

Four steps are involved in this - Analysis

I. Primary Tests

II. Anion Identification Tests

III. Cation Identification Tests

IV. Result

I Primary Test :-

- a) Physical state :- Crystalline solid  
 b) Colour :- Colour less  
 c) Odour :- Pungent smell  
 d) Solubility :- Soluble in distilled water  
 e) flame test :-

Experiment	Observation	Inference
2mg of Salt mixture is taken on watch glass and paste of this mixture is prepared by mixing it with 1ml of conc. HCl and take the glass rod and show it to the flame.	No change in flame colour.	coloured cations are absent.

## II Anion Identification test

Experiment	Observation	Inference
<p>A) By using distilled water:- 25mg of salt mixture taken in centrifuge tube. Add 2ml of distilled water. Both the salt mixtures was soluble and divided into two parts.</p>		
<p>i) <math>\text{CH}_3\text{COO}^-</math> Test:- To first part add some drops of neutral <math>\text{FeCl}_3</math> solution.</p>	<p>Red colour solution is formed</p>	<p>may be acetate (<math>\text{CH}_3\text{COO}^-</math>)</p>
<p>Confirmation Test:- Transfer above sol<sup>n</sup> into boiling tube and add 5 drops of distilled water and allow to boil for 2min, and keep it aside.</p>	<p>Brown ppt is formed</p>	<p>Acetate is (<math>\text{CH}_3\text{COO}^-</math>) is confirmed.</p>

## Analysis of cations

Groups	Cations	Reagent
I	$\text{Ag}^+$ , $\text{Hg}^+$ , $\text{Pb}^{2+}$	Dil. HCl
II	$\text{Hg}^{2+}$ , $\text{Pb}^{2+}$ , $\text{Cd}^{2+}$	Dil. HCl, $\text{H}_2\text{S}$ gas
III	$\text{Fe}^{3+}$ , $\text{Al}^+$	$\text{NH}_4\text{OH}^+$ , $\text{NH}_4\text{Cl}$
IV	$\text{Co}^{2+}$ , $\text{Ni}^{2+}$ , $\text{Mn}^{2+}$ , $\text{Zn}^{2+}$	$\text{NH}_4\text{OH}^+$ , $\text{NH}_4\text{Cl}^+$ , $\text{H}_2\text{S}$ gas
V	$\text{Ba}^{2+}$ , $\text{Sr}^{2+}$ , $\text{Ca}^{2+}$	$\text{NH}_4\text{OH}^+$ , $\text{NH}_4\text{Cl}^+$ , $(\text{NH}_4)_2\text{CO}_3^+$
VI	$\text{Mg}^{2+}$ , $\text{NH}_4^+$	NO Specific reagent.

(iii)  $\text{NO}_3^-$  Test :-  
 (Brown ring test) :-  
 TO First Part add freshly prepared ferrous sulphate sol<sup>n</sup> and hold test tube slantly and add conc.  $\text{H}_2\text{SO}_4$  drops to the walls of test tube. Brown ring nitrate ( $\text{NO}_3^-$ ) is formed is confirmed.

## III Test of Cations

### Preparations of Salt solutions

Take approximately 12 mg of salt mixture in centrifuge tube and add 2ml of distilled water and shake it and then keep it in water bath and heat it, the salt mixture is totally soluble and then solution for cation analysis.



NH<sub>4</sub> (Ammonium Test):-

Experiment	Observation	Interference
Add few drops of <u>Nessler's</u> reagent to salt mixture.	Brick red ppt is formed	May be NH <sub>4</sub> <sup>+</sup>
Confirmation Test :- Add NaOH solution to salt solution	colourless ammonia gas is evolved at when glass rod (which is dipped in dil. HCl) is kept near this gas. thick flames evolved.	NH <sub>4</sub> <sup>+</sup> is confirmed.

Result :- Given salt mixture contains following anions and cations.

Anions :- Acetate (CH<sub>3</sub>COO<sup>-</sup>)  
Nitrate (NO<sub>3</sub><sup>-</sup>)

Cations :- Lead (Pb<sup>+2</sup>)  
Ammonia (NH<sub>4</sub><sup>+</sup>)

Expt. No. Salt Mixture IISemi Micro Analysis

Four steps are involved in this Analysis

- I. Primary Tests
- II. Anion Identification Test
- III. Cation Identification Test
- IV. Result.

## I Primary Test :-

- a) Physical state :- Amorphous solid
- b) Colour :- Colourless
- c) odour :- Pungent smell
- d) solubility :- Soluble in dil. HCl.
- e) Flame test :-

Experiment	Observation	Inference
2mg of salt mixture is taken on watch glass and paste of this mixture is prepared by mixing it with 1ml conc. HCl and take the glass rod, and show it to the flame	Brick red colour is formed	may be $Ca^{+2}$

## II Anion Identification test :-

	Experiment	Observation	Inference
IA	By using Distilled water:- 25 mg of salt mixture taken in Centrifuge tube. Add 2ml distilled water. Now Centrifuge the soluble mixture and divide it into two parts.		
i)	$\text{CH}_3\text{COO}^-$ Test :- To first part add 5 drops of <del>neutral</del> neutral $\text{FeCl}_3$ sol <sup>n</sup> .	Red colour sol <sup>n</sup> is not formed	Acetate is absent
ii)	$\text{NO}_3^-$ Test :- (Brown Ring test) :- To second part add freshly prepared ferrous sulphate sol <sup>n</sup> and add hold test tube slantly and add conc. $\text{H}_2\text{SO}_4$ dropwise to walls of test tube.	Brown Ring is not formed	Nitrate is absent

II B) By using Conc.  $\text{HNO}_3$ :-  
 25 mg of Salt mixture  
 taken in a boiling  
 tube add 1 ml of  
 Conc.  $\text{HNO}_3$  and boil  
 for a minute now  
 add 10 drops of  
 $\text{AgCl}_2$  Sol<sup>n</sup> and  
 mix it with glass  
 rod.

Pale yellow maybe  
 ppt is  
 formed. Bromide  
 $(\text{Br}^-)$

Confirmation test:-

Add excess  $\text{NH}_4\text{OH}$  to  
 the ppt which you  
 got.

PPT is  
 partially  
 soluble

$\text{Br}^-$  is  
 confirmed.

III C) By using Dil.  $\text{HCl}$ :-

$\text{CO}_3^{2-}$  Test :- Heat  
 2 ml of Dil.  $\text{HCl}$   
 solution take in  
 test tube and add  
 25 mg of salt  
 mixture to it

Efferescence  
 observed

may be  
 $\text{CO}_3^{2-}$ .



# Analysis of cations

Groups	Cations	Reagent
I	$\text{Ag}^+$ , $\text{Hg}^+$ , $\text{Pb}^{2+}$	Dil. HCl
II	$\text{Hg}^{2+}$ , $\text{Pb}^{2+}$ , $\text{Cd}^{2+}$	Dil. HCl, $\text{H}_2\text{S}$ gas
III	$\text{Fe}^{3+}$ , $\text{Al}^+$	$\text{NH}_4\text{OH}^+$ , $\text{NH}_4\text{Cl}$
IV	$\text{Co}^{2+}$ , $\text{Ni}^{2+}$ , $\text{Mn}^{2+}$ , $\text{Zn}^{2+}$	$\text{NH}_4\text{OH}^+$ , $\text{NH}_4\text{Cl}^+$ , $\text{H}_2\text{S}$ gas
V	$\text{Ba}^{2+}$ , $\text{Sr}^{2+}$ , $\text{Ca}^{2+}$	$\text{NH}_4\text{OH}^+$ , $\text{NH}_4\text{Cl}^+$ , $(\text{NH}_4)_2\text{CO}_3$
VI	$\text{Mg}^{2+}$ , $\text{NH}_4^+$	NO specific reagent

## Confirmation Test

The glass rod which is dipped in Ba white ppt  $\text{CO}_3^{2-}$   $(\text{OH})_2$  sol<sup>n</sup> is kept is formed on at the top of the glass test tube from which effervescence is coming.

## IV) Test of Cations

### Preparation of salt solution.

Take app. 12 mg of salt mixture in centrifuge tube and add 2ml of distilled water and shake it well then keep it in water bath and heat it. It is not soluble after heating also, add few drops of dilute HCl and mix it with glass rod the salt mixture is totally soluble and use this solution for cation analysis.

## Semi Micro - Analysis

Four steps are involved in this analysis -

- I. Primary Test
- II. Anion Identification Test
- III. Cation Identification Test.
- IV. Result.

### I. Primary Test :-

- a) Physical state :- Crystalline solid
- b) Colour :- Colourless
- c) Odour :- Pungent smell
- d) Solubility :- Soluble in water
- e) flame Test :-

Experiment	Observation	Inference.
2mg of salt mixture take on watch glass and paste of this mixture is prepared by mixing it with 1ml of conc. HCl and take paste to glass rod and show it to flame.	NO change in flame colour	coloured cation is absent.

## II Anion Identification Test:-

Experiment	Observation	Inference
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A) By using dil. HCl water:-  
25mg of salt mixture take in centrifuge tube. Add 2ml distilled water and boil it, in water totally soluble and it is divided into two parts.

i) $\text{CH}_3\text{COO}^-$ Test :- To the first part add 5 drops of $\text{FeCl}_3$ sol <sup>n</sup>	Red colour sol <sup>n</sup> is not formed	Acetate is absent.
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iii)  $\text{NO}_3^-$  Test :-  
(Brown ring test):-

To second part add freshly prepared $\text{FeSO}_4$ and hold test tube slantly and add conc. $\text{H}_2\text{SO}_4$ drop wise to the walls of test tube.	Brown ring is formed	Nitrate is $\text{NO}_3^-$ is confirmed.
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# Analysis of cations

Groups	Cations	Reagent
I	$\text{Ag}^+$ , $\text{Hg}^+$ , $\text{Pb}^{2+}$	Dil. HCl
II	$\text{Hg}_2^{2+}$ , $\text{Pb}^{2+}$ , $\text{Cd}^{2+}$	Dil. HCl, $\text{H}_2\text{S}$ gas.
III	$\text{Fe}^{3+}$ , $\text{Al}^+$	$\text{NH}_4\text{OH}^+$ , $\text{NH}_4\text{Cl}$
IV	$\text{Co}^{2+}$ , $\text{Ni}^{2+}$ , $\text{Mg}^{2+}$ , $\text{Zn}^{2+}$	$\text{NH}_4\text{OH}^+$ , $\text{NH}_4\text{Cl}$ , $\text{H}_2\text{S}$ gas
V	$\text{Ba}^{2+}$ , $\text{Sr}^{2+}$ , $\text{Ca}^{2+}$	$\text{NH}_4\text{OH}^+$ , $\text{NH}_4\text{Cl}^+$ , $(\text{NH}_4)_2\text{C}_2\text{O}_4$
VI	$\text{Mg}^{2+}$ , $\text{NH}^+$	NO Specific reagent

(iii) By using Conc.  $\text{HNO}_3$

25 mg of salt mixture taken in a boiling tube add 1 ml of white ppt maybe chloride (Cl<sup>-</sup>)  
 Conc.  $\text{HNO}_3$  and boil is formed  
 For a mixture now add 10 drops of  $\text{AgNO}_3$  and mix it with glass rod.

Confirmation Test:-

Add excess of  $\text{NH}_4\text{OH}$  to ppt which you got. Ppt is chloride is partially soluble.

(iv) Test of Cations:-

Preparation of salt solutions

Take app. 12mg of salt mixture in centrifuge tube and add 2ml of distilled water and shake it will then keep in water bath and heat it. It is not soluble after heating also add few drops of dil. HCl and shake it with glass rod the salt mixture is totally soluble. Use this solution for cation analysis.

Take end of salt solution which is prepared in centrifuge tube, to this add 5 drops of dil. HCl.

Precipitate centrifuge :- Pass  $H_2S$  gas through centrifuge solution

Ppt is not formed in I<sup>st</sup> group cation are absent

Precipitate :- Ppt is not formed II group cation are absent

Centrifuge :- Take this in boiling tube and heat this mixture. Fill whole of this of  $H_2O$  is removed then transfer this sol<sup>n</sup> into centrifuge tube and add NHCl solution till the red litmus change to blue colour and now heat the mixture and centrifuge it.

Precipitate :- Ppt is not formed III group cation are absent

Centrifuge :- To this add 3 drops of  $NH_4OH$  and pass  $H_2S$  gas through it

Precipitate :- Ppt is not formed IV group cation are absent

Centrifuge :- Take this in boiling tube in hot  $H_2O$  till whole  $H_2S$  gas evaporated. Now transfer this sol<sup>n</sup> into centrifuge tube and add 6 drops of NHCl in sol<sup>n</sup> at white ppt is formed.

Precipitate :- Centrifuge :- use this to test  $Mg^{+2}$  and  $NH_4^+$ .  
white ppt is formed  
I group cations.

### Analysis of V group cations

Add 1ml of dil.  $CH_3COOH$  to V group ppt and shake it. It will divide this solution into three parts.

#### First part

Experiment	Observation	Inference
To this add 3 drops of $NH_4OH$ sol <sup>n</sup> and 5 drops of $K_2CrO_4$ solution	Yellow ppt is not formed	$Ba^{+2}$ is absent.

#### Second Part.

Experiment	Observation	Inference
To this add $NH_4OH$ sol <sup>n</sup> to make the sol <sup>n</sup> basic add 1ml of $(NH_4)_2SO_4$ sol <sup>n</sup> and keep test tube in water bath to heat the mixture.	White ppt is formed	$Str^{+2}$ is confirmed.

b)  $\text{NH}_4$  (Ammonium Test):-

Experiment	Observation	Inference
Add few drops of Nessler's reagent to salt mixture	Brick red ppt is formed	May be $\text{NH}_4^+$
Confirmation Test:- Add $\text{NaOH}$ sol <sup>n</sup> to salt sol <sup>n</sup> .	colourless $\text{NH}_4^+$ gas is evolved when it is dipped in dil. $\text{HCl}$ and kept near this gas, thick fumes are evolved.	$\text{NH}_4^+$ is confirmed.

IV Result:-

Given salt mixture contains following anions and cations.

Anions:- Nitrate ( $\text{NO}_3^-$ ), chloride ( $\text{Cl}^-$ )

Cations:- Strontium ( $\text{Sr}^{+2}$ ), Ammonia ( $\text{NH}_4^+$ )

## Semi Micro Analysis

Four steps are involved in this analysis -

- I. Primary Tests
- II. Anion Identification Test
- III. Cation Identification Test
- IV. Results

### I. Primary Test :-

- a) Physical Test :- Amorphous solid
- b) Colour :- Colourless
- c) Odour :- Pungent smell
- d) Solubility :- Soluble in dil. HCl.
- e) Flame Test :-

Experiment	Observation	Inference.
2mg of salt mixture is taken on watch glass and paste of this mixture is prepared by 4ml conc. HCl. Take this paste on the glass rod and show it to the flame	NO change in flame colour	coloured cations are absent.





<p>II) By using conc. <math>\text{HNO}_3</math>: 25 mg of salt mixture taken in a boiling tube add 1 ml con. <math>\text{HNO}_3</math> and boil for a mixture now add 10 drops of <math>\text{AgNO}_3</math> sol<sup>n</sup> and mix it with glass rod.</p>	<p>white ppt is not formed</p>	<p><math>\text{Cl}^-</math>, <math>\text{Br}^-</math>, <math>\text{I}^-</math> are absent.</p>
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### Experiment

### Observation

### Inference

<p>IV) By using Dil. <math>\text{HCl}</math>:- 1. <math>\text{CO}_3^{2-}</math> Test:- Heat 2 ml of Dil. <math>\text{HCl}</math> sol<sup>n</sup> taken in test tube and add 25 mg of salt mixture to it</p>	<p>Efferescence observed</p>	<p>maybe <math>\text{CO}_3^{2-}</math></p>
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### Confirmation test:-

The glass which dipped in  $\text{Ba}(\text{OH})_2$  sol<sup>n</sup> is kept on the top of test tube from which efferescence is coming.

white ppt is formed on glass rod.

$\text{CO}_3^{2-}$  is confirmed

# Analysis of cations -

Group	Cations	Reagent
I	$\text{Ag}^+$ , $\text{Hg}^+$ , $\text{Pb}^+$	Dil. HCl
II	$\text{Hg}^{2+}$ , $\text{Pb}^{2+}$ , $\text{Cl}^{2+}$	Dil. HCl, $\text{H}_2\text{S}$ gas
III	$\text{Fe}^{3+}$ , $\text{Al}^+$	$\text{NH}_4\text{OH}^+$ , $\text{NH}_4\text{Cl}$
IV	$\text{Co}^{2+}$ , $\text{Ni}^{2+}$ , $\text{Mn}^{2+}$ , $\text{Zn}^{2+}$	$\text{NH}_4\text{OH}^+$ , $\text{NH}_4\text{Cl}^+$ , $\text{H}_2\text{S}$ gas
V	$\text{Ba}^{2+}$ , $\text{Sr}^{2+}$ , $\text{Ca}^{2+}$	$\text{NH}_4\text{OH}^+$ , $\text{NH}_4\text{Cl}^+$ , $(\text{NH}_4)_2\text{CO}_3$
VI	$\text{Mg}^{2+}$ , $\text{NH}^+$	NO specific reagent

2)  $\text{SO}_4^{2-}$  test :- To 25mg of salt mixture add dil. HCl and heat it in a test tube. Then white ppt may be formed. Then add 5 drops of  $\text{BaCl}_2$  to clear sol<sup>n</sup>.  $\text{SO}_4^{2-}$

Confirmation test :- ppt is  $\text{SO}_4^{2-}$  is confirmed. Add dil. HCl to insoluble white ppt.

IV) Test of cations -  
 Preparation of Salt Solution -

Take approximately 12mg of salt mixture in centrifuge tube and add 2ml of distilled water and shake it well, then keep in water bath and heat it. It is not soluble after heating also. Add few drops of dil. HCl and mix it with watch glass rod. Now, the salt mixture is totally soluble, use this solution for cations analysis.

Take 2ml of salt solution which is prepared in centrifuge tube to this add 5 drops of dil. HCl.

Precipitate:  
ppt is not formed  
I group cations are absent

Centrifuge:  
ppt is not formed  
II group cation are absent

Centrifuge:  
Pass  $H_2S$  gas through centrifuge solution  
Take this into boiling tube and boil this mixture till whole of  $H_2S$  is evaporated then transfer this solution into centrifuge tube and add NHCl sol<sup>n</sup>.  
Till the red colour changes to blue colour and now heat the mixture and centrifuge.

Precipitate:

$Fe(OH)_3$  — Reddish Brown ppt

$Al(OH)_3$  — white ppt

$Cr(OH)_3$  — green ppt

$Mn(OH)_2$  — Red ppt

ppt is formed

III group cations are present.

### Analysis of III group cations

To the III group precipitate add 2ml NaOH and keep it in water bath with continuous stirring for 3min and now centrifuge it.

First part:

Experiment	Observation	Inference
To the first part add distilled HCl to make it acid followed by adding of Lead Acetate solution.	Yellow colour ppt is not formed	$Cr^{3+}$ is absent.

### Second Part

Experiment	Observation	Inference
To the second part add dil. HCl to make it acid and also $NH_4OH$ solution. Till the sol <sup>n</sup> becomes basic, now keep this in centrifuge tube in water bath for few minutes.	white sticking ppt is formed	$Al^+$ is confirmed

## Analysis of V group cations:-

Add 1ml dil.  $\text{CH}_3\text{COOH}$  to V group ppt & shake, it will divide this solution into 3 parts.

First part:-

Experiment	Observation	Inference
To this add 3 drops of $\text{NH}_4\text{OH}$ sol <sup>n</sup> and 5 drops $\text{K}_2\text{CrO}_4$ sol <sup>n</sup> .	Yellow ppt is formed.	$\text{Al}^+$ is confirmed

$\text{NH}_4$  (Ammonium test):-

Experiment	Observation	Inference
Add few drops of Nessler's reagent to salt mixture.	Brick red ppt is formed	May be $\text{NH}_4^+$

Confirmation test:-

Colourless anion gas is evolved & when glass rod (dipped in dil.  $\text{HCl}$ ) is kept near gas. Thick fumes evolved.

$\text{NH}_4^+$  is confirmed.

IV Result:- Given salt mixture contains following anions & cations:

Anions — Carbonate, Sulphate

Cations — Ammonium, Aluminium.

Semi Micro-analysis

Four steps are involved in this analysis-

I. Primary Test

II. Anion identification test

III. Cation identification test

IV. Result.

I. Primary Test :-

- a) Physical state :- Crystalline solid  
 b) colour :- colourless  
 c) Odour :- Pungent smell  
 d) Solubility :- Soluble in dil. HCl.  
 e) flame test :-

Experiment	Observation	Inference.
2mg of salt mixture is taken on watch glass and paste of this mixture is prepared by mixing it with 1ml conc. HCl and take this paste on the glass rod and show it to flame	Apple green	May be $Ba^+$

## II - Anion Identification test :-

Experiment.	Observation	Inference
<p>i) A) By using distilled water :- 25 mg of salt mixture taken in centrifuge tube add 2ml distilled water and boil it in water bath. If not soluble centrifuge it and divide it into two parts.</p>		
<p>i) <math>\text{CH}_3\text{COO}^-</math> Test :- To first part add 5 drops of neutral <math>\text{FeCl}_3</math> sol<sup>n</sup></p>	Red colour sol <sup>n</sup> is formed	May be Acetate ( $\text{CH}_3\text{COO}^-$ )

### Confirmation test :-

<p>Take above sol<sup>n</sup> into boiling tube and add 5 drops of distilled water and allow to boil for a min. and keep it aside</p>	Brown ppt is formed	Acetate ( $\text{CH}_3\text{COO}^-$ ) is confirmed
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ii)  $\text{NO}_3^-$  Test :-  
(Brown Ring test) :-

To second part add freshly prepared  $\text{FeSO}_4$  sol<sup>n</sup> and add conc.  $\text{H}_2\text{SO}_4$  dropwise to the walls of test tube.

Brown ring ppt not formed

Nitrate ( $\text{NO}_3^-$ ) is absent.

iii) B) By using conc.  $\text{HNO}_3$  :-

25 mg of salt mixture taken in a boiling tube add 1 ml conc.  $\text{HClO}_3$  and boil for a minute now add 14 drops of  $\text{AgNO}_3$  solution and mix it with glass rod.

white ppt is not formed.

$\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{I}^-$  are absent.

# Analysis of cation

Group	Cations	Reagent
I	$\text{Ag}^+$ , $\text{Hg}^+$ , $\text{Pb}^+$	Dil. HCl
II	$\text{Hg}^{2+}$ , $\text{Pb}^{2+}$ , $\text{Cl}^{2+}$	Dil. HCl, $\text{H}_2\text{S}$ gas
III	$\text{Fe}^{3+}$ , $\text{Al}^+$	$\text{NH}_4\text{OH}^+$ , $\text{NHCl}$
IV	$\text{CO}^{2+}$ , $\text{Ni}^{2+}$ , $\text{Mn}^{2+}$ , $\text{Zn}^{2+}$	$\text{NH}_4\text{OH}^+$ , $\text{NH}_4\text{Cl}$ ; $\text{H}_2\text{S}$ gas
V	$\text{Ba}^{2+}$ , $\text{Sr}^{2+}$ , $\text{Ca}^{2+}$	$\text{NH}_4\text{OH}^+$ , $\text{NH}_4\text{Cl}$ , $(\text{NH}_4)_2\text{CO}_3$
VI	$\text{Mg}^{2+}$ , $\text{NH}^+$	NO specific reagent

Experiment	Observation	Inference.
III) i) By using dil. HCl:-		
ii) $\text{CO}_2$ Test :- Heat 2ml of Dil. HCl sol <sup>n</sup> and add 25 mg of salt mixture to it.	Effervescence is not observed	Maybe $\text{Ca}^{+2}$ .
Confirmation Test :-		
The glass rod which is dipped in $\text{Ba}(\text{OH})_2$ sol <sup>n</sup> is kept at the top of the test tube from which	white ppt is formed on glass rod.	$\text{CO}_2$ is Confirmed.
Effervescence is coming.		

## IV) Test of Cations:-

### Preparation of Salt Solution —

Take approximately 2 mg of salt mixture in centrifuge tube add 2ml of distilled water and shake it well then keep it in water bath and heat it. If it is not soluble after heating also add few drops of distilled dil. HCl & shake it glass rod. Use the solution for cation analysis.



5ml of salt sol<sup>n</sup> which is prepared in centrifuge tube do this add 5 drops of dil. HCl.

Precipitate:- ppt is not formed I group cations are absent

Precipitate:- ppt is not formed II group cations are absent.

Centrifuge:- Pass  $H_2S$  gas through centrifuge solution. ppt is formed. Pass  $H_2S$  for 3 min till precipitation is completed.

Centrifugate:- Take this in boiling tube and boil this mixture till whole  $H_2S$  is removed then transfer this sol<sup>n</sup> into centrifuge tube and add  $NH_4Cl$  sol<sup>n</sup> till litmus changes to blue colour heat the mixture and centrifuge it.

Precipitate:- ppt is not formed III group cations are absent

Centrifugation:- To this add 8 drops of  $NH_3$  solution and pass  $H_2S$  gas through it.

Precipitate:- ppt is not formed IV group cations are absent.

Centrifugation:- Take this in boiling tube and boil till whole the gas is evaporated. now transfer this sol<sup>n</sup> into centrifuge tube and add  $NH_4Cl$  as 1ml of  $(NH_4)_2CO_3$  keep it in water bath and heat for a min. in centrifugate.

Precipitate:- white ppt is formed V group cations.

Cation:- use this to test  $Mg^{2+}$

Centrifuge tube do this add

Expt. No. \_\_\_\_\_

### Analysis of V<sup>th</sup> group cations:-

Add 1ml dilute  $CH_3COOH$  to V group ppt and shake it well. Divide the sol<sup>n</sup> into three parts.

First part

Experiment	Observation	Inference
To this add 3 drops of $NH_4OH$ solution and 5 drop of $K_2CrO_4$ sol <sup>n</sup> .	Yellow ppt is formed	$Ba^{2+}$ is confirmed.

$NH_4$  (Ammonium test):-

Experiment	Observation	Inference
Add few drops of Nessler's reagent to salt mixture	Bricked red ppt is formed	may be $NH_4^+$

Confirmation test:- colourless ammonia gas is evolved as salt solution to when glass dipped in dil. HCl is kept near flame, fumes are evolved.  $NH_4^+$  is confirmed.

Result:- Given salt mixture contains following anions and cations.

Anions:- Acetate ( $CH_3COOH$ ), Carbonate ( $CO_3^{2-}$ )  
Cations:- Barium ( $Ba^{2+}$ ), -Ammonia ( $NH_4^+$ )

Teacher's Signature \_\_\_\_\_

Expt. No. Salt Mixture - 6Semi Micro-Analysis

Four steps are involved in this analysis-

- I. Primary Test
- II. Anion Identification test
- III. Cation Identification test
- IV. Result.

I. Primary Test:-

- a) Physical state - Crystalline solid
- b) Colour - Colourless
- c) odour - Pungent smell
- d) Solubility - Soluble in distilled water
- e) Flame Test -

Experiment	Observation	Inference
2mg of Salt mixture is taken on watch glass and paste of this mixture is prepared by mixing it with 1ml conc. HCl. Take this paste on to the glass rod and show it to the flame.	No change in colour	coloured cations are absent.

Teacher's Signature \_\_\_\_\_

## II Anion Identification Test :-

	Experiment	Observation	Inference
IA)	By using Distilled water: 25mg of Salt mixture take in Centrifuge tube and add 2ml distilled water and boil it in water bath and divide it into parts		
i)	$\text{CH}_3\text{COO}^-$ Test :- To first part add 5 drops of neutral $\text{FeCl}_3$ Sol <sup>n</sup> .	Red colour sol <sup>n</sup> is formed.	May be Acetate ( $\text{CH}_3\text{COO}^-$ ).
ii)	$\text{NO}_3^-$ Test (Brown ring test):- To Second part add freshly prepared $\text{FeSO}_4$ sol <sup>n</sup> and Hold test tube slantly add Conc. $\text{H}_2\text{SO}_4$ drop wise to the walls of test tube.	Brown ring is not formed	Nitrate ( $\text{NO}_3^-$ ) is absent.

Expt. No. \_\_\_\_\_

II	<p>B) By using conc. <math>\text{HNO}_3</math>: 25 mg of salt mixture take in a boiling tube add 1ml of <math>\text{HNO}_3</math> and boil for a minute, now add 10 drops of <math>\text{AgNO}_3</math> sol<sup>n</sup> and mix it with glass rod.</p>	<p>Pale yellow ppt is formed.</p>	<p>May be Bromide (<math>\text{Br}^-</math>).</p>
<p>Confirmation Test:-</p>			
<p>Add excess <math>\text{NH}_4\text{OH}</math> to the ppt which you got.</p>		<p>Ppt is partially soluble</p>	<p>Bromide (<math>\text{Br}^-</math>) is confirmed.</p>
III	<p>c) By using dil. <math>\text{HCl}</math>:</p>		
<p>i) <math>\text{CO}_3^{2-}</math> Test:- Heat 2ml of dil. <math>\text{HCl}</math> sol<sup>n</sup> take in test tube and add 25 mg of Salt mixture to it.</p>		<p>Effervescence is not observed</p>	<p><math>\text{CO}_3^{2-}</math> is absent.</p>
<p>ii) <math>\text{SO}_4^{2-}</math> Test:- To 25mg salt mixture add dil. <math>\text{HCl}</math> and heat it. Then add 5 drops of <math>\text{BaCl}_2</math> to clear sol<sup>n</sup>.</p>		<p>Ppt is insoluble</p>	<p><math>\text{SO}_4^{2-}</math> is confirmed.</p>
<p>Add dil. <math>\text{HCl}</math> to white ppt.</p>			

Teacher's Signature \_\_\_\_\_

# Analysis of Cations:-

Group	Cations	Reagent
I	$\text{Ag}^+, \text{Hg}^+, \text{Pb}^+$	dil. HCl
II	$\text{Hg}^{2+}, \text{Pb}^{2+}, \text{Ca}^{2+}$	dil. HCl, $\text{H}_2\text{S}$ gas
III	$\text{Fe}^{3+}, \text{Al}^+$	$\text{NH}_4\text{OH}^+$ , $\text{NHCl}$
IV	$\text{Co}^{2+}, \text{Ni}^{2+}, \text{Mn}^{2+}, \text{Zn}^{2+}$	$\text{NH}_4\text{OH}^+$ , $\text{NH}_4\text{Cl}^+$ , $\text{H}_2\text{S}$ gas
V	$\text{Ba}^{2+}, \text{Sr}^{2+}, \text{Ca}^{2+}$	$\text{NH}_4\text{OH}$ , $\text{NHCl}$ , $(\text{NH}_4)_2\text{CO}_3$
VI	$\text{Mg}^{2+}, \text{NH}^+$	NO Specific reagent

## (11) Test of Cations:-

### Preparation of Salt Solution:-

Take approximately 12mg of salt mixture in centrifuge tube and add 2ml of salt distilled water and shake it well. Then keep it in water bath and heat it. It is not soluble after heating also, add few drops of distilled dil. HCl and mix it with glass rod. Use this solution for cation analysis.



b)  $\text{NH}_4^+$  (Ammonium Test) :-

Experiment	Observation	Inference
Add few drops of Nesler's reagent to salt mixture	Brick red ppt is formed.	May be $\text{NH}_4^+$

Confirmation test	Observation	Inference
Add $\text{NaOH sol}^n$ to salt $\text{sol}^n$	colourless ammonia gas is evolved and when glass rod (which is dipped in dil. $\text{HCl}$ ) is kept near this gas, thick fumes are evolved.	$\text{NH}_4^+$ is confirmed.

IV Result :- Given salt mixture contains following anions and cations.

Anions :- Bromide ( $\text{Br}^-$ ), Sulphate ( $\text{SO}_4^{2-}$ )

Cations :-  $\text{Mg}^{+2}$ ,  $\text{NH}_4^+$