

No	Experiment	Observation	Inference
1	Odour: Note the odour of the organic compound.	Fish odour	May be an amine
		Bitter almond odour	May be benzaldehyde
		Phenolic odour	May be phenol
		No characteristics odour	Absence of phenol, amine, benzaldehyde
2	Test with litmus paper: Touch the moist litmus paper with an organic compound.	Blue litmus turns red	May be a carboxylic acid or phenol
		Red litmus turns blue	May be an amine.
		No colour change is noted	Absence of carboxylic acid, phenol and amine
3	Action with NaHCO₃: Organic compound + NaHCO ₃ solution	Brisk effervescence	Presence of a carboxylic acid.
		No brisk effervescence	Absence of a carboxylic acid.
4	Action with Borsche's reagent: Organic compound + Borsche's reagent + conc.HCl + warm, cool.	Red precipitate is obtained	Presence of an aldehyde or ketone
		No characteristic precipitate	Absence of an aldehyde or ketone
5	Charring test: Organic compound + Conc. H ₂ SO ₄ to it, and heat the mixture.	Charring takes place with smell of burnt sugar	Presence of carbohydrate
		No charring takes place with smell of burnt sugar	Absence of carbohydrate
6	Ignition test: Organic compound in a Nickel spatula and burn it in Bunsen flame.	Burns with sooty flame	Presence of an aromatic compound.
		Burns with non-sooty flame	Presence of an aliphatic compound
7	Test with bromine water: Organic compound + distilled water + bromine water.	Orange-yellow colour of bromine water is decolourised.	Substance is unsaturated.
		No decolourisation takes place	Substance is saturated.
		Decolourisation with formation of white precipitate.	Presence of an aromatic amine or phenol
8	Test with KMnO₄ Solution: organic compound + distilled water + dilute alkaline KMnO ₄ solution	Pink colour of KMnO ₄ solution is decolourised.	Substance is unsaturated
		No decolourisation takes place	Substance is saturated

Test for selected organic functional groups

Test for phenol

9	Neutral FeCl₃ test: Organic compound + neutral FeCl ₃	Violet colouration is seen.	Presence of phenol
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Test for carboxylic acids

10	Esterification reaction: Organic compound + C ₂ H ₅ OH + conc. H ₂ SO ₄ then heat 5	A pleasant fruity odour	Presence of carboxylic group.
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	minutes. Then pour the mixture into dil. Na ₂ CO ₃		
Test for aldehydes			
11	Tollen's reagent test: Tollen's reagent + organic compound, warm the mixture on a water bath for about 5 minutes.	Shining silver mirror is formed.	Presence of an aldehyde
12	Fehling's test: Fehling's solution A and B + organic compound, warm the mixture on a water bath for about 5 minutes.	Red precipitate is formed.	Presence of an aldehyde.
Test for ketones			
13	Legal's test: Organic compound + sodium nitro prusside + NaOH	Red colouration.	Presence of a ketone
Test for an amine			
14	Dye test: Organic compound + HCl + NaNO ₂ cool the mixture in ice bath + ice cold solution of β-naphthalin NaOH	Scarlet red dye is	Presence of an aromatic primary amine
Test for diamide			
15	Biuret test: Organic compound heat and cool + water + dil CuSO ₄ solution+ 10% NaOH.	Violet colour is appeared.	Presence of a diamide
Test for carbohydrates			
16	Molisch's test: Organic compound + water + α- naphthol + conc. H ₂ SO ₄	Violet or purple ring is formed at the junction of the two liquids.	Presence of carbohydrates.
17	Osazone test: Organic compound+ phenyl hydrazine warm the mixture on a water bath for about 5 minutes.	Yellow crystals are obtained	Presence of carbohydrates.

REPORT: The given organic compound contains

i) Aromatic/Aliphatic **ii) Saturated/ Unsaturated** **iii)-----functional group**

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|-------------------|---|---|
| 1. Benzaldehyde | C ₆ H ₅ CHO | Aromatic /saturated/aldehyde |
| 2. Cinnamaldehyde | C ₆ H ₅ CH=CHCHO | Aromatic/ Unsaturated/aldehyde |
| 3. Acetophenone | C ₆ H ₅ COCH ₃ | Aromatic/saturated/ketone |
| 4. Benzoic acid | C ₆ H ₅ COOH | Aromatic/saturated/ carboxylic acid |
| 5. Cinnamic acid | C ₆ H ₅ CH=CHCOOH | Aromatic/ Unsaturated/ carboxylic acid |
| 6. Urea | H ₂ NCONH ₂ | Aliphatic /saturated/ diamide |
| 7. Glucose | C ₆ H ₁₂ O ₆ | Aliphatic /saturated/ aldehyde & carbohydrate |
| 8. Aniline | C ₆ H ₅ NH ₂ | Aromatic/saturated/ amine |
| 9. Salicylic acid | C ₆ H ₄ OH COOH | Aromatic/saturated/ carboxylic acid & phenol |

LIQUID – Benzaldehyde, cinnamaldehyde(yellow), acetophenone(colourless), aniline(rosy yellow)

1. Estimation of Ferrous sulphate

Aim: To Estimate the amount of ferrous sulphate dissolved in 750 ml of the given unknown solution volumetrically. For this you are given with a standard solution of ferrous ammonium sulphate (FAS) of normality 0.1102N and potassium permanganate solution as link solution.

Short procedure

S.N	Contents	Titration-I	Titration-II
1	Burette solution	KMnO ₄	KMnO ₄
2	Pipette solution	20ml of std FAS	20ml of unknown FeSO ₄
3	Acid to be added	20 ml of 2N H ₂ SO ₄	20 ml of 2N H ₂ SO ₄
4	Indicator	Self-indicator (KMnO ₄)	Self-indicator (KMnO ₄)
5	Temperature	Lab temperature	Lab temperature
6	End point	Appearance of permanent pale pink colour	Appearance of permanent pale pink colour
7	Equivalent mass of FeSO ₄ = 278		

Titration -I

Link KMnO₄ Vs std FAS

Indicator : Self indicator (KMnO₄)

S.NO	Volume of Std FAS (ml)	Burette reading		Volume of KMnO ₄ (ml)	Concordant value (ml)
		Initial (ml)	Final (ml)		
1	20 ml	0			
2	20 ml	0			

Calculation:

Volume of KMnO₄ solution $V_1 =$ ml
 Normality of KMnO₄ solution $N_1 =$ N₁
 Volume of FAS solution $V_2 =$ 20 ml
 Normality of FAS solution $N_2 =$ 0.1102N

According normality equation:

$$V_1 N_1 = V_2 N_2$$

$$N_1 = V_2 N_2 / V_1$$

Titration -II

Link KMnO₄ Vs Unknown FeSO₄

Indicator : Self indicator (KMnO₄)

S.NO	Volume of FeSO ₄ (ml)	Burette reading		Volume of KMnO ₄ (ml)	Concordant value (ml)
		Initial (ml)	Final (ml)		
1	20	0			
2	20	0			

Calculation:

Volume of FeSO₄ $V_1 =$ 20 ml
 Normality of FeSO₄ $N_1 =$ N₁
 Volume of KMnO₄ $V_2 =$ ml
 Normality of KMnO₄ $N_2 =$ N

According normality equation:

$$V_1N_1=V_2N_2$$

$$N_1=V_2N_2/V_1$$

Amount of FeSO_4 present in
750ml of the given solution

$$= \text{Equivalent mass} \times \text{Normality} \times 750/1000$$

Result:

- i) Normality of KMnO_4 = N
 ii) Normality of FeSO_4 = N
 iii) Amount of FeSO_4 present in 750ml of the given solution = g.

1. Estimate the amount of **Ferrous sulphate** dissolved in **750 ml** of the given unknown solution volumetrically. For this you are given with a standard solution of **Ferrous ammonium sulphate (FAS)** of normality **0.1102N** and **Potassium permanganate (KMnO_4)** solution as a link solution.
2. Estimate the amount of **Ferrous ammonium sulphate (FAS)** dissolved in 1500 ml of the given unknown solution volumetrically. For this you are given with a standard solution of Ferrous sulphate of normality **0.1024N** and **Potassium permanganate (KMnO_4)** solution as a link solution.
3. Estimate the amount of **oxalic acid** dissolved in 500 ml of the given unknown solution volumetrically. For this you are given with a standard solution of **Ferrous Ammonium sulphate (FAS)** of normality **0.1N** and **Potassium permanganate (KMnO_4)** solution as a link solution.
4. To estimate the amount of **Sodium hydroxide** dissolved in **250ml** of the given unknown solution volumetrically. For this you are given with a **standard solution of sodium carbonate** normality **0.0948 N** and **hydrochloric acid** as link solution.
5. To estimate the amount of **Oxalic acid** dissolved in **1250 ml** of the given unknown solution volumetrically. For this you are given with a **standard solution of HCl** solution of normality **0.1010N** and **sodium hydroxide solution** as link solution.

Experiment		Titration-I	Titration-II	Equivalent weight
1. Estimation of FeSO_4		$V_1N_1 \text{ KMnO}_4$ $V_2N_2 \text{ FAS}$	$V_1N_1 \text{ FeSO}_4$ $V_2N_2 \text{ KMnO}_4$	Ferrous sulphate =278
2. Estimation of FAS		$V_1N_1 \text{ KMnO}_4$ $V_2N_2 \text{ FeSO}_4$	$V_1N_1 \text{ FAS}$ $V_2N_2 \text{ KMnO}_4$	FAS =392
3. Estimation of $\text{H}_2\text{C}_2\text{O}_4$		$V_1N_1 \text{ KMnO}_4$ $V_2N_2 \text{ FAS}$	$V_1N_1 \text{ Oxalic acid } (\text{H}_2\text{C}_2\text{O}_4)$ $V_2N_2 \text{ KMnO}_4$	Oxalic acid =63
4. Estimation of NaOH		$V_1N_1 \text{ HCl}$ $V_2N_2 \text{ Na}_2\text{CO}_3$	$V_1N_1 \text{ NaOH}$ $V_2N_2 \text{ HCl}$	Sodium hydroxide=40
5. Estimation of $\text{H}_2\text{C}_2\text{O}_4$		$V_1N_1 \text{ NaOH}$ $V_2N_2 \text{ HCl}$	$V_1N_1 \text{ Oxalic acid } (\text{H}_2\text{C}_2\text{O}_4)$ $V_2N_2 \text{ NaOH}$	Oxalic acid =63

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CONGRATS 2024 CENTUM SCORER-LEKSHMI, SUNDARI, SIVAHARI, VENGATESH

Aim: To Estimate the amount of **ferrous sulphate** dissolved in **750 ml** of the given unknown solution volumetrically. For this you are given with a **standard solution of ferrous ammonium sulphate (FAS)** of normality **0.1102N** and **potassium permanganate solution** as link solution.

S.N	Contents	Titration-I	Titration-II
1	Burette solution	KMnO ₄	KMnO ₄
2	Pipette solution	20ml of std FAS	20ml of unknown FeSO ₄
3	Acid to be added	20 ml of 2N H ₂ SO ₄	20 ml of 2N H ₂ SO ₄
4	Indicator	Self-indicator (KMnO ₄)	Self-indicator (KMnO ₄)
5	Temperature	Lab temperature	Lab temperature
6	End point	Appearance of permanent pale pink colour	Appearance of permanent pale pink colour
7	Equivalent weight of FeSO ₄ = 278		

Titration –I

Link KMnO_4 Vs std FAS

Indicator : Self indicator (KMnO_4)

S.NO	Volume of Std FAS (ml)	Burette reading		Volume of KMnO_4 (ml)	Concordant value (ml)
		Initial (ml)	Final (ml)		
1	20 ml	0	19.4	19.4	
2	20 ml	0	19.2	19.2	19.2
3	20 ml	0	19.2	19.2	

Calculation:

Volume of KMnO_4 solution

$$V_1 = 19.2 \text{ ml}$$

Normality of KMnO_4 solution

$$N_1 = N_1$$

Volume of FAS solution

$$V_2 = 20 \text{ ml}$$

Normality of FAS solution

$$N_2 = 0.1102 \text{ N}$$

According normality equation:

$$V_1 N_1 = V_2 N_2$$

$$N_1 = \frac{V_2 N_2}{V_1}$$

$$N_1 = \frac{20 \times 0.1102}{19.2}$$

$$N_1 = 0.1148 \text{ N}$$

Normality of KMnO_4 solution $N_1 = 0.1148 \text{ N}$

Titration -II

Link KMnO_4 Vs Unknown FeSO_4

Indicator : Self indicator (KMnO_4)

S.NO	Volume of FeSO_4 ml	Burette reading		Volume of KMnO_4 ml	Concordant value ml
		Initial ml	Final ml		
1	20 ml	0	21.5	21.5	
2	20 ml	0	21.2	21.2	21.2
3	20 ml	0	21.2	21.2	

Calculation:

Volume of FeSO_4

$$V_1 = 20 \text{ ml}$$

Normality of FeSO_4

$$N_1 = N_1$$

Volume of KMnO_4

$$V_2 = 21.2 \text{ ml}$$

Normality of KMnO_4

$$N_2 = 0.1148 \text{ N}$$

According normality equation:

$$V_1 N_1 = V_2 N_2$$

$$N_1 = \frac{V_2 N_2}{V_1}$$

$$N_1 = \frac{21.2 \times 0.1148}{20}$$

$$N_1 = 0.1217 \text{ N}$$

Weight calculation:

The Amount of FeSO_4 present in 750ml of the given solution = $\frac{\text{Equivalent mass} \times \text{Normality} \times 750}{1000}$

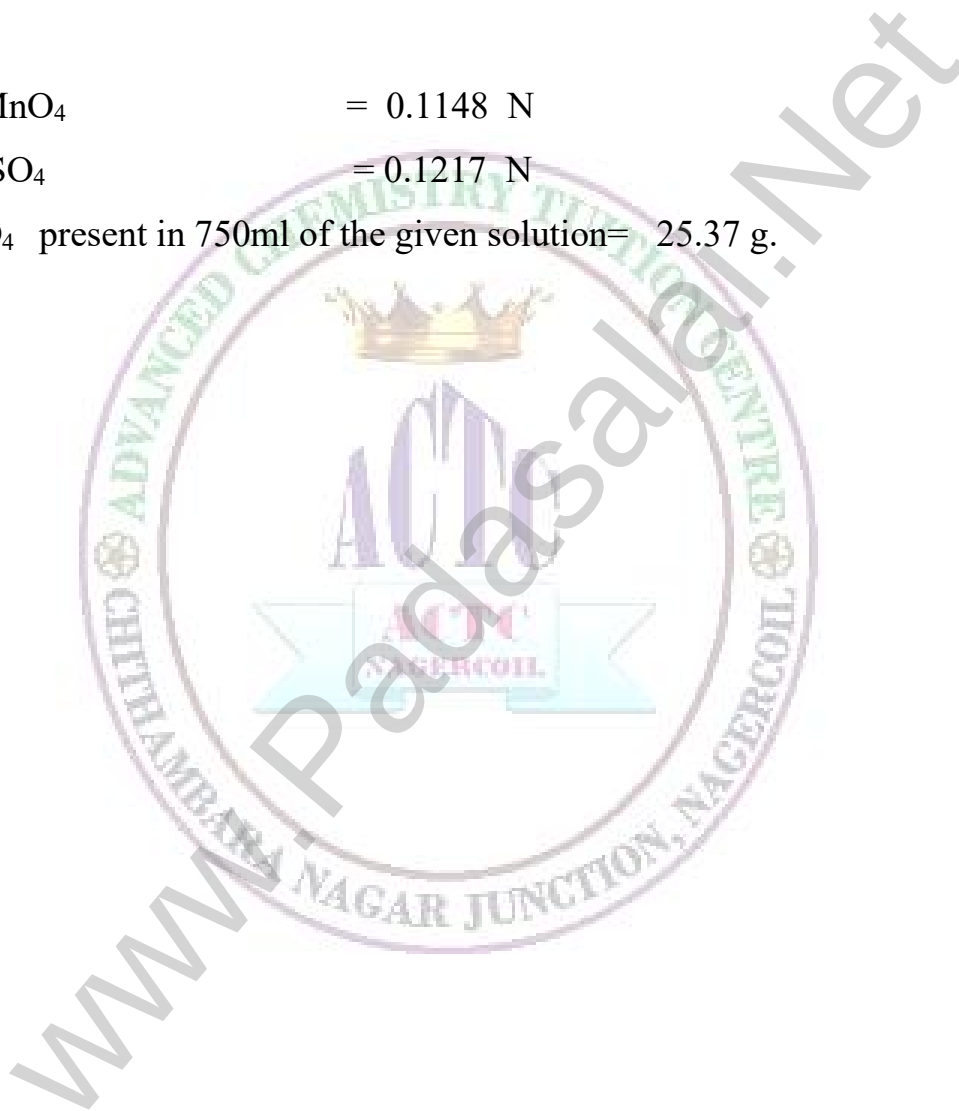
$$= \frac{278 \times 0.1217 \times 750}{1000}$$
$$= 25.37\text{g.}$$

Result:

Normality of KMnO_4 = 0.1148 N

Normality of FeSO_4 = 0.1217 N

Amount of FeSO_4 present in 750ml of the given solution = 25.37 g.



2. Estimation of Ferrous Ammonium sulphate (FAS)

Aim: To Estimate the amount of **ferrous A m m o n i u m** sulphate dissolved in **1500 ml** of the given unknown solution volumetrically. For this you are given with a **standard solution of ferrous sulphate** (FeSO_4) of normality **0.1024N** and **potassium permanganate solution** as link solution.

Short procedure (3mark)

S.N	Contents	Titration-I	Titration-II
1	Burette solution	KMnO ₄	KMnO ₄
2	Pipette solution	20ml of std FeSO ₄	20ml of unknown FAS
3	Acid to be added	20 ml of 2N H ₂ SO ₄	20 ml of 2N H ₂ SO ₄
4	Indicator	Self-indicator (KMnO ₄)	Self-indicator (KMnO ₄)
5	Temperature	Lab temperature	Lab temperature
6	End point	Appearance of permanent pale pink colour	Appearance of permanent pale pink colour
7	Equivalent weight of FAS = 392		

Titration –I

Link KMnO_4 Vs std FeSO_4

Indicator : Self indicator (KMnO_4)

S.NO	Volume of Std FeSO_4 (ml)	Burette reading		Volume of KMnO_4 (ml)	Concordant value (ml)
		Initial (ml)	Final (ml)		
1	20 ml	0	19.4	19.4	
2	20 ml	0	19.2	19.2	19.2
3	20 ml	0	19.2	19.2	

Calculation:

Volume of KMnO_4 solution $V_1 = 19.2\text{ml}$
 Normality of KMnO_4 solution $N_1 = N_1$
 Volume of FeSO_4 solution $V_2 = 20\text{ ml}$
 Normality of FeSO_4 solution $N_2 = 0.1024\text{N}$

According normality equation:

$$V_1 N_1 = V_2 N_2$$

$$N_1 = \frac{V_2 N_2}{V_1}$$

$$N_1 = \frac{20 \times 0.1024}{19.2}$$

$$N_1 = 0.1067\text{N}$$

Normality of KMnO_4 solution $N_1 = 0.1067\text{N}$

Indicator : Self indicator (KMnO_4)

S.NO	Volume of FAS ml	Burette reading		Volume of KMnO ₄ ml	Concordant value ml
		Initial ml	Final ml		
1	20 ml	0	21.5	21.5	
2	20 ml	0	21.2	21.2	21.2
3	20 ml	0	21.2	21.2	

$$N_1 = 0.1131N$$

Weight calculation:

The Amount of FAS present in 1500ml of the given solution = $\frac{\text{Equivalent mass} \times \text{Normality} \times 1500}{1000}$

$$= \frac{392 \times 0.1131 \times 1500}{1000}$$
$$= 66.50\text{g.}$$

Result:

Normality of KMnO_4 = 0.1067 N

Normality of FAS = 0.1131 N

Amount of FAS present in 1500ml of the given solution = 66.50g.

3. Estimation of Oxalic acid

Aim: To Estimate the amount of **Oxalic acid** dissolved in **1250ml** of the given unknown solution volumetrically. For this you are given with a **standard solution of HCl** of normality **0.1010N** and **potassium permanganate solution** as link solution.

Short procedure (3mark)

S.N	Contents	Titration-I	Titration-II
1	Burette solution	HCl(standard solution)	Oxalic acid(Unknown Solution)
2	Pipette solution	20ml of NaOH link Solution	20ml of NaOH link Solution
3	Temperature	Lab temperature	Lab temperature
4	Indicator	Phenolphthalein	Phenolphthalein
5	End point	Disappearance of pink colour	Disappearance pink colour
6	Equivalent weight of Oxalic Acid= 63		

Titration –I

Standard HCl Vs Link NaOH

Indicator : Phenolphthalein

S.NO	Volume of NaOH (ml)	Burette reading		Volume of HCl (ml)	Concordant value (ml)
		Initial (ml)	Final (ml)		
1	20 ml	0	19.4	19.4	19.2
2	20 ml	0	19.2	19.2	
3	20 ml	0	19.2	19.2	

Calculation:

Volume of NaOH (link) solution

$$V_1 = 20 \text{ ml}$$

Normality NaOH (link) solution

$$N_1 = N_1$$

Volume of standard HCl solution

$$V_2 = 19.2 \text{ ml}$$

Normality of standard HCl solution

$$N_2 = 0.1010 \text{ N}$$

According normality equation:

$$V_1 N_1 = V_2 N_2$$

$$N_1 = \frac{V_2 N_2}{V_1}$$

$$N_1 = \frac{19.2 \times 0.1010}{20}$$

$$N_1 = 0.0969 \text{ N}$$

Normality of HCl solution $N_1 = 0.0969 \text{ N}$

Titration -II

Link NaOH Vs Unknown Oxalic acid solution

Indicator : Phenolphthalein

S.NO	Volume of NaOH link (ml)	Burette reading		Volume of Oxalic acid ml	Concordant value ml
		Initial (ml)	Final (ml)		
1	20 ml	0	21.5	21.5	
2	20 ml	0	21.2	21.2	21.2
3	20 ml	0	21.2	21.2	

Calculation:

Volume of Unknown oxalic acid solution $V_1 = 21.2\text{ml}$

Normality of Unknown oxalic acid solution $N_1 = N_1$

Volume of NaOH solution $V_2 = 20\text{ml}$

Normality of NaOH Solution $N_2 = 0.0969\text{N}$

According normality equation:

$$V_1 N_1 = V_2 N_2$$

$$N_1 = \frac{V_2 N_2}{V_1}$$

$$N_1 = \frac{20 \times 0.0969}{21.2}$$

$$N_1 = 0.0914\text{N}$$

Weight calculation:

The Amount of Oxalic acid present in 1250ml of the given solution

$$= \frac{\text{Equivalent mass} \times \text{Normality} \times 1250}{1000}$$

$$= \frac{63 \times 0.0914 \times 1250}{1000}$$

$$= 7.19\text{g.}$$

Result:

Normality of NaOH = 0.0969 N

Normality of Oxalic acid = 0.0914 N

Amount of OXALIC ACID present in 1500ml of the given solution = 7.19g.