

ANALYSIS OF SIMPLE SALT - 2

Preliminary Tests :

1. Colour

White

Cu^{+2} , Fe^{+2} & Mn^{+2}
cations may be absent.

2. State

Crystalline

EXPERIMENT

OBSERVATION

INFERENCE

3. Flame test :

Clean the platinum wire by dipping in *con.HCl* and heat it on flame upto no colour appears. Now, prepare the paste of *con.HCl* + salt in watch glass, then introduce this paste by platinum wire loop into the flame.

4. Action of heat :

A small quantity of salt is taken in a dry test tube and strongly heated.

Colour flame is not observed

$Ca^{+2}, Sr^{+2}, Ba^{+2}, Cu^{+2}, Zn^{+2}$
(or) Mn^{+2}, Pb^{+2}
are absent.

Water droplets are formed on the inner walls of test tube.

May be Hydrated salt.

Identification of Anion

1. Action of *dil.HCl* :

A small quantity of salt is taken in a dry test tube and *dil.HCl* is added.

No reaction.

Carbonate (CO_3^{2-}) &
Acetate (CH_3COO^-) ion
are absent.

2. Action of *Conc.H₂SO₄* :

A small quantity of salt is taken in a dry test tube and *Conc.H₂SO₄* is added.

a) Before heating *no reaction*.

Chloride (Cl^-) & Bromide (Br^-)
ions are absent.

b) After heating *no reaction*.

Nitrate (NO_3^-) ion is
absent.

3. Action of *Cu* turnings

and *Conc.H₂SO₄* :

To the small quantity of salt is taken in a test tube 1 or 2 pieces of *Cu* turnings and *Conc.H₂SO₄* are added and then heated.

No reaction.

Nitrate (NO_3^-) ion is
absent.

4. Action of *BaCl₂* solution :

To the salt solution *BaCl₂* solution is added.

White ppt. of ($BaSO_4$) is formed.

Sulphate (SO_4^{2-}) ion is
present.

Confirmation test for Sulphate ion

Action of *BaCl₂* solution :

To the salt solution *BaCl₂* solution is added.

White ppt. of ($BaSO_4$) is formed.

Sulphate (SO_4^{2-}) ion is
confirmed.

Solubility : Above ppt. is insoluble

in *Conc.HCl*

Identification of Cation

INFERENCE

EXPERIMENT

OBSERVATION

1. Test for Ammonium (NH_4^+) ion :

To the small quantity of salt is taken in a dry test tube few drops of $NaOH$ solution is added and heated strongly.

colour less gas (NH_3) with pungent smell is not evolved.

Ammonium (NH_4^+) cation is absent.

2. Test for I Group Cations :

To the salt solution a few drops of *dil HCl* solution is added.

No ppt. is formed.

Lead (Pb^{+2}) cation absent.

3. Test for II Group Cations :

To the salt solution a few drops of *dil HCl* solution is added and H_2S gas is passed.

No ppt. is formed.

Copper (Cu^{+2}) cation is absent.

4. Test for III Group Cations :

To the salt solution NH_4Cl salt and NH_4OH solution are added.

White gelatinous ppt. is formed.

Aluminium (Al^{+3}) cation may be present.

Confirmation Tests for Aluminium

1. Action of $NaOH$ solution :

To the salt solution $NaOH$ solution is added.

White gelatinous ppt. is formed which is soluble in excess of $NaOH$ solution.

Aluminium (Al^{+3}) cation is confirmed.

2. Action of NH_4OH solution :

To the salt solution NH_4OH solution is added.

White gelatinous ppt. is formed which is soluble in excess of NH_4OH solution.

Aluminium (Al^{+3}) cation is confirmed.

Report :

The given Cation is : Aluminium (Al^{+3})

The given Anion is : Sulphate (SO_4^{-2})

The given salt is : **Aluminium Sulphate** [$Al_2(SO_4)_3$]

ANALYSIS OF SIMPLE SALT - 3

Preliminary Tests :

EXPERIMENT	OBSERVATION	INFERENCE
1. Colour :	White	$Cu^{+2}, Fe^{+2} \& Mn^{+2}$ cations may be absent.
2. State :	Crystalline	
3. Flame test :	Colour flame is not observed	$Ca^{+2}, Sr^{+2}, Ba^{+2}, Cu^{+2}, Zn^{+2}$ (or) Mn^{+2}, Pb^{+2} are absent.
4. Action of heat :	Characteristic smell of vinegar .	May be Acetate (CH_3COO^-) ion is present.
5. Action of <i>dil.HCl</i> :	Colourless vapours with smell of vinegar is evolved and which turns blue litmus to red.	May be Acetate (CH_3COO^-) ion is present.

Confirmation tests for Acetate ion

1. Action of Neutral $FeCl_3$ Solution :	Deep Red filtrate is formed. On boiling above solution with water it becomes brownish red ppt.	Acetate (CH_3COO^-) ion is confirmed.
2. Esterification test :	Fruity odour is obtained.	Acetate (CH_3COO^-) ion is confirmed.

Identification of Cation

EXPERIMENT

OBSERVATION

INFERENCE

Test for Ammonium (NH_4^+) ion :

To the small quantity of salt is taken in a dry test tube a few drops of $NaOH$ solution is added and heated strongly.

~~colour less gas~~ with pungent smell of ammonia (NH_3) is evolved and gives dense white fumes ($MgCl_2$) with glass rod when dipped in *Conc. HCl*

Ammonium (NH_4^+) cation may be present

Note : If Ammonium cation is identified then write following table. Do confirmation test of Ammonium Cation.

Group	Group Reagents (Identification Tests of cations)	Name of the Precipitate	Name of the Cation
I	Salt solution + dil. HCl	<i>White ppt. $PbCl_2$</i> is not formed..	Lead (Pb^{+2}) absent
II	Salt solution + dil. HCl + H_2S gas	<i>Black ppt. CuS</i> is not formed.	Copper (Cu^{+2}) absent
III	Salt solution + NH_4Cl salt + NH_4OH solution	<i>White gelatinous ppt. $Al(OH)_3$</i> is not formed. <i>Dirty Green ppt. $Fe(OH)_2$</i> is not formed.	Aluminium (Al^{+3}) absent Ferrous (Fe^{+2}) absent
IV	Salt solution + NH_4Cl salt + NH_4OH solution + H_2S gas	<i>White ppt. ZnS</i> is not formed. <i>Flesh colour ppt. MnS</i> is not formed. <i>Black ppt. NiS</i> is not formed.	Zinc (Zn^{+2}) absent Manganese (Mn^{+2}) absent Nickel (Ni^{+2}) absent
V	Salt solution + NH_4Cl salt + NH_4OH solution + $(NH_4)_2CO_3$ solution	<i>White ppt. $CaCO_3$</i> is not formed. <i>White ppt. $BaCO_3$</i> is not formed. <i>White ppt. $SrCO_3$</i> is not formed.	Calcium (Ca^{+2}) absent Barium (Ba^{+2}) absent Strontium (Sr^{+2}) absent
VI	No group reagents	-----	Magnesium (Mg^{+2}) absent

↑ Table on
left side.

Confirmation Test for Ammonium

Action of Nessler's reagent :

To the salt solution ~~Nessler's reagent~~ $[K_2HgI_4]$ is added. ~~Reddish Brown colour ppt.~~ is formed. (Iodide of Million's base) Ammonium (NH_4^+) cation is confirmed.

Report :

The given Cation is : Ammonium (NH_4^+)

The given Anion is ; Acetate (CH_3COO^-)

The given salt is : **Ammonium Acetate** [$NH_4(CH_3COO)$]

ANALYSIS OF SIMPLE SALT - 4

Preliminary Tests :

EXPERIMENT	OBSERVATION	INFERENCE
1. Colour :	White	$Cu^{+2}, Fe^{+2} \& Mn^{+2}$ cations may be absent.
2. State :	Crystalline	
3. Flame test :	Colour flame is not observed	$Ca^{+2}, Sr^{+2}, Ba^{+2}, Cu^{+2}, Zn^{+2}$ (or) Mn^{+2}, Pb^{+2} are absent.
4. Action of heat :	Colourless gas with ammonia smell is evolved and sublimate is formed.	May be Ammonium (NH_4^+) salt is present.
1. Action of <i>dil.HCl</i> :	No reaction.	Carbonate (CO_3^{2-}) & Acetate (CH_3COO^-) ions are absent.
2. Action of <i>Conc.H_2SO_4</i> :	Reddish Brown vapours with pungent smell are evolved. Which turns starch to yellow.	Bromide (Br^-) ion may be present.
Confirmation tests for Bromide ion		
1. Action of MnO_2 & <i>Conc.H_2SO_4</i> :	Reddish Brown vapours (Br_2) with pungent smell are evolved. Which turns starch to yellow.	Bromide (Br^-) ion is confirmed.
2. Action of $AgNO_3$ solution :	Pale yellow ppt. of ($AgBr$) is formed. Solubility : Above <i>ppt.</i> is partially soluble in NH_4OH solution.	Bromide (Br^-) ion is confirmed.

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Identification of Cation

EXPERIMENT	OBSERVATION	INFERENCE
Test for Ammonium (NH_4^+) ion : To the small quantity of salt is taken in a dry test tube a few drops of $NaOH$ solution is added and heated strongly.	<i>colour less gas</i> with pungent smell of ammonia (NH_3) is evolved and gives dense white fumes (NH_4Cl) with glass rod when dipped in <i>Conc. HCl</i>	Ammonium (NH_4^+) cation may be present

Note : If Ammonium cation is identified then write following table. Do confirmation test of Ammonium Cation.

Group	Group Reagents (Identification Tests of cations)	Name of the Precipitate	Name of the Cation
I	Salt solution + dil. HCl	<i>White ppt.</i> $PbCl_2$ is not formed.	Lead (Pb^{+2}) absent
II	Salt solution + dil. HCl + H_2S gas	<i>Black ppt.</i> CuS is not formed.	Copper (Cu^{+2}) absent
III	Salt solution + NH_4Cl salt + NH_4OH solution	<i>White gelatinous ppt.</i> $Al(OH)_3$ is not formed. <i>Dirty Green ppt.</i> $Fe(OH)_2$ is not formed.	Aluminium (Al^{+3}) absent Ferrous (Fe^{+2}) absent
IV	Salt solution + NH_4Cl salt + NH_4OH solution + H_2S gas	<i>White ppt.</i> ZnS is not formed. <i>Flesh colour ppt.</i> MnS is not formed. <i>Black ppt.</i> NiS is not formed.	Zinc (Zn^{+2}) absent Manganese (Mn^{+2}) absent Nickel (Ni^{+2}) absent
V	Salt solution + NH_4Cl salt + NH_4OH solution + $(NH_4)_2CO_3$ solution	<i>White ppt.</i> $CaCO_3$ is not formed. <i>White ppt.</i> $BaCO_3$ is not formed. <i>White ppt.</i> $SrCO_3$ is not formed.	Calcium (Ca^{+2}) absent Barium (Ba^{+2}) absent Strontium (Sr^{+2}) absent
VI	No group reagents	-----	Magnesium (Mg^{+2}) absent

Table on left side Confirmation Test for Ammonium

Action of Nessler's reagent :

To the salt solution *Nessler's reagent* [K_2HgI_4] is added. *Reddish Brown colour ppt.* is formed. (Iodide of Million's base) Ammonium (NH_4^+) cation is confirmed

Report :

The given Cation is : Ammonium (NH_4^+)

The given Anion is : Bromide (Br^-)

The given salt is : **Ammonium Bromide** [NH_4Br]

ANALYSIS OF SIMPLE SALT - 5

Preliminary Tests :

1. Colour :

White

Cu^{+2} , Fe^{+2} & Mn^{+2}

cations may be absent.

2. State :

Crystalline

EXPERIMENT

OBSERVATION

INFERENCE

3. Flame test :

Clean the platinum wire by dipping in *con. HCl* and heat it on flame upto no colour appears. Now, prepare the paste of *con. HCl* + salt in watch glass, then introduce this paste by platinum wire loop into the flame.

Colour flame is not observed

Ca^{+2} , Sr^{+2} , Ba^{+2} , Cu^{+2} , Zn^{+2}
(or) Mn^{+2} , Pb^{+2}
are absent.

4. Action of heat :

A small quantity of salt is taken in a dry test tube and strongly heated.

Colourless gas with ammonia smell is evolved.

May be Ammonium (NH_4^+) salt is present.

1. Action of *dil. HCl* :

A small quantity of salt is taken in a dry test tube and *dil. HCl* is added.

Colour and *smell less gas* (CO_2) evolved with Brisk effervescence.

The gas puts off a burning splinter.
It turns *Lime water* into *milky*.

Carbonate (CO_3^{2-}) ion may be present.

Identification of Anion

Action of $BaCl_2$ solution :

A small quantity of salt solution is taken in a dry test tube and $BaCl_2$ solution is added.

White ppt. of ($BaCO_3$) is formed.

Carbonate (CO_3^{2-}) ion is confirmed.

Solubility :

Above *ppt.* is soluble in *dil. HCl*

Identification of Cation

EXPERIMENT	OBSERVATION	INFERENCE
Test for Ammonium (NH_4^+) ion : To the small quantity of salt is taken in a dry test tube a few drops of $NaOH$ solution is added and heated strongly.	<i>colour less gas</i> with pungent smell of ammonia (NH_3) is evolved and gives dense white fumes (NH_4Cl) with glass rod when dipped in <i>Conc. HCl</i>	Ammonium (NH_4^+) cation may be present

Note : If Ammonium cation is identified then write following table. Do confirmation test of Ammonium Cation.

Group	Group Reagents (Identification Tests of cations)	Name of the Precipitate	Name of the Cation
I	Salt solution + dil. HCl	<i>White ppt. $PbCl_2$</i> is not formed.	Lead (Pb^{+2}) absent
II	Salt solution + dil. $HCl + H_2S$ gas	<i>Black ppt. CuS</i> is not formed.	Copper (Cu^{+2}) absent
III	Salt solution + NH_4Cl salt + NH_4OH solution	<i>White gelatinous ppt. $Al(OH)_3$</i> is not formed. <i>Dirty Green ppt. $Fe(OH)_2$</i> is not formed.	Aluminium (Al^{+3}) absent Ferrous (Fe^{+2}) absent
IV	Salt solution + NH_4Cl salt + NH_4OH solution + H_2S gas	<i>White ppt. ZnS</i> is not formed. <i>Flesh colour ppt. MnS</i> is not formed. <i>Black ppt. NiS</i> is not formed.	Zinc (Zn^{+2}) absent Manganese (Mn^{+2}) absent Nickel (Ni^{+2}) absent
V	Salt solution + NH_4Cl salt + NH_4OH solution + $(NH_4)_2CO_3$ solution	<i>White ppt. $CaCO_3$</i> is not formed. <i>White ppt. $BaCO_3$</i> is not formed. <i>White ppt. $SrCO_3$</i> is not formed.	Calcium (Ca^{+2}) absent Barium (Ba^{+2}) absent Strontium (Sr^{+2}) absent
VI	No group reagents	-----	Magnesium (Mg^{+2}) absent

Confirmation Test for Ammonium

Action of Nessler's reagent :

To the salt solution *Nessler's reagent* [K_2HgI_4] is added. *Reddish Brown colour ppt.* is formed. (Iodide of Million's base)

Ammonium (NH_4^+) cation is confirmed.

Report :

The given Cation is : Ammonium (NH_4^+)

The given Anion is : Carbonate (CO_3^{2-})

The given salt is : **Ammonium Carbonate** [$(NH_4)_2CO_3$]

ANALYSIS OF SIMPLE SALT - 8

Preliminary Tests :

1. Colour : White $Cu^{+2}, Fe^{+2} & Mn^{+2}$
cations may be absent.

2. State : Crystalline

EXPERIMENT

OBSERVATION

INFERENCE

3. Flame test :

Clean the platinum wire by dipping in *con. HCl* and heat it on flame upto no colour appears. Now, prepare the paste of *con. HCl + salt* in watch glass, then introduce this paste by platinum wire loop into the flame.

Grassy-green colour flame is observed.

Ba^{+2} May be present

4. Action of heat :

A small quantity of salt is taken in a dry test tube and strongly heated.

Characteristics smell of **Vinegar**.

May be Acetate (CH_3COO^-) ion is present.

1. Action of *dil. HCl* :

A small quantity of salt is taken in a dry test tube and *dil. HCl* is added.

Colourless vapours with smell of **vinegar** is evolved and which turns blue litmus to red.

May be Acetate (CH_3COO^-) ion is present.

Identification of Anion

Confirmation tests for Acetate ion

1. Action of Neutral $FeCl_3$

Solution :

To the small quantity of salt is taken in a test tube and neutral $FeCl_3$ solution is added.

Deep Red filtrate is formed. On boiling above solution with water it becomes **brownish red** ppt.

Acetate (CH_3COO^-) ion is confirmed.

2. Esterification test :

To the salt solution *Conc. H_2SO_4* and *C_2H_5OH* are added and heated. It is poured into water.

Fruity odour is obtained.

Acetate (CH_3COO^-) ion is confirmed.

Identification of Cation

EXPERIMENT	OBSERVATION	INFERENCE
1. Test for Ammonium (NH_4^+) ion : To the small quantity of salt is taken in a dry test tube a few drops of $NaOH$ solution is added and strongly heated.	<i>colour less gas (NH_3)</i> with pungent smell is not evolved. <i>SCORER</i>	Ammonium (NH_4^+) cation is absent.
2. Test for I Group Cations : To the salt solution a few drops of <i>dil HCl</i> solution is added.	No ppt. is formed. <i>SCORER</i>	Lead (Pb^{+2}) cation is absent.
3. Test for II Group Cations : To the salt solution a few drops of <i>dil HCl</i> solution is added and H_2S gas is passed.	No ppt. is formed. <i>SCORER</i>	Copper (Cu^{+2}) cation is absent.
4. Test for III Group Cations : To the salt solution NH_4Cl salt and NH_4OH solution are added.	No ppt. is formed. <i>SCORER</i>	Aluminium (Al^{+3}) & Ferrous (Fe^{+2}) cations are absent.
5. Test for IV Group Cations : To the salt solution NH_4Cl salt and NH_4OH solution are added, then H_2S gas is passed.	No ppt. is formed. <i>SCORER</i>	Zinc (Zn^{+2}), Manganese (Mn^{+2}) & Nickel (Ni^{+2}) cations are absent.
6. Test for V Group Cations : To the salt solution NH_4Cl salt is added, then NH_4OH and $(NH_4)_2CO_3$ solutions are added.	<i>White ppt.</i> is formed. <i>SCORER</i>	Barium (Ba^{+2}) or Calcium (Ca^{+2}) or Strontium (Sr^{+2}) cation may be present.

Confirmation Tests for Barium

1. Action of K_2CrO_4 solution : To the salt solution Potassium chromate solution (K_2CrO_4) is added.	<i>Yellow colour ppt.</i> ($BaCrO_4$) is formed which is soluble in <i>dil. Acetic acid</i> and soluble in <i>dil. HCl</i>	Barium (Ba^{+2}) cation is confirmed.
2. Action of Ammonium oxalate solution : To the salt solution Ammonium oxalate solution is added.	<i>White colour ppt.</i> (BaC_2O_4) is formed. Above ppt. is soluble in hot Acetic acid.	Barium (Ba^{+2}) cation is confirmed.

Report :

The given Cation is : Barium (Ba^{+2})

The given Anion is : Acetate (CH_3COO^-)

The given salt is : **Barium Acetate** [$Ba(CH_3COO)_2$]

ANALYSIS OF SIMPLE SALT - 10

Preliminary Tests :

1. Colour : White $Cu^{+2}, Fe^{+3} \& Mn^{+2}$
cations may be absent.

2. State : Crystalline

EXPERIMENT

OBSERVATION

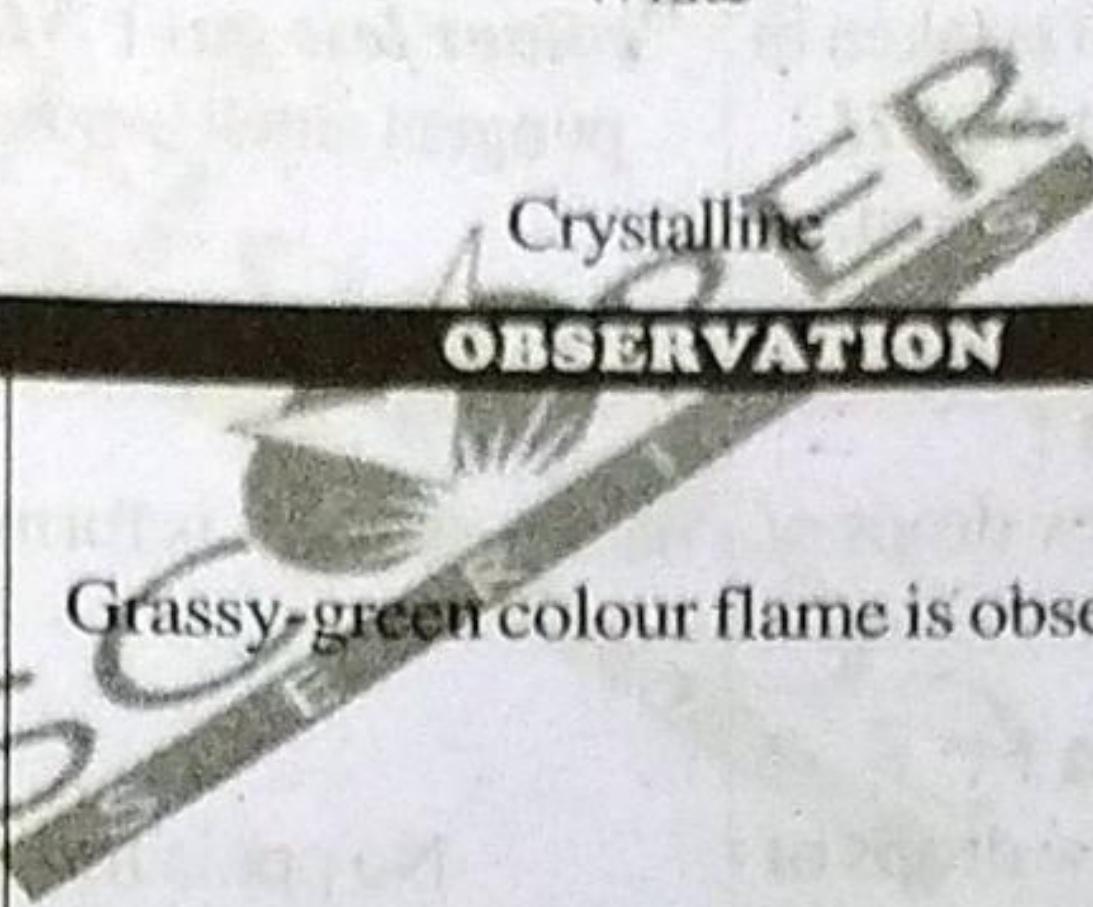
INFERENCE

3. Flame test :

Clean the platinum wire by dipping in *con.HCl* and heat it on flame upto no colour appears. Now, prepare the paste of *con.HCl* + salt in watch glass, then introduce this paste by platinum wire loop into the flame.

4. Action of heat :

A small quantity of salt is taken in a dry test tube and strongly heated.



Grassy-green colour flame is observed.

Ba^{+2} May be present

1. Action of *dil.HCl* :

A small quantity of salt is taken in a dry test tube and *dil.HCl* is added.

Identification of Anion

No reaction.

May be Hydrated salt.

Carbonate (CO_3^{2-}) & Acetate (CH_3COO^-) ions are absent.

2. Action of *Conc.H₂SO₄* :

A small quantity of salt is taken in a dry test tube and *Conc.H₂SO₄* is added.

Colour less gas (HCl) with pungent smell is evolved and gives dense white fumes (NH_4Cl) with glass rod when dipped in NH_4OH .

Chloride (Cl^-) ion may be present.

Confirmation tests for Chloride ion

1. Action of MnO_2 & $Conc.H_2SO_4$:

To the small quantity of salt is taken in a test tube pinch of MnO_2 and *Conc.H₂SO₄* are added.

Greenish yellow colour vapours (Cl_2) with pungent smell are evolved.

Chloride (Cl^-) ion is confirmed.

2. Action of $AgNO_3$ solution :

To the salt solution $AgNO_3$ solution is added.

White curdy ppt. of ($AgCl$) is formed.

Solubility : Above ppt. is completely soluble in NH_4OH

Chloride (Cl^-) ion is confirmed.

Identification of Cation

EXPERIMENT	OBSERVATION	INFERENCE
1. Test for Ammonium (NH_4^+) ion :	colour less gas (NH_3) with pungent smell is not evolved.	Ammonium (NH_4^+) cation is absent.
2. Test for I Group Cations :	No ppt. is formed.	Lead (Pb^{+2}) cation is absent.
3. Test for II Group Cations :	No ppt. is formed.	Copper (Cu^{+2}) cation is absent.
4. Test for III Group Cations :	No ppt. is formed.	Aluminium (Al^{+3}) & Ferrous (Fe^{+2}) cations are absent.
5. Test for IV Group Cations :	No ppt. is formed.	Zinc (Zn^{+2}), Manganese (Mn^{+2}) & Nickel (Ni^{+2}) cations are absent.
6. Test for V Group Cations :	White ppt. is formed.	Barium (Ba^{+2}) or Calcium (Ca^{+2}) or Strontium (Sr^{+2}) cation may be present.

Confirmation Tests for Barium

1. Action of K_2CrO_4 solution :	<i>Yellow colour ppt.</i> ($BaCrO_4$) is formed which is soluble in <i>dil. Acetic acid</i> and soluble in <i>dil. HCl</i>	Barium (Ba^{+2}) cation is confirmed.
2. Action of Ammonium oxalate solution :	<i>White colour ppt.</i> (BaC_2O_4) is formed. Above ppt. is soluble in hot acetic acid.	Barium (Ba^{+2}) cation is confirmed.

Report :

The given Cation is : Barium (Ba^{+2})

The given Anion is : Chloride (Cl^-)

The given salt is : **Barium Chloride** [$BaCl_2$]

ANALYSIS OF SIMPLE SALT - 12

Preliminary Tests :

1. Colour :	White	$Cu^{+2}, Fe^{+2} \& Mn^{+2}$ cations may be absent.
2. State :	Crystalline	

EXPERIMENT

OBSERVATION

INFERENCE

3. Flame test :

Clean the platinum wire by dipping in *con. HCl* and heat it on flame upto no colour appears. Now, prepare the paste of *con. HCl* + salt in watch glass, then introduce this paste by platinum wire loop into the flame.

Brick red colour flame is observed.

Ca^{+2} may be present

4. Action of heat :

A small quantity of salt is taken in a dry test tube and strongly heated.

Water droplets are formed on the inner walls of test tube.

May be Hydrated salt.

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1. Action of *dil. HCl* :

A small quantity of salt is taken in a dry test tube and *dil. HCl* is added.

No reaction.

Carbonate (CO_3^{2-}) & Acetate (CH_3COO^-) ions are absent.

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2. Action of *Conc. H_2SO_4* :

A small quantity of salt is taken in a dry test tube and *Conc. H_2SO_4* is added.

Colour less gas (HCl) with pungent smell is evolved and gives dense white fumes (NH_4Cl) with glass rod when dipped in NH_4OH .

Chloride (Cl^-) ion may be present.

Identification of Anion

1. Action of MnO_2 &

Conc. H_2SO_4 :

To the small quantity of salt is taken in a test tube pinch of MnO_2 and *Conc. H_2SO_4* are added.

Greenish yellow colour vapours (Cl_2) with pungent smell are evolved.

Chloride (Cl^-) ion is confirmed.

2. Action of $AgNO_3$ solution :

To the salt solution $AgNO_3$ solution is added.

White curdy ppt. of ($AgCl$) is formed.

Solubility : Above ppt. is completely soluble in NH_4OH

Chloride (Cl^-) ion is confirmed.

Identification of Cation

EXPERIMENT	OBSERVATION	INFERENCE
1. Test for Ammonium (NH_4^+) ion : To the small quantity of salt is taken in a dry test tube a few drops of $NaOH$ solution is added and strongly heated.	colour less gas (NH_3) with pungent smell is not evolved.	Ammonium (NH_4^+) cation is absent.
2. Test for I Group Cations : To the salt solution a few drops of <i>dil HCl</i> solution is added.	No ppt. is formed.	Lead (Pb^{+2}) cation is absent.
3. Test for II Group Cations : To the salt solution a few drops of <i>dil HCl</i> solution is added and H_2S gas is passed.	No ppt. is formed.	Copper (Cu^{+2}) cation is absent.
4. Test for III Group Cations : To the salt solution NH_4Cl salt and NH_4OH solution are added.	No ppt. is formed.	Aluminium (Al^{+3}) & Ferrous (Fe^{+2}) cations are absent.
5. Test for IV Group Cations : To the salt solution NH_4Cl salt and NH_4OH solution are added, then H_2S gas is passed.	No ppt. is formed.	Zinc (Zn^{+2}), Manganese (Mn^{+2}) & Nickel (Ni^{+2}) cations are absent.
6. Test for V Group Cations : To the salt solution NH_4Cl salt is added, then NH_4OH and $(NH_4)_2CO_3$ solutions are added.	White ppt. is formed.	Barium (Ba^{+2}) or Calcium (Ca^{+2}) or Strontium (Sr^{+2}) cation may be present.

Confirmation Tests for Calcium

1. Action of K_2CrO_4 solution : To the salt solution Potassium chromate solution (K_2CrO_4) is added.	Yellow colour ppt. ($CaCrO_4$) is not formed. (Yellow colour solution is formed.)	Calcium (Ca^{+2}) cation is confirmed.
2. Action of Ammonium oxalate solution : To the salt solution Ammonium oxalate solution is added.	White colour ppt. (CaC_2O_4) is formed. Above ppt. is insoluble in hot Acetic acid.	Calcium (Ca^{+2}) cation is confirmed.

Report :

The given Cation is : Calcium (Ca^{+2})

The given Anion is : Chloride (Cl^-)

The given salt is : **Calcium Chloride** [$CaCl_2$]

ANALYSIS OF SIMPLE SALT - 16

Preliminary Tests :

1. Colour :

Pale Green

May be Fe^{+2} cation is present.

2. State :

Crystalline

EXPERIMENT

OBSERVATION

INFERENCE

3. Flame test :

Clean the platinum wire by dipping in *con. HCl* and heat it on flame upto no colour appears. Now, prepare the paste of *con. HCl + salt* in watch glass, then introduce this paste by platinum wire loop into the flame.

4. Action of heat :

A small quantity of salt is taken in a dry test tube and strongly heated.

Colour flame is not observed

$Ca^{+2}, Sr^{+2}, Ba^{+2}, Cu^{+2}, Zn^{+2}$
(or) Mn^{+2}, Pb^{+2}
are absent.

1. Action of *dil. HCl* :

A small quantity of salt is taken in a dry test tube and *dil. HCl* is added.

Water droplets are formed on the inner walls of test tube.

May be Hydrated salt.

2. Action of *Conc. H_2SO_4* :

A small quantity of salt is taken in a dry test tube and *Conc. H_2SO_4* is added.

Identification of Anion

No reaction.

Carbonate (CO_3^{2-}) & Acetate (CH_3COO^-) ions are absent.

3. Action of *Cu turnings*

and *Conc. H_2SO_4* :

To the small quantity of salt is taken in a test tube 1 or 2 pieces of *Cu turnings* and *Conc. H_2SO_4* are added and then heated.

a) Before heating ***no reaction***.

Chloride (Cl^-) & Bromide (Br^-) ions are absent.

b) After heating ***no reaction***.

Nitrate (NO_3^-) ion is absent.

4. Action of *BaCl₂* solution :

To the salt solution *BaCl₂* solution is added.

White ppt. of ($BaSO_4$) is formed.

Nitrate (NO_3^-) ion is absent.

Sulphate (SO_4^{2-}) ion is present.

Confirmation test for Sulphate ion

Action of *BaCl₂* solution :

To the salt solution *BaCl₂* solution is added.

White ppt. of ($BaSO_4$) is formed.

Solubility : Above ppt. is insoluble in *Conc. HCl*

Sulphate (SO_4^{2-}) ion is confirmed.

Identification of Cation

EXPERIMENT

OBSERVATION

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1. Test for Ammonium (NH_4^+) ion :

To the small quantity of salt is taken in a dry test tube a few drops of $NaOH$ solution is added and strongly heated.

colour less gas (NH_3) with pungent smell is not evolved.

Ammonium (NH_4^+) cation is absent.

2. Test for I Group Cations :

To the salt solution a few drops of *dil HCl* solution is added.

No ppt. is formed.

Lead (Pb^{+2}) cation is absent.

3. Test for II Group Cations :

To the salt solution a few drops of *dil HCl* solution is added and H_2S gas is passed.

No ppt. is formed.

Copper (Cu^{+2}) cation is absent.

4. Test for III Group Cations :

To the salt solution NH_4Cl salt and NH_4OH solution are added.

Dirty Green ppt. is formed.

Ferrous (Fe^{+2}) cation may be present.

Confirmation Tests for Ferrous

1. Action of NH_4OH solution :

To the salt solution NH_4OH solution is added.

Dirty Green ppt. [$Fe(OH)_2$] is formed.

Ferrous (Fe^{+2}) cation is confirmed.

2. Action of $K_4[Fe(CN)_6]$ solution :

To the salt solution Potassium ferrocyanide ($K_4[Fe(CN)_6]$) solution is added.

Deep Blue ppt. is formed.

Ferrous (Fe^{+2}) cation is confirmed.

Report :

The given Cation is : Ferrous (Fe^{+2})

The given Anion is : Sulphate (SO_4^{2-})

The given salt is : **Ferrous Sulphate** [$Fe SO_4$]

ANALYSIS OF SIMPLE SALT - 18

Preliminary Tests :

1. Colour :

White

Cu^{+2}, Fe^{+2} & Mn^{+2}

cations may be absent.

2. State :

Crystalline

EXPERIMENT

OBSERVATION

INFERENCE

3. Flame test :

Clean the platinum wire by dipping in *con. HCl* and heat it on flame upto no colour appears. Now, prepare the paste of *con. HCl* + salt in watch glass, then introduce this paste by platinum wire loop into the flame.

Colour flame is not observed

$Ca^{+2}, Sr^{+2}, Ba^{+2}, Cu^{+2}, Zn^{+2}$
(or) Mn^{+2}, Pb^{+2}
are absent.

4. Action of heat :

A small quantity of salt is taken in a dry test tube and strongly heated.

Water droplets are formed on the inner walls of test tube.

May be Hydrated salt.

Identification of Anion

1. Action of *dil. HCl* :

A small quantity of salt is taken in a dry test tube and *dil. HCl* is added.

No reaction.

Carbonate (CO_3^{2-}) &
Acetate (CH_3COO^-)
ions are absent.

2. Action of *Conc. H₂SO₄* :

A small quantity of salt is taken in a dry test tube and *Conc. H₂SO₄* is added.

Colour less gas (HCl) with pungent smell is evolved and gives dense white fumes (NH_4Cl) with glass rod when dipped in NH_4OH .

Chloride (Cl^-) ion
may be present.

Confirmation tests for Chloride ion

1. Action of *MnO₂* &

Conc. H₂SO₄:

To the small quantity of salt is taken in a test tube pinch of *MnO₂* and *Conc. H₂SO₄* are added.

Greenish yellow colour vapours (Cl_2) with pungent smell are evolved.

Chloride (Cl^-) ion
is confirmed.

2. Action of *AgNO₃* solution :

To the salt solution *AgNO₃* solution is added.

White curdy ppt. of ($AgCl$) is formed.

Solubility : Above ppt. is completely soluble in NH_4OH

Chloride (Cl^-) ion
is confirmed.

Identification of Cation

INFERENCE

EXPERIMENT

OBSERVATION

1. Test for Ammonium (NH_4^+) ion :

To the small quantity of salt is taken in a dry test tube a few drops of $NaOH$ solution is added and strongly heated.

colour less gas (NH_3) with pungent smell is not evolved.

Ammonium (NH_4^+) cation is absent.

2. Test for I Group Cations :

To the salt solution a few drops of *dil HCl* solution is added.

No ppt. is formed.

Lead (Pb^{+2}) cation is absent.

3. Test for II Group Cations :

To the salt solution a few drops of *dil HCl* solution is added and H_2S gas is passed.

No ppt. is formed.

Copper (Cu^{+2}) cation is absent.

4. Test for III Group Cations :

To the salt solution NH_4Cl salt and NH_4OH solution are added.

No ppt. is formed.

Aluminium (Al^{+3}) & Ferrous (Fe^{+2}) cations are absent.

5. Test for IV Group Cations :

To the salt solution NH_4Cl salt and NH_4OH solution are added, then H_2S gas is passed.

No ppt. is formed.

Zinc (Zn^{+2}), Manganese (Mn^{+2}) & Nickel (Ni^{+2}) cations are absent.

6. Test for V Group Cations :

To the salt solution NH_4Cl salt is added, then NH_4OH and $(NH_4)_2CO_3$ solutions are added.

No ppt. is formed.

Barium (Ba^{+2}), Calcium (Ca^{+2}) & Strontium (Sr^{+2}) cations are absent.

7. Test for Megnesium (Mg^{+2}) ion:

Action of NH_4OH and Na_2HPO_4 solutions :

To the salt solution NH_4Cl salt is added, then NH_4OH and Na_2HPO_4 solutions are added.

*White ppt. $Mg(NH_4)_2PO_4$ is formed. Which is soluble in *dil.HCl* and acetic acid.*

Magnesium (Mg^{+2}) cation may be present.

Confirmation Tests for Magnesium

1. Action of $NaOH$ solution :

To the salt solution $NaOH$ solution is added.

White ppt. is formed. Which is insoluble in excess of $NaOH$.

Magnesium (Mg^{+2}) cation is confirmed.

2. To the salt solution Na_2CO_3 solution is added.

White ppt. is formed.

Magnesium (Mg^{+2}) cation is confirmed.

Report :

The given Cation is : Magnesium (Mg^{+2})

The given Anion is : Chloride (Cl^-)

The given salt is : **Magnesium Chloride** [$MgCl_2$]

ANALYSIS OF SIMPLE SALT - 19

Preliminary Tests :

1. Colour :

White

Cu^{+2} , Fe^{+2} & Mn^{+2} cations may be absent.

2. State :

Crystalline

EXPERIMENT

OBSERVATION

INFERENCE

3. Flame test :

Clean the platinum wire by dipping in *con. HCl* and heat it on flame upto no colour appears. Now, prepare the paste of *con. HCl + salt* in watch glass, then introduce this paste by platinum wire loop into the flame.

Colour flame is not observed

Ca^{+2} , Sr^{+2} , Ba^{+2} , Cu^{+2} , Zn^{+2} (or) Mn^{+2} , Pb^{+2} are absent.

4. Action of heat :

A small quantity of salt is taken in a dry test tube and strongly heated.

Water droplets are formed on the inner walls of test tube.

May be Hydrated salt

1. Action of *dil. HCl* :

A small quantity of salt is taken in a dry test tube and *dil. HCl* is added.

No reaction.

Carbonate (CO_3^{+2}) & Acetate (CH_3COO^-) ions are absent.

2. Action of *Conc. H_2SO_4* :

A small quantity of salt is taken in a dry test tube and *Conc. H_2SO_4* is added.

- a) Before heating *no reaction*.
- b) After heating *no reaction*.

Chloride (Cl^-) & Bromide (Br^-) ions are absent.
Nitrate (NO_3^-) ion is absent.

3. Action of *Cu turnings*

and *Conc. H_2SO_4* :

To the small quantity of salt is taken in a test tube 1 or 2 pieces of *Cu turnings* and *Conc. H_2SO_4* are added and then heated.

No reaction.

Nitrate (NO_3^-) ion is absent.

4. Action of *$BaCl_2$ solution* :

To the salt solution *$BaCl_2$* solution is added.

White ppt. of ($BaSO_4$) is formed.

Sulphate (SO_4^{+2}) ion is present.

Confirmation test for Sulphate ion

Action of *$BaCl_2$ solution* :

To the salt solution *$BaCl_2$* solution is added.

White ppt. of ($BaSO_4$) is formed.

Solubility : Above *ppt.* is insoluble in *Conc. HCl*

Sulphate (SO_4^{+2}) ion is confirmed.

Identification of Cation

EXPERIMENT

OBSERVATION

INFERENCE

1. Test for Ammonium (NH_4^+) ion :

To the small quantity of salt is taken in a dry test tube a few drops of $NaOH$ solution is added and strongly heated.

colour less gas (NH_3) with pungent smell is not evolved.

Ammonium (NH_4^+) cation is absent.

2. Test for I Group Cations :

To the salt solution a few drops of *dil HCl* solution is added.

No ppt. is formed.

Lead (Pb^{+2}) cation is absent.

3. Test for II Group Cations :

To the salt solution a few drops of *dil HCl* solution is added and H_2S gas is passed.

No ppt. is formed.

Copper (Cu^{+2}) cation is absent.

4. Test for III Group Cations :

To the salt solution NH_4Cl salt and NH_4OH solution are added.

No ppt. is formed.

Aluminium (Al^{+3}) & Ferrous (Fe^{+2}) cations are absent.

5. Test for IV Group Cations :

To the salt solution NH_4Cl salt and NH_4OH solution are added, then H_2S gas is passed.

No ppt. is formed.

Zinc (Zn^{+2}), Manganese (Mn^{+2}) & Nickel (Ni^{+2}) cations are absent.

6. Test for V Group Cations :

To the salt solution NH_4Cl salt is added, then NH_4OH and $(NH_4)_2CO_3$ solutions are added.

No ppt. is formed.

Barium (Ba^{+2}), Calcium (Ca^{+2}) & Strontium (Sr^{+2}) cations are absent.

7. Test for Megnesium (Mg^{+2}) ion:

Action of NH_4OH and Na_2HPO_4 solutions :

To the salt solution NH_4Cl salt is added, then NH_4OH and Na_2HPO_4 solutions are added.

*White ppt. $Mg(NH_4)_2PO_4$ is formed. Which is soluble in *dil HCl* and acetic acid.*

Magnesium (Mg^{+2}) cation may be present.

Confirmation Tests for Magnesium

1. Action of $NaOH$ solution :

To the salt solution $NaOH$ solution is added.

White ppt. is formed. Which is insoluble in excess of $NaOH$.

Magnesium (Mg^{+2}) cation is confirmed.

2. To the salt solution Na_2CO_3 solution is added.

White ppt. is formed.

Magnesium (Mg^{+2}) cation is confirmed.

Report :

The given Cation is : Magnesium (Mg^{+2})

The given Anion is : Sulphate (SO_4^{2-})

The given salt is : **Magnesium Sulphate** [$MgSO_4$]