



पुनमा International School

Shree Swaminarayan Gurukul, Zundal

Class – XII

Subject: Chemistry (Practical)

Experiments (2024_25)

Exp. No	Aim
	QUANTITATIVE ANALYSIS
1	Prepare 250 ml of 0.1M Solution of Oxalic Acid From Crystalline Oxalic Acid
2	Determination of Concentration/Molarity of KMnO_4 Solution by Titrating it against a 0.1M Standard Solution of Oxalic acid
3	Determination of Concentration/Molarity of KMnO_4 Solution by Titrating it against a Standard Solution of Ferrous ammonium sulphate
	QUALITATIVE ANALYSIS
4	To Identify the given inorganic salt $[\text{Ba}(\text{NO}_3)_2]$
5	To Identify the given inorganic salt $[\text{ZnCO}_3]$
6	To Identify the given inorganic salt $[\text{Pb}(\text{NO}_3)_2]$
7	To Identify the given inorganic salt PbCl_2
8	To Identify the given inorganic salt MgSO_4
9	To Identify the given inorganic salt $[\text{BaSO}_4]$
10	To Identify the given inorganic salt $[\text{Sr}(\text{NO}_3)_2]$
	Content based Experiment
11	Test for functional group present in organic compound: Aldehyde, Ketone, Alcohol, Carboxylic Acid, Phenol, Amine
12	Preparation of inorganic compound, Ferrous ammonium sulphate (potash alum)
13	Chromatography Separation of constituents present in an inorganic mixture containing two cations only (constituents having large difference in R_f values to be provided).

EXPERIMENT-1

Aim: Prepare 250 ml of M/10 Solution of Oxalic Acid From Crystalline Oxalic Acid

Theory

Molecular mass of crystalline oxalic acid $\left(\begin{array}{c} \text{COOH} \\ | \\ \text{COOH} \end{array} \cdot 2\text{H}_2\text{O} \right) = 126$

Hence, for preparing 1000 ml of 1M oxalic acid, weight of oxalic acid crystals required = 126 g

∴ For preparing 250 ml of 0.1M solution,

$$\text{oxalic acid crystals required} = \frac{126}{1000} \times 250 \times 0.1 = 3.150 \text{ g.}$$

Apparatus

Watch glass, analytical balance, weight box, fractional weight box, 250 ml beaker, glass rod, 250 ml measuring flask and wash bottle.

Chemical Required

Oxalic acid crystals and distilled water.

Procedure

1. Take a watch glass, wash it with distilled water and then dry it.

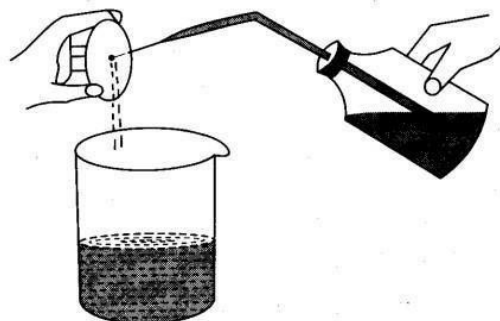


Fig. Washing of watch glass to transfer sticking particles to beaker.

2. Weigh the clean and dried watch glass accurately and record its weight in the notebook.

3. Weigh 3.150 g oxalic acid on the watch glass accurately and record this weight in the note-book.
4. Transfer gently and carefully the oxalic acid from the watch glass into a clean 250 ml beaker. Wash the watch glass with distilled water with the help of a wash bottle to transfer the particles sticking to it into the beaker [Fig].
The volume of distilled water for this purpose should not be more than 50 ml.
5. Dissolve oxalic acid crystals in the beaker by gentle stirring with a clean glass rod.
6. When the oxalic acid in the beaker is completely dissolved, transfer carefully the entire solution from the beaker into a 250 ml measuring flask (volumetric flask) with the help of a funnel [Fig].

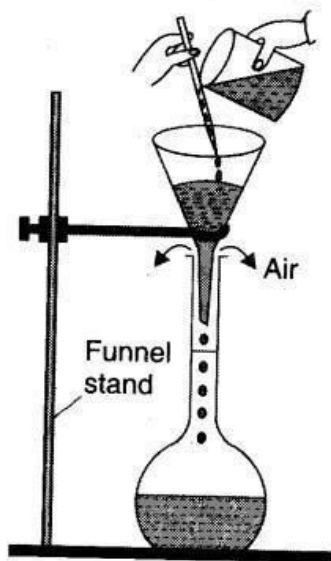


Fig. Transferring solution to measuring flask

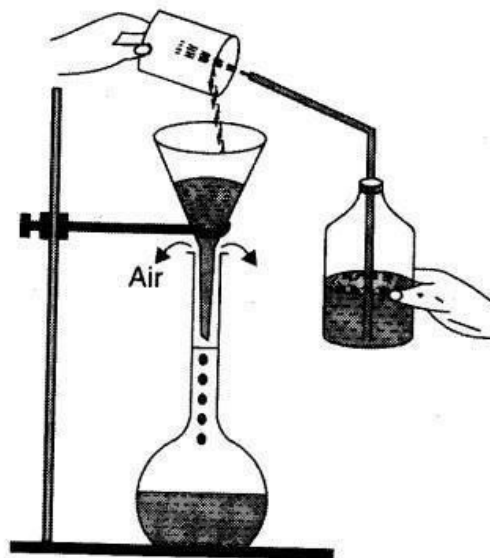


Fig. Transferring last traces of solution

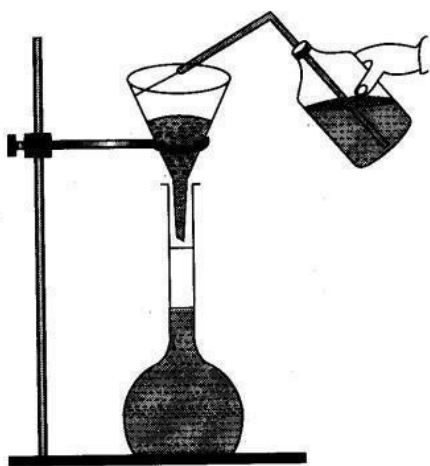


Fig. Washing last traces of solution from funnel to the measuring flask.

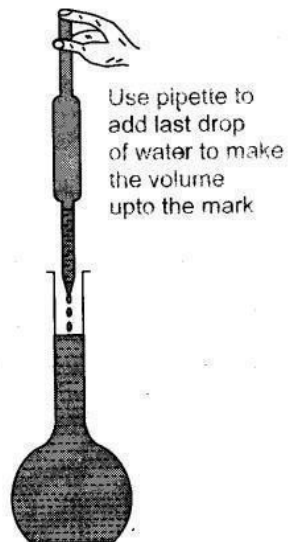


Fig. Using pipette to add last drop of water to make the volume up to the mark.

7. Wash the beaker with distilled water. Transfer the washings into the measuring flask [Fig].

8. Finally wash the funnel well with distilled water with the help of a wash bottle to transfer the solution sticking to the funnel into the measuring flask [Fig].
9. Add enough distilled water to the measuring flask carefully, up to just below the etched mark on it, with the help of a wash bottle.

10. Add the last few drops of distilled water with a pipette until the lower level of the meniscus just touches the mark on the measuring flask [Fig].
11. Stopper the measuring flask and shake gently to make the solution uniform through-out. Label it as oxalic acid solution.

Result:- 250 ml of M/10 Solution of Oxalic Acid From Crystalline Oxalic Acid is prepared.

EXPERIMENT-2

AIM: To determine the strength of potassium permanganate by titrating it against the standard solution of 0.1M oxalic acid.

Theory:

Potassium permanganate is a strong oxidising agent and in the presence of sulfuric acid it acts as a powerful oxidising agent. In acidic medium the oxidising ability of KMnO_4 is represented by the following equation.

In acidic solution,



Solution containing MnO_4^- ions are purple in colour and the solution containing Mn^{2+} ions are colourless and hence permanganate solution is decolourised when added to a solution of a reducing agent. The moment there is an excess of potassium permanganate present the solution becomes purple.

Thus, **KMnO_4 serves as self indicator** in acidic solution.

Potassium permanganate is standardized against pure oxalic acid. It involves a redox reaction. Oxalic acid is oxidised to carbon dioxide by KMnO_4 , which itself gets reduced to MnSO_4 . Oxalic acid reacts with potassium permanganate in the following way.

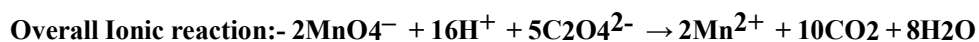
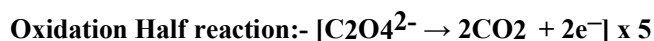
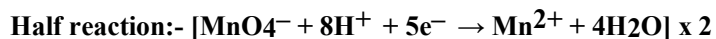
The chemical reaction at room temperature is given below.



The overall reaction takes place in the process is



The **ionic equation** involved in the process is given below. **Reduction**



This titration cannot be carried out in the presence of acids like nitric acid or hydrochloric acid because itself is an oxidising agent. So hydrochloric acid chemically reacts with KMnO_4 solution forming chlorine which is also an oxidising agent.

Materials Required:

1. Oxalic acid
2. Potassium permanganate solution
3. 1.0M sulfuric acid
4. Chemical balance
5. Burette
6. Burette stand
7. Pipette
8. Conical flask
9. Funnel
10. Measuring flask
11. Weighing bottle
12. White tile
13. Burnet
14. Wire gauze

Apparatus Setup:

1. In burette – KMnO_4 solution
2. In Conical flask – 10ml of oxalic acid + Sulfuric acid
3. Indicator – Self indicator (KMnO_4)
4. End Point – Appearance of permanent pale pink colour.

Procedure:

(a) Preparation of 0.1N standard solution of oxalic acid:

The quantity of oxalic acid required for the 250ml of the solution having a normality of 0.1N can be calculated as follows.

Equivalent weight of oxalic acid = Molecular weight/No of electrons lost by one molecule

$$\text{weight of oxalic acid} = 126/2 = 63$$

Strength = Normality x Equivalent weight

$$\text{Strength} = 1/10 \times 63 = 6.3 \text{ g/l}$$

For the preparation of 1 litre of N/10 oxalic acid solution amount of oxalic acid required = 6.3 g

1. Weigh an empty watch glass using a chemical balance.
2. Weigh 6.3g of oxalic acid accurately in the watch glass.
3. With the help of a funnel transfer the oxalic acid into the measuring flask.
4. Now wash the funnel with distilled water without removing the funnel from the flask.
5. Make the solution up to the marked point with distilled water and make sure the oxalic acid is fully dissolved.
6. This solution is 0.1N standard solution of oxalic acid.

(b) Titration of potassium permanganate solution against standard oxalic acid solution:

1. Rinse the burette with the potassium permanganate solution and fill the burette with potassium permanganate solution.
2. Fix the burette in the burette stand and place the white tile below the burette in order to find the end point correctly.
3. Pipette out 10ml of 0.1N standard oxalic acid solution in a conical flask.

4. Add a test tube full of sulfuric acid in order to prevent oxidation of manganese to form manganese dioxide.
5. Heat the mixture upto 60°C before titrating with potassium permanganate.
6. Note down the initial reading in the burette before starting the titration.
7. The hot solution is titrated against potassium permanganate solution and simultaneously swirl the solution in the flask gently.
8. Initially the purple colour of KMnO₄ is discharged with oxalic acid. The appearance of permanent pink colour reveals the end point.
9. Repeat the titration until concordant values are obtained.
10. Note down the upper meniscus on the burette readings. Record the reading in the observation table given below in order to calculate the molarity of KMnO₄ given.

Observation:

S.No	Volume of oxalic acid in ml	Burette Reading		Volume(V) of KMnO ₄ used V = (y-x)ml
		Initial(x)	Final(y)	
1	10 ml	0 ml	18.5 ml	18.5 ml
2	10 ml	0 ml	18.5 ml	
3	10 ml	0 ml	19 ml	

Calculations:

To calculate the strength of given KMnO₄ in terms of molarity the following formula is used

$$a_1 M_1 V_1 = a_2 M_2 V_2$$

Where a₁ and a₂ are stoichiometric coefficient of oxalic acid and KMnO₄ in a balanced chemical equation.

$$a_1 = 2$$

$$a_2 = 5$$

Where

M₂ and M₁ are molarities of potassium permanganate and oxalic acid solutions used in the titration. V₂

and V₁ are the volume of potassium permanganate and oxalic acid solutions used in the titration.

Therefore,

$$\text{KMnO}_4 = \text{Oxalic acid } 5M_2V_2$$

$$= 2M_1V_1$$

$$M_2 = (2M_1V_1/5M_2V_2)$$

The strength of KMnO₄ is calculated by using the molarity.

$$\text{Strength} = \text{Molarity} \times \text{Molar mass}$$

Results and Discussion:

1. Molarity of KMnO₄ is 0.02 M
2. The Strength of KMnO₄ is 0.316 g/l.

Precautions:

1. Clean all the apparatus with distilled water before starting the experiment and then rinse with the solution to be taken in them.
2. Rinse the pipette and burette before use.
3. Potassium permanganate is dark in colour, so always read the upper meniscus.
4. Use dilute sulfuric acid for acidifying the potassium permanganate.
5. Take accurate readings once it reaches the end point and don't go with average readings.
6. Use antiparallex card or autoparallex card while taking the burette readings.
7. Do not use rubber cork burette as it is can be attacked by KMnO_4 .
8. The strength of the unknown solution should be taken upto two decimal places only.

EXPERIMENT-3

Aim:

To determine the strength of a given potassium permanganate solution against a standard ferrous ammonium sulfate (Mohr's salt) solution.

Theory:

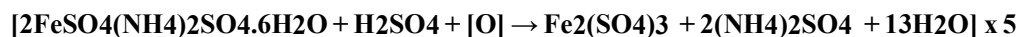
Potassium permanganate is a strong oxidant in the presence of sulfuric acid. Mohr salt is a double salt forming a single crystalline structure having the formula $(\text{NH}_4)_2 \cdot \text{FeSO}_4 \cdot 6\text{H}_2\text{O}$. The chemical name for Mohr's salt is ferrous ammonium sulfate.

In this titration Mohr salt acts as a reducing agent and potassium permanganate acts as an oxidising agent. So, the reaction between Mohr's salt and potassium permanganate is a redox reaction. In this redox reaction, ferrous ion from Mohr's salt gets oxidised and pink coloured of manganese present in potassium permanganate, which is in the +7 oxidation state gets reduced to colourless Mn^{2+} state.

The chemical reaction and the molecular chemical equation is given below. Reduction half reaction –



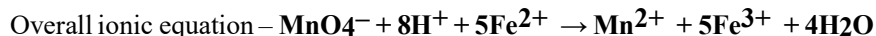
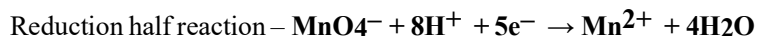
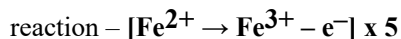
Oxidation half reaction –



Overall reaction –



The ionic equation involved in the process is given below. Oxidation half



This titration is based upon oxidation-reduction titrations. When ferrous ammonium sulfate solution is titrated against potassium permanganate in the presence of acidic medium by sulfuric acid. Acidic medium is necessary in order to prevent precipitation of manganese oxide. Here KMnO_4 acts as a self indicator and this titration is called permanganate titration.

Materials Required:

1. Mohr's salt (ferrous ammonium sulfate)
2. Potassium permanganate solution
3. Dilute sulfuric acid
4. Chemical balance
5. Burette
6. Burette stand
7. Pipette
8. Conical flask
9. Funnel
10. Measuring flask
11. Weighing bottle
12. White tile
13. Burnet
14. Wire gauze
- 15.

Apparatus Setup:

1. In burette – KMnO_4 solution
2. In Conical flask – 10ml of Ferrous Ammonium Sulfate (Mohr's salt) + Sulfuric acid
3. Indicator – Self indicator (KMnO_4)

- End Point – Colourless to permanent pale pink colour.

Procedure:

(a) Preparation of 0.05M standard solution of ferrous ammonium sulfate:

The quantity of Mohr's salt required for the 250ml of the solution having a normality of 0.05N can be calculated as follows.

The molar mass of Mohr's salt = 392 g/mol

$$\text{Strength} = \text{Normality} \times \text{Equivalent weight}$$

$$= (1/20) \times 392 = 19.6 \text{ g/L}$$

For preparing 250ml of N/20 Mohr's salt solution, Mohr salt required
 $= (19.6/1000) \times 250 = 4.9 \text{ gm}$

- Weigh an empty watch glass using a chemical balance.
- Weigh accurately 4.9gm of Mohr's salt in a chemical balance.
- With the help of a funnel transfer the Mohr's salt into the measuring flask.
- Now wash the funnel with distilled water without removing the funnel from the flask.
- Make the solution up to the marked point with distilled water and make sure the Mohr's salt is fully dissolved.
- This solution is 0.05N standard solution of Mohr's salt.

(b) Titration of potassium permanganate solution against standard ferrous ammonium sulfate (Mohr's salt) solution:

- Wash and rinse the burette and pipette with distilled water and then rinse with the corresponding solution to be filled in them.
- Rinse the burette with the potassium permanganate solution and fill the burette with potassium permanganate solution.
- Fix the burette in the burette stand and place the white tile below the burette in order to find the endpoint correctly.
- Rinse the pipette and conical flask with standard ferrous sulfate solution.
- Pipette out 10ml of 0.05N standard Mohr's salt solution into the conical flask.
- Add a test tube full of sulfuric acid in order to prevent oxidation of manganese to form manganese dioxide.
- Note down the initial reading in the burette before starting the titration.
- Now start the titration, titrate against potassium permanganate solution and simultaneously swirl the solution in the flask gently.
- Initially, the purple colour of KMnO_4 is discharged with ferrous ammonium sulfate. The appearance of a permanent pink colour reveals the endpoint.
- Repeat the titration until concordant values are obtained.
- Note down the upper meniscus on the burette readings.
- Record the reading in the observation table given below in order to calculate the molarity of KMnO_4 given.

Observations:

S.No	Volume of ferrous ammonium sulfate (Mohr's salt) used	Burette Reading		Volume (V) of KMnO_4 used $V = (y-x)\text{ml}$
		Initial(x)	Final(y)	

Calculations:

To calculate the strength of given KMnO_4 in terms of molarity the following formula is used

$$a_1M_1V_1 = a_2M_2V_2$$

Where a_1 and a_2 are stoichiometric coefficient of **ferrous ammonium sulfate** and KMnO_4 in a balanced chemical equation.

$$a_1 = 1$$

$$a_2 = 5$$

Where

M_2 and M_1 are molarities of potassium permanganate and **ferrous ammonium sulfate** solutions used in the titration.

V_2 and V_1 are the volume of potassium permanganate and **ferrous ammonium sulfate** solutions used in the titration.

Therefore,

$$\text{KMnO}_4 = \text{ferrous ammonium sulfate}$$

$$5M_2V_2 = 1M_1V_1$$

$$M_2 = (1M_1V_1/5M_2V_2)$$

The strength of KMnO_4 is calculated by using the molarity.

$$\text{Strength} = \text{Molarity} \times \text{Molar mass}$$

Results and Discussion:

1. Molarity of KMnO_4 is 0.00245 M
2. The Strength of KMnO_4 is 0.3871 g/l.

Precautions:

1. Clean all the apparatus with distilled water before starting the experiment and then rinse with the solution to be taken in them.
2. Rinse the pipette and burette before use.
3. Potassium permanganate is dark in colour, so always read the upper meniscus.
4. Use dilute sulfuric acid for acidifying the potassium permanganate.
5. Take accurate readings once it reaches the end point and don't go with average readings.
6. Use antiparallel card or autoparallel card while taking the burette readings.
7. Do not use rubber cork burette as it can be attacked by KMnO_4 .
8. The strength of the unknown solution should be taken upto two decimal places only.

EXPERIMENT-4

Aim: To analyse the given salt for acidic and basic radicals.

Experiment	Observations	Inference
<p>1. Physical examination :</p> <p>(a) Noted the colour of the given salt.</p> <p>(b) Noted the smell of the salt.</p> <p>2. Dry heating test</p> <p>Heated a pinch of the salt in a dry test tube and noted the following observations :</p> <p>(a) Gas evolved</p> <p>(b) Sublimation</p> <p>(c) Decrepitation</p> <p>(d) Fusion</p> <p>(e) Colour of the residue</p>	<p>White</p> <p>No specific odour</p> <p>A reddish brown gas evolved which turned freshly prepared FeSO₄ solution black.</p> <p>No sublimate formed.</p> <p>No crackling sound observed.</p> <p>Salt does not fuse. White</p>	<p>Cu²⁺, Fe²⁺, Fe³⁺, Ni²⁺, Mn²⁺, Co²⁺ absent.</p> <p>NH₄⁺, S²⁻ and CH₃COO⁻ may be absent.</p> <p>NO₃⁻ may be present.</p> <p>Ammonium halides, aluminium chloride, iodide may be absent.</p> <p>Lead nitrate, barium nitrate, sodium chloride, potassium chloride and potassium iodide may be absent.</p> <p>Alkali (sodium, potassium) salts may be absent.</p> <p>Zn²⁺, Pb²⁺ may be absent.</p>

Experiment	Observations	Inference
<p>5. Flame test Prepared a paste of the salt in conc. HCl and performed flame test.</p> <p>6. Borax bead test Did not perform this test since the given salt was white.</p> <p>7. Dil. sulphuric acid test Treated a pinch of the salt with dil. H₂SO₄ and warmed.</p> <p>8. KMnO₄ test To a pinch of the salt added dil. H₂SO₄ warm and then a drop of KMnO₄ solution.</p> <p>9. Conc. sulphuric acid test Heated a pinch of the salt with conc. sulphuric acid and added to it a paper pellet.</p> <p>10. Confirmatory test for nitrate (a) Copper chips test. Heated a pinch of the salt with conc. sulphuric acid and a few copper chips. (b) Ring test. To 2–3 ml of the salt solution, added freshly prepared FeSO₄ solution. Now added conc. sulphuric acid along the sides of the test tube.</p> <p>11. Heated a pinch of salt with conc. NaOH solution</p> <p>12. Preparation of Original Solution (O.S.) Shook a pinch of the salt with water.</p> <p>13. To a part of the O.S. added 1–2 mls of dilute hydrochloric acid.</p> <p>14. Through a part of the above solution, passed H₂S gas.</p> <p>15. To the remaining solution, added a pinch of solid ammonium chloride. Boiled the solution, cooled it and added excess of ammonium hydroxide solution.</p>	<p>Persistent grassy green flame on prolonged heating.</p> <p>—</p> <p>No gas evolved.</p> <p>Pink colour of KMnO₄ was not discharged.</p> <p>A reddish brown gas evolved which turned FeSO₄ solution black.</p> <p>Reddish brown gas evolved.</p> <p>A dark brown ring formed at the junction of the two liquids.</p> <p>No ammonia gas evolved.</p> <p>Solution obtained No ppt. formed.</p> <p>No ppt. formed.</p> <p>No ppt. formed.</p>	<p>Ba²⁺ present.</p> <p>Cu²⁺, Ni²⁺, Fe³⁺, Mn²⁺, Co²⁺ may be absent.</p> <p>CO²⁻, S²⁻, NO⁻, SO²⁻ may be absent.</p> <p>Cl⁻, Br⁻, I⁻, C O²⁻, Fe²⁺ may be absent.</p> <p>NO⁻ may be present.</p> <p>NO⁻ confirmed.</p> <p>NO⁻ confirmed.</p> <p>NH₄⁺ absent.</p> <p>Labelled it as Original Solution (O.S.) Group I absent. (Pb²⁺ absent)</p> <p>Group II absent (Pb²⁺, Cu²⁺, As³⁺, absent)</p> <p>Group III absent. (Fe³⁺, Al³⁺ absent)</p>

Experiment	Observations	Inference
16. Through a part of this so-lution, passed H ₂ S gas.	No ppt. formed.	Group IV absent. (Zn ²⁺ , Mn ²⁺ , Ni ²⁺ , Co ²⁺ , absent)
17. To the remaining ammonical solution added ammonium carbonate solution.	White ppt. formed.	Group V present. (Ca ²⁺ , Ba ²⁺ , Sr ²⁺ may be present)
18. Confirmatory test for Barium Filtered the above white ppt. Dissolved the ppt. in hot dilute acetic acid.	Yellow ppt.	Ba ²⁺ confirmed.
(a) Pot. chromate test. To one part of the above solution, added a few drops of pot. chromate solution. (b) Flame test. Performed flametest with the salt.	Persistent grassy green flame on prolonged heating.	Ba ²⁺ confirmed.

Result. Acid radical: NO₃⁻

Basic radical: Ba²⁺.

Experiment- 5

To analyse the given salt for acidic and basic radicals.

Experiment	Observations	Inference
<p>1. Physical examination</p> <p>(a) Noted the colour of the given salt.</p> <p>(b) Noted the smell of the salt.</p> <p>2. Dry heating test</p> <p>Heated a pinch of the salt in a dry test tube and noted the following :</p> <p>(a) Gas evolved</p> <p>(b) Sublimation</p> <p>(c) Decrepitation</p> <p>(d) Colour of the residue</p> <p>3. Flame test</p> <p>Prepared a paste of the salt in conc. HCl and performed flame test.</p> <p>4. Borax bead test</p> <p>Did not perform this test since the given salt was white.</p> <p>5. Dil. Sulphuric acid test</p> <p>Treated a pinch of the salt with dil. H₂SO₄ and warmed.</p> <p>Shook a pinch of salt with water taken in test tube.</p> <p>6. KMnO₄ test</p> <p>To a pinch of the salt added dilute H₂SO₄ warm and then a drop of KMnO₄ solution.</p> <p>7. Conc. Sulphuric acid test</p> <p>Did not perform this test because the salt reacted with dil. H₂SO₄.</p> <p>8. Confirmatory tests</p>	<p>White</p> <p>No specific odour</p> <p>A colourless, odourless gas evolved which turned lime water milky.</p> <p>No sublimate formed.</p> <p>No crackling sound observed.</p> <p>Yellow when hot and white when cold.</p> <p>Green flashes seen with naked eye.</p> <p>—</p> <p>Colourless, odourless gas evolved with brisk effervescence, turned lime water milky.</p> <p>Salt did not dissolve.</p> <p>Pink colour of KMnO₄ was not discharged.</p> <p>—</p> <p>Salt did not dissolve.</p> <p>Brisk effervescence with evolution of colourless,</p>	<p>Cu²⁺, Fe³⁺, Ni²⁺, Mn²⁺, Co²⁺ absent.</p> <p>NH₄⁺, S²⁻ and CH₃COO⁻ may be absent.</p> <p>CO²⁻ may be present. 3</p> <p>Ammonium halides, iodide may be absent.</p> <p>Lead nitrate, barium nitrate, sodium chloride, potassium chloride and potassium iodide may be absent.</p> <p>Zn²⁺ may be present.</p> <p>Zn²⁺ may be present.</p> <p>Cu²⁺, Ni²⁺, Fe²⁺, Fe³⁺, Mn²⁺, Co²⁺ may be absent.</p> <p>CO²⁻ present 3</p> <p>Insoluble CO₃²⁻ indicated.</p> <p>Cl⁻, Br⁻, I⁻, Fe²⁺, CO²⁻ are absent. 2 4</p> <p>Cl⁻, Br⁻, I⁻, NO⁻, CHCOO⁻, C₂O₄²⁻ are absent. 3 3</p>
for carbonate	odourless gas which turned lime water milky.	



- (a) Shook a pinch of the salt with water.
- (b) To the salt added dil. HCl.

11. Heated a pinch of salt with conc. NaOH solution

No ammonia gas evolved.

Insoluble carbonate indicated.

Insoluble carbonate confirmed.

NH_4^+ absent.

Experiment	Observations	Inference
<p>12. Preparation of Original solution (O.S.)</p> <p>(a) Shook a pinch of the salt with water.</p> <p>(b) Shook a pinch of the salt in dil. HCl.</p> <p>13. As the O.S. is prepared in dil. HCl.</p> <p>14. Through a part of O.S. passed H₂S gas.</p> <p>15. To the remaining solution, added a pinch of solid ammonium chloride. Boiled the solution, cooled it and added excess of ammonium hydroxide solution.</p> <p>16. Through a part of this solution, passed H₂S gas.</p> <p>17. Confirmatory tests for Zn²⁺ ion</p> <p>Dissolved the above dull white ppt. in dil HCl. Boiled off H₂S.</p> <p>Divided the solution into two parts.</p> <p>(a) To one part added NaOH solution dropwise.</p> <p>(b) To another part, added potassium ferrocyanide solution.</p>	<p>Insoluble</p> <p>Clear solution obtained.</p> <p>No ppt. formed.</p> <p>No ppt. formed</p> <p>Dull white ppt. formed.</p> <p>White ppt. soluble in excess of NaOH.</p> <p>Bluish white ppt.</p>	<p>Labelled it as O.S.</p> <p>Group I absent. (Pb²⁺ absent)</p> <p>Group II absent (Pb²⁺, Hg²⁺, Cu²⁺, As³⁺ absent).</p> <p>Group III absent. (Fe³⁺, Al³⁺ absent).</p> <p>Group IV present. (Zn²⁺ present)</p> <p>Zn²⁺ confirmed.</p> <p>Zn²⁺ confirmed.</p>

Result. Acid Radical : CO₃²⁻

Basic Radical : Zn²⁺.

EXPERIMENT-6

Aim: To analyse the given salt for acidic and basic radicals.

Experiment	Observations	Inference
<p>1. Physical examination :</p> <p>(c) Noted the colour of the given salt.</p> <p>(d) Noted the smell of the salt.</p> <p>2. Dry heating test</p> <p>Heated a pinch of the salt in a dry test tube and noted the following observations :</p> <p>(f) Gas evolved</p> <p>(g) Sublimation</p> <p>(h) Decepritation</p> <p>(i) Fusion</p> <p>(j) Colour of the residue</p>	<p>White</p> <p>No specific odour</p> <p>A reddish brown gas evolved which turned freshly prepared FeSO₄ solution black.</p> <p>No sublimate formed.</p> <p>No crackling sound observed.</p> <p>Salt does not fuse. White</p>	<p>Cu²⁺, Fe²⁺, Fe³⁺, Ni²⁺, Mn²⁺, Co²⁺ absent.</p> <p>NH₄⁺, S²⁻ and CH₃COO⁻ may be absent.</p> <p>NO₃⁻ may be present.</p> <p>Ammonium halides, aluminium chloride, iodide maybe absent.</p> <p>Lead nitrate, barium nitrate, sodium chloride, potassium chloride and potassium iodide may be absent.</p> <p>Alkali (sodium, potassium) salts may be absent.</p> <p>Zn²⁺, Pb²⁺ may be absent.</p>

Experiment	Observations	Inference
<p>11. Flame test Prepared a paste of the salt in conc. HCl and performed flame test.</p> <p>12. Borax bead test Did not perform this test since the given salt was white.</p> <p>13. Dil. sulphuric acid test Treated a pinch of the salt with dil. H₂SO₄ and warmed.</p> <p>14. KMnO₄ test To a pinch of the salt added dil. H₂SO₄ warm and then a drop of KMnO₄ solution.</p> <p>15. Conc. sulphuric acid test Heated a pinch of the salt with conc. sulphuric acid and added to it a paper pellet.</p> <p>16. Confirmatory test for nitrate (c) Copper chips test. Heated a pinch of the salt with conc. sulphuric acid and a few copper chips. (d) Ring test. To 2–3 ml of the salt solution, added freshly prepared FeSO₄ solution. Now added conc. sulphuric acid along the sides of the test tube.</p> <p>16. Heated a pinch of salt with conc. NaOH solution</p> <p>17. Preparation of Original Solution (O.S.) Shook a pinch of the salt with water.</p> <p>18. Confirmatory test for Barium Add KI in original Solution</p>	<p>Persistent grassy green flame on prolonged heating.</p> <p>—</p> <p>No gas evolved.</p> <p>Pink colour of KMnO₄ was not discharged.</p> <p>A reddish brown gas evolved which turned FeSO₄ solution black.</p> <p>Reddish brown gas evolved.</p> <p>A dark brown ring formed at the junction of the two liquids.</p> <p>No ammonia gas evolved.</p> <p>Solution obtained ppt. formed.</p> <p>Yellow ppt formed</p>	<p>Ba²⁺ present.</p> <p>Cu²⁺, Ni²⁺, Fe³⁺, Mn²⁺, Co²⁺ may be absent.</p> <p>CO²⁻, S²⁻, NO⁻, SO²⁻ may be absent.</p> <p>Cl⁻, Br⁻, I⁻, C O²⁻, Fe²⁺ may be absent.</p> <p>NO⁻ may be present.</p> <p>NO⁻ confirmed.</p> <p>NO⁻ confirmed.</p> <p>NH₄⁺ absent.</p> <p>Labelled it as Original Solution (O.S.) Group I absent. (Pb²⁺ present)</p> <p>Pb²⁺ conformed</p>

Result. Acid radical: NO₃⁻

Basic radical: Pb²⁺.

Experiment- 7

To analyse the given salt for acidic and basic radicals.

Experiment	Observations	Inference
<p>1. Physical examination</p> <p>(a) Noted the colour of the given salt.</p> <p>(b) Noted the smell of the salt.</p> <p>2. Dry heating test</p> <p>Heated a pinch of the salt in a dry test tube and noted the following :</p> <p>(a) Gas evolved</p> <p>(b) Sublimation</p> <p>(c) Decrepitation</p> <p>(d) Colour of the residue</p> <p>3. Flame test</p> <p>Prepared a paste of the salt in conc. HCl and performed flame test.</p> <p>4. Borax bead test</p> <p>Did not perform this test since the given salt was white.</p> <p>5. Dil. Sulphuric acid test</p> <p>Treated a pinch of the salt with dil. H₂SO₄ and warmed.</p> <p>6. Conc. Sulphuric acid test</p> <p>Did not perform this test because the salt reacted with dil. H₂SO₄.</p> <p>7. Confirmatory tests for carbonate</p> <p>8. Silver nitrate test Acidify a portion of</p>	<p>White</p> <p>No specific odour</p> <p>A colourless, odourless gas evolved</p> <p>No sublimate formed.</p> <p>No crackling sound observed.</p> <p>Yellow when hot and white when cold.</p> <p>White Flame observed with naked eye.</p> <p>—</p> <p>Colourless, odourless gas evolved</p> <p>—</p> <p>A white ppt. is formed which is soluble in ammonium hydroxide.</p>	<p>Cu²⁺, Fe³⁺, Ni²⁺, Mn²⁺, Co²⁺ absent.</p> <p>NH₄⁺, S²⁻ and CH₃COO⁻ may be absent.</p> <p>Cl⁻ may be present.</p> <p>Ammonium halides, iodide may be absent.</p> <p>Lead nitrate, barium nitrate, sodium chloride, potassium chloride and potassium iodide may be absent.</p> <p>Zn²⁺ may be present.</p> <p>Pb²⁺ may be present.</p> <p>Cu²⁺, Ni²⁺, Fe²⁺, Fe³⁺, Mn²⁺, Co²⁺ may be absent.</p> <p>Cl⁻</p> <p>present</p> <p>Cl⁻, Br⁻, I⁻, NO⁻, CH₃COO⁻, C₂O₄²⁻ are absent.</p>

<p>aqueous solution (or sodium carbonate extract) with dil. HNO₃. Boil for some time, cool and add silver nitrate solution.</p> <p>9. Manganese dioxide test Heat a pinch of the salt with a small quantity of manganese dioxide and</p>	<p>Evolution of greenish yellow gas having a pungent irritating smell. It turns moist starch-</p>	<p>Cl⁻ is Conformed</p> <p>Cl⁻ is Conformed</p>
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<p>conc. H₂SO₄.</p> <p>10. Heated a pinch of salt with conc. NaOH solution</p>	<p>iodide paper blue.</p> <p>No ammonia gas evolved.</p>	<p>NH₄⁺ absent</p>
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Experiment	Observations	Inference
<p>12. Preparation of Original solution (O.S.)</p> <p>(a) Shook a pinch of the salt with water.</p> <p>(b) Shook a pinch of the salt in dil. HCl.</p> <p>13. As the O.S. is prepared indil. HCl.</p>	<p>Insoluble</p> <p>Clear solution obtained.</p> <p>ppt. formed.</p>	<p>Labelled it as O.S.</p> <p>Group I present.(Pb²⁺ present)</p>
<p>17. Confirmatory tests for Pb²⁺ ion</p> <p>Add KI in original Solution</p>	<p>Yellow ppt formed</p>	<p>Pb²⁺ conformed</p>

Result. Acid Radical : Cl⁻

Basic Radical : Pb²⁺.

Experiment- 8

Aim To analyses the given salt for one anion and one cation present in it.

Sl. No.	Experiment	Observation	Inference
1.	Noted the colour of the salt.	White	Cu^{2+} , Fe^{2+} , Ni^{2+} , Co^{2+} , Mn^{2+} are absent.
2.	Noted the smell of the salt.	No specific smell.	S^{2-} , SO_3^{2-} , CH_3COO^- may be absent.
3.	Heated 0.5 g of the salt in a dry test tube and noted the colour of the gas evolved and change in the colour of the residue on heating and cooling.	(i) No gas was evolved. (ii) No particular change in colour of the residue is observed when heated and when cooled.	(i) CO_3^{2-} may be present, NO_3^- , Br^- may be absent. (ii) Zn^{2+} may be absent.
4.	Prepared a paste of the salt with conc. HCl and performed the flame test.	No distinct colour of the flame seen.	Ca^{2+} , Sr^{2+} , Ba^{2+} , Cu^{2+} may be absent.
5.	Borax bead test was not performed as the salt was white in colour.	—	—
6.	Treated 0.1 g of salt with 1 mL dil. H_2SO_4 and warmed.	No effervescence and evolution of vapours.	CO_3^{2-} , SO_3^{2-} , S^{2-} , NO_3^- , CH_3COO^- absent.
7.	Heated 0.1 g of salt with 1 mL conc. H_2SO_4 .	No gas evolved.	Cl^- , Br^- , I^- , NO_3^- , $\text{C}_2\text{O}_4^{2-}$ are absent.
8.	Acidified 1 mL of aqueous salt solution with conc. HNO_3 . Warmed the contents	No yellow precipitate	PO_4^{3-} absent.

9.	Acidified water extract of the salt with dil. HCl and then added 2mL of BaCl ₂ solution.	A white ppt. is obtained which is insoluble in conc. HNO ₃ and conc. HCl.	SO ₄ ²⁻ present.
10.	Heated 0.1 g of salt with 2mL NaOH solution.	Ammonia gas is not evolved.	NH ₄ ⁺ absent.
11.	Attempted to prepare original solution of the salt by dissolving 1g of it in 20 mL water.	Clear solution formed	Water soluble salt is present.
12.	To a small part of the above salt solution added 2 mL of dil. HCl.	No white precipitate formed.	Group-I absent.
13.	Passed H ₂ S gas through one portion of the solution of step 12.	No precipitate formed.	Group-II absent.
14.	Since salt is white, heating with conc. HNO ₃ is not required. Added about 0.2 g of solid ammonium chloride and then added excess of ammonium hydroxide to the solution of step 12.	No precipitate formed.	Group-III absent.
15.	Passed H ₂ S gas through the above solution.	No precipitate formed.	Group-IV absent.
16.	Added excess of ammonium hydroxide solution to the original solution and then added 0.5 g of ammonium carbonate.	No precipitate formed.	Group-V absent.
17.	To the original solution of salt added ammonium hydroxide solution, followed by disodium hydrogen phosphate solution. Heated and scratched the sides of the test tube.	White precipitate.	Mg ²⁺ confirmed.

Result

The given salt contains:

Result. Acid Radical : SO₄²⁻

Basic Radical : Mg²⁺.

Experiment- 9

Aim To analyse the given salt for one anion and one cation present in it.

Sl. No.	Experiment	Observation	Inference
1.	Noted the colour of the given salt.	White	Cu^{2+} , Fe^{2+} , Ni^{2+} , Co^{2+} , Mn^{2+} are absent.
2.	Noted the smell of the salt.	No specific smell.	S^{2-} , SO_3^{2-} , CH_3COO^- may be absent.
3.	Heated 0.5 g of the salt in a dry test tube and noted the colour of the gas evolved and change in the colour of the residue on heating and cooling.	(i) No gas was evolved. (ii) No particular change in colour of the residue is observed when heated and when cooled.	(iii) CO_3^{2-} may be present, NO_3^- , Br^- may be absent. (iv) Zn^{2+} may be absent.
4.	Prepared a paste of the salt with conc. HCl and performed the flame test.	Green colour of the flame seen.	Ba^{2+} may be present.
5.	Borax bead test was not performed as the salt was white in colour.	—	—
6.	Treated 0.1 g of salt with 1 mL dil. H_2SO_4 and warmed.	No effervescence and evolution of vapours.	CO_3^{2-} , SO_3^{2-} , S^{2-} , NO_3^- , CH_3COO^- absent.
7.	Heated 0.1 g of salt with 1 mL conc. H_2SO_4 .	No gas evolved.	Cl^- , Br^- , I^- , NO_3^- , $\text{C}_2\text{O}_4^{2-}$ are absent.
8.	Acidified 1 mL of aqueous salt solution with conc. HNO_3 . Warmed the contents	No yellow precipitate	PO_4^{3-} absent.

9.	Acidified water extract of the salt with dil. HCl and then added 2mL of BaCl ₂ solution.	A white ppt. is obtained which is insoluble in conc. HNO ₃ and conc. HCl.	SO ₄ ²⁻ present.
10.	Heated 0.1 g of salt with 2 mL NaOH solution.	Ammonia gas is not evolved.	NH ₄ ⁺ absent.
11.	Attempted to prepare original solution of the salt by dissolving 1g of it in 20 mL water.	Clear solution formed	Water soluble salt is present.
12.	To a small part of the above salt solution added 2 mL of dil. HCl.	No white precipitate formed.	Group-I absent.
13.	Passed H ₂ S gas through one portion of the solution of step 12.	No precipitate formed.	Group-II absent.
14.	Since salt is white, heating with conc. HNO ₃ is not required. Added about 0.2 g of solid ammonium chloride and then added excess of ammonium hydroxide to the solution of step 12.	No precipitate formed.	Group-III absent.
15.	Passed H ₂ S gas through the above solution.	No precipitate formed.	Group-IV absent.
16.	Added excess of ammonium hydroxide solution to the original solution and then added 0.5 g of ammonium carbonate.	No precipitate formed.	Group-V present.
17.	Confirmatory test for Barium		
	(a) Pot. chromate test. To one part of the above solution, added a few drops of pot. chromate solution.	Yellow ppt.	Ba ²⁺ conformed
	(b) Flame test. Performed flame test with the salt.	Persistent grassy green flame on prolonged heating.	Ba ²⁺ conformed

Result

The given salt contains:

Acid Radical : SO₄²⁻ Basic Radical

: Ba²⁺.



EXPERIMENT-10

Aim: To analyse the given salt for acidic and basic radicals.

Experiment	Observations	Inference
<p>1. Physical examination :</p> <p>(e) Noted the colour of the given salt.</p> <p>(f) Noted the smell of the salt.</p> <p>2. Dry heating test</p> <p>Heated a pinch of the salt in a dry test tube and noted the following observations :</p> <p>(k) Gas evolved</p> <p>(l) Sublimation</p> <p>(m) Decrepitation</p> <p>(n) Fusion</p> <p>(o) Colour of the residue</p>	<p>White</p> <p>No specific odour</p> <p>A reddish brown gas evolved which turned freshly prepared FeSO₄ solution black.</p> <p>No sublimate formed.</p> <p>No crackling sound observed.</p> <p>Salt does not fuse. White</p>	<p>Cu²⁺, Fe²⁺, Fe³⁺, Ni²⁺, Mn²⁺, Co²⁺ absent.</p> <p>NH₄⁺, S²⁻ and CH₃COO⁻ may be absent.</p> <p>NO₃⁻ may be present.</p> <p>Ammonium halides, aluminium chloride, iodide maybe absent.</p> <p>Lead nitrate, barium nitrate, sodium chloride, potassium chloride and potassium iodide may be absent.</p> <p>Alkali (sodium, potassium) salts may be absent.</p> <p>Zn²⁺, Pb²⁺ may be absent.</p>

Experiment	Observations	Inference
<p>17. Flame test Prepared a paste of the salt in conc. HCl and performed flame test.</p> <p>18. Borax bead test Did not perform this test since the given salt was white.</p> <p>19. Dil. sulphuric acid test Treated a pinch of the salt with dil. H₂SO₄ and warmed.</p> <p>20. KMnO₄ test To a pinch of the salt added dil. H₂SO₄ warm and then a drop of KMnO₄ solution.</p> <p>21. Conc. sulphuric acid test Heated a pinch of the salt with conc. sulphuric acid and added to it a paper pellet.</p> <p>22. Confirmatory test for nitrate (e) Copper chips test. Heated a pinch of the salt with conc. sulphuric acid and a few copper chips. (f) Ring test. To 2–3 ml of the salt solution, added freshly prepared FeSO₄ solution. Now added conc. sulphuric acid along the sides of the test tube.</p> <p>18. Heated a pinch of salt with conc. NaOH solution</p> <p>19. Preparation of Original Solution (O.S.) Shook a pinch of the salt with water.</p> <p>20. To a part of the O.S. added 1–2 mls of dilute hydrochloric acid.</p> <p>21. Through a part of the above solution, passed H₂S gas.</p> <p>22. To the remaining solution, added a pinch of solid ammonium chloride. Boiled the solution, cooled it and added excess of ammonium hydroxide solution.</p>	<p>Red flame on prolonged heating.</p> <p>—</p> <p>No gas evolved.</p> <p>Pink colour of KMnO₄ was not discharged.</p> <p>A reddish brown gas evolved which turned FeSO₄ solution black.</p> <p>Reddish brown gas evolved.</p> <p>A dark brown ring formed at the junction of the two liquids.</p> <p>No ammonia gas evolved.</p> <p>Solution obtained</p> <p>No ppt. formed.</p> <p>formed.</p> <p>No ppt. formed.</p> <p>No ppt. formed.</p>	<p>Sr²⁺ present.</p> <p>Cu²⁺, Ni²⁺, Fe³⁺, Mn²⁺, Co²⁺ may be absent.</p> <p>CO₃²⁻, S²⁻, NO₂⁻, SO₃²⁻ be absent.</p> <p>Cl⁻, Br⁻, I⁻, CO₃²⁻, Fe²⁺ may be absent.</p> <p>NO₃⁻ may be present.</p> <p>NO₃⁻ confirmed.</p> <p>NO₃⁻ confirmed.</p> <p>NH₄⁺ absent.</p> <p>Labelled it as Original Solution (O.S.) Group I absent. (Pb²⁺ absent)</p> <p>Group II absent (Pb²⁺, Cu²⁺, As³⁺, absent)</p> <p>Group III absent. (Fe³⁺, Al³⁺ absent)</p>

Experiment	Observations	Inference
16. Through a part of this solution, passed H ₂ S gas.	No ppt. formed.	Group IV absent. (Zn ²⁺ , Mn ²⁺ , Ni ²⁺ , Co ²⁺ , absent)
17. To the remaining ammonical solution added ammonium carbonate solution.	White ppt. formed.	Group V present. (Ca ²⁺ , Ba ²⁺ , Sr ²⁺ may be present)
18. Confirmatory test for		
1. Amm. sulphate test To the second part of the solution, add 1 ml of amm. sulphate solution and warm.	White ppt.	Sr ²⁺ confirmed.
2. Flame test Perform the flame test with the original salt.	Crimson red flame.	Sr ²⁺ confirmed.

Result. Acid radical: NO₃⁻

Basic radical: Sr²⁺.

EXPERIMENT- 11A

To identify the functional group present in the given organic compound.

Experiment	Observations	Inference
<p>1. Test for unsaturation Dissolved 0.2 ml of organic compound in 2 ml CCl₄. Then added bromine-water dropwise.</p> <p>2. Test for carboxylic group Added a pinch of NaHCO₃ to 0.2 ml of organic compound in a test tube.</p> <p>3. Test for phenolic group Added 0.2 ml of organic compound to 2–3 ml neutral FeCl₃ solution in a test tube.</p> <p>4. Test for alcoholic group Added a small piece of sodium to 1 ml of the given liquid in a dry test tube.</p> <p>5. Test for carbonyl group Shook 0.2 ml of organic compound with 2–3 ml of 2, 3-dinitrophenylhydrazine in a test tube.</p> <p>6. Test for aldehydic group Warmed 1 ml of organic compound with 1 ml of Tollen's reagent in a test tube over a water bath.</p> <p>7. Test for amine group To a small amount of organic liquid in test tube, added 1 ml conc. of HCl and a few drops of CHCl₃. Then, added 2 ml of alc. KOH solution and warmed test tube.</p>	<p>Brown colour of bromine not discharged.</p> <p>No effervescence.</p> <p>No green or violet colour obtained.</p> <p>No effervescence.</p> <p>Orange-yellow ppt. formed.</p> <p>Silver mirror formed on innerside of the test tube.</p> <p>No offensive smelling gas evolved.</p>	<p>No unsaturation is present.</p> <p>Carboxylic group is absent. Phenolic group is absent. Alcoholic group is absent.</p> <p>Carbonyl group is present. Maybe an aldehyde or a ketone.</p> <p>Aldehyde is present.</p> <p>Amino group absent.</p>

RESULT : - Aldehyde group (—CHO).

EXPERIMENT - 11B

To identify the functional group present in the given organic compound.

Experiment	Observations	Inference
<p>1. Test for unsaturation Dissolved 0.2 ml of organic compound in 2ml CCl₄. Then added bromine-water dropwise.</p> <p>2. Test for carboxylic group Added a pinch of NaHCO₃ to 0.2 ml of organic compound in a test tube.</p> <p>3. Test for phenolic group Added 0.2 ml of organic compound to 2–3 ml neutral FeCl₃ solution in a test tube.</p> <p>4. Test for alcoholic group Added a small piece of sodium to 1 ml of the given liquid in a dry test tube.</p> <p>5. Test for carbonyl group Shook 0.2 ml of organic compound with 2–3 ml of 2, 3-dinitrophenylhydrazine in a test tube.</p> <p>6. Test for aldehydic group Warmed 1 ml of organic compound with 1ml of Tollen's reagent in a test tube over a water bath.</p> <p>7. Test for amine group To a small amount of organic liquid in test tube, added 1 ml conc. of HCl and a few drops of CHCl₃. Then, added 2 ml of alc. KOH solution and warmed test tube.</p> <p>8. TESTS FOR KETONES</p> <p>Place 0.5 ml of the given liquid (or 0.5 g of solid) in a clean test tube and add about 0.1 g of finely powdered m-dinitrobenzene. Now add about 1 ml of dilute sodium hydroxide solution and shake.</p>	<p>Brown colour of bromine not discharged.</p> <p>No effervescence.</p> <p>No green or violet colour obtained.</p> <p>No effervescence.</p> <p>Orange-yellow ppt. formed.</p> <p>Silver mirror formed on innerside of the test tube.</p> <p>No offensive smelling gas evolved.</p> <p>Appearance of violet colour which slowly fades</p>	<p>No unsaturation is present.</p> <p>Carboxylic group is absent. Phenolic group is absent. Alcoholic group is absent.</p> <p>Carbonyl group is present. May be an aldehyde or ketone.</p> <p>Aldehyde is present.</p> <p>Amino group absent.</p> <p>confirms ketonic group.</p>

RESULT : - Ketone (-CO-)

EXPERIMENT-11 C

To identify the functional group present in the given organic compound.

Experiment	Observations	Inference
4. Test for unsaturation Dissolved 0.2 ml of organic compound in 2ml CCl ₄ . Then added bromine-water dropwise.	Brown colour of bromine not discharged.	No unsaturation is present.
5. Test for carboxylic group Added a pinch of NaHCO ₃ to 0.2 ml of organic compound in a test tube.	No effervescence.	Carboxylic group is absent.
6. Test for phenolic group Added 0.2 ml of organic compound to 2–3 ml neutral FeCl ₃ solution in a test tube.	No green or violet colour obtained.	Phenolic group is absent.
6. Test for alcoholic group Added a small piece of sodium to 1ml of the given liquid in a dry test tube.	Brisk effervescence.	Alcoholic group is present.
7. Test for carbonyl group Shook 0.2 ml of organic compound with 2–3 ml of 2, 3-dinitrophenylhydrazine in a test tube.	Orange-yellow ppt. formed.	Carbonyl group is present. Maybe an aldehyde or a ketone.
8. Test for aldehydic group Warmed 1 ml of organic compound with 1 ml of Tollen's reagent in a test tube over a water bath.	No observation	Aldehyde is absent.
9. Test for amine group To a small amount of organic liquid in test tube, added 1 ml conc. of HCl and a few drops of CHCl ₃ . Then, added 2 ml of alc. KOH solution and warmed test tube.	No offensive smelling gas evolved.	Amino group absent.

RESULT : - Alcohol (-OH)

EXPERIMENT-11 D

To identify the functional group present in the given organic compound.

Experiment	Observations	Inference
<p>1. Test for unsaturation Dissolved 0.2 ml of organic compound in 2ml CCl₄. Then added bromine-water dropwise.</p> <p>2. Test for carboxylic group Added a pinch of NaHCO₃ to 0.2 ml of organic compound in a test tube.</p> <p>3. Test for phenolic group Added 0.2 ml of organic compound to 2–3 ml neutral FeCl₃ solution in a test tube.</p> <p>4. Test for alcoholic group Added a small piece of sodium to 1 ml of the given liquid in a dry test tube.</p> <p>5. Test for carbonyl group Shook 0.2 ml of organic compound with 2–3 ml of 2, 3-dinitrophenylhydrazine in a test tube.</p> <p>6. Test for aldehydic group Warmed 1 ml of organic compound with 1ml of Tollen's reagent in a test tube over a water bath.</p> <p>7. Test for amine group To a small amount of organic liquid in test tube, added 1 ml conc. of HCl and a few drops of CHCl₃. Then, added 2 ml of alc. KOH solution and warmed test tube.</p>	<p>Brown color of bromine not discharged.</p> <p>Brisk effervescence.</p> <p>No green or violet colour obtained.</p> <p>No effervescence.</p> <p>Orange-yellow ppt. formed.</p> <p>No observation</p> <p>No offensive smelling gas evolved.</p>	<p>No unsaturation is present.</p> <p>Carboxylic group is present. Phenolic group is absent.</p> <p>Alcoholic group is absent.</p> <p>Carbonyl group is present. Maybe an aldehyde or a ketone.</p> <p>Aldehyde is absent.</p> <p>Amino group absent.</p>

RESULT : - Carboxylic acid (-COOH)

EXPERIMENT-11 E

To identify the functional group present in the given organic compound.

Experiment	Observations	Inference
<p>1. Test for unsaturation Dissolved 0.2 ml of organic compound in 2 ml CCl₄. Then added bromine-water dropwise.</p> <p>2. Test for carboxylic group Added a pinch of NaHCO₃ to 0.2 ml of organic compound in a test tube.</p> <p>3. Test for phenolic group Added 0.2 ml of organic compound to 2–3 ml neutral FeCl₃ solution in a test tube.</p> <p>4. Test for alcoholic group Added a small piece of sodium to 1 ml of the given liquid in a dry test tube.</p> <p>5. Test for carbonyl group Shook 0.2 ml of organic compound with 2–3 ml of 2, 3-dinitrophenylhydrazine in a test tube.</p> <p>6. Test for aldehydic group Warmed 1 ml of organic compound with 1ml of Tollen's reagent in a test tube over a water bath.</p> <p>7. Test for amine group To a small amount of organic liquid in test tube, added 1 ml conc. of HCl and a few drops of CHCl₃. Then, added 2 ml of alc. KOH solution and warmed test tube.</p>	<p>Brown color of bromine not discharged.</p> <p>No observation</p> <p>green or violet colour obtained.</p> <p>No effervescence.</p> <p>Orange-yellow ppt. formed. No observation</p> <p>No offensive smelling gas evolved.</p>	<p>No unsaturation is present.</p> <p>Carboxylic group absent</p> <p>Phenolic group is present</p> <p>Alcoholic group is absent.</p> <p>Carbonyl group is present. Maybe an aldehyde or a ketone.</p> <p>Aldehyde is absent.</p> <p>Amino group absent.</p>

RESULT : - Phenol(-OH)

EXPERIMENT-11 F

To identify the functional group present in the given organic compound.

Experiment	Observations	Inference
<p>1. Test for unsaturation Dissolved 0.2 ml of organic compound in 2 ml CCl₄. Then added bromine-water dropwise.</p> <p>2. Test for carboxylic group Added a pinch of NaHCO₃ to 0.2 ml of organic compound in a test tube.</p> <p>3. Test for phenolic group Added 0.2 ml of organic compound to 2–3 ml neutral FeCl₃ solution in a test tube.</p> <p>4. Test for alcoholic group Added a small piece of sodium to 1 ml of the given liquid in a dry test tube.</p> <p>5. Test for carbonyl group Shook 0.2 ml of organic compound with 2–3 ml of 2, 3-dinitrophenylhydrazine in a test tube.</p> <p>6. Test for aldehydic group Warmed 1 ml of organic compound with 1 ml of Tollen's reagent in a test tube over a water bath.</p> <p>7. Test for amine group To a small amount of organic liquid in test tube, added 1 ml conc. of HCl and a few drops of CHCl₃. Then, added 2 ml of alc. KOH solution and warmed test tube.</p>	<p>Brown color of bromine not discharged.</p> <p>No observation</p> <p>No green or violet colour obtained.</p> <p>No effervescence.</p> <p>Orange-yellow ppt. formed.</p> <p>No observation</p> <p>offensive smelling gas evolved.</p>	<p>No unsaturation is present.</p> <p>Carboxylic group absent</p> <p>Phenolic group is absent</p> <p>Alcoholic group is absent.</p> <p>Carbonyl group is absent. May be an aldehyde or a ketone.</p> <p>Aldehyde is absent.</p> <p>Amino group present.</p>

RESULT : - Amine(-NH₂)

EXPERIMENT-12

Aim:

Preparation of pure sample of Ferrous ammonium sulphate (Mohr's salt) $[\text{FeSO}_4 \cdot (\text{NH}_4)_2\text{SO}_4 \cdot 6\text{H}_2\text{O}]$

Materials Required

- Ferrous sulphate
- Ammonium sulphate
- Dil. Sulphuric acid
- Ethyl alcohol
- Distilled water
- Beakers
- China dish
- Funnel
- Glass rod
- Tripod stand
- Wire gauze
- Burner
- Wash bottle
- Measuring jar
- Electronic balance

Procedure

1. We'll first take 7g ferrous sulphate 3.5g ammonium sulphate in a clean 250ml beaker.
2. To this add about 2-3ml of dil. sulphuric acid to prevent the hydrolysis of ferrous sulphate.
3. In another beaker, boil about 20ml of water for 5 minutes.
4. Add the boiling hot water to the contents in the first beaker in small quantities at a time.
5. Stir the contents of the beaker with a glass rod until the salts have completely dissolved.
6. Filter the solution into a china dish.
7. Now heat the solution in the china dish until its crystallization point is reached. Then transfer the solution into a crystallising dish and keep it undisturbed.
8. On cooling, crystals of Mohr's salt separate.
9. Decant the mother liquor and wash the crystals with a small quantity of alcohol and then dry the crystals by placing them between filter paper pads.
10. Find the weight of the crystals.

Observations

1. Weight of the crystals obtained = 3.5 g
2. Colour of the crystals = light green
3. Shape of the crystals = octahedral

EXPERIMENT-13

Aim:- Separation of constituents present in an inorganic mixture containing two cations only (constituents having large difference in R_f values to be provided).

Materials Required:- Chromatographic chamber, measuring jar, filter paper, pencil, scale, glass rod, IPA, mixture of cations, distilled water

Procedure

- Take a Whatman filter paper strip and using a pencil draw a horizontal line 4cm from one end of the paper. Then draw another line lengthwise (vertically) from the centre of the paper. Name the point at which the two lines intersect as P.
- Using a fine capillary tube, put a drop of the mixture of red and blue inks at the point P. Let it dry in air.
- Put another drop on the same spot and dry again, so that the spot is rich in the mixture.
- Pour equal amounts of isopropyl alcohol and distilled water into a chromatographic chamber and mix it well using a glass rod. This is used as the solvent.
- Suspend the filter paper vertically in the chromatographic chamber containing the solvent in such a way that the pencil line remains about 2cm above the solvent level.
- Close the jar with its lid and keep it undisturbed.
- Notice the rising solvent along with the red and blue inks. After the solvent has risen about 15 cm you will notice two different spots of blue and red colors on the filter paper.
- Take the filter paper out of the jar and using a pencil mark the distance that the solvent has risen on the paper. This is called the solvent front.
- Dry the filter paper and put pencil marks at the centre of the red and blue ink spots.
- Measure the distance of the two spots from the original line and the distance of the solvent from the original line.
- Calculate the R_f values of the red and blue inks using the formula,

$$R_f = \frac{\text{Distance travelled by the component from the original line}}{\text{Distance travelled by the solvent from the original line}}$$

Observation

Observations can be recorded as shown.

SI No.	Components	Distance travelled by the component from the original line (cm)	Distance travelled by the solvent from the original line (cm)	R_f value
1.	Red	5.2	10.2	0.5
2.	Blue	6.2	10.2	0.6

Inference

- R_f value of red ink = 0.5
- R_f value of blue ink = 0.6