearest integer]

Given : $2Cu^{2+} + 4I^- \rightarrow Cu_2I_2 + I_2$

$I_2 + 2S_2O_3^{2-} \rightarrow 2I^- + S_4O_6^{2-}$

Space for your notes:

Q7 - 27 July - Shift 1

20 mL of 0.02 M $K_2Cr_2O_7$ solution is used for the titration of 10 mL of Fe^{2+} solution in the acidic medium.

The molarity of Fe^{2+} solution is _____ $\times 10^{-2}$ M. (Nearest Integer)

Space for your notes:

Q8 - 28 July - Shift 2

Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R**

Assertion A : Permanganate titrations are not performed in presence of hydrochloric acid.

Reason R : Chlorine is formed as a consequence of oxidation of hydrochloric acid.

In the light of the above statements, choose the ***correct*** answer from the options given below

(A) Both A and R are true and R is the correct explanation of A

(B) Both A and R are true but R is NOT the correct explanation of A

(C) A is true but R is false

(D) A is false but R is true

Space for your notes:

Q9 - 28 July - Shift 2

2L of 0.2 M H_2SO_4 is reacted with 2L of 0.1 M NaOH solution, the molarity of the resulting product Na_2SO_4 in the solution is ____ millimolar. (Nearest integer).

Space for your notes:

Q10 - 29 July - Shift 2

A compound 'X' is a weak acid and it exhibits colour change at pH close to the equivalence point during neutralization of NaOH with CH_3COOH. Compound 'X' exists in ionized form in basic medium. The compound 'X' is :

(A) methyl orange (B) methyl red

(C) phenolphthalein (D) erichrome Black T

Space for your notes:

Answer Key

Q1 (C) **Q2** (A) **Q3** (C) **Q4** (A)

Q5 (C) **Q6** (4) **Q7** (24) **Q8** (A)

Q9 (25) **Q10** (C)

Q1 (C)

$$\text{Let } n(SO_2Cl_2) = x \text{ moles}$$

$$\therefore n(H_2SO_4) = x,\ n(HCl) = 2x$$

$$\Rightarrow n(H^+) = 4x$$

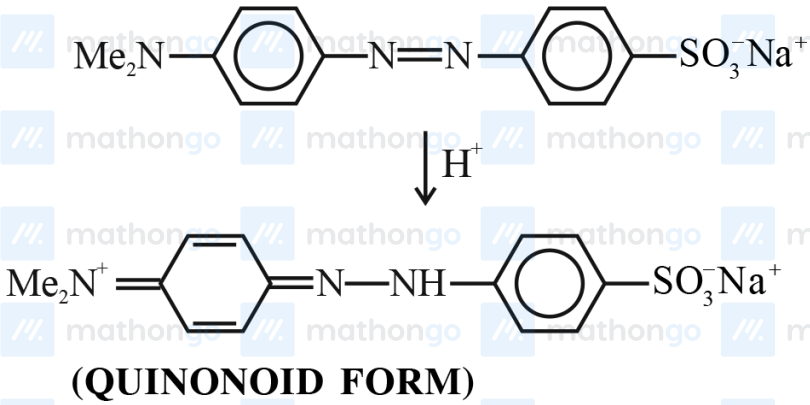
For Neutralisation

$$\Rightarrow n(H^+) = n(OH^-)$$

$$\Rightarrow 4x = 16$$

$$\Rightarrow \mathbf{x = 4}$$

Q2 (A)



(QUINONOID FORM)

Q3 (C)

$2\overset{-1}{H_2O_2} \longrightarrow 2\overset{-2}{H_2O} + \overset{0}{O_2}$: Disproportionation

$2\overset{+4}{NO_2} + H_2O \rightarrow \overset{+5}{HNO_3} + \overset{+3}{HNO_2}$: Disproportionation

$MnO_4^- + 4H^+ + 3e^- \rightarrow MnO_2 + 2H_2O$: reduction

$3\overset{+6}{MnO_4^{2-}} + 4H^+ \rightarrow 2\overset{+7}{MnO_4^-} + \overset{+4}{MnO_2} + 2H_2O$: Disproportionation

Q4 (A)

In acidic medium,

$\overset{+7}{MnO_4^-} \rightarrow Mn^{+2}$

change in ox. no. = 5

Q5 (C)

Phenolphthalein dissociate in basic medium

$HPh(aq) \rightleftharpoons H^+ + Ph^-$

(colourless) (Pink)

Q6 (4)

$n_{eq.}$ of $I_2 = n_{eq}$ of $Na_2S_2O_3 = 20 \times 0.002 \times 1$

$2 \times n_{mol}$ of $I_2 = 0.4$

n_{mol} of $I_2 = 0.2$ m mol

n_{mol} of $Cu^{+2} = 0.2 \times 2 \times 10^{-3}$

$$[Cu^{+2}] = \frac{0.4 \times 10^{-3}}{10 \times 10^{-3}} = 0.04 = 4 \times 10^{-2}$$

Q7 (24)

Eq. of $K_2Cr_2O_7$ = Eq. of Fe^{2+}

$\Rightarrow$ (Molarity $\times$ volume $\times$ n.f) of $K_2Cr_2O_7$ = (molarity $\times$ volume $\times$ n.f) of Fe^{2+}

$\Rightarrow 0.02 \times 20 \times 6 = M \times 10 \times 1$

$\Rightarrow$ M = 0.24

$\Rightarrow$ Molarity = 24×10^{-2}

Q8 (A)

$2KMnO_4 + 16HCl \rightarrow 2MnCl_2 + 2KCl + 8H_2O + Cl_2$

HCl gets oxidised by $KMnO_4$ into Cl_2

Q9 (25)

$H_2SO_4 + 2NaOH \rightarrow Na_2SO_4 + 2H_2O$

0.4 mol 0.2 mol -

0.3 mol - 0.1 mol

Molarity of Na_2SO_4 is $\frac{0.1}{4} = 0.025M$

= 25 mM.

Q10 (C)

Phenolphthalein is weak acid give colour in basic medium.