Cambridge Assessment International Education

Cambridge IGCSE™

CHEMISTRY **0620/11**

Paper 1 Multiple Choice (Core) **October/November 2024**

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 The table shows the melting and boiling points of four elements.

Which element is a gas at room temperature and pressure?

	melting point / °C	boiling point / °C
A	–101	–35
B	–7	59
C	10	100
D	113	445

2 Four statements about the arrangement or movement of particles are given.

1 Particles are packed in a regular arrangement.

2 Particles are randomly arranged.

3 Particles move over each other.

4 Particles vibrate about fixed points.

Which statements describe the particles in a pure solid?

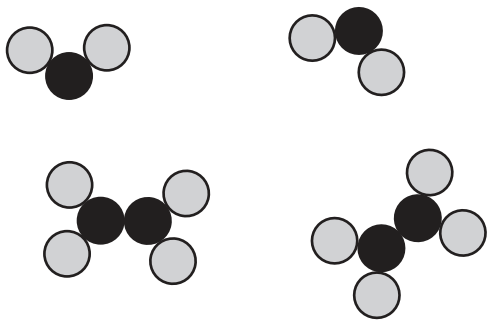
A 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

3 One atom of an element contains 12 electrons, 12 protons and 13 neutrons.

How many nucleons does this atom contain?

A 12 **B** 13 **C** 24 **D** 25

4 A diagram representing a mixture of four particles is shown.



Which statement describes the mixture of particles?

A It is a mixture of two different compounds.

B It is a mixture of two different elements.

C It is a mixture of four different compounds.

D It is a mixture of four different elements.

5 Chlorine reacts with sodium to form sodium chloride.

What happens to the sodium atoms during this reaction?

A They gain electrons to form anions.

B They lose electrons to form anions.

C They gain electrons to form cations.

D They lose electrons to form cations.

6 Nitrogen monoxide, NO, is a simple molecular compound.

Which row shows the properties of nitrogen monoxide?

	boiling point	electrical conductivity
A	high	good
B	high	poor
C	low	good
D	low	poor

7 Metal X is in Group II of the Periodic Table.

X is reacted separately with dilute sulfuric acid and with oxygen.

Which row identifies the products of each reaction?

	products with dilute sulfuric acid	product with oxygen
A	XSO_4 and H_2	XO
B	XSO_4 and H_2	XO_2
C	X_2SO_4 and H_2	XO
D	X_2SO_4 and H_2	XO_2

8 What is the relative molecular mass, M_r, of sulfuric acid, H_2SO_4?

A 81 **B** 82 **C** 97 **D** 98

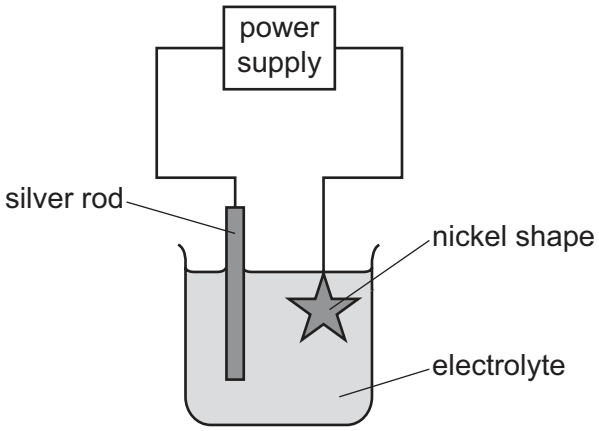
9 The equation for the production of ammonia, NH_3, is shown.

$$N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$$

Which mass of nitrogen is required to make 51 tonnes of ammonia?

A 21 tonnes **B** 25.5 tonnes **C** 42 tonnes **D** 84 tonnes

10 The diagram shows the apparatus used to electroplate a nickel shape with silver.



Which row identifies the negative electrode, the positive electrode and the electrolyte?

	negative electrode	positive electrode	electrolyte
A	silver rod	nickel shape	aqueous nickel nitrate
B	nickel shape	silver rod	aqueous silver nitrate
C	nickel shape	silver rod	aqueous nickel nitrate
D	silver rod	nickel shape	aqueous silver nitrate

11 Concentrated aqueous sodium chloride and dilute sulfuric acid are each electrolysed separately using inert electrodes.

Three statements about the electrolysis of these electrolytes are listed.

1 A gas is produced at each electrode for both electrolytes.

2 Oxygen is produced at the cathode for both electrolytes.

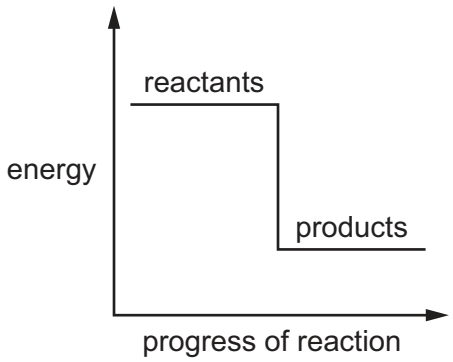
3 Hydrogen is produced at the cathode for both electrolytes.

Which statements are correct?

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

12 Which reaction pathway diagram represents an endothermic reaction?

A



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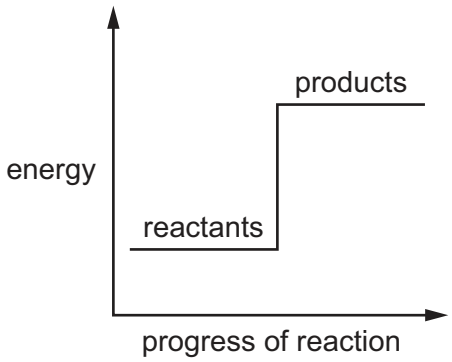

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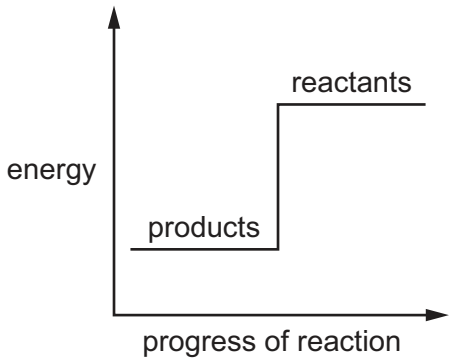
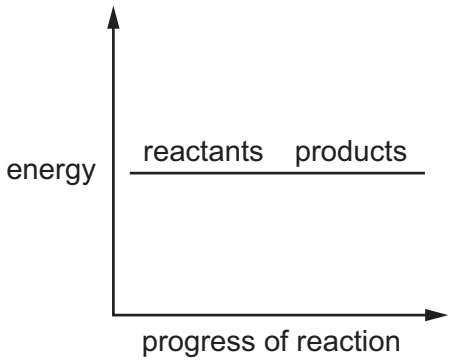
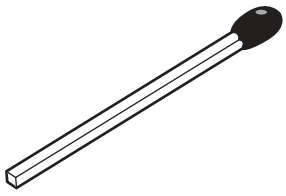


D



13 The diagram shows a match.



By striking the match, a chemical reaction takes place.

Which row describes the chemical reaction?

	type of reaction	reason
A	endothermic	because energy is given out as the match burns
B	endothermic	because energy is used to strike the match
C	exothermic	because energy is given out as the match burns
D	exothermic	because energy is used to strike the match

[Turn over

14 Hydrogen peroxide decomposes to form water and oxygen. The equation is shown.

$$2H_2O_2(l) \rightarrow 2H_2O(l) + O_2(g)$$

Manganese(IV) oxide catalyses this reaction.

Which statements about manganese(IV) oxide are correct?

1 It increases the rate of the reaction.

2 It increases the total volume of oxygen gas produced at the end of the reaction.

3 It will have the same mass at the end of the reaction as it does at the start of the reaction.

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

15 Four students collect the gas produced from the reaction of calcium carbonate with dilute hydrochloric acid. Each student records the time taken to collect a volume of gas.

Which results show the highest average rate of reaction?

A 15 cm^3 of gas collected in 20 seconds

B 50 cm^3 of gas collected in 40 seconds

C 75 cm^3 of gas collected in 80 seconds

D 90 cm^3 of gas collected in 100 seconds

16 The equation for the reaction between hydrogen and oxygen is shown.

$$2H_2(g) + O_2(g) \rightarrow 2H_2O(g)$$

Which statement explains why this is a redox reaction?

A Both oxidation and reduction take place.

B Heat energy is released to the surroundings.

C Hydrogen is a reactant.

D The reaction can be reversed.

17 Which statements about dilute ethanoic acid are correct?

1 It has a pH of 8.

2 It is an organic compound.

3 It turns universal indicator orange-yellow.

4 It reacts with magnesium to produce carbon dioxide.

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

18 An aqueous solution of Z turns universal indicator paper purple.

Which row identifies the colour of methyl orange and of thymolphthalein when they are added separately to an aqueous solution of Z?

	methyl orange	thymolphthalein
A	yellow	blue
B	yellow	colourless
C	red	blue
D	red	colourless

19 Which row describes the solubility of lead(II) chloride and lead(II) sulfate in water?

	lead(II) chloride	lead(II) sulfate
A	soluble	soluble
B	soluble	insoluble
C	insoluble	soluble
D	insoluble	insoluble

20 Four different groups of oxides are shown.

1 MgO FeO CuO

2 CaO SO_2 TiO_2

3 PbO CaO Cl_2O

4 NO_2 Br_2O P_2O_5

Which statement about these groups of oxides is correct?

A 1, 2 and 3 contain basic oxides only.

B 2, 3 and 4 contain basic oxides only.

C 1 contains basic oxides only, and 4 contains acidic oxides only.

D 1 contains acidic oxides only, and 4 contains basic oxides only.

21 Four steps in the preparation of a soluble salt from a dilute acid and a solid metal oxide are listed.

1 Warm the dilute acid.

2 Evaporate the solution to half of its volume and allow to cool.

3 Add excess metal oxide.

4 Filter to remove any unreacted solid.

What is the correct order for these steps?

A $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$

B $1 \rightarrow 3 \rightarrow 4 \rightarrow 2$

C $3 \rightarrow 1 \rightarrow 2 \rightarrow 4$

D $3 \rightarrow 4 \rightarrow 1 \rightarrow 2$

22 Which pair of elements react together most violently?

A chlorine and lithium

B chlorine and potassium

C iodine and lithium

D iodine and potassium

23 Rubidium is an element in Group I of the Periodic Table.

Which row describes a physical property and a chemical property of rubidium?

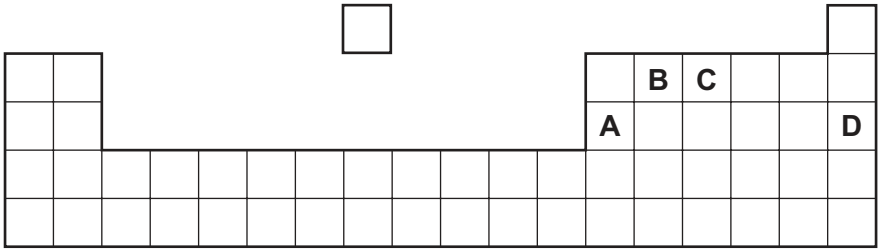
	physical property	chemical property
A	hard	reacts with water
B	hard	does **not** react with water
C	soft	reacts with water
D	soft	does **not** react with water

24 Which row describes the state and colour of bromine at room temperature and pressure?

	state	colour
A	liquid	red-brown
B	liquid	grey-black
C	solid	red-brown
D	solid	grey-black

25 Part of the Periodic Table is shown.

Which element is a metal?



26 Which compound is made from elements that are **all** in the same period?

A $Al_2(SO_4)_3$ **B** C_2H_5OH **C** $LiNO_3$ **D** Na_3AlF_6

27 Silver metal is separately tested with cold water, with steam and with dilute hydrochloric acid.

Which row identifies the tests that show the chemical reactivity of silver?

	cold water	steam	dilute hydrochloric acid
A	✓	✓	✓
B	✗	✓	✓
C	✗	✗	✓
D	✗	✗	✗

key
✓ = reaction
✗ = no reaction

28 Which statement about the extraction of iron from hematite is correct?

A Air is blown into the blast furnace to oxidise the molten iron.

B Carbon dioxide is reduced by coke to carbon monoxide.

C Hematite is oxidised by carbon to molten iron.

D The slag produced is denser than molten iron.

29 What is an alloy?

A a compound of two metallic elements

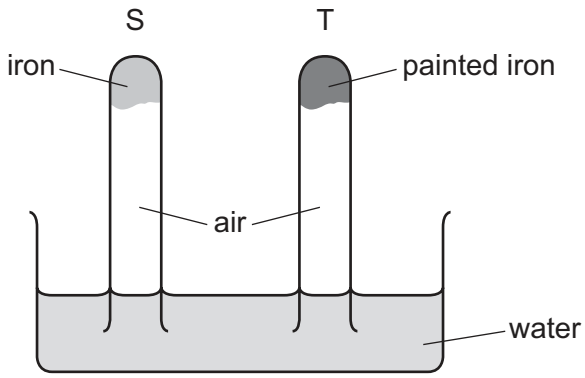
B a compound of metallic and non-metallic elements

C a mixture of a metal and at least one other element

D a pure metallic element

[Turn over

30 The diagram shows an experiment to investigate how paint affects the rusting of iron.



What happens to the water level in tubes S and T?

	tube S	tube T
A	falls	rises
B	no change	rises
C	rises	falls
D	rises	no change

31 Which statement describes clean, dry air?

A It is a compound containing about 78% nitrogen and 21% oxygen only.

B It is a mixture of about 21% nitrogen and 78% oxygen only.

C It is a mixture of several gases, including nitrogen and oxygen.

D It is a compound containing nitrogen, oxygen, carbon dioxide and other gases.

32 Which word equation describes photosynthesis?

A carbon dioxide + water → glucose + oxygen

B glucose + water → carbon dioxide + oxygen

C carbon dioxide + oxygen → glucose + water

D glucose + oxygen → carbon dioxide + water

33 Some adverse effects caused by air pollutants are listed.

- acid rain
- photochemical smog
- respiratory problems

Which air pollutant contributes to **all three** of these adverse effects?

A carbon monoxide

B oxides of nitrogen

C methane

D particulates

34 Petroleum is an important raw material that is separated into useful products.

Which terms describe petroleum and the method used to separate it?

	description	separation method
A	compound	cracking
B	compound	fractional distillation
C	mixture	cracking
D	mixture	fractional distillation

35 Which statements about homologous series are correct?

1 All carboxylic acids have similar chemical properties.

2 All alcohols have the same molecular mass.

3 Ethane and ethene are members of the same homologous series.

4 Ethane and propane are members of the same homologous series.

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

36 The formulae of two organic compounds, P and Q, are shown.

P	Q
$CH_3CH_2CH_2OH$	$CH_3CH{=}CHCH_3$

Which type of organic compounds are P and Q?

	P	Q
A	alcohol	alkane
B	alcohol	alkene
C	carboxylic acid	alkane
D	carboxylic acid	alkene

37 Which fuel is manufactured by fermentation?

A diesel

B ethanol

C hydrogen

D kerosene

38 Which statement about the disposal of waste plastics is correct?

A They are put in landfill sites, where they quickly decompose.

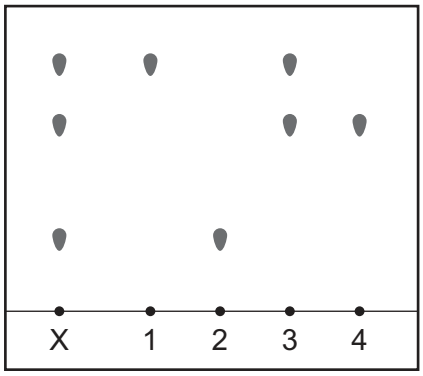
B They are burned to produce non-toxic products.

C They accumulate in oceans, where they are harmful to aquatic life.

D They are dissolved in water and pumped into the sea.

39 Dyes are coloured substances.

The chromatogram of substance X and four different dyes, 1, 2, 3 and 4, is shown.



Substance X contains only **two** of the dyes 1, 2, 3 and 4.

Which **two** dyes are present in substance X?

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

40 The results of two tests on substance G are listed.

- A flame test produces a yellow flame.
- Substance G is added to aqueous sodium hydroxide and powdered aluminium and warmed carefully. A gas is given off which turns damp red litmus paper blue.

What is G?

A potassium chloride

B potassium nitrate

C sodium chloride

D sodium nitrate

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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 –	113 Nh nihonium –	114 Fl flerovium –	115 Mc moscovium –	116 Lv livermorium –	117 Ts tennessine –	118 Og oganesson –

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.).