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.

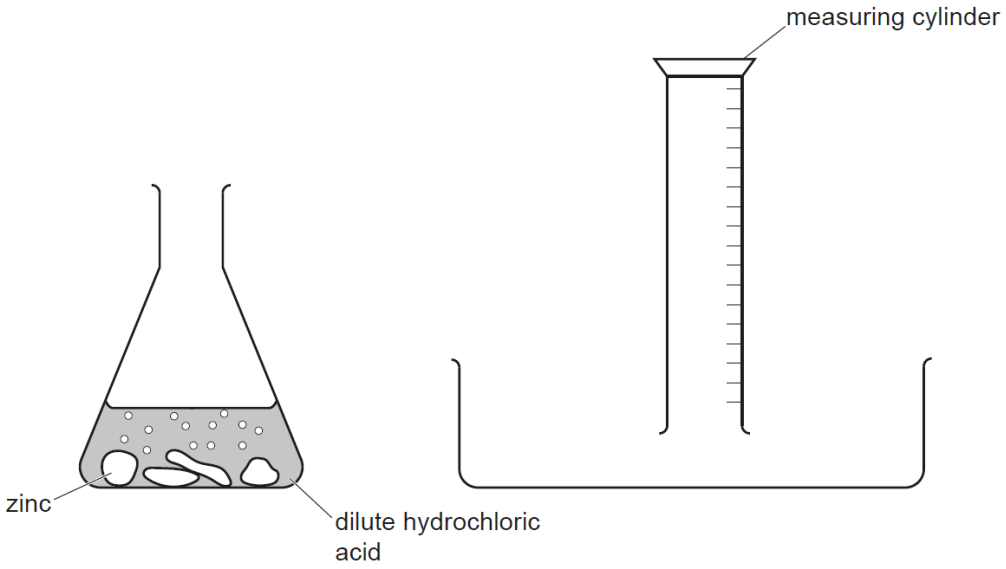
zinc + hydrochloric acid → zinc chloride + a **gas**

$Zn + 2HCl \rightarrow ZnCl_2 +$ a **gas**

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^3 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^3 gas to be made (s)
1 (control)			75
2	Concentration of Acid	higher concentration of acid (2.0 mol/dm^3)	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^3**	**2.0 mol/dm^3**	**3.0 mol/dm^3**
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.

The time taken to collect the gas will be….

- >75 s. ☐
- <75 s. ☐
- =75 s. ☐

The activation energy for the reaction will….

- increase. ☐
- stay the same. ☐
- decrease. ☐

[2]

Total Marks for Question Set 26: 11