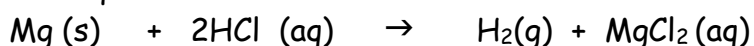


Experiment to find the relative atomic mass of magnesium

Introduction

Magnesium reacts with hydrochloric acid to give hydrogen gas. If we measure the volume of hydrogen given off by a known mass of magnesium at room temperature and pressure, we can work out the number of moles of hydrogen gas produced. Using the equation for the reaction, the number of moles of magnesium can be calculated and hence the relative atomic mass of magnesium.

The equation for the reaction is: -



Safety

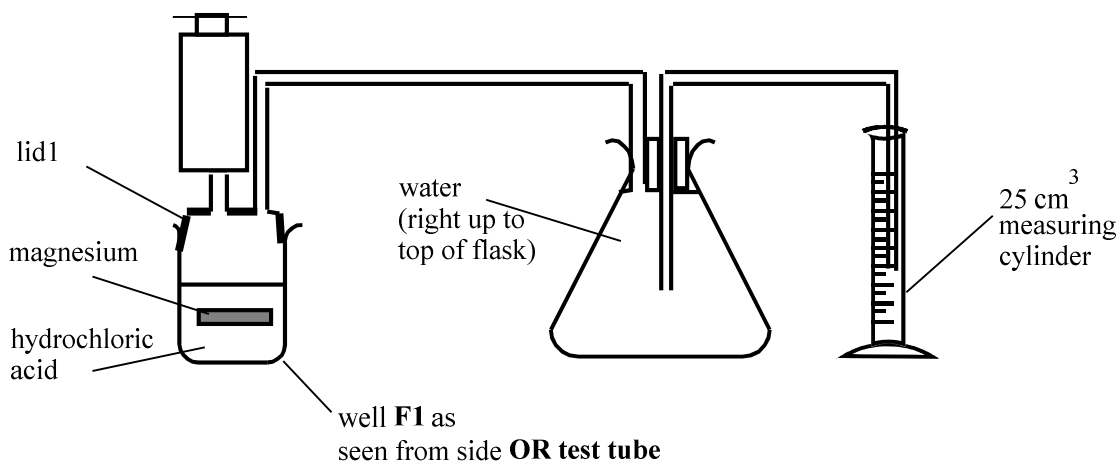
Always refer to the departmental risk assessment before carrying out any practical work. See *Hazcard* references. Wear eye protection at all times.

Apparatus per student

- Comboplate + lid 1 + syringe OR test tube with 1-hole-bung
- Conical flask and delivery tubing as shown in diagram below
- 10 cm³ and 25 cm³ measuring cylinders
- Access to 3 decimal place balance if possible but a 2 decimal place one will suffice
- Magnesium ribbon (10 cm per student)
- Steel wool
- Ruler
- 2 mol dm⁻³ hydrochloric acid (20 cm³ per student)
- Eye protection

PROCEDURE

1. We will measure the volume of hydrogen by displacing water from a conical flask as shown below.



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2. Measure out 10 cm of magnesium ribbon. And note down its mass on the results page. **Your top-pan balance must read to at least 0.01g.**
Your balance will not be able to read very small masses and therefore we will have to calculate the masses of very small amounts of magnesium using the formula shown below: -

$$\text{mass of magnesium ribbon} = \frac{\text{length of ribbon}}{10} \times (\text{mass of 10cm of ribbon})$$

3. Measure out 0.5 cm (5 mm), 1.0 cm (10 mm) and 1.5 cm (15 mm) lengths of magnesium ribbon.
4. Using your syringe measure out 2cm³ of 2mol dm⁻³ hydrochloric acid and add it to well F1 **OR the test tube.**
5. Set up your apparatus ready as shown in the diagram.
6. Add the 0.5 cm length of magnesium ribbon to the acid and collect the water displaced by the hydrogen in the measuring cylinder. **Remember to take the tube out of the measuring cylinder** before measuring the volume of water displaced
7. Record your results in an appropriate results table.
8. Repeat instructions 4 - 7 using the 1 cm and 1.5 cm lengths of magnesium ribbon. Repeat your experiments if possible.
9.
 - a) Plot a graph of mass of magnesium (horizontal axis) against **average** volume of H₂ gas (vertical axis).
 - b) Draw a line of best-fit through your points and using this line work out the mass of magnesium that would give **24 cm³** of hydrogen.
 - c) Use the result to work out the mass of magnesium that would give **24,000 cm³** of hydrogen