Expt. No.: .....

Date: .....

Page No.: .....

- Aim: Prepare M/20 solution of Ferrous ammonium sulphate (mohr's salt). Using this solution, find out the molarity & strength of the given $KMnO_4$ solution. You are provided with 2g of $KMnO_4$.

Chemical Equation

Ionic equation

$$MnO_4^{\ominus} + 8H^{\oplus} + 5e^{\ominus} \longrightarrow Mn^{2+} + 4H_2O$$

$$Fe^{2+} \longrightarrow [Fe^{3+} + 1e^{\ominus}] \times 5$$

Indicator

$KMnO_4$ is a self indicator

End Point

Colourless to permanent pink colour ($KMnO_4$ in burette).

Procedure

1. Prepare 200mL of M/20 Mohr's salt solution by dissolving 3.92g of Mohr's salt in water. Rinse the pippette with the M/20 Mohr's salt solution and pipette out 10.0 mL of it in a washed titration flask.

2. Rinse and fill the burette with the given $KMnO_4$ sol$^n$.

Teacher's Signature _____

## Observation —

| S.No. | Volume of Mohr's salt sol$^n$ (mL) | Burette Reading Initial | Burette Reading Final | Volume of $KMnO_4$ sol$^n$ (mL) |
|---|---|---|---|---|
| 1 | 10 | 0.0 | 10.1 | 10.1 |
| 2 | 10 | 10.1 | 20.2 | 10.1 |

Concordant value = 10.1 mL

$M_1$ (Molarity of Mohr's salt sol$^n$) = 1/20 M

$M_2$ (Molarity of $KMnO_4$ sol$^n$) = 0.009 mol $L^{-1}$

$V_1$ (Volume of Mohr's salt sol$^n$) = 10 mL

$V_2$ (Volume of $KMnO_4$ sol$^n$) = 10.1 mL

a (no. of electrons in oxidation) = 1

b (no. of electrons in reduction) = 5

## Calculation —

(a) Molarity of unknown $KMnO_4$ using

$$aM_1V_1 = bM_2V_2$$

$$M_2 = \frac{aM_1V_1}{V_2}$$

$$= \frac{1 \times 0.05 \times 10}{5 \times 10.1} = 0.009\ M$$

(b) Strength of given $KMnO_4$

= Molarity x molar mass of $KMnO_4$

= $0.009 \times 158 = 1.42$ g $mol^{-1}$

(c) % Purity of given $KMnO_4$

$$= \frac{\text{strength of given } KMnO_4}{\text{approx. strength}} \times 100 = \frac{1.42}{2} \times 100 = 71\ \%$$

3. Add 3/4th of test tube of dilute sulphuric acid to the solution in titration flask.

4. Note the initial reading of the burette.

5. Now add $KMnO_4$ solution from the burette till a permanent light pink colour is imparted to the solution in the titration flask on addition of last single drop of $KMnO_4$ solution.

6. Note the final reading of the burette.

Result —

(i) Molarity of the given $KMnO_4$ = $0.009\ mol\ L^{-1}$
(ii) Strength of the given $KMnO_4$ = $1.42\ g\ L^{-1}$
(iii) % Purity of the given $KMnO_4$ = 71%