Cambridge Assessment International Education

Cambridge IGCSE™

CHEMISTRY **0620/11**

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 **12** pages.

[Turn over

1 Decane has a freezing point of –30 °C and a boiling point of 174 °C.

A small sample of decane is placed in an open beaker in an oven at a temperature of 120 °C and at atmospheric pressure for 24 hours.

What happens to the sample of decane?

A It boils.

B It evaporates.

C It melts.

D It sublimes.

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?

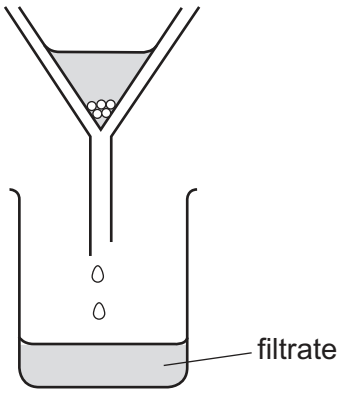
A balance, measuring cylinder, thermometer

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 Two isotopes of carbon are ^{12}C and ^{14}C.

Which statement about these two isotopes is correct?

A Their electronic structure is different.

B They have different numbers of nucleons.

C They have different numbers of protons.

D They have the same number of neutrons.

5 Which description of brass is correct?

A alloy

B compound

C element

D non-metal

6 The element livermorium, Lv, was discovered in the year 2000.

Which statement predicts what will happen to an Lv atom when it forms an Lv^{2-} ion?

A The atom will gain two electrons.

B The atom will lose two electrons.

C The atom will lose two protons.

D The atom will gain two protons.

7 Which substance is a diatomic covalent compound?

A Cl_2 **B** HCl **C** H_2O **D** MgO

8 Which statement about carbon is correct?

A Diamond and graphite both have simple molecular structures.

B Diamond and graphite are both used to make cutting tools.

C Each carbon atom in diamond is bonded to three other carbon atoms.

D Graphite conducts electricity and has a giant covalent structure.

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 Which statements about the products of electrolysis, using inert electrodes, are correct?

1 When molten lead(II) bromide is electrolysed, bromine is formed at the cathode.

2 When dilute sulfuric acid is electrolysed, oxygen is formed at the anode.

3 When concentrated aqueous sodium chloride is electrolysed, sodium is formed at the cathode.

4 When concentrated hydrochloric acid is electrolysed, chlorine is formed at the anode.

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

11 The temperature decreases when aqueous ethanoic acid reacts with solid sodium carbonate to form a salt.

Which type of reaction and energy change occur?

	type of reaction	energy change
A	neutralisation	endothermic
B	neutralisation	exothermic
C	redox	endothermic
D	redox	exothermic

12 Which gas is used as a fuel?

A helium

B hydrogen

C nitrogen

D oxygen

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 Some changes are shown in the table.

In which rows are the changes described correctly?

	chemical change	physical change
1	rusting iron	melting ice
2	burning ethanol	evaporating ethanol
3	melting iron	evaporating ethanol
4	cracking hydrocarbons	burning methane

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

15 X is a pink solid.

Y is a blue solid.

When X is heated, water is produced and the solid turns blue.

When water is added to Y, the solid turns pink.

What are X and Y?

	X	Y
A	anhydrous cobalt(II) chloride	hydrated cobalt(II) chloride
B	hydrated cobalt(II) chloride	anhydrous cobalt(II) chloride
C	anhydrous copper(II) sulfate	hydrated copper(II) sulfate
D	hydrated copper(II) sulfate	anhydrous copper(II) sulfate

16 Carbon reacts with carbon dioxide as shown.

$$CO_2 + C \rightarrow 2CO$$

Which statement about this reaction is correct?

A Carbon dioxide and carbon are both oxidised.

B Carbon dioxide and carbon are both reduced.

C Carbon dioxide is reduced and carbon is oxidised.

D Carbon dioxide is oxidised and carbon is reduced.

[Turn over

17 Which substances do **not** produce water as a product when they are reacted together?

A calcium hydroxide and ammonium chloride

B calcium carbonate and dilute hydrochloric acid

C copper(II) oxide and dilute nitric acid

D zinc and dilute sulfuric acid

18 The surface of magnesium ribbon reacts with the air to form magnesium oxide.

Which statement explains why the layer of magnesium oxide is removed by dilute hydrochloric acid?

A Magnesium is a base.

B Magnesium ribbon reacts with hydrochloric acid.

C Magnesium oxide is a base.

D Magnesium oxide is an acid.

19 Copper(II) chloride crystals are made by adding solid copper(II) carbonate to dilute hydrochloric acid until no more dissolves.

Which process is used to obtain pure copper(II) chloride crystals from the mixture?

A distillation of the mixture

B evaporation of the mixture

C filtration followed by drying of the residue

D filtration followed by evaporation of the filtrate

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 What are the products of the reaction between sodium and water?

A hydrogen and sodium hydroxide

B hydrogen and sodium oxide

C oxygen and sodium hydroxide

D oxygen and sodium oxide

23 Element X has a high density, a high melting point and a high electrical conductivity.

It forms many coloured compounds.

Element X and many of its compounds act as catalysts.

What could be the atomic number of X?

A 19 **B** 26 **C** 33 **D** 35

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.

[Turn over

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 statement about the extraction of metals is correct?

A Aluminium is extracted from the ore bauxite by electrolysis.

B Aluminium is extracted from the ore hematite by electrolysis.

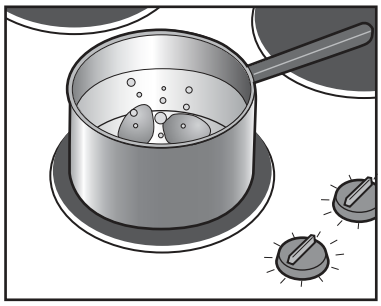
C Iron is extracted from the ore bauxite by electrolysis.

D Iron is extracted from the ore hematite by electrolysis.

27 Which row identifies a use of mild steel and a use of stainless steel?

	mild steel	stainless steel
A	chemical plant and cutlery	car bodies and machinery
B	car bodies and chemical plant	machinery and cutlery
C	machinery and chemical plant	car bodies and cutlery
D	car bodies and machinery	chemical plant and cutlery

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



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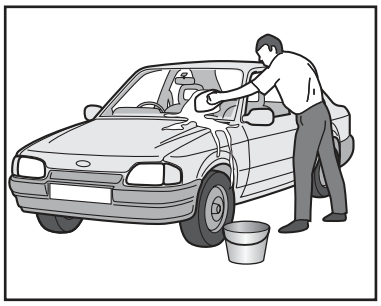

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3

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 Which air pollutants can cause damage to buildings made of limestone?

1 carbon monoxide

2 lead compounds

3 oxides of nitrogen

4 sulfur dioxide

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

30 Which statement about fertilisers is correct?

A Ammonium sulfate, $(NH_4)_2SO_4$, is a better fertiliser than ammonium nitrate, NH_4NO_3, because it contains more oxygen.

B Ammonium phosphate, $(NH_4)_3PO_4$, is a good fertiliser because it contains hydrogen.

C Potassium nitrate, KNO_3, is a good fertiliser because it provides potassium and nitrogen.

D Urea, $(NH_2)_2CO$, is a good fertiliser because it contains carbon.

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

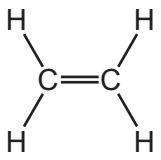
B sodium chloride

C sodium hydroxide

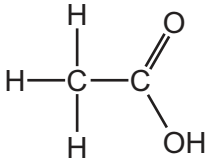
D sulfuric acid

33 Which compound is correctly named?

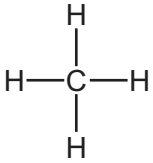
A ethane



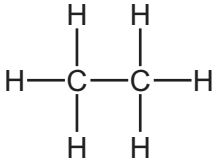
B ethanoic acid



C methene



D ethene



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 hydrocarbon is the main constituent of natural gas?

A butane

B ethane

C methane

D propane

36 Which statements about ethene are correct?

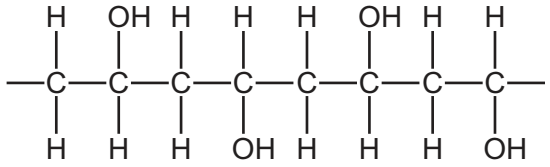
1 It contains a C=C bond.

2 It does not decolourise bromine water.

3 Its molecules can join together to form long chain compounds.

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

37 Part of the structure of a very large molecule is shown.



Which term describes the small unit used to make this molecule?

A hydrocarbon

B monomer

C polymer

D saturated

38 What is the total number of single covalent bonds in a molecule of ethanol?

A 5 **B** 6 **C** 7 **D** 8

39 Which statement about aqueous ethanoic acid is correct?

A It reacts with magnesium to produce a salt and hydrogen.

B It reacts with sodium hydroxide to produce a salt and hydrogen.

C It reacts with ammonium salts to produce ammonia.

D It turns red litmus blue.

40 Three statements about synthetic polymers are listed.

1 Man-made fibres are used for making clothing.

2 Plastics can cause pollution problems both on land and at sea.

3 Plastics which do not rot away are described as non-biodegradable.

Which statements are correct?

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

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.).