**Reaction of Metals with Acids**

**Background**

The reaction between an acid and a metal produces hydrogen gas and a salt. Some metals, like sodium, react violently while some are unreactive, or inert.

The general reaction equation for an acid combining with a metal is:

acid + metal → salt + hydrogen gas

When hydrochloric acid reacts with magnesium metal, it produces magnesium chloride and hydrogen gas.

Hydrochloric acid + Magnesium → Hydrogen + Magnesium chloride

HCl + Mg → MgCl2 + H2

The test for hydrogen gas is the ‘pop’ test. The gas produced can be collected in an inverted test tube. When a lit match is held near the mouth of the test tube, a popping sound can be heard as the hydrogen reacts with oxygen in the air to form water.

**Aim**: To investigate the reaction of metals with an acid.

**Equipment**: 2 test tubes (one small and one large)

Test tube rack

Samples of various metals

Hydrochloric acid

Sulfuric acid

Acetic acid (vinegar)

Matches

Safety glasses

**Method**:

1. Pour 2 cm of hydrochloric acid into the **small** test tube.
2. Add a piece of magnesium to the acid.
3. If there is a noticeable reaction, hold the large test tube upside down over the reaction tube. This will collect the gases produced in the reaction.
4. Hold a lit match to the mouth of the test tube you collected the gas in. If hydrogen has been produced, you should hear a small popping sound.
5. Record your observations in the table.
6. Repeat the magnesium reaction with sulphuric and acetic acid.
7. Try each of the other combinations of acids and metals. Record all your tests and observations.

**Results**:

|  |  |  |  |
| --- | --- | --- | --- |
| **Acid** | **Metal** | **Observation of reaction** | **Hydrogen test** |
| Hydrochloric (HCl) | Magnesium |  |  |
| Sulfuric (H2SO4) | Magnesium |  |  |
| Acetic (Vinegar) | Magnesium |  |  |
| Hydrochloric (HCl) | Copper |  |  |
| Sulfuric (H2SO4) | Copper |  |  |
| Acetic (Vinegar) | Copper |  |  |
| Hydrochloric (HCl) | Zinc |  |  |
| Sulfuric (H2SO4) | Zinc |  |  |
| Acetic (Vinegar) | Zinc |  |  |

**Questions:**

1. Which of the metals you tested was the most reactive? Explain your choice.
2. Which of the metals you tested was the least reactive? Explain your choice.
3. Write a word equation for eachof the reactions you conducted in your experiment. The first one has been done for you.
4. Hydrochloric acid + Magnesium → Hydrogen + Magnesium chloride