



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CHEMISTRY

5070/11

Paper 1 Multiple Choice

May/June 2012

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, highlighters, 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.

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.

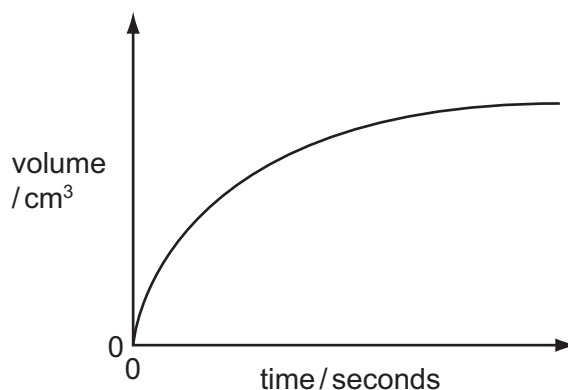
Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 16.

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

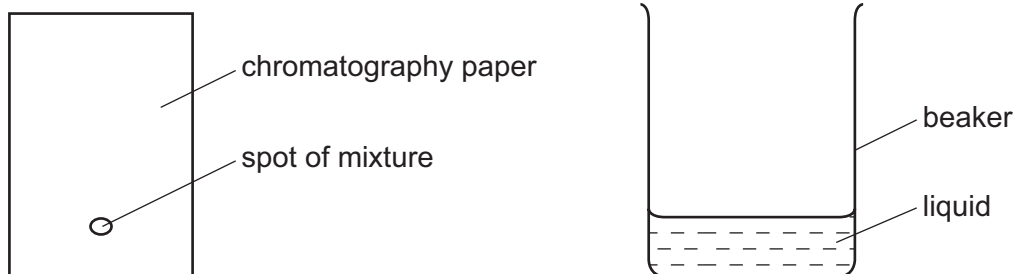


- 1 A student measured the rate of reaction between calcium carbonate and dilute hydrochloric acid. A graph showing the volume of gas produced against time is shown.



Which apparatus was used to measure the variables shown on the graph?

- A balance and gas syringe
 - B burette and pipette
 - C gas syringe and stop watch
 - D pipette and stop watch
- 2 A mixture of two substances is spotted onto a piece of chromatography paper.
- The paper is inserted into a beaker containing a liquid.



For separation of the substances to occur the spot of mixture must

- A be placed so that the spot is just below the level of the liquid.
 - B be soluble in the liquid.
 - C contain substances of the same R_f values.
 - D contain substances that are coloured.
- 3 Which molecule contains a total of three covalent bonds?
- A C_2H_4
 - B H_2
 - C H_2O
 - D N_2

- 4 The addition of dilute acid to a solution containing the anion Q and the subsequent use of limewater can be used to identify the anion Q.

What is Q?

- A** a carbonate
B a chloride
C an iodide
D a sulfate

- 5 Four substances have the following electrical properties.

substance	property
W	does not conduct under any conditions
X	conducts only in aqueous solution
Y	conducts in both the molten and solid states
Z	conducts in both the molten and aqueous states

What are these four substances?

	W	X	Y	Z
A	HCl	S	NaCl	Pb
B	Pb	HCl	NaCl	S
C	S	HCl	Pb	NaCl
D	S	NaCl	HCl	Pb

- 6 The proton number of element X is 6. The proton number of element Y is 9.

What is the formula of a compound of these elements?

- A** X_2Y_3 **B** X_3Y_2 **C** XY_3 **D** XY_4

- 7 Which ion reacts with aqueous ammonia to give a precipitate that dissolves in an excess of ammonia?

- A** $Al^{3+}(aq)$ **B** $Fe^{2+}(aq)$ **C** $Fe^{3+}(aq)$ **D** $Zn^{2+}(aq)$

8 Which statement about aqueous sodium chloride is correct?

- A It contains sodium atoms.
- B It contains two different types of molecules.
- C It does not conduct electricity.
- D It forms a white precipitate when added to aqueous silver nitrate.

9 15.0 cm^3 of 1.0 mol/dm^3 potassium hydroxide just neutralise 20.0 cm^3 of a solution of nitric acid.

What is the concentration of the acid?

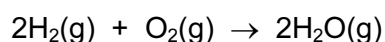
- A 0.75 mol/dm^3
- B 1.0 mol/dm^3
- C 1.5 mol/dm^3
- D 7.5 mol/dm^3

10 An atom, X, contains 16 protons.

Which statement about X is correct?

- A It cannot form an ion.
- B It contains 6 electrons in the outer shell.
- C It contains 6 neutrons.
- D It has relative atomic mass of 16.

11 The equation for the burning of hydrogen in oxygen is shown.

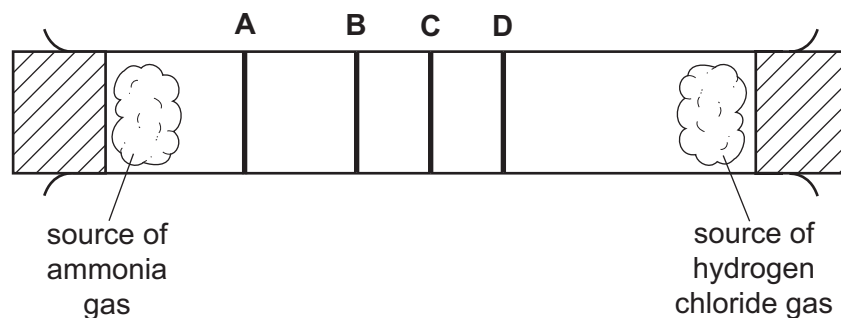


What does this equation indicate?

- A 2 atoms of hydrogen combine with 2 atoms of oxygen.
- B 2 g of hydrogen combine with 1 g of oxygen.
- C 2 moles of steam can be obtained from 0.5 mole of oxygen.
- D 2 moles of steam can be obtained from 1 mole of oxygen.

12 The diagram shows an apparatus used to compare rates of diffusion.

At which labelled position did a white deposit of ammonium chloride form?



13 Which statement about conduction of electricity is correct?

- A Electricity is conducted in aqueous solution by electrons.
- B Electricity is conducted in a metal wire by ions.
- C Electricity is conducted in a molten electrolyte by electrons.
- D Electricity is conducted in an acid solution by ions.

14 In terms of electrons, what happens when potassium combines with iodine to form a compound?

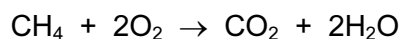
- A The atoms of both elements each lose one electron.
- B The atoms of both elements each gain one electron.
- C The potassium atoms each lose one electron and the iodine atoms each gain one electron.
- D The potassium atoms each gain one electron and the iodine atoms each lose one electron.

15 Aqueous copper(II) sulfate is electrolysed using copper electrodes.

Which equation represents the reaction taking place at the anode (positive electrode) in this electrolysis?

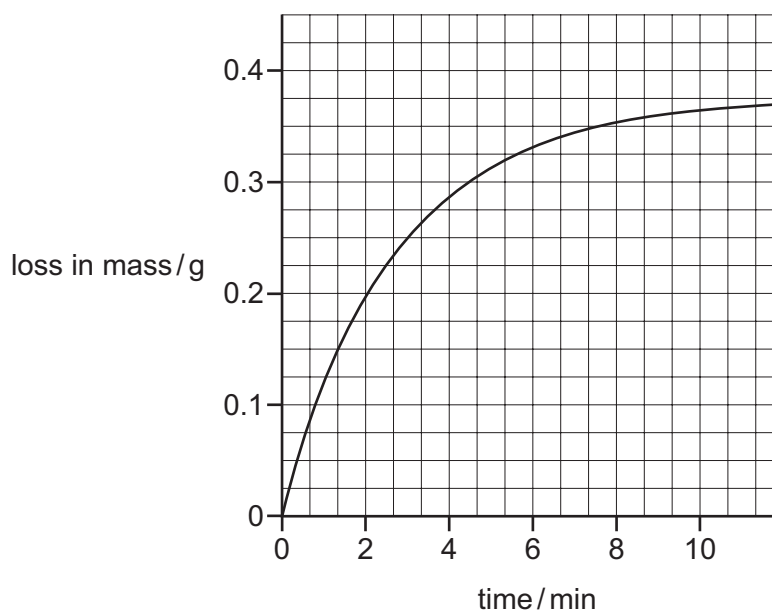
- A $\text{Cu(s)} \rightarrow \text{Cu}^{2+}(\text{aq}) + 2\text{e}^{-}$
- B $\text{SO}_4^{2-}(\text{aq}) \rightarrow \text{SO}_2(\text{g}) + \text{O}_2(\text{g}) + 2\text{e}^{-}$
- C $\text{Cu}^{2+}(\text{aq}) + 2\text{e}^{-} \rightarrow \text{Cu(s)}$
- D $4\text{OH}^{-}(\text{aq}) \rightarrow 2\text{H}_2\text{O(l)} + \text{O}_2(\text{g}) + 4\text{e}^{-}$

- 16 The combustion of methane is exothermic. The equation is given below.



What can be deduced from the fact that the reaction is exothermic?

- A** Fewer bonds are broken than are made.
B Less energy is involved in breaking bonds than is involved in making bonds.
C More bonds are broken than are made.
D More energy is involved in breaking bonds than is involved in making bonds.
- 17 How does a catalyst increase the speed of a reaction?
- A** by increasing the collision frequency of particles
B by increasing the speed of the particles
C by increasing the temperature of the reaction
D by lowering the activation energy
- 18 Copper(II) carbonate powder was heated. The loss in mass was plotted against time as shown on the graph.



During which time interval is the reaction fastest?

- A** 0 to 2 min **B** 2 to 4 min **C** 6 to 8 min **D** 8 to 10 min

19 In which equation is the underlined element reduced?

- A $\underline{\text{Cu}}\text{SO}_4(\text{aq}) + \text{Mg}(\text{s}) \rightarrow \text{Cu}(\text{s}) + \text{MgSO}_4(\text{aq})$
B $2\underline{\text{Fe}}\text{Cl}_2(\text{s}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{FeCl}_3(\text{s})$
C $2\underline{\text{S}}\text{O}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{SO}_3(\text{g})$
D $\underline{\text{Zn}}(\text{s}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{ZnSO}_4(\text{aq}) + \text{H}_2(\text{g})$

20 A sample of air was bubbled into water. The pH of the water slowly changed from 7 to 6.

Which gas in the sample caused this change?

- A carbon dioxide
B carbon monoxide
C nitrogen
D oxygen

21 Which compound is insoluble in water?

- A lead sulfate
B silver nitrate
C sodium carbonate
D zinc chloride

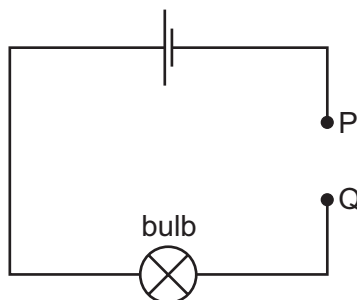
22 The following statements about dilute sulfuric acid are **all** correct.

- 1 Addition of Universal Indicator shows that the solution has a pH value of less than 7.0.
- 2 A white precipitate is formed when aqueous barium nitrate is added.
- 3 The solution reacts with copper(II) oxide, forming a blue solution.
- 4 The solution turns anhydrous copper(II) sulfate from white to blue.

Which two statements confirm the acidic nature of the solution?

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

- 23 Pieces of material are placed in turn between P and Q in the incomplete electrical circuit shown.



Which material would **not** cause the bulb to light?

- A aluminium
 - B diamond
 - C magnesium
 - D zinc
- 24 Which of the following pairs of compounds react together to produce ammonia?
- 1. ammonium nitrate and calcium carbonate
 - 2. ammonium nitrate and calcium oxide
 - 3. ammonium sulfate and calcium hydroxide
 - 4. ammonium sulfate and calcium nitrate
- A 1 and 2 only
 - B 1 and 4 only
 - C 2 and 3 only
 - D 3 and 4 only
- 25 Which reaction occurring in the blast furnace is an acid base reaction?
- A $\text{C} + \text{CO}_2 \rightarrow 2\text{CO}$
 - B $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$
 - C $\text{CaO} + \text{SiO}_2 \rightarrow \text{CaSiO}_3$
 - D $\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}_2$

A aluminium

B iron

C nitrogen

D silicon

Where is **X** in the Periodic Table?

A in Group II

B in Group III

C the second Period

D in the transition elements

1. calcium

2. copper

3. potassium

4. silver

A 1 and 2

B 1 and 3

C 2 and 4

D 3 and 4

The letters are not the symbols of the elements.

[illegible]

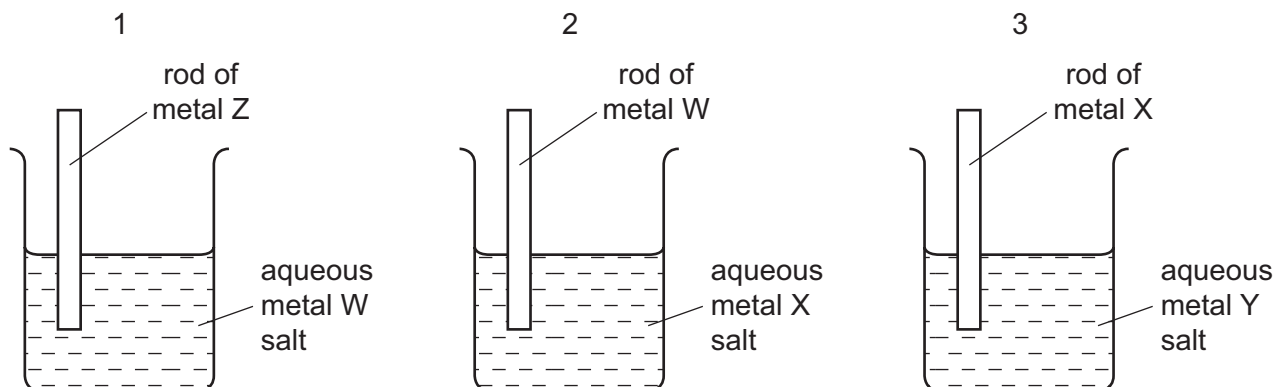
A V is more reactive than X.

B W is more reactive than Z.

C Y is in the same Group as X.

D Z has a lower melting point than W.

30 Three different beakers are set up as shown.



In beaker 1 metal W is displaced from solution.

In beaker 2 metal X is displaced from solution.

In beaker 3 metal Y is displaced from solution.

What is the order of **decreasing** reactivity of the four metals?

	most reactive	→			least reactive
A	W	X	Y	Z	
B	X	Y	W	Z	
C	Z	W	X	Y	
D	Z	X	W	Y	

31 Which gases are formed during the production of aluminium by electrolysis of molten aluminium oxide?

- A** carbon dioxide, carbon monoxide, oxygen
- B** carbon dioxide, carbon monoxide, sulfur dioxide
- C** carbon dioxide, oxygen, sulfur dioxide
- D** carbon monoxide, oxygen, sulfur dioxide

32 Which pair of gases could be removed from the atmosphere using calcium carbonate?

- A** CO_2 and O_3
- B** CO and SO_2
- C** CH_4 and NO_2
- D** NO_2 and SO_2

33 In which parts of a motor car do the reactions, shown in the equations, take place?

	$\text{N}_2 + \text{O}_2 \rightarrow 2\text{NO}$	$2\text{CO} + 2\text{NO} \rightarrow 2\text{CO}_2 + \text{N}_2$
A	engine	engine
B	engine	exhaust
C	exhaust	engine
D	exhaust	exhaust

34 The diagrams show four monomers.



How many of these monomers would react with the molecule below to form a polymer?



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

35 For which molecules are the empirical and molecular formulae the same?

1. methanoic acid, HCO_2H
2. ethanoic acid, $\text{CH}_3\text{CO}_2\text{H}$
3. propanoic acid, $\text{C}_2\text{H}_5\text{CO}_2\text{H}$
4. butanoic acid, $\text{C}_3\text{H}_7\text{CO}_2\text{H}$

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

36 A compound Y is thought to be an organic acid.

Which reaction shows that Y is an **organic** acid?

- A** It reacts with an alcohol to form an ester.
B It reacts with magnesium to form hydrogen.
C It reacts with sodium carbonate to form carbon dioxide.
D It turns litmus red.

- 37 A 10 cm^3 sample of a gaseous hydrocarbon is completely burnt in oxygen. The total volume of the products is 70 cm^3 . All gas volumes are measured at room temperature and pressure.

Which equation represents the combustion of the hydrocarbon?

- A $\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g})$
- B $\text{C}_2\text{H}_4(\text{g}) + 3\text{O}_2(\text{g}) \rightarrow 2\text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g})$
- C $\text{C}_3\text{H}_8(\text{g}) + 5\text{O}_2(\text{g}) \rightarrow 3\text{CO}_2(\text{g}) + 4\text{H}_2\text{O}(\text{g})$
- D $2\text{C}_2\text{H}_6(\text{g}) + 7\text{O}_2(\text{g}) \rightarrow 4\text{CO}_2(\text{g}) + 6\text{H}_2\text{O}(\text{g})$

- 38 The boiling points of the alcohols increase as their relative molecular mass increases.

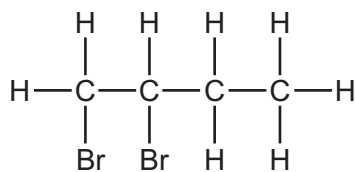
Which alcohol has the highest boiling point?

- A butanol
- B ethanol
- C methanol
- D propanol

- 39 Which of the following is a type of naturally occurring polymer?

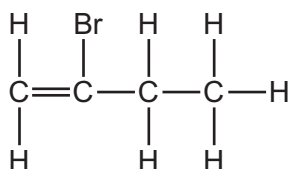
- A paraffin
- B polyethene
- C protein
- D sugar

40 Compound Q reacts with bromine to form the compound shown.

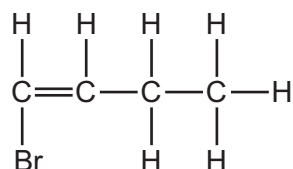


Which is compound Q?

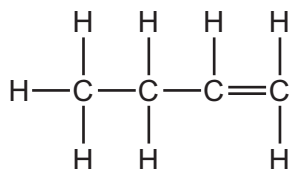
A



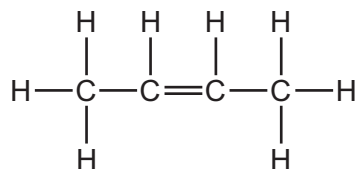
B



C



D



BLANK PAGE

BLANK PAGE

DATA SHEET
The Periodic Table of the Elements

Group																											
I	II											III	IV	V	VI	VII	0										
1 H Hydrogen 9 Be Beryllium 24 Mg Magnesium 40 Ca Calcium 45 Sc Scandium 88 Sr Strontium 137 Ba Barium 226 Ra Radium 227 Ac Actinium 7 Li Lithium 23 Na Sodium 39 K Potassium 85 Rb Rubidium 133 Cs Caesium Fr Francium 11 B Boron 27 Al Aluminium 70 Ga Gallium 115 In Indium 204 Tl Thallium 12 C Carbon 28 Si Silicon 73 Ge Germanium 119 Sn Tin 207 Pb Lead 13 N Nitrogen 31 P Phosphorus 75 As Arsenic 122 Sb Antimony 209 Bi Bismuth 14 O Oxygen 32 S Sulfur 79 Se Selenium 128 Te Tellurium 209 Po Polonium 16 F Fluorine 35.5 Cl Chlorine 80 Br Bromine 127 I Iodine 209 At Astatine 19 Ne Neon 40 Ar Argon 84 Kr Krypton 131 Xe Xenon 209 Rn Radon 2 He Helium																											
158-71 Lanthanoid series † 90-103 Actinoid series																											
140 Ce Cerium 141 Pr Praseodymium 144 Nd Neodymium 150 Sm Samarium 152 Eu Europium 157 Gd Gadolinium 159 Tb Terbium 162 Dy Dysprosium 165 Ho Holmium 167 Er Erbium 169 Tm Thulium 175 Lu Lutetium 232 Th Thorium 238 U Uranium 238 Pa Protactinium 238 Np Neptunium 238 Pu Plutonium 238 Am Americium 238 Cm Curium 238 Bk Berkelium 238 Cf Californium 238 Es Einsteinium 238 Fm Fermium 238 Md Mendelevium 238 No Nobelium 238 Lr Lawrencium																											

a	X	b
Key		

a = relative atomic mass

X = atomic symbol

b = proton (atomic) number

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

University of Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.