Cambridge
O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

CHEMISTRY **5070/12**

Paper 1 Multiple Choice **October/November 2019**

1 hour

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB recommended)

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READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.
DO **NOT** WRITE IN ANY BARCODES.

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 separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
A copy of the Periodic Table is printed on page 16.
Electronic calculators may be used.

This document consists of **15** printed pages and **1** blank page.

1 The concentration of aqueous sodium carbonate can be found by reaction with hydrochloric acid of known concentration. The indicator methyl orange is used.

Which items of equipment are needed?

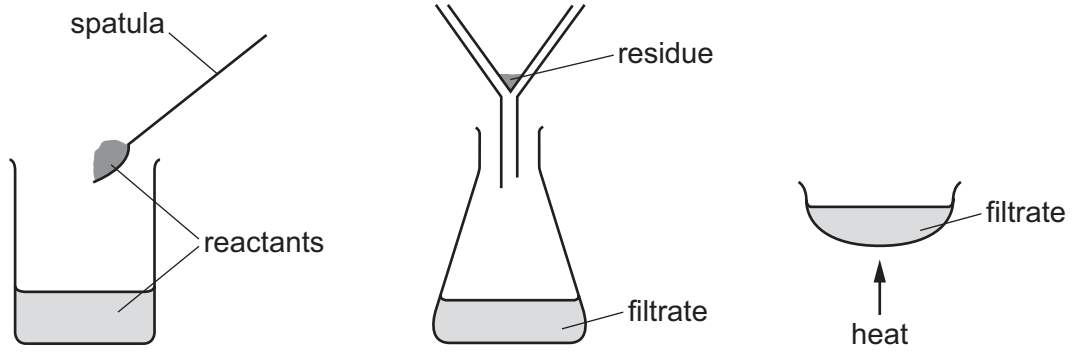
A burette, measuring cylinder, gas syringe

B burette, measuring cylinder, thermometer

C burette, pipette, conical flask

D burette, pipette, stopwatch

2 The diagrams show three stages, 1, 2 and 3, used in the preparation of a salt.



Which row correctly shows the solubilities both of the reactants and of the salt formed in this preparation?

	solubility of reactants	solubility of salt formed
A	both soluble	insoluble
B	both soluble	soluble
C	one soluble, one insoluble	insoluble
D	one soluble, one insoluble	soluble

3 The nucleon number of an atom is typically greater than its proton number. The difference between these two numbers indicates the number of .....1..... in the atom.

Atoms that have different nucleon numbers but the same proton number are called .....2..... .

Which words correctly complete gaps 1 and 2?

	1	2
A	electrons	isomers
B	electrons	isotopes
C	neutrons	isomers
D	neutrons	isotopes

4 Which three elements exist as diatomic molecules at room temperature?

A hydrogen, oxygen, helium

B nitrogen, chlorine, neon

C nitrogen, oxygen, fluorine

D oxygen, chlorine, helium

5 Which is a pure compound?

A dry air

B ethanol

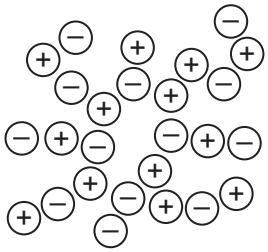
C steel

D petrol (gasoline)

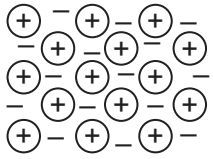
[Turn over

6 Which diagram best represents the structure of a solid metal?

A



B



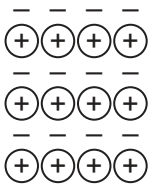
key

⊖ a negative ion

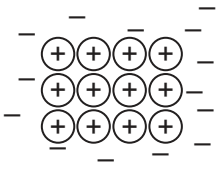
⊕ a positive ion

− an electron

C



D



7 Hydrogen sulfide burns in an excess of oxygen according to the equation shown.

$$2H_2S(g) + 3O_2(g) \rightarrow 2H_2O(g) + 2SO_2(g)$$

48 dm^3 of hydrogen sulfide is burned.

Which volume of sulfur dioxide will be formed at room temperature and pressure?

[All volumes are measured at the same temperature and pressure.]

A 24 dm^3 **B** 36 dm^3 **C** 48 dm^3 **D** 96 dm^3

8 Which statement about electrical conductivity is correct?

A Covalent compounds, such as glucose, conduct when molten or dissolved in water.

B Dilute acids, such as sulfuric acid, conduct because all the ions are free to move.

C Ionic compounds, such as sodium chloride, conduct due to movement of electrons.

D Metals, such as copper, conduct due to movement of positive ions.

9 Ammonia is manufactured from nitrogen and hydrogen by the Haber process.

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

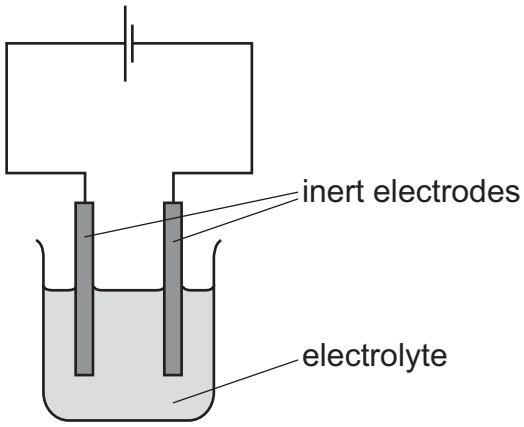
What is the percentage yield when 60 kg of ammonia is produced from 60 kg of hydrogen?

A 5.9% **B** 17.6% **C** 35.3% **D** 50.0%

10 What is the ratio of the number of molecules in 71 g of gaseous chlorine to the number of molecules in 2 g of gaseous hydrogen?

A 1 : 1 **B** 1 : 2 **C** 2 : 1 **D** 71 : 2

11 The diagram shows the apparatus for an electrolysis experiment.



Using the apparatus shown, which electrolyte would give colourless gases at both electrodes?

A aqueous copper(II) sulfate

B concentrated aqueous sodium chloride

C dilute sulfuric acid

D molten lead bromide

12 Which metal is most likely to be extracted from its molten chloride by the use of electrolysis?

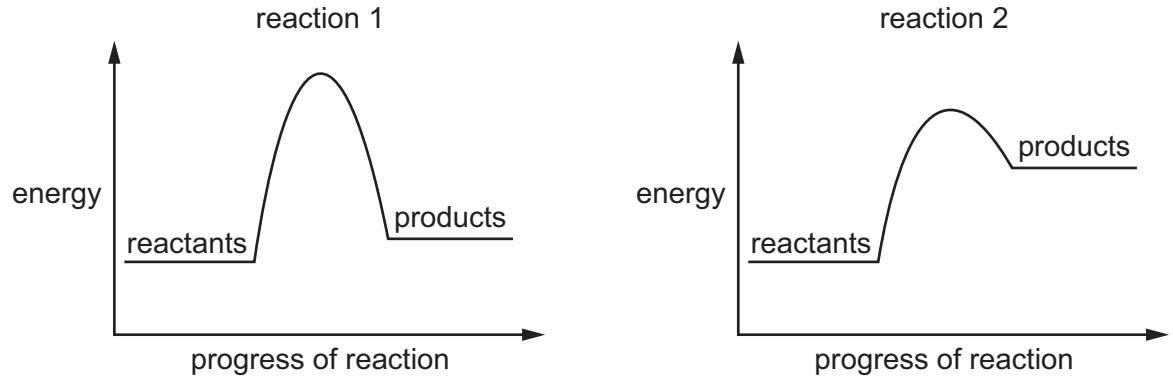
A calcium

B copper

C iron

D silver

13 Two energy profile diagrams are shown. The scale on the *y*-axis is the same for both diagrams.



Which statement is correct?

A Both reactions are exothermic.

B Only one reaction is endothermic.

C The activation energy of reaction 1 is smaller than the activation energy of reaction 2.

D The enthalpy change of reaction 2 is larger than the enthalpy change of reaction 1.

14 Ammonium nitrate dissolves in water.

$$NH_4NO_3(s) \xrightarrow{H_2O} NH_4NO_3(aq) \qquad \Delta H = +25\ kJ/mol$$

Which statements are correct?

1 The reaction is endothermic.

2 The water gets colder during the reaction.

3 Heat energy is absorbed by the ammonium nitrate from the water.

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

15 Which statement about photosynthesis is correct?

A Chlorophyll is a reactant.

B Oxygen is a product.

C Sunlight is a reactant.

D Water is a product.

16 In which reaction is the underlined substance reduced?

A $\underline{C}(s) + CO_2(g) \rightarrow 2CO(g)$

B $\underline{Cl_2}(g) + 2I^-(aq) \rightarrow I_2(aq) + 2Cl^-(aq)$

C $\underline{Mg}(s) + CuO(s) \rightarrow MgO(s) + Cu(s)$

D $\underline{Zn}(s) + 2H^+(aq) \rightarrow Zn^{2+}(aq) + H_2(g)$

17 Catalysts alter the rate of chemical reactions.

Which statements correctly describe the effect of adding a catalyst to a reaction?

1 All reactant particles have more energy and move faster.

2 The activation energy is lowered.

3 More reactant particles collide with enough energy to react.

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

18 Solution T has the following properties.

1 It reacts with magnesium forming a gas.

2 It reacts with calcium carbonate forming a gas.

Which statement about solution T is correct?

A It contains more OH^- ions than H^+ ions.

B It has pH 9.

C Its reaction with calcium carbonate produces hydrogen.

D It reacts with aqueous ammonia.

19 Which substance is soluble in water?

A copper(II) carbonate

B copper(II) oxide

C copper(II) hydroxide

D copper(II) nitrate

20 Which statement about ammonia is correct?

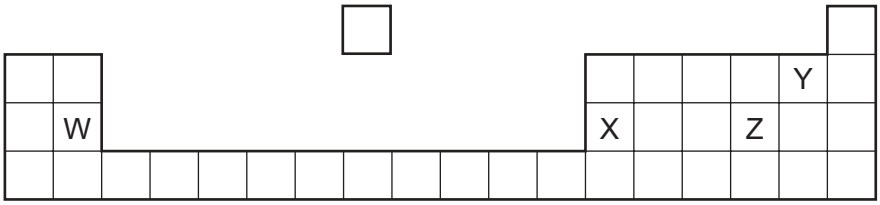
A It is a colourless, odourless gas.

B It is a gas that turns damp blue litmus paper red.

C It is formed when potassium nitrate is heated with aqueous sodium hydroxide and aluminium.

D It is manufactured using vanadium(V) oxide as a catalyst.

21 Part of the Periodic Table is shown with four elements, W, X, Y and Z. These are **not** the elements' actual symbols.



Some pairs of these elements may react to form compounds.

Which formulae are correct?

A WX and YZ

B WY_2 and WZ

C WZ and XZ

D X_2Z_3 and YZ

22 The elements in Group I have similar chemical properties.

Which statement explains why this is true?

A They all have metallic bonding.

B They all have the same number of complete electron shells.

C They all have the same number of electrons in their outer shell.

D They are all stored under oil to prevent reactions with the air.

23 Helium and xenon are both noble gases.

What is true of both elements?

	they are chemically inert	the atoms have eight electrons in their outer shell
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

24 The ions of metal X react with aqueous potassium iodide.

$$2X^{2+}(aq) + 4I^{-}(aq) \rightarrow 2XI(s) + I_2(aq)$$
coloured

From this information, it can be deduced that X is most likely a .....1..... metal and the $X^{2+}(aq)$ ions are .....2..... .

Which words correctly complete gaps 1 and 2?

	1	2
A	Group II	oxidised
B	Group II	reduced
C	transition	oxidised
D	transition	reduced

25 Which substance is a metal?

	melting point	conducts electricity when solid	conducts electricity when molten
A	high	✗	✓
B	high	✗	✗
C	high	✓	✓
D	low	✗	✗

26 Which metal can be obtained from its oxide by using either carbon or hydrogen?

A Cu **B** Fe **C** Mg **D** Zn

27 Metal carbonates decompose when heated.

Which carbonate is most stable to heat?

A calcium carbonate

B copper(II) carbonate

C lead(II) carbonate

D zinc carbonate

28 Iron is extracted from its ore in a blast furnace. Coke and limestone are also added to the blast furnace.

What is the purpose of the limestone?

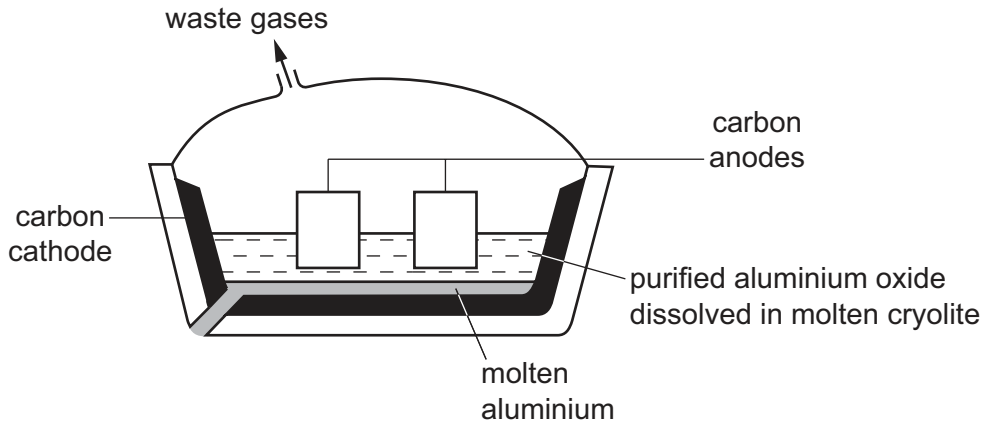
A to decompose to release oxygen to burn the coke

B to decompose to release oxygen to oxidise the iron

C to decompose to neutralise the acidic impurities

D to react with coke to heat the blast furnace

29 Aluminium is extracted from aluminium oxide by electrolysis.



Which statement about this electrolysis is correct?

A Aluminium ions gain electrons to form aluminium.

B Cryolite increases the melting point of the electrolyte.

C Cryolite reacts with impurities to form slag.

D The carbon cathode has to be replaced regularly as it reacts with oxygen.

30 Steel is produced by blowing oxygen into impure molten iron.

A student suggests two reasons why this process is carried out.

1 The oxygen removes some of the carbon from the impure iron.

2 The oxygen oxidises iron(II) ions to iron(III) ions.

Which reasons are correct?

A both 1 and 2

B 1 only

C 2 only

D neither 1 nor 2

31 Z is a pollutant gas that is formed in internal combustion engines.

An aqueous solution of Z is acidic.

Z is removed from the exhaust gases in a catalytic converter by reduction.

What is Z?

A CO **B** N_2 **C** H_2O **D** NO_2

32 A student investigates the properties of a colourless organic liquid.

Which observation shows that the liquid is unsaturated?

A It decolourises aqueous bromine.

B It has a sweet smell.

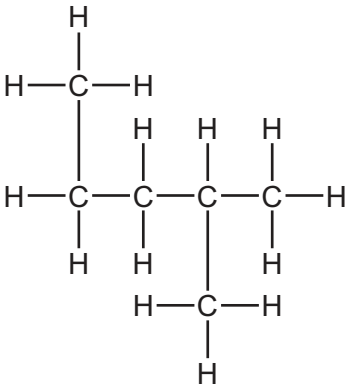
C It is a good solvent for organic compounds.

D It produces carbon dioxide when burned.

33 Alkanes are saturated compounds containing carbon and hydrogen only.

Structures 1, 2, 3 and 4 are saturated hydrocarbons.

1



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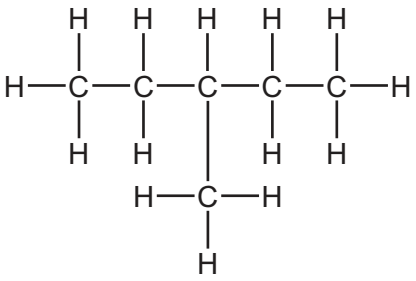

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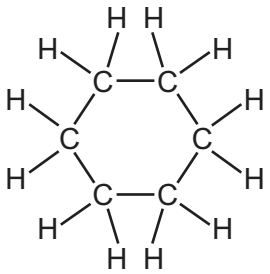

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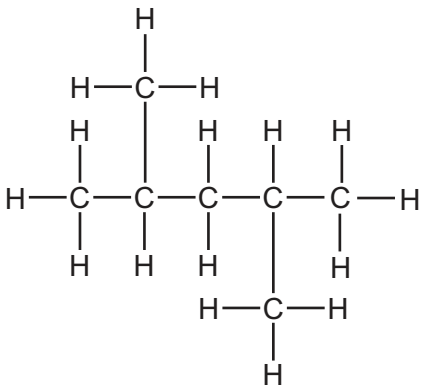
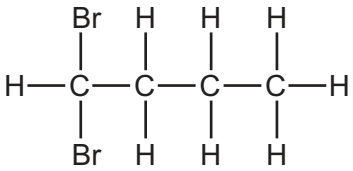


Which pair of structures are isomers?

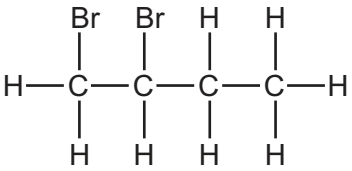
A 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

34 When butene reacts with bromine, which compound could be made?

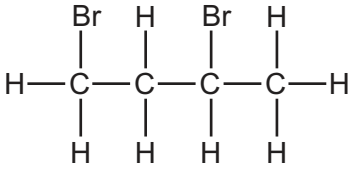
A



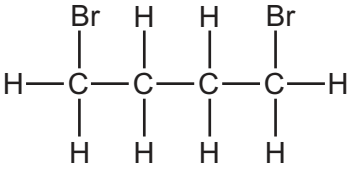
B



C



D



35 Which statement about propene is correct?

A It can be formed by cracking butane.

B It has the formula C_3H_8.

C It is a saturated hydrocarbon.

D It reacts with hydrogen to form ethane.

36 Which term describes the structure of *Terylene*?

A polyalkene

B polyamide

C polyester

D protein

37 Which process is involved in the formation of ethanol from ethene?

A addition

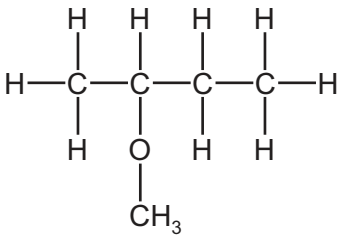
B combustion

C polymerisation

D substitution

38 Which compound is an alcohol?

A



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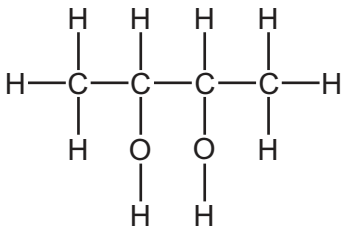

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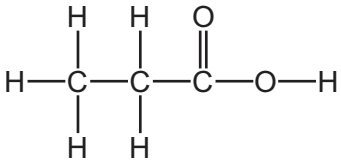

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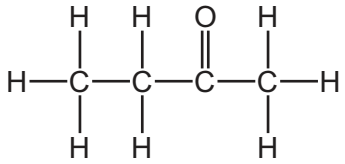

39 Which two compounds react together to form $CH_3CH_2COOCH_3$?

A ethanoic acid and ethanol

B methanoic acid and ethanol

C methanoic acid and propanol

D propanoic acid and methanol

40 Which compound might be suitable to flavour a soft drink?

A $CH_3CH_2CH_2COOCH_3$

B $CH_3CH_2CH_2CH_2CH_2OH$

C $CH_3CH_2CH_2CH_2COOH$

D $CH_3CHCHCH_2CH_3$

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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.).