Cambridge Assessment International Education

Cambridge IGCSE™

CHEMISTRY **0620/13**

Paper 1 Multiple Choice (Core) **October/November 2025**

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.

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[Turn over

1 Substances exist as solids, liquids or gases.

In which states of matter are the particles a similar distance apart?

A solid, liquid and gas

B solid and liquid only

C solid and gas only

D liquid and gas only

2 A container with a fixed shape is filled with gas and then sealed. The container is then heated.

Which changes take place?

1 The volume of gas decreases.

2 The gas molecules move faster.

3 The pressure inside the cylinder increases.

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

3 A crystal of sodium chloride is dropped into a beaker of water.

Over time, the sodium chloride particles become evenly distributed throughout the water.

Which processes occur in this experiment?

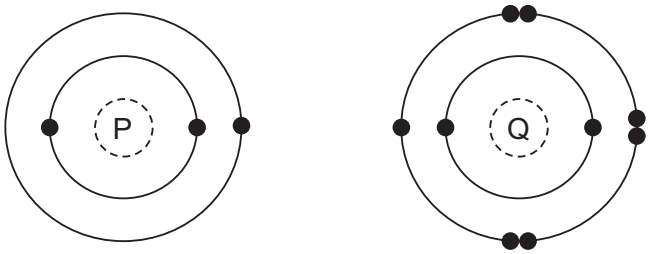
A both dissolving and diffusion

B dissolving only

C diffusion only

D neither dissolving nor diffusion

4 The electronic structures of two atoms, P and Q, are shown.



P and Q combine together to form a compound.

What is the type of bonding in the compound, and what is the formula of the compound?

	type of bonding	formula
A	covalent	PQ_2
B	covalent	PQ
C	ionic	PQ
D	ionic	PQ_2

5 The electronic configuration of an ion is 2,8,8.

What could this ion be?

	S^{2-}	Ca^{2+}
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = yes

✗ = no

6 The table shows the nucleon number and the number of neutrons in one atom of isotopes W, X, Y and Z.

isotope	nucleon number	number of neutrons
W	35	18
X	37	20
Y	39	20
Z	40	22

Which statement about W, X, Y and Z is correct?

A W and X are isotopes of the same element.

B X and Y are isotopes of elements in the same group of the Periodic Table.

C Y and Z are isotopes of elements in the same period of the Periodic Table.

D Z has a higher proton number than Y.

7 Which statement about an ionic bond is correct?

A It is a strong electrostatic attraction between cations and anions.

B It is a strong electrostatic attraction between protons and electrons.

C It is a weak electrostatic attraction between cations and anions.

D It is a weak electrostatic attraction between protons and electrons.

8 Which row describes simple molecular compounds?

	melting point	electrical conductivity when molten
A	high	good
B	high	poor
C	low	good
D	low	poor

9 Boron nitride is a compound of the elements boron and nitrogen.

It has a similar structure to diamond.

What is likely to be a property of boron nitride?

A It conducts electricity.

B It is soluble in water.

C It is used as a lubricant.

D It is very hard.

10 Which statement defines the term molecular formula?

A a formula that shows the total number of atoms in a molecule

B a formula that shows the total number of elements in a molecule

C a formula that shows the arrangement of different atoms in a molecule

D a formula that shows the number and type of different atoms in a molecule

11 What is the relative formula mass, M_r, of calcium hydroxide, $Ca(OH)_2$?

A 38 **B** 58 **C** 74 **D** 114

12 Which statements explain why metal objects are electroplated?

1 Electroplating improves the appearance of the object.

2 Electroplating insulates the metal object.

3 Electroplating makes the metal object more resistant to corrosion.

4 Electroplating makes the metal object softer.

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

13 Three statements about a hydrogen–oxygen fuel cell are listed.

1 The overall equation for the reaction is $2H_2 + O_2 \rightarrow 2H_2O$.

2 The hydrogen required comes from the air.

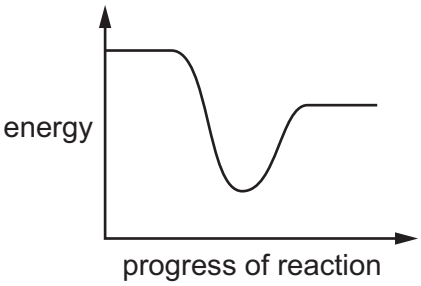
3 The waste gas causes respiratory problems.

Which statements are correct?

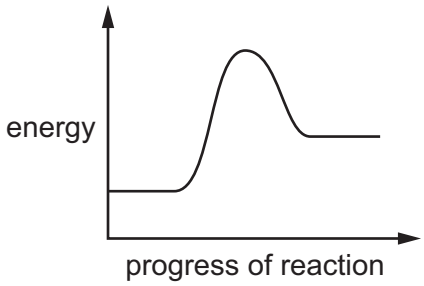
A 1, 2 and 3 **B** 1 only **C** 2 and 3 only **D** 3 only

14 Which reaction pathway diagram represents an endothermic reaction?

A



B



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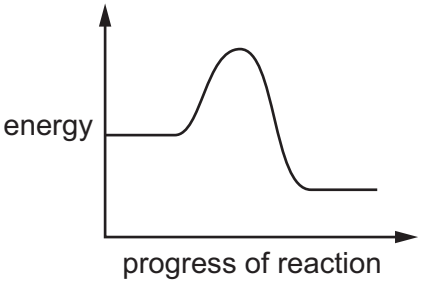

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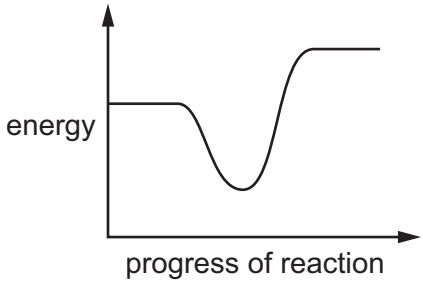


15 Some physical and chemical changes are listed.

1 rusting of iron

2 condensing of steam

3 dissolving of sugar in water

4 cracking of alkanes

Which changes are physical changes?

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

16 Blue copper(II) sulfate crystals are heated in air until they turn into a white powder.

The powder is allowed to cool and after a few days it starts to turn blue.

Why does the white powder start to turn blue?

A Carbon dioxide in the air reacts with the powder to form copper(II) carbonate.

B The powder reacts with water in the air to form copper(II) hydroxide.

C The white copper compound is slowly oxidised.

D Water is absorbed from the air and causes the reaction to reverse.

17 Carbon reacts with silver oxide to form carbon dioxide and silver.

Which substance is reduced?

A carbon

B carbon dioxide

C silver

D silver oxide

18 Base Q dissolves in water to make aqueous Q.

Aqueous Q is tested with thymolphthalein.

Which row gives the colour of thymolphthalein in aqueous Q and the ion responsible for this colour?

	colour of thymolphthalein	ion
A	blue	H^+
B	colourless	H^+
C	blue	OH^-
D	colourless	OH^-

19 Solid calcium hydroxide is added to aqueous ammonium chloride and the mixture is warmed.

A gas is produced.

What is the name of the gas?

A hydrogen

B chlorine

C carbon dioxide

D ammonia

20 Elements L and M are in the same group of the Periodic Table.

Why do L and M have similar chemical properties?

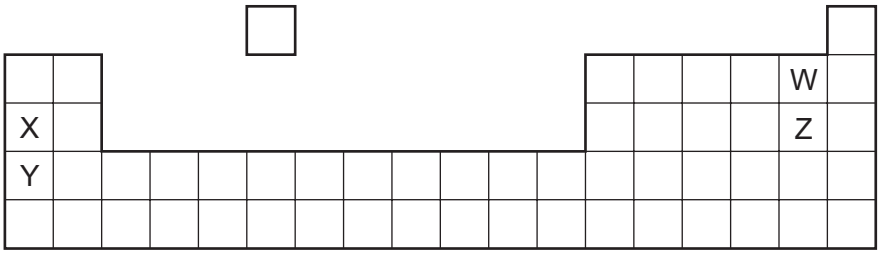
A They have the same number of electrons in the nucleus.

B They have the same number of electrons in the outer shell.

C They have the same number of neutrons in the nucleus.

D They have the same number of neutrons in the outer shell.

21 The diagram shows elements W, X, Y and Z in a section of the Periodic Table.



Which statement about the reactivity of the elements is correct?

A X is more reactive than Y, and W is more reactive than Z.

B X is more reactive than Y, and Z is more reactive than W.

C Y is more reactive than X, and W is more reactive than Z.

D Y is more reactive than X, and Z is more reactive than W.

22 Which three compounds are all insoluble in water?

A ammonium carbonate, silver chloride and sodium sulfate

B barium sulfate, calcium chloride and magnesium hydroxide

C calcium nitrate, magnesium carbonate and lead(II) hydroxide

D calcium sulfate, magnesium hydroxide and silver chloride

23 18 carat gold contains 75% gold and 25% copper by mass.

Which statements about 18 carat gold are correct?

1 It is a mixture.

2 It is a compound.

3 It is an alloy.

4 It conducts electricity.

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

24 The properties of four metals, E, F, G and H, are shown.

E does **not** react with cold water, but reacts with steam.

F does **not** react with water or dilute acid, but the oxide of F is reduced by carbon.

The oxide of G is **not** reduced by carbon, but G reacts vigorously with cold water.

H does **not** react with water or steam, but reacts with dilute acid.

What is the order of reactivity of the metals starting with the most reactive?

	most reactive →			least reactive
A	F	E	H	G
B	F	H	E	G
C	G	E	H	F
D	G	H	E	F

25 Four substances, or groups of substances, found in water from a natural source are listed.

1 some metal compounds

2 plastics

3 dissolved oxygen

4 nitrates and phosphates from fertilisers and detergents

Which substances found in water from a natural source can be beneficial to aquatic life?

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

26 Which element is used to remove tastes and odours in the treatment of the domestic water supply?

A chlorine

B carbon

C calcium

D copper

27 NPK fertilisers are mixtures of salts used to improve plant growth.

Which salt could be used as a component of an NPK fertiliser?

A sodium nitrate

B aluminium sulfate

C magnesium chloride

D calcium ethanoate

28 Plants produce glucose by photosynthesis.

What is essential for this process?

1 carbon dioxide

2 oxygen

3 light

4 water

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

29 Two reactions, M and N, both form carbon dioxide.

$$CaCO_3 \xrightarrow{M} CO_2 \xleftarrow{N} CH_4$$

Which types of reaction are M and N?

	M	N
A	thermal decomposition	thermal decomposition
B	thermal decomposition	combustion
C	combustion	thermal decomposition
D	combustion	combustion

30 The molecular formulae of four compounds are shown.

C_2H_2 C_3H_8 C_4H_8 C_5H_{10}

How many of these compounds are in the alkane homologous series?

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

31 Which type of reaction takes place when pentane reacts with chlorine?

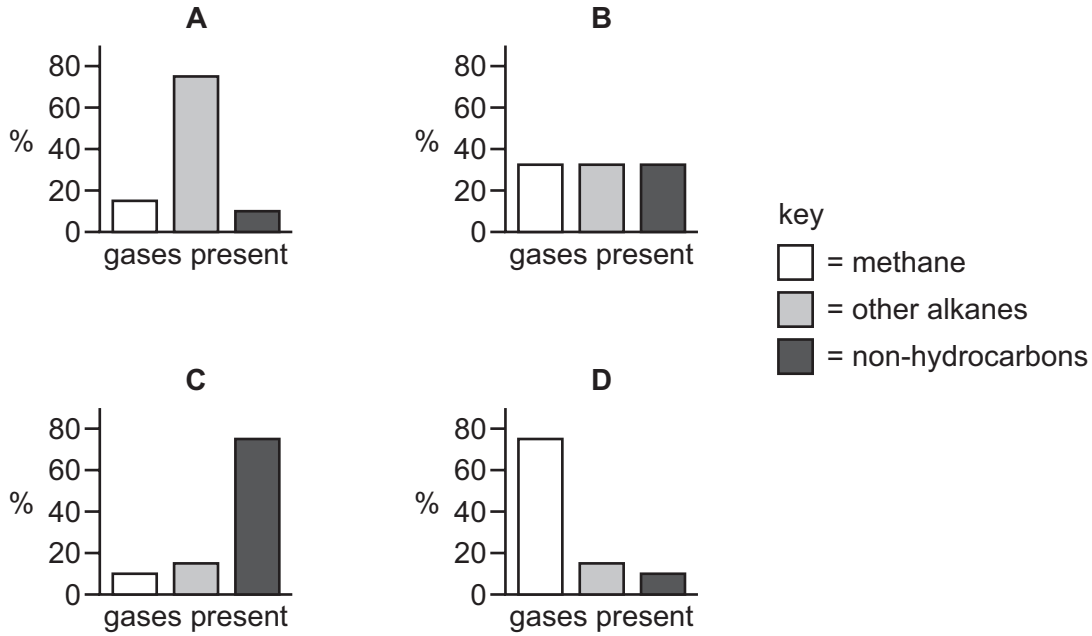
A polymerisation

B addition

C substitution

D cracking

32 Which bar chart shows the percentage composition of natural gas?



33 Which statement about alcohols is correct?

A Alcohols have the same functional group as carboxylic acids.

B Ethanol is an alcohol that is formed by fermentation at 300 °C.

C Ethanol is the alcohol produced in the addition reaction between ethene and hydrogen.

D Water is produced from the combustion of alcohols.

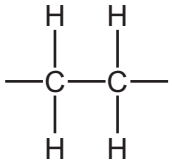
34 The equation shows the reaction between ethanoic acid and solid P to produce Q and hydrogen.

ethanoic acid + P $\rightarrow$ Q + hydrogen

Which row identifies P and Q?

	P	Q
A	sodium	ethanol
B	sodium	sodium ethanoate
C	sodium oxide	ethanol
D	sodium oxide	sodium ethanoate

35 The diagram shows one repeat unit of a polymer.



Which row gives the name of the polymer and of the monomer used to make it?

	name of polymer	name of monomer
A	poly(ethane)	ethane
B	poly(ethane)	ethene
C	poly(ethene)	ethane
D	poly(ethene)	ethene

36 Some properties of a plastic pollutant are listed.

1 It is a poor conductor of electricity.

2 It does **not** react with water.

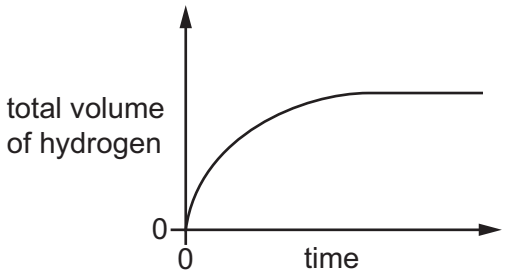
3 It is resistant to oxidation.

4 It has low density.

Which properties explain why this plastic is difficult to remove from the environment?

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

37 The graph shows the volume of hydrogen produced over time in a chemical reaction.



A student uses a stop-watch.

Which other item of apparatus is used to take measurements to produce this graph?

A beaker

B gas syringe

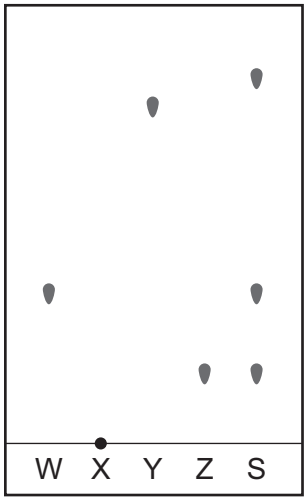
C pipette

D test-tube

38 A student uses paper chromatography to identify the food dyes in a coloured sweet, S.

The student uses four known food dyes, W, X, Y, and Z, and ethanol as the solvent.

The chromatogram obtained is shown.



Which statements are correct?

1 S contains only two dyes.

2 X is insoluble in ethanol.

3 S contains Y and Z.

4 S contains W.

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

39 An aqueous cation reacts with aqueous sodium hydroxide to form a white precipitate.

The precipitate is insoluble in excess sodium hydroxide.

What is the aqueous cation?

A aluminium ion

B calcium ion

C chromium ion

D zinc ion

40 A piece of damp red litmus paper is put into a test-tube of gas. The litmus paper turns white.

Which gas is in the test-tube?

A ammonia

B carbon dioxide

C chlorine

D oxygen

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The Periodic Table of Elements

Group																	
I	II											III	IV	V	VI	VII	VIII
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
11 Na sodium 23	12 Mg magnesium 24											13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium –	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium –	85 At astatine –	86 Rn radon –
87 Fr francium –	88 Ra radium –	89–103 actinoids	104 Rf rutherfordium –	105 Db dubnium –	106 Sg seaborgium –	107 Bh bohrium –	108 Hs hassium –	109 Mt meitnerium –	110 Ds darmstadtium –	111 Rg roentgenium –	112 Cn copernicium –	113 Nh nihonium –	114 Fl flerovium –	115 Mc moscovium –	116 Lv livermorium –	117 Ts tennessine –	118 Og oganesson –

Key

atomic number
atomic symbol
name
relative atomic mass

lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium –	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
actinoids	89 Ac actinium –	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium –	94 Pu plutonium –	95 Am americium –	96 Cm curium –	97 Bk berkelium –	98 Cf californium –	99 Es einsteinium –	100 Fm fermium –	101 Md mendelevium –	102 No nobelium –	103 Lr lawrencium –

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