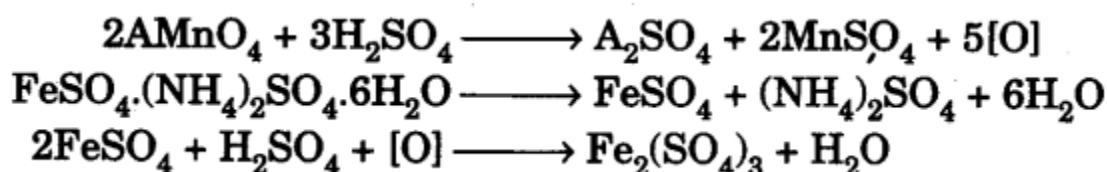


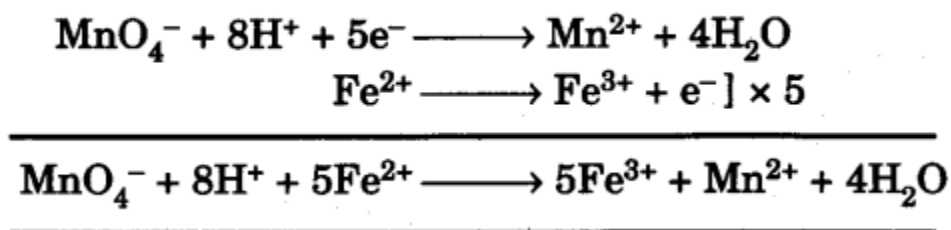
The Given Solution has been Prepared By Dissolving 1.6 g Of An Alkali Metal Permanganate Per litre Of Solution. Determine Volumetrically the Atomic mass Of the Alkali metal. Prepare M/20 Mohr's Salt Solution For Titration

Chemical Equations

Molecular equations. Let A represent the alkali metal and AMnO_4 represent alkali metal permanganate,



Ionic equations



Indicator

AMnO_4 will act as a self-indicator.

End Point

Colourless to permanent pink colour (AMnO_4 in burette).

Procedure

1. Weigh exactly 4.90 g of Mohr's salt on a watch glass and dissolve in water to prepare exactly 250 ml of its solution using a 250 ml measured flask. Rinse the pipette with the M/20 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 AMnO_4 solution.
3. Add one test-tube (~ 20 ml) full of dilute sulphuric acid (~ 4M) to the solution in titration flask.
4. Note the initial reading of the burette.
5. Now add AMnO_4 solution from the burette till a permanent light pink colour is just imparted to the solution in the titration flask.

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 = 4.90 g

Volume of solution prepared = 250 ml

Molarity of Mohr's salt solution = M/20

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

<i>S. No.</i>	<i>Initial reading of the burette</i>	<i>Final reading of the burette</i>	<i>Volume of the KMnO₄ solution used</i>
1.	—	—	— ml
2.	—	—	— ml
3.	—	—	— ml
4.	—	—	— ml

Concordant volume = x ml (say).

Calculations

From the balanced chemical equation, it can be seen that 2 moles of KMnO_4 react with 10 moles of Mohr's salt.

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

$$\frac{M_{\text{AMnO}_4} \times x}{\frac{1}{20} \times 20} = \frac{2}{10}$$

Molarity of AMnO_4 , $M_{\text{AMnO}_4} = \frac{2}{10} \times \frac{1}{x} = \frac{2}{10x}$

Strength of $\text{AMnO}_4 = 1.6 \text{ g/litre}$.

Molecular mass of alkali metal permanganate

$$= \frac{\text{Strength}}{\text{Molarity}}$$

$$= \frac{1.6}{\frac{2}{10x}} = 8x \quad \dots(11.1)$$

But molecular mass of $\text{AMnO}_4 = \text{Atomic mass of A} + \text{Formula mass of } \text{MnO}_4^-$

$$= a + 119 \quad \dots(11.2)$$

From equations (11.1) and (11.2),

$$8x = a + 119$$

$$a = 8x - 119$$

Instructions for the Preparation of Solutions

Provide the following :

1. KMnO_4 solution (1.58 g/litre)

Label it as AMnO_4 solution

2. Mohr's salt

3. 4N H_2SO_4 .