Cambridge Assessment International Education

Cambridge IGCSE™

CHEMISTRY **0620/11**

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

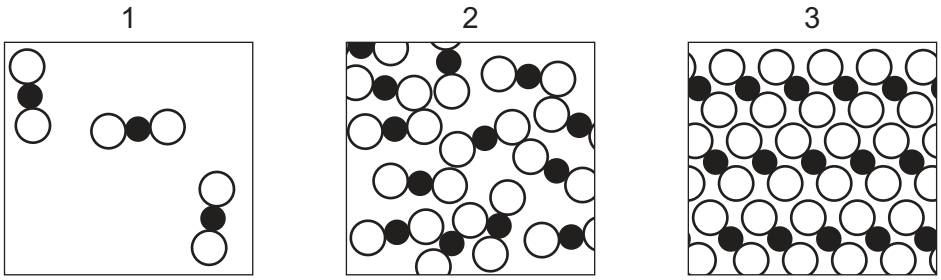
INFORMATION

- 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.

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

[Turn over

1 Diagrams of the three states of matter for carbon dioxide are shown.



Which two diagrams show the states of matter before and after the sublimation of carbon dioxide?

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

2 A student measures the time taken for 2.0 g of magnesium to dissolve in 50 cm^3 of dilute sulfuric acid.

Which apparatus is essential to complete the experiment?

1 stop-clock

2 measuring cylinder

3 thermometer

4 balance

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

3 Which method is used to separate a mixture of the following liquids?

liquid	boiling point / °C
methanol	64.5
ethanol	78.5
propan-1-ol	97.2
butan-1-ol	117.0

A crystallisation

B evaporation

C filtration

D fractional distillation

4 Which substance should be pure for the intended use?

A a drug for curing disease

B limestone for iron extraction

C petroleum for fractional distillation

D water for washing a car

5 Which row identifies an alloy, a pure metal and a non-metal?

	alloy	pure metal	non-metal
A	brass	carbon	copper
B	brass	copper	carbon
C	copper	brass	carbon
D	copper	carbon	brass

6 Information about the structures of three atoms, X, Y and Z, is shown.

atom	proton number	nucleon number
X	1	1
Y	1	2
Z	1	3

Which statements about atoms X, Y and Z are correct?

1 They are isotopes of the same element.

2 They contain the same number of electrons.

3 They contain the same number of neutrons.

4 They contain one occupied electron shell.

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

7 What happens to an atom when it becomes an ion with a charge of +1?

A It gains an electron.

B It gains a proton.

C It loses an electron.

D It loses a proton.

8 The relative atomic mass, A_r, of an element is determined by comparing the mass of one atom of the element with the mass of one atom of element Q.

What is Q?

A carbon

B chlorine

C hydrogen

D oxygen

9 Which equation for the decomposition of calcium nitrate is correct?

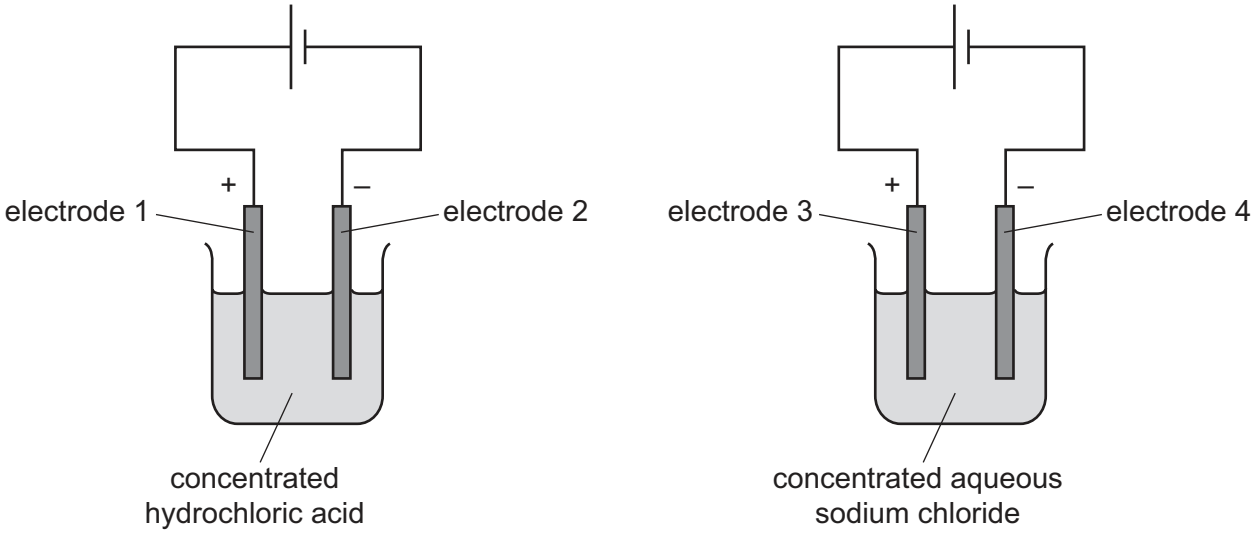
A $Ca(NO_3)_2 \rightarrow CaO + NO_2 + O_2$

B $Ca(NO_3)_2 \rightarrow CaO + 2NO_2 + O_2$

C $2Ca(NO_3)_2 \rightarrow 2CaO + 2NO_2 + O_2$

D $2Ca(NO_3)_2 \rightarrow 2CaO + 4NO_2 + O_2$

10 The diagram shows the electrolysis of concentrated hydrochloric acid and concentrated aqueous sodium chloride using carbon electrodes.



At which electrodes is hydrogen produced?

A electrode 1 only

B electrodes 1 and 3

C electrode 2 only

D electrodes 2 and 4

11 Overhead power cables made from (steel-cored) aluminium are used to carry electricity over long distances.

Which property of (steel-cored) aluminium makes it suitable for use in power cables?

A Aluminium has a low density.

B Aluminium has low strength.

C Steel is a good conductor of heat.

D Steel is resistant to corrosion.

12 Which row identifies a chemical change and a physical change?

	chemical change	physical change
A	boiling ethanol	burning ethanol
B	burning ethanol	evaporating ethanol
C	dissolving ethanol in water	burning ethanol
D	evaporating ethanol	dissolving ethanol in water

13 The equation for the reaction when hydrogen is used as a fuel is shown.

$$2H_2 + O_2 \rightarrow 2H_2O$$

Which statement about this reaction is correct?

A Energy is given out so the temperature of the surroundings decreases.

B Energy is taken in so the temperature of the surroundings increases.

C The reaction is endothermic so the temperature of the surroundings decreases.

D The reaction is exothermic so the temperature of the surroundings increases.

14 Which fuels release carbon dioxide when burned?

1 gasoline

2 hydrogen

3 methane

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

15 Water is added to anhydrous copper(II) sulfate.

What happens during the reaction?

A The copper(II) sulfate turns blue and the solution formed gets colder.

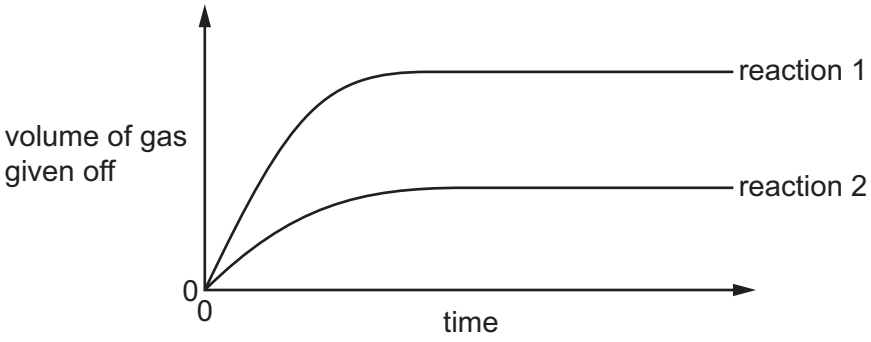
B The copper(II) sulfate turns blue and the solution formed gets hotter.

C The copper(II) sulfate turns white and the solution formed gets colder.

D The copper(II) sulfate turns white and the solution formed gets hotter.

16 Excess magnesium ribbon is reacted with a fixed volume of hydrochloric acid and the volume of gas given off over time is measured.

The results of two different experiments are shown.



Which statement explains the differences between the results of the two experiments?

A Reaction 1 uses a catalyst.

B The acid used is twice as concentrated in reaction 1.

C The magnesium ribbon is in smaller pieces in reaction 2.

D The temperature is higher in reaction 2.

17 Which products are formed when magnesium hydroxide reacts with hydrochloric acid?

A magnesium chloride, carbon dioxide and water

B magnesium chloride, hydrogen and water

C magnesium chloride and hydrogen only

D magnesium chloride and water only

18 The oxides of two elements, X and Y, are separately dissolved in water and the pH of each solution tested.

oxide tested	pH of solution
X	1
Y	13

Which information about X and Y is correct?

	oxide is acidic	oxide is basic	metal	non-metal
A	X	Y	X	Y
B	X	Y	Y	X
C	Y	X	X	Y
D	Y	X	Y	X

19 An acid is neutralised by adding an excess of an insoluble solid base.

A soluble salt is formed.

How is the pure salt obtained from the reaction mixture?

A crystallisation → evaporation → filtration

B evaporation → crystallisation → filtration

C filtration → crystallisation → evaporation

D filtration → evaporation → crystallisation

[Turn over

20 Three separate samples of an aqueous compound T are tested.

The results of the tests are shown.

test	observation
acidify with dilute nitric acid, then add aqueous barium nitrate	white precipitate
add aqueous ammonia	white precipitate, soluble in excess
add aqueous sodium hydroxide	white precipitate, soluble in excess

What is T?

A aluminium chloride

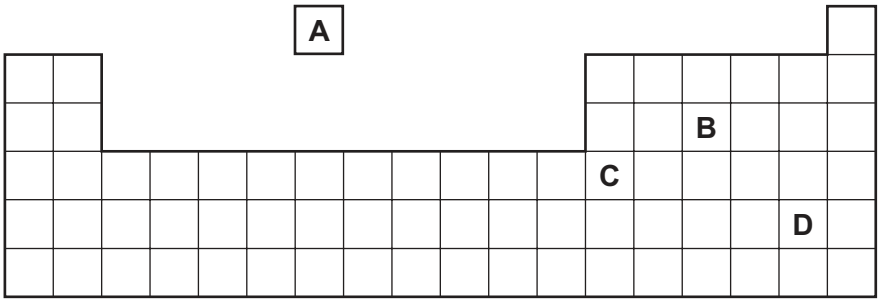
B aluminium sulfate

C zinc chloride

D zinc sulfate

21 Part of the Periodic Table is shown.

Which element is a metal?



22 The elements sodium to argon form Period 3 of the Periodic Table.

Which row describes the trend across Period 3 from left to right?

	number of outer-shell electrons	metallic character	group number
A	decreases	decreases	decreases
B	decreases	increases	decreases
C	increases	decreases	increases
D	increases	increases	increases

23 Lithium, sodium and potassium are elements in Group I of the Periodic Table.

Which statement about these elements is correct?

A Lithium has the highest melting point and the lowest density.

B Lithium has the highest density and the most violent reaction with water.

C Potassium has the highest melting point and the highest density.

D Potassium has the lowest melting point and the least violent reaction with water.

24 Which statement describes a transition element?

A It can act as a catalyst and some of its compounds can also act as catalysts.

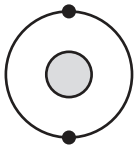
B It forms white compounds with sulfur, oxygen, chlorine and bromine.

C It has a low density and a piece of it will float on water.

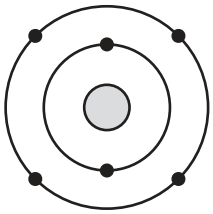
D It is a very poor conductor of electricity.

25 Which diagram represents the arrangement of the outer-shell electrons of a noble gas?

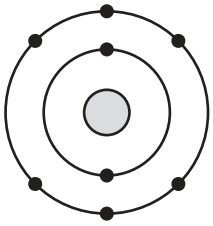
A



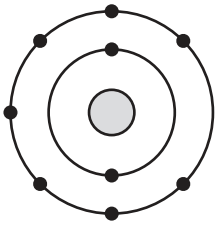
B



C



D



26 Which statements about the general properties of metals are correct?

1 They are good conductors of heat and electricity.

2 They have low melting points.

3 They react with dilute acids to form a salt and water.

4 They react with oxygen to form basic oxides.

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

27 Reactions of three metals and their oxides are shown.

metal	add dilute hydrochloric acid to metal	heat metal oxide with carbon
1	✓	✓
2	✓	✗
3	✗	✓

key
✓ = reacts
✗ = does not react

What is the order of reactivity of these metals, from most reactive to least reactive?

A $1 \rightarrow 2 \rightarrow 3$ **B** $1 \rightarrow 3 \rightarrow 2$ **C** $2 \rightarrow 1 \rightarrow 3$ **D** $2 \rightarrow 3 \rightarrow 1$

28 Which uses of the metals shown are correct?

	aluminium	stainless steel
A	aircraft bodies	car bodies
B	car bodies	aircraft bodies
C	chemical plant	food containers
D	food containers	cutlery

29 Which statement about the reactions in the blast furnace is correct?

A Carbon reacts with oxygen and heats the furnace.

B Carbon monoxide removes the silicon dioxide impurity forming slag.

C Iron(III) oxide is oxidised to iron.

D Limestone reduces iron(III) oxide to iron.

30 Iron rusts when exposed to air.

Which two substances in air cause iron to rust?

A carbon dioxide and oxygen

B nitrogen and oxygen

C oxygen and water

D carbon dioxide and water

31 Fertilisers are used to provide three of the elements needed for plant growth.

Which two compounds would give a fertiliser containing all three of these elements?

A $Ca(NO_3)_2$ and $(NH_4)_2SO_4$

B $Ca(NO_3)_2$ and $(NH_4)_3PO_4$

C KNO_3 and $(NH_4)_2SO_4$

D KNO_3 and $(NH_4)_3PO_4$

32 Which process produces methane?

A combustion of hydrocarbons

B decomposition of vegetation

C respiration

D reaction between hydrochloric acid and calcium carbonate

33 Which statements about sulfur dioxide are correct?

1 Sulfur dioxide decolourises acidified potassium manganate(VII).

2 Sulfur dioxide forms when acids react with carbonates.

3 Sulfur dioxide is used as a bleach.

4 Sulfur dioxide is used to treat acidic soil.

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

34 What are the products when limestone (calcium carbonate) is heated strongly?

A calcium hydroxide and carbon dioxide

B calcium hydroxide and carbon monoxide

C calcium oxide and carbon dioxide

D calcium oxide and carbon monoxide

35 In which lists are the compounds in the same homologous series?

1 CH_4, C_2H_4, C_3H_8

2 CH_3OH, C_2H_5OH, C_3H_7OH

3 CH_3CO_2H, CH_3CH_2OH, $CH_3CH_2CH_2OH$

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

36 Which row about aqueous ethanoic acid and dilute hydrochloric acid is correct?

	both contain carbon	both contain hydrogen	both react with carbonates
A	✓	✗	✓
B	✓	✓	✗
C	✗	✓	✓
D	✗	✗	✗

key

✓ = yes

✗ = no

37 Some properties of colourless liquid L are listed.

- It boils at 65 °C.
- When added to water, two layers form which do not mix.
- It does not react with sodium carbonate.
- It has no effect on bromine water.

What is L?

A ethanol

B hexane

C hexene

D ethanoic acid

38 A molecule of compound P contains two carbon atoms and four hydrogen atoms.

Which row represents P?

	name of compound	M_r	reacts with aqueous bromine
A	ethane	30	✗
B	ethene	16	✓
C	ethene	28	✓
D	ethene	28	✗

39 The equation representing the reaction of a hydrocarbon with water is shown.

$$C_xH_y + H_2O \xrightarrow{\text{catalyst}} C_xH_5OH$$

What are the values of x and y?

	x	y
A	1	4
B	1	6
C	2	4
D	2	6

40 Many molecules of J join together in reaction R to form a long chain molecule K.

K is the only product.

Which row describes molecule J, reaction R and molecule K?

	molecule J	reaction R	molecule K
A	polymer	addition	monomer
B	monomer	addition	polymer
C	polymer	cracking	monomer
D	monomer	cracking	polymer

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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.).