CHEMISTRY		5070/01
Paper 1 Multiple		ber/November 2006
Additional Materials:	Multiple Choice Answer Sheet	1 hou

## **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.

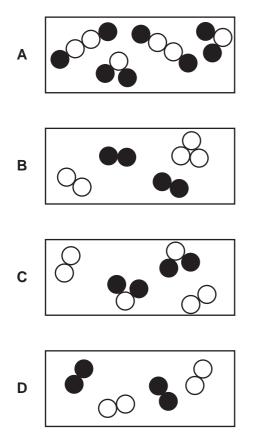
Each correct answer will score one mark. A mark will not be deducted for a wrong answer. Any rough working should be done in this booklet. A copy of the Periodic Table is printed on page 16.

This document consists of 16 printed pages.



- 1 At which temperature does a concentrated aqueous solution of sodium chloride begin to boil?
  - **A** 96 °C **B** 99 °C **C** 100 °C **D** 104 °C
- 2 The symbols  $\bigcirc$  and  $\bigcirc$  represent atoms of different elements.

Which diagram shows a mixture of an element and a compound?

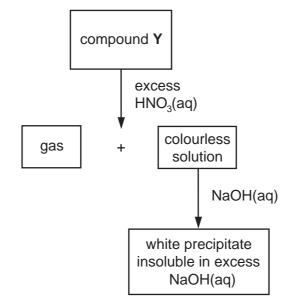


**3** An aqueous solution of compound **X** reacts with aqueous sodium hydroxide to form a green precipitate and then aluminium powder is added. The mixture is heated and a gas that turns damp red litmus paper blue is given off.

What is X?

- A ammonium nitrate
- **B** copper(II) chloride
- **C** iron(II) nitrate
- **D** iron(III) chloride

- **4** Which of the following reagents could be used to distinguish between dilute nitric acid and dilute hydrochloric acid?
  - **A** aqueous barium chloride
  - **B** copper(II) carbonate
  - **C** aqueous silver nitrate
  - D aqueous sodium hydroxide
- 5 The scheme shows some reactions of a compound Y.



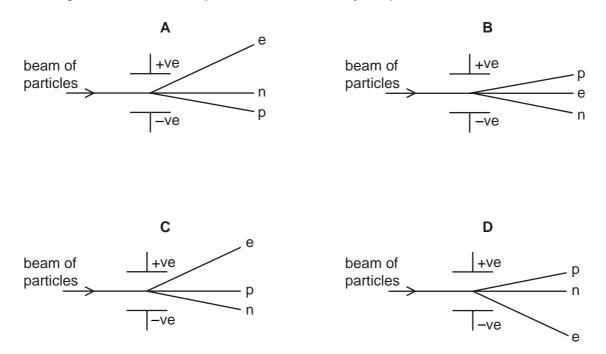
What could the compound Y be?

- **A** aluminium sulphate
- B calcium carbonate
- **C** copper(II) carbonate
- D zinc carbonate

6 A beam of particles contains neutrons, n, protons, p, and electrons, e.

The beam is passed between charged plates.

Which diagram shows how the particles are affected by the plates?

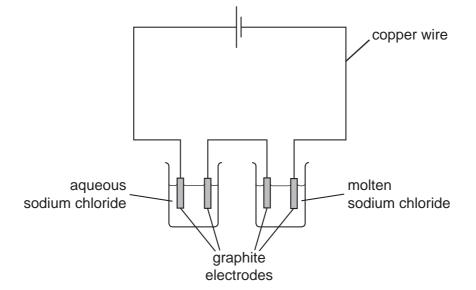


7 The table shows the properties of some substances.

Which substance is a covalent compound?

	melting point	electrical conductivity		
	/°C	of solid	of liquid	
Α	-38	conducts	conducts	
в	-7	does not conduct	does not conduct	
С	801	does not conduct	conducts	
D	1540	conducts	conducts	

8 The diagram shows the electrolysis of aqueous sodium chloride and of molten sodium chloride.



Which substance has both positive ions and mobile electrons?

- A aqueous sodium chloride
- **B** copper wire
- **C** graphite electrodes
- D molten sodium chloride
- 9 Hydrogen can form both ionic and covalent compounds.

With which element will hydrogen form an ionic compound?

- A carbon
- B chlorine
- C nitrogen
- D sodium
- 10 Which quantity is the same for one mole of ethanol and one mole of ethane?
  - A mass
  - **B** number of atoms
  - C number of molecules
  - D volume at r.t.p.

**11** In an experiment 264 g of strontium reacts with 213 g of chlorine.

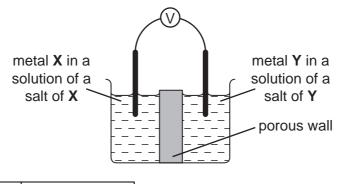
What is the formula of strontium chloride?

- **A** SrCl **B** SrCl<sub>2</sub> **C** SrCl<sub>3</sub> **D** Sr<sub>2</sub>Cl
- **12** Aqueous copper(II) sulphate is electrolysed using copper electrodes.

Which observations will be made?

	at anode (+ve)	at cathode (-ve)	electrolyte
Α	anode dissolves	pink solid forms	blue colour fades
в	anode dissolves	pink solid forms	no change
С	colourless gas forms	colourless gas forms	no change
D	colourless gas forms	pink solid forms	blue colour fades

**13** Which pair of metals **X** and **Y** will produce the highest voltage when used as electrodes in a simple cell?



	metal <b>X</b> meta		
Α	copper	silver	
В	magnesium	silver	
С	magnesium	zinc	
D	zinc	copper	

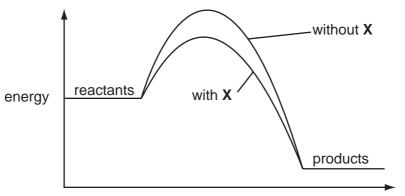
- 14 On combustion, which fuel never produces pollutants?
  - A diesel
  - B hydrogen
  - C methane
  - D petrol

15 The reversible reaction below has reached dynamic equilibrium.

$$N_2O_4(g) \rightleftharpoons 2NO_2(g)$$

What does the term dynamic equilibrium mean?

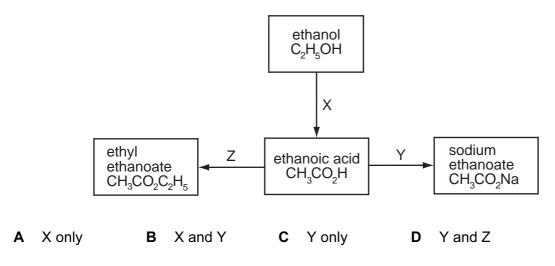
- **A** The reaction has stopped.
- **B** The rate of the forward reaction is now zero.
- **C** The concentrations of  $NO_2$  and  $N_2O_4$  are equal.
- **D** The rates of the forward and backward reactions are equal.
- **16** The energy profile diagrams show how adding a substance **X** to a reaction mixture changes the reaction pathway.



reaction pathway

Which change occurs when X is added to the reaction mixture?

- **A** The rate of reaction decreases.
- **B** The rate of reaction increases.
- C The reaction becomes less exothermic.
- **D** The reaction becomes more exothermic.
- 17 Which of the reactions X, Y and Z involve oxidation?

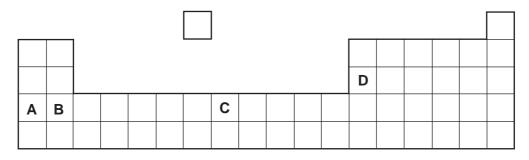


- 18 Which compound, when added to aqueous iron(II) sulphate, takes part in a redox reaction?
  - A ammonia
  - B barium chloride
  - **C** acidified potassium dichromate(VI)
  - **D** sodium hydroxide
- 19 Which substance does not produce copper(II) sulphate when added to dilute sulphuric acid?
  - A copper
  - B copper(II) carbonate
  - C copper(II) hydroxide
  - D copper(II) oxide
- **20** Which ionic equation represents the neutralisation of aqueous sodium hydroxide with dilute nitric acid?
  - $\textbf{A} \quad \textbf{H}^{\scriptscriptstyle +} + \textbf{O}\textbf{H}^{\scriptscriptstyle -} \rightarrow \textbf{H}_2\textbf{O}$
  - **B** Na<sup>+</sup> + NO<sub>3</sub><sup>-</sup>  $\rightarrow$  NaNO<sub>3</sub>
  - $\textbf{C} \quad Na^{+} + HNO_{3} \rightarrow NaNO_{3} + H^{+}$
  - **D** NaOH +  $H^+ \rightarrow Na^+ + H_2O$
- **21** The positions of four elements are shown on the outline of part of the Periodic Table.

Element X has a high melting point and is a good conductor of electricity.

It forms chlorides  $XCl_2$  and  $XCl_3$ .

Which element is X?

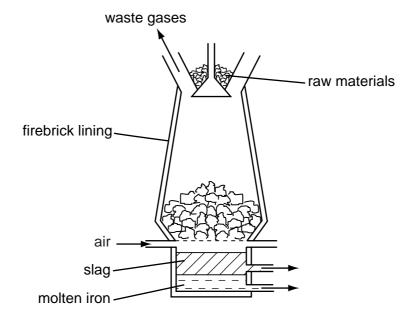


- 22 Why is nickel used in the hydrogenation of alkenes?
  - **A** It increases the yield of products.
  - **B** It lowers the activation energy of the reaction.
  - **C** It makes the reaction more exothermic.
  - **D** It prevents a reverse reaction from occurring.
- **23** Three elements *X*, *Y* and *Z* have consecutive, increasing proton numbers.

If element X is a noble gas, what will be the symbol for the ions of element Z in its compounds?

**A**  $Z^{2-}$  **B**  $Z^{+}$  **C**  $Z^{2+}$  **D**  $Z^{3+}$ 

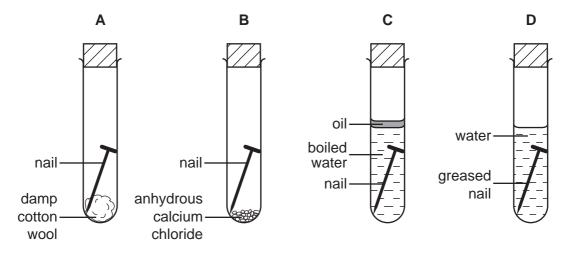
- 24 Which substance reacts with water to form a soluble compound and an insoluble gas?
  - **A** ammonium sulphate
  - B caesium
  - C calcium carbonate
  - D copper
- 25 Iron is extracted in the blast furnace using the raw materials haematite, coke and limestone.



Which substance undergoes thermal decomposition?

- A limestone
- B carbon dioxide
- C haematite
- D slag

- 26 Which gas is not formed during the manufacture of aluminium?
  - A carbon dioxide
  - B carbon monoxide
  - C oxygen
  - D sulphur dioxide
- 27 In which test-tube is the iron nail most likely to rust?



28 The carbonate of metal X is a white solid.

It decomposes when heated to form carbon dioxide and a yellow solid oxide.

What is metal X?

- A copper
- B iron
- C lead
- D sodium
- 29 Which metal will displace hydrogen from aqueous solutions of acids but not from cold water?
  - A calcium
  - B copper
  - C sodium
  - D zinc

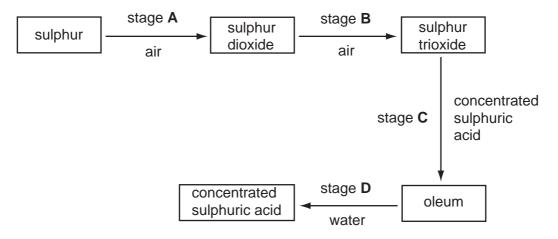
**30** The table shows the solubility of some salts of metal **Y** in cold water.

salt	solubility in cold water
carbonate	insoluble
chloride	soluble
sulphate	insoluble

What is metal Y?

- A barium
- B lead
- C magnesium
- **D** sodium
- 31 Which method would not produce ammonia gas?
  - A heating concentrated aqueous ammonia
  - **B** heating ammonium chloride with calcium hydroxide
  - **C** heating ammonium sulphate with sodium hydroxide
  - D heating ammonium sulphate with dilute hydrochloric acid
- 32 The following scheme shows four stages in the conversion of sulphur to sulphuric acid.

In which stage is a catalyst used?



**33** Vegetable matter is biodegradable.

Which gas is released into the atmosphere when vegetable matter biodegrades?

- A carbon monoxide
- B methane
- **C** nitrogen dioxide
- D sulphur dioxide
- **34** To reduce atmospheric pollution, the waste gases from a coal-burning power station are passed through powdered calcium carbonate.

Which waste gas will not be removed by the powdered calcium carbonate?

- A carbon monoxide, CO
- B nitrogen dioxide, NO<sub>2</sub>
- **C** phosphorus(V) oxide, P<sub>2</sub>O<sub>5</sub>
- **D** sulphur dioxide, SO<sub>2</sub>
- **35** A compound, **X**, has a molecular formula  $C_4H_8O_2$  and can be prepared by the reactions shown.



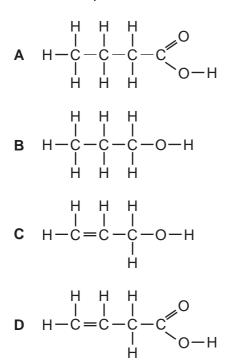
What is the structural formula of X?

- A HCO<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>
- B CH<sub>3</sub>CO<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>
- C CH<sub>3</sub>CH<sub>2</sub>CO<sub>2</sub>CH<sub>3</sub>
- D CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>CO<sub>2</sub>H

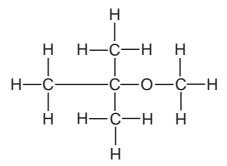
36 The results of tests on compound Z are shown.

test	result	
add bromine water	turns colourless	
add aqueous sodium carbonate	carbon dioxide formed	

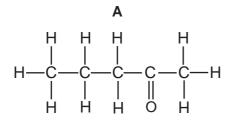
What is compound **Z**?

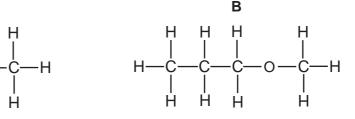


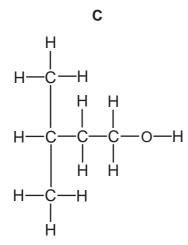
**37** A compound known in industry as 'MTBE' is used as an additive in 'lead-free' petrol. The structural formula of MTBE is shown.

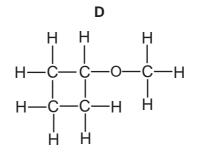


Which compound is an isomer of MTBE?







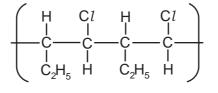


**38** A liquid reacts with each of sodium carbonate, potassium hydroxide and ethanol.

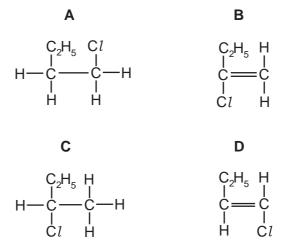
What is the liquid?

- A aqueous ammonia
- B ethanoic acid
- C ethyl ethanoate
- D hydrochloric acid

**39** The structural formula of a polymer is shown below.



Which one of the following will form this polymer?



40 A polymer X was hydrolysed and the two products were



What can be deduced about **X**?

- A It was a condensation polymer.
- B It was starch.
- **C** It was made by addition polymerisation.
- **D** It was *Terylene*.

	0	4 Helium	20 Neon Argon	84 Krypton 131 Xenon Xenon	Radon	175 Lut Luteium 71 Lawrencium 103
	١١	0	19 19   9 Fluorine 10   35.5 Chlorine 18   17 Chlorine 18	80 Br <sup>300mine</sup> 127 Iodine	At At Astatine 86	173 173 177 70 Nobelium 102 102
	⋝		8 Oxygen 9 8 32 33 32 \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	79 Selenium 34 128 128 34 128	olonium Jonium	169 Thulium 69 Mendelevium 101
	>		14 Nitrogen 7 31 Phosphorus 15	75 Ashanic 33 122 Sb Antimony	Bismuth 83 Bismuth	167 Er 68 Fermium 100
	≥		6 Carbon 6 28 28 28 14 Silicon	73 Germanium 32 119 119 Sn	207 207 82 Lead	165 Holmium 67 Einsteinium 99
	≡		11 <b>B</b> 5 8000 5 27 <b>A</b> 1 Mininium 13	70 Galilum 31 115 Indium	204 <b>T 1</b> B1	162 Dysprosium 66 Californium 98
SILLS				65 Zinc 30 112 112 Cdd Cdd	201 201 Mercury 80	159 Tb 65 Berkelium 97
				64 Copper 108 Silver	197 <b>Au</b> 79 Gold	157 Gdd Gd 64 64 Cmium 96
Group				59 Nickel 106 Palladium	195 195 Platinum 78	152 Eu 63 Amenicium 95
			_	59 CO 27 103 Rhodium	192 <b>Ir</b> Indium	150 Samarium 62 PUtonium 94
		L Hydrogen		Fe Fe Iron 26 Ruthenium	Dosmium 76	Promethium 61 Neptunium 93
				55 Manganese 25 Technetium	186 Rtenium 75	144 Neodymium 60 Cranium 92
				52 Chromium 24 96 Molybdenum	184 184 74 74	141 Praseodymium 59 Protactinium 91
				51 Vanadium 23 93 93 93	181 181 Tantalum 73	140 Cerium 58 232 232 Thorium
				48 Titanium 22 91 91 Croonium	178 Hathium 72	L nic mass bol number
				45 Scandium 21 89 89	39 139 Lanthanum 57 ∗ 227 Actinium 89	id series a series a = relative atomic mass X = atomic symbol b = proton (atomic) number
	=		9 Beryllium 4 24 Nagnesium 12	A0 Calcium 20 88 88 Strontium	137 137 3arium 226 <b>Ra</b> adium	noid
				Potassium 19 85 85 Rb bubidium	Francium	ام <mark>ت</mark>

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 University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.