



Oxford Cambridge and RSA

**GCSE Chemistry B (Twenty First Century Science)**  
**J258/02** Depth in chemistry (Foundation Tier)

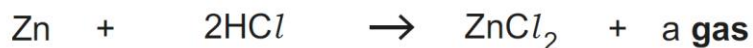
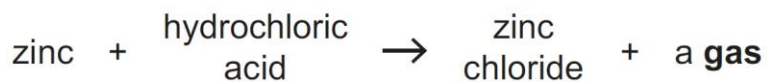
**Question Set 26**

1 Beth does an experiment to measure the rate of reaction between zinc pieces and dilute hydrochloric acid.

(a)

When dilute hydrochloric acid reacts with zinc a gas is made.

This is the word and symbol equation for the reaction between zinc and dilute hydrochloric acid.



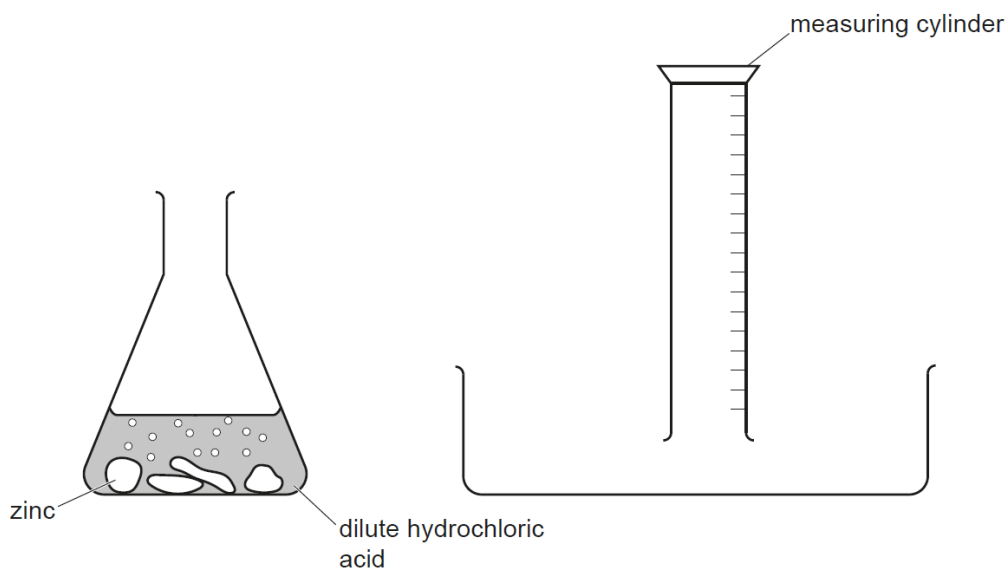
What is the name of the **gas** that is made in this reaction?

[1]

(b)

Beth uses this apparatus to collect and measure the amount of gas that is made.

Complete the diagram to show how the gas is collected.



[2]

(c) Beth does a control experiment first. She then repeats her experiment three times.

For each experiment, she measures the time taken for 50.0 cm<sup>3</sup> of gas to be made.

She changes one variable for each experiment.

**Table 4.1** shows her results.

Experiment	What variable has changed?	How has the variable changed?	Time taken for 50.0 cm <sup>3</sup> gas to be made (s)
1 (control)			75
2	Concentration of Acid	higher concentration of acid (2.0 mol/dm <sup>3</sup> )	34
3	Temperature	higher temperature (40 °C)	10
4	Surface Area	greater surface area (small pieces of zinc)	23

**Table 4.1**

(i) What conclusions can you make about the effects of changing **each** variable on the rate of the reaction?

Use the data in **Table 4.1** to explain your reasons.

Concentration of Acid

Temperature

Surface Area

[3]

(ii) What conditions did Beth use for her **control** experiment?

Put a (ring) around **one** condition in **each** row.

Use the data in **Table 4.1** to help you.

Concentration of Acid:      1.0 mol/dm<sup>3</sup>                  2.0 mol/dm<sup>3</sup>                  3.0 mol/dm<sup>3</sup>

Temperature:                          20 °C                          40 °C                          60 °C

Surface Area:                          powdered zinc                  small pieces of zinc                  large pieces of zinc

[3]

(d) Beth repeats her control experiment, but now adds a small amount of catalyst to the reaction mixture.

How does adding a catalyst affect the reaction?

Tick (✓) **two** boxes.

>75s.

The time taken to collect the gas will be....

<75s.

=75s.

increase.

The activation energy for the reaction will....

stay the same.

decrease.

[2]

**Total Marks for Question Set 26: 11**

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