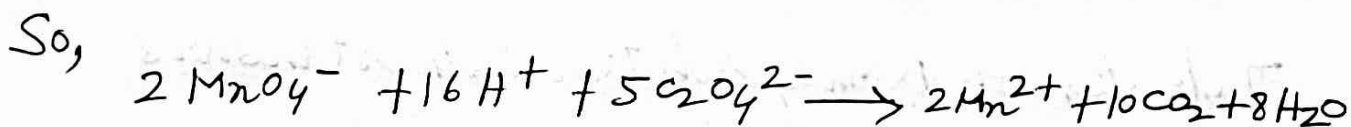
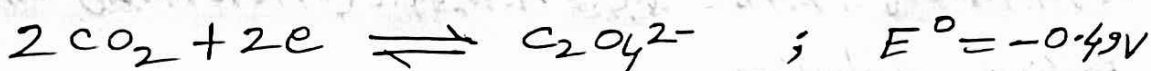
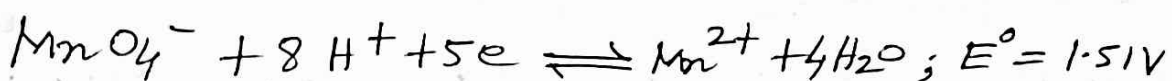


# Standardisation of $KMnO_4$ solution by standard oxalic acid solution

## Principle

$KMnO_4$  being a powerful oxidant can quantitatively oxidises oxalate ion ( $C_2O_4^{2-}$ ) to  $CO_2$ .



$$\text{Equivalent weight of oxalic acid} = \frac{MW}{2}$$

$$\left[ \text{Oxalic acid} \rightarrow \begin{array}{c} \text{COOH} \\ | \\ \text{COOH} \end{array} \cdot 2H_2O \right] = \frac{126}{2} = 63$$

To prepare 250 ml (N/10) oxalic acid solution, the

$$\text{weight of oxalic acid to be taken} = \frac{63 \times 250}{1000 \times 10} \text{ gm}$$

$$= 1.575 \text{ gm}$$

## Procedure

Preparation of standard (N/10) oxalic acid solution

weight of the bottle with Oxalic acid ( $W_1$ gm)	weight of the bottle after transfer ( $W_2$ gm)	weight taken ( $W_1 - W_2 = W$ gm)

$$\begin{aligned}
 \text{Strength of oxalic acid} &= \frac{\text{height taken}}{\text{height required}} \left( \frac{N}{10} \right) \\
 &= \frac{W_1 - W_2}{1.575} \left( \frac{N}{10} \right) \\
 &= \frac{W}{1.575} \left( \frac{N}{10} \right) \\
 &= f \left( \frac{N}{10} \right), \quad f = \text{factor}
 \end{aligned}$$

~~Titration of oxalic acid solution with  $\text{KMnO}_4$  solution~~

Titration of  $\text{KMnO}_4$  solution with standard oxalic acid solution

25 ml of standard oxalic acid solution is pipetted out into a 250 ml conical flask. To it 100 ml 2 N  $\text{H}_2\text{SO}_4$  solution is added. The mixture is heated on an asbestos board to about  $70^\circ\text{--}80^\circ\text{C}$  and titrated in hot condition with  $\text{KMnO}_4$  solution running from a burette dropwise.

Disappearance of pink colour is slow at the beginning, then becomes rapid as  $\text{Mn}^{2+}$  formed auto catalyzes the reaction. The end point is marked by the just appearance of pale pink colour by a drop of  $\text{KMnO}_4$ .

The burette reading is noted with the upper meniscus, as it is deep coloured.

Table: Titration of  $KMnO_4$  by standard oxalic acid solution

No. of Titrations	Vol. of oxalic acid (ml)	Initial burette reading (ml)	Final burette reading (ml)	Difference in (ml)	Mean Volume (ml)
1.	25				✓
2.					
3.					

Calculation

$$V_1 S_1 = V_2 S_2$$

$$\text{or, } 25 \times f\left(\frac{N}{10}\right) = V \times S_2$$

$$\text{or, } S_2 = \frac{25 \times f\left(\frac{N}{10}\right)}{V}$$

NOTE

2 N  $H_2SO_4$

50 ml conc.  $H_2SO_4$  + 850 ml water = 900 ml 2N  $H_2SO_4$