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4E**BEDOK GREEN SECONDARY SCHOOL****4E****Preliminary Examination 2022****Chemistry****6092/1**

Paper 1

30 Aug 2022

1 hour

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST**Do not open this booklet until you are told to do so.**

Write your name, register number and class on the multiple choice answer sheet provided.

There are **forty** questions in this paper. Answer **all** questions. For each question, there are four possible answers, **A, B, C** and **D**. Choose the one you consider to be correct and record your choice in soft pencil on the optical mark sheet.

Read very carefully the instructions on the Multiple Choice Answer Sheet.**INFORMATION FOR CANDIDATES**

Each correct answer will score one mark.

Any rough working should be done in this booklet.

A copy of the Periodic Table is on Page **16**.This document consists of **16** printed pages including the cover page.

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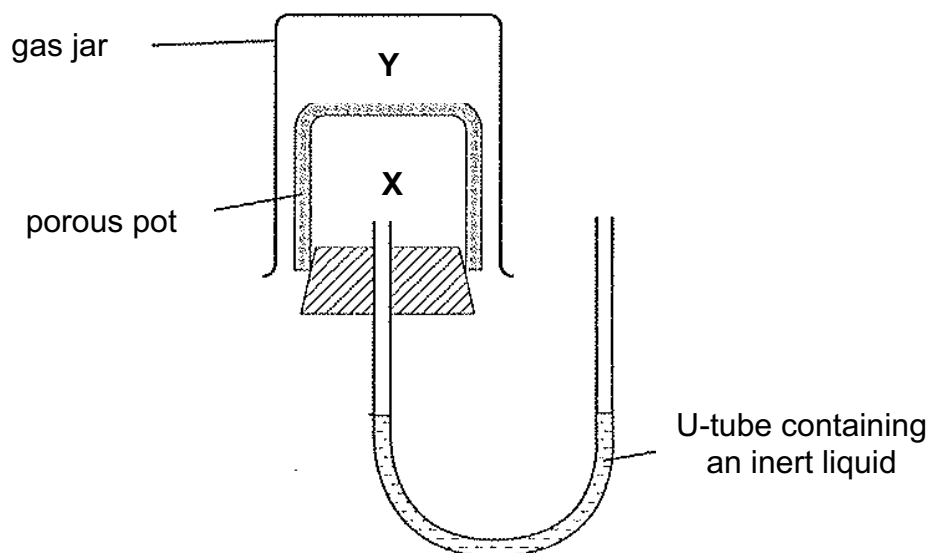
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[Turn Over

Section A: Multiple Choice Questions [40 marks]

Answer **all** questions on the Multiple Choice Answer Sheet.

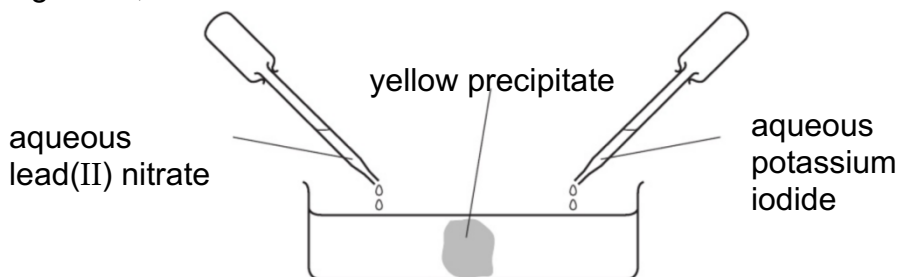
- 1 The apparatus consists of a porous pot containing a gas **X** which is surrounded by a gas **Y** in a gas jar.



Which of the following pairs of gases would cause an upward movement of the liquid in the right hand limb of the U-tube?

	gas X	gas Y
A	H ₂	NH ₃
B	NH ₃	CO ₂
C	O ₂	H ₂
D	O ₂	CO ₂

- 2 Aqueous lead(II) nitrate and aqueous potassium iodide are added to a dish containing water, as shown.

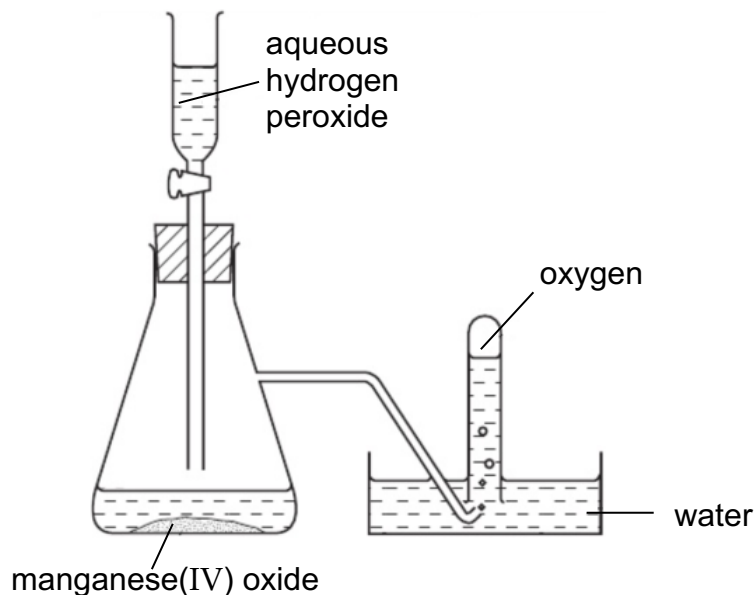


A yellow precipitate forms after a few minute.

Which process occurs **before** the precipitate forms?

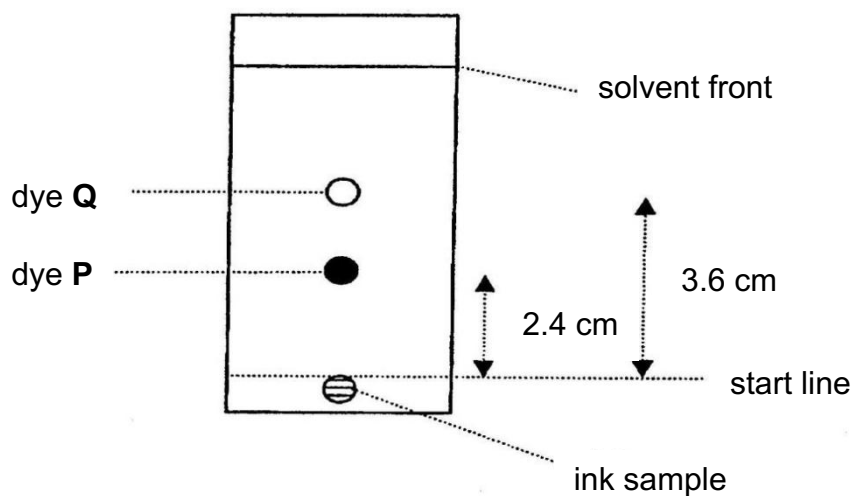
- A** diffusion
- B** distillation
- C** precipitation
- D** neutralisation

- 3 Oxygen was prepared from hydrogen peroxide and collected as shown in the diagram.



The first few tubes of gas were rejected because the gas was contaminated by

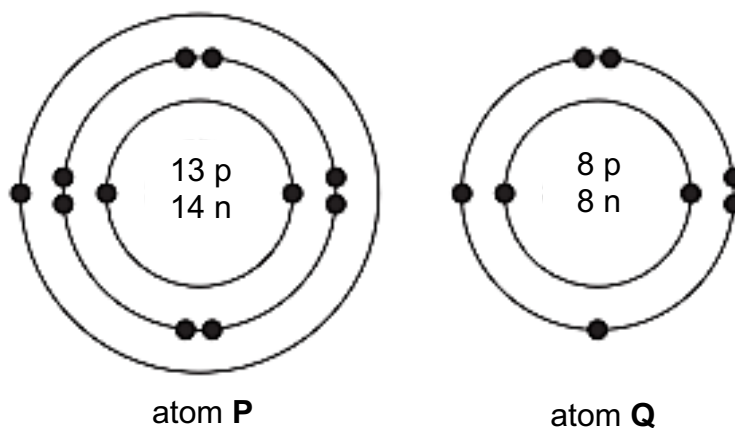
- A nitrogen.
 - B hydrogen.
 - C water vapour.
 - D hydrogen peroxide.
- 4 The results of a paper chromatography experiment shown below were obtained.



Given that the R_f value of dye **P** is 0.40, determine the R_f value of dye **Q**.

- A 0.50
- B 0.60
- C 0.70
- D 0.80

- 5 Which of the following properties **cannot** be used to test for the purity of a coloured liquid?
- A filtration
 B freezing point
 C fractional distillation
 D paper chromatography
- 6 The electronic structure of two atoms **P** and **Q** are shown below.



When these two elements combine chemically, what will be the type of bonding and mass of one mole of the compound formed?

	type of bonding	mass of one mole of compound / g
A	ionic bonding	43
B	covalent bonding	70
C	ionic bonding	102
D	covalent bonding	113

- 7 An atom of element **X** has a proton number of 6 and nucleon number 16.

Which of the statements about **X** is correct?

- A An oxide of **X** is likely to be basic.
 B The formula of a molecule of **X** is likely to be **X₂**.
 C The formula of the compound formed by **X** and hydrogen is **XH₂**.
 D **X** is likely to form four covalent bonds and a giant covalent structure.

- 8 A metal consists of a lattice of positive ions in a 'sea' of electrons.

What changes, if any, take place to the 'sea' of electrons and positive ions in a metal wire when an electric current is passed through it?

	electrons	positive ions
A	replaced by new electrons	replaced by new electrons
B	replaced by new electrons	unchanged
C	unchanged	replaced by new electrons
D	unchanged	unchanged

- 9 Fibre glass can be considered to be a mixture of ionic oxides and giant covalent oxides.

Which of the following is **not** a constituent of fibre glass?

- A MgO
 B Na₂O
 C P₄O₁₀
 D SiO₂
- 10 Melamine is a plastic. It has an empirical formula of CH₂N₂.

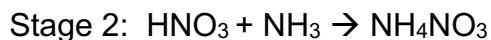
If its relative molecular mass is 126, what is its molecular formula?

- A CH₂N₂
 B C₂H₄N₄
 C C₃H₆N₆
 D C₄H₈N₈
- 11 One mole of each of the following compounds is burnt in excess oxygen.

Which compound will produce two moles of carbon dioxide and two moles of steam only?

- A C₂H₄
 B C₃H₈
 C C₂H₅OH
 D C₂H₅COOH

- 12 The fertiliser ammonium nitrate is manufactured from ammonia by a two-stage process.



What is the maximum mass of fertiliser that can be made if only 17 tonnes of ammonia is available?

- A 34 tonnes
 - B 40 tonnes
 - C 80 tonnes
 - D 97 tonnes
- 13 68 g of impure hydrogen peroxide decomposes in the presence of manganese(IV) oxide to give 1.2 dm³ of oxygen gas at room temperature and pressure.



What is the percentage purity of the hydrogen peroxide?

- A 2.5%
 - B 5.0%
 - C 10.0%
 - D 15.0%
- 14 One mole of compound **X** gives three moles of ions in aqueous solution. **X** reacts with ammonium carbonate to give an acidic gas.

What is compound **X**?

- A sulfuric acid
 - B ethanoic acid
 - C calcium hydroxide
 - D sodium hydroxide
- 15 In which pair of substances, does each have a giant molecular structure?
- A methane, silica
 - B diamond, silica
 - C diamond, iodine
 - D iodine, methane

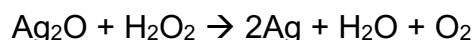
16 Which of the following salts is **incorrectly** matched with its method of preparation?

	salt	method of preparation
A	silver nitrate	add excess silver to warm dilute nitric acid
B	ammonium sulfate	titrate aqueous ammonia with dilute sulfuric acid
C	lead(II) chloride	mix aqueous lead(II) nitrate and dilute hydrochloric acid
D	iron(III) sulfate	add excess iron(III) oxide to warm dilute sulfuric acid

17 Which one of the following is **not** a redox reaction?

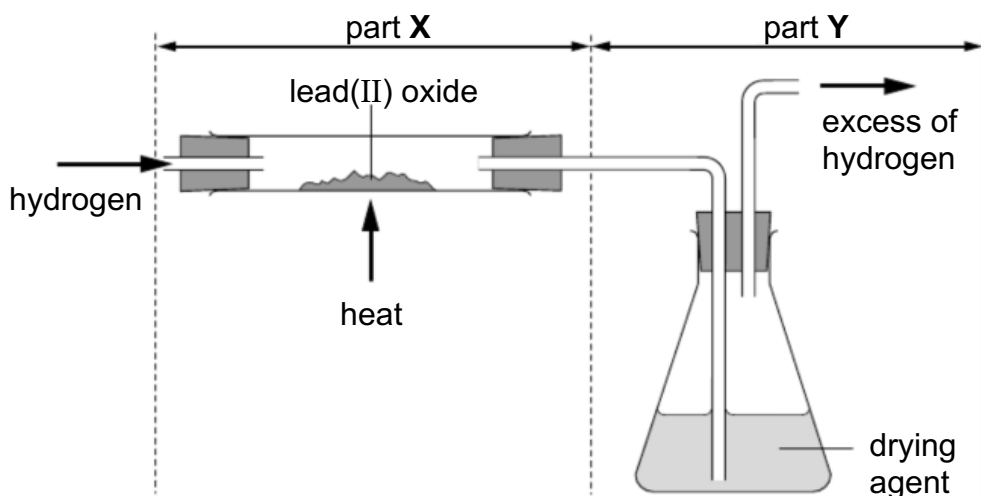
- A $\text{Mg} + 2\text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2$
 B $\text{Mg}(\text{OH})_2 + 2\text{HCl} \rightarrow \text{MgCl}_2 + 2\text{H}_2\text{O}$
 C $\text{Cu} + 2\text{H}_2\text{SO}_4 \rightarrow \text{CuSO}_4 + 2\text{H}_2\text{O} + \text{SO}_2$
 D $\text{Cu} + 4\text{HNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + 2\text{H}_2\text{O} + 2\text{NO}_2$

18 What is the role of hydrogen peroxide as shown in the reaction?



- A a catalyst
 B a reducing agent
 C an oxidising agent
 D a dehydrating agent

19 Lead(II) oxide is reduced in the apparatus shown.



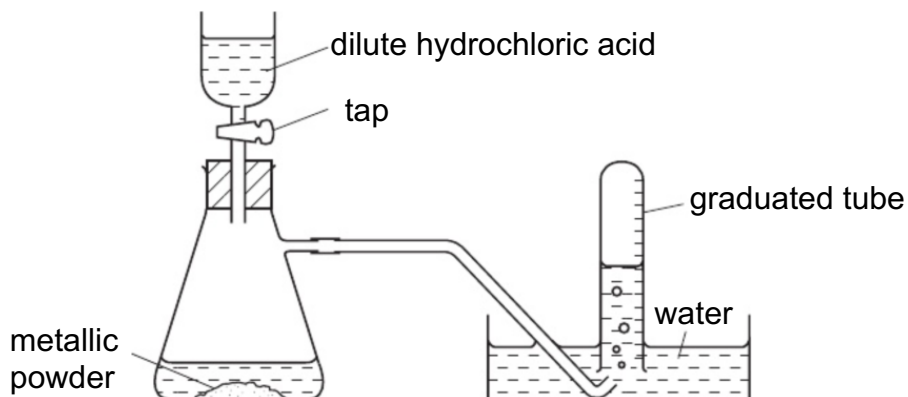
How do the masses of parts X and Y of the apparatus change?

	X	Y
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

- 20 A 25 cm³ of phosphoric acid, H₃PO₄, contains 0.025 mole of the acid. What is the hydrogen ion concentration in the solution?
- A 0.25 mol/dm³
 B 1.00 mol/dm³
 C 2.00 mol/dm³
 D 3.00 mol/dm³
- 21 The carbonate of metal **X** is a white solid. It decomposes when heated. Carbon dioxide and a yellow solid oxide are formed.

What is metal **X**?

- A iron
 B lead
 C copper
 D sodium
- 22 The diagram shows apparatus for measuring the volume of hydrogen given off when an excess of dilute hydrochloric acid is added to powdered metal. The volume of gas is measured at room temperature and pressure.



The experiment is carried out three times, using the same mass of powder each time but with different powders:

- pure magnesium
- pure zinc
- a mixture of magnesium and zinc

Which powder gives the greatest volume of hydrogen and which the least volume?

	greatest volume of H ₂	least volume of H ₂
A	magnesium	zinc
B	magnesium	the mixture
C	zinc	magnesium
D	zinc	the mixture

- 23 The table shows the results of adding weighed pieces of nickel metal in salt solutions of metals **P**, **Q**, **R** and **S**.

solution	initial mass of nickel /g	mass of nickel after 15 minutes /g
P	6.0	5.0
Q	6.0	5.5
R	6.0	4.5
S	6.0	0.0

Which of the following statements is correct?

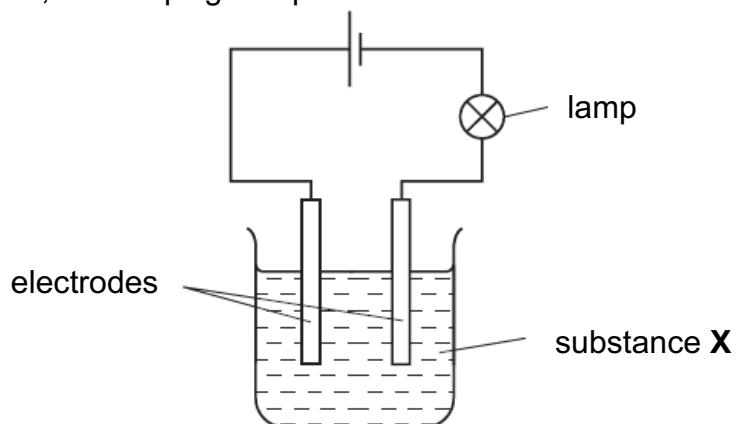
- A** **S** could be nickel(II) chloride solution.
 - B** Metal **R** can displace the metal in solution **S**.
 - C** The metal **R** is higher than nickel in the reactivity series.
 - D** The metal **P** is higher than metal **Q** in the reactivity series.
- 24 Iron rusts when exposed to oxygen in the presence of water.
- Which of these methods will **not** slow down the rate of rusting of an iron roof?
- A** painting it
 - B** coating it with plastic
 - C** galvanising it with zinc
 - D** attaching strips of copper to it
- 25 Three stages in making steel from iron ore are listed.

- P** carbon dioxide reacts with carbon
- Q** basic oxides and oxygen are added
- R** haematite is reduced

In which order do these stages occur?

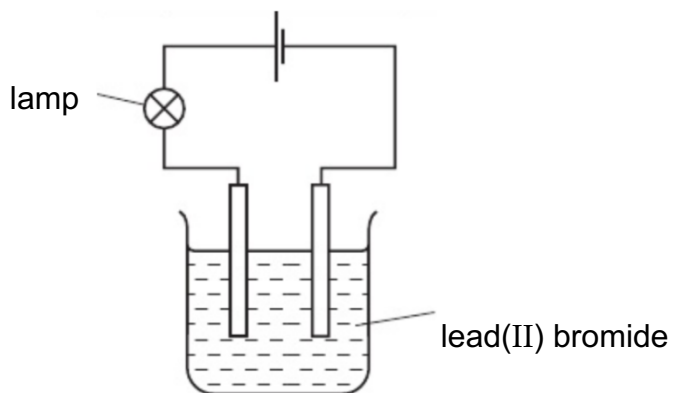
- A** **P** → **Q** → **R**
- B** **P** → **R** → **Q**
- C** **Q** → **P** → **R**
- D** **R** → **Q** → **P**

- 26 In the circuit below, the lamp lights up.



What could **X** be?

- A liquid ethanol
 - B solid sodium chloride
 - C a solution of ethanol in water
 - D a solution of sodium chloride in water
- 27 The diagram shows the apparatus used to electrolyse lead(II) bromide using inert electrodes.



Why does the lamp light up only when the lead(II) bromide is melted?

- A There are no ions in solid lead(II) bromide.
- B Electrons flow through the lead(II) bromide when it is melted.
- C The ions in lead(II) bromide are free to move only when the solid is melted.
- D Bromine atoms in the lead(II) bromide are converted to ions when it is melted.

- 28** A molten compound is electrolysed. Two atoms of **X** are deposited at the negative electrode at the same time as three atoms of **Y** are deposited at the positive electrode.

These results show that:

X is a1.....;

Y is a2.....;

The formula of the compound is3..... .

How are gaps 1, 2 and 3 correctly completed?

	1	2	3
A	metal	non-metal	X₃Y₂
B	metal	non-metal	X₂Y₃
C	non-metal	metal	X₃Y₂
D	non-metal	metal	X₂Y₃

- 29** The results of three halogen displacement experiment are shown.

experiment	halogen added	halide solution		
		X⁻	Y⁻	Z⁻
1	X₂	-	Y₂ displaced	Z₂ displaced
2	Y₂	no reaction	-	no reaction
3	Z₂	no reaction	Y₂ displaced	-

What are halogen **X**, **Y**, **Z**?

	X	Y	Z
A	bromine	chlorine	iodine
B	bromine	iodine	chlorine
C	chlorine	bromine	iodine
D	chlorine	iodine	bromine

30 **R**, **S** and **T** are three elements in the same period of the Periodic Table.

- **R** forms an oxide which dissolves into aqueous sodium hydroxide only
- **S** forms an oxide which dissolves into dilute sulfuric acid only
- **T** forms an oxide which dissolves in both aqueous sodium hydroxide and dilute sulfuric acid

If **R**, **S** and **T** are placed in order of increasing number (lowest atomic number first), which order is correct?

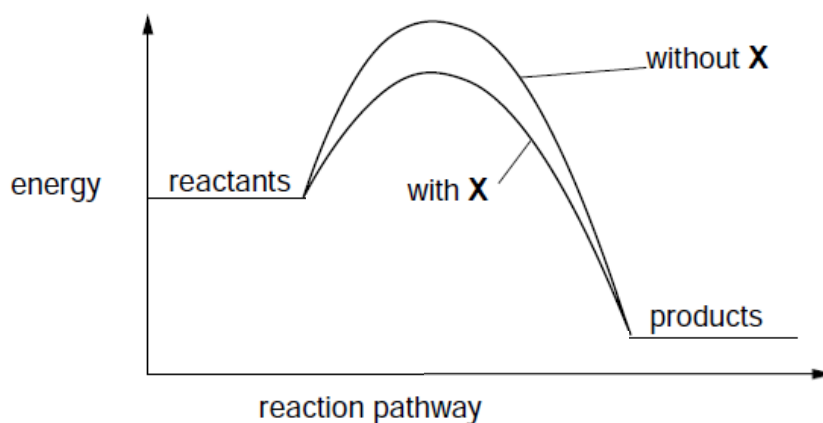
- A** **R**, **S**, **T**
- B** **S**, **T**, **R**
- C** **R**, **T**, **S**
- D** **T**, **S**, **R**

31 When solid **X** is dissolved in water, an endothermic change takes place. When 5 g of **X** are completely dissolved in 1000 cm³ of water, a temperature change of 10°C occurs.

Which temperature change occurs when 5 g of **X** are completely dissolved in 500 cm³ of water?

- A** a decrease of 5°C
- B** an increase of 5°C
- C** a decrease of 20°C
- D** an increase of 20°C

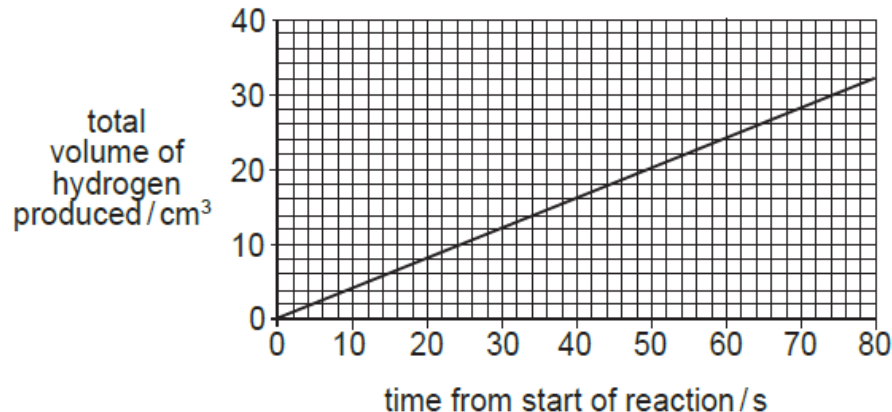
32 The energy profile diagrams show how adding a substance **X** to a reaction mixture changes the reaction pathway.



Which change is likely to be observed when **X** is added to the reaction mixture?

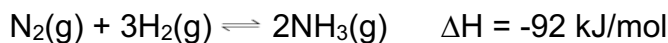
- A** The speed of reaction increases.
- B** The speed of reaction decreases.
- C** The reaction become less exothermic.
- D** The reaction become more exothermic.

- 33 Dilute hydrochloric acid was reacted with magnesium ribbon and the volume of hydrogen evolved was measured for the first 80 s.



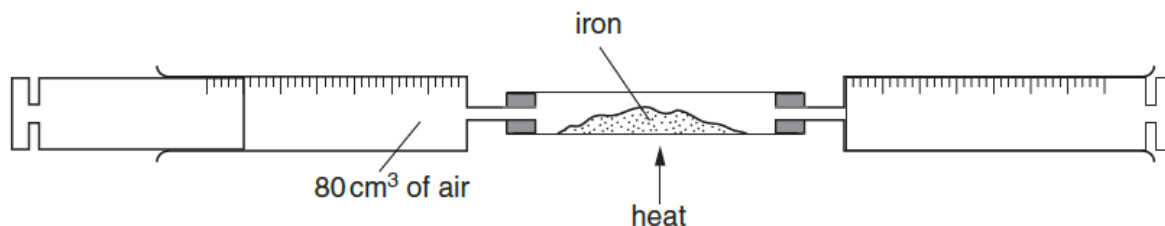
What was the average rate of production of hydrogen?

- A 0.4 cm³/s
 - B 2.5 cm³/s
 - C 4 cm³/s
 - D 40 cm³/s
- 34 In the Haber process, nitrogen and hydrogen react to form ammonia.



Which factor decreases the speed of reaction?

- A addition of a catalyst
 - B increasing the pressure
 - C increasing the temperature
 - D decreasing the temperature
- 35 An 80 cm³ sample of air is trapped in a syringe. The air is slowly passed over heated iron in a tube until there is no further decrease in volume.



When cooled to the original temperature, which volume of gas remains?

- A 16 cm³
- B 20 cm³
- C 64 cm³
- D 80 cm³

- 36 Butane and methylpropane are isomers.
Which formula is different for the two isomers?

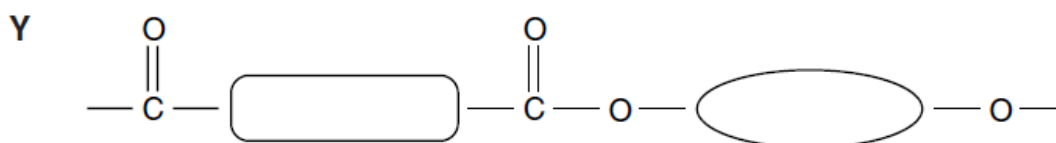
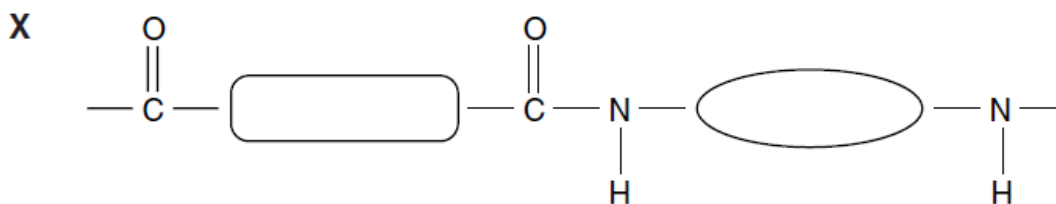
A general formula
B empirical formula
C structural formula
D molecular formula

- 37 When 1 volume of gas **X** reacts with exactly 5 volume of oxygen it forms carbon dioxide and water only.

What is gas **X**?

A methane
B ethane
C propane
D butane

- 38 The repeating units of two polymers, **X** and **Y**, are shown below.



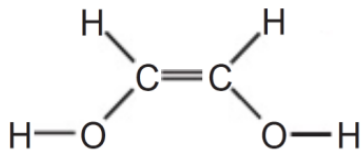
What are **X** and **Y**?

	X	Y
A	nylon	Terylene
B	starch	Terylene
C	protein	starch
D	nylon	protein

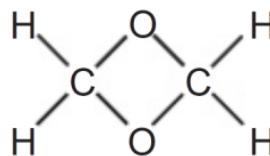
- 39 An aqueous solution of a compound of formula $C_2H_4O_2$ reacts with sodium carbonate, liberating carbon dioxide.

What is the structural formula of the compound?

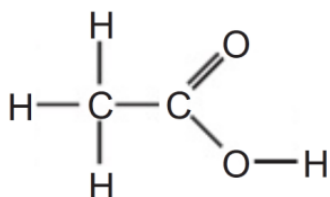
A



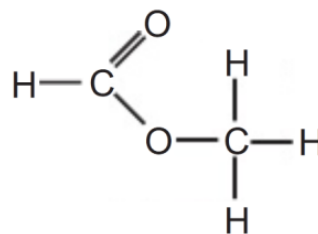
B



C



D



- 40 In the polymerisation of propene to poly(propene), there is **no** change in

- A melting point.
- B structural formula.
- C molecular formula.
- D percentage composition.