EXPERIMENT No. 2

AIM – (a) To prepare 100ml of M/50 solution of Mohr's salt.
(b) Using this calculate the molarity and strength of the given $KMnO_4$ solution.

APPARATUS AND CHEMICALS REQUIRED- Mohr's salt, weighing bottle, weight box, volumetric flask, funnel, distilled water, chemical balance, dilute H_2SO_4, beakers, conical flask, funnel, burette, pipette, clamp stand, tile, $KMnO_4$ solution.

THEORY- (a) Mohr's salt having the formula $FeSO_4.(NH_4)_2SO_4.6H_2O$ has molar mass $392gmol^{-1}$. It is a primary standard.
Its equivalent mass is 392/1 = 392 as its *n* factor is 1 as per the following reaction:

$Fe^{2+} \rightarrow Fe^{3+} + e^-$

Calculation of amount of Mohr's Salt to be weighed to prepare 100ml M/20 solution:

$$M = \frac{\text{wt.}}{\text{Mol. Wt}} \times \frac{1000}{\text{V(ml)}}$$

PROCEDURE:

1. Weigh a clean dry bottle using a chemical balance.
2. Add more weights to the pan containing the weights for the weighing bottle.
3. Add Mohr's salt in small amounts to the weighing bottle, so that the pans are balanced.
4. Remove the weighing bottle from the pan.
5. Using a funnel, transfer the Mohr's salt to the volumetric flask.
6. Add about 5ml. of **dilute H_2SO_4** to the flask followed by **distilled water** and dissolve the Mohr's salt.
7. Make up the volume to the required level using **distilled water.**
8. The standard solution is prepared.

(b) **THEORY**-

1. The reaction between $KMnO_4$ and Mohr's salt is a **redox reaction** and the titration is therefore called a **redox titration**.
2. Mohr's salt is the reducing agent and $KMnO_4$ is the oxidizing agent.
3. $KMnO_4$ acts as an oxidizing agent in all the mediums; i.e. acidic, basic and neutral medium.
4. $KMnO_4$ acts as the strongest oxidizing agent in the acidic medium and therefore dil. H_2SO_4 is added to the conical flask before starting the titration.
5.

IONIC EQUATIONS INVOLVED:

Reduction Half: $MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O$
Oxidation Half: $5Fe^{2+} \rightarrow 5Fe^{3+} + 5e^-$
Overall Equation: $MnO_4^- + 8H^+ + 5Fe^{2+} \rightarrow Mn^{2+} + 5Fe^{3+} + 4H_2O$

INDICATOR- $KMnO_4$ acts as a self indicator.

END POINT- Colourless to light pink ($KMnO_4$ in the burette)

PROCEDURE-

1. Fill the burette with $KMnO_4$ solution.
2. Pipette out 10ml. of Mohr's salt solution into the conical flask.
3. Add half a test tube of dil. H_2SO_4.
4. Keep a glazed tile under the burette and place the conical flask on it.
5. Note down the initial reading of the burette.
6. Run down the $KMnO_4$ solution into the conical flask drop wise with shaking.
7. Stop the titration when a permanent pink colour is obtained in the solution.
8. This is the end point. Note down the final burette reading.
9. Repeat the experiment until three concordant values are obtained.

OBSERVATION TABLE: ***(TO BE PUT UP ON THE BLANK SIDE USING A PENCIL)***

Volume of Mohr's salt solution taken =

S.No	BURETTE READINGS		VOLUME OF $KMnO_4$
	INITIAL	FINAL	USED (ml)
1			
2			
3			
4			
5			

Concordant Value =

CALCULATIONS: ***(TO BE PUT UP ON THE BLANK SIDE USING A PENCIL)***

Using formula:

$N_1M_1V_1 = N_2M_2V_2$

Where N_1=5 (for $KMnO_4$), V_1= , M_1 =?

N_2 =1 (for Mohr's salt), V_2 = 10ml, M_2 =

Strength = M X Molar Mass.

RESULT- ***(ON RULED SIDE)***- The Molarity of $KMnO_4$ =

And the strength of $KMnO_4$ =