

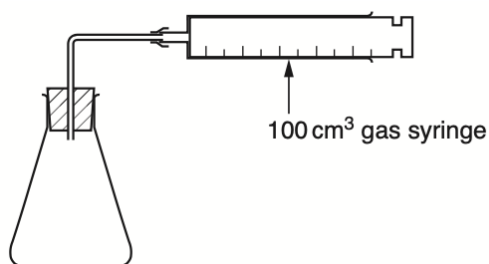
## **AS level Chemistry A**

**H032/02** Depth in chemistry

### **Question Set 2**

2. A student was asked to carry out an experiment to determine the initial rate of reaction of zinc and hydrochloric acid.

The student plans to collect a total of about  $72 \text{ cm}^3$  of hydrogen at RTP and to use an excess of zinc.



The student selects the following apparatus:

- the apparatus shown in the diagram
- $100 \text{ cm}^3$  measuring cylinder
- stop clock
- 2 decimal place balance

Outline how the student could carry out the experiment and explain how the results could be processed graphically.

Show all working in your calculations.

[6]

1 mole of any gas occupies  $24 \text{ dm}^3$  at RTP

$$\Rightarrow \text{Moles of } \text{H}_2 = \frac{72}{24000} = 0.003$$



$$\text{minimum mass of zinc} = 0.003 \times 65.4 = 0.20\text{g}$$

$$\text{moles HCl} = 0.006$$

$$\text{If concentration of HCl is } 1 \text{ mol dm}^{-3} \text{ then volume} = 0.006 \times \frac{1000}{0.1} = 60 \text{ cm}^3$$

Method:

1. Measure minimum mass of zinc using a scale balance and volume of HCl using measuring cylinder.

2. Mix the acid and zinc in the flask and replace the bung.

3. Measure the gas volume every 10s and record results in a table.

To process the results graphically, plot a graph of volume of  $H_2$  (on y axis) against time (on x axis). Draw a tangent at  $t=0$  and calculate the gradient of the tangent. The gradient equals the initial rate of reaction.

$$\downarrow \frac{\text{volume}}{\text{time}}$$

**Total Marks for Question Set 2: 6**

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