

Chemistry Experiments to be written in Chemistry Practical File

Chemistry Practical File (Nova ICSE Chemistry-Lab Manual)

Students of Class X as per the requirement of CISCE (ICSE Board), have to make a Practical File in the Subject of Chemistry.

Instructions to be followed for writing experiments:

1. On the ruled lined pages: Write the experiment number (as given in the list of experiments to be performed for Session 2021-22); Aim of the experiment; Requirements, Procedure, Observations, Conclusions, Precautions (if any). All these details are described by the publisher (of the Practical File) in the beginning of the file.
2. On the blank pages: Draw the diagram/s or table (if any) related to the experiments. Make use of the pencil only for making the diagrams.
3. New experiment will start from a new page.
4. Do not use any other colour pen in the 'Practical File' except blue pen. You may write headings using black pen.
5. For reference a sample 'Practical File' made by a student is being attached with.

CHEMISTRY PRACTICALS - X

As per the guidelines from the Council (ICSE), the students of Class X are required to perform following experiments for the session 2021-22.

- Expt-1.** To identify Ca^{2+} ion in the given salt using NaOH and NH_4OH solution.
- Expt-2.** To identify Zn^{2+} cation in the given salt solution using NaOH and NH_4OH solutions.
- Expt-3.** To identify Pb^{2+} cation in the given salt using NaOH and NH_4OH solution.
- Expt-4.** To identify Cu^{2+} cation in the given salt using NaOH and NH_4OH solution.
- Expt-5.** To identify Fe^{2+} cation in the given salt using NaOH and NH_4OH solution.
- Expt-6.** To identify Fe^{2+} cation in the given salt using NaOH and NH_4OH solution.
- Expt-7.** To identify Fe^{3+} cation in the given salt using NaOH and NH_4OH solution.
- Expt-8.** To identify the anions Cl^- , NO_3^- and SO_4^{2-} present in the salt using conc. sulphuric acid.
- Expt-9.** To study the effect of conc. HCl acid on metal oxide (CuO).
- Expt-10.** To study the effect of conc. HCl acid on metal oxide (MnO_2).
- Expt-11.** To determine acidic and basic nature of solution.



NOVA[®]

ICSE

Chemistry

Lab Manual



10



Experiment - 1

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

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

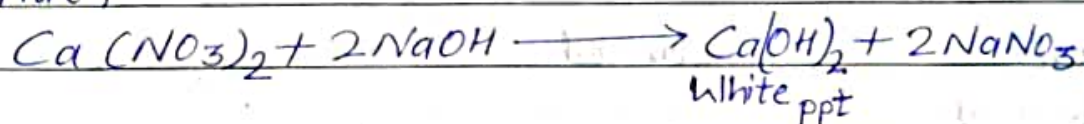
Chemicals :- NaOH solution, NH_4OH solution

Procedure :-

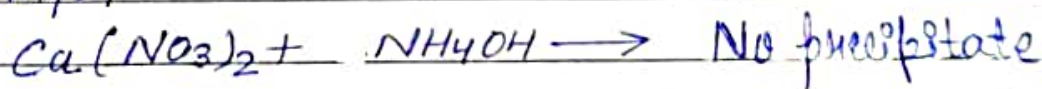
Take about 1-2 gram of salt solution for its cation identification. Add about 10 ml of distilled water to the salt and shake well to obtain the aqueous solution.

Reactions :-

With NaOH



With NH_4OH



Experiment - 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 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 formed

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.

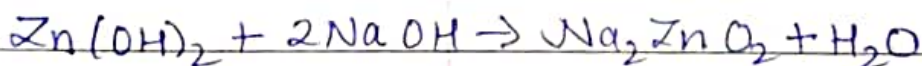
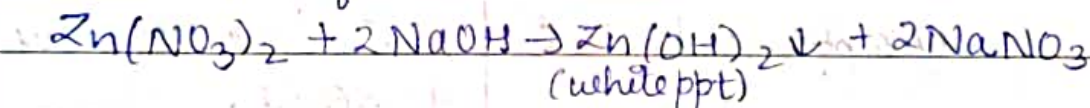
Chemicals: - $NaOH$ & NH_4OH solution.

Procedure:

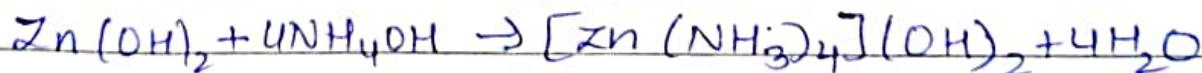
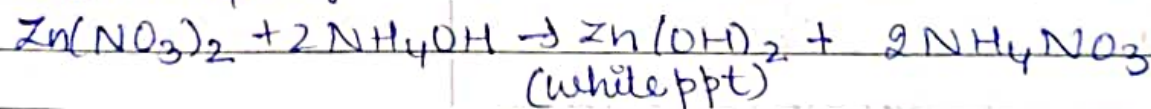
Take about 1-2g of salt solution for its cation identification. Add about 10ml of distilled water to the salt and well to obtain the aqueous salt solution.

Reactions:

With $NaOH$:



With NH_4OH :



Experiment - 2

Aim: To identify Zn^{2+} cation in the given salt solution using NaOH & 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.	Gelatinous white ppt is obtained.	Zn^{2+} ion may be present.
Add NaOH sol. in excess.	White ppt dissolves	Zn^{2+} ion confirmed
To the given salt solution add NH_4OH sol.	Gelatinous white ppt is obtained	Zn^{2+} ion may be present.
Add NH_4OH sol. in excess.	White ppt dissolves.	Zn^{2+} ion confirmed.

Experiment - 3

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

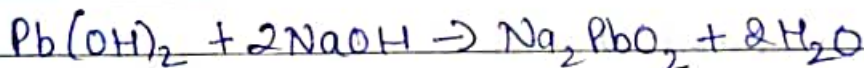
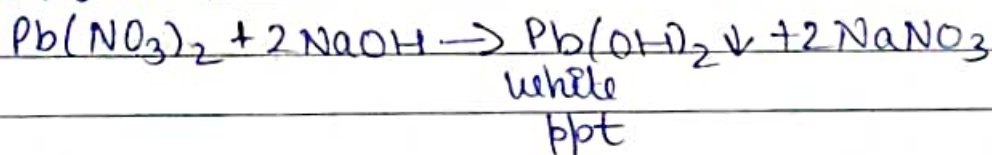
Apparatus :- clean test tube, test tube holder, glass rod, dropper.

Chemicals :- $NaOH \& NH_4OH$ solution.

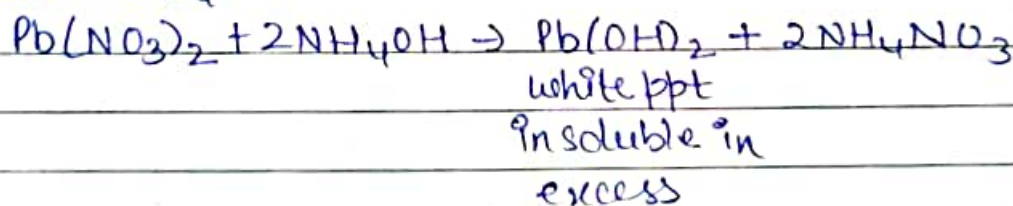
Procedure :- Take about 1-2 gm of the salt solution for its cation identification. Add about 10ml of distilled water to the salt and shake well to obtain the aqueous salt solution.

Reactions :-

with $NaOH$



with NH_4OH



Experiment - 3

Aim: To identify Pb^{2+} solution in the given salt solution using $(NaOH \& NH_4OH)$ solution.

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

OBSERVATION TABLE

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

Experiment - 4

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

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

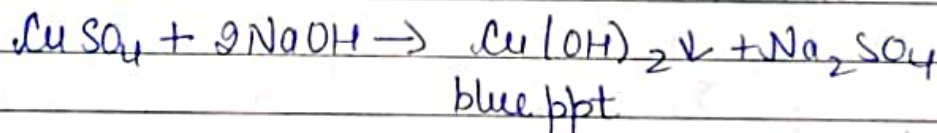
Chemicals: NaOH solution and NH_4OH solution.

Procedure:

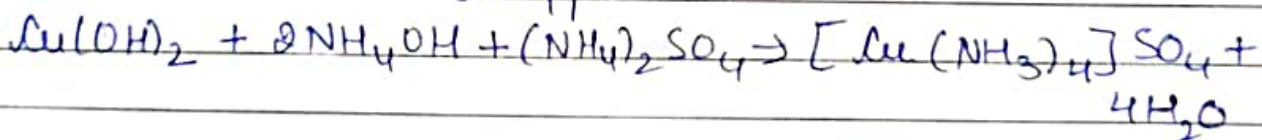
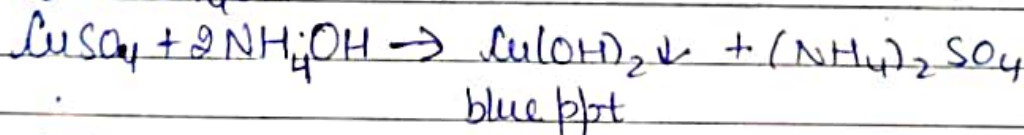
Take about 1 to 2 gm of salt solution for its cation identification. Add about 10 ml of distilled water to the salt and shake well to obtain the aqueous salt solution.

Reactions:

With NaOH



With NH_4OH



Experiment - 4

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

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

OBSERVATION TABLE

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

Experiment-5

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

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

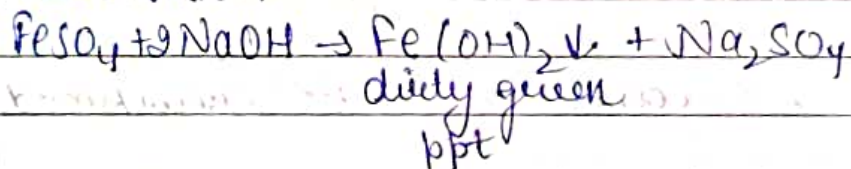
Chemicals: NaOH solution and NH_4OH solution

Procedure:

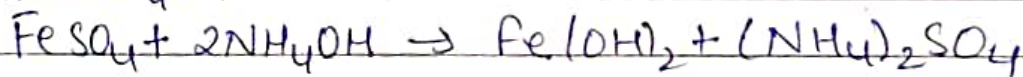
Take about 1-2 grams of salt solution for its cation identification. Add about 10ml of distilled water to the salt solution and shake well to obtain the aqueous salt solution.

Reactions:

With NaOH



With NH_4OH



Experiment-5

Aim:- To identify Fe^{2+} cation in the given salt solution.

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

OBSERVATION TABLE

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

Experiment - 6

AIM: To identify the cation Fe^{3+} in a given salt solution using $NaOH$ and NH_4OH solution.

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

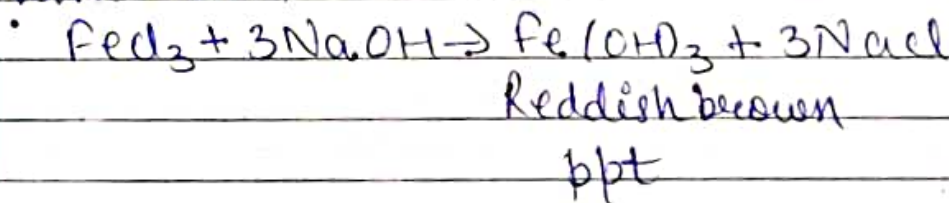
Chemicals: $NaOH$ solution and NH_4OH solution

Procedure:

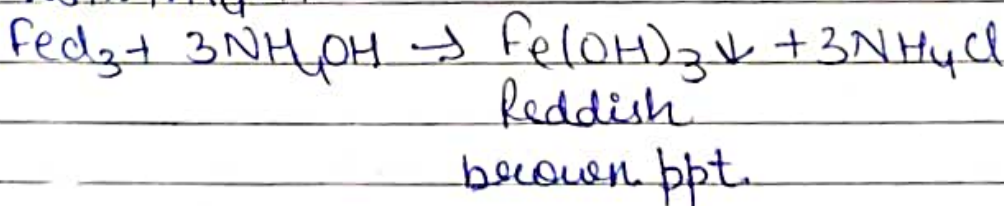
Take about 1-2 gm of the salt solution for its cation identification. Add about 10ml of distilled water to one salt and shake well to obtain the aqueous salt solution.

Reactions:

With $NaOH$



With NH_4OH



Experiment-6

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

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

Observation Table :-

Experiment	Observation	Inference
To the salt solution add NaOH	Reddish brown ppt obtained	Fe^{3+} may be present
Add NaOH in excess	ppt is insoluble	Fe^{3+} is confirmed.
To the salt sol. add NH_4OH	Reddish brown ppt is obtained	Fe^{3+} may be present.
Add NH_4OH	ppt is insoluble	Fe^{3+} is confirmed

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:-

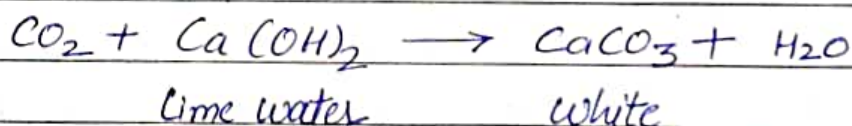
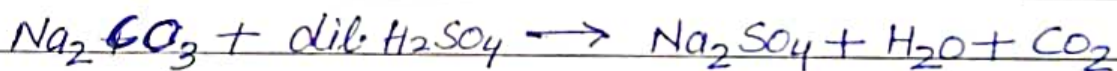
clean test tube, glass rod, test tube holder, spirit lamp.

Procedure:-

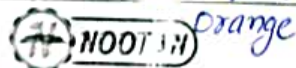
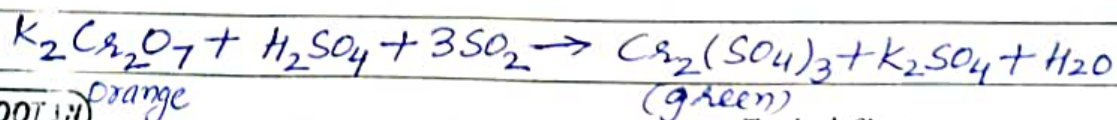
Take about 1 to 2 gm of salt for anion identification. Add about 10 ml of distilled water to the salt and shake well to obtain the aqueous salt solution. The salt solution are then acted upon by dilute H_2SO_4 .

Reactions:-

1. Carbonate ions -



2. Sulphide ions -



Teacher's Signature _____

P.T.O

Experiment - 7

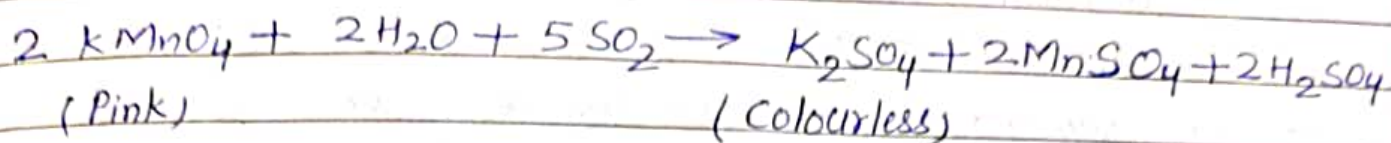
Aim :- To identify the anions CO_3^{2-} , S^{2-} , SO_3^{2-} in the given salt using dilute H_2SO_4 .

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

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 become 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 the filter paper	CO_2 gas confirmed CO_3^{2-} ion in the salt confirmed

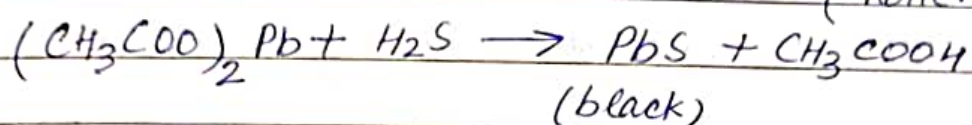
EXPERIMENT	OBSERVATION	INFERENCE
Given salt + dilute H_2SO_4	Gas with suffocating smell of burning Sulphur is evolved	Gas may be SO_2
Bring filter paper dipped in acidified $\text{K}_2\text{Cr}_2\text{O}_7$ near the gas	Orange coloured paper turn green	Gas is SO_2 . SO_3^{2-} ion confirmed



9. Sulphide ions -



(Rotten egg smell)



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 become Red	H_2S gas may be present
Bring lead acetate paper near the gas	Lead acetate paper become black	Presence of S^{2-} ion Confirmed

Experiment - 8

Aim :-

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

Apparatus :-

Clean test tubes, glass rod, test tube holder, spirit lamp.

Chemicals :-

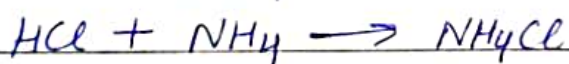
MnO_2 , conc. H_2SO_4 , ammonia solution, AgNO_3 , dil. HNO_3

Procedure :-

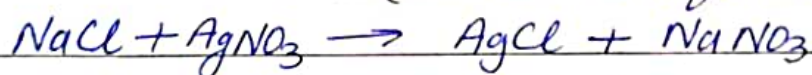
Cl^- and NO_3^- are acted upon by conc. H_2SO_4 .

Chemical Reactions involved in the reaction of :-

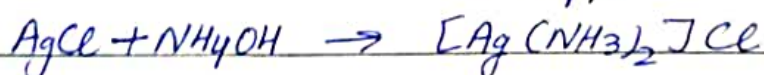
1. Chloride ions -



(dense white fumes)



(white ppt)



P.T.O

Experiment - 8

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

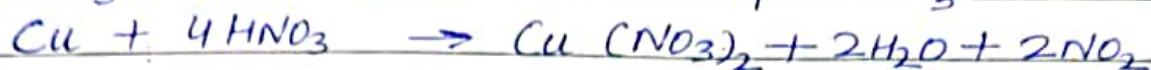
Apparatus:- Clean test tube, glass rod, test tube holder, spirit lamp

Observation Table :-

EXPERIMENT	OBSERVATION	INFERENCE
Given solution + Conc. H_2SO_4	Colourless gas with pungent odour	Cl^- may be prepared
Wet blue litmus paper	Become Red	Cl^- may be present
Glass rod dipped in NH_4OH & bring it on mouth of test tube	Dense white fumes of NH_4Cl are formed	Cl^- ion present
Given salt + $AgNO_3$	Curdy white ppt	contain Cl^-
Add NH_4OH to the above ppt	curdy white ppt dissolves	Cl^- ion confirmed

EXPERIMENT	OBSERVATION	INFERENCE
Given salt + Conc. H_2SO_4	Brown fumes with irritating odour	NO_2 gas may be present
Add Cu turning to the	Evolution of brown fumes intensified	NO_2 gas confirmed

2. Nitrate ions :-



Ring test :-



nitroso ferrous sulphate

EXPERIMENT	OBSERVATION	INFERENCE
Given salt solution + 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

EXPERIMENT	OBSERVATION	INFERENCE
Given salt + solution & $(\text{CH}_3\text{COO})\text{Pb}$	White ppt is formed	SO_4^{2-} may present
To above ppt add $\text{CH}_3\text{COONH}_4$	White ppt dissolves	SO_4^{2-} gas may present
Given salt solution + BaCl_2	White ppt appears	SO_4^{2-} is confirmed
Add HCl to above	White ppt is insoluble	

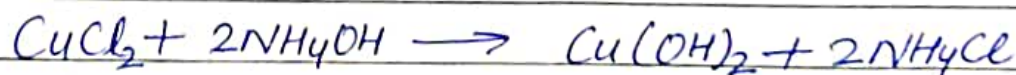
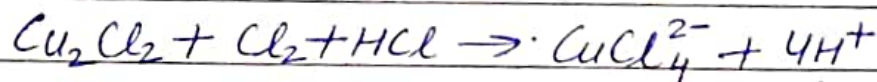
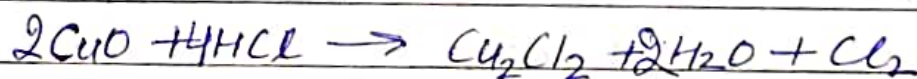
Experiment - 9

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

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

Chemicals :- CuO, conc. HCl, NH₄OH solution, NaOH solution, 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, Cl₂ gas is evolved and a green solution is formed in the test tube which turns blue on dilution



Experiment-9

Aim:- To study the effect of conc. HCl and on metal oxide (CuO)

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

Observation table :-

Experiment	Observation	Inference
Heat the substance and conc. HCl	Greenish yellow gas	The 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	Chloride 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

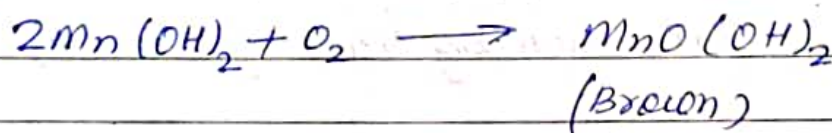
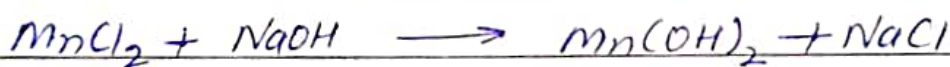
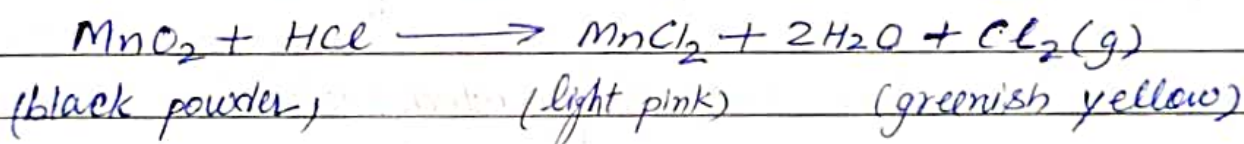
Experiment - 10

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

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

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

Procedure:- When concentrated hydrochloric acid is added to manganese dioxide and mixture is heated, Chlorine gas is evolved and light pink solution of manganese chloride ($MnCl_2$) is formed in the test tube



Experiment - 10

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

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

Observation Table :-

Experiment	Observation	Inference
Heat the substance and conc. HCl	Greenish yellow gas	Cl_2 may be present
Pass the gaseous red rose petal	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 become brown when exposed to air	Solution contains Mn^{2+} ion
Substance + conc. HCl	Light pink solution is obtained	Mn^{2+} confirmed

Experiment - 11

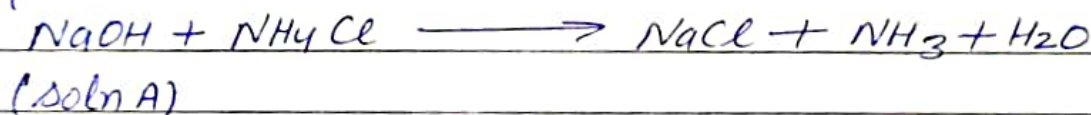
Aim :- To determine acidic and basic nature of solution

Apparatus :- Clean test tubes, test tube holder.

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

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

Chemical Reaction involved in the test.



Experiment - II

Aim :- To determine acidic and basic nature of solution

Apparatus :- Clean test tubes, test tube holder

Observation table :-

Experiment	Observation		Inference
Test with -	Sol A	Sol B	
Blue litmus paper	No change in colour	Blue become Red	Sol B is acidic
Red litmus paper	Red become 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	A colourless gas with choking smell	Sol A is Basic and Gas is NH_3
	produces white fumes with conc. HCl	produces white ppt with AgNO_3 Sol.	Sol B is acidic and gas is HCl