EXPERIMENT-3

AIM: To perform the following reactions:

a) The action of water on quicklime

b) The action of heat on ferrous sulphate crystals

c) Iron nails kept in copper sulphate solution

d) The reaction between sodium sulphate and barium chloride solutions and classify them into:

e) Combination reaction

f) Decomposition reaction

g) Displacement reaction

h) Double displacement reaction

APPARATUS:

Test tubes, test tube stand, glass tube or glass rod, dropper, quicklime, ferrous sulphate crystals, Iron nails, copper sulphate solution, sodium sulphate, and barium chloride solutions

BASIC PRINCIPLES INVOLVED:

Water and calcium oxide (2 reactants) react to form calcium hydroxide (a single product).

The reaction is a combination reaction.

A lot of heat is liberated in the reaction; the reaction is highly exothermic.

$CaO\ (s) + H_2O\ (l)$ ---------- $Ca(OH)_2$ + heat

EXPERIMENT-3(a)

AIM: To perform and observe the action of water on quicklime.

APPARATUS: Beakers, distilled water, quicklime, test tubes, filtration set, red litmus paper.

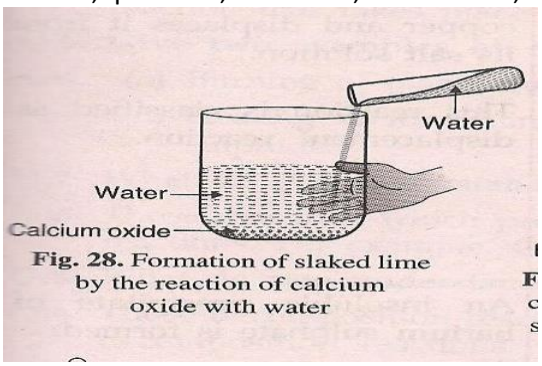

Fig. 28. Formation of slaked lime by the reaction of calcium oxide with water

OBSERVATION TABLE:

S.N.	EXPERIMENT	OBSERVATION	INFERENCE
1.	About 40 ml of distilled water is taken in a beaker and 5g of calcium oxide is added to it. The mixture is stirred with a glass rod.		
2.	The outer surface of the beaker is touched by hand.		
3.	2 drops of the liquid are taken from the beaker and placed on a red litmus paper.		
4.	The mixture is filtered and about 10 ml of the filtrate is taken in a clean test tube. CO_2 is passed through it by blowing air from the mouth.		

RESULT:

In the given samples we have observed that:

1) Water and calcium oxide directly combine to form ------. This reaction is an example of ----------.

2) The reaction is ----- as the test tube becomes hot.

3) The reaction that takes place is----------.

EXPERIMENT-3(b)

AIM: To perform and observe the reaction when ferrous sulphate is heated.

APPARATUS:

Solid ferrous sulphate, test tubes, test tube holder, blue litmus paper, acidified solution of potassium dichromate

BASIC PRINCIPLES INVOLVED:

When ferrous sulphate is heated the following reaction is observed to take place:

2FeSO4 (s) ----------▯ Fe2O3 (s) + SO2 (g) + SO3 (g)

A single substance gives 3 new substances. So, it is a decomposition reaction.

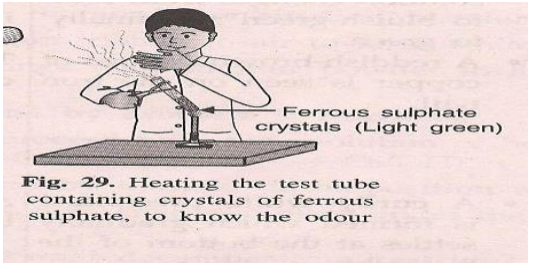

Fig. 29. Heating the test tube containing crystals of ferrous sulphate, to know the odour

OBSERVATION TABLE:

S.No.	EXPERIMENT	Observations	Inference
1)	About 2 g of solid ferrous sulphate is taken in a clean, dry test tube and the colour is noted. It is then heated over the flame of a Bunsen burner.		
2)	The odour of the gas liberated is noted.		
3)	A moist blue litmus paper is brought in contact with the gas.		
4)	A strip of filter paper soaked with an acidified solution of potassium dichromate is brought above the mouth of the test tube.		

RESULT:

In the given samples we have observed that:

1) When ferrous sulphate is heated it decomposes into ----------and----------.

2) The reaction for heating ferrous sulphate crystals is: ----------.

3) The reaction is called----------of ferrous sulphate.

EXPERIMENT-3(c)

AIM: To perform and observe the reaction between the iron nail and copper sulphate solution

APPARATUS:

Iron nails, test tubes, test tube stand, copper sulphate solution

BASIC PRINCIPLES INVOLVED:

Iron + Copper sulphate ---------- Iron sulphate + c

Fe (s) + CuSO4 (aq) ---------- FeSO4 (aq) + Cu (s)

In this reaction iron has replaced copper from the copper sulphate solution; so it is a displacement reaction

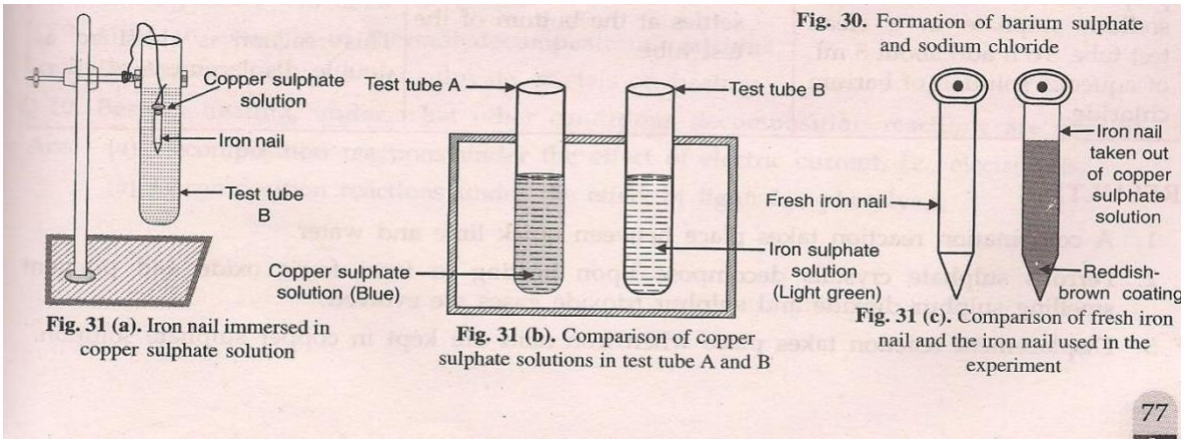

Fig. 30. Formation of barium sulphate and sodium chloride

Fig. 31 (a). Iron nail immersed in copper sulphate solution

Fig. 31 (b). Comparison of copper sulphate solutions in test tube A and B

Fig. 31 (c). Comparison of fresh iron nail and the iron nail used in the experiment

OBSERVATION TABLE:

S.No	Experiment	Observations	Inference
	2 iron nails are taken and cleaned by rubbing with sand paper. 10 ml of copper sulphate solution is taken in 2 test tubes. The colour of the iron nail and the solution is noted. One clean iron nail is tied with a thread and immersed in one test tube of $CuSO_4$ solution. After about 30 minutes the nail is removed and kept aside for observation. The colour of the solution is also noted.		

RESULT:

1) A brown coating on the iron nail after the experiment shows that-------from copper sulphate solution.
2) The light green colour in the test tube indicates the presence of----------.
3) The reaction is called---------.
4) The reaction is-------.

EXPERIMENT-3(d)

AIM: To perform and observe the reaction between sodium sulphate solution and barium chloride solution

APPARATUS:

Sodium sulphate solution, barium chloride solution, test tubes, conical flask.

BASIC PRINCIPLES INVOLVED:

On mixing sodium sulphate solution and barium chloride solution, a white precipitate of barium sulphate is formed.

$Na_2SO_4 (aq) + BaCl_2 (aq) \rightarrow BaSO_4 (s) + 2NaCl (aq)$

This is an example of a double displacement reaction.

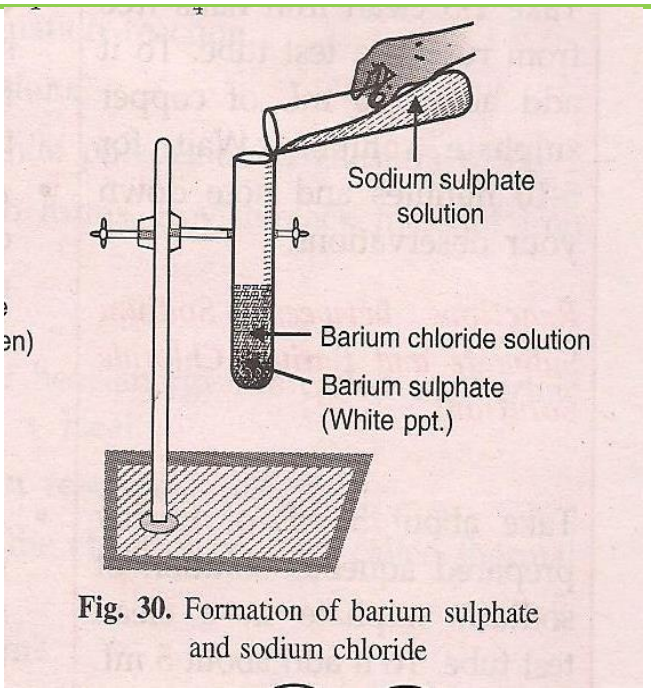

Fig. 30. Formation of barium sulphate and sodium chloride

OBSERVATION TABLE:

S.No.	EXPERIMENT	Observations	Inference
1.	10 ml of sodium sulphate the solution is taken in a test tube A. 10 ml of barium chloride solution is taken in another test tube B. The 2 solutions are mixed in a conical flask and the observations are recorded.		

RESULT:

1) In this reaction a-------- of barium sulphate is formed and sodium chloride appears in----------.
2) The reaction is called ----------.
3) The reaction is----------.

PRACTICAL BASED QUESTIONS

1. What happens when ferrous sulphate crystals are heated?
2. When an iron rod is dipped into a solution of copper sulphate, copper is displaced. Why is it so?
3. When we add water to quick lime we observe some changes. Based on those changes what can be concluded about the reaction between quick lime and water?
4. Rahul adds aqueous solution of barium chloride to an aqueous solution of sodium sulphate. What would he observe?