Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CHEMISTRY **5070/12**

Paper 1 Multiple Choice **May/June 2017**

1 hour

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

8111012495

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.

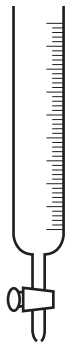
This document consists of **14** printed pages and **2** blank pages.

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1 The diagram shows four pieces of apparatus that are used to measure the volume of a gas or liquid.

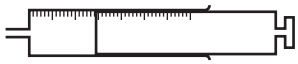
Which piece of apparatus should always be filled to the same level?

A



burette

B



gas syringe

C



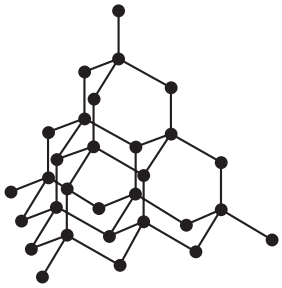
measuring cylinder

D

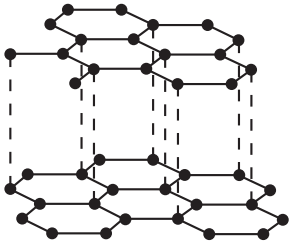


pipette

2 The diagrams show the structures of two forms of carbon.



X



Y

Which of X and Y conduct electricity?

	X	Y
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

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3 An aqueous solution of zinc chloride is tested by adding reagents.

Which observation is correct?

	reagent added to zinc chloride (aq)	observations
A	acidified aqueous barium nitrate	forms a white precipitate
B	aqueous ammonia	forms a white precipitate, soluble in excess of the reagent
C	aqueous sodium hydroxide	forms a white precipitate, insoluble in excess of the reagent
D	powdered copper	forms a grey precipitate

4 Which statement about the particles $^{19}_{9}F^{-}$, $^{20}_{10}Ne$ and $^{23}_{11}Na^{+}$ is correct?

A They all contain more electrons than protons.

B They all contain more neutrons than protons.

C They all contain the same number of electrons.

D They all contain the same number of protons.

5 The table shows some properties of four substances.

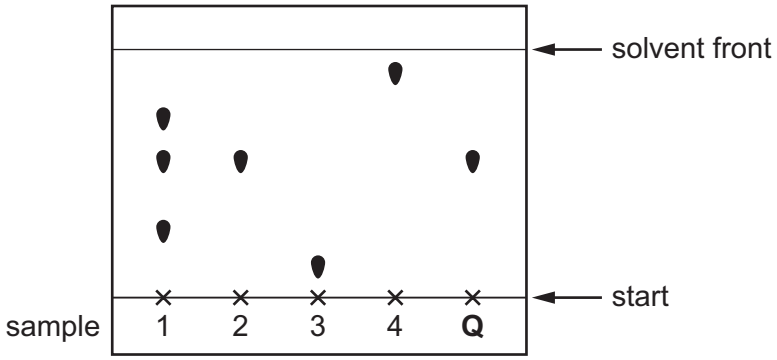
Which substance is an ionic compound?

	melting point / °C	conducts electricity when solid	dissolves in water	conducts electricity in aqueous solution
A	–102	✗	✓	✓
B	801	✗	✓	✓
C	842	✓	✓	✓
D	3000	✓	✗	✗

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6 Four samples are spotted onto chromatography paper. It is known that one of these samples is pure compound **Q**. A separate sample of pure compound **Q** is also spotted onto the paper. The paper is placed in a solvent.

The diagram shows the chromatogram produced.



Which statement is correct?

A Sample 2 has travelled the furthest and sample 3 is pure compound **Q**.

B Sample 3 has travelled the furthest and sample 2 is pure compound **Q**.

C Sample 4 has travelled the furthest and sample 1 is pure compound **Q**.

D Sample 4 has travelled the furthest and sample 2 is pure compound **Q**.

7 How many of the molecules shown contain only one covalent bond?

Cl_2 H_2 HCl N_2 O_2

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

8 Which statements about sulfur and its compounds are correct?

1 Sulfur is in Group VI of the Periodic Table and has six outer shell electrons.

2 In hydrogen sulfide, H_2S, sulfur shares one electron with each hydrogen atom.

3 Sulfur dioxide is used as a bleach.

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

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9 $50.0\,cm^3$ of $0.10\,mol/dm^3$ silver nitrate, $AgNO_3$, is added to $150.0\,cm^3$ of $0.05\,mol/dm^3$ sodium chloride, NaC*l*, in a beaker.

As well as solid silver chloride, what is present in the beaker after reaction?

A aqueous silver nitrate and aqueous sodium nitrate

B aqueous sodium chloride and aqueous sodium nitrate

C aqueous sodium chloride only

D aqueous sodium nitrate only

10 Nitrogen monoxide and oxygen react to form nitrogen dioxide.

$$2NO(g) + O_2(g) \rightarrow 2NO_2(g)$$

What is the maximum volume of nitrogen dioxide that could be obtained when $1\,dm^3$ of nitrogen monoxide reacts with $2\,dm^3$ of oxygen?

A $1\,dm^3$ **B** $2\,dm^3$ **C** $3\,dm^3$ **D** $4\,dm^3$

11 Dilute sulfuric acid is electrolysed between inert electrodes.

Which statements are correct?

1 Hydrogen is released at the negative electrode.

2 Oxygen is released at the positive electrode.

3 Sulfur dioxide is released at the positive electrode.

4 The acid becomes more concentrated.

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

12 Caesium, Cs, is in the same group of the Periodic Table as sodium.

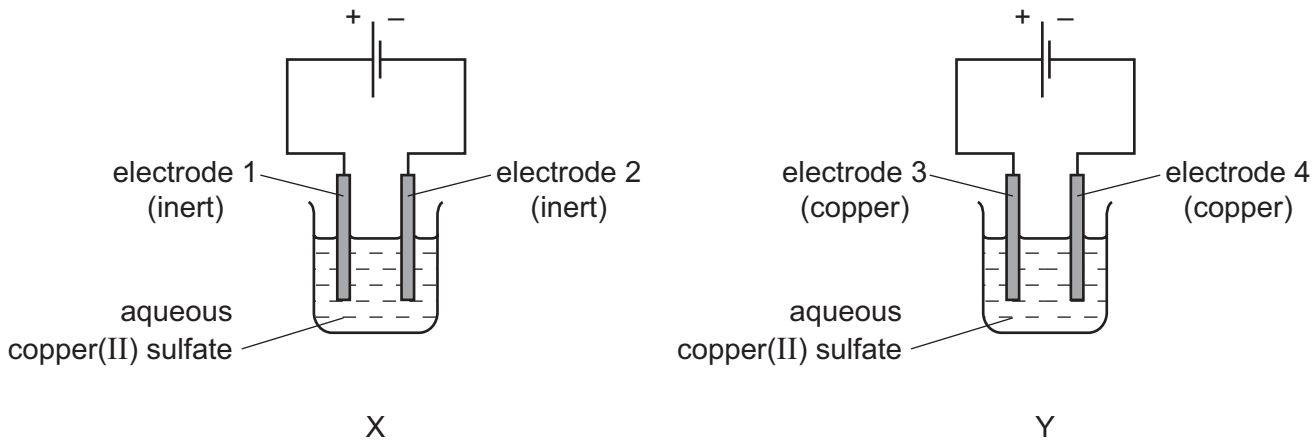
Which products are obtained from the electrolysis of concentrated aqueous caesium chloride?

	product at negative electrode	solution remaining
A	caesium	hydrochloric acid
B	chlorine	caesium hydroxide
C	hydrogen	caesium hydroxide
D	hydrogen	hydrochloric acid

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13 The diagrams show the apparatus for the electrolysis of aqueous copper(II) sulfate.

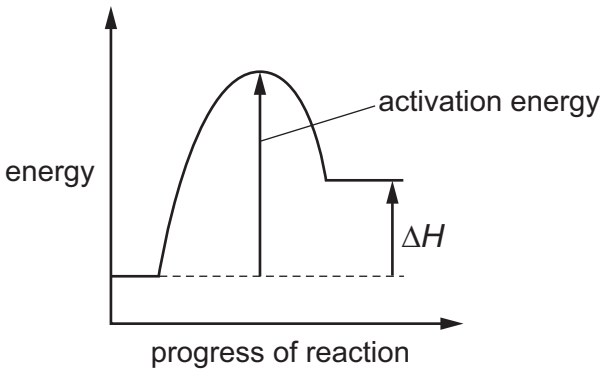
In experiment X both electrodes are inert. In experiment Y both electrodes are made of copper.



On which electrodes is solid metal deposited?

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

14 The energy profile diagram for the **forward** direction of a reversible reaction is shown.



For the **reverse** reaction, which row correctly shows the sign of the activation energy and the type of enthalpy change?

	sign of activation energy	type of enthalpy change
A	negative	endothermic
B	negative	exothermic
C	positive	endothermic
D	positive	exothermic

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15 The formation of liquid water from hydrogen and oxygen may occur in three stages.

1 $2H_2(g) + O_2(g) \rightarrow 4H(g) + 2O(g)$

2 $4H(g) + 2O(g) \rightarrow 2H_2O(g)$

3 $2H_2O(g) \rightarrow 2H_2O(l)$

Which stages would be exothermic?

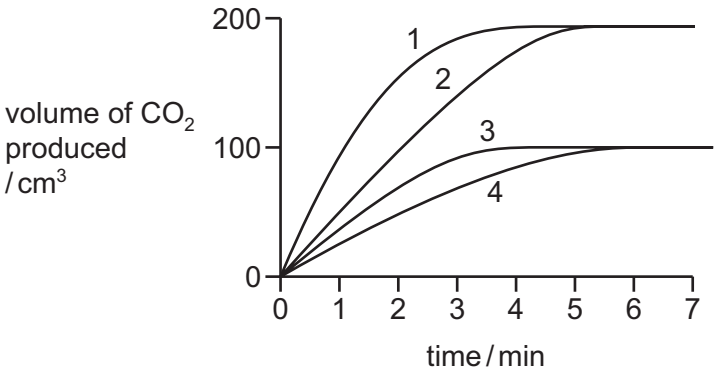
A 1, 2 and 3 **B** 1 and 2 only **C** 2 and 3 only **D** 2 only

16 In four separate experiments, 1, 2, 3 and 4, nitric acid was added to excess marble chips and the volume of carbon dioxide formed was measured.

In all four experiments the same volume of nitric acid was used.

Its concentration, or temperature, or both concentration and temperature, were changed.

The results of the experiments are shown on the graph.



Which statement is correct?

A A lower concentration of acid was used in experiment 3 than in experiment 1.

B Experiment 4 was faster than experiment 3.

C The acid used in experiment 2 was of a lower concentration than in experiment 1.

D The temperature of the acid was the same in experiments 1 and 2.

17 The equation shows the formation of sulfur trioxide in the contact process.

$$2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g) \qquad \Delta H = -196\,kJ/mol$$

What would **decrease** the yield of sulfur trioxide?

A addition of more oxygen

B an increase in pressure

C an increase in temperature

D removal of sulfur trioxide from the reaction chamber

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18 Zinc reacts with dilute sulfuric acid.

$$Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$$

From this equation, what can be deduced about the reaction?

A It is a redox reaction.

B It is exothermic.

C Zinc is acting as a base.

D Zinc is acting as a catalyst.

19 Consider the three reactions.

1 reaction between ammonium chloride and calcium hydroxide

2 ethane burning in air

3 reaction between ethanoic acid and ethanol

What is true for all three reactions?

A Carbon dioxide is formed.

B Neutralisation takes place.

C Oxidation takes place.

D Water is formed.

20 Which statement about weak acids is correct?

A They are partially ionised.

B They do not react with metals.

C They do not react with strong alkalis.

D Their solutions have pH values in the range 0 to 2.

21 Which gas dissolves in water to give a solution with a pH greater than 7?

A ammonia

B carbon dioxide

C nitrogen dioxide

D sulfur dioxide

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22 Element X forms an oxide of formula X_2O_5.

In which group of the Periodic Table is X likely to be found?

A Group II

B Group III

C Group V

D Group VIII

23 Element M is a typical transition metal.

Which property will it **not** have?

A a low melting point

B coloured compounds

C good electrical conductivity

D variable oxidation states

24 An atom of element **E** forms a white oxide of formula **E**O.

What is **E**?

A argon

B calcium

C copper

D potassium

25 The table shows the proton numbers of four elements.

element	Q	R	T	Z
proton number	9	11	17	19

Which statement is correct?

A Q is a metal.

B Q is more reactive than T.

C R is more reactive than Z.

D T and Z are in the same period.

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26 The results of experiments involving four metals, W, X, Y and Z, and their ions are shown.

$$Y(s) + Z^+(aq) \rightarrow Y^+(aq) + Z(s)$$

$$W(s) + X^+(aq) \rightarrow \text{no reaction}$$

$$Z(s) + X^+(aq) \rightarrow Z^+(aq) + X(s)$$

What is the order of reactivity of the four metals, most reactive to least reactive?

A $W \rightarrow X \rightarrow Y \rightarrow Z$

B $X \rightarrow W \rightarrow Z \rightarrow Y$

C $Y \rightarrow Z \rightarrow X \rightarrow W$

D $Z \rightarrow Y \rightarrow W \rightarrow X$

27 Metals have a structure of positive ions in a 'sea of electrons'. Metals are malleable because it is possible to force the ions to slide over each other.

The alloy brass is .....1..... malleable than pure copper and than pure zinc.

Brass is .....2..... to conduct electricity.

Which words correctly complete gaps 1 and 2?

	1	2
A	less	unable
B	less	able
C	more	unable
D	more	able

28 Which two substances are removed from the bottom of a blast furnace?

1 coke

2 iron

3 limestone

4 slag

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

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29 Aluminium is used in the manufacture of aeroplanes.

What is a property of aluminium and is also a reason for this use?

A It has a low density.

B It is a good conductor of electricity.

C It is a poor conductor of heat.

D It is covered in an unreactive layer of aluminium carbonate.

30 How can the reaction between nitrogen and hydrogen be described?

A a displacement reaction

B a neutralisation reaction

C a precipitation reaction

D a reversible reaction

31 Bottled fruit juice may have small amounts of sulfur dioxide added.

What is the purpose of this?

A to adjust the acidity of the fruit juice

B to kill any bacteria present

C to improve the flavour of the fruit juice

D to neutralise any alkalis present

32 Dissolved substances in water can cause eutrophication.

How many of the ions shown cause this effect?

Cl^- CO_3^{2-} Na^+ NO_3^- PO_4^{3-}

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

33 Which list contains only gases that are always present in unpolluted air?

A oxygen, nitrogen, carbon dioxide, argon, carbon monoxide, nitrogen dioxide

B oxygen, nitrogen, carbon dioxide, argon, neon

C oxygen, nitrogen, carbon dioxide, nitrogen dioxide, ozone

D oxygen, nitrogen, carbon monoxide, methane, sulfur dioxide

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34 One mole of each alkane undergoes complete combustion.

Which alkane will produce seven moles of products?

A CH_4 **B** C_2H_6 **C** C_3H_8 **D** C_4H_{10}

35 Ethanoic acid is formed when ethanol is reacted with acidified potassium manganate(VII).

What is the name of this process?

A combustion

B condensation

C oxidation

D polymerisation

36 The structure of compound X is shown.

$$CH_3–CH_2–CH_2–CH_2–OH$$

Which statement is **not** correct?

A X is an alcohol because it contains an –OH group.

B X is an isomer of propanol.

C X would burn in air to form carbon dioxide and water.

D X would have a higher boiling point than ethanol.

37 After which conversion does the product contain more carbon atoms than the reactant?

A ethanol to ethanoic acid

B ethanol to ethyl ethanoate

C ethene to ethane

D ethene to ethanol

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38 Molecules 1–4 are unbranched hydrocarbons.

1 $C_{10}H_{22}$

2 $C_{10}H_{20}$

3 C_9H_{20}

4 C_8H_{16}

Which row correctly identifies these hydrocarbons as alkanes or alkenes?

	alkane	alkene
A	1 and 2	3 and 4
B	1 and 3	2 and 4
C	1 and 4	2 and 3
D	2 and 3	1 and 4

39 Which polymer contains only three different elements?

A protein

B poly(ethene)

C poly(propene)

D starch

40 Which statement about macromolecules is correct?

A Nylon and *Terylene* are both polyesters.

B Proteins and nylon have the same monomer units.

C Proteins have the same amide linkages as nylon.

D *Terylene* and fats are esters but with different linkages.

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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.).