Upload the answers.

OBSERVATION AND CALCULATIONS

Potentiometric Titration-I:

Burette: $KMnO_4$ solution (0.05 N)

Beaker: 20 mL of steel solution containing Fe(II) + 20 mL (one test tube) of dil. H_2SO_4

Electrodes: Indicator electrode (Pt) to red terminal and SCE to black terminal

S. No.	Volume of $KMnO_4$ (mL)	EMF (volts)
1	0	0.05
2	1	0.06
3	2	0.07
4	3	0.08
5	4	0.16
6	5	0.16
7	6	0.17
8	7	0.18
9	8	0.19
10	9	0.19

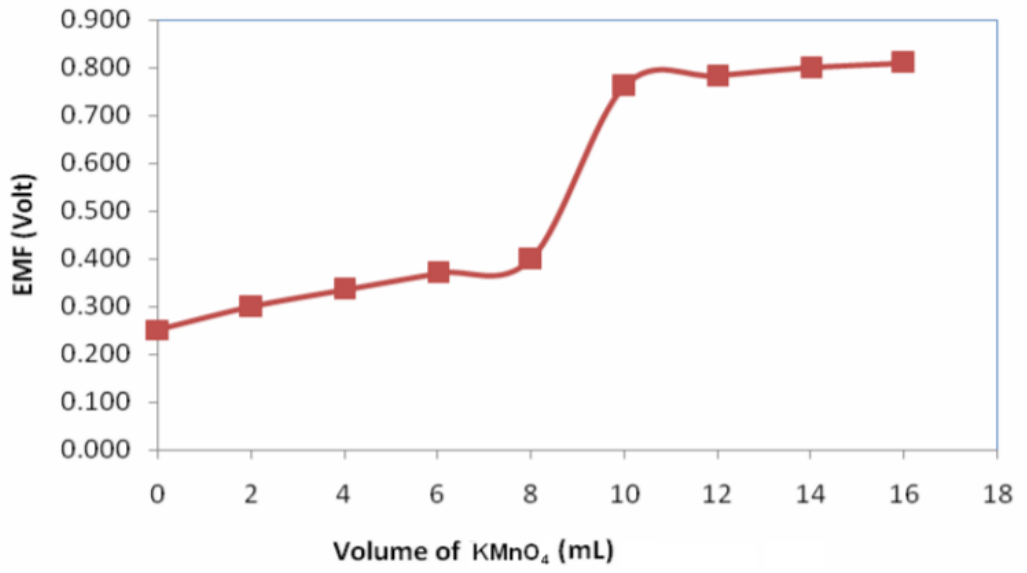


Fig. 3: Plot of EMF *vs* Volume of $KMnO_4$ added (mL)

Potentiometric Titration-II:

Burette: $KMnO_4$ solution (0.05 N)
Beaker: 20 mL of steel solution containing Fe(II) + 20 mL (one test tube) of dil. H_2SO_4
Electrodes: Indicator electrode (Pt) to red terminal and SCE to black terminal

Sl. No.	Vol. of $KMnO_4$ (mL)	EMF (Volt)	ΔE (Volt)	ΔV (mL)	ΔE/ΔV (Volt/mL)	Average Volume (mL)
1	3.0	0.08				
2	3.2	0.09	0.01	0.2 ml	0.05	3.1 ml
3	3.4	0.095	0.005	0.2 ml	0.025	3.3 ml
4	3.6	0.15	0.055	0.2	0.275	3.5
5	3.8	0.16	0.01	0.2	0.05	3.7
6	4.0	0.161	0.001	0.2	0.005	3.9
7	4.2	0.163	0.002	0.2	0.01	4.1
8	4.4	0.165	0.002	0.2	0.01	4.3
9						
10						

My graph is attached at the end.

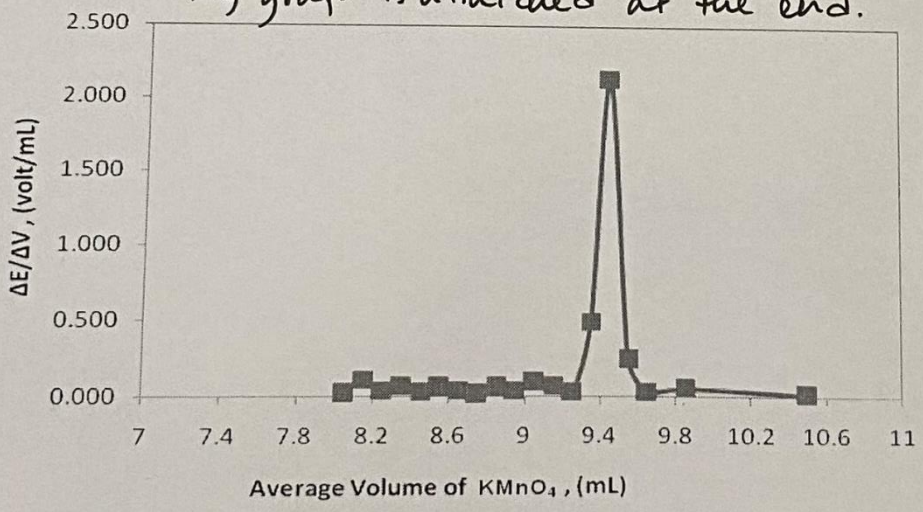


Fig. 4: Plot of ΔE/ΔV *vs* Average volume of $KMnO_4$ added.

Calculation:

Iron in carbon steel by potentiometry

(N x V) of steel sample solution = (N x V) of $KMnO_4$

N of steel sample solution = $\frac{0.05\ N \times \text{Volume of } KMnO_4 \text{ from Plot-2}}{20\ mL \text{ of steel sample}}$

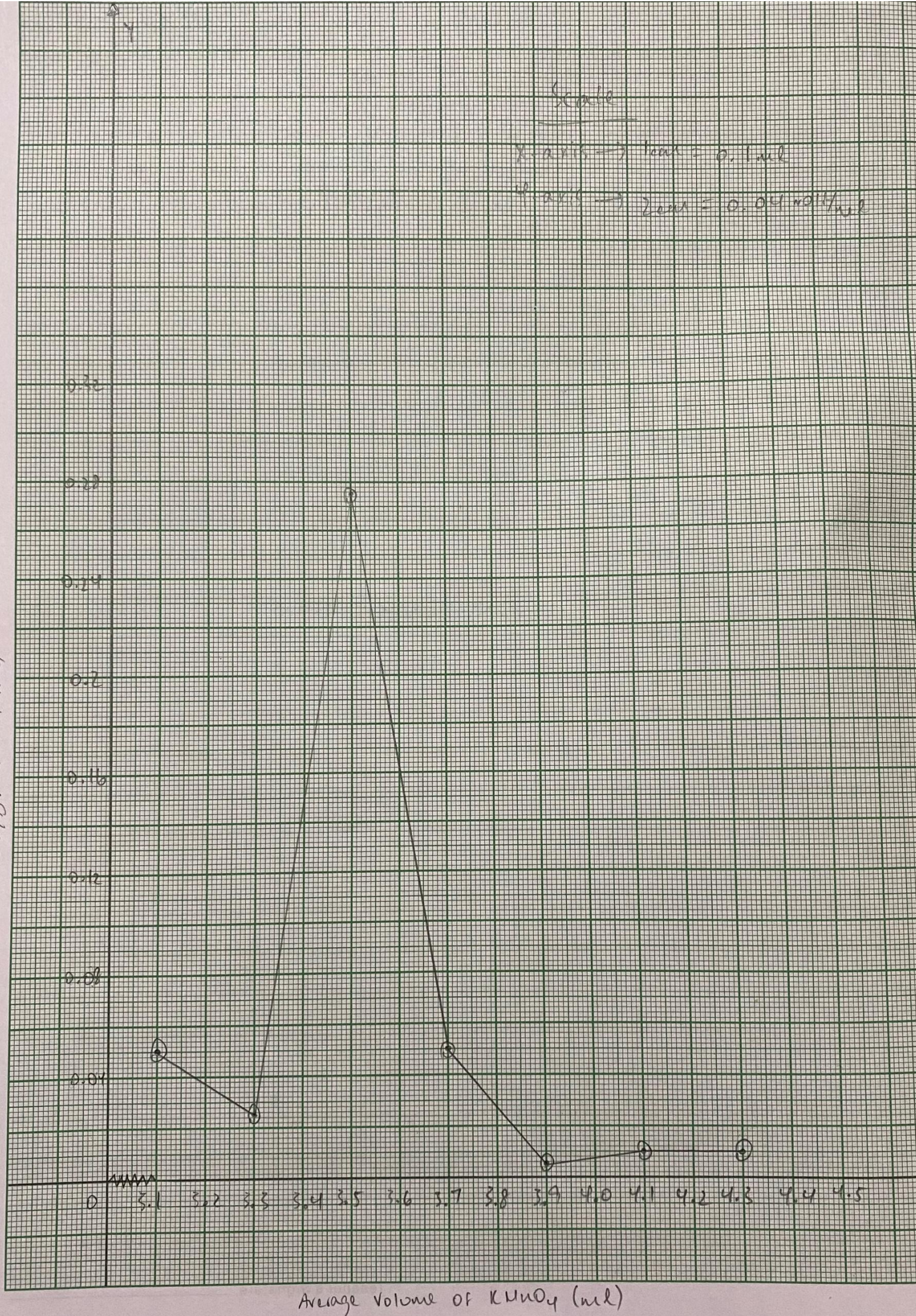
= 0.00875 N

Amount of Fe present in 1 L of sample solution = Normality of steel sample x At. wt. of Fe (55.85)

Amount of Fe present in given (100 ml) sample solution = $\frac{\text{Normality of steel sample} \times 55.85 \times 100}{1000}$

= 0.049 grams in 100 mL

Result: The amount of Iron present in given steel sample is found to be = 0.0098 **grams.**


Y
Scale
X axis → 1 cm = 0.1 ml
Y axis → 2 cm = 0.04 volt/ml
0.32
0.28
0.24
0.2
0.16
0.12
0.08
0.04
0
3.1
3.2
3.3
3.4
3.5
3.6
3.7
3.8
3.9
4.0
4.1
4.2
4.3
4.4
4.5
ΔE/ΔV (volt/ml)
Average Volume of KMnO4 (ml)