

3

1 In which pair do neither of the gases change the colour of damp blue litmus paper?

- A ammonia and hydrogen
- B ammonia and hydrogen chloride
- C carbon dioxide and chlorine
- D carbon dioxide and sulfur dioxide

2 In an experiment,  $1 \text{ cm}^3$  of a gaseous hydrocarbon X required  $4 \text{ cm}^3$  of oxygen for complete combustion to give  $3 \text{ cm}^3$  of carbon dioxide. All gas volumes are measured at r.t.p.

Which formula represents X?

- A  $\text{C}_2\text{H}_2$                       B  $\text{C}_2\text{H}_4$                       C  $\text{C}_3\text{H}_4$                       D  $\text{C}_3\text{H}_8$

3 What is the concentration of a solution containing 1.0 g of sodium hydroxide in  $250 \text{ cm}^3$  of solution?

- A  $0.025 \text{ mol / dm}^3$
- B  $0.10 \text{ mol / dm}^3$
- C  $0.25 \text{ mol / dm}^3$
- D  $1.0 \text{ mol / dm}^3$

4 Which aqueous reagent liberates ammonia from ammonium nitrate on warming?

- A calcium nitrate
- B potassium hydroxide
- C sodium chloride
- D sulfuric acid

- 5 An aqueous solution of a compound X reacts with
- aqueous zinc chloride to form a white precipitate which dissolves when X is in excess,
  - aluminium sulfate solution to form a white precipitate which is insoluble when X is in excess.

What is the identity of X?

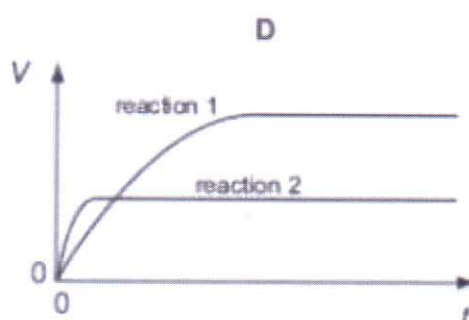
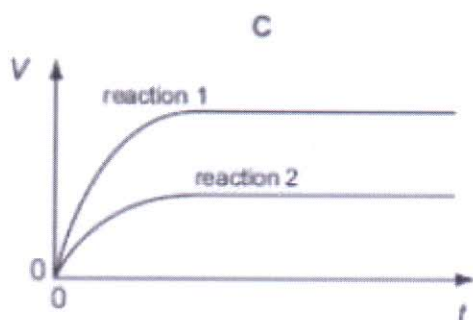
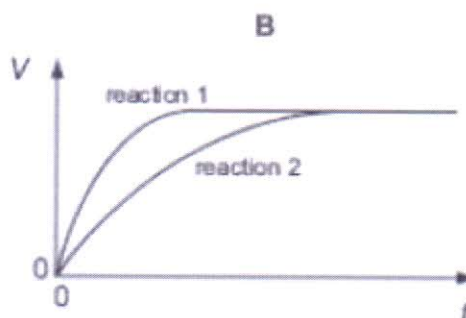
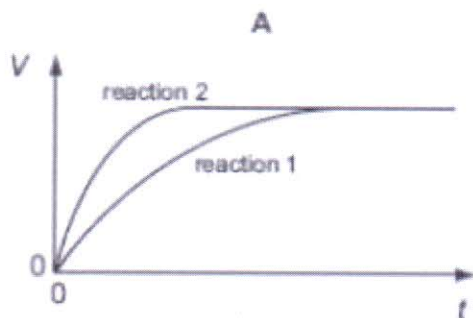
- A ammonia  
 B barium chloride  
 C silver nitrate  
 D sodium hydroxide
- 6 A student performs two reactions.

reaction 1 10 g of magnesium ribbon with excess  $2.0 \text{ mol / dm}^3$  dilute hydrochloric acid

reaction 2 5 g of magnesium powder with excess  $2.0 \text{ mol / dm}^3$  dilute hydrochloric acid

In both experiments, the volume of hydrogen produced, V, is measured against time, t, and the results plotted graphically.

Which set of graphs is correct?



7 What is the mass of one mole of carbon-12?

A 0.012 g

B 0.024 g

C 1 g

D 12 g

8 A metal reacts with dilute hydrochloric acid to produce a gas.

What is used to identify this gas?

A. a glowing splint

B. a lighted splint

C. damp blue litmus paper

D. limewater

9 Substance X dissolves in water to form a colourless solution. This solution reacts with aqueous lead(II) nitrate in the presence of dilute nitric acid to give a yellow precipitate.

What is substance X?

A. calcium iodide

B. copper(II) chloride

C. iron(II) iodide

D. sodium chloride

10 What is the concentration of iodine molecules,  $I_2$ , in a solution containing 2.54 g of iodine in 250  $cm^3$  of solution?

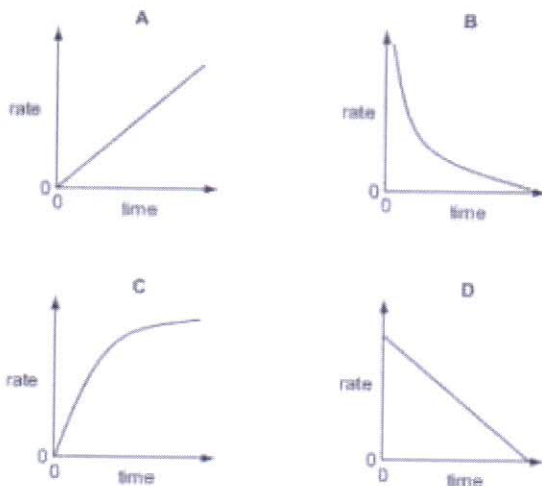
A. 0.01 mol /  $dm^3$

B. 0.02 mol /  $dm^3$

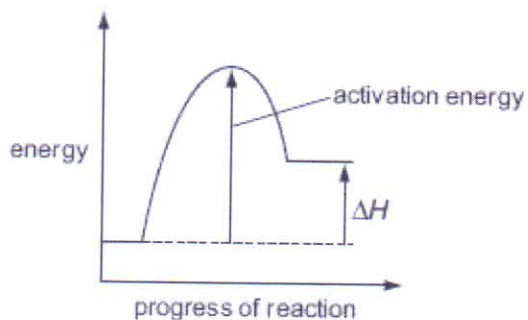
C. 0.04 mol /  $dm^3$

D. 0.08 mol /  $dm^3$

- 11 Which graph represents how the rate of reaction varies with time when an excess of calcium carbonate reacts with dilute hydrochloric acid?



- 12 The energy profile for the forward direction of a reversible reaction is shown.



Which row correctly shows the sign of both the activation energy and the type of the enthalpy change for the reverse reaction?

	Sign of activation energy	Type of enthalpy change
A	Negative	Endothermic
B	Negative	Exothermic
C	Positive	Endothermic
D	Positive	Exothermic

3

- 13 A student mixed together aqueous solutions of Y and Z. A white precipitate formed. Which could not be solutions Y and Z?

	Solution Y	Solution Z
A	Hydrochloric acid	Silver nitrate
B	Hydrochloric acid	Sodium nitrate
C	Silver chloride	Lead(II)nitrate
D	Silver chloride	Silver nitrate

- 14 The tests below were carried out on a solution containing ions of the metal X.

test	observation
Add sodium chloride solution	No change
Add sodium sulfate solution	No change
Add sodium hydroxide solution	A white precipitate is formed, soluble in excess of the hydroxide

What is metal X?

A calcium

B iron

C lead

D zinc

- 15 What is the molecular mass Mr of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ ?

A 127

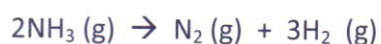
B 160

C 178

D 250



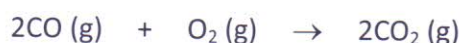
16 Ammonia gas decomposes according to the equation:



What total volume of gas is produced from the decomposition of  $100\text{cm}^3$  of ammonia (all volumes of gases being measured at r.t.p.)?

- A  $150\text{cm}^3$  C  $300\text{cm}^3$   
B  $200\text{cm}^3$  D  $400\text{cm}^3$

17 Carbon dioxide is produced from the burning of carbon monoxide in oxygen according to the reaction.



$20\text{cm}^3$  of carbon monoxide was reacted with  $15\text{cm}^3$  of oxygen at room condition. What is the total volume of gases measured at the end of the reaction?

- A)  $30\text{cm}^3$  C)  $10\text{cm}^3$   
B)  $25\text{cm}^3$  D)  $35\text{cm}^3$

18 A sample of  $1.6\text{g}$  of methane was burnt in excess oxygen above  $100^\circ\text{C}$ .



What is the total volume of gaseous products formed?

- A  $2.4\text{dm}^3$  B  $7.2\text{dm}^3$   
C  $24\text{dm}^3$  D  $72\text{dm}^3$

19  $0.4$  mole of potassium nitrate is dissolved in  $2\text{dm}^3$  of solution.

The concentration of the solution is

- A.  $10.1\text{g/dm}^3$   
B.  $20.2\text{g/dm}^3$   
C.  $30.3\text{g/dm}^3$   
D.  $40.4\text{g/dm}^3$

20 The empirical formula of a liquid compound is  $C_2H_4O$ .

To find the empirical formula, it is necessary to know the

- A. Density of the compound
- B. Percentage composition of the compound
- C. Relative molecular mass of the compound
- D. Volume occupied by 1 mole of the compound

21 The Mr of oxygen  $O_2$  is 32 and the Mr of sulfur is 256.

What is the formula of molecule of sulfur?

- A  $S_2$                   B  $S_4$                   C  $S_8$                   D  $S_{16}$

22 Bitumen, diesel, naphtha and paraffin (kerosene) are all fractions obtained by the fractional distillation of petroleum.

Which row gives a correct use for the named fraction?

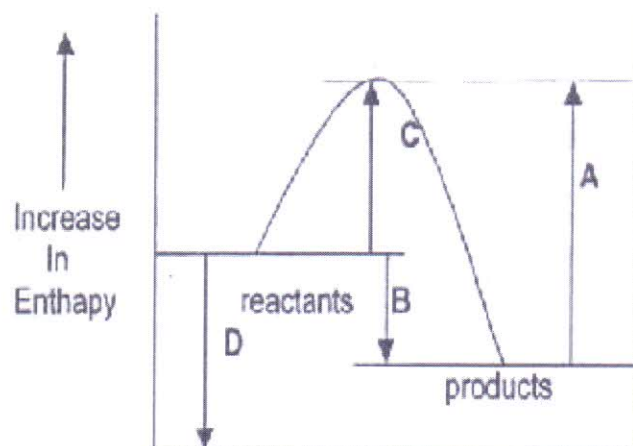
	fraction	use
<b>A</b>	bitumen	a source of polish
<b>B</b>	diesel	a fuel for aircraft engines
<b>C</b>	naphtha	a fuel for heating
<b>D</b>	paraffin	a fuel for cooking

23 The synthesis of hydrogen iodide from hydrogen and iodine is an endothermic reaction.

From this information, it may be deduced that, in this reaction,

- A hydrogen and iodine react more rapidly at room temperature than when heated.
- B the energy change involved in bond formation is less than the energy change involved in bond breaking.
- C the number of bonds broken is greater than the number of bonds formed.
- D hydrogen iodide has a lower energy level than hydrogen and iodine

- 24 The energy diagram shows enthalpy changes that could take place during a chemical reaction.



Which enthalpy change represents the overall enthalpy change for the reaction?

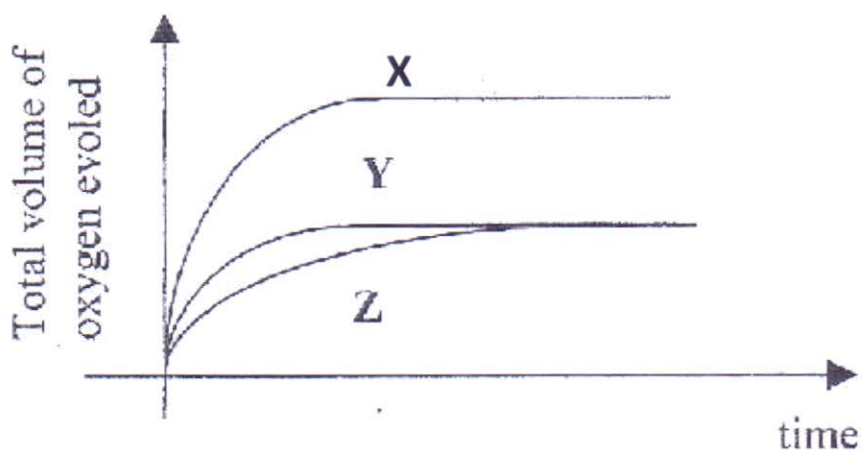
- 25 To a solution of zinc nitrate, concentrated ammonia solution is added drop wise. Which of the following is the correct sequence of observations as the reaction proceeds?
- A A cloudy white suspension forms at first, but eventually the solution becomes clear.
  - B The solution turns deep blue at first, then a pale blue precipitate forms.
  - C The solution remains clear for the entire procedure.
  - D A white precipitate forms in the solution, but the solution eventually turns a deep blue colour.



- 26 Hydrogen peroxide solution is catalytically decomposed by manganese(IV) oxide according to the equation below:



Three experiments were performed using different solutions but a fixed mass of catalyst. The graph shows the following results :



The solutions used were :

- Solution 1 :  $50\text{cm}^3$  of  $2.0\text{mol/dm}^3$  hydrogen peroxide  
Solution 2 :  $100\text{cm}^3$  of  $1.0\text{mol/dm}^3$  hydrogen peroxide  
Solution 3 :  $100\text{cm}^3$  of  $2.0\text{mol/dm}^3$  hydrogen peroxide

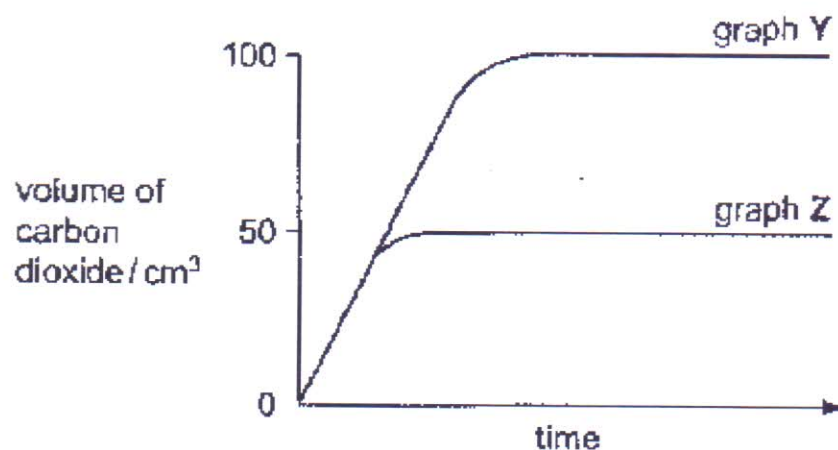
Which curve corresponds to which solution?

	Solution 1	Solution 2	Solution 3
A)	X	Y	Z
B)	X	Z	Y
C)	Y	Z	X
D)	Z	Y	X

27 A compound contains 75% carbon and 25% hydrogen by mass.  
What is the molecular formula of the compound?

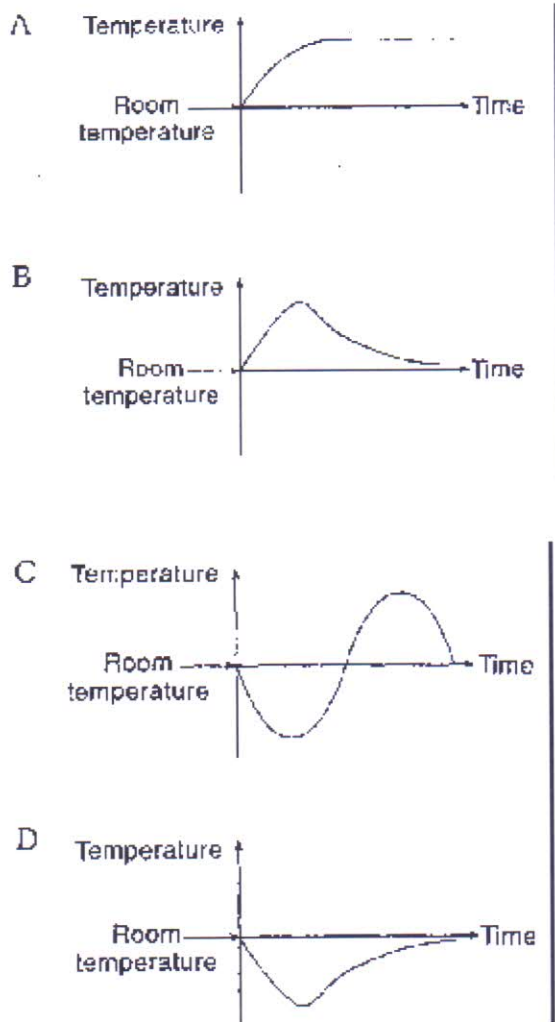


28 Some crystals of sodium carbonate were added to an excess of sulphuric acid at room temperature. The volume of carbon dioxide produced was measured over a period of time. The results are shown in graph Y. The experiment was repeated and graph Z was obtained. Which one change was used to obtain the results shown in graph Z?



- A Acid of half the original concentration was used.
- B A lower temperature was used.
- C Half the amount of sodium carbonate was used.
- D Larger crystals of sodium carbonate were used.

- 29 The dissolving of ammonium nitrate is an endothermic process. Which graph best shows the temperature change of the solution that occurs when ammonium nitrate is stirred with water until no further change in temperature is observed?



- 30 Several tests were conducted for a colourless solution S to determine its chemical properties and the observations were recorded below.

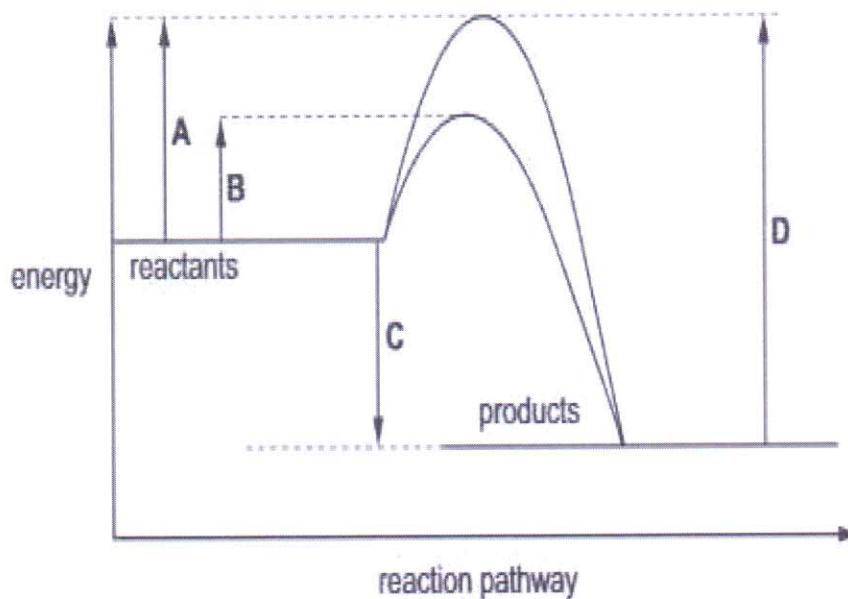
Test	Observations
1. To a portion of S, add excess aqueous sodium hydroxide	White precipitate formed
2. Add aluminium powder to Test 1. Warm mixture gently.	Effervescence of pungent gas which gave brown precipitate when bubbled into aqueous iron (III) chloride

Which ions could be present in S?

- A) Calcium and nitrate
  - B) zinc and nitrate
  - C) aluminium and bromide
  - D) sodium and ammonium
- 31 The equation for the burning of hydrogen is shown :
- $$2\text{H}_2 (\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O} (\text{g})$$
- 1.5 mole of hydrogen was burned with one mole of oxygen. What was present after the reaction ?
- A. 1.5 mole of steam only
  - B. 1.5 mole of steam + 0.25 mole of oxygen gas
  - C. 1.5 mole of steam + 0.5 mole of hydrogen gas
  - D. 2 mole of steam only
- 32 The formula of an oxide of iron is  $\text{Fe}_2\text{O}_3$ . How many grams of oxygen are combined with 56 g of iron?
- A 16 g      B 24 g      C 32 g      D 48 g

- 33 The diagram shows an energy profile diagram for a chemical reaction, both with and without a catalyst.

Which energy change is the activation energy for the catalysed reaction?



- 34 What is the mass of 2 mole of nitrogen gas?

A. 56  
B. 28  
C. 14  
D. 7

- 35 A solution P forms a white precipitate with dilute sulphuric acid and also with aqueous silver nitrate. P could be

A. barium chloride.  
B. calcium iodide.  
C. zinc sulphate.  
D. aluminium chloride.



- 36 In each of the following four experiments, the same mass of magnesium reacts with the same volume of excess dilute hydrochloric acid. Which set of conditions will result in the magnesium being used up the fastest?

	Form of Magnesium	Concentration of Acid	Temperature
A	ribbon	80 g HCl in 2 dm <sup>3</sup> of water	80°C
B	powder	20 g HCl in 1 dm <sup>3</sup> of water	20°C
C	ribbon	10 g HCl in 500 cm <sup>3</sup> of water	80°C
D	powder	20 g HCl in 500 cm <sup>3</sup> of water	80°C

- 37 What is used to test for ammonia gas?

- A a lighted splint  
 B aqueous sodium hydroxide  
 C aqueous calcium hydroxide  
 D damp red litmus paper

- 38 A student investigated the rate of reaction of marble chips with excess dilute hydrochloric acid, by measuring the change in mass over a period of time. The experiment was then repeated using powdered calcium carbonate of equivalent amount to the marble chips.

How did the initial rate and the final mass change when the powdered calcium carbonate was used?

	Initial Rate	Final Mass
A)	faster	less
B)	faster	unchanged
C)	slower	less
D)	unchanged	unchanged

39 Aspartame is an artificial sweetener with a molecular formula of  $C_{14}H_{18}N_2O_5$ .

What is the relative molecular mass,  $M_r$ , of this molecule?

- A 39
- B 156
- C 294
- D 350

40 When dilute hydrochloric acid is added to substance P, a gas is produced which forms a white precipitate with limewater.

When no more gas is produced, aqueous sodium hydroxide is gradually added to the resulting solution and a green precipitate forms.

Which one of the following is P likely to be?

- A Copper(II) chloride
- B Iron(II) carbonate
- C Iron(III) carbonate
- D Zinc chloride