MUNIRAJ . T , POST GRADUATE TEACHER (CHEMISTRY) MODEL SCHOOL, PALACODE , DHARMAPURI

+2 PRACTICALS (Revised Edition – 2020) **I – ORGANIC QUALITATIVE ANALYSIS**

Experiment No : …… Date : ……

S.NO	Experiment	Observation	Inference
1	**Odour:** Note the Odour of the organic compound	**Bitter almond odour**	**May be benzaldehyde**
2	**Test with litmus paper:** Touch the Moist litmus paper with an organic compound	No colour change is noted	Absence of carboxylic acid , phenol and amine
3	**Action with sodium bicarbonate:** Take small amount of saturated sodium bi carbonate solution Add a pinch of an organic compound to it.	No brisk effervescence	Absence of a carboxylic acid
4	**Action with Borsche's reagent:** Take a small amount of an organic compound Add few ml of Borsche's reagent, few ml of Con HCl then warm the mixture gently and cool it.	**yellow precipitate**	**Presence of an aldehyde or ketone**
5	**Charring test:** Take a small amount of an organic compound in a dry test tube. Add few ml of conc H_2SO_4 to it, and heat the mixture.	No Charring	Absence of carbohydrate
	Tests for Aliphatic or Aromatic nature		
6	**Ignition test:** Take small amount of the organic compound in a Nickel spatula and burn it in Bunsen flame.	**Burn with sooty flame**	**Presence of an aromatic compound**
	Tests for an unsaturation:		
7	**Test with bromine water:** Take small amount of the organic compound , add 2 ml of distilled water to dissolve it. To this solution add few drops of bromine water and shake it well	**No Decolourisation takes place**	**Substance is saturated.**
8	**Test with $KMnO_4$ solution:** Take small amount of the organic compound add few ml of distilled water to dissolve it. To this solution add few drops of very dilute alkaline $KMnO_4$ solution and shake it well.	**No Decolourisation takes place**	**Substance is saturated**
	TEST FOR SELECTED ORGANIC FUNCTIONAL GROUPS - Test for aldehydes.		
9	**Tollen's reagent test:** Take few ml of Tollen's reagent in a clean dry test tube. Add few drops of an organic compound , and warm the mixture for few minutes	**Shining silver mirror is formed.**	**Presence of an aldehyde**
10	**Fehling's test:** Take few ml each of Fehling's solution A and B are taken in a test tube. Add few drops of an organic compound to it, and warm the mixture for few minutes.	**Red precipitate is formed.**	**Presence of an aldehyde**

Report:

The given organic compound **(BENZALDEHYDE)** contains is

(i) **Aromatic**

(ii) **Saturated**

(iii) **Aldehyde** functional group

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Experiment No : ..... Date : .....

S.NO	Experiment	Observation	Inference
1	**Odour:** Note the Odour of the organic compound	No characteristic odour	Absense of aniline, phenol ,ester ,benzaldehyde
2	**Test with litmus paper:** Touch the Moist litmus paper with an organic compound	No colour change is noted	Absence of carboxylic acid , phenol and amine
3	**Action with sodium bicarbonate:** Take small amount of saturated sodium bi carbonate solution Add a pinch of an organic compound to it.	No brisk effervescence	Absence of a carboxylic acid
4	**Action with Borsche's reagent:** Take a small amount of an organic compound Add few ml of Borsche's reagent, few ml of Con HCl then warm the mixture gently and cool it.	**yellow precipitate**	**Presence of an aldehyde or ketone**
5	**Charring test:** Take a small amount of an organic compound in a dry test tube. Add few ml of conc H_2SO_4 to it, and heat the mixture.	No Charring	Absence of carbohydrate
	Tests for Aliphatic or Aromatic nature		
6	**Ignition test:** Take small amount of the organic compound in a Nickel spatula and burn it in Bunsen flame.	**Burn with sooty flame**	**Presence of an aromatic compound**
	Tests for an unsaturation:		
7	**Test with bromine water:** Take small amount of the organic compound , add 2 ml of distilled water to dissolve it. To this solution add few drops of bromine water and shake it well	**Orange - yellow colour of bromine water is decolourised**	**Substance is unsaturated.**
8	**Test with $KMnO_4$ solution:** Take small amount of the organic compound add few ml of distilled water to dissolve it. To this solution add few drops of very dilute alkaline $KMnO_4$ solution and shake it well.	**Pink colour of $KMnO_4$ solution is decolourised**	**Substance is unsaturated**
	TEST FOR SELECTED ORGANIC FUNCTIONAL GROUPS - Test for aldehydes.		
9	**Tollen's reagent test:** Take few ml of Tollen's reagent in a clean dry test tube. Add few drops of an organic compound , and warm the mixture for few minutes	**Shining silver mirror is formed.**	**Presence of an aldehyde**
10	**Fehling's test:** Take few ml each of Fehling's solution A and B are taken in a test tube. Add few drops of an organic compound to it, and warm the mixture for few minutes.	**Red precipitate is formed.**	**Presence of an aldehyde**

Report:

The given organic compound **(CINNAMALDEHYDE)** contains is

(i) **Aromatic**

(ii) **UnSaturated**

(iii) **Aldehyde** functional group

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Experiment No : ..... Date : .....

S.NO	Experiment	Observation	Inference
1	**Odour:** Note the Odour of the organic compound	No characteristic odour	Absense of aniline, phenol ,ester ,benzaldehyde
2	**Test with litmus paper:** Touch the Moist litmus paper with an organic compound	No colour change is noted	Absence of carboxylic acid , phenol and amine
3	**Action with sodium bicarbonate:** Take small amount of saturated sodium bi carbonate solution Add a pinch of an organic compound to it.	No brisk effervescence	Absence of a carboxylic acid
4	**Action with Borsche's reagent:** Take a small amount of an organic compound Add few ml of Borsche's reagent, few ml of Con HCl then warm the mixture gently and cool it.	**red precipitate**	**Presence of an aldehyde or ketone**
5	**Charring test:** Take a small amount of an organic compound in a dry test tube. Add few ml of conc H_2SO_4 to it, and heat the mixture.	No Charring	Absence of carbohydrate
	Tests for Aliphatic or Aromatic nature		
6	**Ignition test:** Take small amount of the organic compound in a Nickel spatula and burn it in Bunsen flame.	**Burn with sooty flame**	**Presence of an aromatic compound**
	Tests for an unsaturation:		
7	**Test with bromine water:** Take small amount of the organic compound , add 2 ml of distilled water to dissolve it. To this solution add few drops of bromine water and shake it well	**No Decolourisation takes place**	**Substance is saturated.**
8	**Test with $KMnO_4$ solution:** Take small amount of the organic compound add few ml of distilled water to dissolve it. To this solution add few drops of very dilute alkaline $KMnO_4$ solution and shake it well.	**No Decolourisation takes place**	**Substance is saturated**
	TEST FOR SELECTED ORGANIC FUNCTIONAL GROUPS - Test for ketones.		
9	**Legal's test:** A small amount of the substance , few ml sodium nitro prusside solution is added. Then sodium hydroxide solution is added dropwise	**Red colouration.**	**Presence of a ketone**

Report:

The given organic compound **(ACETOPHENONE)** contains is

(i) **Aromatic**

(ii) **Saturated**

(iii) **Ketone** functional group

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Experiment No : ..... Date : .....

S.NO	Experiment	Observation	Inference
1	**Odour:** Note the Odour of the organic compound	No characteristic odour	Absense of aniline, phenol ,ester ,benzaldehyde
2	**Test with litmus paper:** Touch the Moist litmus paper with an organic compound	No colour change is noted	Absence of carboxylic acid , phenol and amine
3	**Action with sodium bicarbonate:** Take small amount of saturated sodium bi carbonate solution Add a pinch of an organic compound to it.	No brisk effervescence	Absence of a carboxylic acid
4	**Action with Borsche's reagent:** Take a small amount of an organic compound Add few ml of Borsche's reagent, few ml of Con HCl then warm the mixture gently and cool it.	**red precipitate**	**Presence of an aldehyde or ketone**
5	**Charring test:** Take a small amount of an organic compound in a dry test tube. Add few ml of conc H_2SO_4 to it, and heat the mixture.	No Charring	Absence of carbohydrate
	Tests for Aliphatic or Aromatic nature		
6	**Ignition test:** Take small amount of the organic compound in a Nickel spatula and burn it in Bunsen flame.	**Burn with sooty flame**	**Presence of an aromatic compound**
	Tests for an unsaturation:		
7	**Test with bromine water:** Take small amount of the organic compound , add 2 ml of distilled water to dissolve it. To this solution add few drops of bromine water and shake it well	**No Decolourisation takes place**	**Substance is saturated.**
8	**Test with $KMnO_4$ solution:** Take small amount of the organic compound add few ml of distilled water to dissolve it. To this solution add few drops of very dilute alkaline $KMnO_4$ solution and shake it well.	**No Decolourisation takes place**	**Substance is saturated**
	TEST FOR SELECTED ORGANIC FUNCTIONAL GROUPS - Test for ketones.		
9	**Legal's test:** A small amount of the substance , few ml sodium nitro prusside solution is added. Then sodium hydroxide solution is added dropwise	**Red colouration.**	**Presence of a ketone**

Report:

The given organic compound **(BENZOPHENONE)** contains is

(i) **Aromatic**

(ii) **Saturated**

(iii) **Ketone** functional group

Experiment No : ..... Date : .....

S.NO	Experiment	Observation	Inference
1	**Odour:** Note the Odour of the organic compound	No characteristic odour	Absense of aniline, phenol ,ester ,benzaldehyde
2	**Test with litmus paper:** Touch the Moist litmus paper with an organic compound	**Blue litmus turns red is noted**	**May be a carboxylic acid or phenol**
3	**Action with sodium bicarbonate:** Take small amount of saturated sodium bi carbonate solution Add a pinch of an organic compound to it.	**Brisk effervescence**	**Presence of a carboxylic acid**
4	**Action with Borsche's reagent:** Take a small amount of an organic compound Add few ml of Borsche's reagent, few ml of Con HCl then warm the mixture gently and cool it.	No characteristic colour precipitate is formed	Absence of an aldehyde or ketone
5	**Charring test:** Take a small amount of an organic compound in a dry test tube. Add few ml of conc H_2SO_4 to it, and heat the mixture.	No Charring	Absence of carbohydrate
	Tests for Aliphatic or Aromatic nature		
6	**Ignition test:** Take small amount of the organic compound in a Nickel spatula and burn it in Bunsen flame.	**Burn with sooty flame**	**Presence of an aromatic compound**
	Tests for an unsaturation:		
7	**Test with bromine water:** Take small amount of the organic compound , add 2 ml of distilled water to dissolve it. To this solution add few drops of bromine water and shake it well	**No Decolourisation takes place**	**Substance is saturated.**
8	**Test with $KMnO_4$ solution:** Take small amount of the organic compound add few ml of distilled water to dissolve it. To this solution add few drops of very dilute alkaline $KMnO_4$ solution and shake it well.	**No Decolourisation takes place**	**Substance is saturated**
	TEST FOR SELECTED ORGANIC FUNCTIONAL GROUPS - TEST FOR CARBOXYLIC ACIDS.		
9	**Esterification reaction:** Take a pinch of solid of an organic compound , Add few ml of ethyl alcohol and few drops of conc. sulphuric acid to it. Heat the reaction mixture strongly for about few minutes. Then pour the mixture into a beaker containing dil. Sodium carbonate solution and note the smell.	**A Pleasant fruity odour is noted**.	**Presence of carboxylic group**.

Report:

The given organic compound **(BENZOIC ACID)** contains is

(i) **Aromatic**

(ii) **Saturated**

(iii) **Carboxilic acid** functional group

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Experiment No : ..... Date : .....

S.NO	Experiment	Observation	Inference
1	**Odour:** Note the Odour of the organic compound	No characteristic odour	Absense of aniline, phenol ,ester ,benzaldehyde
2	**Test with litmus paper:** Touch the Moist litmus paper with an organic compound	**Blue litmus turns red is noted**	**May be a carboxylic acid or phenol**
3	**Action with sodium bicarbonate:** Take small amount of saturated sodium bi carbonate solution Add a pinch of an organic compound to it.	**Brisk effervescence**	**Presence of a carboxylic acid**
4	**Action with Borsche's reagent:** Take a small amount of an organic compound Add few ml of Borsche's reagent, few ml of Con HCl then warm the mixture gently and cool it.	No characteristic colour precipitate is formed	Absence of an aldehyde or ketone
5	**Charring test:** Take a small amount of an organic compound in a dry test tube. Add few ml of conc H_2SO_4 to it, and heat the mixture.	No Charring	Absence of carbohydrate
	Tests for Aliphatic or Aromatic nature		
6	**Ignition test:** Take small amount of the organic compound in a Nickel spatula and burn it in Bunsen flame.	**Burn with sooty flame**	**Presence of an aromatic compound**
	Tests for an unsaturation:		
7	**Test with bromine water:** Take small amount of the organic compound , add 2 ml of distilled water to dissolve it. To this solution add few drops of bromine water and shake it well	**Decolourisation takes place**	**Substance is Unsaturated.**
8	**Test with $KMnO_4$ solution:** Take small amount of the organic compound add few ml of distilled water to dissolve it. To this solution add few drops of very dilute alkaline $KMnO_4$ solution and shake it well.	**Decolourisation takes place**	**Substance is Unsaturated**
	TEST FOR SELECTED ORGANIC FUNCTIONAL GROUPS - TEST FOR CARBOXYLIC ACIDS.		
9	**Esterification reaction:** Take a pinch of solid of an organic compound , Add few ml of ethyl alcohol and few drops of conc. sulphuric acid to it. Heat the reaction mixture strongly for about few minutes. Then pour the mixture into a beaker containing dil. Sodium carbonate solution and note the smell.	**A Pleasant fruity odour is noted**.	**Presence of carboxylic group**.

Report:

The given organic compound **(CINNAMIC ACID)** contains is

(i) **Aromatic**

(ii) **UnSaturated**

(iii) **Carboxilic acid** functional group

Experiment No : ..... Date : .....

S.NO	Experiment	Observation	Inference
1	**Odour:** Note the Odour of the organic compound	No characteristic odour	Absense of aniline, phenol ,ester ,benzaldehyde
2	**Test with litmus paper:** Touch the Moist litmus paper with an organic compound	No colour change is noted	Absence of carboxylic acid , phenol and amine
3	**Action with sodium bicarbonate:** Take small amount of saturated sodium bi carbonate solution Add a pinch of an organic compound to it.	No brisk effervescence	Absence of a carboxylic acid
4	**Action with Borsche's reagent:** Take a small amount of an organic compound Add few ml of Borsche's reagent, few ml of Con HCl then warm the mixture gently and cool it.	No characteristic precipitate	Absence of an aldehyde or ketone
5	**Charring test:** Take a small amount of an organic compound in a dry test tube. Add few ml of conc H_2SO_4 to it, and heat the mixture.	No Charring	Absence of carbohydrate
	Tests for Aliphatic or Aromatic nature		
6	**Ignition test:** Take small amount of the organic compound in a Nickel spatula and burn it in Bunsen flame.	**Burn with non sooty flame**	**Presence of an aliphatic compound**
	Tests for an unsaturation:		
7	**Test with bromine water:** Take small amount of the organic compound , add few ml of distilled water to dissolve it. To this solution add few drops of bromine water and shake it well	**No Decolourisation takes place**	**Substance is saturated.**
8	**Test with $KMnO_4$ solution:** Take small amount of the organic compound add few ml of distilled water to dissolve it. To this solution add few drops of very dilute alkaline $KMnO_4$ solution and shake it well.	**No Decolourisation takes place**	**Substance is saturated**
	TEST FOR SELECTED ORGANIC FUNCTIONAL GROUPS - Test for diamide		
9.	**Biuret test:** Take A small amount of an organic compound,Heat strongly and then cool.Dissolve the residue with few ml of water. Then Add few ml of dilute copper sulphate solution and few drops of 10% NaOH solution drop by drop.	**Violet colour is appeared**	**presence of a diamide**

Report:

The given organic compound **(UREA)** contains is

(i) **Aliphatic**

(ii) **Saturated**

(iii) **diamide** functional group

Experiment No : ..... Date : .....

S.NO	Experiment	Observation	Inference
1	**Odour:** Note the Odour of the organic compound	No characteristic odour	Absense of aniline, phenol ,ester ,benzaldehyde
2	**Test with litmus paper:** Touch the Moist litmus paper with an organic compound	No colour change is noted	Absence of carboxylic acid , phenol and amine
3	**Action with sodium bicarbonate:** Take small amount of saturated sodium bi carbonate solution Add a pinch of an organic compound to it.	No brisk effervescence	Absence of a carboxylic acid
4	**Action with Borsche's reagent:** Take a small amount of an organic compound Add few ml of Borsche's reagent, few ml of Con HCl then warm the mixture gently and cool it.	**yellow precipitate**	**Presence of an aldehyde or ketone**
5	**Charring test:** Take a small amount of an organic compound in a dry test tube. Add few ml of conc H2SO4 to it, and heat the mixture.	**Charring takes place with smell of burnt sugar**	**Presence of carbohydrate**
	Tests for Aliphatic or Aromatic nature		
6	**Ignition test:** Take small amount of the organic compound in a Nickel spatula and burn it in Bunsen flame.	**Burn with non sooty flame**	**Presence of an aliphatic compound**
	Tests for an unsaturation:		
7	**Test with bromine water:** Take small amount of the organic compound , add few ml of distilled water to dissolve it. To this solution add few drops of bromine water and shake it well	**No Decolourisation takes place**	**Substance is saturated.**
8	**Test with KMnO4 solution :** Take small amount of the organic compound add few ml of distilled water to dissolve it. To this solution add few drops of very dilute alkaline KMnO4 solution and shake it well.	**No Decolourisation takes place**	**Substance is saturated**
	TEST FOR SELECTED ORGANIC FUNCTIONAL GROUPS - Test for Aldehyde & carbohydrate		
9	**Tollen's reagent test:** Take few ml of Tollen's reagent in a clean dry test tube. Add few drops of an organic compound , and warm the mixture for few minutes	**Shining silver mirror is formed.**	**Presence of an aldehyde**
10	**Fehling's test:** Take few ml each of Fehling's solution A and B are taken in a test tube. Add few drops of an organic compound to it, and warm the mixture for few minutes.	**Red precipitate is formed.**	**Presence of an aldehyde**
11	**Molisch's test :** Take A small amount of an organic compound is dissolved in few ml of water. Add few drops of alpha naphthol .Then add conc H2SO4 through the sides of test tube carefully.	**Violet ring is formed at the junction of the two liquids.**	**Presence of carbohydrate**
12	**Osazone test:** Take A small amount of an organic compound , Add few ml of phenyl hydrazine solution and heat the mixture for about 5 minutes on a boiling water bath	**Yellow crystals are obtained**	**Presence of carbohydrate**

Report : The given organic compound **(GLUCOSE)** contains is

(i) **Aliphatic**

(ii) **Saturated**

(iii) **Carbohydrate with Aldehyde** functional group

Experiment No : ..... Date : .....

S.NO	Experiment	Observation	Inference
1	**Odour:** Note the Odour of the organic compound	**Fish odour**	**May be an amine**
2	**Test with litmus paper:** Touch the Moist litmus paper with an organic compound	**Red litmus turns Blue is noted**	**May be an amine**
3	**Action with sodium bicarbonate:** Take small amount of saturated sodium bi carbonate solution Add a pinch of an organic compound to it.	No Brisk effervescence	Absence of a carboxylic acid
4	**Action with Borsche's reagent:** Take a small amount of an organic compound Add few ml of Borsche's reagent, few ml of Con HCl then warm the mixture gently and cool it.	No characteristic colour precipitate is formed	Absence of an aldehyde or ketone
5	**Charring test:** Take a small amount of an organic compound in a dry test tube. Add few ml of conc H_2SO_4 to it, and heat the mixture.	No Charring	Absence of carbohydrate
	Tests for Aliphatic or Aromatic nature		
6	**Ignition test:** Take small amount of the organic compound in a Nickel spatula and burn it in Bunsen flame.	**Burn with sooty flame**	**Presence of an aromatic compound**
	Tests for an unsaturation:		
7	**Test with bromine water :** Take small amount of the organic compound , add few ml of distilled water to dissolve it. To this solution add few drops of bromine water and shake it well	**No Decolourisation takes place**	**Substance is saturated.**
8	**Test with $KMnO_4$ solution :** Take small amount of the organic compound add few ml of distilled water to dissolve it. To this solution add few drops of very dilute alkaline $KMnO_4$ solution and shake it well.	**No Decolourisation takes place**	**Substance is saturated**
	TEST FOR SELECTED ORGANIC FUNCTIONAL GROUPS - Test for an amine.		
9	**Dye test :** Take A small amount of an organic substance in a clean test tube, add few ml of HCl to dissolve it. Add few crystals of $NaNO_2$, and cool the mixture in ice bath. Then add few ml of ice cold solution of β-naphtholin NaOH.	**Scarlet red dye is obtained**	**Presence of an aromatic primary amine.**

Report:

The given organic compound **(ANILINE)** contains is

(i) **Aromatic**

(ii) **Saturated**

(iii) **Amine** functional group

Experiment No : ..... Date : .....

S.NO	Experiment	Observation	Inference
1	**Odour:** Note the Odour of the organic compound	**Phenolic odour**	**Presense of phenol**
2	**Test with litmus paper:** Touch the Moist litmus paper with an organic compound	**Blue litmus turns red is noted**	**May be a carboxylic acid or phenol**
3	**Action with sodium bicarbonate:** Take small amount of saturated sodium bi carbonate solution Add a pinch of an organic compound to it.	No Brisk effervescence	Absence of a carboxylic acid
4	**Action with Borsche's reagent:** Take a small amount of an organic compound Add few ml of Borsche's reagent, few ml of Con HCl then warm the mixture gently and cool it.	No characteristic colour precipitate is formed	Absence of an aldehyde or ketone
5	**Charring test:** Take a small amount of an organic compound in a dry test tube. Add few ml of conc H_2SO_4 to it, and heat the mixture.	No Charring	Absence of carbohydrate
	Tests for Aliphatic or Aromatic nature		
6	**Ignition test:** Take small amount of the organic compound in a Nickel spatula and burn it in Bunsen flame.	**Burn with sooty flame**	**Presence of an aromatic compound**
	Tests for an unsaturation:		
7	**Test with bromine water :** Take small amount of the organic compound,add few ml of distilled water to dissolve it. To this solution add few drops of bromine water and shake it well	**No Decolourisation takes place**	**Substance is saturated.**
8	**Test with $KMnO_4$ solution:** Take small amount of the organic compound add few ml of distilled water to dissolve it. To this solution add few drops of very dilute alkaline $KMnO_4$ solution and shake it well.	**No Decolourisation takes place**	**Substance is saturated**
	TEST FOR SELECTED ORGANIC FUNCTIONAL GROUPS - TEST FOR PHENOL & CARBOXYLIC ACIDS.		
9	**Neutral $FeCl_3$ test :** Take few ml of neutral ferric chloride solution is taken , Add a pinch of solid Of organic compound to it.	**Violet colouration is seen**	**Presence of phenol**
9	**Esterification reaction:** Take a pinch of solid of an organic compound , Add few ml of ethyl alcohol and few drops of conc. sulphuric acid to it. Heat the reaction mixture strongly for about few minutes. Then pour the mixture into a beaker containing dil. Sodium carbonate solution and note the smell.	**A Pleasant fruity odour is noted**.	**Presence of carboxylic group**.

Report:

The given organic compound **(SALICYLIC ACID)** contains is

(i) **Aromatic**

(ii) **Saturated**

(iii) **Phenol with Carboxilic acid** functional group

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II-VOLUMETRIC ANALYSIS

1.Estimation of Ferrous Sulphate (Fe^{2+})

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 0.1102 N and potassium permanganate solution as link solution .

Short procedure:

S.No	Content	Titration - I	Titration - I
1.	Burette solution	$KMnO_4$	$KMnO_4$
2.	Pipette solution	20 ml of standard FAS	20 ml of unknown $FeSO_4$
3.	Acid to be added	20ml of 2N H_2SO_4 (approx)	20ml of 2N H_2SO_4 (approx.)
4.	Temperature	Lab temperature	Lab temperature
5.	Indicator	Self-indicator ($KMnO_4$)	Self-indicator ($KMnO_4$)
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 (Standard FAS) Indicator : self indicator ($KMnO_4$)

S.No	Volume of standard FAS (ml)	Burette readings		Concordant value (Volume of $KMnO_4$) (ml)
		Initial (ml)	Final(ml)	
1.	20	0		
2.	20	0		

Calculation :

Volume of $KMnO_4$ (link) solution (V_1) = ---------- ml

Normality $KMnO_4$ (link) solution (N_1) =---------- N

Volume of standard FAS solution (V_2) = 20 ml

Normality of standard FAS solution (N_2) = 0.1102 N

According to normality equation : $V_1 \times N_1 = V_2 \times N_2$

$$N_1 = \frac{V_2 \times N_2}{V_1} \qquad N_1 = \frac{20 \times 0.1102}{\ldots\ldots\ldots\ldots} \qquad N_1 = \text{-------X-------N}$$

Normality of $KMnO_4$ (link) solution (N_1) = _____x_____ N

Titration – II (Link $KMnO_4$) Vs (Unknown $FeSO_4$) Indicator : self indicator ($KMnO_4$)

S.No	Volume of standard $FeSO_4$ (ml)	Burette readings		Concordant value (Volume of $KMnO_4$) (ml)
		Initial (ml)	Final(ml)	
1.	20	0		
2.	20	0		

Calculation :

Volume of Unknown $FeSO_4$ solution V_1 = 20 ml

Normality of Unknown $FeSO_4$ solution N_1 = ? .... N

Volume of $KMnO_4$ (link) solution V_2 = ... ml

Normality $KMnO_4$ (link) solution N_2 = X N

According to normality equation : $V_1 \times N_1 = V_2 \times N_2$

$$N_1 = \frac{V_2 \times N_2}{V_1} \qquad N_1 = \frac{\ldots\ldots \times X}{20} \qquad N_1 = \text{-------Y----N}$$

The normality of unknown $FeSO_4$ solution = _____Y_____ N

Weight calculation:

The amount of $FeSO_4$ dissolved in 1 lit of the solution = (Normality) x (equivalent weight)

The amount of $FeSO_4$ dissolved in 750 ml of the solution = $\frac{Y \times 278 \times 750}{1000}$

= ---------- g

Report

(i) Normality of $KMnO_4$ (link) solution (N_1) = _____x_____ N

(ii) The normality of unknown $FeSO_4$ solution = _____Y_____ N

(iii) The amount of $FeSO_4$ dissolved in 750 ml of the solution = ... g

2 . Estimation of Ferrous Ammonium Sulphate (FAS)

Aim : To 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 ($FeSO_4$)of normality 0.1024 N and potassium permanganate solution as link solution..

Short procedure:

S.No	Content	Titration - I	Titration - I
1.	Burette solution	$KMnO_4$	$KMnO_4$
2.	Pipette solution	20 ml of standard $FeSO_4$	20 ml of unknown FAS
3.	Acid to be added	20ml of 2N H_2SO_4 (approx)	20ml of 2N H_2SO_4 (approx.)
4.	Temperature	Lab temperature	Lab temperature
5.	Indicator	Self-indicator ($KMnO_4$)	Self-indicator ($KMnO_4$)
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 (Standard $FeSO_4$) Indicator : self indicator ($KMnO_4$)

S.No	Volume of standard $FeSO_4$ (ml)	Burette readings		Concordant value (Volume of $KMnO_4$) (ml)
		Initial (ml)	Final(ml)	
1.	20	0		
2.	20	0		

Calculation :

Volume of $KMnO_4$ (link) solution (V_1) = ---------- ml
Normality $KMnO_4$ (link) solution (N_1) =-----? ------ N
Volume of standard $FeSO_4$ solution (V_2) = 20 ml
Normality of standard $FeSO_4$ solution (N_2) = 0.1024 N
According to normality equation : $V_1 \times N_1 = V_2 \times N_2$

$$N_1 = \frac{V_2 \times N_2}{V_1} \qquad N_1 = \frac{20 \times 0.1024}{\ldots\ldots\ldots\ldots} \qquad N_1 = \text{-------X-------N}$$

Normality of $KMnO_4$ (link) solution (N_1) = _____x_____ N

Titration – II (Link $KMnO_4$) Vs (Unknown FAS) Indicator : self indicator ($KMnO_4$)

S.No	Volume of Unknown FAS (ml)	Burette readings		Concordant value (Volume of $KMnO_4$) (ml)
		Initial (ml)	Final(ml)	
1.	20	0		
2.	20	0		

Calculation :

Volume of Unknown FAS solution V_1 = 20 ml
Normality of Unknown FAS solution N_1 = ? .... N
Volume of $KMnO_4$ (link) solution V_2 = ... ml
Normality $KMnO_4$ (link) solution N_2 = X N
According to normality equation : $V_1 \times N_1 = V_2 \times N_2$

$$N_1 = \frac{V_2 \times N_2}{V_1} \qquad N_1 = \frac{\ldots\ldots \times X}{20} \qquad N_1 = \text{-------Y----N}$$

The normality of unknown FAS solution = _____Y_____ N

Weight calculation:

The amount of FAS dissolved in 1 lit of the solution = (Normality) x (equivalent weight)
The amount of FAS dissolved in 1500 ml of the solution = $\frac{Y \times 392 \times 1500}{1000}$
= ---------- g

Report :

(i) Normality of $KMnO_4$ (link) solution (N1) = _____x_____ N
(ii) The normality of unknown FAS solution = _____Y_____ N
(iii) The amount of FAS dissolved in 1500 ml of the solution = ... g

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3 . Estimation of oxalic acid

Aim : To estimate the amount of oxalic acid dissolved in 500 ml of the given solution volumetrically. For this you are given with a standard solution of ferrous ammonium sulphate(FAS)of normality 0.1 N and potassium permanganate solution as link solution.

Short procedure:

S.No	Content	Titration - I	Titration - I
1.	Burette solution	$KMnO_4$	$KMnO_4$
2.	Pipette solution	20 ml of standard FAS	20 ml of unknown Oxalic acid
3.	Acid to be added	20ml of 2N H_2SO_4 (approx)	20ml of 2N H_2SO_4 (approx.)
4.	Temperature	Lab temperature	60 º – 70 º c
5.	Indicator	Self-indicator ($KMnO_4$)	Self-indicator ($KMnO_4$)
6.	End point	Appearance of permanent pale pink colour	Appearance of permanent pale pink colour
7.	Equivalent weight of Oxalic acid = 63		

Titration – I (Link $KMnO_4$) Vs (Standard FAS Solution) Indicator : self indicator ($KMnO_4$)

S.No	Volume of standard FAS (ml)	Burette readings		Concordant value (Volume of $KMnO_4$) (ml)
		Initial (ml)	Final(ml)	
1.	20	0		
2.	20	0		

Calculation :

Volume of $KMnO_4$ (link) solution (V_1) = ---------- ml

Normality $KMnO_4$ (link) solution (N_1) =-----? ------ N

Volume of standard FAS solution (V_2) = 20 ml

Normality of standard FAS solution (N_2) = 0.1 N

According to normality equation : $V_1 \times N_1 = V_2 \times N_2$

$N_1 = \frac{V_2 \times N_2}{V_1}$ $N_1 = \frac{20 \times 0.1}{\ldots\ldots\ldots\ldots}$ N_1 = -------X-------N

Normality of $KMnO_4$ (link) solution (N_1) = _____x_____ N

Titration – II (Link $KMnO_4$) Vs (Unknown oxalic acid) Indicator : self indicator ($KMnO_4$)

S.No	Volume of Unknown oxalic acid (ml)	Burette readings		Concordant value (Volume of $KMnO_4$) (ml)
		Initial (ml)	Final(ml)	
1.	20	0		
2.	20	0		

Calculation :

Volume of Unknown oxalic acid solution V_1 = 20 ml

Normality of Unknown oxalic acid solution N_1 = ? .... N

Volume of $KMnO_4$ (link) solution V_2 = ... ml

Normality $KMnO_4$ (link) solution N_2 = X N

According to normality equation : $V_1 \times N_1 = V_2 \times N_2$

$N_1 = \frac{V_2 \times N_2}{V_1}$ $N_1 = \frac{\ldots\ldots \times X}{20}$ N_1 = -------Y----N

The normality of unknown oxalic acid solution = _____Y_____ N

Weight calculation:

The amount of oxalic acid dissolved in 1 lit of the solution = (Normality) x (equivalent weight)

The amount of oxalic acid dissolved in 500 ml of the solution = $\frac{Y \times 63 \times 500}{1000}$

= ---------- g

Report :

(i) Normality of $KMnO_4$ (link) solution (N_1) = _____x_____ N

(ii) The normality of unknown oxalic acid solution = _____Y_____ N

(iii) The amount of oxalic acid dissolved in 500 ml of the solution = ... g

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4 . Estimation of sodium hydroxide

Aim : To estimate the amount of sodium hydroxide dissolved in 250 ml of the given unknown solution volumetrically. For this you are given with a standard solution of sodium carbonate solution of normality 0.0948 N and hydrochloric acid solution as link solution.

Short procedure:

S.No	Content	Titration - I	Titration - I
1.	Burette solution	HCl (link solution)	HCl (link solution)
2.	Pipette solution	20 ml of standard Na_2CO_3 solution	20 ml of unknown NaOH solution
3.	Temperature	Lab temperature	Lab temperature
4.	Indicator	Methyl orange	Phenolphthalein
5.	End point	Colour change from straw yellow to pale pink	Disappearance of pink colour
6.	Equivalent weight of NaOH = 40		

Titration – I (Link HCl) Vs (Standard Na_2CO_3 Solution) **Indicator : Methyl orange**

S.No	Volume of standard Na_2CO_3 Solution (ml)	Burette readings		Concordant value (Volume of HCl) (ml)
		Initial (ml)	Final(ml)	
1.	20	0		
2.	20	0		

Calculation :

Volume of **HCl** (link) solution (V_1) = ---------- ml

Normality **HCl** (link) solution (N_1) =-----? ------ N

Volume of standard **Na_2CO_3** solution (V_2) = 20 ml

Normality of standard **Na_2CO_3** solution (N_2) = 0.0948 N

According to normality equation : $V_1 \times N_1 = V_2 \times N_2$

$N_1 = \frac{V_2 \times N_2}{V_1}$ $N_1 = \frac{20 \times 0.0948}{\ldots\ldots\ldots\ldots}$ N_1 = -------X-------N

Normality of HCl (link) solution (N_1) = _____x_____ N

Titration – II (Link HCl) Vs (Unknown NaOH) **Indicator : Phenolphthalein**

S.No	Volume of Unknown NaOH (ml)	Burette readings		Concordant value (Volume of HCl) (ml)
		Initial (ml)	Final(ml)	
1.	20	0		
2.	20	0		

Calculation :

Volume of Unknown **NaOH** solution V_1 = 20 ml

Normality of Unknown **NaOH** solution N_1 = ? .... N

Volume of HCl (link) solution V_2 = ... ml

Normality of HCl (link) solution N_2 = X N

According to normality equation : $V_1 \times N_1 = V_2 \times N_2$

$N_1 = \frac{V_2 \times N_2}{V_1}$ $N_1 = \frac{\ldots\ldots \times X}{20}$ N_1 = -------Y----N

The normality of unknown **NaOH** solution = _____Y_____ N

Weight calculation:

The amount of **NaOH** dissolved in 1 lit of the solution = (Normality) x (equivalent weight)

The amount of **NaOH** dissolved in 250 ml of the solution = $\frac{Y \times 40 \times 250}{1000}$

= ---------- g

Report :

(i) Normality of HCl (link) solution (N_1) = _____x_____ N

(ii) The normality of unknown **NaOH** solution = _____Y_____ N

(iii) The amount of **NaOH** dissolved in 250 ml of the solution = ... g

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5 . Estimation of oxalic acid

Aim : 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 0.1010 N and sodium hydroxide solution as link solution.

Short procedure:

S.No	Content	Titration - I	Titration - I
1.	Burette solution	HCl (standard solution)	$KMnO_4$
2.	Pipette solution	20 ml of NaOH link solution	20 ml of NaOH link solution
3.	Temperature	Lab temperature	Lab temperature
4.	Indicator	Phenolphthalein	Phenolphthalein
5.	End point	Disappearance of pinkcolour	Disappearance of pink colour
6.	Equivalent weight of Oxalic acid = 63		

Titration – I (standard HCl)Vs (link NaOH) **Indicator : Phenolphthalein**

S.No	Volume of standard NaOH (ml)	Burette readings		Concordant value (Volume of standard HCl) (ml)
		Initial (ml)	Final(ml)	
1.	20	0		
2.	20	0		

Calculation :

Volume of NaOH (link) solution (V_1) = 20 ml

Normality NaOH (link) solution (N_1) = ----? ------ N

Volume of standard HCl solution (V_2) = ... ml

Normality of standard HCl solution (N_2) = 0.1010 N

According to normality equation : $V_1 \times N_1 = V_2 \times N_2$

$N_1 = \frac{V_2 \times N_2}{V_1}$ $N_1 = \frac{\ldots\ldots \times 0.1010}{20}$ N_1 = -------X-------N

Normality of NaOH (link) solution (N_1) = _____x_____ N

Titration – II (Link NaOH) Vs (Unknown oxalic acid) Indicator : Phenolphthalein

S.No	Volume of NaOH (ml)	Burette readings		Concordant value (Volume of oxalic acid) (ml)
		Initial (ml)	Final(ml)	
1.	20	0		
2.	20	0		

Calculation :

Volume of Unknown oxalic acid solution V_1 =..... ml

Normality of Unknown oxalic acid solution N_1 = ...? ..... N

Volume of NaOH (link) solution V_2 = 20 ml

Normality NaOH (link) solution N_2 = X N

According to normality equation : $V_1 \times N_1 = V_2 \times N_2$

$N_1 = \frac{V_2 \times N_2}{V_1}$ $N_1 = \frac{20 \times X}{\ldots\ldots\ldots}$ N_1 = -------Y---- N

The normality of unknown oxalic acid solution = _____Y_____ N

Weight calculation:

The amount of oxalic acid dissolved in 1 lit of the solution = (Normality) x (equivalent weight)

The amount of oxalic acid dissolved in 1250 ml of the solution = $\frac{Y \times 63 \times 1250}{1000}$

= ---------- g

Report :

(i) Normality of NaOH (link) solution (N_1) = _____x_____ N

(ii) The normality of unknown oxalic acid solution = _____Y_____ N

(iii) The amount of oxalic acid dissolved in 1250 ml of the solution = ... g