Cambridge Assessment International Education

Cambridge IGCSE™

CHEMISTRY **0620/12**

Paper 1 Multiple Choice (Core) **October/November 2021**

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 Which row describes what happens to the particles in solid iodine when it is heated and turned into a gas?

	separation of particles	speed of particles
A	closer together	faster
B	closer together	slower
C	further apart	faster
D	further apart	slower

2 A student put exactly 25.00 cm^3 of dilute hydrochloric acid into a conical flask.

The student added 2.5 g of solid sodium carbonate and measured the change in temperature of the mixture.

Which apparatus does the student need to use?

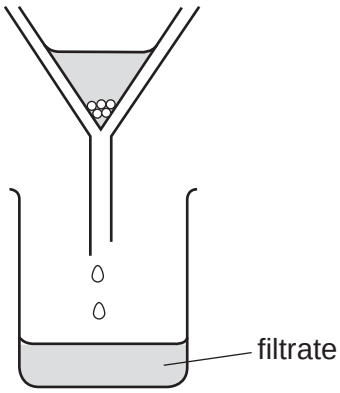
A balance, measuring cylinder, thermometer

B balance, pipette, stopwatch

C balance, pipette, thermometer

D burette, pipette, thermometer

3 A student separates sugar from pieces of broken glass by dissolving the sugar in water and filtering off the broken glass.



What is the filtrate?

A broken glass only

B broken glass and sugar solution

C pure water

D sugar solution

4 How many protons, neutrons and electrons are there in one atom of the isotope $^{27}_{13}Al$?

	protons	neutrons	electrons
A	13	13	13
B	13	14	13
C	14	13	13
D	14	14	13

5 Which description of brass is correct?

A alloy

B compound

C element

D non-metal

6 Rubidium is in Group I and iodine is in Group VII of the Periodic Table.

Which row describes what happens when rubidium and iodine react together to form rubidium iodide?

	rubidium	iodine
A	each atom gains one electron	each atom loses one electron
B	each atom loses one electron	each atom gains one electron
C	each atom loses more than one electron	each atom gains more than one electron
D	each atom neither gains nor loses an electron	each atom neither gains nor loses an electron

7 Which row shows the properties for an ionic compound?

	volatility	electrical conductivity when solid
A	high	good
B	high	poor
C	low	good
D	low	poor

8 Which substance is described as a macromolecule?

A ammonia

B graphite

C iron

D sodium chloride

9 The formula of sodium chlorate(V) is $NaClO_3$.

What is the relative formula mass of sodium chlorate(V), $NaClO_3$?

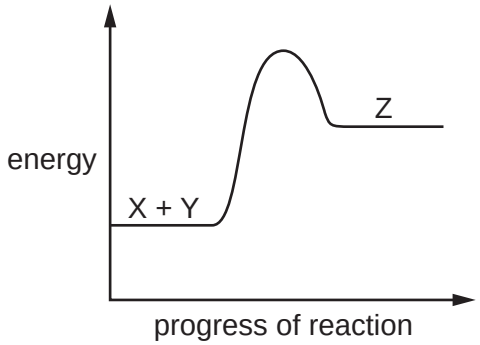
A 52.0 **B** 74.5 **C** 106.5 **D** 223.5

10 Iron can be electroplated with zinc to make it resistant to corrosion.

Which row about electroplating iron with zinc is correct?

	positive electrode (anode)	negative electrode (cathode)	electrolyte
A	iron	zinc	iron nitrate
B	iron	zinc	zinc nitrate
C	zinc	iron	iron nitrate
D	zinc	iron	zinc nitrate

11 An energy level diagram for the reaction between substance X and substance Y to form substance Z is shown.



Which statement is correct?

A Energy is released as substance Z is formed.

B Substance Z has more energy than substance X and substance Y.

C The reaction is exothermic.

D When substance X and substance Y react, the temperature increases.

12 Which reactions are exothermic?

1 $C + O_2 \rightarrow CO_2$

2 $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

3 $2H_2 + O_2 \rightarrow 2H_2O$

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

13 Solid copper(II) carbonate reacts with dilute sulfuric acid.

$$CuCO_3 + H_2SO_4 \rightarrow CuSO_4 + CO_2 + H_2O$$

The rate of the reaction can be changed by varying the conditions.

Which changes always increase the rate of this chemical reaction?

1 increasing the concentration of sulfuric acid

2 increasing the size of the pieces of copper(II) carbonate

3 increasing the temperature

4 increasing the volume of sulfuric acid

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

14 When a piece of marble is added to hydrochloric acid, bubbles of carbon dioxide gas are given off.

Which method is used to find the rate of the reaction?

A counting the number of gas bubbles formed

B measuring the diameter of the gas bubbles

C measuring the speed at which the gas bubbles rise upwards through the acid

D measuring the time taken for 10 cm^3 of gas to be collected

15 Solid X is heated strongly.

The colour of the solid changes from blue to white.

What is solid X?

A anhydrous cobalt(II) chloride

B calcium carbonate

C hydrated copper(II) sulfate

D lead(II) bromide

16 What happens to a chemical substance when it is reduced?

A It burns.

B It decomposes.

C It loses oxygen.

D It gains mass.

17 Which statements about acids and bases are correct?

1 An acid reacts with a metal to give off hydrogen.

2 A base reacts with an ammonium salt to give off ammonia.

3 An acid reacts with a carbonate to give off carbon dioxide.

4 Alkaline solutions are orange in methyl orange.

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

18 Oxide 1 is a solid that reacts with dilute hydrochloric acid.

Oxide 2 is a gas that reacts with sodium hydroxide solution.

What are the formulae of the oxides?

	oxide 1	oxide 2
A	CaO	MgO
B	MgO	NO_2
C	NO_2	SO_2
D	SO_2	CaO

19 In the preparation of zinc sulfate crystals, excess zinc oxide is added to dilute sulfuric acid.

Why is an excess of zinc oxide added?

A to make sure crystals are formed and not powder

B to avoid filtering the mixture

C to use up all of the sulfuric acid

D to use up all of the zinc oxide

20 Which statement about aqueous sodium hydroxide is correct?

A When it is added to a solution containing sulfate ions, a white precipitate is formed.

B When it is added to a solution of copper(II) ions, a blue precipitate is formed which dissolves in excess to give deep blue solution.

C When it is added to a solution of iron(II) ions, a green precipitate is formed which does not dissolve in excess.

D When it is added to ammonium chloride, a gas is produced which turns blue litmus red.

21 A period of the Periodic Table is shown.

group	I	II	III	IV	V	VI	VII	VIII
element	R	S	T	V	W	X	Y	Z

The letters are not their chemical symbols.

Which statement is correct?

A Element R does not conduct electricity.

B Elements R and Y react together to form an ionic compound.

C Element Z exists as a diatomic molecule.

D Element Z reacts with element T.

22 Which statement about the elements in Group VII of the Periodic Table is correct?

A Chlorine can displace bromine from bromides.

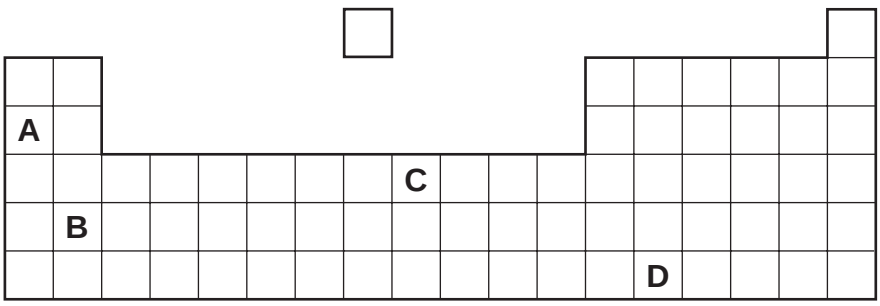
B Group VII elements are all solids at room temperature.

C Group VII elements occur as monoatomic covalent molecules.

D Reactivity increases down Group VII.

23 Part of the Periodic Table is shown.

Which element is a transition element?



24 The noble gases are in Group VIII of the Periodic Table.

Which statement explains why noble gases are unreactive?

A They all have eight electrons in their outer shells.

B They all have full outer shells.

C They are all gases.

D They are all monoatomic.

25 Which statement is correct for **all** metals?

A They conduct electricity when molten.

B They gain electrons when they form ions.

C They have a low density.

D They have a low melting point.

26 Which row describes the method of extraction of aluminium and iron from their ores?

	aluminium	iron
A	electrolysis	electrolysis
B	electrolysis	reduction with carbon
C	reduction with carbon	electrolysis
D	reduction with carbon	reduction with carbon

27 Which statement about metals and their uses is correct?

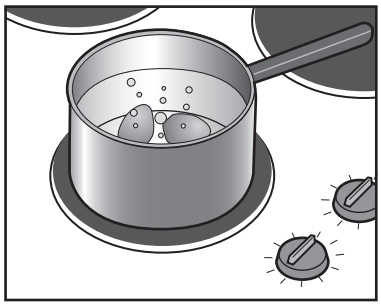
A Aluminium is used to make food containers because it is resistant to corrosion.

B Aluminium is used to make aircraft wings because it is strong and has a high density.

C Iron is used to make electrical wires because it is a good insulator of electricity.

D Iron is used to make cooking utensils because it is easily recycled.

28 The diagrams show some uses of water in the home.



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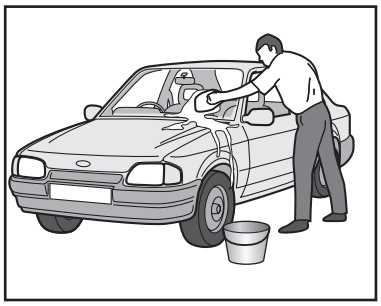


2

3

For which uses is it important for the water to have been treated?

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

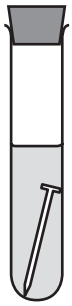
29 Four different test-tubes containing water and an iron nail are left for two weeks.

Which nail showed the least amount of rusting?

A

tap water

B



boiled tap water

C

boiled tap water

D

tap water

30 Which process does **not** produce a greenhouse gas?

A acid rain on limestone buildings

B combustion of wood

C digestion in cows

D zinc reacting with sulfuric acid

31 Sulfur burns to make sulfur dioxide.

Which row describes a source of sulfur and a use of sulfur dioxide?

	source of sulfur	use of sulfur dioxide
A	the air	food preservative
B	the air	treating acidic soils
C	underground deposits	food preservative
D	underground deposits	treating acidic soils

32 Lime (calcium oxide) is used to treat waste water from a factory.

Which substance is removed by the lime?

A ammonia

B sodium chloride

C sodium hydroxide

D sulfuric acid

33 A chemical equation for the complete combustion of methane is shown.

$$2CH_4 + zO_2 \rightarrow 2CO_2 + 4H_2O$$

What is the value of z?

A 2 **B** 3 **C** 4 **D** 6

34 Fuel X produces carbon dioxide and water when it is burned in air. So does fuel Y.

What could X and Y be?

	X	Y
A	C	H_2
B	C	C_8H_{18}
C	CH_4	H_2
D	CH_4	C_8H_{18}

35 Which substance is **not** a fossil fuel?

A ethanol

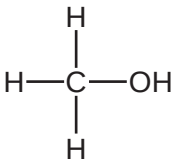
B gasoline

C kerosene

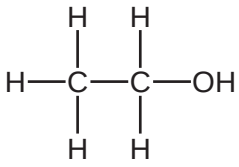
D methane

36 Which compound belongs to a different homologous series to the others?

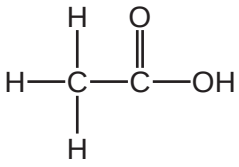
A



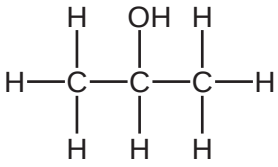
B



C



D



37 What is a property of aqueous ethanoic acid?

A It changes red litmus blue.

B It has a deep purple colour.

C It has a pH of less than 7.

D It reacts with a metal oxide to form carbon dioxide.

38 Which statements about unsaturated hydrocarbons are correct?

1 They contain both single and double bonds.

2 They turn aqueous bromine from colourless to brown.

3 They can be manufactured by cracking.

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

39 Which substance is used to produce alcohol by fermentation?

A phosphoric acid

B platinum

C iron

D yeast

40 Which statements are correct?

1 Polymers are large molecules built up from monomers.

2 Proteins are natural polymers.

3 Proteins and carbohydrates are constituents of food.

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

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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.).