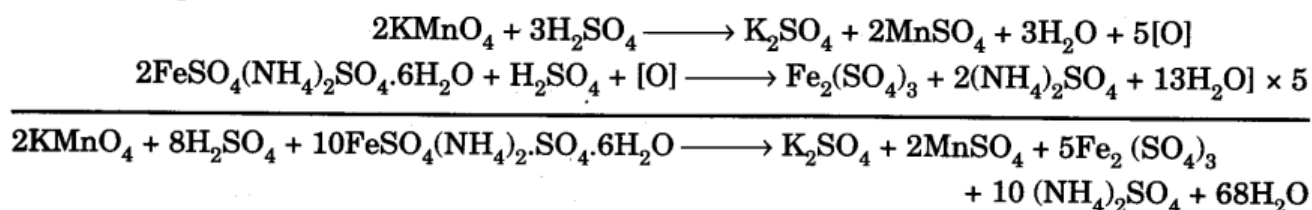


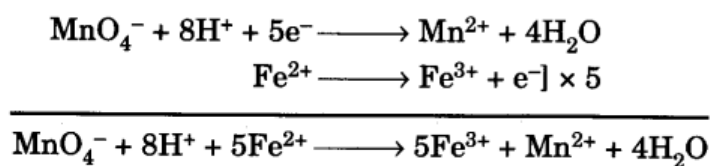
Prepare a Solution of Ferrous Ammonium Sulphate (Mohr's salt) Containing Exactly 17.0 g of the Salt in one litre. With the help of this Solution, Determine the Molarity & the Concentration of KMnO_4 in the Given Solution

Chemical Equations

Molecular equations



Ionic equations



Indicator

KMnO_4 is a self-indicator.

End Point

Colourless to permanent pink colour (KMnO_4 in burette).

Procedure

1. Weigh exactly 4.250 g of Mohr's salt on a watch glass and dissolve in water to prepare exactly 250 ml of solution with the help of a 250 ml measuring flask. Rinse the pipette with the prepared Mohr's salt solution and pipette out 20.0 ml of it in a washed titration flask.
2. Rinse and fill the burette with the given KMnO_4 solution.
3. Add one test-tube (~ 20 ml) full of dilute sulphuric acid (~ 2 M) 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.
7. Repeat the above steps 4-5 times to get a set of three concordant readings.

Observations

Weight of watch glass = g

Weight of watch glass + Mohr's salt =g

Weight of Mohr's salt = 4.250 g

Volume of Mohr's salt solution prepared = 250 ml

Volume of Mohr's salt solution taken for each titration = 20.0 ml

S. No.	Initial reading of the burette	Final reading of the burette	Volume of the KMnO_4 solution used
1.	—	—	— ml
2.	—	—	— ml
3.	—	—	— ml
4.	—	—	— ml

Concordant volume = x ml (say).

Calculations

Concentration of Mohr's salt, ferrous ammonium sulphate, $\text{FeSO}_4 \cdot (\text{NH}_4)_2 \text{SO}_4 \cdot 6\text{H}_2\text{O}$ in the prepared solution = 17.0 g/litre.

Molecular mass of Mohr's salt, $\text{FeSO}_4 \cdot (\text{NH}_4)_2\text{SO}_4 \cdot 6\text{H}_2\text{O} = 392$

$$\text{Molarity of Mohr's salt solution} = \frac{\text{Strength (g/litre)}}{\text{Mol. mass}} = \frac{17.0}{392}$$

Calculation of molarity of KMnO_4 solution

From the overall balanced chemical equation, it is clear that 2 moles of KMnO_4 react with 10 moles of Mohr's salt.

$$\therefore \frac{M_{\text{KMnO}_4} \times V_{\text{KMnO}_4}}{M_{\text{Mohr's salt}} \times V_{\text{Mohr's salt}}} = \frac{2}{10}$$

where, M_{KMnO_4} = Molarity of KMnO_4 solution

V_{KMnO_4} = Volume of KMnO_4 solution

$M_{\text{Mohr's salt}}$ = Molarity of Mohr's salt solution

$V_{\text{Mohr's salt}}$ = Volume of Mohr's salt solution

$$\frac{M_{\text{KMnO}_4} \times x}{17/392 \times 20} = \frac{2}{10}$$

From this equation, molarity of KMnO_4 solution can be calculated.

Calculation of strength of KMnO_4 solution

Strength (in g/litre) = Molarity $\times$ Molar mass

$$= M_{\text{KMnO}_4} \times 158.$$

Instructions for the Preparation of Solutions:

Provide the following:

1. Mohr's salt
2. M/100 KMnO_4 solution (1.58 g/litre)
3. 4N H_2SO_4 .