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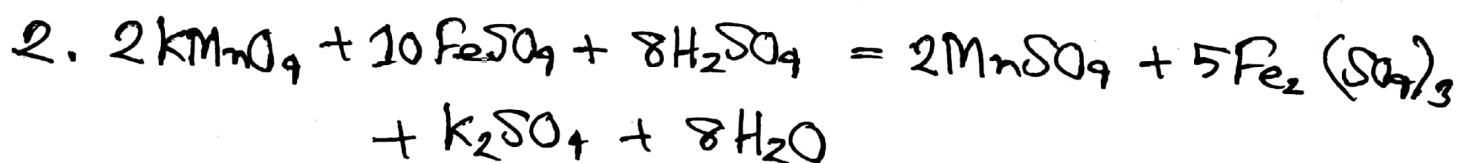
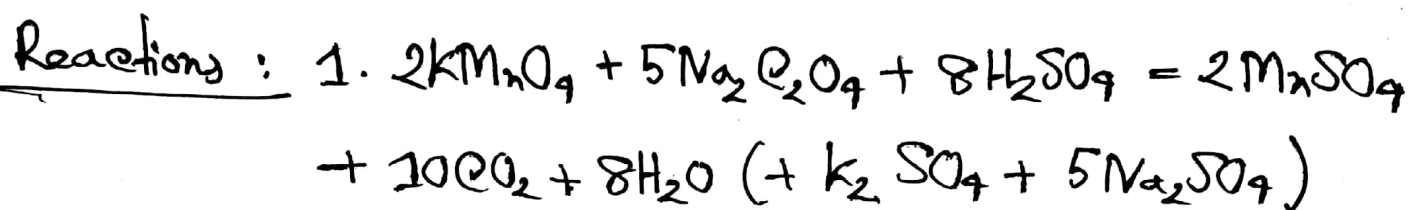
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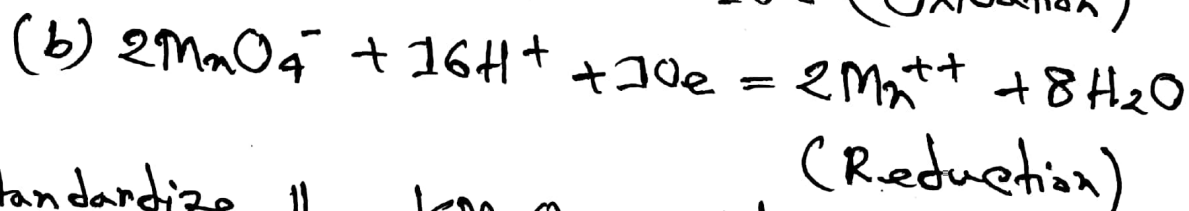
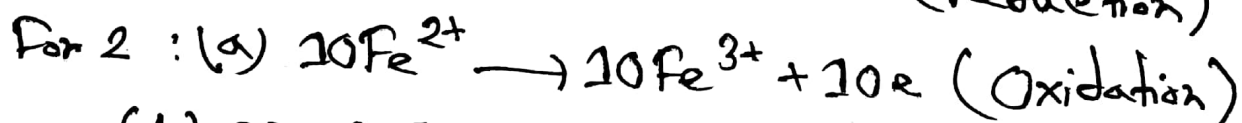
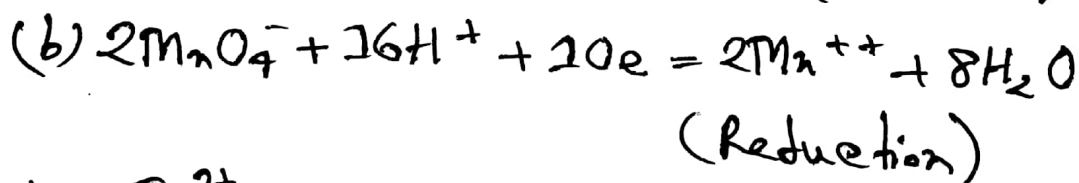
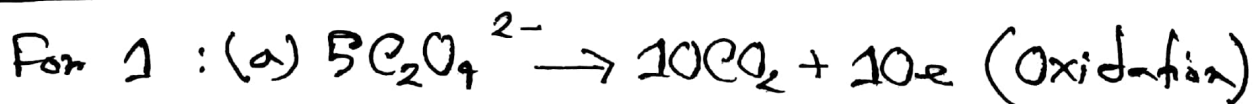
Experiment - 7 : Determination of ferrous ion (Fe^{2+}) in a Supplied Solution of iron salt by standard potassium permanganate (KMnO_4) Solution.

Experimental data :

Method : Oxidation-reduction titration



Redox Half Reactions :



(A) Standardize the KMnO_4 Solution by standard $\text{Na}_2\text{C}_2\text{O}_4$ Solution.

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Table-1 : Standardization of Supplied KMnO_4 Solution by Standard $\text{Na}_2\text{C}_2\text{O}_4$ Solution.

No of reading	Vol. of oxalate Solution (in ml)	Vol. of KMnO_4 (burette reading) (in ml)			Mean (in mL)
		Initial	Final	Difference	
1	10	0.00	9.10	9.10	9.15
2	10	9.10	18.30	9.20	

Weight taken (in gm) = 0.53 gm

The strength of $\text{Na}_2\text{C}_2\text{O}_4$ Solution

$$\begin{aligned} &= \frac{\text{Weight taken (in gm)} \times 0.1}{0.67} \text{ (N)} \\ &= \frac{0.53 \times 0.1}{0.67} = 0.0791 \\ &= 0.08 \text{ (N)} \end{aligned}$$

The strength of supplied KMnO_4 Solution

$$V_{\text{KMnO}_4} \times N_{\text{KMnO}_4} = V_{\text{Na-oxalate}} \times N_{\text{Na-oxalate}}$$

$$\begin{aligned} \Rightarrow N_{\text{KMnO}_4} &= \frac{10 \times 0.08}{9.15} \text{ (N)} \\ &= 0.0874 \text{ (N)} \\ &= 0.09 \text{ N} \end{aligned}$$

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(B) Estimation of Fe ions:

Table - 2: Determination of the amount of iron in Mohr's salt solution using standard KMnO_4 solution.

No of reading	Vol of Mohr's Salt Solution (in ml)	Vol. of KMnO_4 (burette reading) (in ml)			Mean (in ml) (V)
		Initial	Final	Difference	
1	10	18.30	23.30	5.00	4.975 = 4.98
2	10	23.30	28.20	4.90	
3	10	28.20	33.30	5.10	
4	10	33.30	38.20	4.90	

Calculations:

$$1 \text{ mL } 1 \text{ N } \text{KMnO}_4 \equiv 0.05584 \text{ gm of Fe}^{2+}$$

Amount of iron in 10 mL of iron salt solution

$$= 0.05584 \times V \times N \text{ gm}$$

$$= 0.05584 \times 4.98 \times 0.09 \text{ gm}$$

$$= 0.0250 \text{ gm}$$

$$= 0.03 \text{ gm}$$

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Amount of iron in 500mL of iron Salt Solution,

$$= 0.05584 \times v \times 5 \times 50 \text{ gm}$$

$$= 0.05584 \times 4.98 \times 0.09 \times 50 \text{ gm}$$

$$= 1.2513 \text{ gm}$$

$$= 1.25 \text{ gm}$$

Observe value of Fe^{2+} (in 500mL Solution)

$$= 1.25 \text{ gm}$$

Known value of Fe^{2+} (in 500mL Solution)

$$= \frac{55.84 \times 8.55}{392.14} \text{ gm}$$

$$= 1.2175 \text{ gm}$$

$$= 1.22 \text{ gm}$$

Results: The amount of ferrous ions in 500 mL of iron salt Solution is 1.25 gm

Q Percentage of Error:

$$\frac{\text{known value} - \text{Observed value}}{\text{known value}} \times 100$$

$$= \frac{1.22 - 1.25}{1.22} \times 100$$

$$= -0.0245\%$$

$$= -2.45\%$$