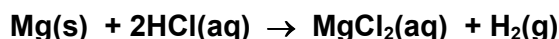


## Investigating How the Length of Magnesium Ribbon Affects Temperature Change when Reacted with Hydrochloric Acid.

The aim of this experiment is to find out how the length of magnesium ribbon affects the temperature change when reacted with hydrochloric acid. This will be carried out by placing different lengths of magnesium ribbon into in the same volume and concentration of hydrochloric acid and measuring the temperature change.

Magnesium + Hydrochloric acid → Magnesium Chloride + Hydrogen



When a metal or metal oxide reacts with an acid an exothermic reaction occurs. An exothermic reaction is one in which

### Apparatus and Materials.

- 1 mol/dm<sup>3</sup> hydrochloric acid
- Magnesium ribbon
- Emery paper
- Boiling tube rack
- Boiling tubes x 5
- Thermometer
- 10 cm<sup>3</sup> Measuring cylinder
- 30 cm ruler
- Goggles



### Variables

	<b>Variable measured</b>	<b>Method of controlling the variable</b>
<b>Independent variable</b>	Length of magnesium ribbon	Making sure the magnesium ribbon is straight and lying flat against a 30 centimetre ruler.
<b>Dependent variable</b>	Temperature of the solution	Measuring the temperature of the acid before the magnesium is added then constantly monitoring the temperature whilst gently stirring to record the highest temperature reached. The temperature rise is calculated by subtracting the highest temperature from the start temperature.
<b>Controlled variables</b>	Concentration of hydrochloric acid	Using the same bottle of acid as there may be slight differences in the concentration of different 1 mol/dm <sup>3</sup> bench acids due to contaminations.
	Volume of hydrochloric acid	Using a measuring cylinder with a resolution of 0.1 cm <sup>3</sup> and measuring the volume of the acid from the bottom of the meniscus.
	Size of boiling tube	Using new boiling tubes of exactly the same size as the surface area of the boiling tube will affect the amount of heat lost from the solution.
	Removing the magnesium oxide layer	Use the emery paper to remove the layer of magnesium oxide that may have formed on the surface. This is complete when the magnesium ribbon is shiny and silver

## Table of Results.

Length of magnesium ribbon (cm)	Temperature of hydrochloric acid at the start (°C)	Highest recorded temperature (°C)	Temperature change (°C)
1			
2			
3			
4			
5			

## Method.

1. Place five clean and dry boiling tubes into a boiling tube rack and label them 1-5.
2. Using a 10 cm<sup>3</sup> measuring cylinder measure out carefully 10cm<sup>3</sup> of hydrochloric acid
3. Transfer the 10cm<sup>3</sup> of hydrochloric acid into the first boiling tube labelled 1
4. Using emery paper clean a strip of magnesium ribbon to remove the oxide layer that may have formed by reacting with oxygen in the air
5. Place the cleaned magnesium ribbon next to a ruler that measures in cm. making sure the magnesium ribbon is flat cut a 1 cm length off making sure both ends are cut straight
6. Place a thermometer into the acid and record the temperature in your table
7. Add the magnesium ribbon to the acid making sure that it does not stick to the side
8. Monitor the temperature of the solution very carefully and record the highest temperature reached, record this in your table
9. Repeat the above steps with but vary the length of magnesium ribbon each time by 1 cm up to 5 cm.

## Safety

Dilute hydrochloric acid is a low hazardous substance but may cause irritation to cuts or in the eyes. You must make sure that you are wearing goggles at all times. If any hydrochloric acid is spilt on your hands or skin wash it off with cold water.



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