Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CHEMISTRY **5070/12**

Paper 1 Multiple Choice **October/November 2018**

1 hour

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

5493589266

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.

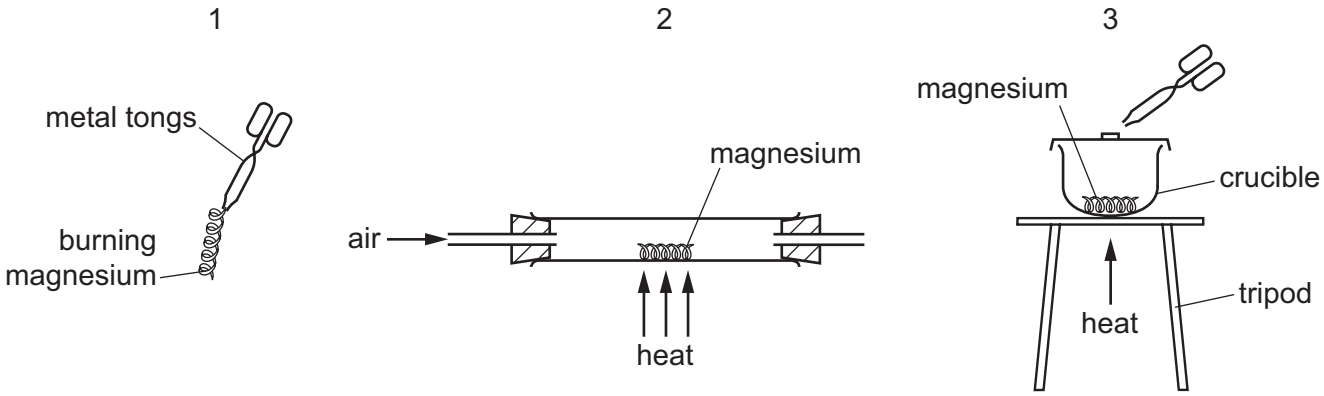
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
A copy of the Periodic Table is printed on page 16.
Electronic calculators may be used.

This document consists of **13** printed pages and **3** blank pages.

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1 When heated, magnesium reacts with oxygen in the air to form magnesium oxide, a white powder.

A student investigates the change in mass that occurs during this reaction. He is given a balance and the three sets of apparatus shown.



Which sets of apparatus are suitable for this investigation?

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

2 Four substances are heated gently. The temperatures at which they start and finish melting are recorded.

substance	temperature	
	start melting / °C	finish melting / °C
1	117	117
2	0	0
3	36	40
4	101	105

Which statement about the substances is correct?

A Substance 1 is the only pure substance.

B Substance 3 and substance 4 are impure.

C Substance 4 is water.

D They are all solids at room temperature.

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3 A substance dissolves in water to form a colourless solution. This solution reacts with aqueous silver nitrate in the presence of dilute nitric acid to give a yellow precipitate.

What is the possible identity of the substance?

A calcium iodide

B copper(II) chloride

C iron(II) iodide

D sodium chloride

4 Which statements are correct?

1 The volume of a gas at constant pressure increases as the temperature increases.

2 The rate of diffusion of a gas increases as the temperature increases.

3 The pressure of a gas at constant volume decreases as the temperature increases.

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

5 Which particle contains the greatest number of electrons?

A Mg^{2+} **B** N^{3-} **C** Ne **D** S^{2-}

6 Which substance has a giant covalent structure at room temperature?

A methane

B sand

C sodium chloride

D water

7 One atom of element X and two atoms of element Y react to form an ionic compound. Element X forms a positive ion.

Which elements could X and Y be?

	X	Y
A	calcium	chlorine
B	calcium	oxygen
C	sodium	chlorine
D	sodium	oxygen

8 An element with a high melting point forms an oxide that is gaseous at room temperature.

Which type of structure or bonding is present in the element?

A giant covalent

B ionic

C metallic

D simple molecular

9 Which statement explains why aluminium is malleable?

A Aluminium has layers of cations that can slide over one another.

B Aluminium has layers of electrons that can slide over one another.

C Aluminium has weak bonds between protons and a 'sea of electrons'.

D Aluminium is covered with a layer of unreactive aluminium oxide.

10 The incomplete equation for the reaction between ethyne, C_2H_2, and oxygen is shown.

$$2C_2H_2(g) + ...O_2(g) \rightarrow ....CO_2(g) + ...H_2O(g)$$

When the equation is balanced, what is the correct value for $O_2(g)$?

A 2 **B** 3 **C** 4 **D** 5

11 A compound contains 40.0% carbon, 6.7% hydrogen and 53.3% oxygen by mass.

The relative molecular mass of the compound is between 55 and 65.

What is the molecular formula of the compound?

A CH_2O **B** C_2H_4O **C** $C_2H_4O_2$ **D** $C_2H_6O_2$

12 What is observed during the electrolysis of aqueous copper(II) sulfate using carbon electrodes?

A A pink solid is deposited on the anode.

B Bubbles form on the negative electrode.

C The colour of the solution fades.

D The negative electrode becomes smaller.

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13 Four processes using electrolysis are listed.

1 the electrolysis of concentrated aqueous sodium chloride

2 the electrolysis of dilute sulfuric acid

3 the extraction of aluminium from pure aluminium oxide

4 the purification of copper using aqueous copper(II) sulfate

Which processes produce oxygen at one of the electrodes?

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

14 Which statements about endothermic reactions are correct?

1 Energy is absorbed from the surroundings.

2 Energy is released to the surroundings.

3 The temperature of the reaction mixture falls.

4 The temperature of the reaction mixture rises.

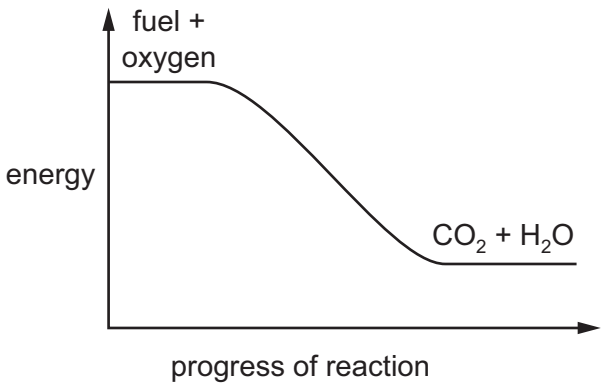
A 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

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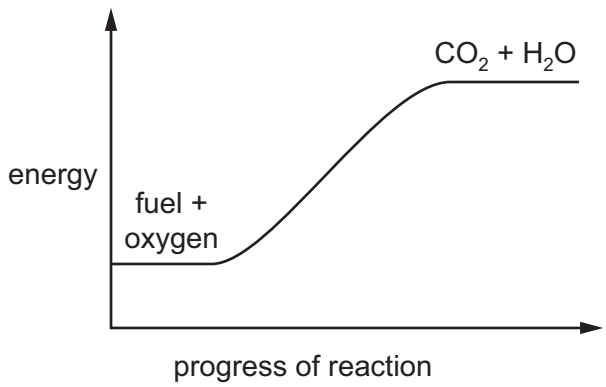
15 A fuel is completely burned in air. Carbon dioxide, water and heat are produced.

Which energy profile diagram is correct for burning a fuel?

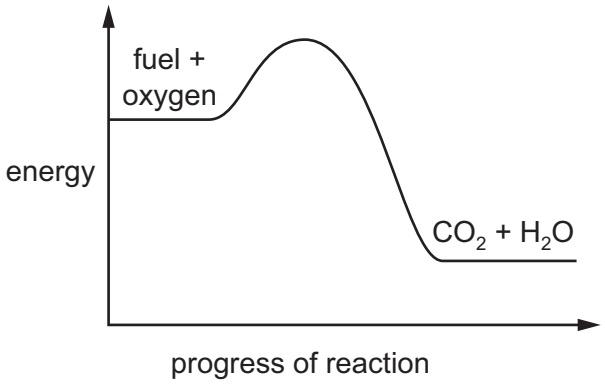
A



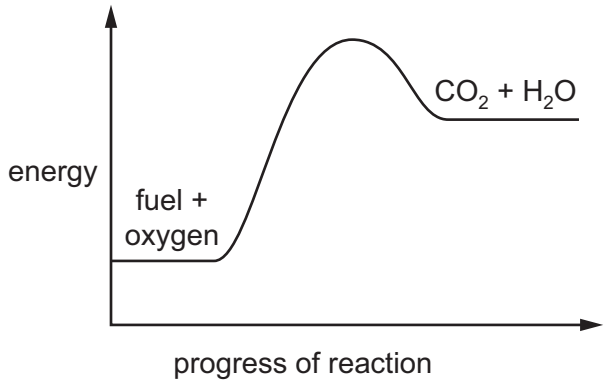
B



C



D



16 The equation shows the reaction for the manufacture of ammonia.

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

Which change will decrease the activation energy of the reaction?

A addition of a catalyst

B decrease in temperature

C increase in concentration

D increase in pressure

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17 Solid ammonium chloride is heated. The gases ammonia and hydrogen chloride are formed. This is reaction 1.

Ammonia gas is mixed with hydrogen chloride gas. Solid ammonium chloride is formed. This is reaction 2.

Which statement is correct?

A Both reaction 1 and reaction 2 are exothermic.

B Reaction 2 is reversible.

C The equation for reaction 1 is $NH_5Cl \rightarrow NH_4 + HCl$.

D The three substances involved in each reaction all have a simple molecular structure.

18 In a closed flask, gases Q and R reach a dynamic equilibrium.

$$Q(g) \rightleftharpoons 2R(g) \qquad \Delta H \text{ is positive}$$

Which change will move the equilibrium to the right?

A adding a catalyst

B decreasing the temperature

C increasing the pressure

D increasing the volume of the flask

19 Which reaction is a redox reaction?

A $Mg + 2HCl \rightarrow MgCl_2 + H_2$

B $MgCO_3 + 2HCl \rightarrow MgCl_2 + H_2O + CO_2$

C $MgO + 2HCl \rightarrow MgCl_2 + H_2O$

D $Mg(OH)_2 + 2HCl \rightarrow MgCl_2 + 2H_2O$

20 Three separate mixtures of a solution and a solid are made, as shown in the table.

The mixtures are warmed.

In which mixtures does gas form?

	NaOH(aq) and NH_4Cl(s)	H_2SO_4(aq) and NH_4Cl(s)	H_2SO_4(aq) and Mg(s)
A	✓	✓	✗
B	✓	✗	✓
C	✗	✓	✗
D	✗	✗	✓

key

✓ = gas forms

✗ = no gas forms

21 The carbonate, chloride and sulfate of a metal are all soluble in water.

What is the metal?

A barium

B calcium

C potassium

D silver

22 Which fertiliser contains the highest percentage of nitrogen by mass?

A ammonium nitrate, NH_4NO_3; formula mass is 80

B ammonium phosphate, $(NH_4)_3PO_4$; formula mass is 149

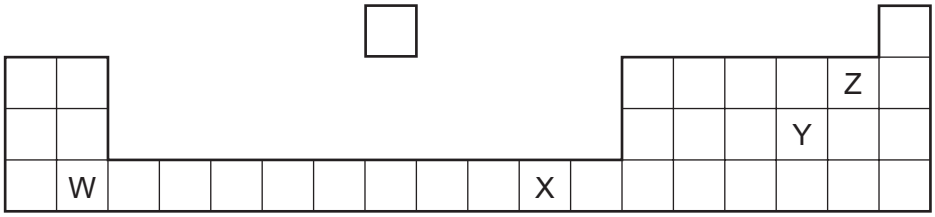
C ammonium sulfate, $(NH_4)_2SO_4$; formula mass is 132

D potassium nitrate, KNO_3; formula mass is 101

23 Which set of conditions is used in the contact process?

	temperature / °C	pressure / atm	catalyst
A	100	1	V_2O_5
B	300	1000	Fe
C	450	1	Fe
D	450	1	V_2O_5

24 The diagram shows part of the Periodic Table.



Which two letters represent elements that can react together to form covalent compounds?

A W and X **B** W and Y **C** X and Y **D** Y and Z

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25 The Group I metals lithium, sodium and potassium show trends in their melting points and in their reactions with water.

Which statement is correct going down the group from lithium to potassium?

A Their melting points decrease and their reaction with water becomes less vigorous.

B Their melting points decrease and their reaction with water becomes more vigorous.

C Their melting points increase and their reaction with water becomes less vigorous.

D Their melting points increase and their reaction with water becomes more vigorous.

26 From their position in the Periodic Table, which properties would you expect the elements vanadium, chromium and cobalt to have?

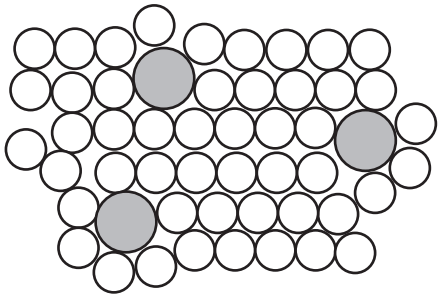
1 variable oxidation states

2 coloured compounds

3 high melting points

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

27 The diagram shows the structure of an alloy.



Which statement about alloys is correct?

A Alloys can only be formed by mixing copper or iron with other metals.

B High carbon steel alloys are soft and easily shaped.

C In an alloy there is attraction between positive ions and a ‘sea of electrons’.

D The alloy brass has a chemical formula.

28 Which pair of reagents will undergo a displacement reaction?

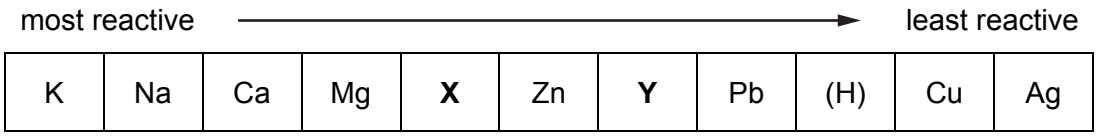
A Ag(s) and $CuSO_4$(aq)

B Cu(s) and $MgSO_4$(aq)

C Mg(s) and $CaSO_4$(aq)

D Zn(s) and $CuSO_4$(aq)

29 The reactivity series for some metals, with two gaps labelled **X** and **Y**, is shown.



Which row correctly identifies metals **X** and **Y** and the method of extraction of **Y** from its ore?

	metal **X**	metal **Y**	method of extraction of **Y**
A	A*l*	Fe	electrolysis
B	A*l*	Fe	reduction with carbon
C	Fe	A*l*	electrolysis
D	Fe	A*l*	reduction with carbon

30 Iron can be extracted from the ore haematite, Fe_2O_3.

What is the maximum mass of iron that could be produced from 500 kg of haematite?
[A_r: O, 16; Fe, 56]

A 160 kg **B** 240 kg **C** 350 kg **D** 420 kg

31 Aluminium is used to make saucepans because of its apparent lack of reactivity.

Which property of aluminium explains its unreactivity?

A It has a layer of oxide on its surface.

B It has a low density.

C It is a good conductor of electricity.

D It is in Group III of the Periodic Table.

32 Pollutant gases are released by the bacterial decay of vegetable matter.

The bacterial decay of vegetable matter is the main source of which gas?

A carbon monoxide

B methane

C nitrogen dioxide

D sulfur dioxide

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33 Several different treatments are used to purify the water supply.

Which impurities can be removed by which treatment?

	filtration	use of carbon	chlorination
A	harmful microbes	solids	unpleasant odours and tastes
B	harmful microbes	unpleasant odours and tastes	solids
C	solids	harmful microbes	unpleasant odours and tastes
D	solids	unpleasant odours and tastes	harmful microbes

34 Which statement about the homologous series of alkanes is correct?

A Alkanes are unsaturated hydrocarbons.

B Alkanes all have the general formula C_nH_{2n}.

C The boiling points decrease as the number of carbon atoms per molecule increases.

D The liquid alkanes become more viscous as the mass of the molecules increases.

35 Which compound has the empirical formula with the greatest relative formula mass?

A C_2H_6 **B** C_4H_{10} **C** C_5H_{10} **D** C_6H_6

36 Which statement about vegetable oil and the margarine made from it is correct?

A Both are liquids at room temperature.

B Both occur naturally.

C Margarine has the higher melting point.

D Vegetable oil has fewer carbon-carbon double bonds than margarine.

37 When ethene reacts with steam to form ethanol, which type of reaction takes place?

A addition

B fermentation

C polymerisation

D reduction

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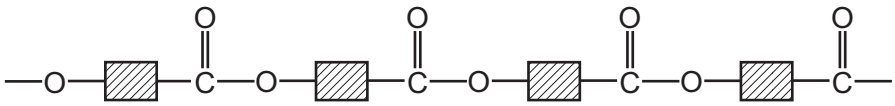
38 An ester is formed from a carboxylic acid and an alcohol.

How does the number of carbon, hydrogen and oxygen atoms in an ester differ from the total number of these atoms in the carboxylic acid and alcohol from which the ester is formed?

	carbon atoms	hydrogen atoms	oxygen atoms
A	fewer	fewer	fewer
B	fewer	same	fewer
C	same	fewer	fewer
D	same	same	same

39 Poly(lactic) acid is a polymer used to make biodegradable cups.

The partial structure of poly(lactic) acid is shown.



Which statements apply to poly(lactic) acid?

1 It is made by addition polymerisation.

2 It is made by condensation polymerisation.

3 It is a polyester.

4 The monomer used to make it is ethene.

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

40 Two large molecules, P and Q, both contain the same linkage.

P occurs naturally but Q does not.

Which row could be P and Q?

	P	Q
A	fat	nylon
B	fat	*Terylene*
C	nylon	protein
D	protein	*Terylene*

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The Periodic Table of Elements

Group																	
I	II											III	IV	V	VI	VII	0
							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

proton (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.).