Cambridge Assessment International Education

Cambridge IGCSE™

CHEMISTRY **0620/12**

Paper 1 Multiple Choice (Core) **February/March 2022**

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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1 Which change of state is an exothermic process?

A condensation

B evaporation

C melting

D sublimation

2 In which state does 1 dm^3 of methane contain the most particles?

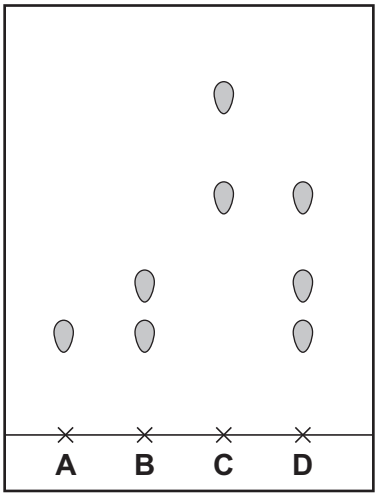
A gas at 100 °C

B gas at room temperature

C liquid

D solid

3 Which dye on the chromatogram is a pure substance?



4 Which piece of apparatus is used to measure exactly 5.00 cm^3 of a liquid?

A 5 cm^3 beaker

B 10 cm^3 measuring cylinder

C 25 cm^3 pipette

D 50 cm^3 burette

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5 Fermentation of sugar produces a mixture of ethanol solution and solid yeast.

How is the solid yeast removed from the mixture?

A crystallisation

B distillation

C filtration

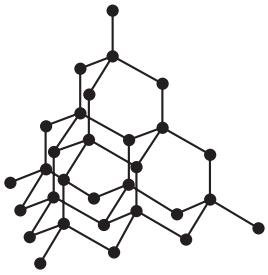
D fractional distillation

6 Matter exists as elements, compounds and mixtures.

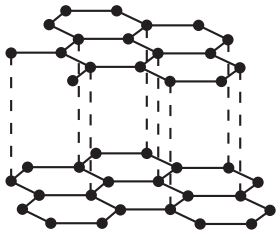
Which row identifies an element, a compound and a mixture?

	element	compound	mixture
A	calcium	potassium carbonate	sodium chloride
B	brass	sodium chloride	air
C	calcium	sodium chloride	brass
D	sodium chloride	water	potassium carbonate

7 Which pair of statements about diamond and graphite is correct?



diamond



graphite

A Diamond and graphite are both pure carbon. They are both macromolecules.

B Diamond and graphite can both be used as electrodes. Graphite is also used as a lubricant.

C Diamond has covalent bonds. Graphite has ionic bonds.

D Diamond is hard with a high melting point. Graphite is soft with a low melting point.

8 An isotope of chromium is represented by $^{52}_{24}Cr$.

Which statement about an atom of this isotope of chromium is correct?

A It contains 24 electrons.

B It contains 24 neutrons.

C It contains 28 protons.

D It contains 52 neutrons.

9 Sodium is in Group I of the Periodic Table and chlorine is in Group VII.

Which row describes what happens when sodium bonds ionically with chlorine?

	sodium atoms	ion formed	chlorine atoms	ion formed
A	gain an electron	Na^-	lose an electron	Cl^+
B	gain an electron	Na^+	lose an electron	Cl^-
C	lose an electron	Na^-	gain an electron	Cl^+
D	lose an electron	Na^+	gain an electron	Cl^-

10 Caesium fluoride is an ionic compound.

Which statements about caesium fluoride are correct?

1 It conducts electricity when solid.

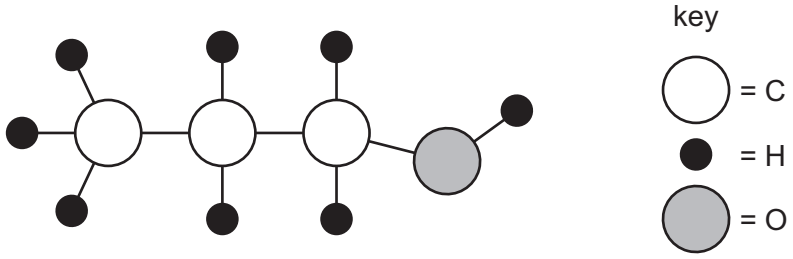
2 It has a high melting point.

3 It is soluble in water.

4 It is highly volatile.

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

11 The structure of a molecule of a compound is shown.



What is the formula of this compound?

A C_3H_7O **B** C_3H_8O **C** C_8H_3O **D** C_8HO_3

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12 Calcium carbonate, $CaCO_3$, reacts with dilute hydrochloric acid to produce carbon dioxide.

The equation for the reaction is shown. The relative formula mass of calcium carbonate is 100.

$$CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2$$

10 g of calcium carbonate is reacted with an excess of dilute hydrochloric acid.

Which mass of carbon dioxide is produced?

A 2.2 g **B** 2.8 g **C** 4.4 g **D** 44 g

13 Molten sodium chloride and concentrated aqueous sodium chloride are electrolysed using platinum electrodes.

What are the products at the negative electrode (cathode) in each electrolysis?

	molten sodium chloride	concentrated aqueous sodium chloride
A	hydrogen	hydrogen
B	hydrogen	sodium
C	sodium	hydrogen
D	sodium	sodium

14 An object is electroplated with silver using an aqueous silver salt as the electrolyte.

Which row is correct?

	the object to be electroplated is the	the other electrode is made from
A	anode	carbon
B	anode	silver
C	cathode	carbon
D	cathode	silver

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15 Which row describes the changes that occur in an endothermic reaction?

	energy change	temperature
A	energy given out to the surroundings	decreases
B	energy given out to the surroundings	increases
C	energy taken in from the surroundings	decreases
D	energy taken in from the surroundings	increases

16 Which statement about fuels is correct?

A Heat energy is only produced by burning fuels.

B Hydrogen is used as a fuel although it is difficult to store.

C Methane is a good fuel because it produces only water when burned.

D Uranium is burned in air to produce energy.

17 A sequence of changes involving sulfur is shown.

$$\underset{\text{solid}}{S} \xrightarrow{\text{change 1}} \underset{\text{liquid}}{S} \xrightarrow{\text{change 2}} \underset{\text{gas}}{SO_2}$$

Which row describes the changes?

	change 1	change 2
A	chemical	chemical
B	chemical	physical
C	physical	chemical
D	physical	physical

18 Magnesium is added to dilute hydrochloric acid.

$25\,cm^3$ of gas is given off in the first 30 s of the reaction.

The experiment is repeated at a lower temperature. All other reaction conditions are the same.

Which volume of gas is produced in the first 30 s of this reaction?

A $15\,cm^3$ **B** $25\,cm^3$ **C** $30\,cm^3$ **D** $50\,cm^3$

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19 The equation for the reaction between magnesium and copper(II) oxide is shown.

$$Mg + CuO \rightarrow MgO + Cu$$

Which substance is oxidised?

A Cu **B** CuO **C** Mg **D** MgO

20 Methyl orange is added to dilute hydrochloric acid and to aqueous sodium hydroxide.

What is the colour of the methyl orange in each solution?

	colour in dilute hydrochloric acid	colour in aqueous sodium hydroxide
A	orange	red
B	red	yellow
C	red	orange
D	yellow	red

21 Compound X is dissolved in water and two separate samples of the solution are tested.

The results of the tests are shown.

test	observation
add aqueous sodium hydroxide	a white precipitate forms which is insoluble in excess
acidify with dilute nitric acid and add aqueous silver nitrate	a yellow precipitate forms

What is compound X?

A calcium chloride

B calcium iodide

C zinc chloride

D zinc iodide

22 Which statement about the Periodic Table is correct?

A Elements with the highest atomic number in each period are metallic.

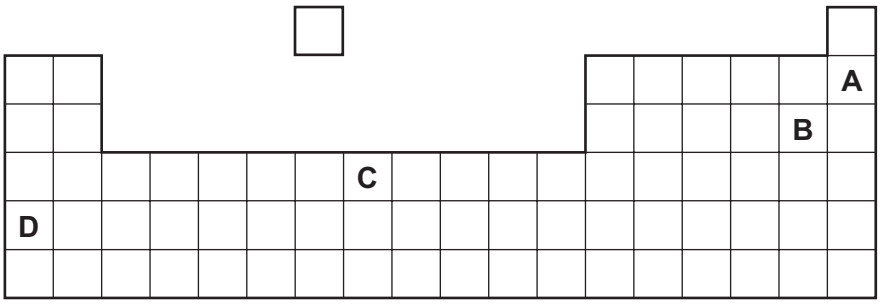
B Elements with the lowest group numbers are non-metals.

C Elements with similar chemical properties are placed in groups.

D Elements with similar physical properties are placed in periods.

23 Part of the Periodic Table is shown.

Which element is a soft solid that reacts violently with cold water?



24 Three properties of element X are listed.

- It contains atoms with a full outer shell of electrons.
- It is monoatomic.
- It is unreactive.

In which part of the Periodic Table is the element placed?

A Group I

B Group VII

C Group VIII

D transition elements

25 Some properties of the elements in Group VII of the Periodic Table are shown.

element	melting point / °C	boiling point / °C	colour
F	–220	–188	pale yellow
C*l*	–101	–35	green
Br	–7	59	brown
I	114	184	
At	302	380	

Which statement is correct?

A Bromine is a brown solid at room temperature.

B Fluorine is a pale yellow gas at room temperature.

C Iodine is a brown liquid at room temperature.

D Astatine is a black liquid at room temperature.

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26 Which process is used to obtain the metal calcium from its ore?

A electrolysis

B oxidation with carbon

C reduction with carbon

D thermal decomposition

27 Which row links the property of a metal to its use?

	property	use
A	high density	aircraft bodies
B	high reactivity	food containers
C	good electrical conductor	cooking pans
D	ductile	electrical wiring

28 The table gives some properties of an element.

melting point in °C	3422
appearance of the element	grey
appearance of the chloride of the element	dark blue
density in g / cm^3	19.2
electrical conductivity when solid	good

Which other property does this element have?

A acts as a catalyst

B brittle

C forms an acidic oxide

D highly reactive with water

29 A metal reacts vigorously with cold water.

Which statement about the metal is correct?

A It is above hydrogen in the reactivity series.

B It is below magnesium in the reactivity series.

C Its oxide can be reduced with carbon.

D It does not react with dilute acids.

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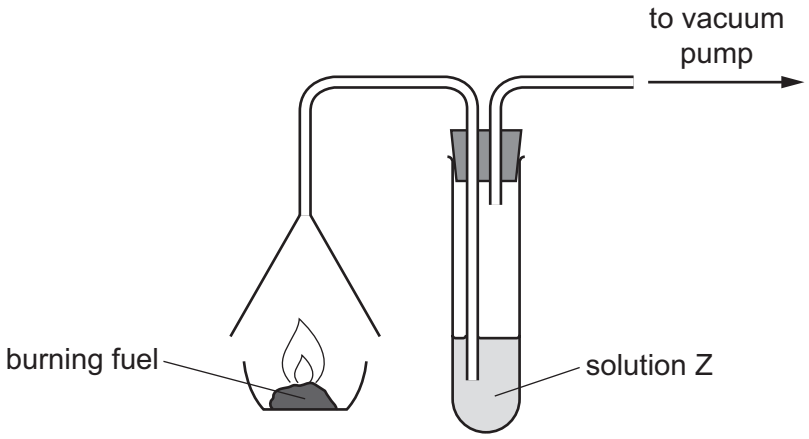
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30 Which row describes the colour changes when water is added to anhydrous cobalt(II) chloride and anhydrous copper(II) sulfate?

	anhydrous cobalt(II) chloride	anhydrous copper(II) sulfate
A	blue to pink	white to blue
B	blue to white	blue to pink
C	pink to blue	blue to white
D	white to blue	pink to blue

31 The gases produced by a burning fuel are passed through solution Z using the apparatus shown.

The fuel contains compounds of sulfur.



Which row identifies solution Z and the result obtained when the fuel contains compounds of sulfur?

	solution Z	result
A	acidified potassium manganate(VII)	turns colourless
B	acidified potassium manganate(VII)	turns purple
C	litmus	bleached
D	litmus	turns blue

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32 Which information about carbon dioxide and methane is correct?

		carbon dioxide	methane
A	formed when vegetation decomposes	✓	✗
B	greenhouse gas	✓	✓
C	present in unpolluted air	✗	✗
D	produced during respiration	✗	✓

key
✓ = correct
✗ = not correct

33 Which row identifies uses of sulfur?

	use 1	use 2	use 3
A	making ammonia	bleaching wood pulp	food preservative
B	making sulfuric acid	bleaching wood pulp	food preservative
C	making sulfuric acid	food preservative	as an NPK fertiliser
D	making ammonia	food preservative	as an NPK fertiliser

34 Which statements about lime are correct?

1 Lime is made by heating calcium carbonate (limestone).

2 Lime is used to desulfurise flue gases.

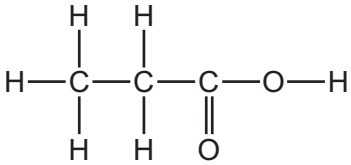
3 Lime is used to treat alkaline soil.

4 The chemical name for lime is calcium oxide.

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

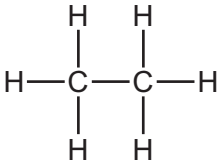
35 Which structure is correctly named?

A



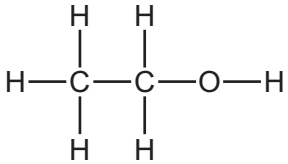
ethanoic acid

B



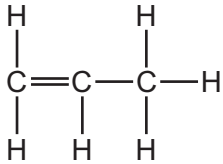
ethene

C



ethanol

D



propane

36 The fractional distillation of petroleum produces a series of fractions with different uses.

Which row identifies a use for a fraction?

	fraction	use
A	bitumen	jet fuel
B	gas oil	cooking
C	kerosene	making roads
D	naphtha	making chemicals

37 Ethene and propene are both members of the same homologous series.

Which statements explain why ethene and propene have similar chemical properties?

1 They are both hydrocarbons.

2 They are both made by cracking.

3 They have the same functional group.

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

38 Which statement about ethane is correct?

A It decolourises bromine water.

B It burns in excess oxygen to form water and carbon dioxide.

C Its molecular formula is C_2H_4.

D Its atoms are joined together by ionic bonding.

39 Which statements about ethanol are correct?

1 Ethanol is used as a solvent.

2 Ethanol can be made directly from ethane.

3 Ethanol is a covalent compound.

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

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40 Polymers are long-chain molecules made from small molecules linked together.

Four polymers or types of polymer are listed.

1 carbohydrates

2 nylon

3 proteins

4 *Terylene*

Which polymers or types of polymer are synthetic?

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

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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 –		114 Fl flerovium –		116 Lv livermorium –		

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.).