EXPT: 2

Standardization of $KMnO_4$ solution by Oxalic acid.

Aim: To Standardization of $KMnO_4$ solution by Oxalic acid.

In this experiment, you will determine the molar concentration of Potassium permanganate solution by titrating it against the standard oxalic acid solution.

Safety: Do not pipette by mouth. Solution of potassium permanganate is irritant. It is readily absorbed through the skin and is harmful if swallowed. Sulphuric acid is extremely corrosive, causes serious burns, is highly toxic, harmful by inhalation, ingestion, and through skin contact. Ingestion may be fatal. Skin contact can lead to extensive and severe burns. Chronic exposure may result in lung damage and possibly cancer. Oxalic acid is harmful if swallowed and in contact with the skin. It May cause burns on contact with the eyes. Special care must be taken to avoid contact with the solutions, especially with the eyes.

Materials Required:

Chemicals:

1. 0.1 N Oxalic acid (6.3 gm of Oxalic acid into 1 L dist. water)

2. Unknown $KMnO_4$

3. H_2SO_4 (1:2) (1 ratio acid with 2 ratios dist. water)

Glassware:

1. 250mL Conical Flask – 2No.

2. 50mL Burette – 1No.

3. 10mL Pipette – 1No.

4. Measuring Cylinder 10mL – 1No.

5. Test tube

6. Water Bath

Theory:

Commercially available potassium permanganate generally contains impurities. Thus it cannot be used as the primary standard. In order to make a standard KMO_4 solution, it requires to be standardized by a primary standard.

Equivalent weight of $KMnO_4$ = [2 $KMnO_4$/10] = 31.606,

Which can be derived from the equation 2 $KMnO_4$ = $K_2O.2MnO$;

i.e. $Mn^{7+} + 5e^- \longrightarrow Mn^{2+}$

Procedure:

Rinse a clean burette (capacity 50 mL) thrice with 5 mL portions of the KMO_4 solution. Fill up the burette with KMO_4 solution up to the zero mark and note the upper meniscus. Examine that the jet of the burette is completely filled with the solution and no air bubble is left behind. Pipette out 10 mL of standard oxalic acid (0.1 M) into a 250 ml conical flask. Add 8-10 mL of H2SO4 (1:2) and then add boiling water to dilute it to about 100 mL. Now titrate the solution with KMO_4 solution. At first, add KMO_4 solution in small quantities at a time with stirring; the pink colour of KMO_4 will take some time to discharge its colour at the beginning. So initial addition should be very slow, when some KMO_4 solution has been added, the pink colour with being discharged quickly. Now add KMO_4 solution more quickly with stirring, Near the endpoint when the rate of disappearance of the pink colour slows down, add KMO_4 solution dropwise with stirring until one drop makes the whole solution pink (the pink colour persists for 30 seconds, after which the colour may be discharged again).

Now the volume of KMO_4 solution is added. Repeat the operation thrice.

Experimental Readings:

Concentration of oxalic acid = 0.1 N

Volume of oxalic acid solution = 10 mL

S. No.	**Volume of Oxalic acid solution taken**	**Burette readings**		***Concurrent reading (V1)***
		Initial	**Final**	
1.	**25**			
2.	**25**			

Calculation:

Let volume of KMO_4 solution = V mL

Concentration of oxalic acid = N1

Therefore, concentration of KMO_4 solution = $N1 \times 10 \frac{mL}{V}$

$$= \frac{0.1N \times 10\ mL}{V}\ (N)$$

Results: Concentration of supplied $KMnO_4$ solution =