

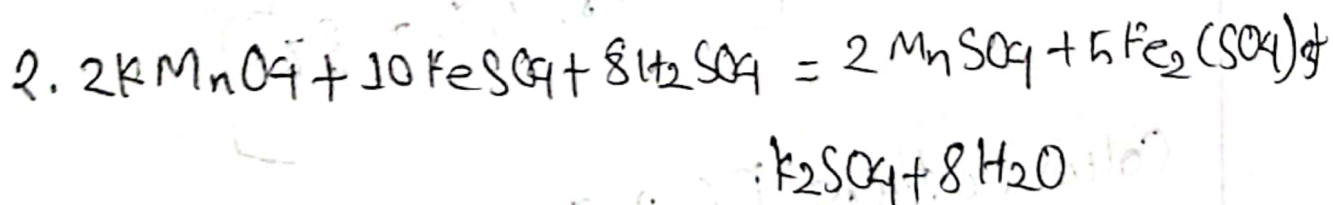
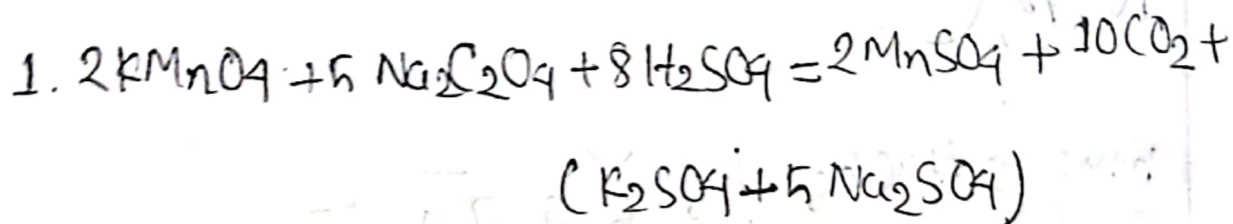
EXP 7: Determination of Ferrous ion (Fe^{2+}) in a supplied solution of Iron salt by standard Potassium permanganate (KMnO_4) solution.

Name: Nafinur Leo, Id: 20-42195-1, Section: U

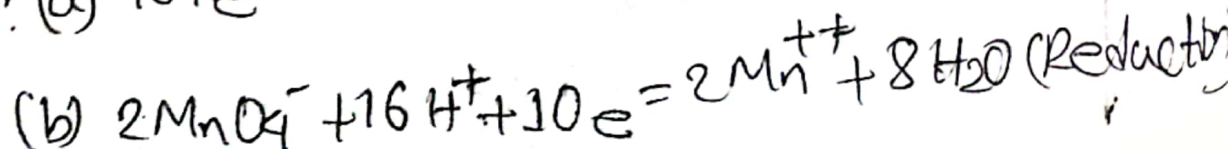
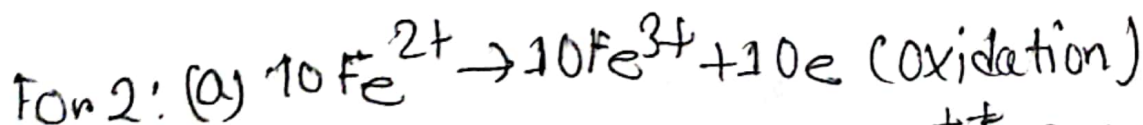
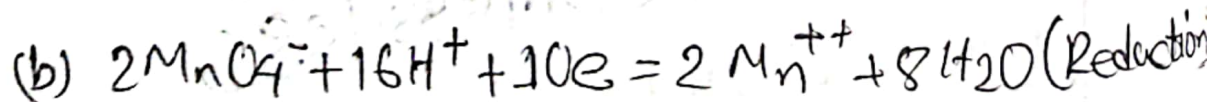
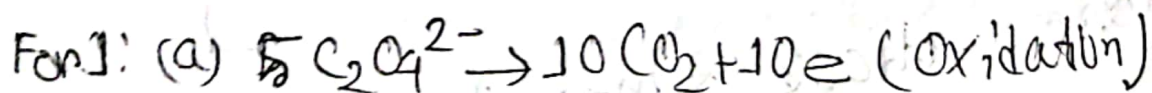
Theory:

Method: Oxidation-reduction titration

Reaction:



Redox Half Reaction:



Indicator:

KMnO_4 Serves as its own indicator

Experimental Data:

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

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 (ml)	Vol of KMnO_4 (burette reading) (in mL)			Mean (in mL)
		Initial	Final	Difference	
1	10	0.00	9.10	9.10	9.10 + 9.20
2	10	9.10	18.30	9.20	$\frac{2}{2} = 9.15$

$$\begin{aligned}\text{The strength of } \text{Na}_2\text{C}_2\text{O}_4 \text{ solution} &= \frac{\text{Weight taken (in gm)} \times 0.1}{0.67} \quad (N) \\ &= \frac{0.49 \times 0.1}{0.67} \quad N \\ &= 0.073 N\end{aligned}$$

The strength of supplied KMnO_4 solution:

$$\begin{aligned}V_{\text{KMnO}_4} \times N_{\text{KMnO}_4} &= V_{\text{No. oxalate}} \times N_{\text{No. oxalate}} \\ \Rightarrow N_{\text{KMnO}_4} &= \frac{10 \times 0.073}{9.15} = 0.079 N\end{aligned}$$

(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:	No. of Mohr's salt solution (in mL)	No. of KMnO_4 (burette reading) (in mL)			Mean (in mL) (V)
		Initial	Final	Difference	
1	10	18.30	23.30	5.00	$\frac{5.00 + 4.90 + 5.10 + 4.90}{4} = 4.975$
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:

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

Amount of iron in 10 mL of iron salt solution:

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

$$= 0.05584 \times 4.975 \times 0.079 \text{ gm}$$

$$= 0.022 \text{ gm}$$

Amount of iron in 500 mL of iron salt solution

$$= 0.05584 \times V \times S \times 50 \text{ gm}$$

$$= 0.022 \times 50 \text{ gm}$$

$$= 1.1 \text{ gm}$$

Observed value of Fe^{2+} (in 500 ml solution) = 1.1 gm

Known value of Fe^{2+} (in 500 ml solution) =

$$= \frac{55.84 \times 8.90}{392.14} \text{ gm}$$

$$= 1.27 \text{ gm}$$

Results:

The amount of ferrous ions in 500 ml of iron salt solution is 1.1 gm

Percentage of error:

$$\frac{\text{Known value} - \text{Observed value}}{\text{Known value}} \times 100 \%$$

$$= \frac{1.27 - 1.1}{1.27} \times 100$$

$$= 0.1338 \times 100$$

$$= 13.38 \%$$