

## The volume of 1 mole of hydrogen gas – teacher notes

### Introduction

Students react magnesium quantitatively with hydrochloric acid. They collect the hydrogen and calculate the molar volume.

### Equipment

#### Apparatus

- Eye protection
- Burette
- Burette stand
- Water bath

### Chemicals

- Hydrochloric acid, 2 mol dm<sup>-3</sup>
- Magnesium ribbon 0.02–0.04 g

### Health, safety and technical notes

- Read our standard health and safety guidance here <https://rsc.li/3FxWjg1>
- Always wear eye protection.
- Hydrochloric acid is an irritant, see CLEAPSS Hazcard [HC047a](#).
- Magnesium is water reactive, see CLEAPSS Hazcard [HC059a](#).

### Notes

You should demonstrate the procedure beforehand.

The inversion is not difficult. Rest the end of the burette on the lip of the beaker and swing the tap end round and upward to a vertical position.

It is important that the liquid level starts on the graduated scale of the burette. If the liquid level is not on the scale, opening the tap momentarily allows the liquid to drop onto the scale.

Volume of one mole of gas at standard temperature and pressure, stp, (0 °C, 101,500 N m<sup>-2</sup>) is 22.4 dm<sup>3</sup>.

At room temperature and average pressure, rtp, the students can expect an answer of approximately 24 dm<sup>3</sup>.

Students that are more able may be able to use the equation  $P_1V_1/T_1 = P_2V_2/T_2$  to find the volume at stp.

The temperature and pressure in the laboratory need to be measured.

### Answers

1. Expect rtp molar volume to be approximately 24 dm<sup>3</sup>.