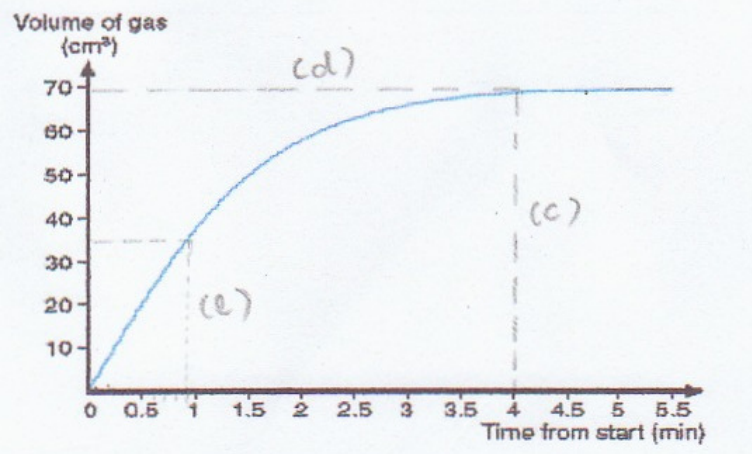
Name : _____ ( ) Class: _____ Date : _____

1. The graph below represents the progress of reaction between magnesium metal and excess dilute sulfuric acid. The curve shows how the total volume of gas liberated at r.t.p changes with time.



{magnesium is the limiting reactant => it is completely used up. as a limiting reactant, it will determine how much product is formed}

(a) Write a chemical equation for the above reaction. [2]

$Mg(s) + H_2SO_4(aq) \rightarrow MgSO_4(aq) + H_2(g)$

(b) Explain why does the curve leveled off towards the end of the reaction. [1]

There is no more gas produced since reaction has stopped when magnesium metal has been used up.

(c) Approximately, how long does it take for the reaction to be completed? [1]

4 minutes

(d) What is the total volume of gas liberated? [1]

70 cm^3

(e) How long does it take for half of the magnesium metal to react? [1]

When half of the magnesium ribbon has reacted, 35cm^3 of gas is produced

From the graph, it takes about 0.9 min for 35cm^3 of gas to be produced

(f) What is the average rate of production of the gas? [1]

70cm^3/ 4min = 17.5cm^3/min

(g) Suggest **two** ways to ***slow*** down the reaction between magnesium metal and sulfuric acid. [2]

Decrease the concentration of dilute sulphuric acid used

Decrease the temperature at which the reaction is carried out

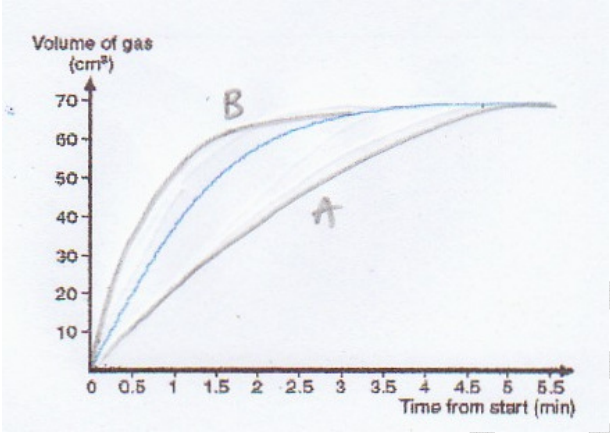
(h) Explain why the speed of reaction was the greatest at the start? [2]

At the start of the reaction, there is a higher concentration of reacting particles, (1) resulting in higher rate of collision between particles (1)

(i) On the same diagram given above, draw the curve you would expect if the experiment were repeated

(i) at 10°C below room temperature. Label this curve as A. [1]

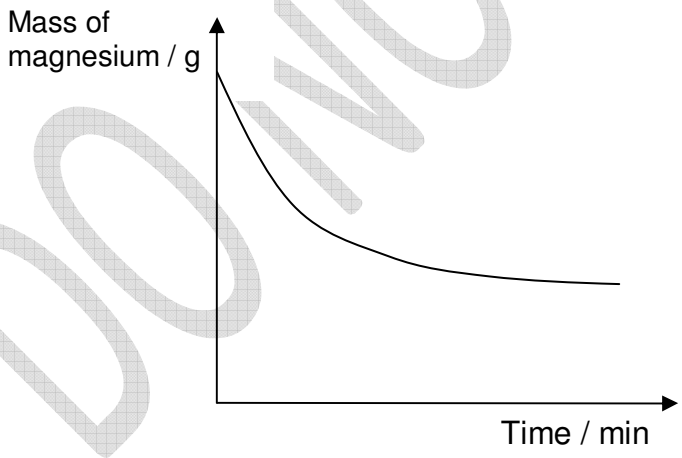
(ii) when concentration of dilute sulfuric acid used was doubled. Label this curve as B. [1]



(j) Explain why there is a change in speed of reaction when the temperature was decreased by 10°C. [4]

At lower temperature, lesser particles have the minimum energy needed to overcome the activation energy (1) in order to start a reaction, resulting in lesser effective collision (1). At the same time, particles with lower energy move slower (1), resulting in a lower rate of collision(1).

(k) If excess magnesium metal was used instead of excess dilute sulfuric acid, complete the graph below to show how the mass of magnesium metal changes over time. [3]



Points to note:

1. *Mass of magesium cannot reach 0g as it is in excess.*
2. *Gradient of graph must decrease over time till it reaches a horizontal.*
3. *Axis must be labeled.*

~ The End ~