

EXPERIMENT No. 2

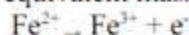
AIM – (a) To prepare 100ml of M/50 solution of Mohr's salt.

(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 $\text{FeSO}_4 \cdot (\text{NH}_4)_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$ has molar mass 392g mol^{-1} . It is a primary standard.

Its equivalent mass is $392/1 = 392$ as its n factor is 1 as per the following reaction:



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

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

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: $\text{MnO}_4^- + 8\text{H}^+ + 5e^- \rightarrow \text{Mn}^{2+} + 4\text{H}_2\text{O}$

Oxidation Half: $5\text{Fe}^{2+} \rightarrow 5\text{Fe}^{3+} + 5e^-$

Overall Equation: $\text{MnO}_4^- + 8\text{H}^+ + 5\text{Fe}^{2+} \rightarrow \text{Mn}^{2+} + 5\text{Fe}^{3+} + 4\text{H}_2\text{O}$

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	BURETT	READINGS		VOLUME OF
	E	INITIAL	FINAL	KMnO_4
				USED (ml)
1				
2				
3				
4				
5				

Concordant Value =

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

Using formula:

$$N_1 M_1 V_1 = N_2 M_2 V_2$$

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

$N_2 = 1$ (for Mohr's salt), $V_2 = 10\text{ml}$, $M_2 =$

Strength = $M \times \text{Molar Mass}$.

RESULT- (ON RULED SIDE)- The Molarity of $\text{KMnO}_4 =$
And the strength of $\text{KMnO}_4 =$