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PHYSICS

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CHEMISTRY

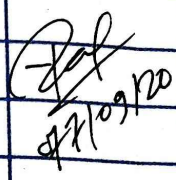
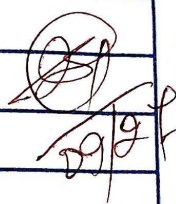
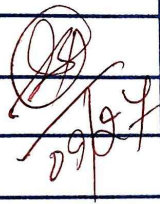
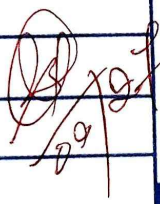
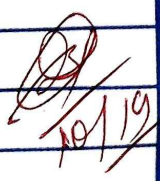
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HOTEL MANAGEMENT

Name : Dinesh Shrestha
Class : 11 Sec. Germaniam
Subject : _____ Roll No.: _____

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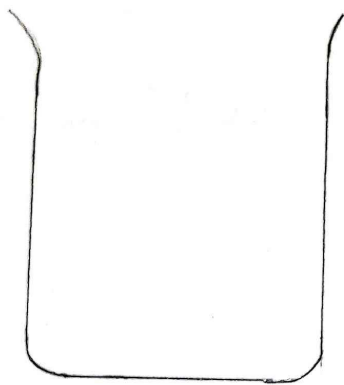


Fig. 1 Beaker

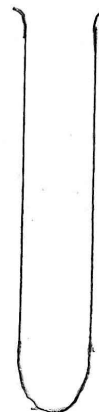


Fig. 2 : Test - tube



Fig. 3: Test tube holder

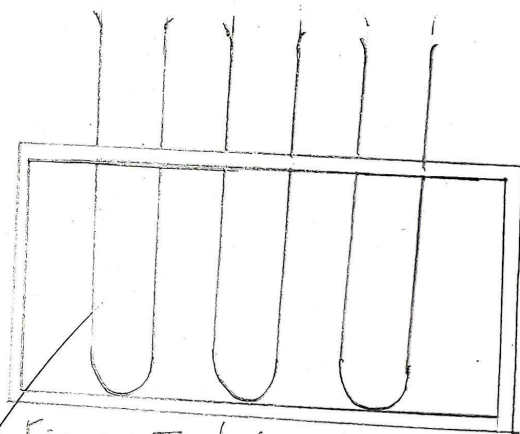


Fig 4: Test tube rack

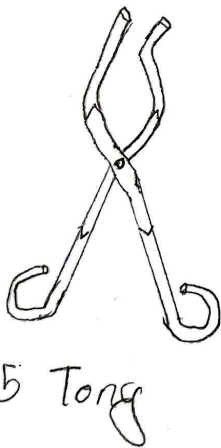


Fig: 5 Tong



Fig 6 watch glass

EXPERIMENT NO: 1

NAME OF EXPERIMENT: TO STUDY DIFFERENT APPARATUS USED IN CHEMICAL LAB

- 1) Beaker : It is used for storing chemicals, transferring chemicals and heating chemicals.
2. Test-tube : It is used for carrying out different chemical reactions.
3. Test-tube Holder : It is used for holding test tube.
4. Test-tube Rack :- It is used for keeping test tube after using for reaction.
5. Tong :- It is used for lifting laboratory items including hot evaporating dishes, beakers, crucibles, etc.
6. Watch glass :- It is used to evaporate a liquid, for heating a small amount of substance and as a cover for beaker.

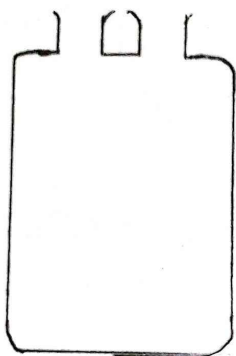


Fig. 7: Woulfe's bottle

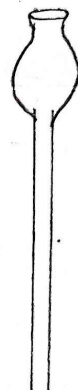


Fig. 8 Thistle funnel

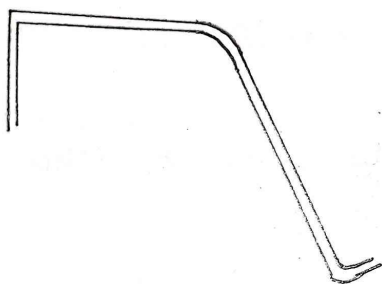


Fig 9: Delivery tube



Fig 10 Beehive shelf

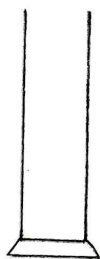


Fig 11 Gas jar

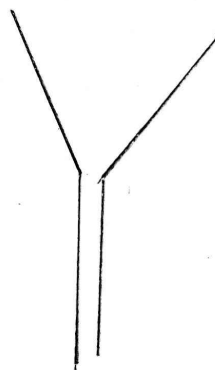


Fig 12 Funnel

7. Woulfe's Bottle :- It is used for preparation of different gas.
8. Thistle funnel :- It is used in pouring different types of chemicals into woulfe's bottle.
9. Delivery tube :- It is used to pass gas from one container to another.
10. Beehive shelf :- It is the laboratory instrument which gives support to the gas jar in preparation of gas.
11. Gas jar :- It is used in laboratory for collecting gas.
12. Funnel :- It is used to pour the solution or liquid from one container to another container.



Fig 13 Glass pipe

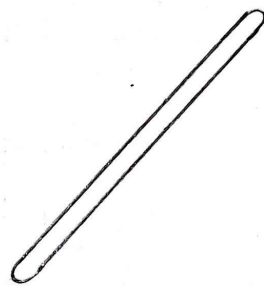


Fig 14 Glass rod



Fig 15 Porcelain basin

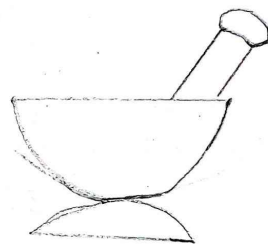


Fig 16 Mortar and pestle

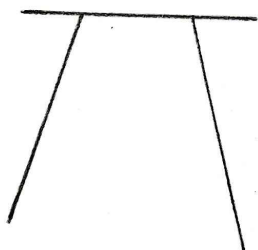


Fig 17 Tripod stand

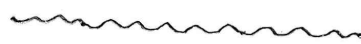


Fig 18 Wire gauge

13. Glass pipe:- It is used to connect other pieces of lab equipment or can be cut, bent and stretched for variety of uses.
14. Glass rod:- It is used to mix the solution or mixture of chemicals.
15. Porcelain basin:- It is used to evaporate excess solvents.
16. Mortar and pestle:- It is used for crushing or graining substances.
17. Tripod stand:- It is used for the support of different vessels while heating chemicals.
18. Wire gauge:- It is used while heating different chemicals because it distributes the heat uniformly.



Fig 19 Eudiometer tube



Fig 20 Burette



Fig 21 Pipette

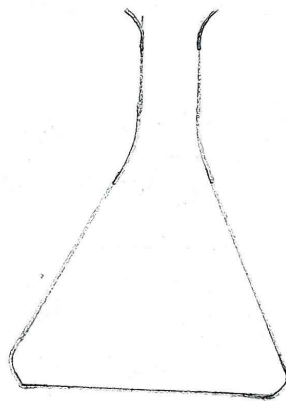


Fig 22 Conical flask

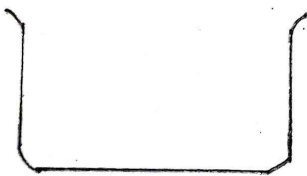


Fig: 23 Water trough

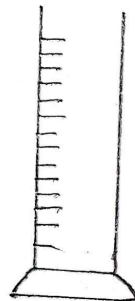


Fig 24 Measuring cylinder

19. Eudiometer tube: It is used to measure the change in volume of a gas mixture following a physical or chemical change.
20. Burette: It is used for delivering known volumes of a liquid or to measure the volume of liquid or a gas.
21. Pipette: It is the instrument which is used for taking out small but exact amount of liquid chemicals.
22. Conical flask: It is used for performing different chemical reactions in it.
23. Water trough: It is used to cool down the hot instruments and can be used for preparation of gas.
24. Measuring cylinder: It is used to measure the volume of different chemicals.

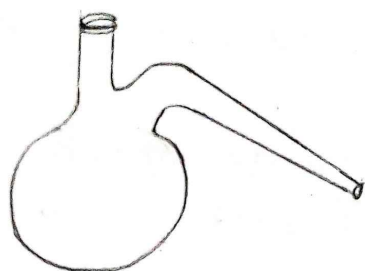


Fig 25 Glass retort

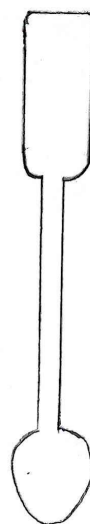


Fig 26 Spatulla



Fig 27 Blow pipe

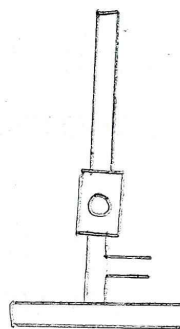


Fig 28 Burner

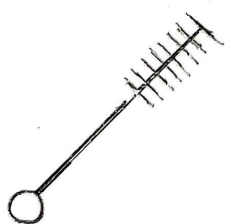


Fig 29 Brush

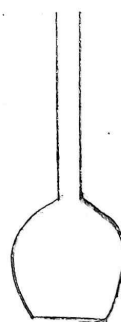


Fig 30 Volumetric flask

25. Glass retort: It is used for distillation of substance that are placed inside and subjected to heat.
26. Spatula: It is used to mix, spread and lift materials used in lab during chemical reactions.
27. Blow pipe: It is used to control stream of air across a candle flame onto a pepper corn-sized sample of the substance to be tested.
28. Burner: It is used for heating, sterilization and combustion.
29. Brush: It is used for cleaning test-tube and narrow mouth laboratory glassware such as graduated cylinder, burettes, etc.
30. Volumetric flask: It is used for precise dilutions and preparation of standard solutions.

RESULT

Hence, from the experiment, the apparatus used in chemistry laboratory were studied.

[Signature]
27/09/20

EXPERIMENT NO: 2

NAME OF EXPERIMENT: TO OBTAIN SAND IN PURE AND DRY STATE FROM THE MIXTURE OF SAND AND COMMON SALT

APPARATUS REQUIRED

- | | | |
|-----------|---------------|-----------------|
| 1. Funnel | 2. Beaker | 3. Glass rod |
| 4. Stand | 5. Test tubes | 6. Filter paper |

CHEMICAL REQUIRED

1. Silver nitrate solution (AgNO_3)
2. Mixture of sand and common salt

THEORY

The soluble and insoluble components of mixture can be separated by dissolving the mixture in water followed by filtration.

Filtration can be defined as the method of separating the insoluble component and solution of soluble component by means of porous medium like filter paper. The insoluble component i.e. sand obtained on filter paper is called residue and solution of soluble component i.e. salt which passes through filter paper and is collected in beaker is called filtrate.

The purity of sand can be checked by treating sand washed water with few drops of silver

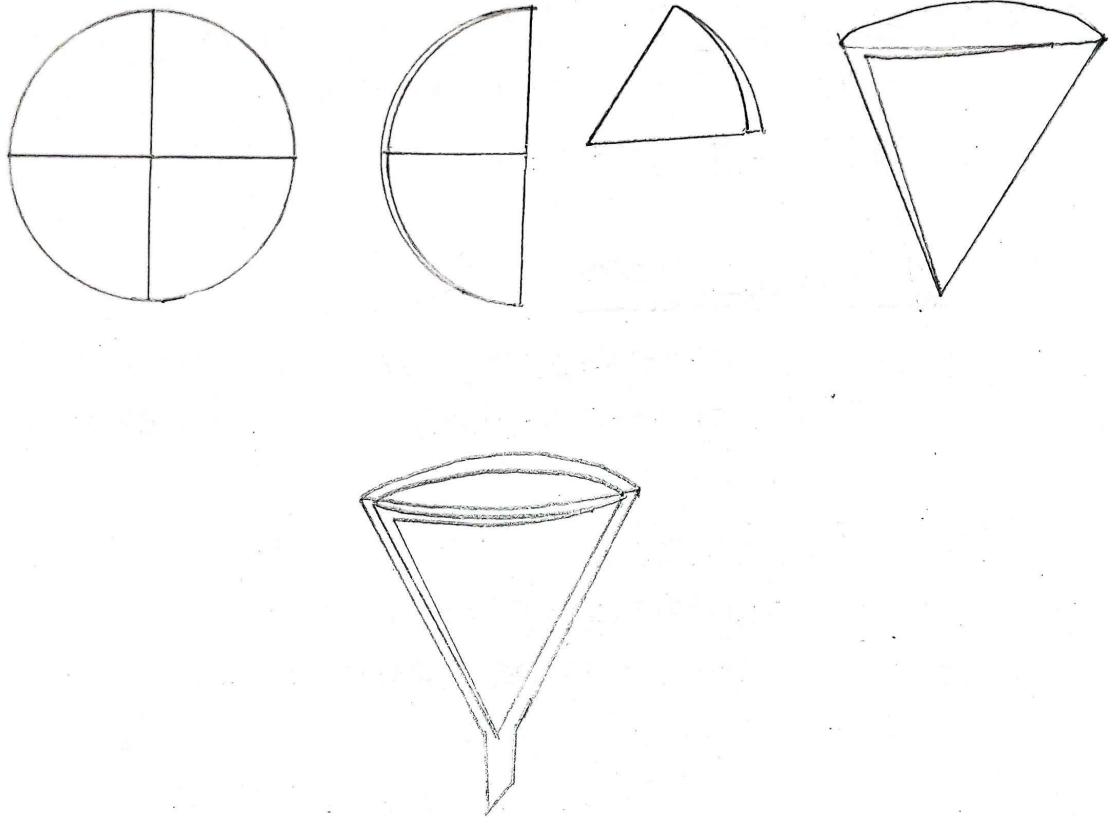
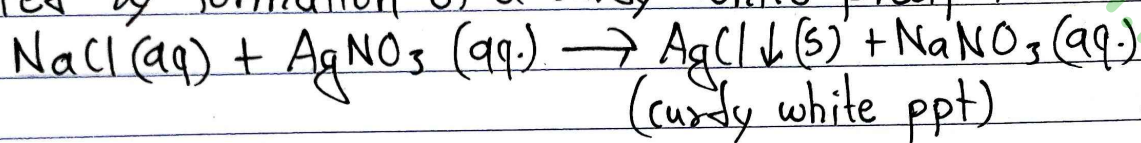


Fig. (a) Folding of filter paper

nitrate solution. Presence of common salt in sand is indicated by formation of a curdy white precipitate.



PROCESS

1. The mixture of sand and common salt was taken in a beaker and a little amount of water was added to the beaker. The mixture was stirred with a glass rod to dissolve the common salt.
2. The mixture of solution was warmed gently.
3. The sand was allowed to settle down. Then the supernatant clear liquid was decanted off. The water was added and the process was repeated 3-4 times.
4. The filter paper was folded as shown in the figure and fitted into the funnel.
5. By means of glass rod, the supernatant liquid was transferred into the funnel.
6. Few drops of the filtrate were taken in a test tube directly from the stem of the funnel. Then a few drops of silver nitrate solution were added to the test tube. The presence of common salt in the sand was indicated by the formation of curdy white precipitate.
7. The process was continued until a curdy white precipitate was absent.
8. All the sand was transferred to the filter paper.

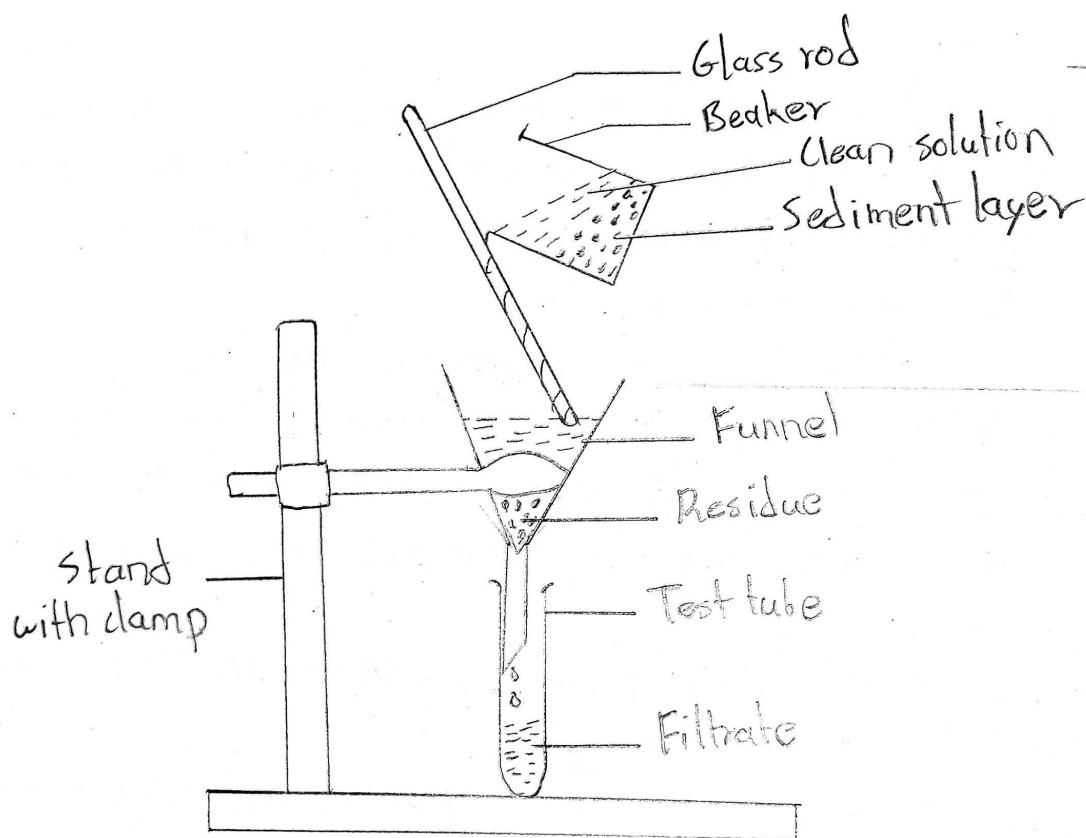


Fig (b) Filtration

9. The filter paper was removed carefully from the funnel.
10. The sand was dried over the bunsen burner.

OBSERVATIONS

Experiment	Observation	Inference
1. Few drops of sand-washed water was treated with few drops of AgNO_3 solution.	A curdy white ppt. was observed.	Presence of common salt in sand.
2. After washing the sand again, few drops of sand-washed water was treated with AgNO_3 solution	No any precipitation was observed.	Absence of common salt in sand.

PRECAUTIONS:

1. While filtering, the solution should not come up to the rim of the filter paper.
2. The stem of funnel should touch the inner wall of the beaker.
3. While drying the sand, care should be taken so that the filter paper does not burn.
4. Filtration should be done using a glass rod.
5. All the glasswares should be handled with care.

RESULT

Sand was obtained in pure and dry state from their mixture by dissolving the mixture in water followed by filtration, washing and drying.

~~09/09/97~~

EXPERIMENT NO: 3

NAME OF EXPERIMENT: TO OBTAIN THE CRYSTALS OF BLUE VITRIOL IN PURE AND DRY STATE FROM BAZZAR COPPER SULPHATE

APPARATUS REQUIRED

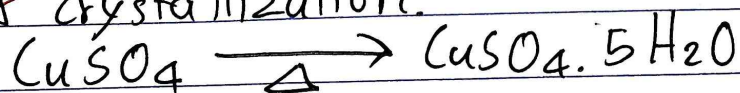
1. Beaker
2. Funnel
3. Burner
4. Porcelain basin
5. Tripod stand
6. Glass rod
7. Filter paper

CHEMICAL REQUIRED

1. Impure bazaar copper sulphate

THEORY

Pure crystal of copper sulphate can be obtained by crystallization of saturated solution of impure Bazaar copper sulphate. The solution which can dissolve no more solute at given temperature is called saturated solution. The process by which a saturated solution at given temperature is heated to a temperature called crystallization point and then allowed to cool to obtain crystalline substance is called crystallization.



Crystals can be defined as homogeneous substances having a fixed shape, sharp edge and shining

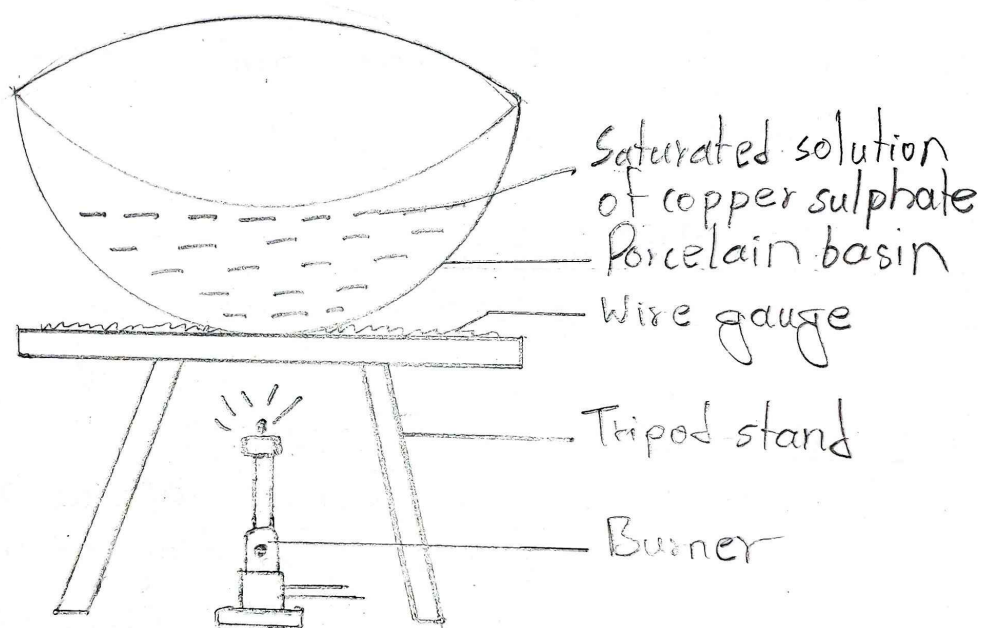
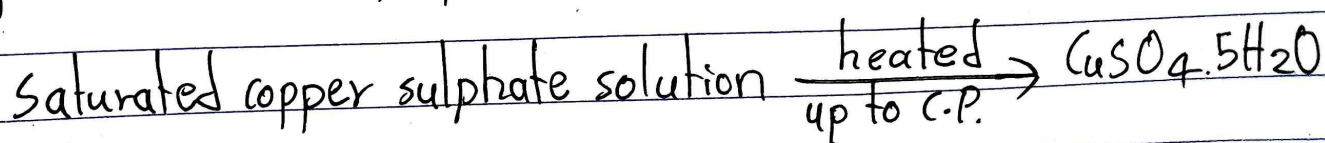


Fig. Formation of supersaturated solution of copper sulphate.

appearance. All the crystalline substances are made up of crystals.

PROCESS

1. One test-tube of water was taken in a clean beaker and impure copper sulphate was added to the beaker to get a saturated solution at room temperature and filtered with constant stirring with a glass rod.
2. Then the saturated solution of copper sulphate was taken in the porcelain basin and evaporated up to the crystallization point (To confirm the crystallization point, a drop of the solution was removed/taken with a glass rod on a dry outer surface of a test tube filled with cold water. The appearance of milli-crystals showed reaching of crystallization point).
3. After reaching that point the basin was removed from the flame and allowed to cool slowly at room temperature, basin was floated in a water trough containing cold water. After some time there was the formation of the crystal.
4. Crystals were separated from the liquid by decantation of mother liquor and soaked between pieces of filter paper.



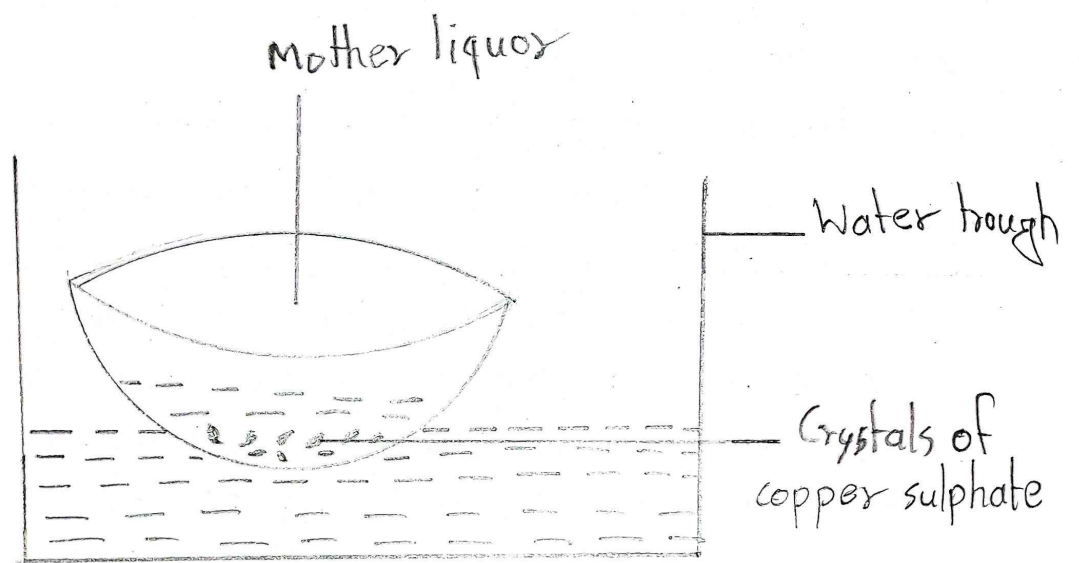


Fig: Formation of copper sulphate crystals.

OBSERVATION TABLE

Experiment	Observation	Inference
1. Drops of heated solution was taken and kept over dry outer surface of test tube filled with cold water.	1. Milli crystals did not form.	1. The crystallization point was not reached.
2. Experiment no. 1 was repeated after further heating of the solution.	2. Milli crystals were observed.	2. The crystallization point was reached.

PRECAUTIONS

1. Saturated solution of copper sulphate should be prepared at room temperature.
2. Solution should be evaporated upto crystallization point.
3. Solution should not be evaporated completely.
4. Blue vitriol should never be dried in open flame.

RESULT

Pure and dry crystals of copper sulphate was obtained from its impure sample.

09/9/21

EXPERIMENT NO: 4

NAME OF EXPERIMENT: TO OBTAIN COMMON SALT IN PURE AND DRY STATE BY NEUTRALIZATION PROCESS

APPARATUS REQUIRED

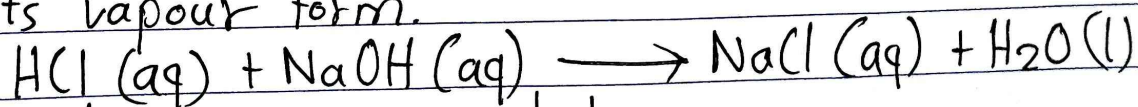
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|--------------------|---------------|--------------|
| 1. Porcelain basin | 2. Beaker | 3. Funnel |
| 4. Glass rod | 5. Wire gauge | 6. Test tube |
| 7. Stand | | |

CHEMICALS REQUIRED

1. Bench (dil.) HCl solution
2. Bench (dil.) NaOH solution
3. Silver nitrate (AgNO_3) solution.
4. Blue and red litmus paper

THEORY

Common salt can be obtained by neutralisation of bench hydrochloric acid with bench sodium hydroxide. It is obtained in dry and solid state by evaporating its aqueous solution. Neutralisation can be defined as the process in which an acid and a base react to give salt and water. Evaporation can be defined as the process of conversion of a liquid into its vapour form.



The reaction is ionic as below:

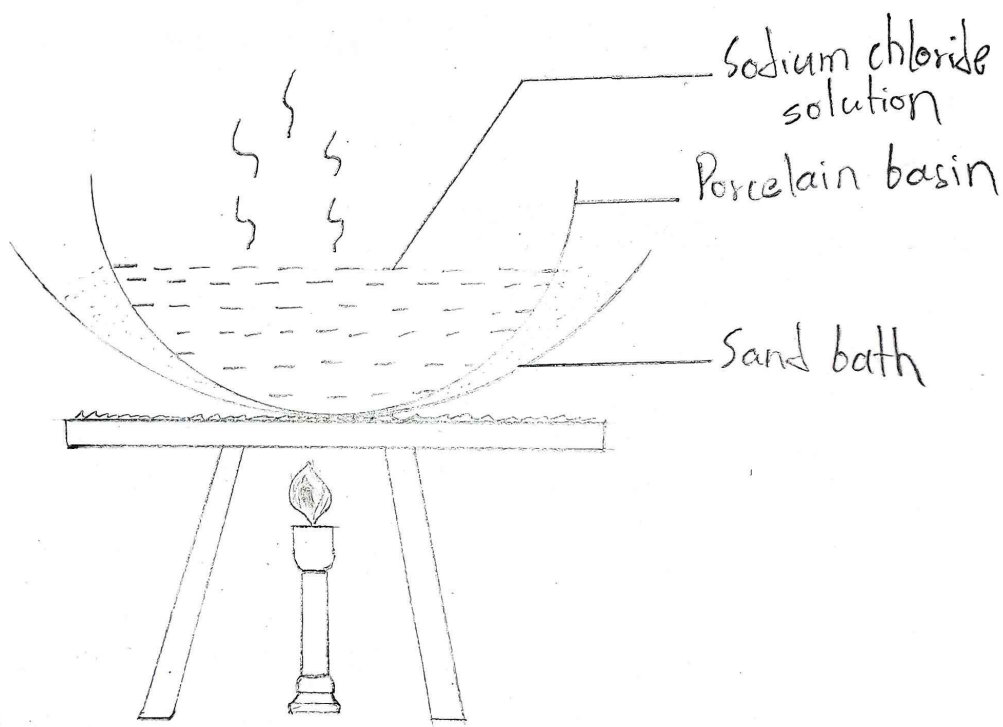
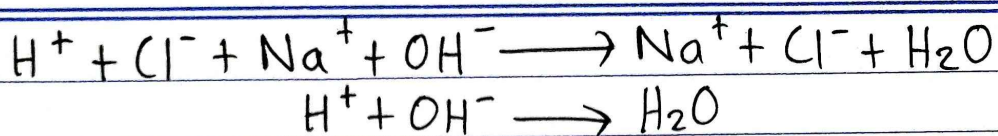


Fig. Evaporation of common salt solution.



Therefore, neutralisation can be defined as the formation of water molecule by the combination of H^+ ion from an acid and OH^- ion from the base.

PROCESS

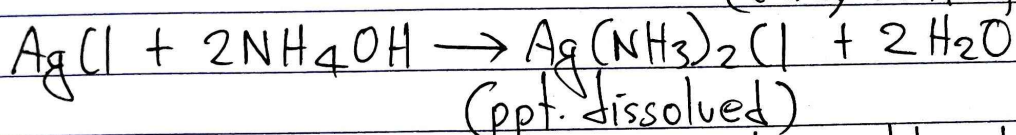
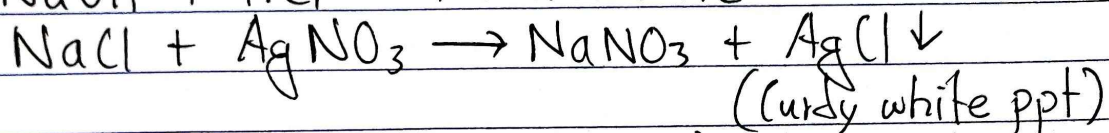
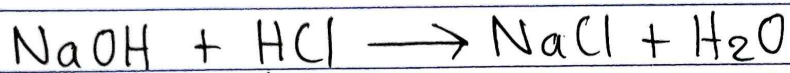
1. A half test ~~test~~ tube full of bench hydrochloric acid was taken in a porcelain basin.
2. A half test tubeful of bench sodium hydroxide was added a little at a time with the help of a glass tube.
3. The mixture was stirred constantly with a glass rod.
4. The mixture solution was introduced on the pieces of both red and blue litmus paper with the help of a glass rod.
5. If the blue litmus turned red, the alkali was introduced dropwise. Similarly, if the red litmus turned blue, the acid was introduced dropwise. In that way, the neutral point was ascertained by the trial-and-error method.
6. The solution was filtered and evaporated to get dry and solid sodium chloride.
7. A pinch of the common salt was taken in a test-tube and dissolved in water. Then a few drops of silver nitrate solution were added to the test tube. The curdy white precipitate was formed.

indicating the presence of chloride salt.

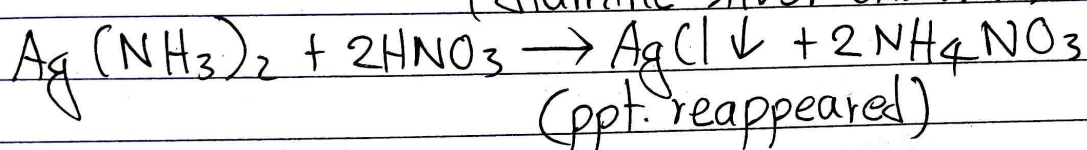
OBSERVATION TABLE

Experiment	Observation	Inference
1. A few drops of the mixture solution were introduced on blue and red litmus papers.	1. Blue litmus paper turned to red.	1. The solution was acidic.
2. After adding few drops of NaOH , a few drops of the mixture solution were again introduced on red and blue litmus papers.	2. Blue litmus was not affected but red litmus turned to blue.	2. The solution was basic.
3. After adding few drops of bench HCl , the mixture was introduced on blue and red litmus papers.	3. Both blue and red litmus papers were not affected.	3. The solution was neutral.
4. The salt solution was treated with a few drops of AgNO_3 solution.	4. Curdy white precipitate was formed.	4. Presence of ion chloride was observed.

REACTION INVOLVED



(diamine silver chloride)



RESULT

Common salt was obtained by neutralisation of bench HCl by bench NaOH followed by evaporation.

PRECAUTIONS

1. The mixture solution should be completely neutral.
2. All the glasswares should be handled with care.
3. Separate glass tubes should be used for acid and base bottles.

09/21

EXPERIMENT NO 5

NAME OF EXPERIMENT: TO SEPARATE THE MIXTURE OF SAND AND CAMPHOR BY THE PROCESS OF SUBLIMATION

APPARATUS REQUIRED

1. Porcelain basin
2. Funnel
3. Filter paper
4. Glass rod

CHEMICALS REQUIRED

1. Mixture of sand and camphor

THEORY

The solid or liquid substance which convert easily into vapour ~~from~~ form by little supply of heat are called volatile substance. Example: camphor, iodine, petrol, etc. The mixture of sand and camphor is separated by sublimation process. Sublimation can be defined as the process of converting solid directly into vapour and cooling back, the vapour directly into solid state. Thus obtained solid is called sublimate. Camphor is obtained as sublimate from the given mixture.

PROCESS

1. The mixture of sand, camphor and common salt was taken in a dry porcelain basin.

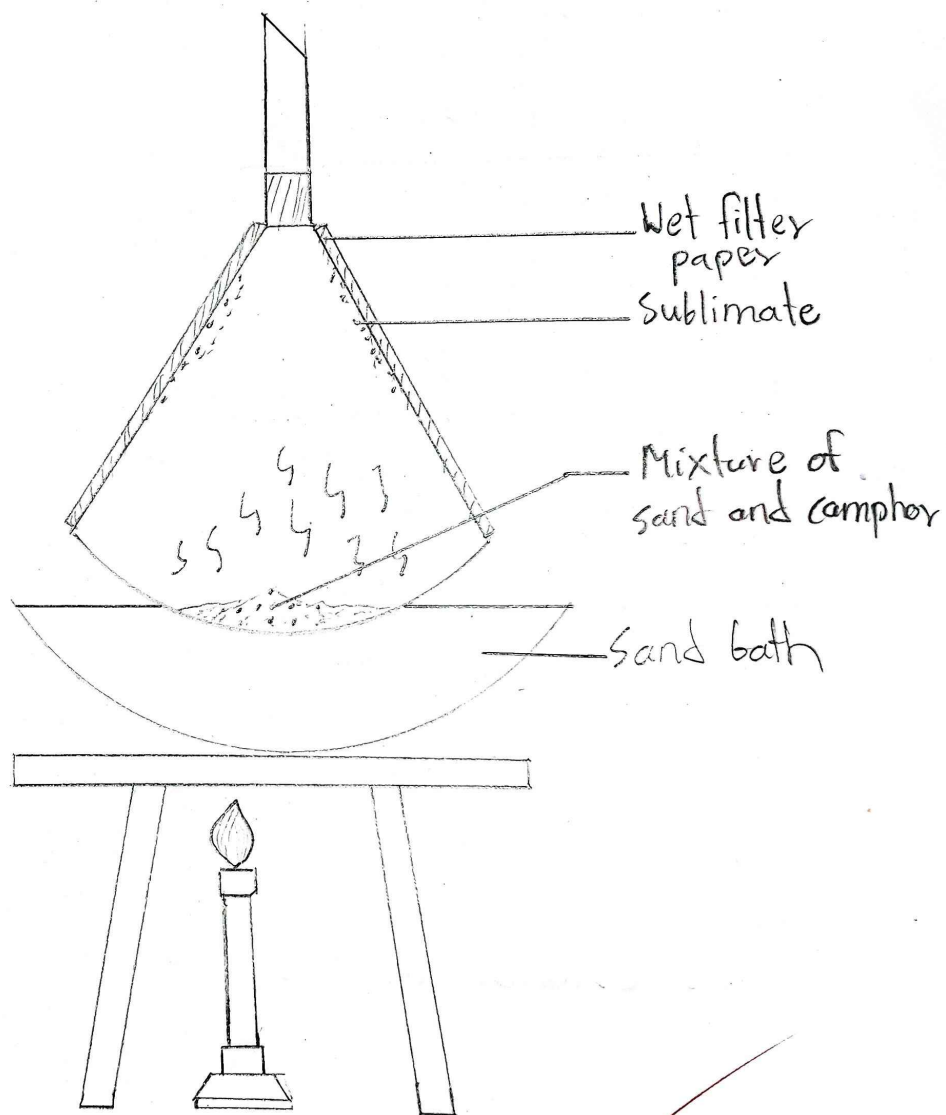


Fig. Sublimation

2. A clean and dry funnel was taken. A moist filter paper was put on the outside of the funnel wall and the stem of the funnel was closed up with a piece of filter paper from inside as shown in figure.
3. The funnel was inverted over the basin.
4. The basin with the inverted funnel was placed on a sand bath over a tripod stand.
5. The mixture was heated gently till the whole of the camphor vapours were given off which could be ascertained by smelling the mixture and by seeing the white vapours inside the funnel.
6. The funnel was removed, the mixture was stirred and smelled. No smell of camphor was noticed. So, the heating was stopped.
7. The camphor was scrapped out on a filter paper by means of a glass rod.

OBSERVATIONS

Experiment	Observation	Inference
1. After heating the mixture, the funnel was removed. The mixture was stirred and smelled.	1. Characteristic smell of camphor was noticed.	1. Presence of camphor in the mixture.
2. After heating the mixture for sometime, the funnel was	2. No smell of camphor.	2. Absence of camphor in the mixture.

removed. The mixture was stirred and smelled.

RESULT

Sand and camphor were separated from their mixture by the sublimation process.

PRECAUTIONS

1. All glasswares should be handled with care.
2. The filter paper wrapped outside the funnel should be moistened respectively.
3. While moistening the filter paper, the sand should not get wetted.
4. The funnel should cover whole of the mixture in the basin.



EXPERIMENT NO. - 6

NAME OF EXPERIMENT: TO OBTAIN BLACK OXIDE OF COPPER AND STUDY IT'S PROPERTIES

APPARATUS REQUIRED

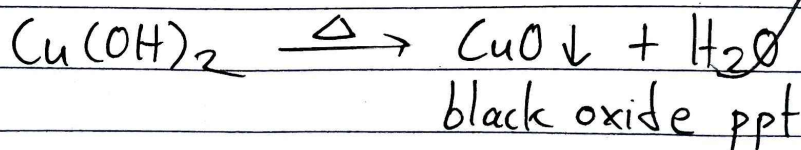
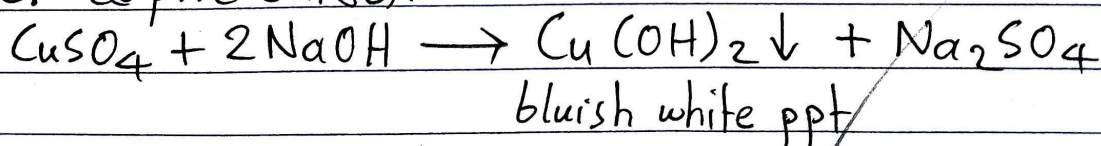
- | | | |
|---------------------|-------------------|--------------|
| 1. Beaker | 2. Glass rod | 3. Burner |
| 4. Tripod stand | 5. Wire gauze | 6. Test tube |
| 7. Test tube holder | 8. Test tube rack | 9. Funnel |
| 10. Filter paper | | |

CHEMICALS REQUIRED

- | | |
|--------------------|-----------------------------|
| 1. Copper sulphate | 2. Dilute sodium hydroxide |
| 3. Glucose | 4. Barium chloride solution |
| 5. Sulphuric acid | 6. Conc. hydrochloric acid |

THEORY

When copper sulphate solution is treated with bench sodium hydroxide then a bluish white precipitate of cupric hydroxide is obtained. The precipitate on heating strongly decomposes to give black oxide of copper (cupric oxide).



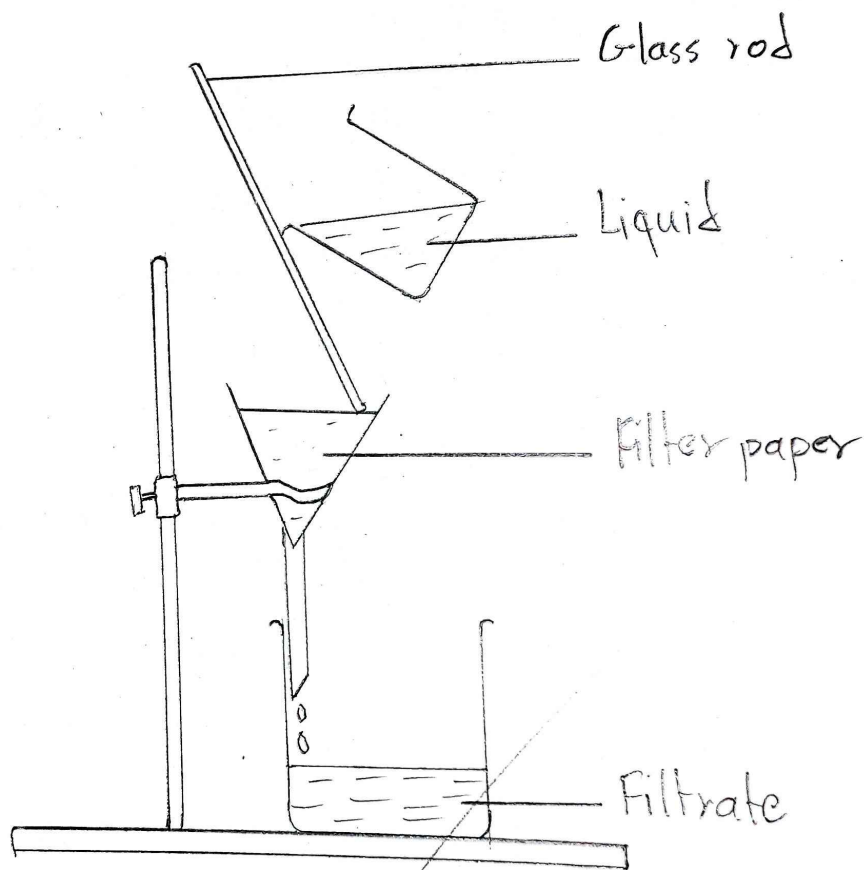
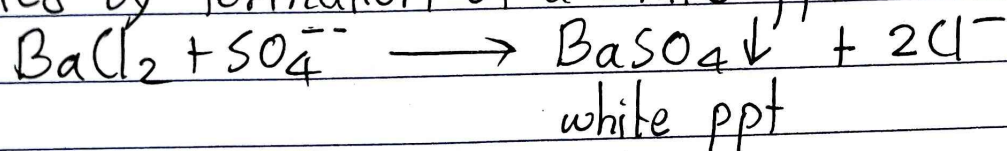


fig. Filtration

The purity of black oxide can be checked by treating the residue washed water with few drops of BaCl_2 solution. Presence of sulphate ion in the residue is indicated by formation of a white ppt.



PROCESS

1. A test tubeful of strong solution of copper sulphate was taken in a beaker.
2. Bench sodium hydroxide was added to obtain a bluish white precipitate.
3. The solution was allowed to stand for some time in order to settle down the precipitate. To the supernatant liquid, a drop of bench NaOH was added.
4. A fresh ppt was appeared. So, few more drops of bench NaOH was added. Again, the completeness of precipitation was checked as in No. (3).
5. No fresh ppt was appeared so the solution was strongly heated.
6. Black residue was formed. When no more black residue was formed, the solution was filtered.
7. The residue was washed 2-3 times with distilled water.
8. Few drops of residue-washed water coming out from the stem of the funnel was taken in a test tube. To this, few drops of barium chloride solution was added.
9. A white precipitate was appeared which mean the

black oxide was contaminated with SO_4^{2-} ions (Na_2SO_4 solution). The ppt was washed again.

10. When no more ppt was produced by the residue-washed water with BaCl_2 solution, then the black residue was left to dry in air.

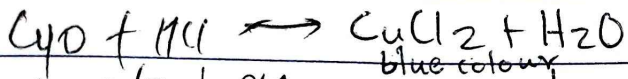
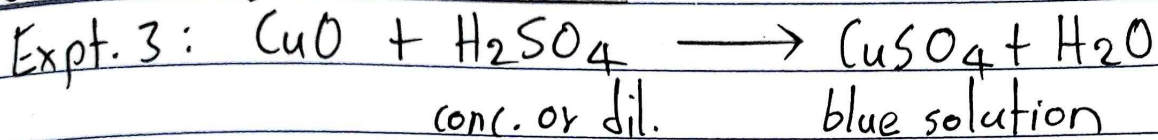
STUDY OF ITS PROPERTIES

1. Concentrated sulphuric acid was added to a pinch of the black oxide in a test tube. A blue colouration was seen.

OBSERVATIONS

Experiment	Observation	Inference
1. The black residue-washed water was treated with few drops of BaCl_2 solution.	1. White ppt	1. Presence of SO_4^{2-} ion in the black oxide.
2. After washing, the black residue-washed water was treated with few drops of BaCl_2 solution.	2. No any ppt	2. Absence of SO_4^{2-} ion in the black oxide.
3. A pinch of the black oxide was treated with H_2SO_4 .	3. Blue colouration was seen.	3. Formation of CuSO_4 solution (black oxide is a basic oxide).

CONCERNED REACTION



RESULT, $\text{CuO} + \text{H}_2\text{O} \rightarrow$ ^{blue colour} No reaction

Black oxide of copper was prepared by the action of copper sulphate solution with dilute sodium hydroxide followed by heating.

PRECAUTIONS

1. All the glasswares should be handled with care.
2. All the copper sulphate should be converted into cupric hydroxide to get the maximum amount of black oxides.

Pat
10/26

EXPERIMENT NO. 7

NAME OF EXPERIMENT: TO RECOVER THE PRECIPITATE OF BARIUM SULPHATE IN PURE AND DRY STATE

APPARATUS REQUIRED

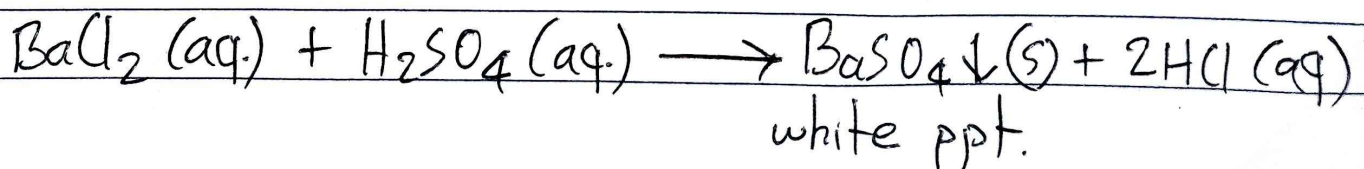
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| 1. Beaker | 2. Test tube | 3. Glass rod |
| 4. Porcelain basin | 5. Funnel | |

CHEMICALS REQUIRED

1. Silver nitrate solution
2. Barium chloride solution
3. Sulphuric acid solution

THEORY

Barium sulphate (BaSO_4) can be obtained in solid state by treating barium chloride solution with excess of sulphuric acid solution. This is precipitation reaction that can be defined as the double decomposition reaction in which an insoluble solid is formed by the action of two substances in solutions. The insoluble solid formed is called precipitate. Here, BaSO_4 is formed as a white precipitate which can be obtained in pure state after several washings.



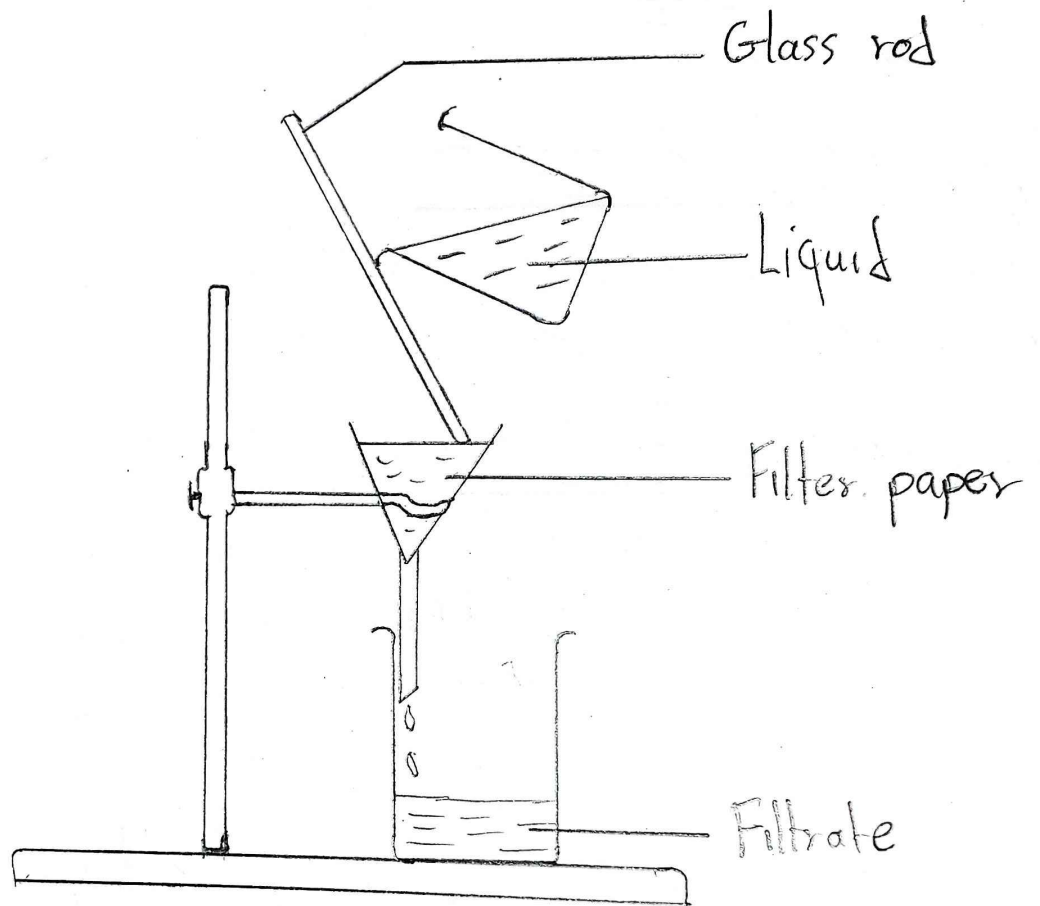
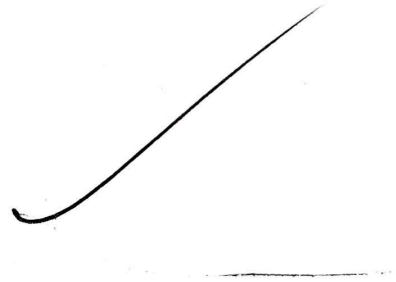
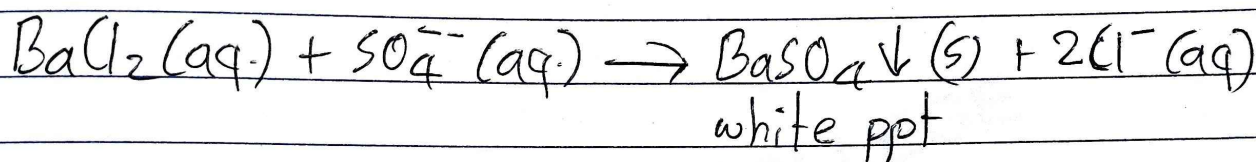
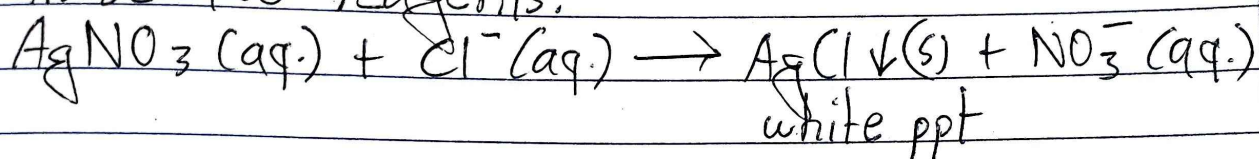


fig. Filtration



The purity of the precipitate can be checked by treating the ppt - washed water with few drops of AgNO_3 solution and BaCl_2 solution separately. Presence of chloride and sulphate ions is indicated by formation of a white precipitate respectively with these two reagents.



PROCESS

1. Take A half test tubeful of barium chloride solution was taken in a beaker.
2. A half test tubeful of dilute sulphuric acid of equal molarity was added dropwise. ~~Nearly less than a half test tubeful of~~
After each addition, the solution was stirred with a glass rod.
3. A white precipitate was formed. The solution was heated to boil and allowed to stand to enable the precipitate settle down.
4. A few ml of the supernatant liquid was taken in a test tube and 2 drops of the precipitant (i.e. H_2SO_4 solution) was added.
5. A white ppt appeared so few more drops of the precipitant were added to the solution in the beaker.

6. The solution was heated to boil, allowed to stand to settle down the ppt and the completeness of precipitation was checked as in number (4).
7. The fresh ppt was appeared in the test tube so the precipitation was incomplete so few more drops of dilute H_2SO_4 were added and the completeness of precipitation reaction was checked again.
8. After the completeness of precipitation, the solution was heated to boil. It was allowed to stand for some time and the supernatant liquid was decanted off.
9. The precipitate was washed three to four times by the process of washing by decantation.
10. The precipitate washed water was taken in two test tubes. A few drops of AgNO_3 and BaCl_2 solutions were added separately.
11. Formation of a white precipitate with AgNO_3 solution indicates the presence of chloride ion (either BaCl_2 solution or HCl solution) in BaSO_4 ppt. Similarly, formation of a white precipitate with BaCl_2 solution indicates the presence of sulphate ion (H_2SO_4 solution) in BaSO_4 ppt.
12. When a white ppt was appeared in any of the test tubes, the BaSO_4 ppt was washed again. Again, the presence of Cl^- or SO_4^{2-} ions was tested in it.
13. The ppt was stopped washing when no any ppt. was further seen on treating the ppt-washed fresh water with AgNO_3 and BaCl_2 solutions separately.

14. The solution in the beaker, was filtered and the pure precipitate was collected on a ~~dry~~ filter paper.
15. finally, the precipitate was dried over the Bunsen burner.

OBSERVATIONS

Experiment	Observation	Inference
1. The precipitate-washed water was treated with few drops of AgNO_3 solution.	1. Curdy white precipitate was formed.	1. Presence of chloride ion in the precipitate of BaSO_4 .
2. The precipitate washed water was treated with few drops of AgNO_3 solution.	2. No any precipitate was formed.	2. Absence of chloride ion in the precipitate of BaSO_4 .
3. The precipitate washed water was treated with few drops of BaCl_2 solution.	3. White precipitate was formed (which is insoluble in HCl)	3. Presence of sulphate ion in the BaSO_4 ppt.
4. The precipitate washed water was treated with few drops of BaCl_2 solution.	4. No any ppt. was formed.	4. Absence of sulphate ion in the BaSO_4 ppt.

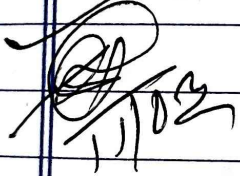
RESULT

White precipitate of Barium sulphate was obtained from

the reaction between H_2SO_4 and $BaCl_2$.

PRECAUTIONS

1. The precipitation should be complete.
2. During washing by decantation, there should not be any loss of the precipitate.
3. All the glass wares should be handled with care.
4. While drying the ppt over burner, care should be taken so that the filter paper does not burn.
5. The precipitant should never be added in a very large excess.


11/10/21

EXPERIMENT NO. 8

NAME OF EXPERIMENT: TO PREPARE AMMONIA GAS AND STUDY ITS PROPERTIES

APPARATUS REQUIRED

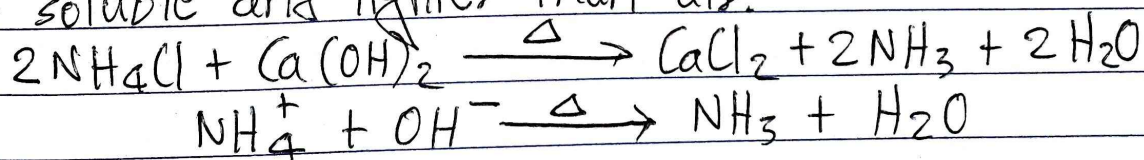
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|-----------------------|------------------|
| 1. Round bottom flask | 2. Delivery tube |
| 3. Cork | 4. Gas jar |
| 5. Stand | |

CHEMICALS REQUIRED

- | | |
|----------------------|----------------------|
| 1. Ammonium chloride | 2. Slaked lime |
| 3. Conc. HCl | 4. Mercurous nitrate |
| 5. Copper sulphate | 6. Ferric chloride |
| 7. Phenolphthalein | 8. Nessler's reagent |

THEORY

Ammonia gas is prepared by heating mixture of ammonium chloride and slaked lime. The gas is collected by downward displacement of air since it is water soluble and lighter than air.

PROCESS

A glass tube was taken and it was bent at right angle. A clean round bottom flask was taken. To this flask, the mixture of ammonium chloride

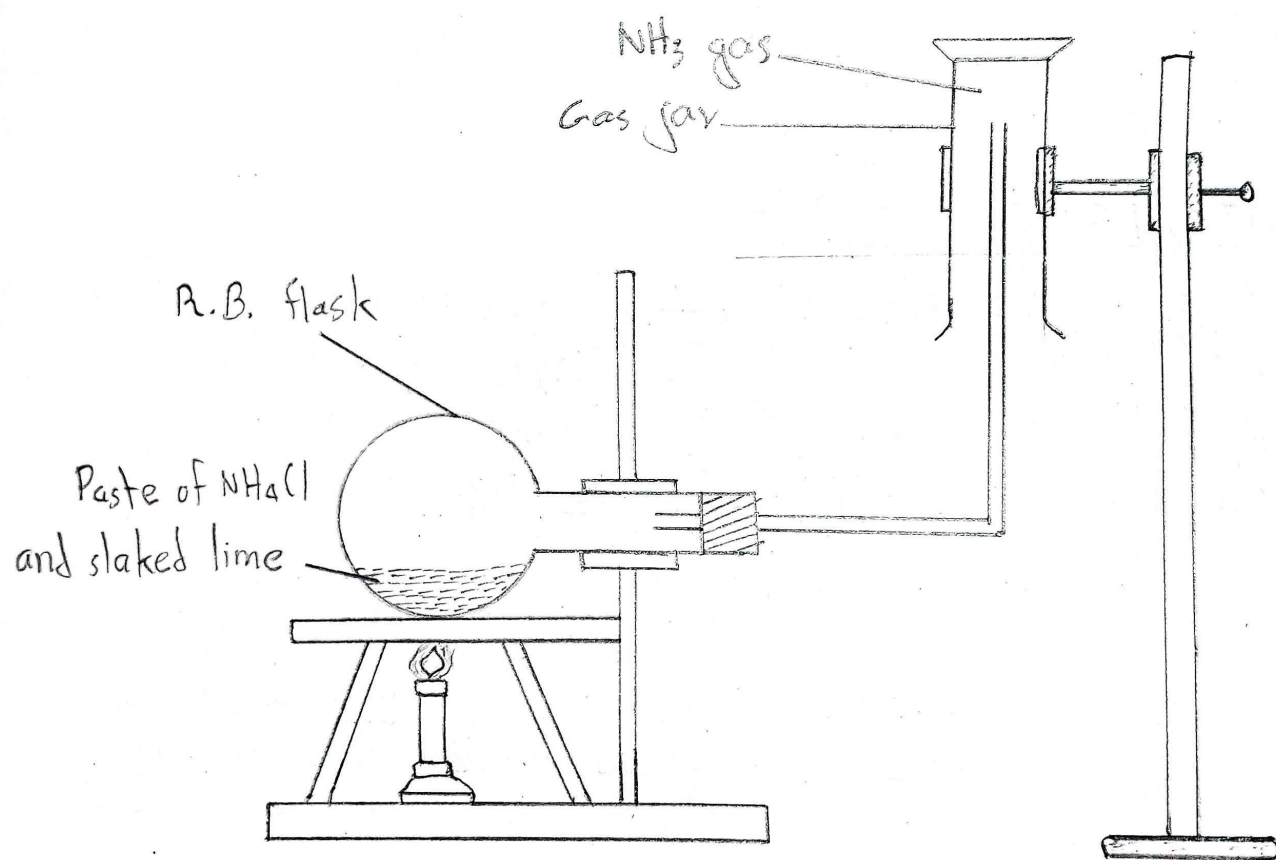


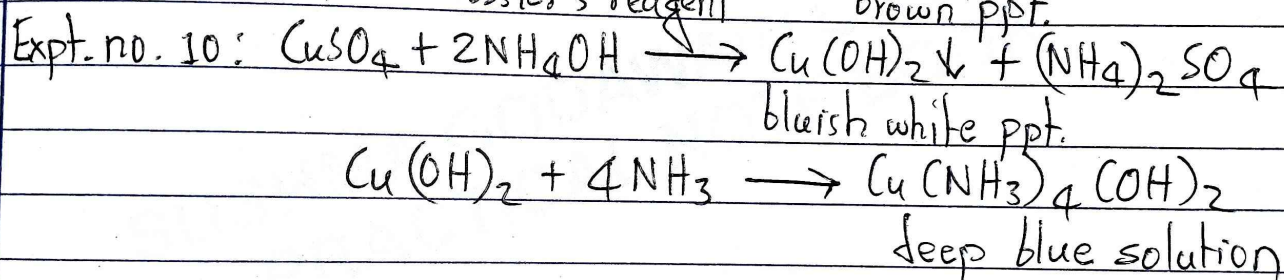
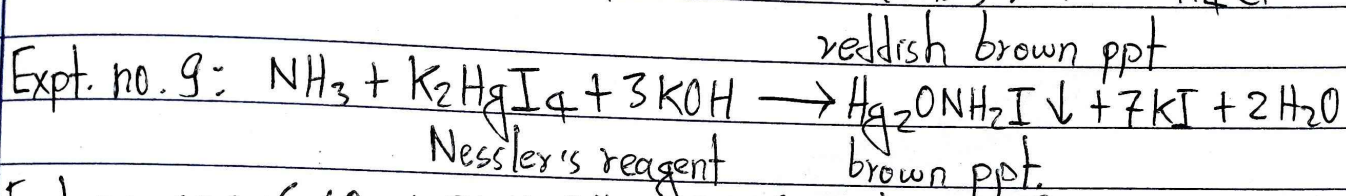
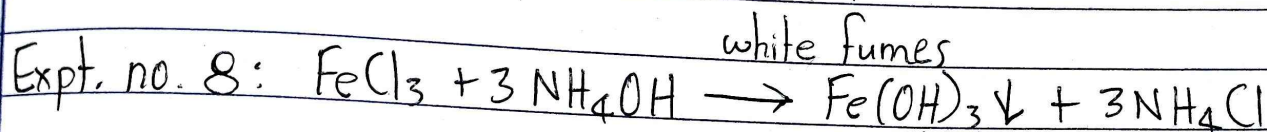
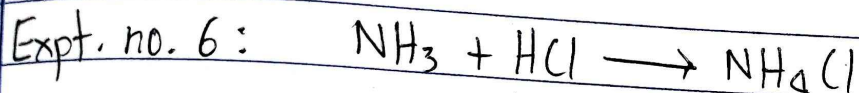
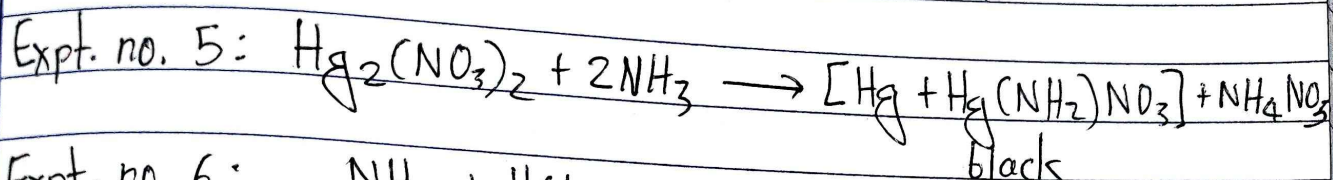
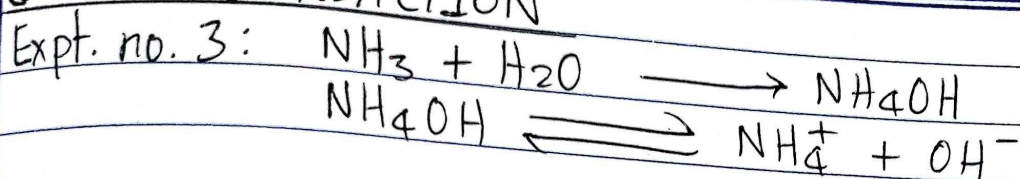
fig. Laboratory preparation of ammonia gas

and slaked lime was put in 1:2 ratio by weight. A few drops of water was added to make the mixture into paste. The apparatus was fitted as shown in figure and it was made airtight. Then the mixture was heated and the ammonia gas was collected by downward displacement of air. Its properties were studied by performing following experiments.

OBSERVATIONS

Experiment	Observation	Inference
1. The colour and odour of the gas in the gas jar was noted.	1. The gas was colourless having pungent smell.	1. It was colourless with pungent smell.
2. A lighted match stick was introduced into the inverted jar of ammonia gas.	2. The stick was extinguished and the gas did not burn.	2. It is neither combustible nor supporter of combustion.
3. A moist red litmus was introduced into the jar of ammonia.	3. The red litmus was turned to blue.	3. The gas is alkaline.
4. A jar of ammonia gas was inverted over water in a trough.	4. Water was rushed up into the jar.	4. The gas is highly soluble in water.
5. A piece of filter paper was dipped in mercurous nitrate solution and placed	5. The mercurous nitrate paper was turned to black.	5. Formation of a mixture of black metallic mercury and mercuric

near the mouth of the jar of ammonia.		amino salt.
6. A tip of glass rod was dipped in conc. HCl and brought near the mouth of the gas jar.	6. Dense white fumes were produced around the rod.	6. Formation of ammonium chloride.
7. The gas was passed through water containing a drop of phenolphthalein in a test tube.	7. The solution was turned into pink.	7. Ammonia solution is alkaline.
8. The gas was passed through FeCl_3 solution.	8. A reddish brown ppt. was formed.	8. Formation of ferric hydroxide.
9. The gas was passed through Nessler's reagent.	9. A brown ppt. was formed.	9. Formation of Million's base.
10. The gas was passed through CuSO_4 solution.	10. A bluish white ppt. was formed that dissolved when the gas was passed continuously till giving deep blue solution.	10. Formation of copper hydroxide at first which dissolves to give deep blue cuprammonium sulphate.

CONCERNED REACTIONRESULT

Ammonia gas was prepared by heating the mixture of ammonium chloride and slaked lime and its properties were studied.

PRECAUTIONS

1. While fitting the apparatus round bottom flask should be inclined slightly.
2. More water should not be used for making paste.
3. All the glasswares should be handled with care.
4. The cork should be fitted tightly to the round bottom

flask.

5. The edge of the delivery tube should be cut smoothly and it should not be dipped into the reaction mixture.

EXPERIMENT NO. 9

NAME OF EXPERIMENT: TO PREPARE CO₂ gas AND STUDY ITS PROPERTIES

APPARATUS REQUIRED

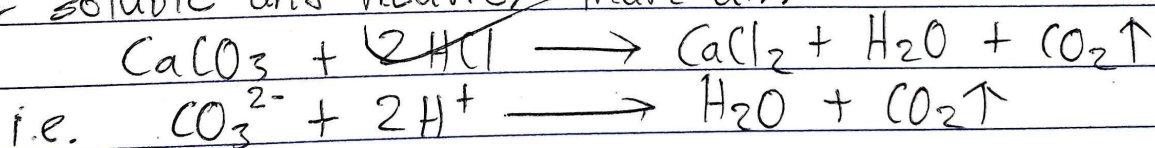
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| 1. Woulfe's bottle | 2. Thistle Funnel | 3. Corks |
| 4. Delivery tube | 5. Gas jar | |

CHEMICALS REQUIRED

- | | |
|--------------------------------|-----------------------------|
| 1. Marble chips | 2. Dilute hydrochloric acid |
| 3. A piece of magnesium ribbon | 4. Lime water |
| 5. Sodium hydroxide | |

THEORY

Carbon dioxide gas is prepared by reacting the marble chips with dilute hydrochloric acid and the gas is collected by upward displacement of air since it is water soluble and heavier than air.

PROCESS

A clean Woulfe's bottle was taken and few chips or pieces of marble chips were added. A thistle funnel was fitted to the bottle. A glass tube was bent twice at right angles. This delivery tube was fitted to the bottle. The apparatus was made airtight.

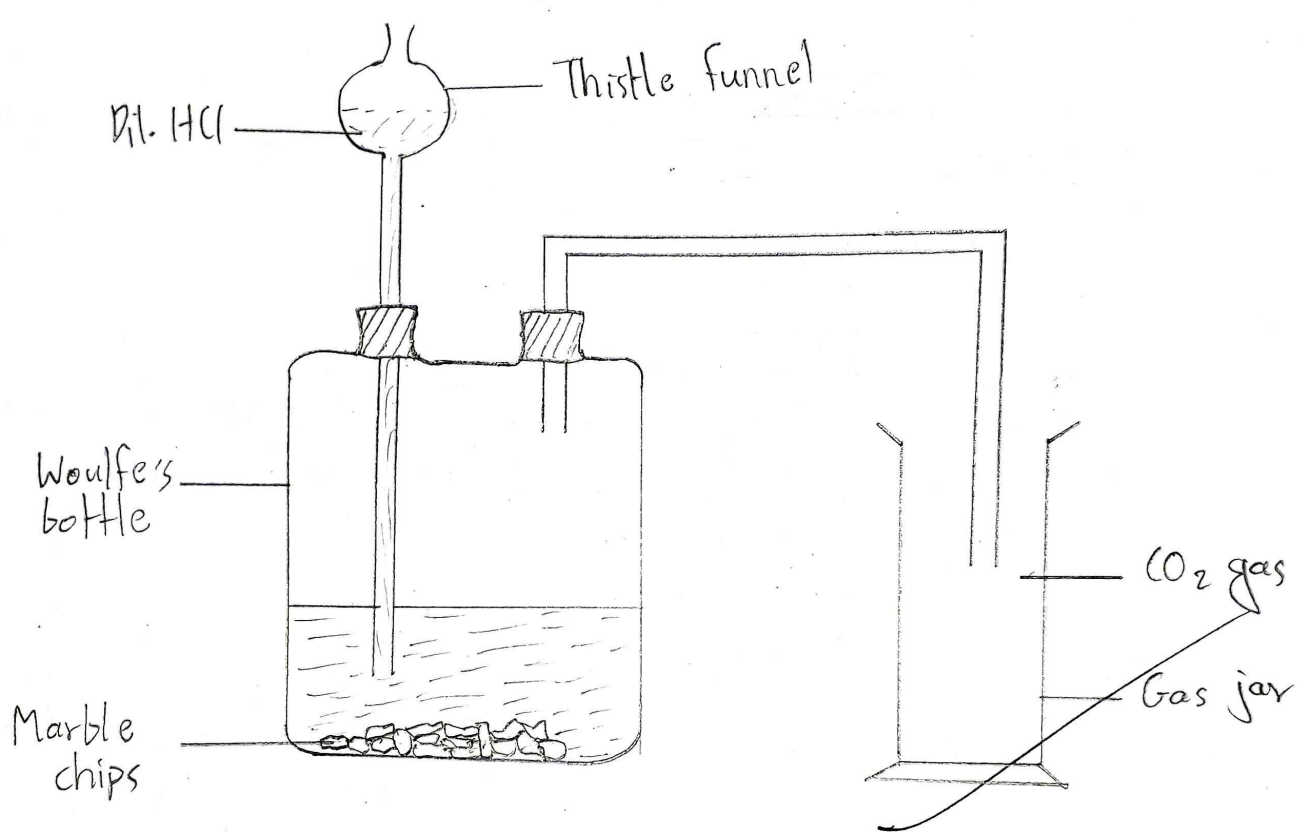


fig. Laboratory preparation of carbon dioxide gas.

and dil. hydrochloric acid was poured into the bottle from the thistle funnel. A few drops of conc. hydrochloric acid was added to increase the rate of chemical reaction. The gas was collected by upward displacement of air. Its properties was studied by performing following experiments.

OBSERVATIONS

Experiment	Observation	Inference
1. The colour and odour of the gas was noted.	1. Colourless, odourless	1. The gas is colourless and odourless.
2. A lighted candle or match stick was introduced into a jar of CO_2 .	2. The gas did not burn and the candle was extinguished.	2. The gas neither burns nor supports combustion.
3. The gas jar full of gas was inverted over water in a water trough and it was shaken by moving jar up and down under water.	3. Water was risen up in the jar very slowly.	3. The gas is slightly soluble in water.
4. A moist blue litmus paper was tested with the gas.	4. Blue litmus turns faint blue.	4. The gas is weakly acidic.
5. The gas was passed into a test tube	5. The lime water was turned milky.	5. Formation of insoluble calcium

containing 1 ml of lime water.

carbonate.

6. The CO_2 gas was passed continuously to that milky solution.

6. Disappearance of milky colour into the clear colourless solution.

6. Formation of insoluble calcium bicarbonate.

7. The clear solution obtained in (6) was boiled.

7. White turbidity reappears.

7. Formation of calcium carbonate by the decomposition of calcium bicarbonate.

8. To test tube full of CO_2 , few drops of caustic soda was added and the mouth of test tube was closed with thumb. Then, the test tube was shaken and it was opened under water kept in water trough.

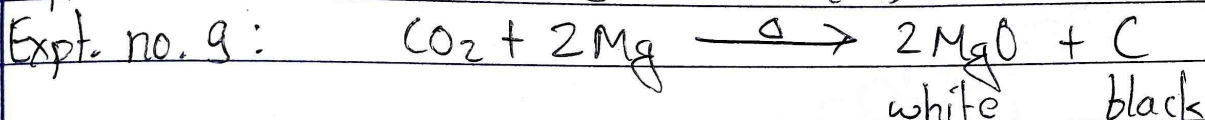
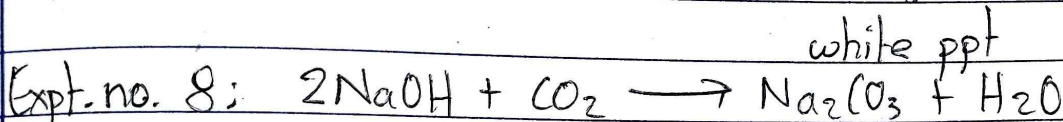
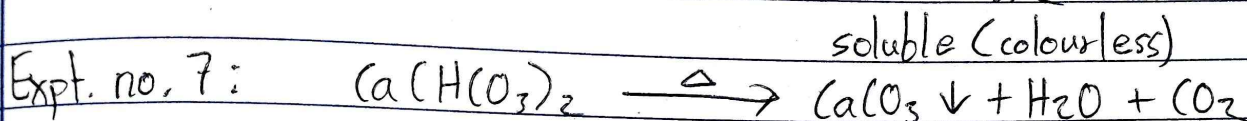
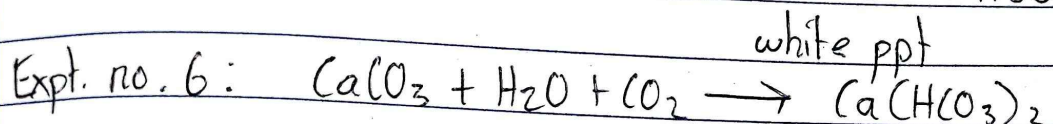
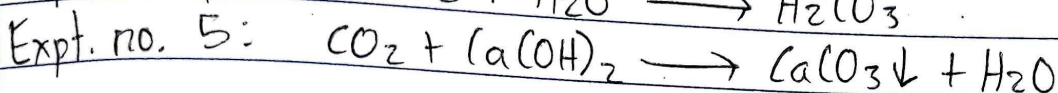
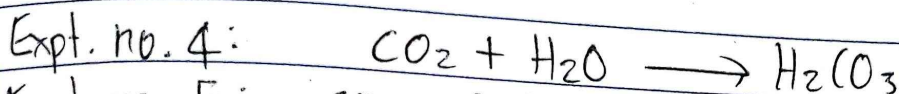
8. Water was risen up in the test tube.

8. Caustic soda solution is an absorbent of CO_2 .

9. A piece of burning magnesium ribbon was introduced into a jar of CO_2 .

9. Magnesium ribbon burns more brilliantly in the atmosphere of CO_2 . A white substance and black flakes of carbon are seen inside the jar.

9. CO_2 supports the burning of magnesium. It oxidises magnesium.

CONCERNED REACTIONSRESULT

Carbon dioxide gas was prepared and its properties were studied.

PRECAUTIONS

1. The tip of the thistle funnel should be dipped into the solution.
2. The apparatus should be air-tight.
3. All the glasswares should be handled with care.
4. The edge of the delivery tube should be cut smoothly and it should not be dipped into the solution.

EXPERIMENT NO. 10

NAME OF EXPERIMENT: TO PREPARE H_2S GAS AND STUDY ITS PROPERTIES

APPARATUS REQUIRED

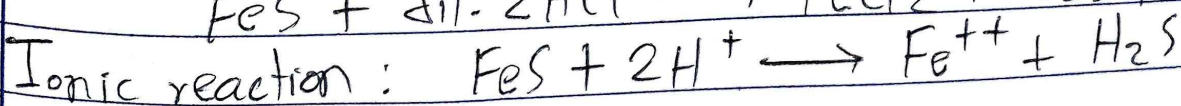
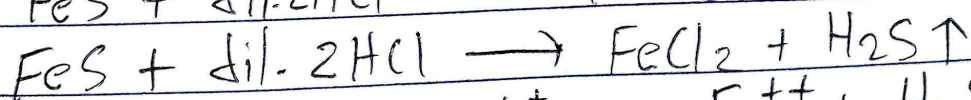
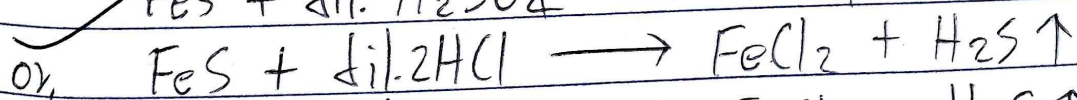
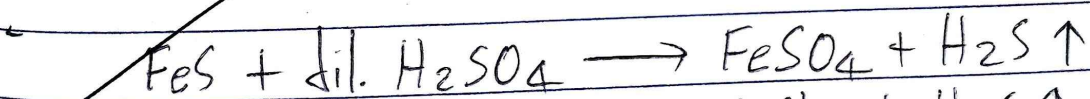
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|--------------------|-------------------|
| 1. Woulfe's bottle | 2. Thistle funnel |
| 3. Delivery tube. | 4. Gas jar |

CHEMICALS REQUIRED

- | | |
|--------------------------|--------------------------|
| 1. Iron sulphide | 2. Lead acetate solution |
| 3. Dilute H_2SO_4 | 4. $KMnO_4$ solution |
| 5. $K_2Cr_2O_7$ solution | 6. $FeCl_3$ solution |
| 7. $CuSO_4$ solution | 8. $NiSO_4$ solution |
| 9. $ZnSO_4$ solution | |

THEORY

Most of the metallic sulphides are decomposed by dilute acids and produce H_2S gas. In laboratory, it is prepared by the action of dilute HCl or dilute H_2SO_4 on iron sulphide. The gas is collected by upward displacement of air since it's water soluble and slightly heavier than air.



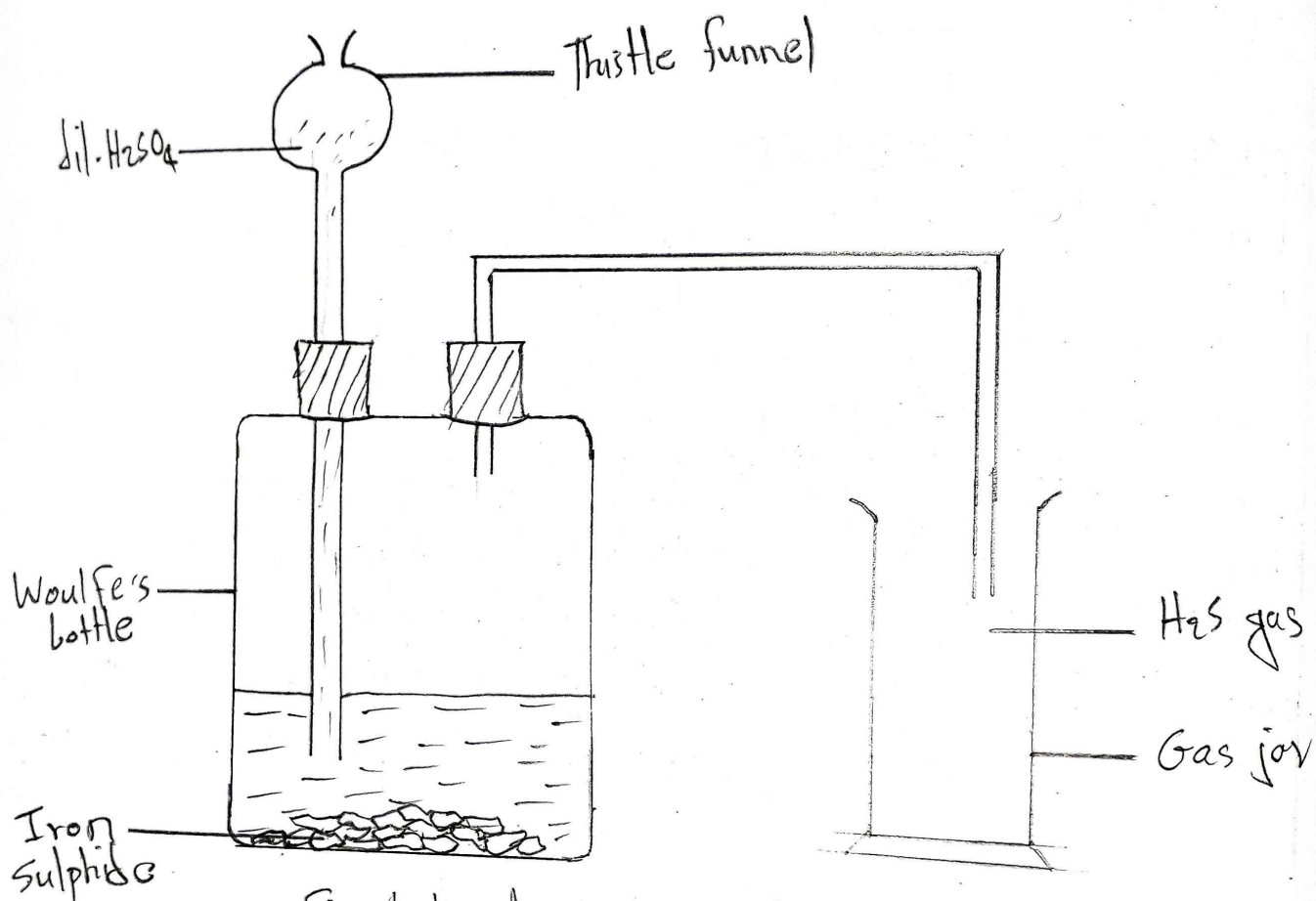


fig. Laboratory preparation of H_2S gas.

PROCESS

The apparatus was fitted as shown in figure. The apparatus was made airtight and some pieces of iron sulphide were put on the woulfer's bottle. Dilute H_2SO_4 was poured down from the thistle funnel such that the lower end of the funnel dipped under the acid. The H_2S gas was collected in the gas jar by upward displacement of air. Lead acetate paper was taken near the mouth of the gas jar. As the jar was filled with H_2S gas, the paper gave shining black colour. The following experiments were conducted to study the properties of the gas.

OBSERVATIONS

Experiment	Observation	Inference
1. The colour and odour of the gas was noted	1. No colour but had rotten egg smell.	1. H_2S gas is colourless but has smell of rotten egg.
2. A lighted candle was introduced into the jar of H_2S .	2. The candle was extinguished but the gas was burned with pale yellow flame on the mouth of the jar.	2. The gas is combustible but not the supporter of combustion.
3. The H_2S gas jar was inverted over water and shaken.	3. Water was risen up in the jar slowly.	3. It is slightly soluble in water.
4. A moist blue litmus	4. Blue litmus turned	4. It is weak acid.

paper was introduced into the jar of H_2S .

5. The lead acetate paper was put into the jar of H_2S .

into faint red.

5. The paper was turned into shining black.

5. It forms insoluble lead sulphide with lead acetate solution.

Reducing properties of H_2S :

6. H_2S gas was passed through dilute $KMnO_4$ solution acidified with dilute H_2SO_4 .

6. The pink colour of $KMnO_4$ solution was discharged and yellowish white substance was precipitated out.

6. H_2S reduces acidified $KMnO_4$ solution.

7. H_2S gas was passed through dilute $K_2Cr_2O_7$ solution acidified with dilute H_2SO_4 .

7. The orange colour of $K_2Cr_2O_7$ solution was changed to green colour.

7. H_2S reduces acidified $K_2Cr_2O_7$ solution.

8. H_2S gas was passed through $FeCl_3$ solution.

8. The reddish brown colour of $FeCl_3$ was slowly changed to pale yellow turbidity.

8. H_2S reduces ferric salts to ferrous salts.

* H_2S gas as analytical reagent:

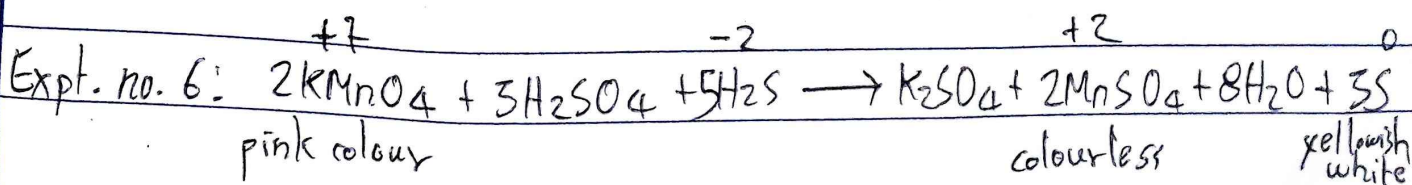
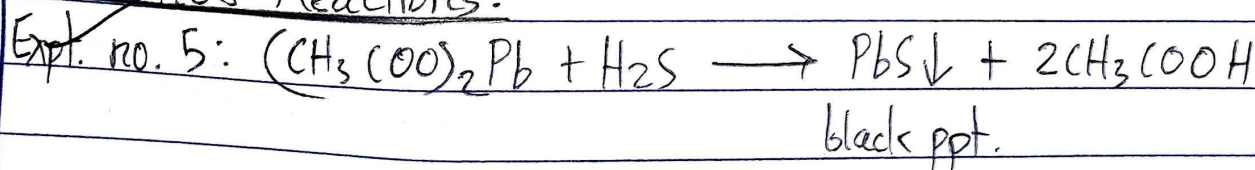
9. H_2S gas was passed into the $CuSO_4$ solution acidified with few drops of dilute HCl .

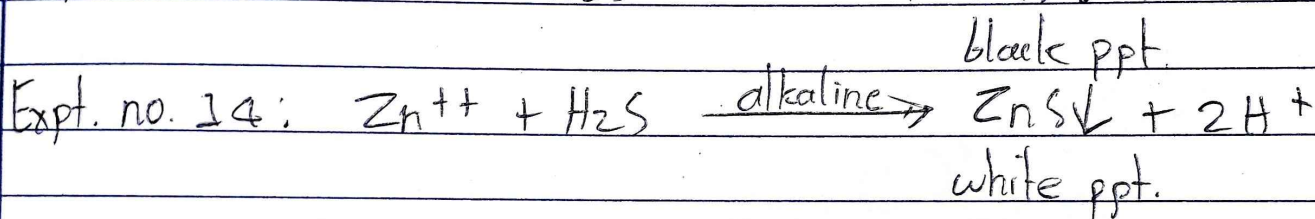
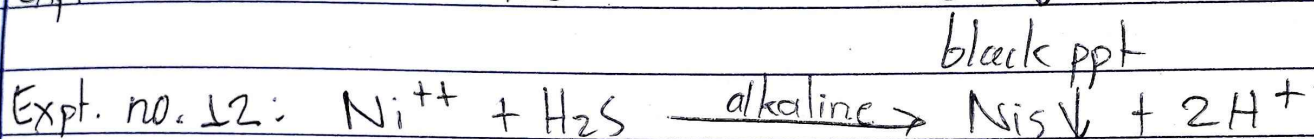
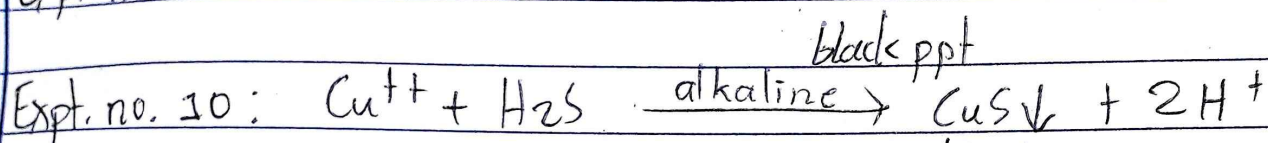
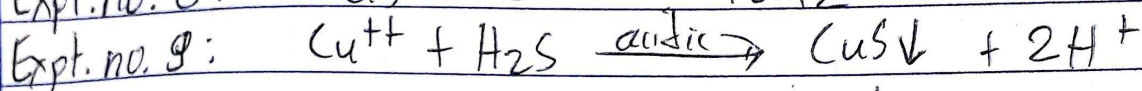
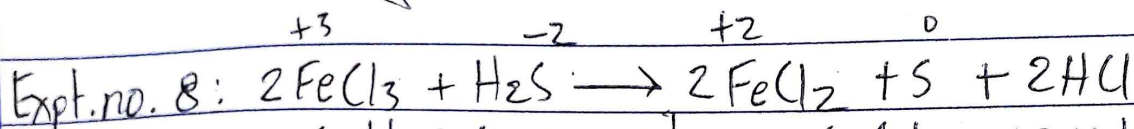
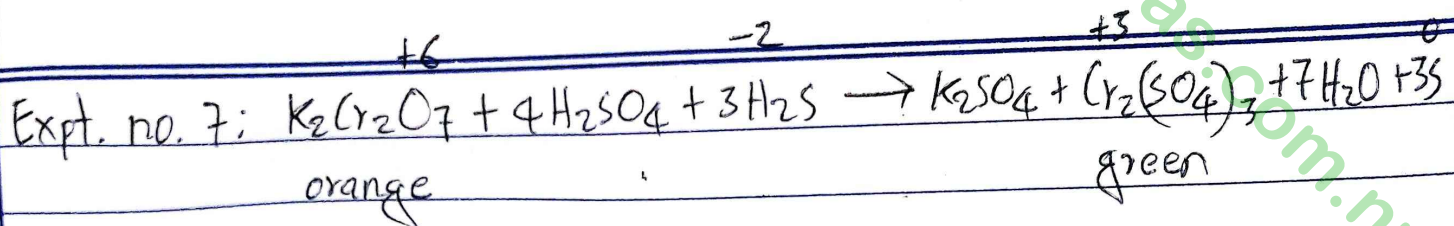
9. It gave black ppt.

9. Insoluble copper sulphide is formed.

10. H_2S gas was passed to a test tube containing $CuSO_4$ solution made alkaline with NH_4OH .	10. It gave black ppt.	10. Insoluble copper sulphide is formed.
11. H_2S gas was passed into the $NiSO_4$ solution acidified with a few drops of dilute HCl .	11. No ppt.	11. No reaction in acidic medium.
12. H_2S gas was passed into $NiSO_4$ solution made alkaline with NH_4OH .	12. Black ppt was formed.	12. In alkaline medium, H_2S produces more S^{2-} which is sufficient to precipitate NiS .
13. H_2S gas was passed through acidified $ZnSO_4$ solution.	13. No ppt.	13. No reaction of H_2S in acidic medium.
14. H_2S gas was passed through $ZnSO_4$ solution made alkaline with NH_4OH .	14. White ppt was formed.	14. Formation of ZnS in alkaline medium.

Concerned Reactions:





RESULT

Hydrogen sulphide gas was prepared in laboratory by the action of dilute HCl or dilute H₂SO₄ on iron sulphide and its properties were studied.

PRECAUTIONS

1. All glasswares should be handled with care.
2. The lower end of the thistle funnel should dip into the acid.
3. The apparatus should be airtight.
4. The gas should not be inhaled directly.

[Signature]

Date-2077-12-02

EXPERIMENT NO. 11

NAME OF EXPERIMENT: TO IDENTIFY ACIDIC RADICAL PRESENT IN GIVEN SALT SAMPLE (S_1)

APPARATUS REQUIRED

1. Test tube
2. Test tube holder
3. Brush

CHEMICALS REQUIRED

1. $BaCl_2$
2. Copper turning
3. $AgNO_3$
4. NH_4OH

THEORY

A radical formed by removal of all hydroxyl or analogous groups from an acid is called acid radical.

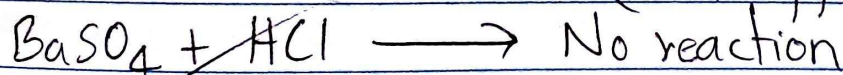
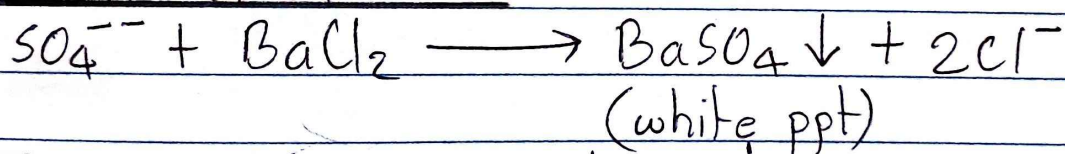
OBSERVATION

Dry test:

Experiment	Observation	Inference
1. In a clean and dry test tube, a pinch of salt was taken and dil. HCl was added.	1. No gas was seen.	1. Absence of CO_3^{2-} , SO_3^{2-} , NO_2^-
2. Salt + conc. H_2SO_4	2. No gas was seen.	2. Absence of halogens
3. Salt + conc. H_2SO_4 + Cu turning (warm)	3. No brown fume was seen.	3. Absence of NO_3^-

Wet test:

Experiment	Observation	Inference
1. In a clean test tube 2ml of salt solution was taken and BaCl_2 was added. (If ppt appeared add dil. HCl)	1. White ppt, insoluble in HCl .	1. Presence of SO_4^{2-} confirmed.
2. Salt solution + AgNO_3 (If ppt appeared then add NH_4OH)	2. No ppt.	2. Absence of halogens.
3. Salt solution + conc. H_2SO_4 + FeSO_4	3. No ring was formed.	3. Absence of NO_3^- .

TEST REACTIONSRESULT

Hence, the presence of acidic radical was identified in the given salt sample. (S_1)

PRECAUTIONS

1. Salt should be used very small.
2. Sodium ~~extract~~ carbonate extract should be prepared carefully.

(Signature)
12/23

EXPERIMENT NO. 12

NAME OF EXPERIMENT: TO IDENTIFY THE ACID RADICAL FROM THE GIVEN SAMPLE OF SALT (S_2)

APPARATUS REQUIRED

1. Test tube 2. Test tube holder 3. Brush

CHEMICAL REQUIRED

1. $BaCl_2$ 2. Cu (Copper turning) 3. $AgNO_3$
 4. NH_4OH 5. HCl 6. H_2SO_4
 7. $FeSO_4$

THEORY

Acid radical is the ion formed after the removal of hydrogen ion (H^+) from an acid.

Example: When H_2SO_4 losses H^+ ion, it form, $H_2SO_4^-$ which is an acid radical.

OBSERVATION

Dry Tests

Experiment	Observation	Inference
1. In a clean and dry test tube, a pinch of salt was taken and dil. HCl was added.	1. No gas was seen.	1. Presence of CO_3^{--}
2. Salt + conc. H_2SO_4	2. No gas was seen	2. Absence of halogens

3. Salt + conc. H_2SO_4 + copper turning

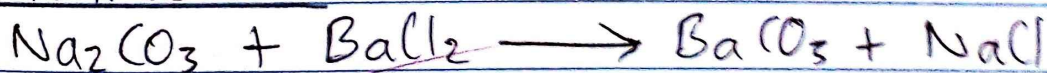
3. No brown fume was seen.

3. Absence of NO_3^-

Wet Test:

Experiment	Observation	Inference
1. In a clean test tube 2 ml of salt solution was taken and $BaCl_2$ was added. (If ppt appeared add dil. HCl)	1. White ppt was appeared which was insoluble in dil. HCl .	1. Presence of CO_3^{2-} was confirmed.
2. Salt solution + $AgNO_3$ (If ppt appeared then add NH_4OH)	2. No ppt was seen.	2. Absence of halogens
3. Salt solution + conc. H_2SO_4 + $FeSO_4$	3. No ring was formed.	3. Absence of NO_3^-

Reaction involved:



(white ppt)



RESULT

Acid radical was found in the given sample of salt (S_2).

~~12/20~~

EXPERIMENT NO. 13

NAME OF EXPERIMENT: TO IDENTIFY THE ACID RADICAL PRESENT IN A GIVEN SAMPLE OF SALT (S_3)

APPARATUS REQUIRED

1. Test tube
2. Test tube holder
3. Burner

CHEMICAL REQUIRED

1. H_2SO_4
2. HCl
3. dil. HNO_3
4. $AgNO_3$
5. $BaCl_2$
6. $FeSO_4$
7. NH_4OH

THEORY

Radical is an atom having positive or negative charge and behaves as a single unit in a chemical change. The electropositive radical which comes from base is called basic radical. The electronegative radical which comes from an acid is called acidic radical.

OBSERVATION

Dry Test:

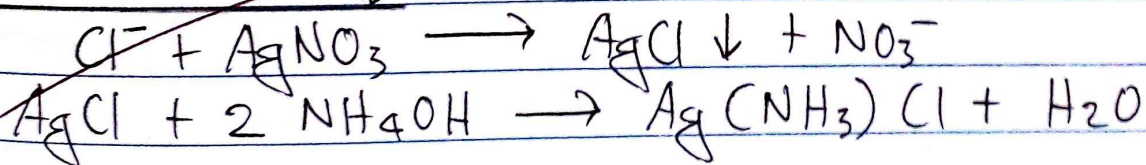
Experiment	Observation	Inference
1. A pinch of salt was taken and few drops of HCl was added.	1. No gas was seen.	1. Absence of SO_3^{2-} , CO_3^{2-} , NO_2^-
2. Salt + conc. H_2SO_4	2. gas was seen.	2. May be halogen.

3. exp. 2 + (u turning (warm))	3. brown fume was not seen.	3. Absence of NO_3^-
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Wet Test:

Experiment	Observation	Inference
1. 2ml of salt solution was taken in a clean test tube and few drops of BaCl_2 was added. (If ppt appeared add dil HCl)	1. No ppt was seen.	1. Absence of SO_4^{2-}
2. Salt solution + AgNO_3 (If ppt appeared, add NH_4OH)	2. White ppt was formed which was soluble in NH_4OH .	2. Presence of Chlorine confirmed.
3. Salt solution + FeSO_4 + conc. H_2SO_4	3. No brown ring was formed.	3. Absence of NO_3^-

REACTION INVOLVED



RESULT

Hence, the acid radical was identified present in the given sample of salt. (S_3)

[Signature]

EXPERIMENT NO. 14

NAME OF EXPERIMENT: TO IDENTIFY ACIDIC RADICAL PRESENT IN GIVEN SAMPLE OF SALT (S_a)

APPARATUS REQUIRED

1. Test tube
2. Burner
3. Test tube holder

CHEMICAL REQUIRED

1. Salt solution
2. Dil. H_2SO_4
3. Dil. HCl
4. $BaCl_2$
5. Conc. H_2SO_4
6. $AgNO_3$
7. $NaCl$
8. Copper turning

THEORY

A radical may be defined as a group of atoms having positive or negative charge and behave as single unit in chemical change. There are two radicals i.e. Acid radical, Basic radical. Acidic radical is electronegative and basic is electropositive.

OBSERVATION

Dry test:

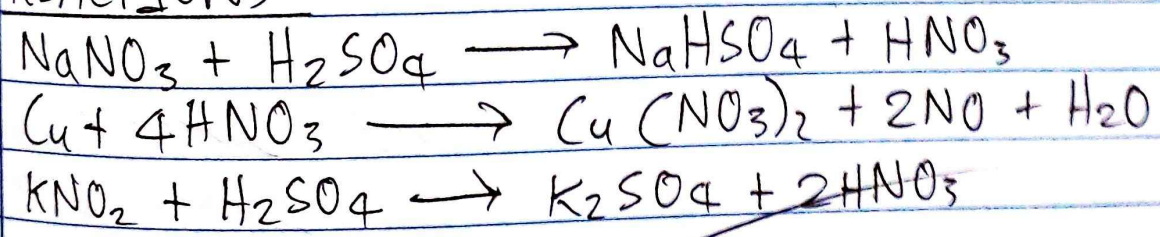
Experiment	Observation	Inference
1. A pinch of salt was taken and few drops of dil. HCl was added.	1. No gas was seen	1. Absence of NO_3^- , CO_3^{2-} , SO_3^{2-}

2. Salt + conc. H_2SO_4	2. No gas was seen.	2. Absence of Cl^- or I^- .
3. Exp. (2) + for Cu turning.	3. Brown fume was formed.	3. May be presence of NO_2^- .

Wet test:

Experiment	Observation	Inference
1. 2ml of salt solution was taken in a clean test tube and few drops of $AgNO_3$ was added.	1. No ppt was seen.	1. Absence of Cl^- , Br^- , I^- .
2. Salt solution + $BaCl_2$ + dil. HCl	2. No ppt was seen.	2. Absence of SO_4^{2-} .
3. Salt solution + $FeSO_4$ + conc. H_2SO_4	3. Dark brown ring was seen.	3. Presence of NO_3^- .

REACTIONS



RESULT

Hence, from the given experiment, NO_3^- was identified as acid radical.

[Signature]
2/10

EXPERIMENT NO. 15

NAME OF EXPERIMENT: TO IDENTIFY BASIC RADICAL PRESENT IN GIVEN SALT SAMPLE

APPARATUS REQUIRED

1. Test tube
2. Test tube holder
3. Bunsen

CHEMICAL REQUIRED

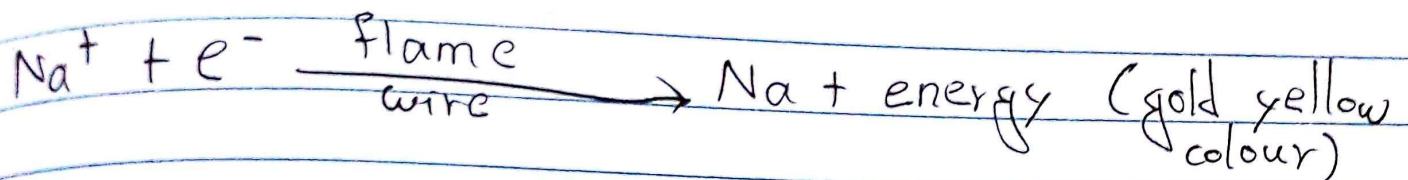
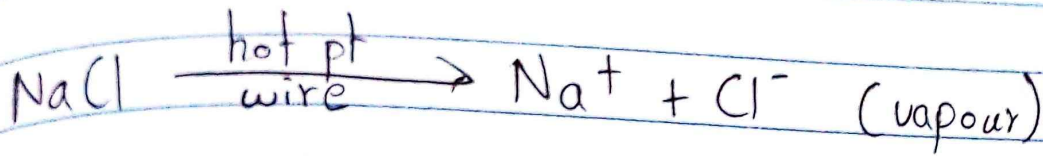
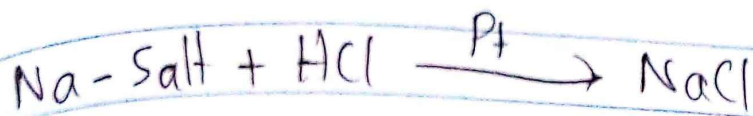
1. Salt
2. conc. HCl

OBSERVATION

Dry test:

Experiment	Observation	Inference
1. A pinch of salt was taken in a clean and dry test tube and heated.	1. i) Salt produce crackling sound ii) The colour of salt remained same	1. Salt may contain Na^+ , K^+ radicals
2. Flame test was performed.	2. Golden yellow flame was seen.	2. Presence of Na^+
3. A pinch of salt was taken in test tube and heated.	3. Salt was same as original but infusible.	3. May be Al^{++} , Zn^{++} , Mg^{++}
4. Filter ash test was performed.	4. Blue cooler ash was obtained.	4. Presence of Al_3^+

TEST REACTION



RESULT

Hence, the basic radical was identified in the given salt sample.

PRECAUTION

1. Glassware should be handled carefully.
2. Concentrated acid should be used by safety measure.



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