



Cambridge IGCSE™

CHEMISTRY

Paper 1 Multiple Choice (Core)

0620/11

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

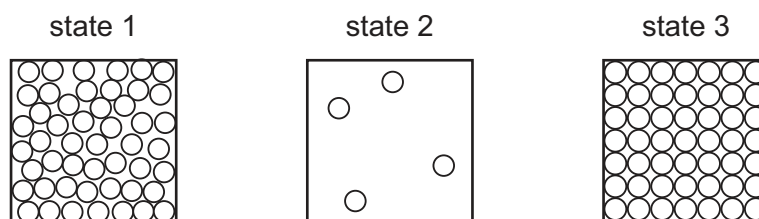
- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

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 → 2	decreases	decreases
B	2 → 1	decreases	increases
C	3 → 1	increases	increases
D	1 → 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 $^{11}_5\text{B}$?

	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.



[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.

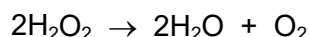
Four statements about this reaction are listed.

- 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.



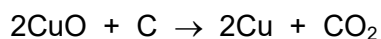
The reaction is exothermic.

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.



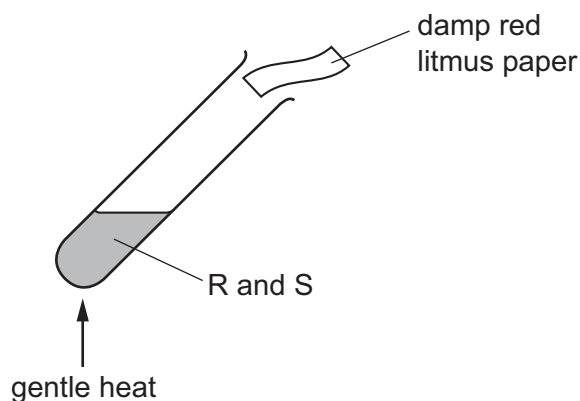
Which statement about this reaction is correct?

- A** CuO is reduced.
B CO₂ 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 HCl	colourless	yellow
B	dilute HCl	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?

[illegible]

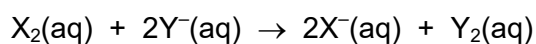
22 E is an element from Group I of the Periodic Table. Two properties of E are listed.

- 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.



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	✓	x
C	x	✓
D	x	x

key

✓ = hydrogen is formed

x = 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.

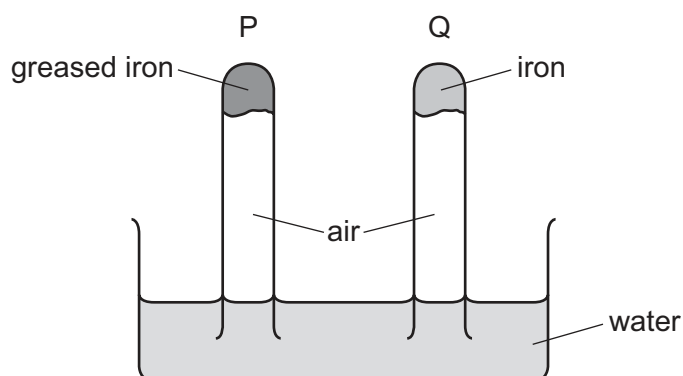
The table gives some information about three common types of steel.

	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
		<div>1Hhydrogen1</div>															
		<div>Key</div>															
		<div>atomic number atomic symbol name relative atomic mass</div>															
3Li lithium 7	4Be beryllium 9																
11Na sodium 23	12Mg magnesium 24																
19K potassium 39	20Ca calcium 40	21Sc scandium 45	22Ti titanium 48	23V vanadium 51	24Cr chromium 52	25Mn manganese 55	26Fe iron 56	27Co cobalt 59	28Ni nickel 59	29Cu copper 64	30Zn zinc 65	31Ga gallium 70	32Ge germanium 73	33As arsenic 75	34Se selenium 79	35Br bromine 80	36Kr krypton 84
37Rb rubidium 85	38Sr strontium 88	39Y yttrium 89	40Zr zirconium 91	41Nb niobium 93	42Mo molybdenum 96	43Tc technetium —	44Ru ruthenium 101	45Rh rhodium 103	46Pd palladium 106	47Ag silver 108	48Cd cadmium 112	49In indium 115	50Sn tin 119	51Sb antimony 122	52Te tellurium 128	53I iodine 127	54Xe xenon 131
55Cs caesium 133	56Ba barium 137	57–71lanthanoids	72Hf hafnium 178	73Ta tantalum 181	74W tungsten 184	75Re rhenium 186	76Os osmium 190	77Ir iridium 192	78Pt platinum 195	79Au gold 197	80Hg mercury 201	81Tl thallium 204	82Pb lead 207	83Bi bismuth 209	84Po polonium —	85At astatine —	86Rn radon —
87Fr francium —	88Ra radium —	89–103actinoids	104Rf rutherfordium —	105Db dubnium —	106Sg seaborgium —	107Bh bohrium —	108Hs hassium —	109Mt meitnerium —	110Ds darmstadtium —	111Rg roentgenium —	112Cn copernicium —	113Nh nihonium —	114Fl flerovium —	115Mc moscovium —	116Lv livermorium —	117Ts tennessine —	118Og oganesson —

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
	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.).