

Name: ()	Class:
 GREENDALE SECONDARY SCHOOL Preliminary Examination 2022 CHEMISTRY Paper 1 Multiple Choice Secondary 4 Express Additional Materials: Multiple Choice Answer Sheet	
6092/01 31 August 2022 1 hour	

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, glue or correction fluid.

Write your name, class and register number on the Answer Sheet and on the Question Paper in the spaces provided.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.

Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done on this question paper.

A copy of the Periodic Table is printed on Page 18.

The use of an approved scientific calculator is expected, where appropriate.

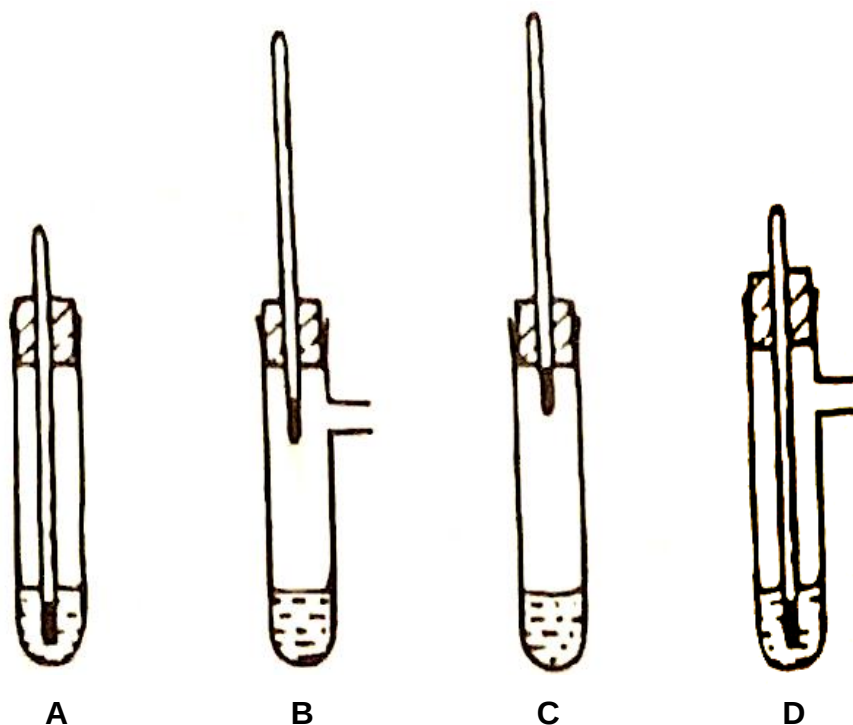
- 1 A student put exactly 25.0 cm^3 of dilute hydrochloric acid into a conical flask.

The student added 2.5 g of solid sodium carbonate and measured the change in temperature of the mixture.

Which apparatus does the student need to use?

- A balance, measuring cylinder, thermometer
 - B balance, pipette, stopwatch
 - C balance, pipette, thermometer
 - D burette, pipette, thermometer
- 2 The tubes shown all contain a dilute solution of a solid X dissolved into a liquid Y.

Which apparatus is most suitable for finding the boiling point of liquid Y?



- 3 Which description of brass are correct?

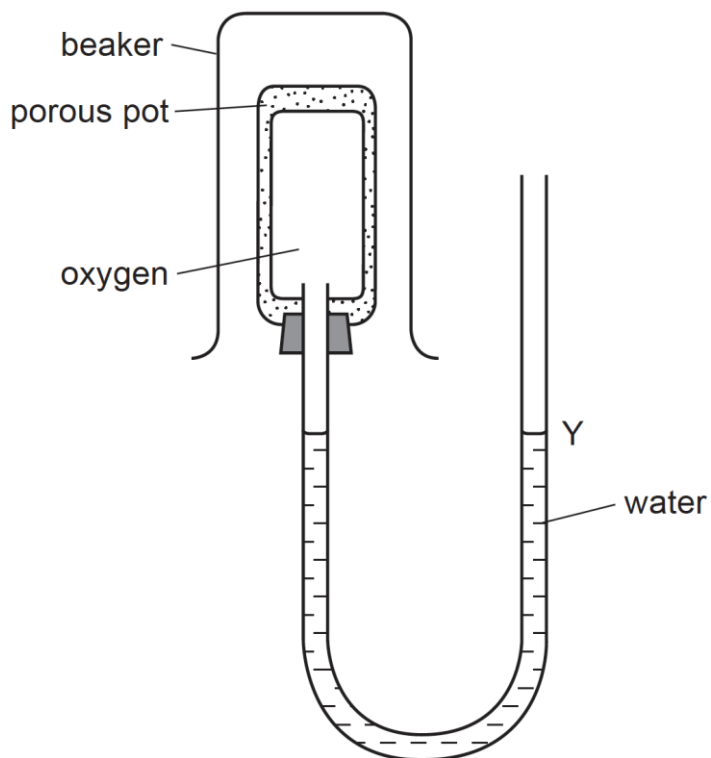
- 1 It is an alloy.
- 2 It is a mixture.
- 3 It is a non-metal.

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

- 4 Which one of the following correctly describes the particles in a dilute sugar solution at room temperature?

	sugar molecules	water molecules
A	widely separated, moving at random	close together, moving at random
B	widely separated, moving at random	close together, not moving
C	close together, moving at random	widely separated, moving at random
D	close together, vibrating slightly	close together, moving at random

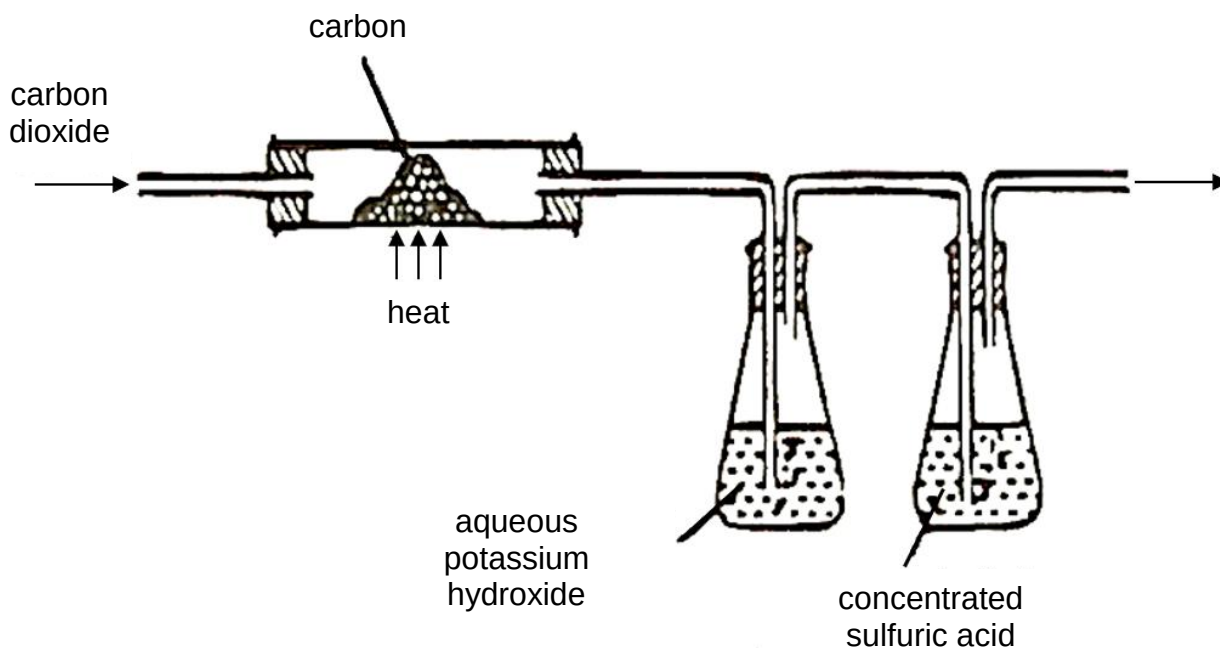
- 5 The diagram shows a diffusion experiment.



Which gas, when present in the beaker over the porous pot, will cause water level at Y to initially rise?

- | | |
|------------------------|------------------------|
| A CO_2 | B Cl_2 |
| C CH_4 | D NO_2 |

- 6 The apparatus shown is used to prepare carbon monoxide.



What is the purpose of the aqueous potassium hydroxide?

- A to absorb any oxygen formed
 - B to cool the carbon monoxide
 - C to dry carbon monoxide
 - D to remove traces of carbon dioxide
- 7 A bottle of copper(II) oxide has been contaminated with some solid sodium chloride.

How can the sodium chloride be removed from the copper(II) oxide?

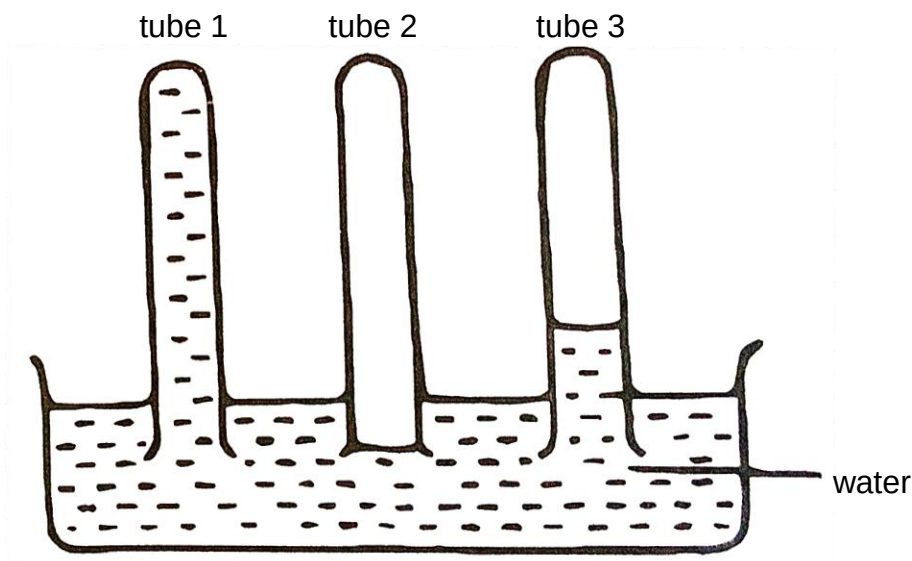
- A Place the mixture in a separating funnel.
 - B Heat the mixture and allow it to cool.
 - C Add aqueous silver nitrate to the mixture and filter.
 - D Add water to the mixture and filter.
- 8 A particle consists of three electrons, four protons and five neutrons.

Which of the statement about the particle are correct?

- 1 The particle has an atomic number of 3.
- 2 The particle has a mass number of 7.
- 3 The particle has a charge of 1+.

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

- 9 Three dry test-tubes were filled with different gases and placed in a trough of water. After a short time, the water had risen in two of the tubes as shown.



Which gases could the tubes have contained?

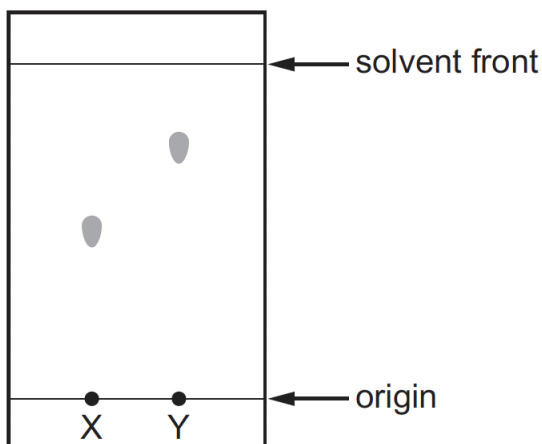
	tube 1	tube 2	tube 3
A	ammonia	carbon dioxide	hydrogen
B	ammonia	hydrogen	carbon dioxide
C	carbon dioxide	ammonia	oxygen
D	oxygen	ammonia	carbon dioxide

- 10 The elements T, X and Y have consecutive, increasing atomic numbers.

If element T is a noble gas, what will be the symbol for the ion of element Y in its compounds?

- A Y^+ B Y^{2+} C Y^{2-} D Y^-
- 11 What are the different forms for the same element in the same physical state called?
- A allotropes B isomers C isotopes D polymers

12 The results of a paper chromatography experiment are shown.



X is an aqueous solution of a salt of a Group I element.

Y is an aqueous solution of a salt of a transition element.

Which row is correct?

	larger R_f value	requires a locating agent
A	X	X
B	X	Y
C	Y	X
D	Y	Y

13 Hydrogen gas is produced when sodium is added to water.

What is the volume of hydrogen gas, measured at r.t.p., produced when 18.4 g of sodium reacts with excess water?

- A** 9.6 dm³ **B** 15.0 dm³ **C** 19.2 dm³ **D** 30.0 dm³

14 Iron can be electroplated with zinc to make it resistant to corrosion.

Which row about electroplating iron with zinc is correct?

	positive electrode	negative electrode	electrolyte
A	iron	zinc	iron(II) nitrate
B	iron	zinc	zinc nitrate
C	zinc	iron	iron(II) nitrate
D	zinc	iron	zinc nitrate

- 15** Element P has an electronic configuration of 2.8.6.

Element R has an electronic configuration of 2.8.8.1.

What is likely to form if P and R combine?

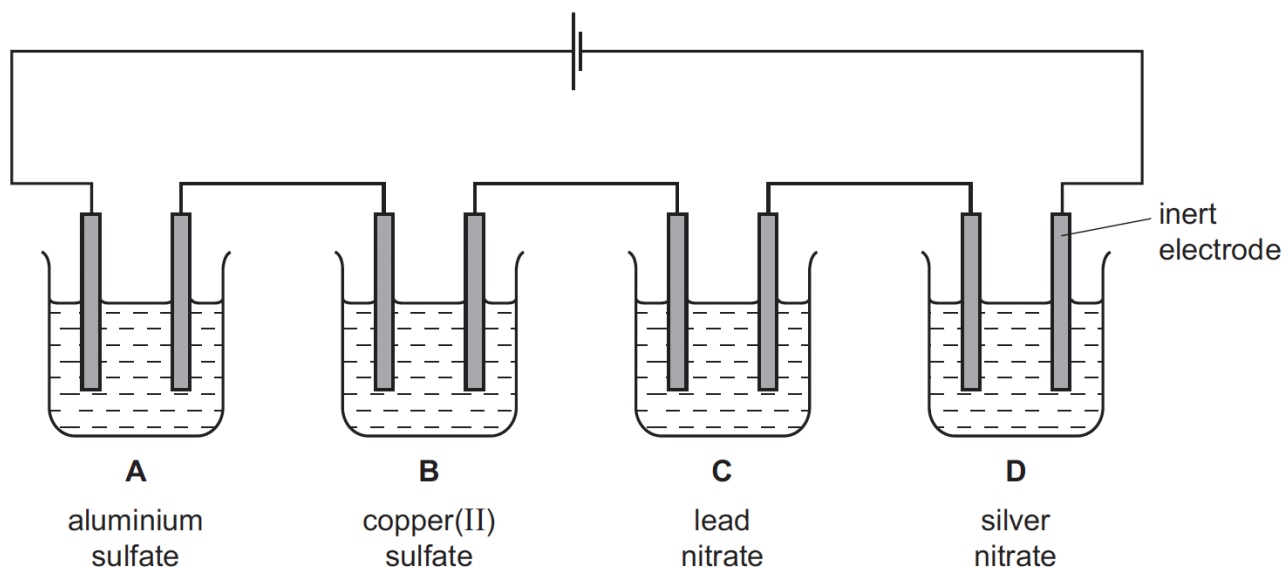
- A** a covalent compound RP
B a covalent compound R₂P
C an ionic compound RP
D an ionic compound R₂P
- 16** One mole of compound Q gives three moles of ions in aqueous solution. Q reacts with ammonium carbonate to give an acidic gas.

What is compound Q?

- A** calcium hydroxide
B nitric acid
C sodium hydroxide
D sulfuric acid
- 17** 124 g of phosphorus vapour has the same volume as 71 g of chlorine gas at the same temperature and pressure.

What is the formula of a molecule of phosphorus?

- A** P₈ **B** P₄ **C** P₂ **D** P
- 18** When electrolysed using inert electrodes, which dilute solution would produce the greatest increase in mass of the negative electrode?
[A_r: Al, 27; Cu, 64; Pb, 207; Ag, 108]



A 5 moles of OH^- ions
B 6 moles of Cu^{2+} ions
C 7 moles of O^{2-} ions
D 12 moles of Na^+ ions

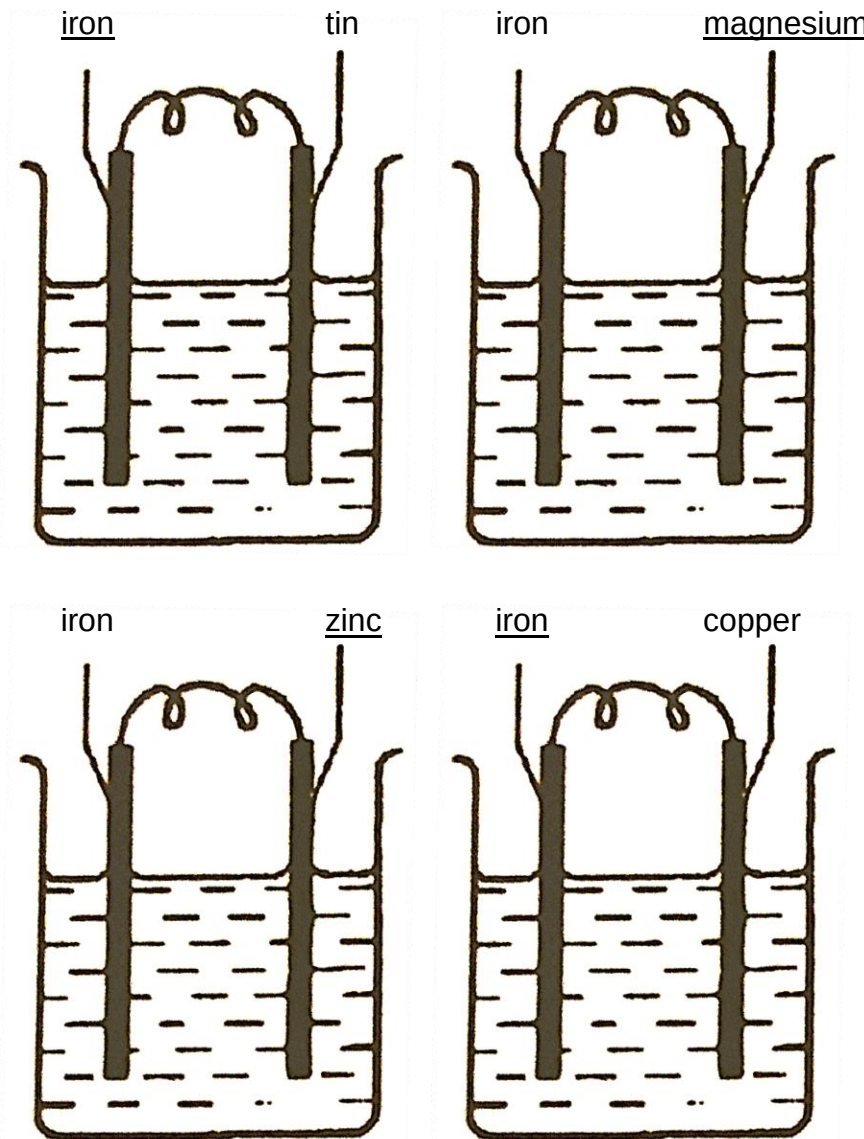
- 1 It is brittle.
- 2 It is malleable.
- 3 It is soft.
- 4 It is strong.

compound	M_r	ΔH in kJ/mol
methane	16	– 880
ethanol	46	– 1380
propane	44	– 2200
heptane	100	– 4800

A ethanol
C methane

B heptane
D propane

22 Four cells were set up using aqueous sodium chloride as the electrolyte.



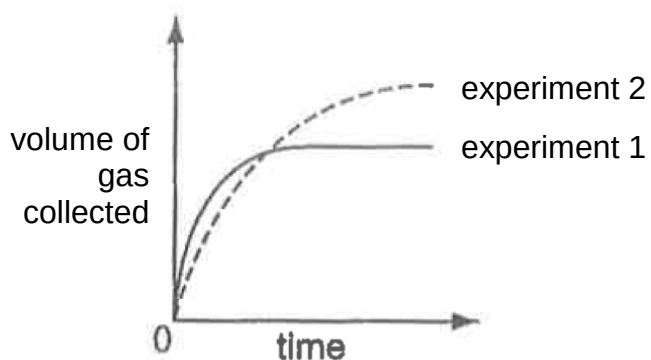
In each cell, only the underlined electrode dissolved. To establish the order of reactivity of the metals, it is necessary to set up two or more cells.

Which of the following pairs of cells are needed in addition to the four cells above?

	first cell electrodes	second cell electrodes
A	tin/copper	magnesium/zinc
B	tin/magnesium	zinc/copper
C	tin/zinc	magnesium/copper
D	tin/zinc	zinc/copper

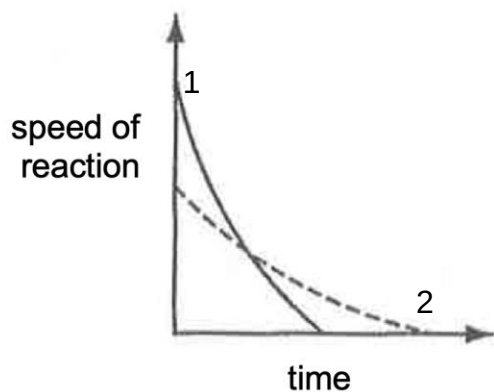
- 23** In two separate experiments, a substance was decomposed and the gas evolved was collected.

The graph shows the total volume of gas collected against time for each experiment.

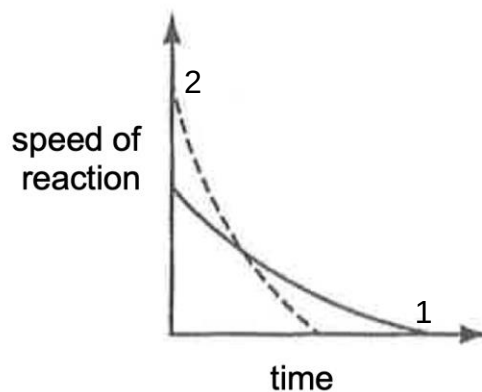


Which graph shows how the speed of reaction varied with time in each experiment?

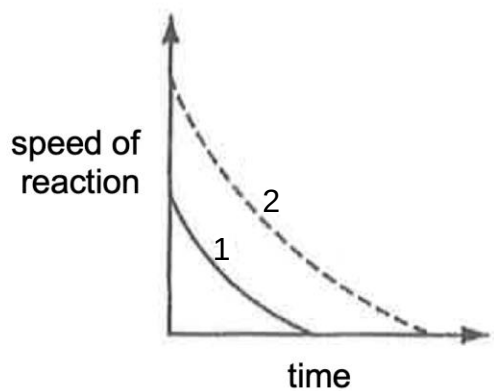
A



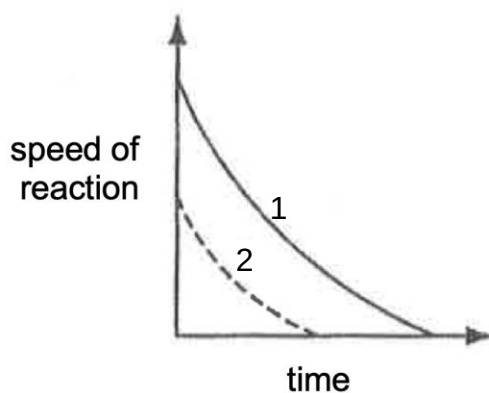
B



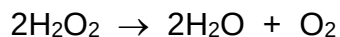
C



D



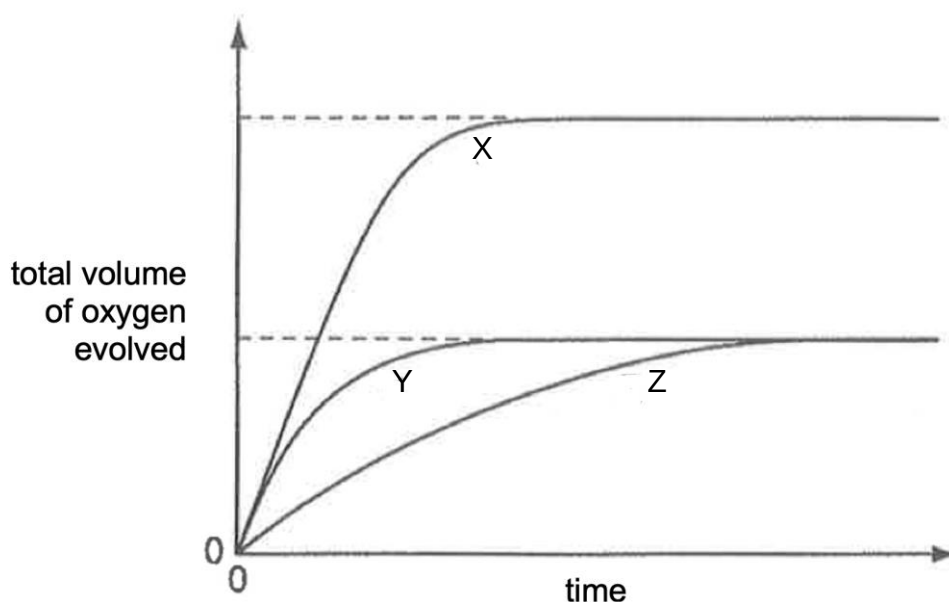
- 24** The hydrogen peroxide solution is catalytically decomposed by manganese(IV) oxide.



To study the effect of the concentration of the solutions on the rate of reaction, the total volume of oxygen evolved was recorded against time.

Three experiments were performed using a fixed mass of catalyst but with

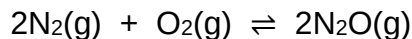
- (i) 50 cm³ of 2.0 mol/ dm³ hydrogen peroxide.
- (ii) 100 cm³ of 1.0 mol/ dm³ of hydrogen peroxide.
- (iii) 100 cm³ of 2.0 mol/dm³ of hydrogen peroxide.



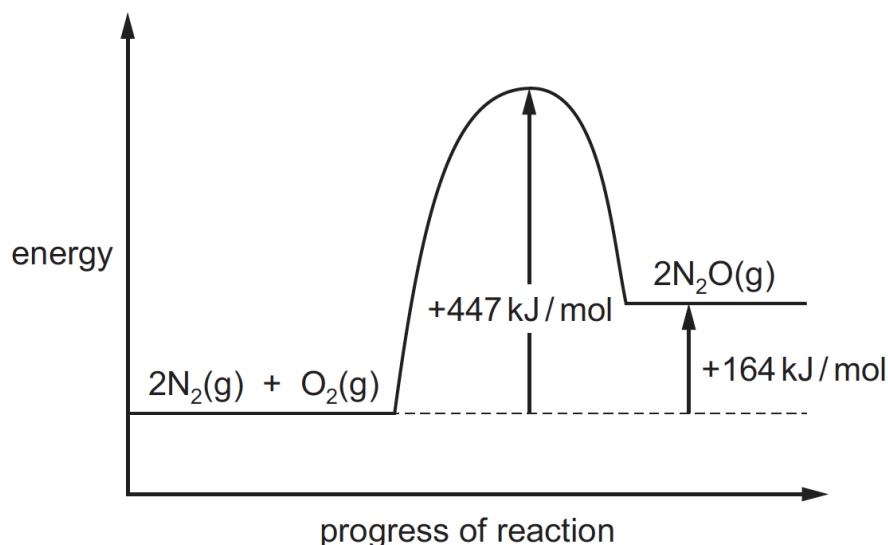
On the graph above, which of the curves, X, Y and Z relate to the solutions (i), (ii) and (iii)?

	(i)	(ii)	(iii)
A	X	Y	Z
B	X	Z	Y
C	Z	X	Y
D	Y	Z	X

- 25** Under certain conditions nitrogen reacts with oxygen to form dinitrogen monoxide.



The energy profile diagram for the reaction is shown.



What is the activation energy for the reverse reaction?

- A** -447 kJ/mol **B** -283 kJ/mol
C $+141.5 \text{ kJ/mol}$ **D** $+283 \text{ kJ/mol}$
- 26** The formation of liquid water from hydrogen and oxygen is thought to occur in three stages.
- 1 $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 4\text{H}(\text{g}) + 2\text{O}(\text{g})$
 - 2 $4\text{H}(\text{g}) + 2\text{O}(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{g})$
 - 3 $2\text{H}_2\text{O}(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{l})$

Which stages would be exothermic?

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

27 Iron is extracted from iron ore in a blast furnace.

Which substances are fed into the top of the blast furnace?

- 1 coke
- 2 limestone
- 3 hot air

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

28 Which noble gas is present in the largest percentage by volume in air?

- A** argon
- B** helium
- C** krypton
- D** neon

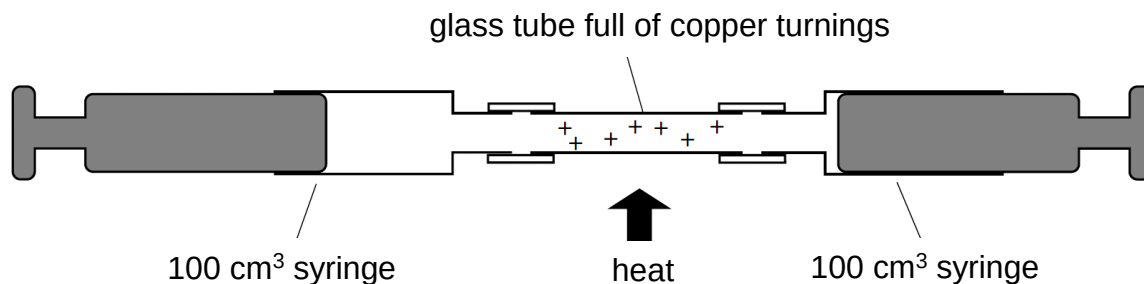
29 Which gas can be removed from the exhaust gases of a petrol-powered car by its catalytic converter?

- A** carbon monoxide
- B** carbon dioxide
- C** nitrogen
- D** steam

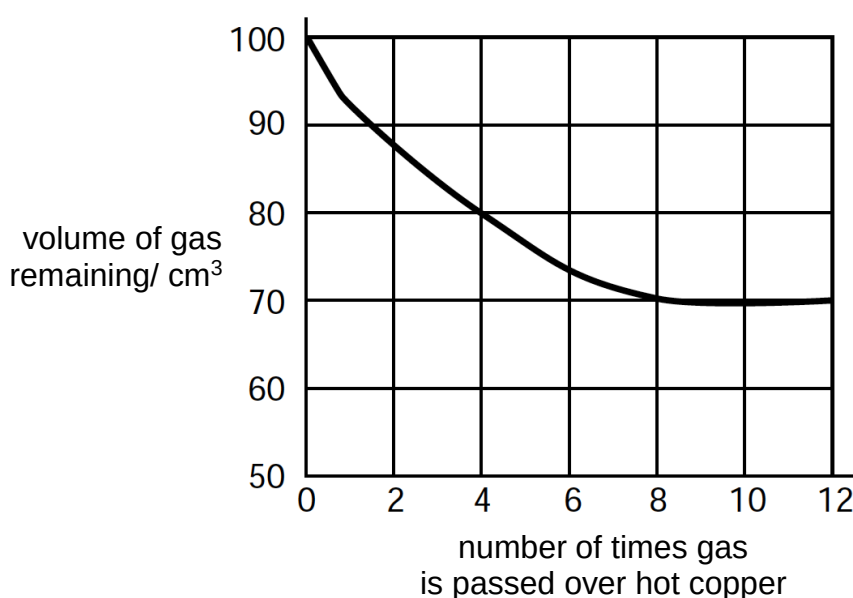
30 Which gas will react with ozone in the upper atmosphere of the Earth?

- A** CF_2Cl_2
- B** CH_4
- C** CO_2
- D** CF_4

- 31** A 100 cm³ sample of bottled gas used for diving was placed in a gas syringe in the apparatus shown.



The gas was passed backward and forward over heated copper turnings. The results obtained were used to plot the graph.



What is the percentage of oxygen in the bottled gas?

- A** 20% **B** 30% **C** 70% **D** 80%

- 32** Which physical properties of the alkanes does **not** increase as relative molecular mass increases?

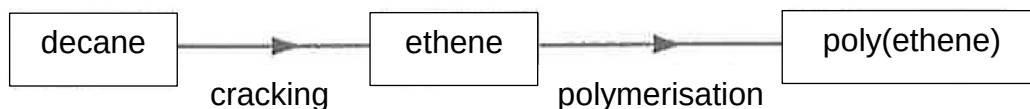
- A** boiling point
C melting point
- B** flammability
D viscosity

- 33** When 20 cm³ of a gaseous alkene burns in an excess of oxygen, 60 cm³ of carbon dioxide are formed. Both volumes are measured at r.t.p.

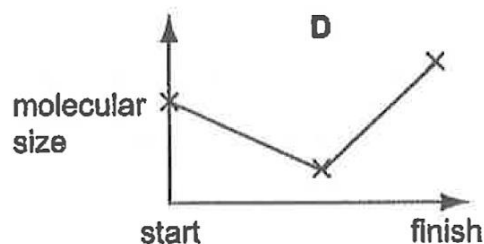
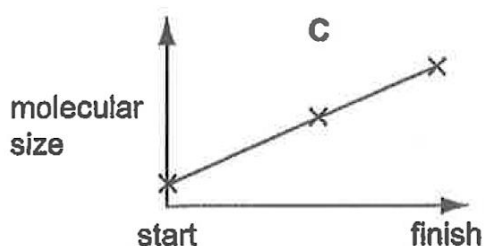
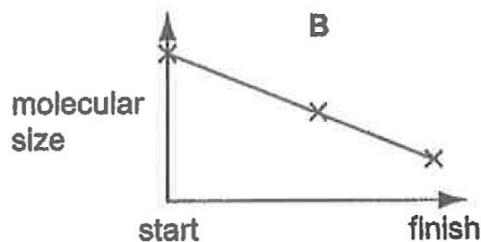
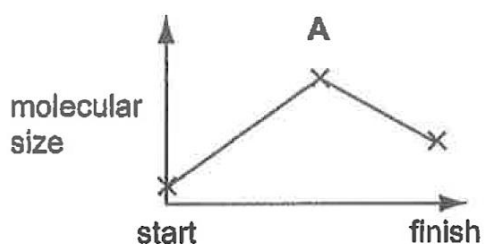
What is the formula of the alkene?

- A** C_3H_6 **B** C_3H_8 **C** C_6H_{12} **D** C_6H_{14}

34 Poly(ethene) can be manufactured by the process below.



Which diagram shows the change in molecular size during this process?



35 Which bond in a molecule of ethanoic acid is broken when it reacts with magnesium?

- A** the C — H bond
- B** the C — C bond
- C** the O — H bond
- D** the C = O bond

36 An alcohol contains 60% carbon by mass.

What is its formula?

- | | |
|---|---|
| A CH ₃ OH | B C ₂ H ₅ OH |
| C C ₃ H ₇ OH | D C ₄ H ₉ OH |

37 Some synthetic products are said to be non-biodegradable.

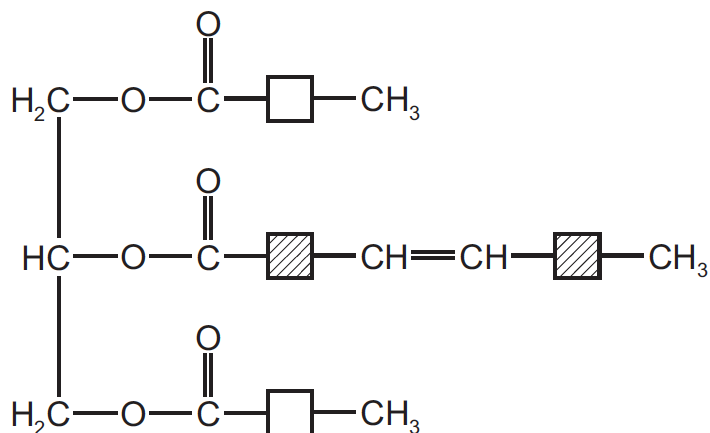
What does this term mean?

- A** cannot act as catalysts for biological process
- B** not harmful to living organisms
- C** not decomposed by strong heat
- D** not broken down by bacteria

38 What is the catalyst used in the preparation of ethyl ethanoate from ethanol and ethanoic acid?

- A** concentrated sulfuric acid
- B** nickel
- C** phosphoric acid
- D** yeast

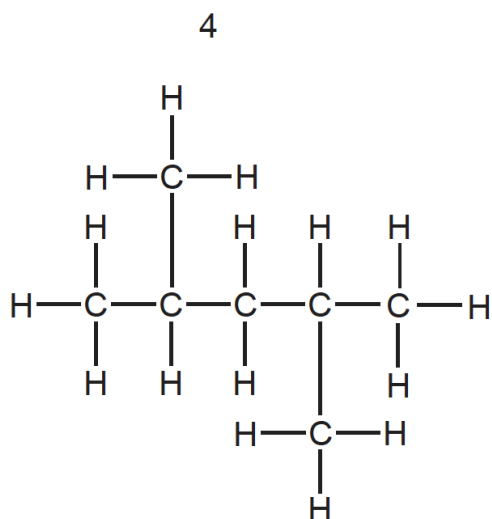
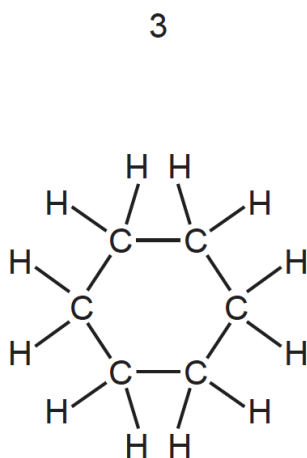
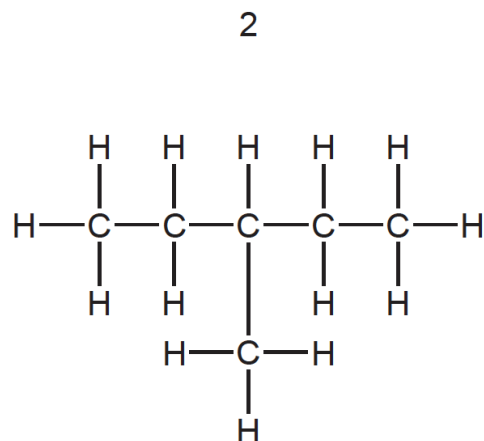
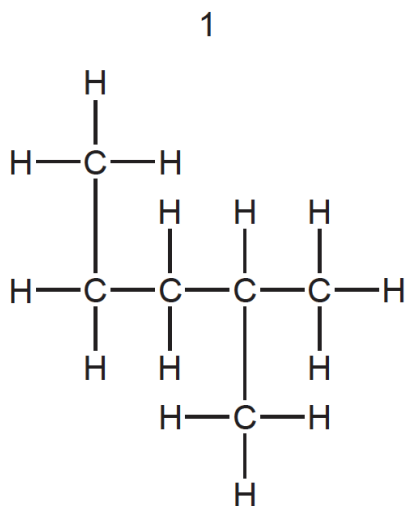
39 The diagram shows a simplified structure of a fat.



Which compounds in the table have functional groups that can be found in this fat?

	ethene	nylon	ethanoic acid
A	✓	✓	✓
B	✓	✓	X
C	✓	X	X
D	X	X	X

40 Structures 1, 2, 3 and 4 are hydrocarbons.



Which pair of structures are isomers?

A 1 and 2

B 1 and 4

C 2 and 3

D 2 and 4

END OF PAPER

[illegible]

actinoids

The volume of one mole of any gas is 24 dm^3 at room temperature and pressure (r.t.p.).