Experiment 5

Aim

To study the reactions of sodium hydroxide with aluminum metal and hydrochloric acid.

Theory

Sodium hydroxide is a base. It reacts with aluminium metal to produce hydrogen gas. It also neutalises the hydrochloric acid to produce sodium chloride salt and water.

$$2NaOH\ (aq) + 2Al\ (s) + 2H_2O\ (l) \longrightarrow 2NaAlO_2\ (aq) + H_2\ (g)$$

$$NaOH\ (aq) + HCl\ (aq) \longrightarrow NaCl\ (aq) + H_2O\ (l)$$

Materials Required

Dil. hydrochloric acid, sodium hydroxide solution, some pieces of aluminium metal, red and blue litmus papers, a small measuring cylinder (100 mL), three test tube, and a candle.

Procedure

(i) *Reaction with Aluminium Metal*

1. Take a small piece of aluminium metal and place it in a clean and dry test tube.

2. Add about 5 mL sodium hydroxide solution in it.
3. Observe the effervescence coming out from the reaction mixture. Look at the colour of the gas liberated.
4. Perform the smell test on the gas liberated by fanning the gas gently towards your nose.
5. Bring moist blue and red litmus papers to the mouth of the test tube.
6. Perform combustion test by bringing a lighted candle near to the mouth of the test tube. Does the liberated gas ignites exothermically to produce water?

OBSERVATIONS 

(i) *Reaction with Aluminium Metal*

Sl. No.	Test	Experiment	Observations	Inference
1.	Colour	Look at the colour of the gas liberated		
2.	Smell	Fan the gas gently towards your nose with your hand		
3.	Litmus test	Bring moist blue and red litmus papers near to the mouth of the test tube		
4.	Combustion test	Bring a lighted candle near to the mouth of the test tube		

(ii) *Reaction with hydrochloric acid*

The experiment should be carried out as done in Experiment 4.

RESULTS AND DISCUSSION 

State and discuss the performance of each test in all reactions performed in this experiment.

PRECAUTIONS 

- Always carry out the test for hydrogen with a very small volume of gas.
- Handle hydrochloric acid and sodium hydroxide solutions very carefully.
- Shake the solutions and reaction mixtures carefully without spilling.
- Care must be taken while performing the combustion test.

QUESTIONS

- What will be the colour of a blue litmus paper on bringing it in contact with a drop of dil. NaOH?
- Explain why hydrogen gas is not collected by the downward displacement of air?
- What will happen to a lighted candle if it is brought near the mouth of a gas jar containing hydrogen gas?
- Which gas is produced when aluminium metal reacts with sodium hydroxide?
- Hydrogen gas is neutral to litmus paper. Explain how?
- What are the metals (other than Al) which react with alkalies to produce hydrogen gas? What are these metals called?