



O-LEVEL Chemistry

RATE OF REACTION

5070-MCQ

FAIZAN SALEEM



2026 EDITION

Q1

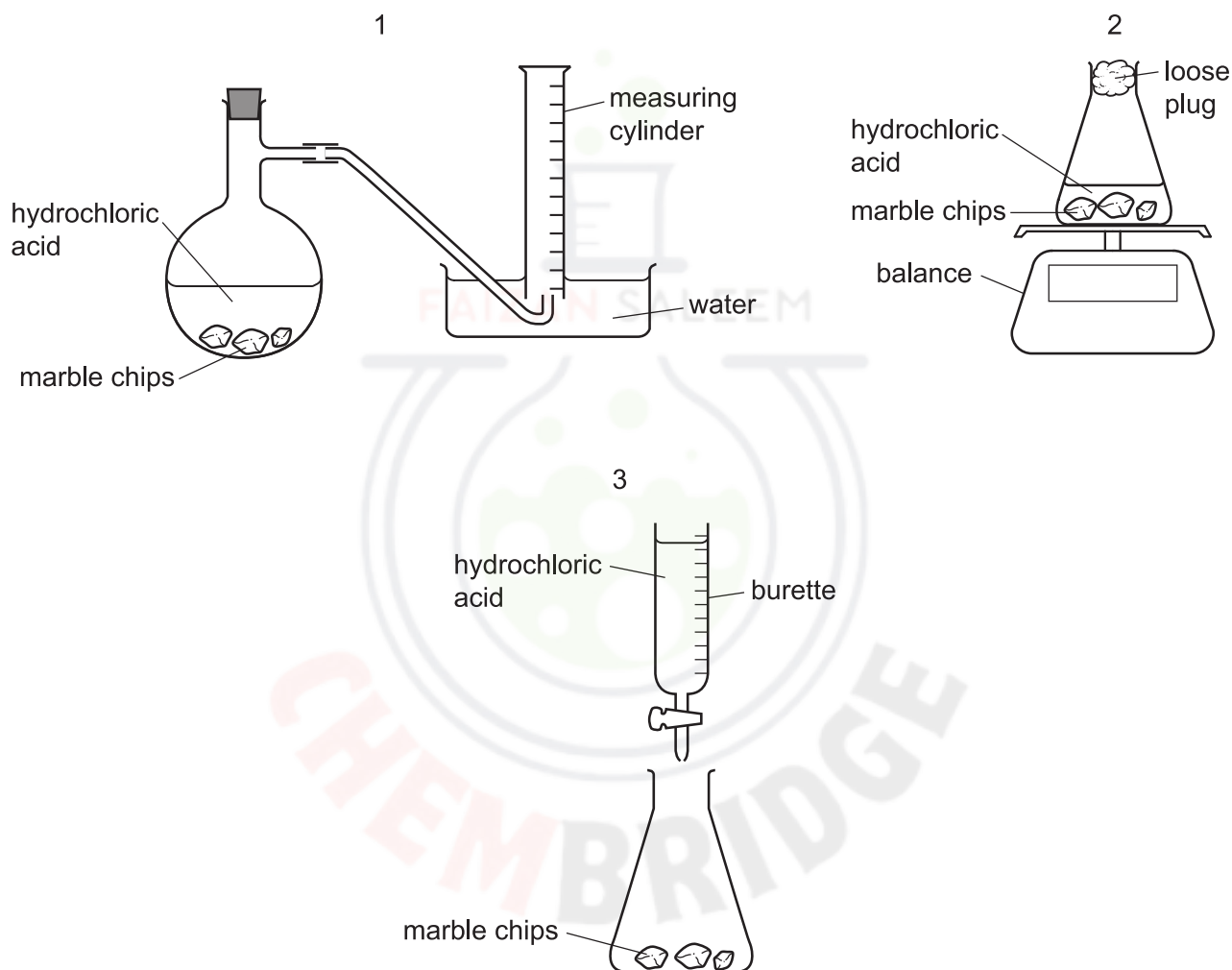
5070/11/O/N/21/Q2

Definition - Easy

- 2 A student follows the rate of the reaction between marble chips, CaCO_3 , and dilute hydrochloric acid.



Which diagrams show apparatus that, with a stopwatch, is suitable for this experiment?



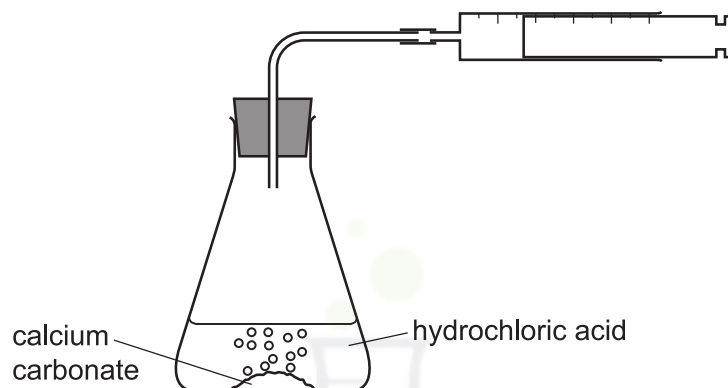
- A 1 only B 1 and 2 only C 2 and 3 only D 1, 2 and 3

Q2

5070/12/M/J/22/Q1

Definition - Easy

- 1 A student investigates the rate of reaction between calcium carbonate and hydrochloric acid.



The volume of gas in the syringe is recorded after one minute.

The experiment is repeated using different concentrations of hydrochloric acid.

Which additional pieces of apparatus are essential for the investigation?

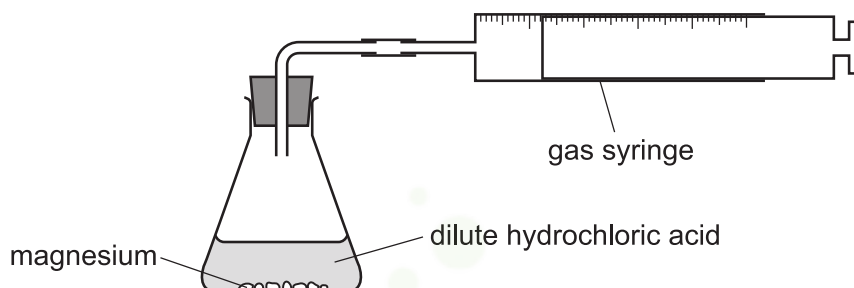
- 1 balance
 - 2 measuring cylinder
 - 3 stop-clock
- A** 1 and 2 only **B** 1 and 3 only **C** 2 and 3 only **D** 1, 2 and 3

Q3

5070/12/M/J/24/Q38

Definition - Easy

- 38** A student measures the rate at which a fixed mass of magnesium reacts with a fixed volume of dilute hydrochloric acid.



Which additional pieces of apparatus are required for this experiment?

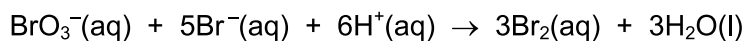
- A** a balance, a measuring cylinder and a stop-watch only
- B** a balance, a measuring cylinder and a thermometer only
- C** a balance, a stop-watch and a thermometer only
- D** a measuring cylinder, a stop-watch and a thermometer only

Q4

5070/12/M/J/22/Q20

Definition - Hard

20 Bromate, bromide and hydrogen ions react according to the equation shown.



Some apparatus for measuring how the rate of this reaction varies over time is suggested.

- 1 gas syringe
- 2 balance
- 3 pH meter

Which apparatus is suitable to measure the rate of this reaction?

- A** 1 and 2 **B** 1 only **C** 2 and 3 **D** 3 only

Q5

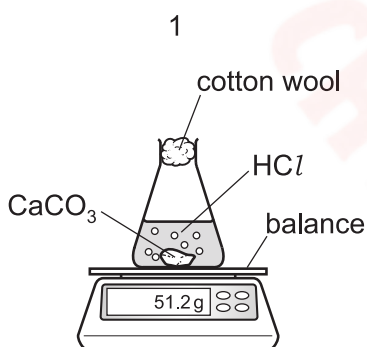
5070/11/O/N/23/Q17

Definition - Hard

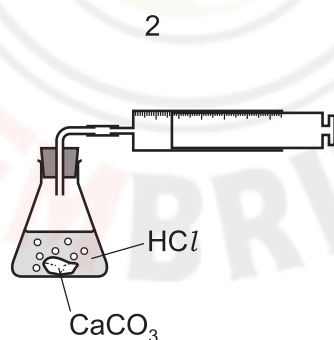
17 A student plans to investigate how the rate of the reaction changes when hydrochloric acid and calcium carbonate react.



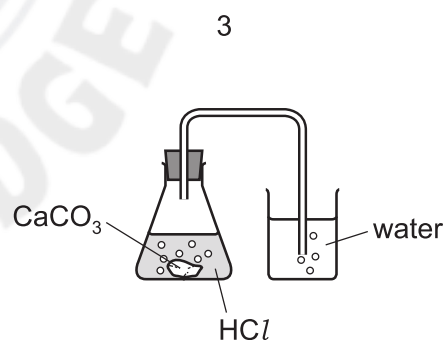
Three methods are described.



Record the mass of the flask and contents every 30 seconds for 5 minutes.



Measure and record the volume of gas in the syringe after 30 seconds.



Count and record the total number of bubbles of gas in the water every 30 seconds for 5 minutes.

Which methods could be used to measure how the rate of reaction changes?

- A** 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

Q6

5070/12/O/N/23/Q16

Definition - Hard

16 Two methods used by students to measure the rate of a reaction are the 'disappearing cross' method and the 'loss of mass' method.

- For the 'disappearing cross' method, the student measures the time taken for the reaction mixture to go cloudy.
- For the 'loss of mass' method, the student measures the loss of mass over a known time interval.

The rates of two reactions are investigated.

reaction 1 Warm aqueous silver nitrate is added to chlorobutane dissolved in ethanol. Two products are formed. One is an organic compound which is soluble in ethanol and the other is silver chloride which is insoluble in ethanol.

reaction 2 Pieces of solid calcium carbonate are added to dilute hydrochloric acid.

Which method should be used for each reaction?

	reaction 1	reaction 2
A	disappearing cross	disappearing cross
B	disappearing cross	loss of mass
C	loss of mass	disappearing cross
D	loss of mass	loss of mass

Q7

5070/11/M/J/21/Q18

Factors affecting the rate of reaction - Easy

18 Which changes will speed up a chemical reaction?

- 1 decreasing the pressure in a reaction between gases
- 2 increasing the size of the solid particles in a reaction involving solids
- 3 increasing the temperature of any reaction
- 4 increasing the concentration of a solution

A 1 and 3 **B** 2, 3 and 4 **C** 3 and 4 only **D** 4 only

Q8

5070/12/O/N/25/Q15

Factors affecting the rate of reaction - Easy

15 Which change increases the rate of a chemical reaction?

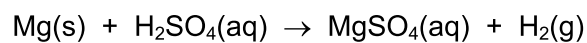
- A** using a higher pressure in a gaseous reaction
- B** using a lower temperature
- C** using a more dilute solution
- D** using larger pieces of a solid

Q9

5070/12/O/N/22/Q21

Factors affecting the rate of reaction - Hard

21 Magnesium reacts with dilute sulfuric acid.



Which changes in the conditions will result in the lowest rate of production of hydrogen?

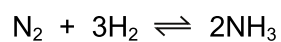
	acid concentration	solid particle size	temperature
A	decrease	decrease	increase
B	decrease	increase	decrease
C	increase	decrease	increase
D	increase	increase	decrease

Q10

5070/11/O/N/25/Q16

Rate and temperature - Easy

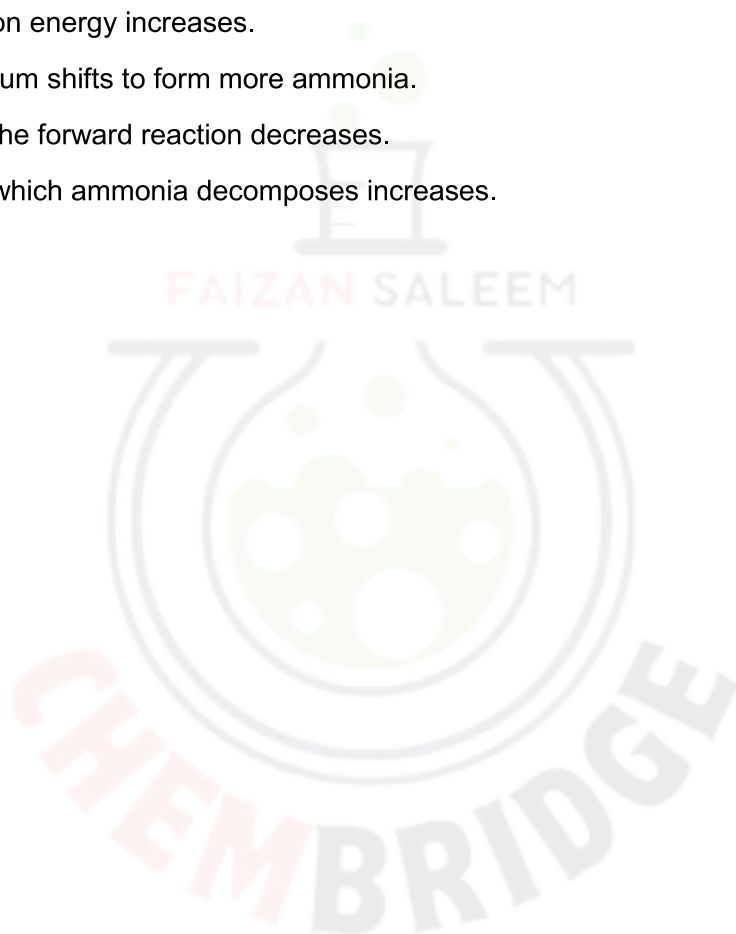
16 The equation shows the reversible reaction between nitrogen and hydrogen to form ammonia.



The forward reaction is exothermic.

Which statement is correct when the temperature is increased?

- A** The activation energy increases.
- B** The equilibrium shifts to form more ammonia.
- C** The rate of the forward reaction decreases.
- D** The rate at which ammonia decomposes increases.

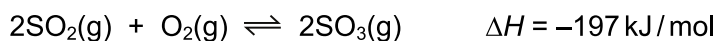


Q11

5070/11/M/J/23/Q15

Rate and temperature - Hard

15 The equation for a reaction in the Contact process is shown.



The conditions used are 450 °C, 2 atmospheres pressure and a catalyst.

What will be the effects when the temperature is reduced to 250 °C and the catalyst is removed?

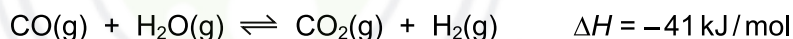
	percentage of SO ₃ in the equilibrium mixture	rate of the forward reaction
A	decrease	no change
B	decrease	decrease
C	increase	increase
D	increase	decrease

Q12

5070/12/M/J/23/Q17

Rate and temperature - Hard

17 Hydrogen is made industrially by the reaction shown.



Statements about this industrial process are given.

- 1 A high pressure can be used to increase the rate of formation of hydrogen.
- 2 A high pressure can be used to shift the equilibrium to the right.
- 3 A high temperature can be used to increase the rate of formation of hydrogen.
- 4 A high temperature can be used to shift the equilibrium to the right.

Which statements are correct?

- A** 1, 2 and 3 **B** 1 and 3 only **C** 1 only **D** 2 and 4

Q13

5070/12/M/J/23/Q15

Rate and concentration - Easy

- 15** What is the best way of slowing down the reaction between magnesium and sulfuric acid?
- A** adding a catalyst to the reactants
 - B** diluting the acid used in the reaction
 - C** stirring the reagents
 - D** using magnesium powder instead of a strip of magnesium



Q14

5070/12/M/J/25/Q17

Rate and concentration - Hard

- 17 Aqueous sodium thiosulfate reacts with hydrochloric acid. The rate of the reaction increases if the concentration of both reactants is increased.

Nitrogen gas reacts with hydrogen gas. The rate of the reaction increases if the pressure in the reaction vessel is increased.

Which row correctly explains why the given change increases the rate of the reaction?

	increasing the concentration of aqueous sodium thiosulfate and hydrochloric acid	increasing the pressure in the reaction vessel containing nitrogen and hydrogen
A	higher frequency of collisions between particles	higher frequency of collisions between particles
B	higher frequency of collisions between particles	the activation energy is decreased
C	the activation energy is decreased	higher frequency of collisions between particles
D	the activation energy is decreased	the activation energy is decreased

Q15

5070/11/M/J/24/Q17

Rate and surface area - Easy

17 A 2 g sample of calcium carbonate reacts with dilute hydrochloric acid as shown.



Which change in conditions makes the reaction proceed more slowly?

- A increasing the acid concentration
- B increasing the size of the solid particles
- C increasing the surface area of the solid particles
- D increasing the temperature

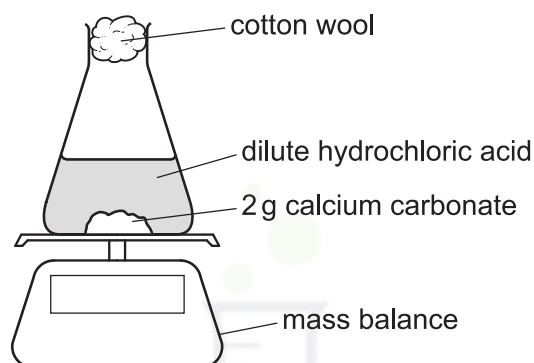


Q16

5070/11/O/N/25/Q15

Rate and surface area - Hard

- 15 The rate of reaction between calcium carbonate and dilute hydrochloric acid is measured in three separate experiments.

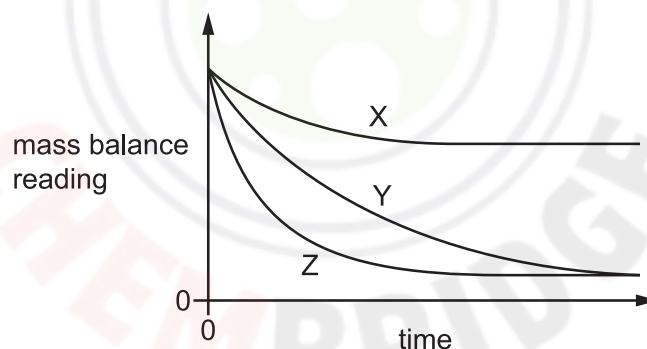


In experiment 1, the calcium carbonate is powdered, and an excess of hydrochloric acid is used.

In experiment 2, the calcium carbonate is in lumps, and an excess of hydrochloric acid is used.

In experiment 3, the calcium carbonate is in lumps, less hydrochloric acid is used, and the calcium carbonate is in excess.

The results of these experiments are shown.



Which statement is correct?

- A Experiment 1 is shown by curve X.
- B Experiment 1 is shown by curve Y.
- C Experiment 2 is shown by curve Y.
- D Experiment 3 is shown by curve Z.

Q17

5070/11/M/J/23/Q13

Rate and pressure - Easy

13 Two gases react inside a sealed vessel.

Which change in conditions would increase the rate of reaction?

- 1 increasing the pressure inside the vessel
- 2 increasing the temperature inside the vessel
- 3 increasing the volume of the vessel

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only



Q18

5070/11/O/N/24/Q14

Rate and pressure - Hard

- 14 Two gases react together to produce a single product. The rate of the reaction is affected by an increase in pressure. The reaction is catalysed by platinum.

Which row describes one effect on this reaction of increasing pressure and one effect on this reaction of adding platinum?

	one effect of increasing pressure	one effect of adding platinum
A	The rate of the reaction decreases.	The activation energy, E_a , decreases.
B	The rate of the reaction decreases.	The activation energy, E_a , increases.
C	The rate of the reaction increases.	The activation energy, E_a , decreases.
D	The rate of the reaction increases.	The activation energy, E_a , increases.

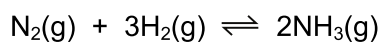


Q19

5070/11/O/N/21/Q18

Rate and catalyst - Easy

18 The equation shows the reaction for the manufacture of ammonia.



Which change will decrease the activation energy of the reaction?

- A addition of a catalyst
- B decrease in temperature
- C increase in concentration
- D increase in pressure

Q20

5070/11/M/J/22/Q21

Rate and catalyst - Easy

21 Which statement is correct?

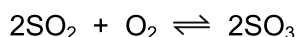
- A An enzyme is a biological catalyst that decreases the activation energy of a reaction.
- B An enzyme is a biological catalyst that increases the activation energy of a reaction.
- C An enzyme is a compound of a transition element that decreases the activation energy of a reaction.
- D An enzyme is a compound of a transition element that increases the activation energy of a reaction.

Q21

5070/12/O/N/22/Q23

Rate and catalyst - Easy

23 In the Contact process, sulfur is converted into sulfuric acid. A catalyst is added to the reaction mixture shown in the equation.



What is the purpose of the catalyst?

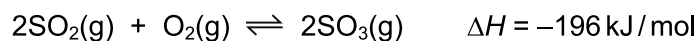
- A to lower the activation energy for the reaction
- B to oxidise the sulfur dioxide
- C to reduce the sulfur dioxide
- D to shift the equilibrium to the right

Q22

5070/11/M/J/22/Q20

Rate and catalyst - Hard

20 Sulfur dioxide reacts with oxygen in the air.



The reaction is very slow if no catalyst is present.

Which statement explains this?

- A Air contains only 21% oxygen so there is not enough oxygen for all the sulfur dioxide to react.
- B Only a small proportion of the sulfur dioxide and oxygen molecules have enough energy to react, even at high temperatures.
- C The reaction is exothermic and so at high temperatures the equilibrium shifts to the left.
- D The reaction is reversible and so products turn back to reactants; this happens more quickly at high temperatures.

Q23

5070/11/O/N/22/Q21

Rate and catalyst - Hard

21 A sample of sulfuric acid is added to 10 g of zinc granules. A reaction occurs and a gas is produced. The rate of the reaction is increased if a small amount of copper is added. The copper is unchanged after the reaction.

Which statement about this reaction is correct?

- A Copper acts as a biological catalyst in this reaction.
- B Copper lowers the activation energy of this reaction.
- C The rate of the reaction is greater as the particle size of the zinc is greater.
- D The rate of the reaction is greater if the pressure is increased.

Q24

5070/11/M/J/23/Q14

Rate and catalyst - Hard

14 Catalysts change the rate of chemical reactions.

Which statements correctly describe the effect of adding a catalyst to a reaction?

- 1 All reactant particles have more energy and move faster.
- 2 The activation energy is lowered.
- 3 More reactant particles collide with enough energy to react.

A 1, 2 and 3 **B** 1 and 3 only **C** 2 and 3 only **D** 3 only

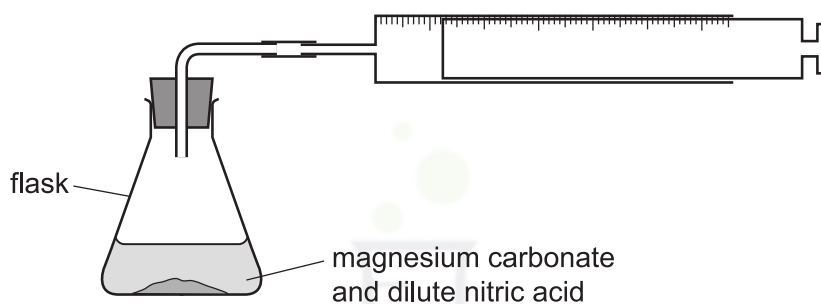
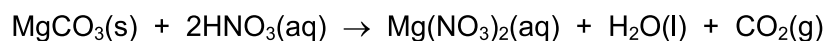


Q25

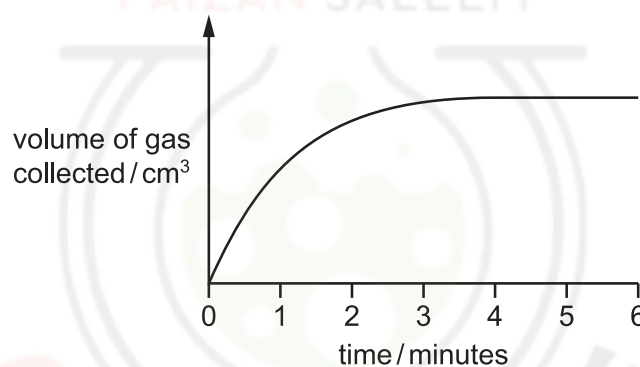
5070/12/O/N/21/Q19

Graph questions - Easy

- 19 The apparatus shows a method of following the rate of the reaction between magnesium carbonate, MgCO_3 , and dilute nitric acid, HNO_3 .



The graph shows the volume of gas collected against time.



Three statements are made about the experiment.

- 1 The mass of the flask and its contents decreases as time increases.
- 2 The rate of the reaction decreases as time increases.
- 3 The reaction has finished after four minutes.

Which statements are correct?

- A** 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

Q26

5070/12/M/J/24/Q17

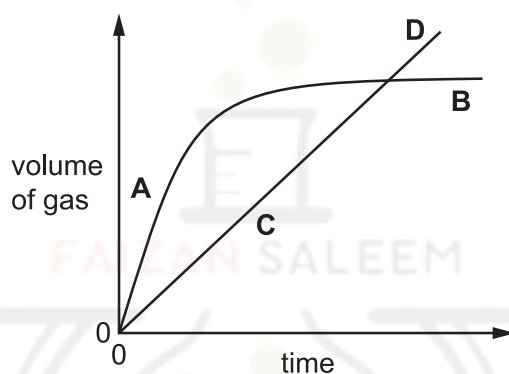
Graph questions - Easy

17 Two reactions each produce a gaseous product.

The reactions are performed separately using the same conditions of temperature and pressure.

The volume of gas formed in each experiment is measured over time and the results are plotted in the graph shown.

At which point is the rate of production of gas the greatest?



Q27

5070/12/O/N/25/Q16

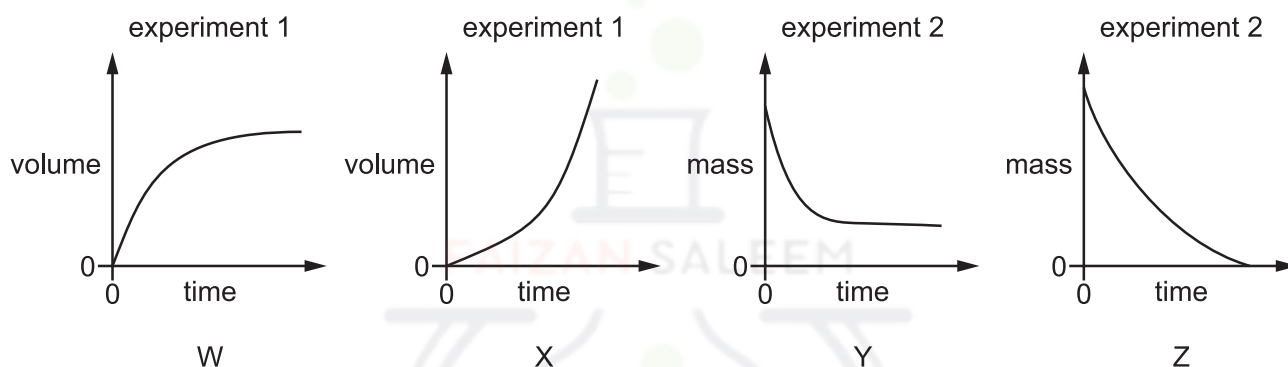
Graph questions - Easy

- 16** In two separate experiments, 1 and 2, an excess of powdered calcium carbonate reacts in a flask with dilute hydrochloric acid.

In experiment 1, the volume of carbon dioxide evolved is measured at regular time intervals.

In experiment 2, the mass of the flask and its contents is measured at regular time intervals.

The results of both experiments are plotted on graphs.



Which graphs show the results of these two experiments?

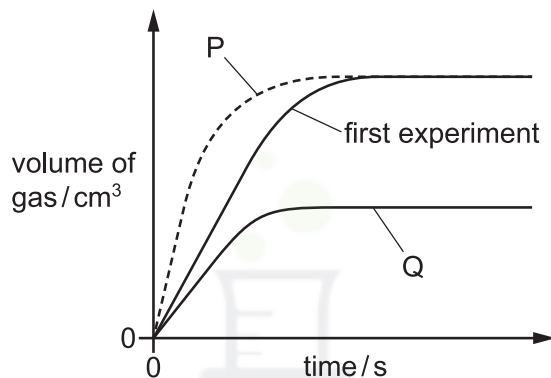
	experiment 1	experiment 2
A	W	Y
B	W	Z
C	X	Y
D	X	Z

Q28

5070/12/M/J/22/Q21

Graph questions - Hard

- 21** 25 cm^3 of 1.0 mol/dm^3 hydrochloric acid reacts with 10 g of a solid to produce a gas. The solid is in excess. The graph labelled first experiment shows the volume of gas produced over time. Graphs P and Q show the volume of gas produced under different conditions.



Which changes in conditions produce graphs P and Q, if all other conditions are kept the same?

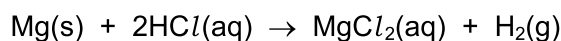
- A** P uses a catalyst and Q has a lower temperature.
- B** P uses 25 cm^3 of more concentrated acid and Q uses smaller pieces of solid.
- C** P uses a higher temperature and Q uses 25 cm^3 of more dilute acid.
- D** P uses smaller pieces of solid and Q uses larger pieces of solid.

Q29

5070/11/O/N/22/Q22

Graph questions - Hard

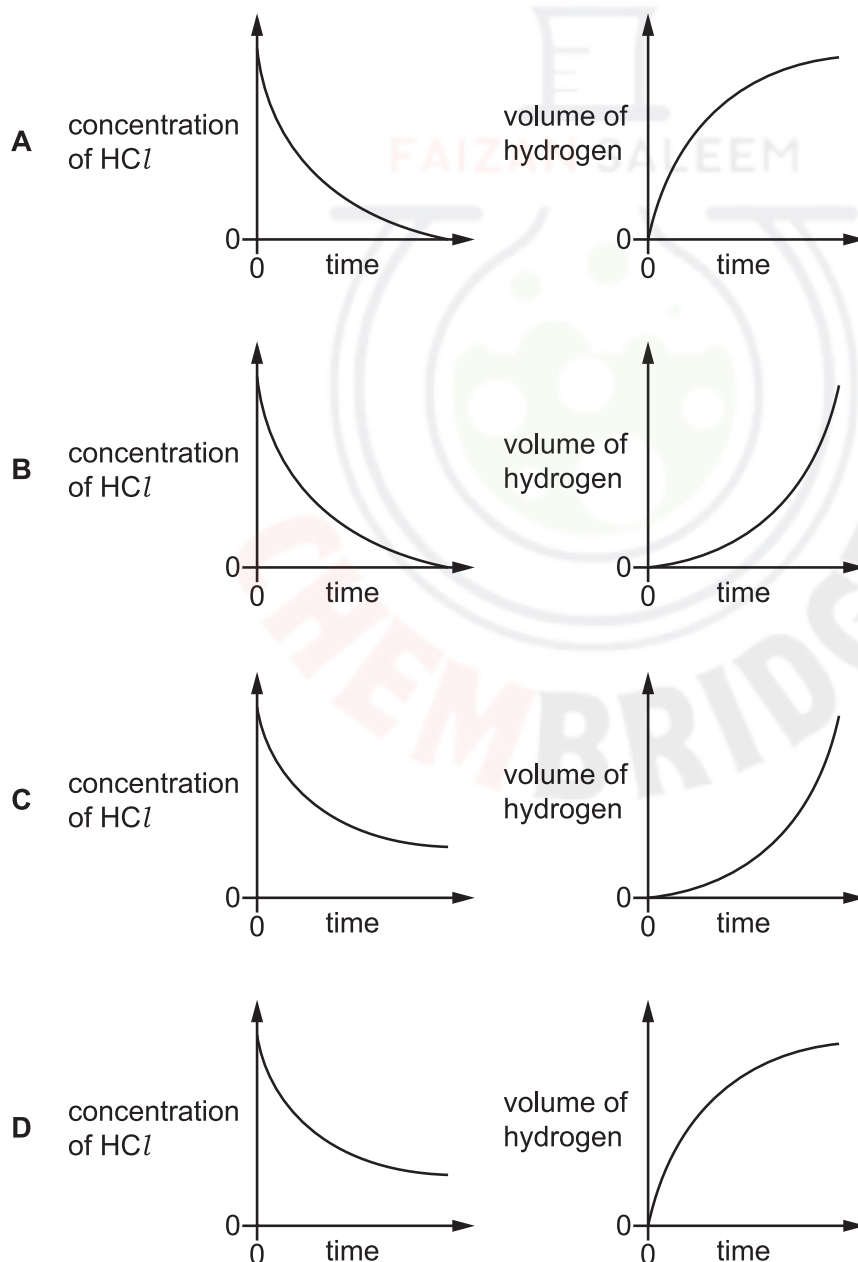
- 22 The rate of reaction between magnesium and dilute hydrochloric acid is investigated. The equation is shown.



A known mass of magnesium is added to an excess of dilute hydrochloric acid.

The concentration of the hydrochloric acid and the volume of hydrogen produced is measured at regular time intervals.

Which pair of graphs correctly shows the experimental results?



Q30

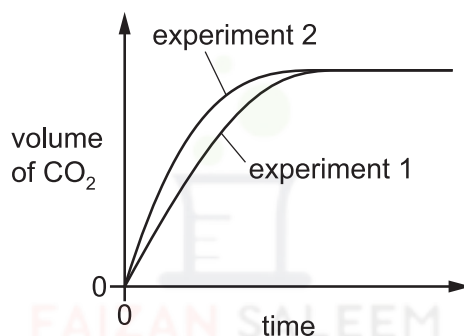
5070/11/O/N/24/Q15

Graph questions - Hard

15 Calcium carbonate reacts with excess dilute hydrochloric acid to form carbon dioxide.

The reaction is investigated in two experiments.

The rate of the reactions is compared by measuring the volume of carbon dioxide formed over time in each experiment. The two rates are compared by plotting graphs.



Which statement about experiments 1 and 2 is correct?

- A** Experiments 1 and 2 both slow down as the reaction proceeds.
- B** Experiments 1 and 2 must both use acid of the same concentration.
- C** Experiments 1 and 2 must have been done at the same temperature.
- D** Experiment 2 uses larger lumps of calcium carbonate. All other conditions stay the same.

MARKING SCHEME

Q	Ans	Paper reference
Q1	B	5070/11/O/N/21/Q2
Q2	D	5070/12/M/J/22/Q1
Q3	A	5070/12/M/J/24/Q38
Q4	D	5070/12/M/J/22/Q20
Q5	C	5070/11/O/N/23/Q17
Q6	B	5070/12/O/N/23/Q16
Q7	C	5070/11/M/J/21/Q18
Q8	A	5070/12/O/N/25/Q15
Q9	B	5070/12/O/N/22/Q21
Q10	D	5070/11/O/N/25/Q16
Q11	D	5070/11/M/J/23/Q15
Q12	B	5070/12/M/J/23/Q17
Q13	B	5070/12/M/J/23/Q15
Q14	A	5070/12/M/J/25/Q17
Q15	B	5070/11/M/J/24/Q17
Q16	C	5070/11/O/N/25/Q15
Q17	B	5070/11/M/J/23/Q13
Q18	C	5070/11/O/N/24/Q14
Q19	A	5070/11/O/N/21/Q18
Q20	A	5070/11/M/J/22/Q21
Q21	A	5070/12/O/N/22/Q23
Q22	B	5070/11/M/J/22/Q20
Q23	B	5070/11/O/N/22/Q21
Q24	C	5070/11/M/J/23/Q14
Q25	A	5070/12/O/N/21/Q19
Q26	A	5070/12/M/J/24/Q17

Q	Ans	Paper reference
Q27	A	5070/12/O/N/25/Q16
Q28	C	5070/12/M/J/22/Q21
Q29	D	5070/11/O/N/22/Q22
Q30	A	5070/11/O/N/24/Q15

