

**GCSE Chemistry A (Gateway Science)**

**J248/02 C4-C6 and C7 Foundation (Foundation Tier)**

**Question Set 15**

1 Antacid tablets are used to treat indigestion.

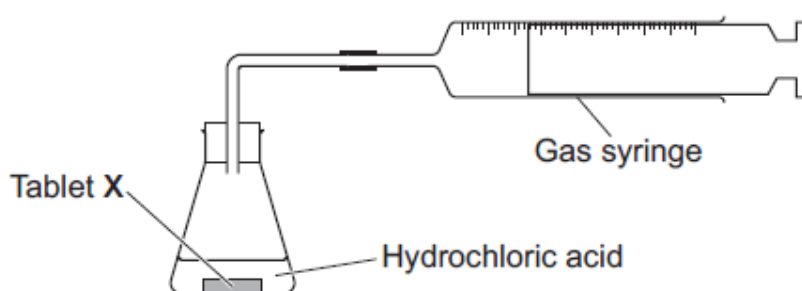
A student investigates two different antacid tablets, X and Y. Both tablets, X and Y, contain calcium carbonate,  $\text{CaCO}_3$ .

Calcium carbonate reacts with hydrochloric acid. Calcium chloride,  $\text{CaCl}_2$ , water and carbon dioxide are made.

(a) Write a **balanced symbol** equation for this reaction. [2]



(b) The diagram shows the apparatus the student uses.



The student reacts tablet X with  $100\text{ cm}^3$  of hydrochloric acid. The hydrochloric acid is in excess.

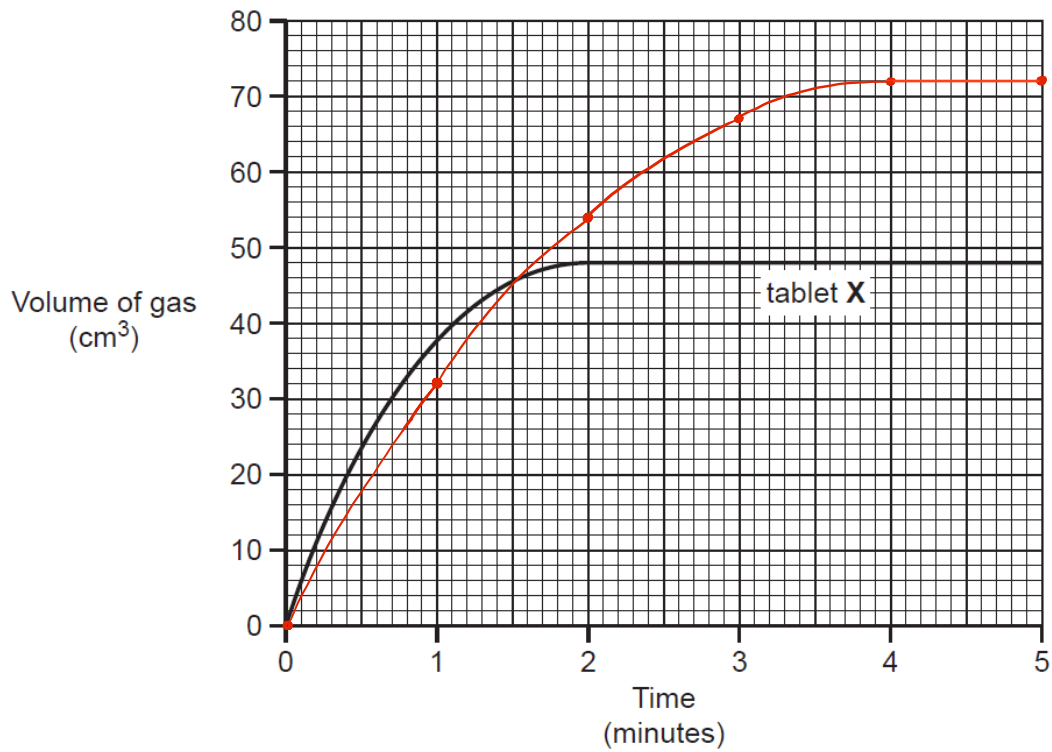
He measures the volume of gas made every minute during the first five minutes.

He does a second experiment using tablet Y and a fresh  $100\text{ cm}^3$  sample of the same hydrochloric acid.

The table shows his results.

Time (minutes)	Volume of gas ( $\text{cm}^3$ )	
	Tablet X	Tablet Y
0	0	0
1	38	32
2	48	54
3	48	67
4	48	72
5	48	72

(i) The graph shows the results for tablet X.



What is the volume of gas made by the end of the experiment?

Answer = ..... **48** ..... cm<sup>3</sup> [1]

(ii) Plot the results for tablet Y on the grid. Draw a line of best fit. [2]

(iii) Tablet X contains less calcium carbonate than tablet Y.

How do the results show this?

[1]

*Less gas is produced from tablet X*

(c) The rate of reaction between calcium carbonate and hydrochloric acid can be increased by:

- Using a more concentrated solution of hydrochloric acid
- Increasing the temperature of the acid.

Explain how each of these methods increase the rate of the reaction.

Use ideas about collisions between particles.

[4]

- Greater concentration of HCl reactant means there will be more particles available to react with  $\text{CaCO}_3$ . Hence there would be more collisions increasing the rate of reaction
- Increasing the temperature of acid allows the particles to have greater kinetic energy. Hence, there would be more collisions increasing the rate of reaction

**Total Marks for Question Set 15: 10**

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