

Daily Tutorial Sheet-13	Level-3
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147. (% of $K_2Cr_2O_7$ = 14.61%; % of $KMnO_4$ = 85.4%)

Let 'a' g of $K_2Cr_2O_7$ and $(0.5 - a)$ g $KMnO_4$ be present in mixture.

$$\text{Eq. of } Na_2S_2O_3 = \frac{100 \times 0.15}{1000} = 0.015$$

Eq. of $K_2Cr_2O_7 + KMnO_4 \equiv$ Eq. of iodine \equiv Eq. of $Na_2S_2O_3$

$$\text{Eq. weight of } K_2Cr_2O_7 = \frac{294}{6} = 49$$

$$\text{Eq. weight of } KMnO_4 = \frac{158}{5} = 31.6$$

Equivalents of $K_2Cr_2O_7 + KMnO_4 =$ Equivalents of $Na_2S_2O_3$

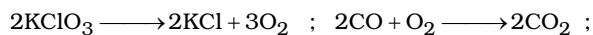
$$\frac{a}{49} + \frac{0.5 - a}{31.6} = 0.015$$

$$a = 0.0732$$

$$\% K_2Cr_2O_7 = \frac{0.0732 \times 100}{0.5} = 14.6\%$$

$$\% KMnO_4 = 85.4\%$$

148.(65.4)



$$n_{CO} = \frac{PV}{RT} = \frac{750 / 760 \times 0.02}{0.0821 \times 300} \times 1000 = 0.8 \text{ m moles}$$

$$n_{O_2} = 0.4 \text{ m moles} ; \quad n_{KClO_3} = \frac{0.8}{3} \text{ m moles}$$

$$\text{Mass of } KClO_3 = \frac{0.8 \times 10^{-3}}{3} \times 122.5 = 0.0326 \text{ g}$$

$$\% \text{ purity} = \frac{0.0326}{0.05} \times 100 = 65.4\%$$

149. (% of MnO_2 = 48.9 ; % of O_2 = 9%)

Meq of oxalic acid which reacted with $MnO_2 = 18 \text{ meq}$

\therefore meq of O_2 available = 18

$$\Rightarrow \frac{18}{1000} = \frac{x}{32/4} \quad (\text{n-factor for } O_2 = 4)$$

$$\Rightarrow x = 0.144 \text{ g}$$

$$\text{So, \% of } O_2 = \frac{0.144}{1.6} \times 100 = 9\%$$

Meq of $MnO_2 = 18$

$$\frac{18}{1000} = \frac{x \times 2}{87} \quad (\text{n-factor of } MnO_2 = 2)$$

$$x = 0.783 \text{ g}$$

$$\text{So, \% of } MnO_2 = \frac{0.783}{1.6} \times 100 = 48.9\%$$

150.(17.136)

Normality of $KMnO_4$ solution = $0.0245 \times 5 = 0.1225 \text{ N}$

$$\text{Eq. of } KMnO_4 \text{ used} = \frac{0.1225 \times 25}{1000} = 3.0625 \times 10^{-3}$$

$$\text{Eq. of } H_2O_2 \text{ in } 10 \text{ mL} = 3.0625 \times 10^{-3}$$

$$\text{Eq. of H}_2\text{O}_2 \text{ in 100 mL} = 3.0625 \times 10^{-2}$$

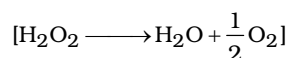
$$\text{Eq. of H}_2\text{O}_2 \text{ in 10 mL (original)} = 3.0625 \times 10^{-2}$$

(on dilution equivalents of substance does not change)

$$\text{Moles of H}_2\text{O}_2 \text{ in original 10 mL} = \frac{3.0625 \times 10^{-2}}{2} = 1.53 \times 10^{-2} \quad (\text{n factor of H}_2\text{O}_2 = 2)$$

$$\text{Moles of H}_2\text{O}_2 \text{ in 1 mL of original 10 mL} = \frac{1.53 \times 10^{-2}}{10} = 1.53 \times 10^{-3}$$

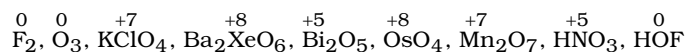
$$\text{Moles of O}_2 \text{ that it would give up on decomposing} = \frac{1.53 \times 10^{-3}}{2} = 7.65 \times 10^{-4}$$



$$\text{Volume of O}_2 \text{ at STP in mL} = 7.65 \times 10^{-4} \times 22400 = 17.136$$

$$\text{Volume strength} = 17.136$$

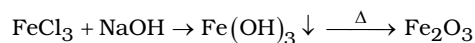
151.(9) All can act as oxidizing agents because corresponding atom is in higher oxidation state.



152. Eq. of NaOH = $50 \times 0.2 = 10$

$$\text{Eq. of HCl} = 5 \times 1 = 5$$

$$\text{Eq. of NaOH left after reaction with HCl} = 10 - 5 = 5$$



FeCl₃ reacts with NaOH to give Fe(OH)₃ which on ignition gives Fe₂O₃

$$\therefore \text{Eq. of NaOH used for FeCl}_3 = \text{Eq. of Fe}(\text{OH})_3$$

$$= \text{Eq. of Fe}_2\text{O}_3 = 15 \times 0.1 = 1.5$$

$$\therefore \text{Eq. of NaOH left finally} = 5 - 1.5 = 3.5$$

$$\text{Normality of NaOH in the resultant solution} = \frac{3.5}{70} = 0.05$$

$$\frac{W_{\text{Fe}_2\text{O}_3}}{M_{\text{Fe}_2\text{O}_3}} \times 6 = 1.5 \quad (\text{n-factor for Fe}_2\text{O}_3 = 6)$$

$$\therefore W_{\text{Fe}_2\text{O}_3} = \frac{1.5 \times 160}{6} = 40 \text{ g}$$