

EXPERIMENT-1

Aim: To identify Ca^{2+} cation in the given salt solution using NaOH & NH_4OH

Apparatus: Clean test tube, glass rod, dropper, test tube holder

OBSERVATION TABLE

TEST	OBSERVATION	INFERENCE
To the salt solution add NaOH solution	A white precipitate is obtained	Ca^{2+} or Pb^{2+} ion may be present
Add excess NaOH solution	White precipitate is insoluble	Ca^{2+} ion is formed
To the salt solution add NH_4OH solution	No precipitate is obtained	May be Ca^{2+} ion
Add NH_4OH solution in excess	No precipitate is obtained	Ca^{2+} ion is formed

EXPERIMENT-1

Aim:- To identify Ca^{2+} cation in the given salt solution using NaOH , NH_4OH solution

Apparatus:- Clean test tubes, glass rod, dropper, test tube holder

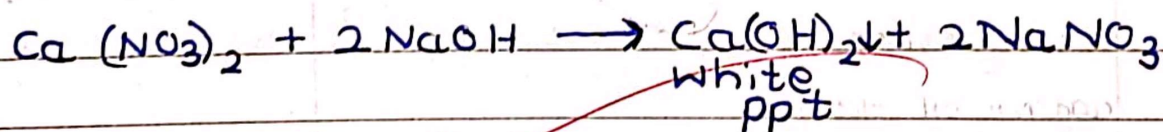
Chemicals:- NaOH solution, NH_4OH solution

Procedure:-

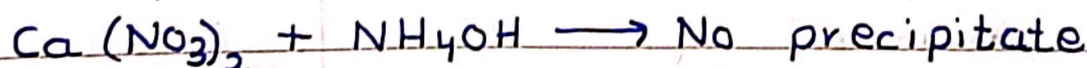
Take about 1-2 gram of salt solution for its cation identification. Add about 10 mL of distilled water to the salt and shake well to obtain the aqueous solution.

Reactions:-

• With NaOH



• With NH_4OH



EXPERIMENT-2

Aim: To identify Zn^{2+} ion in the given salt solution using $NaOH$ and NH_4OH solution.

Apparatus: Clean test tube, glass rod, dropper, test tube holder

OBSERVATION TABLE

TEST	OBSERVATION	INFERENCE
To the salt solution add $NaOH$ solution	Gelatinous white ppt is obtained	Zn^{2+} ion may be present
Add $NaOH$ solution in excess	White ppt dissolves	Zn^{2+} ion is confirmed
To the given salt solution add NH_4OH solution	Gelatinous white ppt is obtained	Zn^{2+} ion may be present
Add NH_4OH solution in excess	White ppt. dissolves	Zn^{2+} ion is confirmed

EXPERIMENT - 2

Aim:- To identify Zn^{2+} cation in the given salt solution using NaOH & NH_4OH solutions

Apparatus:- clean test tube, glass rod, dropper, test tube holder

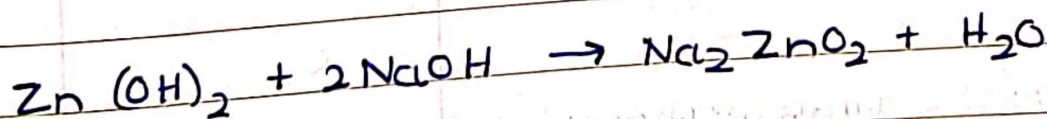
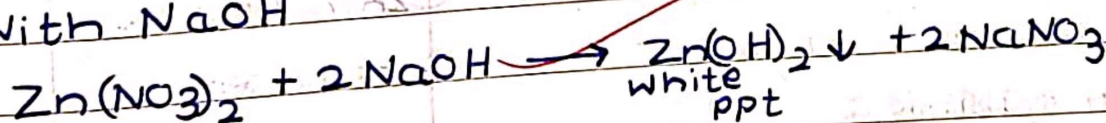
Chemicals:- NaOH & NH_4OH solution.

Procedure:-

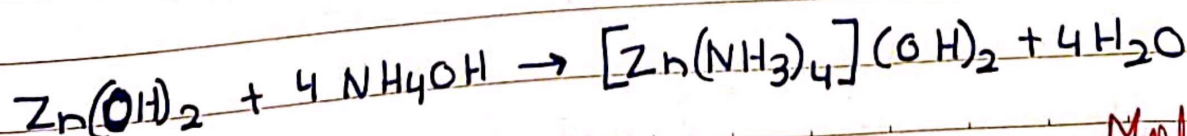
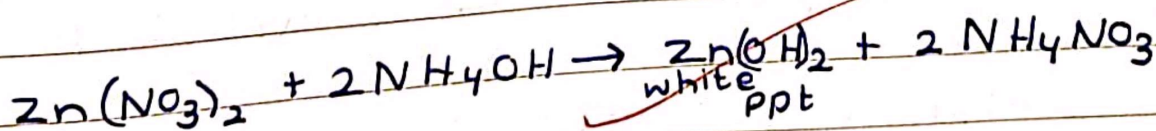
Take about 1-2 gram of salt solution for its cation identification. Add about 10ml of distilled water to the salt and well to obtain the aqueous salt solution

Reactions:-

• With NaOH



• With NH_4OH



EXPERIMENT-3

Aim: To identify Pb^{2+} ion in the given salt solution using $NaOH$ and NH_4OH solution.

Apparatus: Clean test tube, glass rod, dropper, test tube holder

OBSERVATION TABLE

TEST	OBSERVATION	INFERENCE
To the salt solution add $NaOH$ solution	White ppt is obtained	Ca^{2+} , Zn^{2+} or Pb^{2+} may be present
Add $NaOH$ solution in excess	White ppt dissolves	Zn^{2+} or Pb^{2+} may be present
To the salt solution add NH_4OH solution	White ppt is obtained	Zn^{2+} or Pb^{2+} may be present
Add NH_4OH solution in excess	White ppt doesn't dissolve [This is difference between Zn^{2+} & Pb^{2+} ions]	Pb^{2+} is confirmed

EXPERIMENT-3

Aim:- To identify the cation Pb^{2+} in the given salt solution using $NaOH$ & NH_4OH solution

Apparatus:- Clean test tube, test tube holder, glass rod, dropper

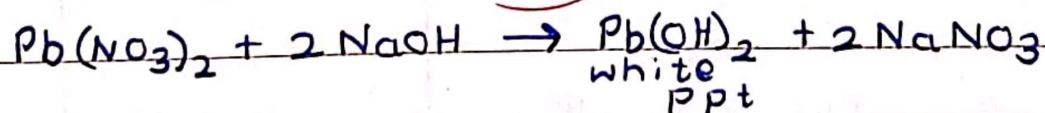
Chemicals:- $NaOH$ & NH_4OH solution

Procedure:-

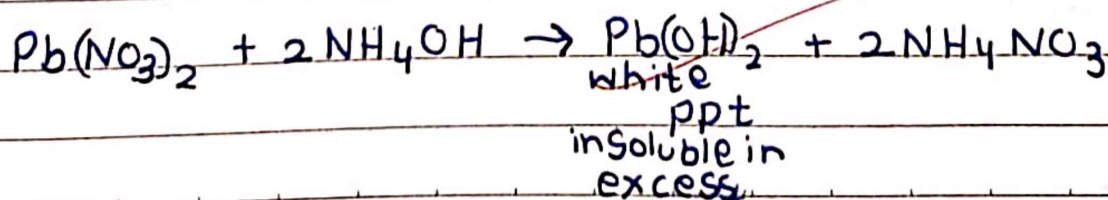
Take about 1-2 gm of the salt solution for its cation identification. Add about 10ml of distilled water to the salt & shake well to obtain the aqueous salt solution.

Reactions:-

• With $NaOH$



• With NH_4OH



EXPERIMENT-4

Aim: To identify Cu^{2+} ions in the given salt solution using NaOH and NH_4OH solution.

Apparatus: Clean test tube, glass rod, dropper, test tube holder.

OBSERVATION TABLE

TEST	OBSERVATION	INFERENCE
To the salt sol. add NaOH Sol.	Blue ppt is obtained.	Cu^{2+} may be present
Add NaOH Sol. in excess	ppt is insoluble	Cu^{2+} confirmed
To the salt sol. add NH_4OH Sol.	Blue ppt is obtained	Cu^{2+} may be present
Add NH_4OH Sol. in excess	Blue ppt dissolve giving brinky blue sol. of the complex salt	Cu^{2+} confirmed

EXPERIMENT-4

Aim:- To identify Cu^{2+} cation in the given salt solution using NaOH & NH_4OH solution

Apparatus:- Clean test tube, test tube holder, glass rod, dropper

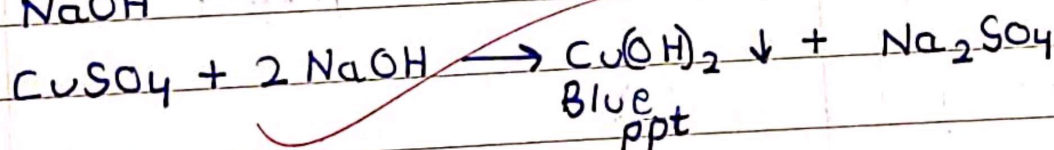
Chemicals:- NaOH solution & NH_4OH solution

Procedure:-

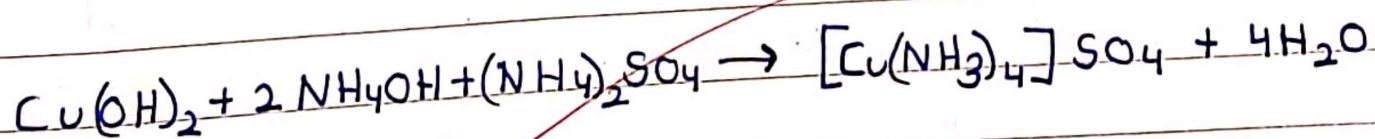
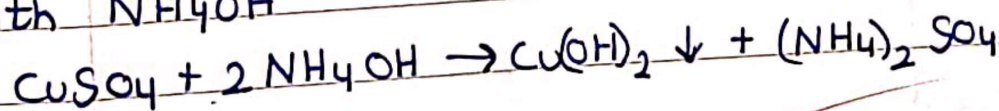
Take about 1-2 gm of salt solution for its cation identification. Add about 10 mL of distilled water to the salt & shake well to obtain the aqueous salt solution

Reactions:-

With NaOH



With NH_4OH



EXPERIMENT-5

Aim: To identify Fe^{2+} ion in the given salt solution using NaOH and NH_4OH solution

Apparatus: Clean test tube, glass rod, dropper, test tube holder

OBSERVATION TABLE

TEST	OBSERVATION	INFERENCE
To the salt Sol. add NaOH sol.	Dirty green ppt is obtained	Fe^{2+} may be present
Add NaOH sol. in excess	ppt is insoluble	Fe^{2+} confirmed
To the salt Sol. add NH_4OH sol.	Dirty green ppt is obtained	Fe^{2+} may be present
Add NH_4OH Sol. in excess	ppt is insoluble	Fe^{2+} confirmed

EXPERIMENT - 5

Aim:- To identify the cation Fe^{2+} present in a given salt solution using NaOH & NH_4OH solution

Apparatus:- Clean test tubes, glass rod, test tube holder, dropper

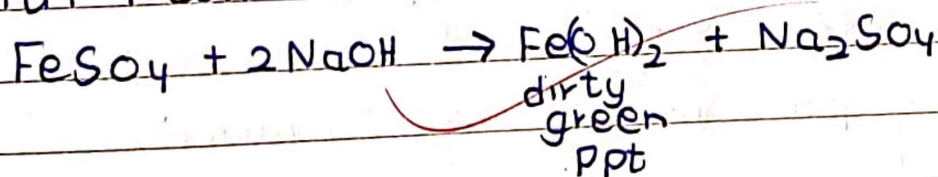
Chemicals:- NaOH solution & NH_4OH solution

Procedure:-

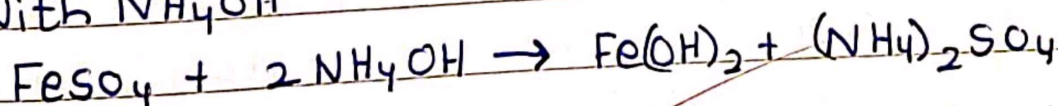
Take about 1-2 grams of salt solution for its cation identification. Add about 10 mL of distilled water to the salt solution and shake well to obtain the aqueous salt solution

Reactions:-

• With NaOH



• With NH_4OH



EXPERIMENT-6

Aim: To identify Fe^{3+} ions in the given salt solution using NaOH and NH_4OH solution.

Apparatus: Clean test tube, glass rod, dropper, test tube holder

OBSERVATION TABLE

EXPERIMENT	OBSERVATION	INFERENCE
To the salt sol. add NaOH sol.	Reddish Brown ppt is obtained	Fe^{3+} may be present
Add NaOH sol. in excess	ppt is insoluble	Fe^{3+} confirmed
To the salt sol. add NH_4OH sol.	Reddish Brown ppt is obtained	Fe^{3+} may be present
Add NH_4OH sol. in excess	ppt is insoluble	Fe^{3+} confirmed

EXPERIMENT-6

Aim :- To identify the cation Fe^{3+} in a given salt solution using NaOH & NH_4OH solution

Apparatus :- Clean test tube, glass rod, test tube holder, dropper

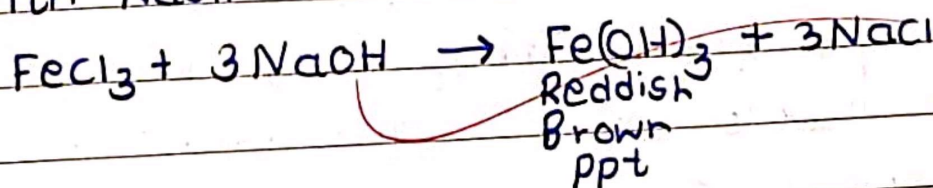
Chemicals :- NaOH solution & NH_4OH solution

Procedure :-

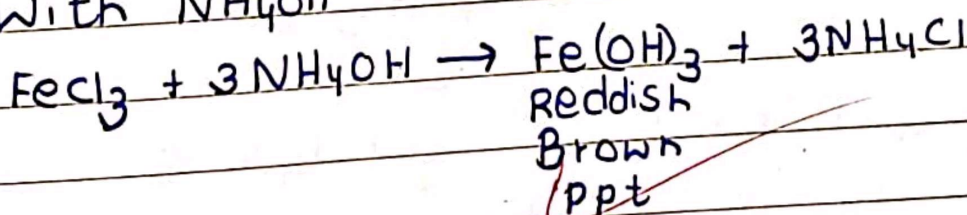
Take about 1-2 gm of the salt solution for its cation identification. Add about 10 mL of distilled water to one salt and shake well to obtain the aqueous salt solution

Reactions :-

• With NaOH



• With NH_4OH



EXPERIMENT-7

Aim: To identify CO_3^{2-} , S^{2-} , SO_3^{2-} in the given salt solution using dilute H_2SO_4 .

Apparatus: Clean test tube, glass rod, test tube holder, Spirit lamp

OBSERVATION TABLE

EXPERIMENT	OBSERVATION	INFERENCE
Given Salt + dil. H_2SO_4	Gas is evolved with effervescence	Gas may be SO_2 or CO_2
Bring moist blue litmus paper near gas	Blue litmus paper becomes red	CO_2 or SO_2 gas
Pass the gas through lime water	Lime water turns milky	CO_2 or SO_2 gas
Bring filter paper dipped in acidified KMnO_4 or $\text{K}_2\text{Cr}_2\text{O}_7$ near the gas	No effect on filter paper	CO_2 gas confirmed, CO_3^{2-} ion in the salt confirmed

EXPERIMENT	OBSERVATION	INFERENCE
Given salt + dilute H_2SO_4	Gas with suffocating smell of burning Sulphur is evolved	Gas may be SO_2

EXPERIMENT-7

Aim:- To identify the anions CO_3^{2-} , S^{2-} & SO_3^{2-} in the given salt using dilute H_2SO_4

Apparatus:- Clean test tube, glass rod, test tube holder, spirit lamp

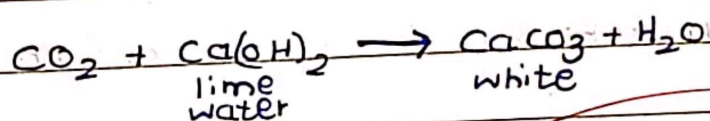
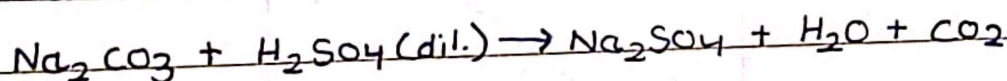
Procedure:-

Take about 1-2 gm of salt for anion identification.

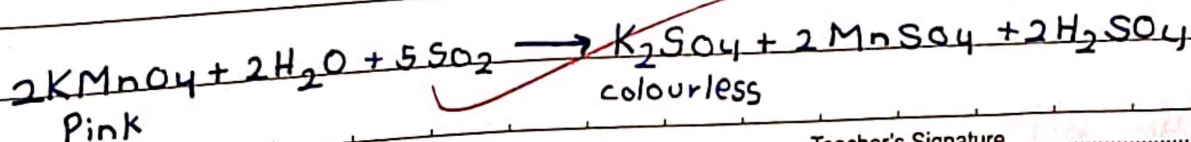
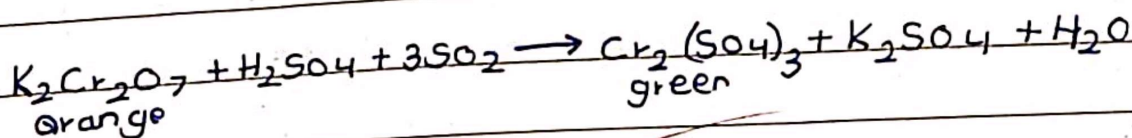
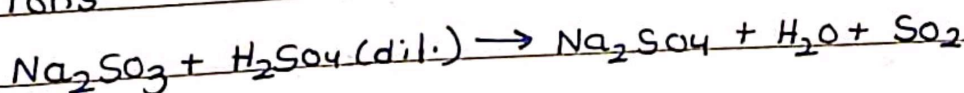
Add about 10 mL of distilled water to the salt & shake well to obtain aqueous salt solution. The salt solutions are then acted upon by dilute H_2SO_4

Reactions:-

1. Carbonate ions-



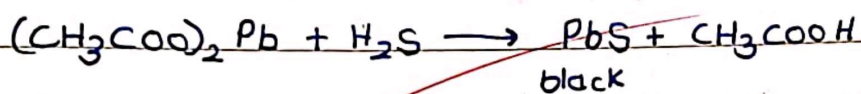
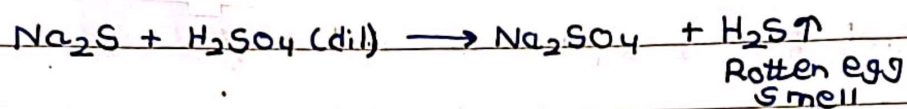
2. Sulphite ions-



Bring filter paper dipped in acidified $K_2Cr_2O_7$ near the gas	Orange coloured paper turns green	Gas is SO_2 . SO_3^{2-} is confirmed
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EXPERIMENT	OBSERVATION	INFERENCE
Bring filter paper dipped in acidified $KMnO_4$ near the gas	Pink coloured paper turn colourless	SO_3^{2-} ion is confirmed
Given Salt + dil. H_2SO_4	A gas is evolved with smell of rotten eggs	H_2S gas may be present
Bring moist blue litmus paper near the gas	Blue litmus becomes Red	H_2S gas may be present
Bring lead acetate paper near the gas	Lead acetate paper turns black	Presence of S^{2-} ion is confirmed

3. Sulphide ions -



EXPERIMENT-8

Aim: To identify Cl^- , NO_3^- & SO_4^{2-} ion present in the salt using conc H_2SO_4

Apparatus: - Clean test tube, glass rod, spirit lamp, test tube holder

OBSERVATION TABLE

EXPERIMENT	OBSERVATION	INFERENCE
Given Sol. + dil. H_2SO_4	Colourless gas with pungent smell	Cl^- may be prepared
Wet Blue litmus paper	Becomes Red	Cl^- may be present
Glass rod dipped in NH_4OH bring it on the mouth of test tube	Dense white fumes of NH_4Cl are formed	Cl^- ion present
Add NH_4OH to above ppt	curdy white ppt dissolves	Cl^- ion confirmed

EXPERIMENT	OBSERVATION	INFERENCE
Given Salt + dil. H_2SO_4	Brown fumes with irritating odour	NO_2 gas may be present
Add Cu	Evolution of brown fumes intensified	NO_2 gas confirmed

EXPERIMENT-8

Aim: To identify the anion Cl^- , NO_3^- and SO_4^{2-} present in the salt using conc. H_2SO_4

Apparatus: Clean test tube, glass rod, spirit lamp, test tube holder

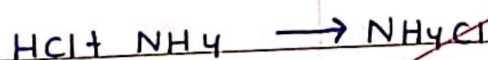
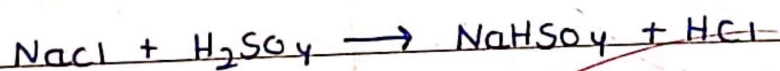
Chemicals: MnO_2 , conc. H_2SO_4 , ammonia solution, AgNO_3 , dil. HNO_3

Procedure:

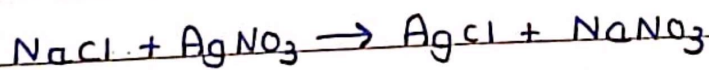
Cl^- and NO_3^- are acted upon by conc. H_2SO_4 .

Chemical Reactions involved in the reaction of:-

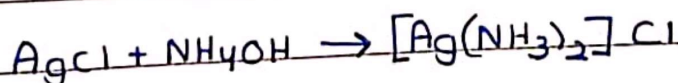
1. Chloride ions -



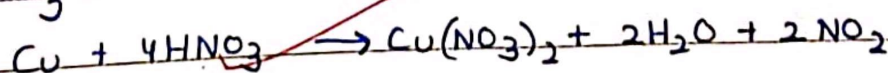
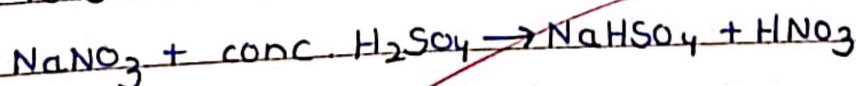
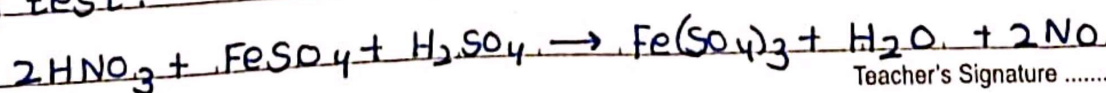
(dense white fumes)



(white ppt)



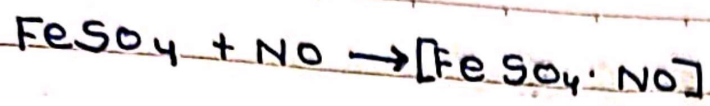
2. Nitrate ions -

Ring test:-

Teacher's Signature

Given salt Sol. + freshly prepared FeSO_4 + conc. H_2SO_4 along the side of test tube	A brown ring is formed at the junction of two layers	Presence of NO_3^- confirmed
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EXPERIMENT	OBSERVATION	INFERENCE
Given salt + $(\text{CH}_3\text{COO})\text{Pb}$ Sol.	white ppt is formed	SO_4^{2-} may be present
To above ppt add $\text{CH}_3\text{COONH}_4$	white ppt dissolves	SO_4^{2-} gas may be present
Given salt sol. + BaCl_2	white ppt appears	SO_4^{2-} is confirmed
Add HCl to above	white ppt is insoluble	



nitrous ferrous sulphate

EXPERIMENT - 9

Aim: To study the effect of conc. HCl on metal oxide CuO

Apparatus: Clean test tube, glass rod, spirit lamp, test tube holder

OBSERVATION TABLE

EXPERIMENT	OBSERVATION	INFERENCE
Heat the substance & conc. HCl	Greenish yellow gas	This gas may be Cl_2
Pass the gas over red rose petal	Colour is bleached	The gas is bleached
Pass the gas over Starch iodide test tube	Dark blue colouration is produced	Cl_2 gas is confirmed
Solution of the substance + NH_4OH in excess	Blue ppt which dissolves in excess giving inky blue solution	Solution contains Cu^{2+} ion
Heat the ppt	Turns	Cu^{2+} confirmed

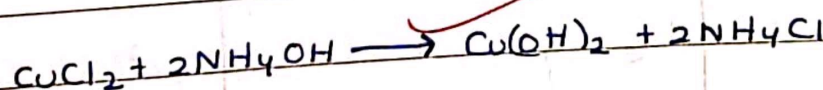
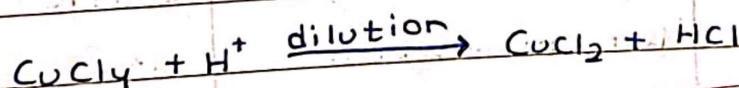
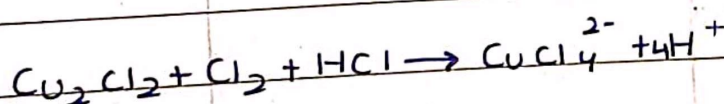
EXPERIMENT-9

Aim: To study the effect of conc. HCl acid on metal oxide
CuO

Apparatus: Clean test tube, glass rod, spirit lamp, test tube holder

Chemicals: CuO, conc. HCl, NH_4OH sol., NaOH sol., starch
iodide paper

Procedure: Cupric oxide oxidises conc. HCl to evolve chlorine gas and itself is reduced to cuprous chloride when conc. HCl is added to CuO, Cl_2 gas is evolved and a green solution is formed in the test tube which turn blue on dilution.



EXPERIMENT-10

Aim: To study the effect of conc. HCl on metal oxide MnO_2

Apparatus: Clean test tube, glass rod, spirit lamp, test tube holder

OBSERVATION TABLE

EXPERIMENT	OBSERVATION	INFERENCE
Heat the substance & conc. HCl	Greenish yellow gas	Cl_2 may be present
Pass the gas over red rose plate	Colour is bleached	The gas is Cl_2
Pass the gas over Starch iodide paper	Dark blue colouration	Cl_2 gas is confirmed
Solution of substance + NaOH slowly in excess	ppt is formed which turns brown when exposed to air	Solution contains Mn^{2+} ion
Substance + conc. HCl	Light pink solution is obtained	Mn^{2+} confirmed

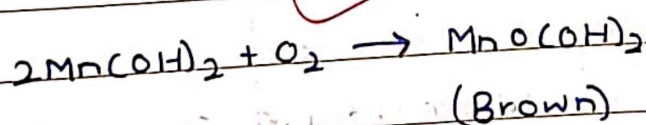
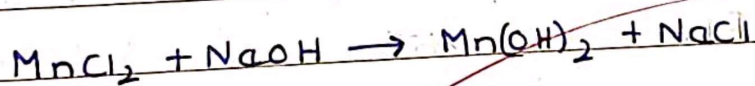
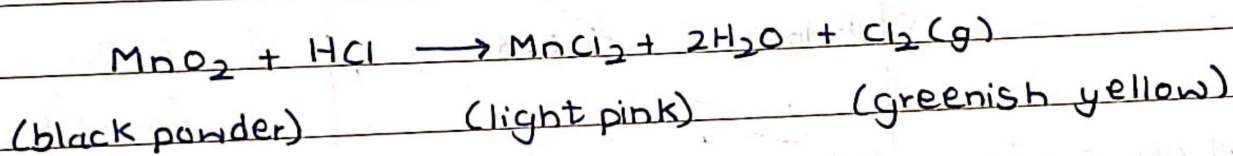
EXPERIMENT-10

Aim: To study the effect of conc. HCl on metal oxide MnO_2

Apparatus: Clean test tube, glass rod, spirit lamp, test tube holder

Chemicals: MnO_2 , conc. HCl, NH_4OH , NaOH, starch iodide paper

Procedure: When conc. HCl is added to MnO_2 and mixture is heated, Cl_2 gas is evolved and light pink solution of $MnCl_2$ is formed in the test tube.



EXPERIMENT - II

Aim: To determine the acidic & basic nature of solution

Apparatus: Clean test tube, test tube holder

OBSERVATION TABLE

EXPERIMENT	OBSERVATION		INFERENCE
Test with	Sol. A	Sol. B	
Blue litmus paper	No change in colour	Blue becomes Red	Sol. B is acidic
Red litmus paper	Red becomes Blue	No change in colour	Sol. A is Basic
Na_2CO_3 Solution	No change	Effervescence with evolution of gas which turns lime water milky	Sol. B is acidic Gas is CO_2
Solid NH_4Cl	A colourless gas with pungent smell produces white fumes with conc. HCl	A colourless gas with choking smell produces white ppt with AgNO_3 sol.	Sol. A. is basic and gas is NH_3 Sol. B is acidic and gas is HCl

EXPERIMENT-11

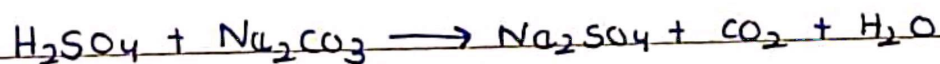
Aim: To determine acidic and basic nature of solution

Apparatus: Clean test tube, test tube holder

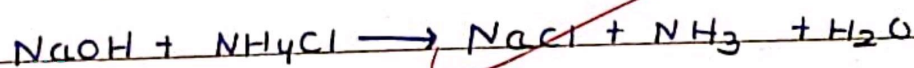
chemicals: Blue litmus paper, Red litmus paper, Na_2CO_3 , NH_4Cl , AgNO_3 , conc. HCl , lime water

Procedure: Solution A and B are acted upon by various reagent.

Chemical Reactions involved in the test:



(sol. B)



(sol. A)

