



# Cambridge IGCSE™

**CHEMISTRY**

**0620/11**

Paper 1 Multiple Choice (Core)

**October/November 2023**

**45 minutes**

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet  
Soft clean eraser  
Soft pencil (type B or HB is recommended)

## INSTRUCTIONS

- 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 multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.

## INFORMATION

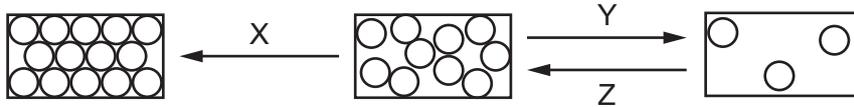
- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

This document has **16** pages. Any blank pages are indicated.



1 The three rectangles show the arrangements of the particles in each of the three states of matter.

X, Y and Z represent the processes needed to change from one state to another.



What are the processes X, Y and Z?

	X	Y	Z
<b>A</b>	melting	condensing	evaporating
<b>B</b>	evaporating	melting	freezing
<b>C</b>	melting	freezing	condensing
<b>D</b>	freezing	evaporating	condensing

2 Which substance is a pure compound?

- A** air
- B** brass
- C** ethanol
- D** petroleum

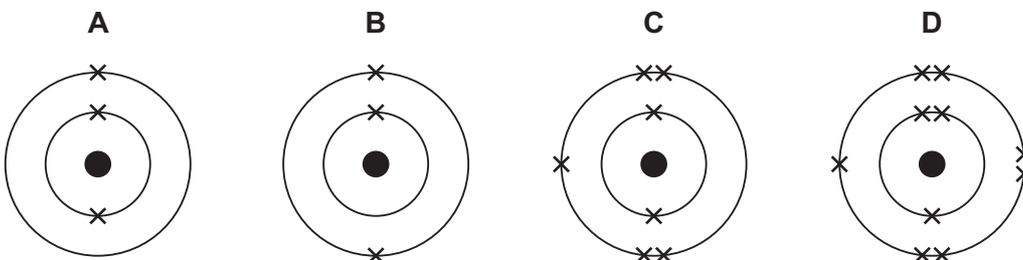
3 The Group I element potassium forms an ionic bond with the Group VII element fluorine.

Which two ions are produced?

- A**  $K^+$  and  $F^+$
- B**  $K^+$  and  $F^-$
- C**  $K^-$  and  $F^-$
- D**  $K^-$  and  $F^+$

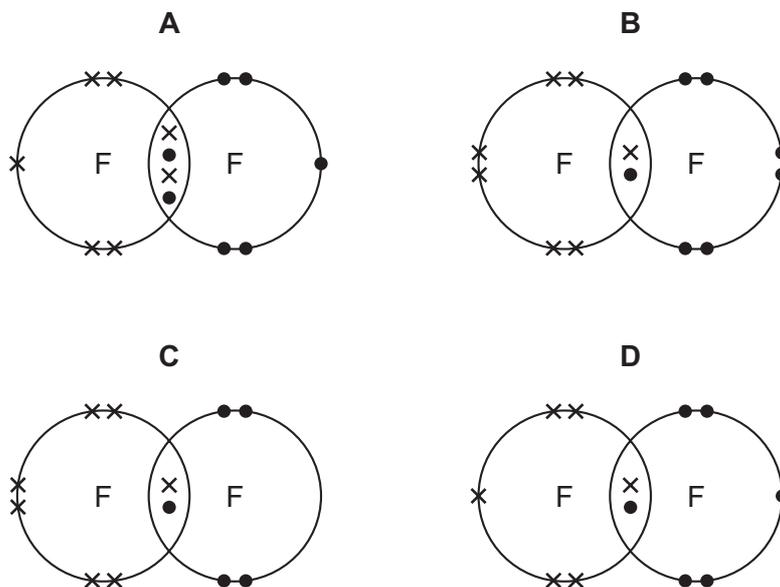
4 An isotope of lithium has the symbol  ${}^7_3\text{Li}$ .

What is the arrangement of electrons in one atom of this isotope of lithium?



- 5 Fluorine,  $F_2$ , is in the same group of the Periodic Table as chlorine,  $Cl_2$ .

Which diagram represents the arrangement of the outer-shell electrons in a molecule of fluorine?



- 6 Which use of graphite depends on the layers of carbon atoms being able to slide over each other?

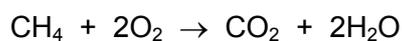
- A cutting tools
- B electrodes
- C jewellery
- D lubricant

- 7 Which equations are balanced?

- 1  $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$
- 2  $ZnCO_3 + 2HCl \rightarrow ZnCl_2 + CO_2 + 2H_2O$
- 3  $Mg(NO_3)_2 + NaOH \rightarrow Mg(OH)_2 + 2NaNO_3$
- 4  $CaCO_3 + H_2SO_4 \rightarrow CaSO_4 + H_2O + CO_2$

- A 1 and 2      B 1 and 4      C 2 and 3      D 3 and 4

- 8 The equation for the combustion of methane is shown.



Which mass of methane produces 36 g of water?

- A 16 g      B 18 g      C 32 g      D 64 g

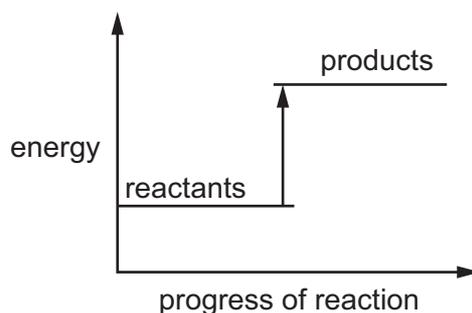
- 9 What is produced at each electrode during the electrolysis of aqueous solutions using inert electrodes?

	positive electrode (anode)	negative electrode (cathode)
<b>A</b>	metals or hydrogen	non-metals only
<b>B</b>	metals or oxygen	non-metals only
<b>C</b>	non-metals only	metals or hydrogen
<b>D</b>	non-metals only	metals or oxygen

- 10 Which statement about a hydrogen-oxygen fuel cell in a car is correct?

- A** The fuel cell produces heat, which powers the car.  
**B** The fuel cell is supplied with hydrogen directly from the air.  
**C** The only emission from the fuel cell is nitrogen gas, which is non-polluting.  
**D** The fuel cell produces electricity, which powers an electric motor.

- 11 The reaction pathway diagram for a reaction is shown.



Which statements are correct?

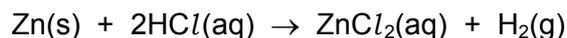
- 1 The reaction is exothermic.
- 2 The reaction is endothermic.
- 3 The temperature of the surroundings increases.
- 4 The temperature of the surroundings decreases.

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

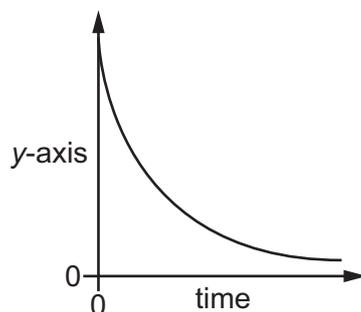
- 12 Which process involves a chemical change?

- A** adding sodium to water  
**B** boiling water  
**C** dissolving sodium chloride in water  
**D** producing water from aqueous sodium chloride

- 13 An experiment is carried out to find the rate of reaction between hydrochloric acid and zinc.



The results of the experiment are shown.



What is the label on the y-axis?

- A amount of  $\text{ZnCl}_2$  produced
  - B concentration of  $\text{HCl}$
  - C mass of  $\text{Zn}$  reacted
  - D volume of  $\text{H}_2$  produced
- 14 Solid S changes colour from white to blue when water is added.

What is S?

- A anhydrous cobalt(II) chloride
  - B anhydrous copper(II) sulfate
  - C hydrated cobalt(II) chloride
  - D hydrated copper(II) sulfate
- 15 Which equation shows the reduction of copper?
- A  $\text{CuO} + \text{C} \rightarrow \text{Cu} + \text{CO}$
  - B  $2\text{CuS} + 3\text{O}_2 \rightarrow 2\text{CuO} + 2\text{SO}_2$
  - C  $\text{Cu(g)} \rightarrow \text{Cu(l)}$
  - D  $\text{Cu(l)} \rightarrow \text{Cu(s)}$

16 Which solids react with dilute sulfuric acid to form aqueous magnesium sulfate?

- 1 magnesium
- 2 magnesium hydroxide
- 3 magnesium nitrate
- 4 magnesium oxide

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

17 Which statements about an aqueous acid are correct?

- 1 Ammonia is formed when solid ammonium nitrate is added to an aqueous acid.
- 2 Effervescence is seen when sodium carbonate is added to an aqueous acid.
- 3 Methyl orange becomes yellow when added to an aqueous acid.
- 4 Red litmus remains red when added to an aqueous acid.

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

18 Copper(II) sulfate is formed by reacting excess solid copper(II) carbonate with dilute sulfuric acid.

Which processes are part of the preparation of solid copper(II) sulfate?

- 1 crystallisation
- 2 distillation
- 3 filtration
- 4 titration

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

19 Element X forms ions with the formula  $X^{2-}$ .

Which row describes element X?

	group number	type of element
<b>A</b>	II	metal
<b>B</b>	II	non-metal
<b>C</b>	VI	metal
<b>D</b>	VI	non-metal

20 Which compound is likely to be coloured?

- A**  $\text{KMnO}_4$       **B**  $\text{KNO}_3$       **C**  $\text{K}_2\text{CO}_3$       **D**  $\text{K}_2\text{SO}_4$

21 Chlorine, bromine and iodine are in the same group of the Periodic Table.

Which statements about these three elements are correct?

- 1 Iodine is more reactive than chlorine.
- 2 They are diatomic covalent molecules.
- 3 They are all gases at room temperature.
- 4 Their atoms have seven electrons in their outer shell.

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

22 The electronic configurations of four elements, P, Q, R and S, are shown.

element	electronic configuration
P	2
Q	2,2
R	2,6
S	2,8

Which elements are unreactive monatomic gases?

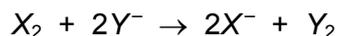
- A** P and Q      **B** P and S      **C** Q and R      **D** S only

23 The table shows some physical properties of four different substances.

Which row describes the properties of a non-metallic element?

	melting point / °C	conductivity when solid	conductivity when melted
<b>A</b>	63	good	good
<b>B</b>	119	poor	poor
<b>C</b>	659	good	good
<b>D</b>	808	poor	good

24 The equation shows the reaction between a halogen and the aqueous ions of another halogen.



What is  $X_2$  and the colour of  $Y^-$ ?

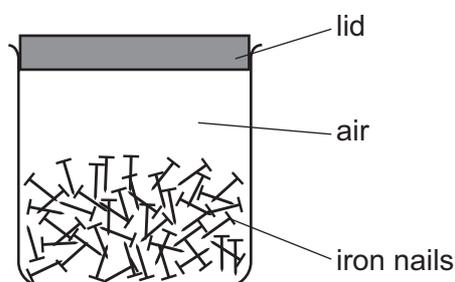
	$X_2$	$Y^-$
<b>A</b>	chlorine	brown
<b>B</b>	chlorine	colourless
<b>C</b>	iodine	brown
<b>D</b>	iodine	colourless

25 Zinc oxide reacts with carbon to produce zinc.

Which equation represents this reaction?

- A**  $2ZnO + C \rightarrow 2Zn + CO$
- B**  $2ZnO + 2C \rightarrow 2Zn + 2CO_2$
- C**  $ZnO + C \rightarrow Zn + CO$
- D**  $ZnO + 2C \rightarrow Zn + 2CO_2$

26 Iron nails are stored in an airtight container.



The nails begin to rust after a few days.

How can the rusting of the nails be prevented?

- A** Leave the lid off.
- B** Replace the air with argon.
- C** Put the container in a warm place.
- D** Seal the container in a bag.

27 Four substances present in the blast furnace during iron extraction are listed.

- 1 calcium carbonate
- 2 carbon dioxide
- 3 carbon monoxide
- 4 iron(III) oxide

Which substances are both a reactant and a product during the reactions occurring in the blast furnace?

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

28 Which test is used to show that a sample of water is pure?

- A** Evaporate the water to see if any solids remain.  
**B** Heat the water to check its boiling point.  
**C** Test with anhydrous cobalt(II) chloride.  
**D** Use universal indicator paper to check its pH.

29 Which mixture of salts produces an NPK fertiliser?

- A** ammonium phosphate + potassium sulfate  
**B** calcium phosphate + sodium nitrate  
**C** potassium nitrate + calcium sulfate  
**D** sodium phosphate + ammonium nitrate

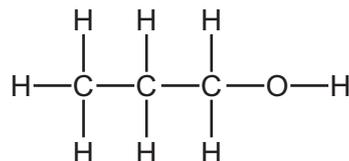
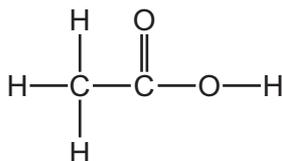
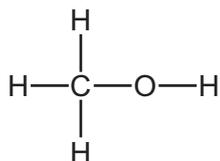
30 What are the **main** products obtained by the fractional distillation of liquid air?

- A** carbon dioxide and oxygen  
**B** carbon dioxide and water vapour  
**C** nitrogen and oxygen  
**D** nitrogen and water vapour

31 In which reaction is the rate of reaction increased by light?

- A** carbon dioxide + water  $\rightarrow$  glucose + oxygen  
**B** ethanoic acid + sodium carbonate  $\rightarrow$  sodium ethanoate + water + carbon dioxide  
**C** ethene + bromine  $\rightarrow$  dibromoethane  
**D** methane + oxygen  $\rightarrow$  carbon dioxide + water

32 The structures of three organic molecules are shown.



Which description of the three molecules is correct?

	they all have the same general formula, $\text{C}_n\text{H}_{2n+1}\text{OH}$	they all belong to the same homologous series
<b>A</b>	no	no
<b>B</b>	no	yes
<b>C</b>	yes	no
<b>D</b>	yes	yes

33 Petroleum is separated into fractions by fractional distillation.

Which row describes a use of the named fraction?

	fraction	use
<b>A</b>	bitumen	fuel for ships
<b>B</b>	refinery gas	jet fuel
<b>C</b>	fuel oil	road making
<b>D</b>	gasoline	fuel for cars

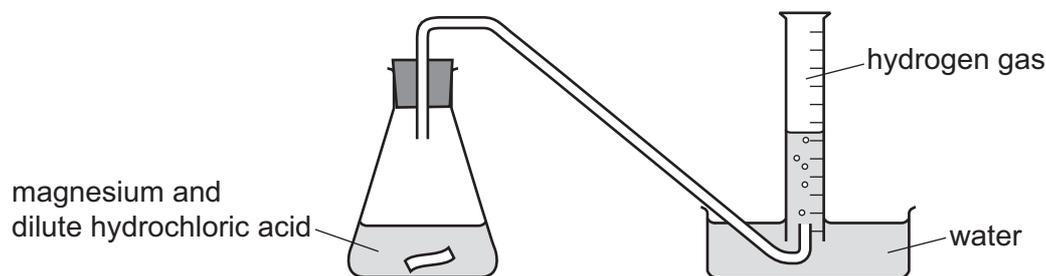
34 Which statement about alkanes is correct?

- A** They are saturated.
- B** They are very reactive.
- C** They contain carbon, hydrogen and oxygen only.
- D** They contain double bonds.

35 What is the approximate volume of nitrogen in  $200 \text{ cm}^3$  of air?

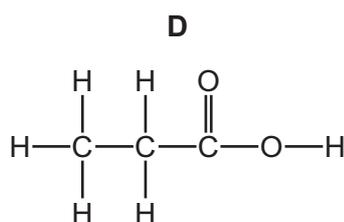
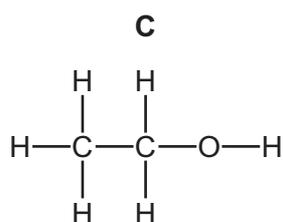
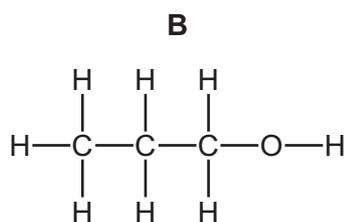
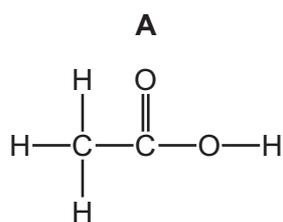
- A**  $20 \text{ cm}^3$
- B**  $40 \text{ cm}^3$
- C**  $80 \text{ cm}^3$
- D**  $160 \text{ cm}^3$

- 36 The apparatus used to investigate the rate at which hydrogen gas is given off when a piece of magnesium reacts with dilute hydrochloric acid is shown.



Which additional piece of apparatus is needed to determine the rate of reaction?

- A balance
  - B burette
  - C stop-watch
  - D volumetric pipette
- 37 Which diagram shows the displayed formula of ethanol?

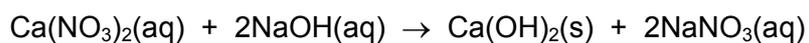


- 38 Ethane is used as a fuel.

Which equation shows the complete combustion of ethane?

- A  $2\text{C}_2\text{H}_6 + 7\text{O}_2 \rightarrow 4\text{CO}_2 + 6\text{H}_2\text{O}$
- B  $2\text{C}_2\text{H}_6 + 5\text{O}_2 \rightarrow 4\text{CO} + 6\text{H}_2\text{O}$
- C  $\text{C}_2\text{H}_4 + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 2\text{H}_2\text{O}$
- D  $\text{C}_2\text{H}_4 + 2\text{O}_2 \rightarrow 2\text{CO} + 2\text{H}_2\text{O}$

- 39 The equation for the reaction of aqueous calcium nitrate and aqueous sodium hydroxide is shown.



Which process is used to remove calcium hydroxide from the mixture?

- A chromatography
  - B crystallisation
  - C distillation
  - D filtration
- 40 The results of two tests on aqueous compound X are given.

test	result
warm with aluminium foil and aqueous sodium hydroxide	ammonia is produced
aqueous sodium hydroxide	brown precipitate

What is X?

- A iron(III) nitrate
- B iron(II) nitrate
- C iron(III) sulfate
- D iron(II) sulfate





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