Cambridge Assessment International Education

Cambridge IGCSE™

CHEMISTRY **0620/11**

Paper 1 Multiple Choice (Core) **May/June 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.

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

1 Which process happens when water vapour changes to rain?

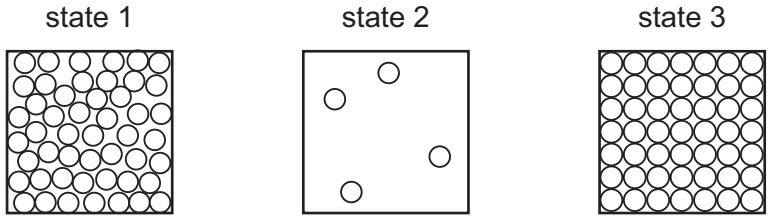
A boiling

B condensing

C evaporating

D freezing

2 The diagrams show the arrangement of particles in three different states of matter.



Which row describes the change in energy of the particles and in particle motion for the given change in state?

	change in state	energy of particles	particle motion
A	$1 \rightarrow 2$	decreases	decreases
B	$2 \rightarrow 1$	decreases	increases
C	$3 \rightarrow 1$	increases	increases
D	$1 \rightarrow 3$	increases	decreases

3 An atom of element Q contains 19 electrons, 19 protons and 20 neutrons.

What is Q?

A calcium

B potassium

C strontium

D yttrium

4 Which part of an atom has a relative mass of 1 and a relative charge of 0?

A electron

B neutron

C nucleus

D proton

5 Which row identifies the number of electrons, neutrons and protons in a particle which is an isotope of $^{11}_{5}B$?

	electrons	neutrons	protons
A	5	5	5
B	5	6	5
C	6	5	6
D	6	6	6

6 Which statements about potassium iodide are correct?

1 It is formed from potassium anions and iodide cations.

2 It is a good electrical conductor when molten or in aqueous solution.

3 Potassium atoms share electrons with iodine atoms.

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

7 Which substances contain one or more shared pairs of electrons?

1 argon

2 methane

3 iron(III) oxide

4 chlorine

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

8 Which substance has a giant covalent structure at room temperature and pressure?

A ammonia

B carbon dioxide

C diamond

D water

9 Which row shows the correct formula for the named substance?

	substance	formula
A	cobalt(II) chloride	Cu_2Cl
B	sodium carbonate	Na_2CO_3
C	xenon	Xe_2
D	ammonium sulfate	NH_4SO_4

10 The equation shows the thermal decomposition of magnesium carbonate.

$$MgCO_3 \rightarrow MgO + CO_2$$

[M_r: $MgCO_3$, 84]

Which mass of magnesium oxide is formed when 21.0 g of magnesium carbonate is completely decomposed?

A 1.9 g **B** 4.0 g **C** 10.0 g **D** 40.0 g

11 Concentrated aqueous sodium chloride is electrolysed using inert electrodes.

What is the main product formed at the positive electrode (anode)?

A chlorine

B hydrogen

C oxygen

D sodium

12 A hydrogen–oxygen fuel cell uses 630 dm^3 of oxygen.

The oxygen for the reaction is extracted from clean, dry air.

What is the minimum volume of clean, dry air needed to provide this volume of oxygen?

A 788 dm^3 **B** 808 dm^3 **C** 3000 dm^3 **D** 3316 dm^3

13 Three statements about energy changes in chemical reactions are listed.

1 In an endothermic reaction, the temperature of the surroundings increases.

2 In an exothermic reaction, thermal energy is taken in from the surroundings.

3 In the reaction pathway diagram for an exothermic reaction, the energy level of the products is lower than the energy level of the reactants.

Which statements are correct?

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

14 When a small piece of a Group I metal is placed into a large beaker of cold water, a reaction occurs.

Four statements about this reaction are listed.

1 The metal melts.

2 Hydrogen is produced.

3 Steam is produced.

4 The pH of the solution increases.

Which statements about this reaction describe a physical change?

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

15 The equation for the decomposition of hydrogen peroxide is shown.

$$2H_2O_2 \rightarrow 2H_2O + O_2$$

The reaction is exothermic.

When a small amount of a catalyst is added, the oxygen is produced more quickly.

Which statement about the catalyst is correct?

A The catalyst makes the reaction more exothermic.

B The mass of catalyst is the same before and after the reaction.

C The catalyst increases the final volume of oxygen produced.

D All of the catalyst is used up in the reaction.

16 The equation for the reaction between copper(II) oxide and carbon is shown.

$$2CuO + C \rightarrow 2Cu + CO_2$$

Which statement about this reaction is correct?

A CuO is reduced.

B CO_2 is oxidised.

C Cu is oxidised.

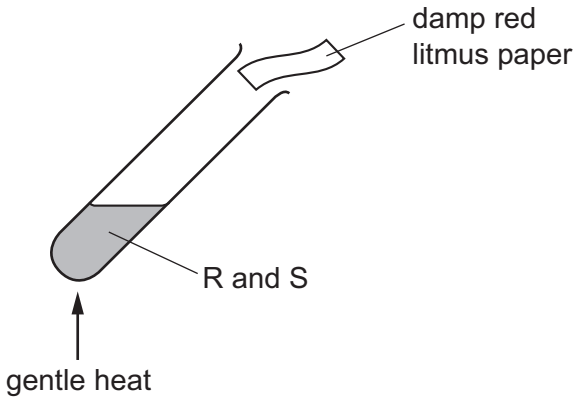
D C is reduced.

17 Which row gives the colours observed when thymolphthalein and methyl orange are added separately to the named solution?

	solution	colour with thymolphthalein	colour with methyl orange
A	dilute HC*l*	colourless	yellow
B	dilute HC*l*	blue	red
C	aqueous NaOH	colourless	red
D	aqueous NaOH	blue	yellow

18 A mixture of two substances, R and S, is heated gently.

The damp red litmus paper turns blue.



What are R and S?

	R	S
A	a basic oxide	ammonium chloride
B	a basic oxide	sodium nitrate
C	an acidic oxide	ammonium chloride
D	an acidic oxide	sodium nitrate

19 Which reactants are used to make the salt copper(II) sulfate?

A dilute acid + alkali

B dilute acid + metal carbonate

C dilute acid + metal

D dilute acid + non-metal oxide

20 Which statement about the Periodic Table is correct?

A The elements are arranged in order of increasing relative atomic mass.

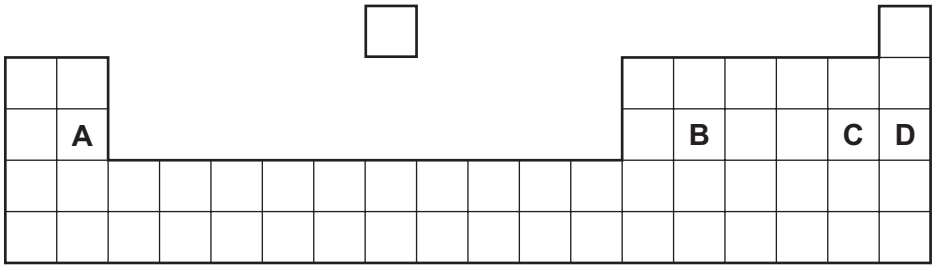
B The reactivity of the elements in Group I and in Group VII increases as the groups are descended.

C Elements in the same period have similar chemical properties.

D Elements in Group II form ions with a 2+ charge.

21 Part of the Periodic Table is shown.

Which element shows the most metallic character?



22 E is an element from Group I of the Periodic Table. Two properties of E are listed.

- It has a higher melting point than caesium.
- It has a lower density than sodium.

What is the identity of E?

A lithium

B potassium

C rubidium

D francium

23 An equation for the displacement reaction between aqueous halogen, X_2, and aqueous halide ions, Y^-, is shown.

$$X_2(aq) + 2Y^-(aq) \rightarrow 2X^-(aq) + Y_2(aq)$$

Which row identifies X_2 and Y^- and explains why the reaction takes place?

	X_2	Y^-	explanation
A	chlorine	iodide	chlorine is less reactive than iodine
B	chlorine	iodide	chlorine is more reactive than iodine
C	iodine	chloride	chlorine is less reactive than iodine
D	iodine	chloride	chlorine is more reactive than iodine

24 Some information about an element is shown.

melting point / °C	1555
boiling point / °C	2963
colour of oxide	brown
use of element	as a catalyst

What is the position of this element in the Periodic Table?

A Group I

B Group VII

C Group VIII

D transition elements

25 The table shows the observations when four metals, Q, R, S and T, are added separately to cold water and to dilute hydrochloric acid.

metal	observation with cold water	observation with dilute hydrochloric acid
Q	slow fizzing	fizzing
R	no reaction	fizzing
S	no reaction	no reaction
T	vigorous fizzing	vigorous fizzing

Which row gives the order of reactivity of the metals?

	least reactive →			most reactive
A	S	Q	R	T
B	T	R	Q	S
C	S	R	Q	T
D	T	Q	R	S

26 Magnesium is reacted separately with dilute sulfuric acid and with steam.

Which row correctly identifies if hydrogen is formed as a product in each reaction?

	reaction with dilute sulfuric acid	reaction with steam
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = hydrogen is formed

✗ = hydrogen is **not** formed

27 Which statements about aluminium are correct?

1 It is more reactive than calcium.

2 The main ore of aluminium is bauxite.

3 It can be extracted from its oxide using carbon.

4 Brass is an alloy of aluminium and copper.

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

28 Steel is a mixture of iron and one or more other elements.

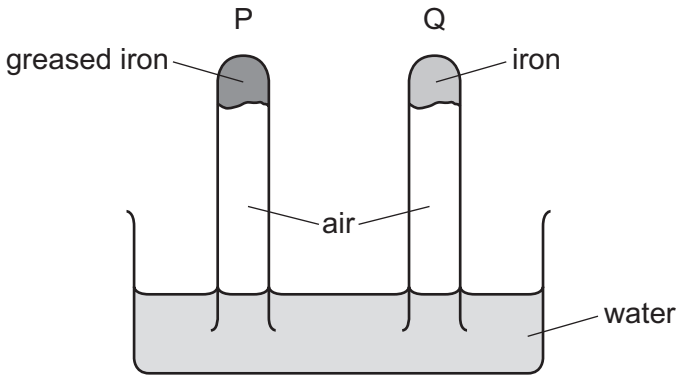
The table gives some information about three common types of steel.

	type of steel	elements added to iron	properties
1	high-carbon steel	carbon only	strong, brittle and corrodes
2	low-carbon steel	carbon only	soft, easily shaped and corrodes slowly
3	stainless steel	carbon, chromium and nickel	hard and resistant to corrosion

Which rows identify a type of steel that is suitable to make cutlery?

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

29 The diagram shows an experiment to investigate the corrosion of iron.



What happens to the water level in tubes P and Q?

	tube P	tube Q
A	rises	falls
B	no change	rises
C	falls	rises
D	no change	no change

30 Fertilisers are used to provide the three elements needed for improved plant growth.

Which two compounds would provide **all three** of these elements?

A ammonium nitrate and calcium phosphate

B ammonium nitrate and potassium sulfate

C potassium nitrate and calcium phosphate

D potassium phosphate and potassium sulfate

31 Which substances can be used to detect the presence of water?

1 anhydrous cobalt(II) chloride

2 anhydrous copper(II) sulfate

3 litmus

4 methyl orange

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

32 What is produced by the incomplete combustion of methane?

A carbon monoxide

B hydrogen

C lead compounds

D sulfur dioxide

33 Which row identifies compounds in the same homologous series?

	chemical properties	functional group
A	different	different
B	different	same
C	similar	different
D	similar	same

34 The molecular formula of compound Z is C_4H_{10}.

Which row identifies the substance that reacts with Z and describes the type of reaction that occurs?

	substance	type of reaction
A	chlorine	addition
B	chlorine	substitution
C	steam	addition
D	steam	substitution

35 Which list shows the fractions obtained from the fractional distillation of petroleum, in order of increasing boiling point?

A bitumen → diesel oil → fuel oil → lubricating oil

B diesel oil → gasoline → naphtha → kerosene

C gasoline → naphtha → kerosene → diesel oil

D kerosene → lubricating oil → naphtha → refinery gas

36 Three statements about cracking of larger alkane molecules are listed.

1 Cracking produces petrol for cars.

2 Cracking only produces short-chain alkenes.

3 Cracking produces alkenes used to make polymers.

Which statements are correct?

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

37 Some words used to describe organic compounds are listed.

1 hydrocarbon

2 monomer

3 saturated

4 unreactive

Which words describe ethene?

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

38 A student measures 25.00 cm^3 of dilute hydrochloric acid accurately.

Which piece of apparatus is most suitable?

A beaker

B measuring cylinder

C burette

D dropping pipette

39 Excess solid magnesium oxide is added to dilute nitric acid.

Which separation technique is used to remove the excess solid magnesium oxide after the reaction finishes?

A chromatography

B crystallisation

C distillation

D filtration

40 Four different aqueous metal nitrates are tested separately with aqueous sodium hydroxide, with dilute sulfuric acid and with a flame test.

Which row shows the correct set of results for the named aqueous metal nitrate?

	aqueous metal nitrate	with aqueous sodium hydroxide	with dilute sulfuric acid	flame test
A	sodium nitrate	no visible change	white precipitate	yellow flame
B	copper(II) nitrate	blue precipitate	no visible change	blue-green flame
C	barium nitrate	white precipitate	no visible change	blue-green flame
D	calcium nitrate	no visible change	white precipitate	yellow flame

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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.).