

THEORY

The theory of the present experiment is based on the fact that the rate of reaction between a metal and an acid is directly proportional to the surface area of the metal. In this experiment, the rate of reaction between zinc and hydrochloric acid is studied. The reaction is as follows:

$$\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$$

The rate of reaction is measured by the volume of hydrogen gas evolved in a given time. The rate of reaction is found to be directly proportional to the surface area of the metal. This is because a larger surface area provides more sites for the reaction to take place.

APPARATUS

- Conical flask
- Delivery tube
- Gas jar
- Stop watch
- Measuring cylinder
- Beaker
- Thermometer
- Hydrochloric acid
- Zinc granules

PROCEDURE

1. Weigh a certain amount of zinc granules (say 10g) and divide it into four equal parts (2.5g each).

2. Take a conical flask and add 20ml of hydrochloric acid to it.

3. Place the delivery tube in a gas jar inverted in a trough of water.

4. Add the zinc granules to the flask and stop the flask with a stopper.

5. Measure the volume of hydrogen gas evolved in a given time (say 5 minutes) by the displacement of water in the gas jar.

CONCLUSION

The rate of reaction between zinc and hydrochloric acid is directly proportional to the surface area of the metal. This is because a larger surface area provides more sites for the reaction to take place. In this experiment, it was observed that the rate of reaction was higher when the surface area of the zinc granules was increased.

QUESTIONS

1. Why is the rate of reaction between zinc and hydrochloric acid higher when the surface area of the zinc granules is increased?
2. How does the rate of reaction between zinc and hydrochloric acid change when the concentration of the acid is increased?
3. How does the rate of reaction between zinc and hydrochloric acid change when the temperature of the acid is increased?

EXERCISES

1. Write the balanced chemical equation for the reaction between zinc and hydrochloric acid.
2. Write the balanced chemical equation for the reaction between magnesium and hydrochloric acid.
3. Write the balanced chemical equation for the reaction between iron and hydrochloric acid.