



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)



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.

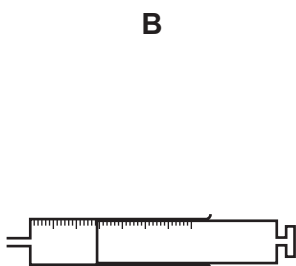


- 1 The diagram shows four pieces of apparatus that are used to measure the volume of a gas or liquid.

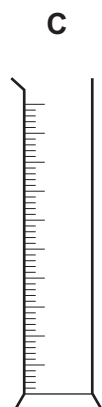
Which piece of apparatus should always be filled to the same level?



burette



gas syringe

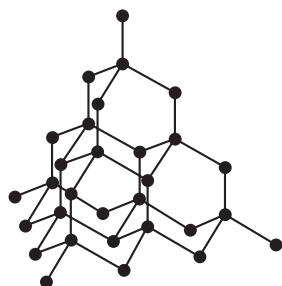


measuring cylinder

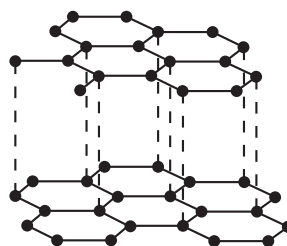


pipette

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



X



Y

Which of X and Y conduct electricity?

	X	Y
A	✓	✓
B	✓	x
C	x	✓
D	x	x

- 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 ${}^{19}_{9}\text{F}^{-}$, ${}^{20}_{10}\text{Ne}$ and ${}^{23}_{11}\text{Na}^{+}$ 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.

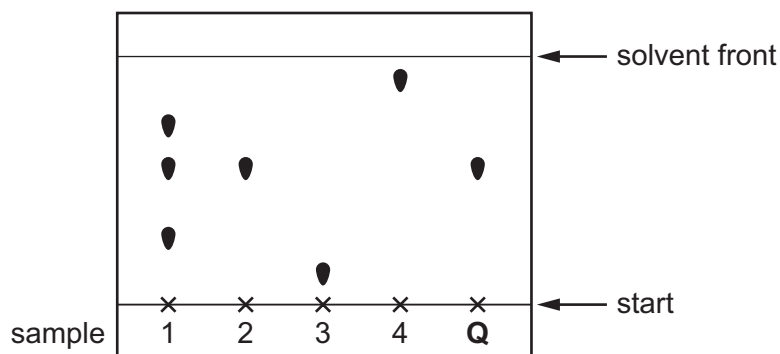
- 5 The table shows some properties of four substances.

Which substance is an ionic compound?

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

- 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?



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

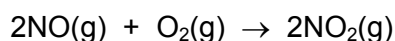
D 2 and 3 only

- 9 50.0 cm³ of 0.10 mol/dm³ silver nitrate, AgNO₃, is added to 150.0 cm³ of 0.05 mol/dm³ sodium chloride, NaCl, 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.



What is the maximum volume of nitrogen dioxide that could be obtained when 1 dm³ of nitrogen monoxide reacts with 2 dm³ of oxygen?

- A 1 dm³ B 2 dm³ C 3 dm³ D 4 dm³

- 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

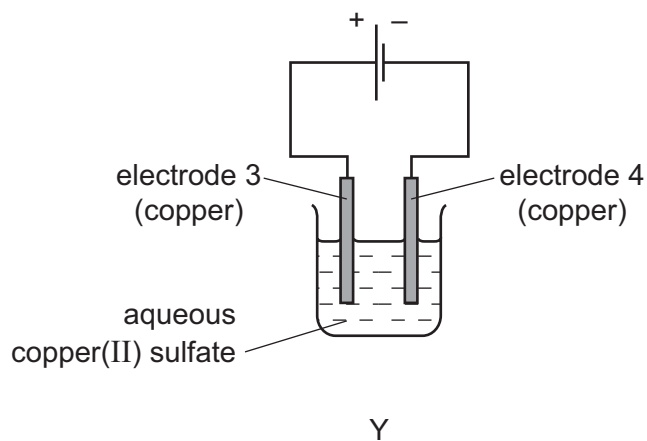
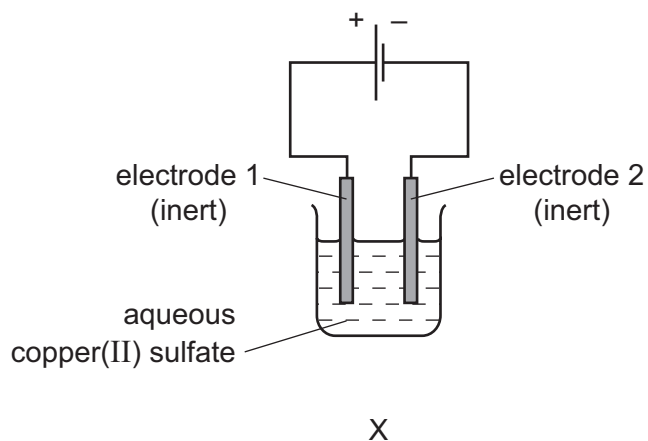
- 12 Caesium, Cs, is in the same group of the Periodic Table as sodium.

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

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

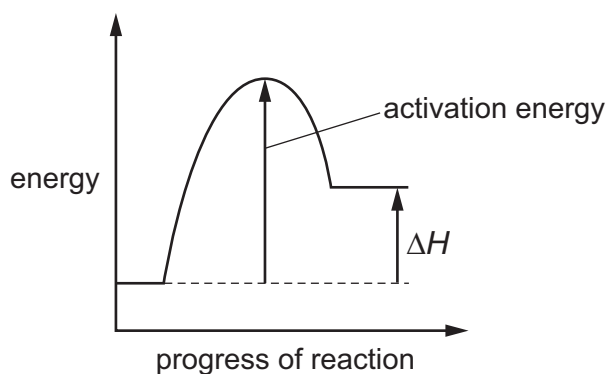
In experiment X both electrodes are inert. In experiment Y both electrodes are made of copper.



On which electrodes is solid metal deposited?

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

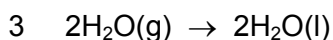
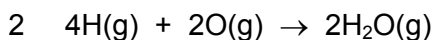
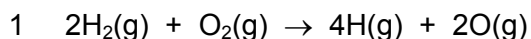
14 The energy profile diagram for the **forward** direction of a reversible reaction is shown.



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

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



Which stages would be exothermic?

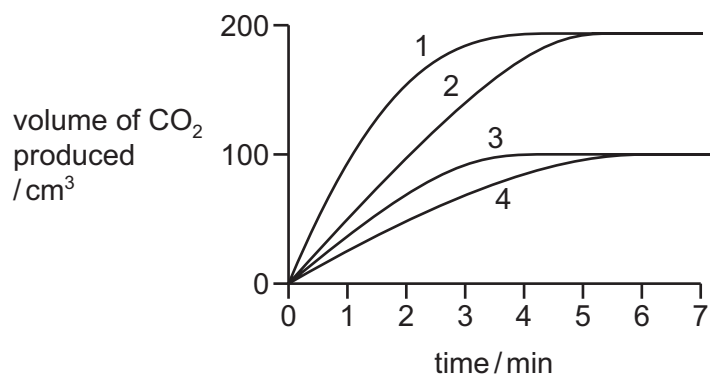
- A** 1, 2 and 3 **B** 1 and 2 only **C** 2 and 3 only **D** 2 only

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.

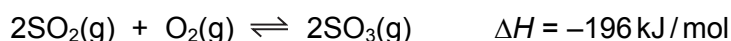
The results of the experiments are shown on the graph.



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.

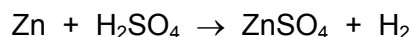
17 The equation shows the formation of sulfur trioxide in the contact process.



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

18 Zinc reacts with dilute sulfuric acid.



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

- 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 **EO**.

What is **E**?

- A argon
- B calcium
- C copper
- D potassium

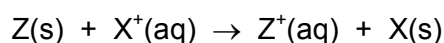
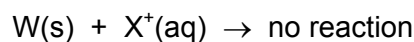
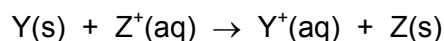
- 25 The table shows the proton numbers of four elements.

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.

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



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 is1..... malleable than pure copper and than pure zinc.

Brass is2..... 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

- 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

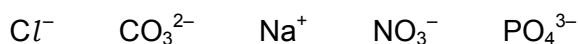
- 31 Bottled fruit juice may have small amounts of sulfur dioxide added.

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?



- 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

- 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.



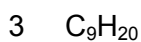
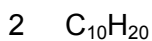
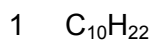
Which statement is **not** correct?

- 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

38 Molecules 1–4 are unbranched hydrocarbons.



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

lanthanoids

57	La	58	Ce	59	Pr	60	Nd	61	Pm	62	Sm	63	Eu	64	Gd	65	Tb	66	Dy	67	Ho	68	Er	69	Tm	70	Yb	71	Lu
lanthanum	139	cerium	140	praseodymium	141	neodymium	144	—	promethium	150	samarium	152	europium	157	gadolinium	159	terbium	163	dysprosium	165	holmium	167	erbium	169	thulium	173	ytterbium	175	lutetium

actinoids

89	Ac	90	Th	91	Pa	92	U	93	Np	94	Pu	95	Am	96	Cm	97	Bk	98	Cf	99	Es	100	Fm	101	Md	102	No	103	Lr
actinium	231	thorium	232	protactinium	231	uranium	238	—	neptunium	239	plutonium	241	americium	247	curium	247	berkelium	247	californium	251	einsteinium	252	fermium	258	merendelevium	259	nobelium	261	lawrencium

The volume of one mole of any gas is 24 dm^3 at room temperature and pressure (r.t.p.).