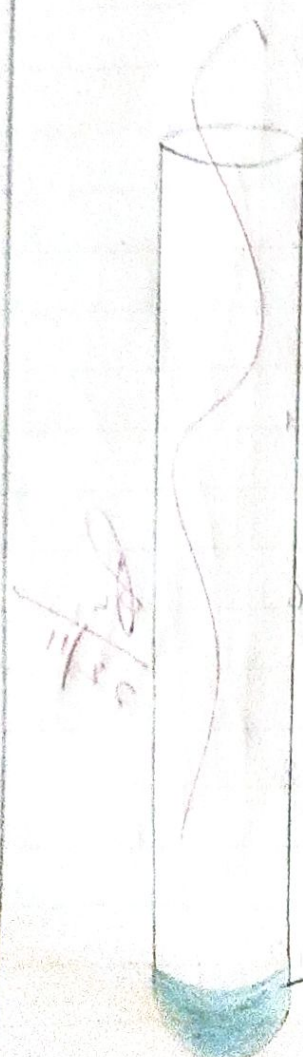


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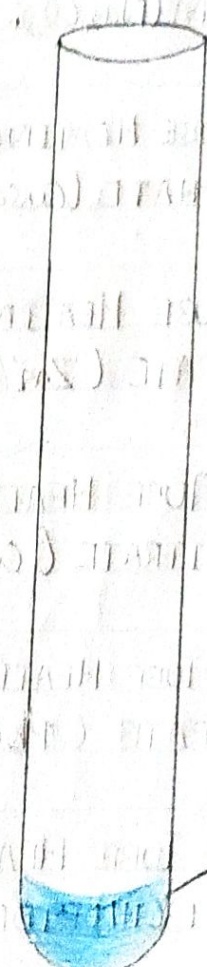
EXPT NO.	EXPERIMENT NAME	DATE	PAGE NO.	TEACHER'S SIGNATURE
01.	ACTION OF NaOH ON CUPRIC ION (Cu^{++})	29/04/19	01	✓
02.	ACTION OF NH_4OH ON CUPRIC ION (Cu^{++})	29/04/19	02	✓
03.	ACTION OF NaOH ON FERROUS ION (Fe^{++})	29/04/19	03	✓
04.	ACTION OF NH_4OH ON FERROUS ION (Fe^{++})	29/04/19	04	✓ 22/11
05.	ACTION OF NaOH ON FERRIC ION (Fe^{+++})	29/04/19	05	✓
06.	ACTION OF NH_4OH ON FERRIC ION (Fe^{+++})	29/04/19	06	✓
07.	ACTION OF NaOH ON LEAD ION (Pb^{++})	29/04/19	07	✓
08.	ACTION OF NH_4OH ON LEAD ION (Pb^{++})	29/04/19	08	✓

EXPT No.	EXPERIMENT NAME	DATE	PAGE No.	TEACHER'S SIGNATURE
09.	ACTION OF NaOH ON ZINC ION (Zn^{++})	29/04/19	09	-
10.	ACTION OF NH_4OH ON ZINC ION (Zn^{++})	29/04/19	10	✓
11.	ACTION OF NaOH ON CALCIUM ION (Ca^{++})	29/04/19	11	✓
12.	ACTION OF NH_4OH ON CALCIUM ION (Ca^{++})	29/04/19	12	✓
13.	ACTION OF NaOH ON AMMONIUM ION (NH_4^+)	29/04/19	13	✓

22/11



Pale blue ppt.



Pale blue ppt.

NaOH is added dropwise

NaOH is added in excess

ACTION OF NaOH ON CUPRIC ION (Cu^{+2})

The sample supplied is blue solution of CuSO_4 in water.

<u>Experiment</u>	<u>Observation</u>	<u>Inference</u>
1. A portion of the supplied sample is taken in a clean test tube and a few drops of NaOH is added	Blue precipitate of copper hydroxide is obtained. $\text{CuSO}_4 + 2\text{NaOH} \rightarrow \text{Cu(OH)}_2 + \text{Na}_2\text{SO}_4$ (blue precipitate)	Blue precipitate of Cu(OH)_2 is obtained hence Cu^{++} is confirmed.
2. To the above solution excess NaOH is added.	No change	Cu^{++} ion is confirmed.

ACTION OF NaOH ON COPPER ION (Cu^{2+})

The sample supplied is blue solution of CuSO_4 in water.

Test/observation

Observation

Experiment

Blue precipitate of $\text{Cu}(\text{OH})_2$ is obtained.

Blue precipitate of $\text{Cu}(\text{OH})_2$ is obtained.

A portion of the sample is added to a test tube.

Confirmation.

$\text{CuSO}_4 + 2\text{NaOH} \rightarrow$

test tube and a few drops of NaOH is added.

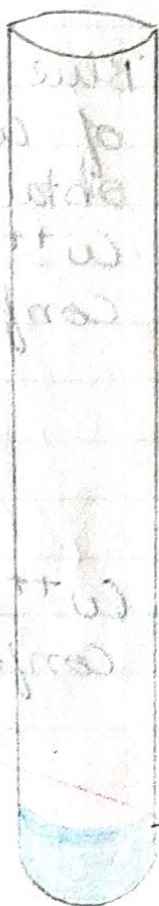
$\text{Cu}(\text{OH})_2 + \text{Na}_2\text{SO}_4$ (blue precipitate)

to the above solution excess NaOH is added.

Confirmation.

No change

To the above solution excess NaOH is added.



Blue ppt



Inky blue solution

NH_4OH is added dropwise

NH_4OH is added in excess

DATE: 29/04/19

Expt No.
02

ACTION OF NH_4OH ON CUPRIC ION (Cu^{2+})

The sample supplied is blue solution of CuSO_4 in water.

<u>Experiment</u>	<u>Observation</u>	<u>Inference</u>
A portion of the original sample is taken in a test tube and NH_4OH is added by few drops and then in excess.	Blue precipitate of $\text{Cu}(\text{OH})_2$ is obtained. The precipitate undergoes formation of tetramine copper sulphate to form an inky blue solution.	Hence presence of Cu^{++} is formed.
	$\text{CuSO}_4 + 2\text{NH}_4\text{OH} \rightarrow (\text{NH}_4)_2\text{SO}_4 + \text{Cu}(\text{OH})_2$	
	$\text{Cu}(\text{OH})_2 + (\text{NH}_4)_2\text{SO}_4 + 2\text{NH}_4\text{OH} \rightarrow 4\text{H}_2\text{O} + [\text{Cu}(\text{NH}_3)_4]\text{SO}_4$	

ACTION OF NH_4OH ON COPPER ION (Cu^{2+})

The sample substance is blue solution of CuSO_4 in water.

Test tube

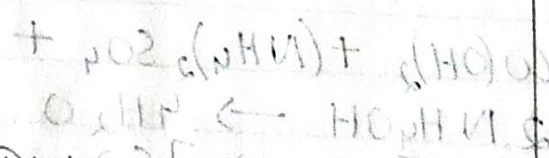
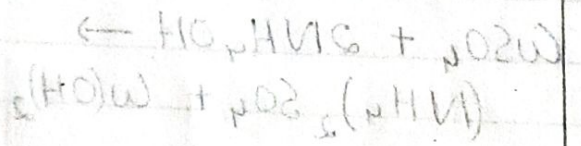
Observation

Test tube

When NaOH is added dropwise, a blue precipitate is formed.

Blue precipitate of $\text{Cu}(\text{OH})_2$ is obtained. The precipitate undergoes formation of tetraammine copper sulphate to form an inky blue solution.

A portion of the original sample is taken in a test tube and NH_4OH is added dropwise until it is in excess.



Dirty green ppt. +

Dirty green ppt.

NaOH is added dropwise

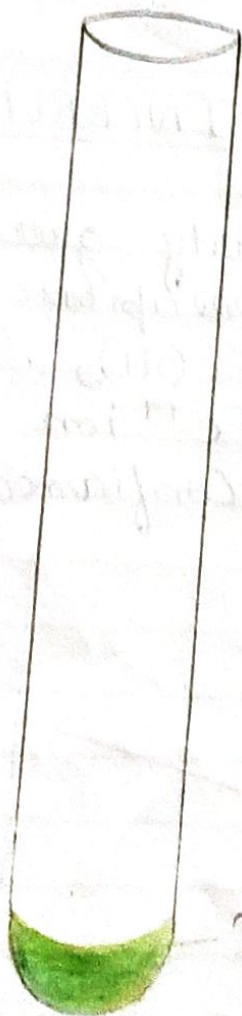
NaOH is added in excess.

ACTION OF NaOH ON FERROUS ION (Fe^{++})

The sample supplied is greenish ferrous sulphate aqueous solution.

[$\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ - Green vitriol]

<u>EXPERIMENT</u>	<u>OBSERVATION</u>	<u>INFERENCE</u>
A portion of the sample solution is taken in a test tube and NaOH is added to it first a little and then in excess.	The solution turns dirty green precipitate due to the formation of ferrous hydroxide. On excess NaOH, no change occurs. $\text{FeSO}_4 + 2\text{NaOH} \rightarrow \text{Fe(OH)}_2 + \text{Na}_2\text{SO}_4$	Dirty green precipitate of Fe(OH)_2 . Hence Fe^{++} ion is confirmed.



Dirty green ppt

NH_4OH is added
dropwise



Dirty green ppt

NH_4OH is added
in excess

ACTION OF NH_4OH ON FERROUS ION (Fe^{++})

The sample supplied is greenish ferrous sulphate aqueous solution $[\text{FeSO}_4 \cdot 7\text{H}_2\text{O}]$

EXPERIMENT	OBSERVATION	INFERENCE
A portion of the sample solution is taken in a test tube and to it ammonium hydroxide is added first a little and then in excess.	The solution turns dirty green precipitate due to formation of ferrous hydroxide. On excess NH_4OH , no change occurs. $\text{FeSO}_4 + 2\text{NH}_4\text{OH} \rightarrow \text{Fe}(\text{OH})_2 + (\text{NH}_4)_2\text{SO}_4$	Dirty green precipitate of $\text{Fe}(\text{OH})_2$. Hence Fe^{++} ion is confirmed.

ACTION OF NH_4OH ON FERROUS ION (Fe^{2+})



Reddish brown ppt.

NaOH is added dropwise



Reddish brown ppt

NaOH is added in excess

ACTION OF NaOH ON FERRIC ION (Fe^{+++})

The sample supplied is a reddish-brown solution of ferric chloride (FeCl_3)

<u>EXPERIMENT</u>	<u>OBSERVATION</u>	<u>INFERENCE</u>
A portion of the sample solution is taken in a test tube and to it NaOH is added first a little and then in excess.	The solution turns deep brown precipitate due to the formation of ferric hydroxide. On adding excess NaOH, no change occurs. $\text{FeCl}_3 + 3\text{NaOH} \rightarrow \text{Fe}(\text{OH})_3 + 3\text{NaCl}$ (deep brown)	Deep brown precipitate of $\text{Fe}(\text{OH})_3$. Hence Fe^{+++} ion is confirmed.



Reddish brown ppt

NH_4OH is added
dropwise



Reddish
brown
ppt

NH_4OH is added
in excess

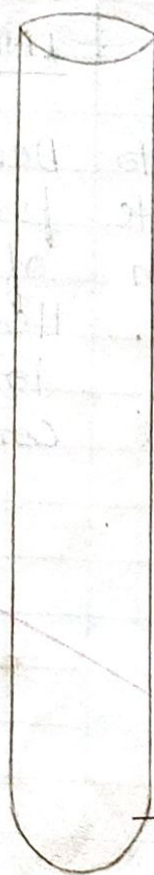
ACTION OF NH_4OH ON FERRIC ION (Fe^{+++})

The sample supplied is a reddish-brown solution of ferric chloride (FeCl_3).

<u>EXPERIMENT</u>	<u>OBSERVATION</u>	<u>INFERENCE</u>
A portion of the sample is taken in a test tube and to it ammonium hydroxide (NH_4OH) is added first a little and then in excess.	The solution changes to deep brown precipitate due to the formation of ferric hydroxide. On adding excess NH_4OH , no change occurs. $\text{FeCl}_3 + 3\text{NH}_4\text{OH} \rightarrow \text{Fe(OH)}_3 + 3\text{NH}_4\text{Cl}$	Deep brown precipitate of Fe(OH)_3 . Hence Fe^{+++} ion is confirmed.

ACTION OF NH_4OH ON FERRIC ION (Fe^{3+})

OBSERVATION



Chalky white ppt

NaOH is added
dropwise



Colourless
solution

NaOH is added
in excess.

ACTION OF NaOH ON LEAD ION (Pb^{2+})

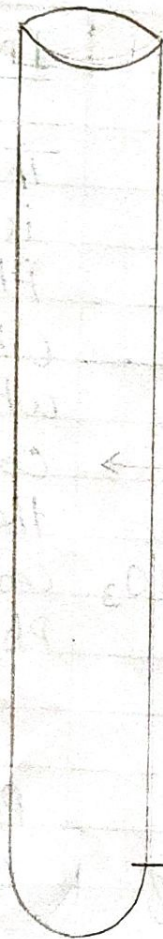
The sample supplied is a colourless solution of lead nitrate.

EXPERIMENT	OBSERVATION	INFERENCE
A portion of the supplied sample is taken in a clean dry test tube and a few drops of NaOH is added.	A chalky white precipitate of lead hydroxide is obtained. $Pb(NO_3)_2 + 2NaOH \rightarrow Pb(OH)_2 + 2NaNO_3$	The precipitate is of $Pb(OH)_2$ which is white in colour. Hence the sample contains Pb^{2+} ions.
To the above solution excess of NaOH is added.	The precipitate is soluble in excess of NaOH due to the formation of sodium plumbate. $Pb(OH)_2 + 2NaOH \rightarrow Na_2PbO_2 + H_2O$ (sodium plumbate)	Pb^{2+} is confirmed.

ACTION OF NaOH ON LEAD ION (Pb^{2+})

The sample supplied is a colorless solution of lead salt.

OBSERVATION



Chalky white ppt

NH_4OH is added dropwise



Chalky white ppt.

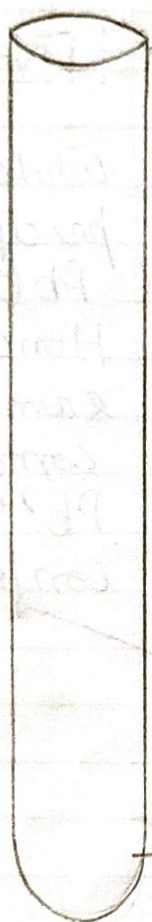
NH_4OH is added in excess

ACTION OF NH_4OH ON THE LEAD ION (Pb^{2+})

The sample supplied is a colourless solution of lead nitrate.

<u>EXPERIMENT</u>	<u>OBSERVATION</u>	<u>INFERENCE</u>
A portion of the original sample is taken in a test tube and NH_4OH is added dropwise and then in excess.	A chalky white precipitate of lead hydroxide is obtained which is insoluble in excess of NH_4OH . $\text{Pb}(\text{NO}_3)_2 + 2\text{NH}_4\text{OH} \rightarrow$ $\text{Pb}(\text{OH})_2 + 2\text{NH}_4\text{NO}_3$	White precipitate of $\text{Pb}(\text{OH})_2$. Hence the sample contains Pb^{2+} is confirmed.

ACTION OF NH_4OH ON THE LEAD ION (Pb^{2+})



Gelatinous white ppt.

NaOH is added
dropwise



Colourless
solution

NaOH is added
in excess

ACTION OF NaOH ON ZINC ION (Zn^{++})

The sample supplied is a colourless solution of zinc nitrate - $Zn(NO_3)_2$

<u>EXPERIMENT</u>	<u>OBSERVATION</u>	<u>INFERENCE</u>
A portion of the sample solution is taken in a test tube and to it sodium hydroxide NaOH is added, first a little and then in excess.	The solution turns gelatinous white precipitate due to the formation of zinc hydroxide. On adding excess NaOH the solution becomes transparent due to the formation of a complex salt. $Zn(OH)_2 + 2NaOH \rightarrow Na_2ZnO_2 + 2H_2O$ (soluble) $Zn(NO_3)_2 + 2NaOH \rightarrow Zn(OH)_2 + 2NaNO_3$ (gelatinous white).	Gelatinous white precipitate of $Zn(OH)_2$. Hence Zn^{++} ion is confirmed.

ACTION OF NaOH ON ZINC ION (Zn²⁺)



Crystalline white ppt

NH₄OH is added dropwise



Colourless solution.

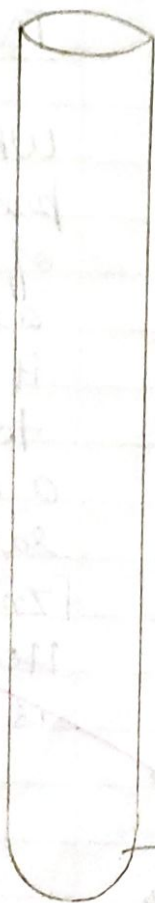
NH₄OH is added in excess

ACTION OF NH_4OH ON ZINC ION (Zn^{++})

The sample supplied is a colourless solution of Zinc nitrate - $\text{Zn}(\text{NO}_3)_2$

<u>EXPERIMENT</u>	<u>OBSERVATION</u>	<u>INFERENCE</u>
A portion of the sample supplied is taken in a test tube and to it ammonium hydroxide is added first a little then in excess.	The solution turns gelatinous white precipitate due to the formation of zinc hydroxide. On adding excess NH_4OH , the precipitate dissolves in it to form a complex salt. $\text{Zn}(\text{NO}_3)_2 + 2\text{NH}_4\text{OH} \rightarrow$ $\text{Zn}(\text{OH})_2 + 2\text{NH}_4\text{NO}_3$ (white ppt.) $\text{Zn}(\text{OH})_2 + 2\text{NH}_4\text{OH} + \text{NH}_4\text{NO}_3 \rightarrow$ $[\text{Zn}(\text{NH}_3)_4](\text{NO}_3)_2 + 4\text{H}_2\text{O}$	White precipitate of $\text{Zn}(\text{OH})_2$ and then it dissolves to form a complex salt $[\text{Zn}(\text{NH}_3)_4](\text{NO}_3)_2$. Hence Zn^{++} is confirmed.

(A) ACTION OF NaOH ON ZINC ION (Zn²⁺)



white ppt.

NaOH is added
disproportionate



white ppt

NaOH is added
in excess

ACTION OF NaOH ON CALCIUM ION (Ca^{++})

The sample supplied is calcium nitrate crystals.

PHYSICAL CHARACTERISTICS

Colour : Colourless

State : Crystalline

Odour : Odourless

Solubility: Soluble in water.

<u>EXPERIMENT</u>	<u>OBSERVATION</u>	<u>INFERENCE</u>
The portion of the supplied sample solution of Ca^{++} ion is taken in a test tube and NaOH solution was added to it first gently and then in excess.	White precipitate of calcium hydroxide is obtained. On adding excess NaOH, the chalky white precipitate remains. Hence, no change.	Presence of calcium ions.

ACTION OF NH_4OH ON CALCIUM ION (Ca^{++})

The sample supplied is calcium nitrate crystals.

PHYSICAL CHARACTERISTICS

- Colour : Colourless
- State : Crystalline
- Odour : Odourless
- Solubility : Soluble in H_2O

EXPERIMENT

OBSERVATION

INFERENCE

The portion of the supplied sample was taken in a test tube and a small amount of ammonium hydroxide was added to it.

No appreciable colour change occurs. No precipitation of $\text{Ca}(\text{OH})_2$ occurs even with addition of excess of NH_4OH . This is because of the concentration of OH^- from NH_4OH is so low that it cannot precipitate the hydroxide of calcium.

$\text{Ca}(\text{OH})_2$ is not precipitated on adding NH_4OH to calcium salt. Hence Ca^{++} ion is confirmed.

ACTION OF NaOH ON AMMONIUM ION (NH_4^+)

The sample supplied is ammonium chloride solution containing NH_4^+ ion.

<u>EXPERIMENT</u>	<u>OBSERVATION</u>	<u>INFERENCE</u>
The portion of the sample solution was taken in a test tube and NaOH was added first a little and then in excess.	No visible change appears but smell of ammonia gas was perceived on smelling carefully.	Presence of ammonia.
The issuing gas was passed through Nessler's reagent.	Nessler's reagent turns brown.	Presence of ammonia gas Hence ammonia salt confirmed.