

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Ordinary Level

**CHEMISTRY**

**5070/01**

Paper 1 Multiple Choice

October/November 2006

**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.

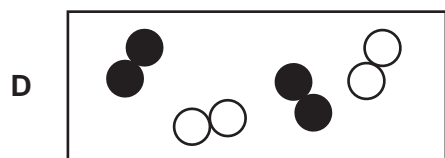
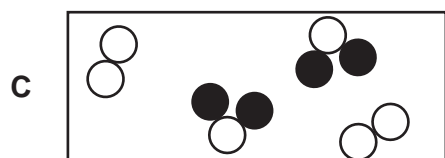
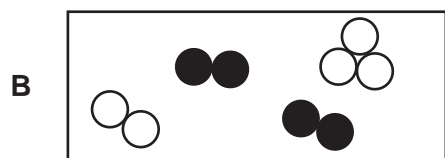
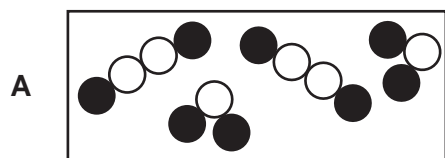
This document consists of **16** printed pages.



- 1 At which temperature does a concentrated aqueous solution of sodium chloride begin to crystallise?
- A 96°C                      B 99°C                      C 100°C                      D 104°C

- 2 The symbols  and  represent atoms of different elements.

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

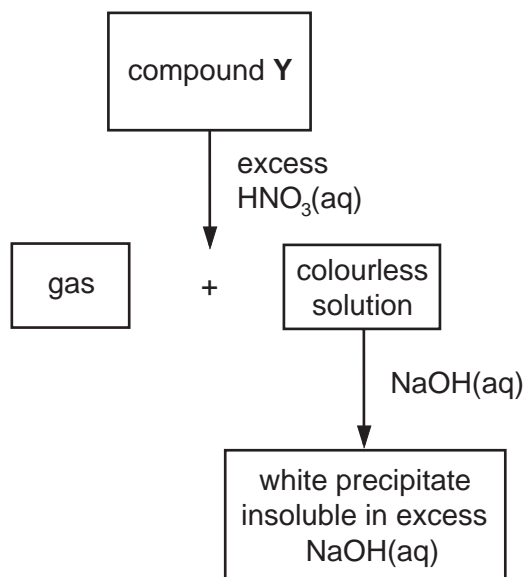


- 3 An aqueous solution of compound **X** reacts with aqueous sodium hydroxide to form a green precipitate and then aluminium powder is added. The mixture is heated and a gas that turns damp red litmus paper blue is given off.

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.



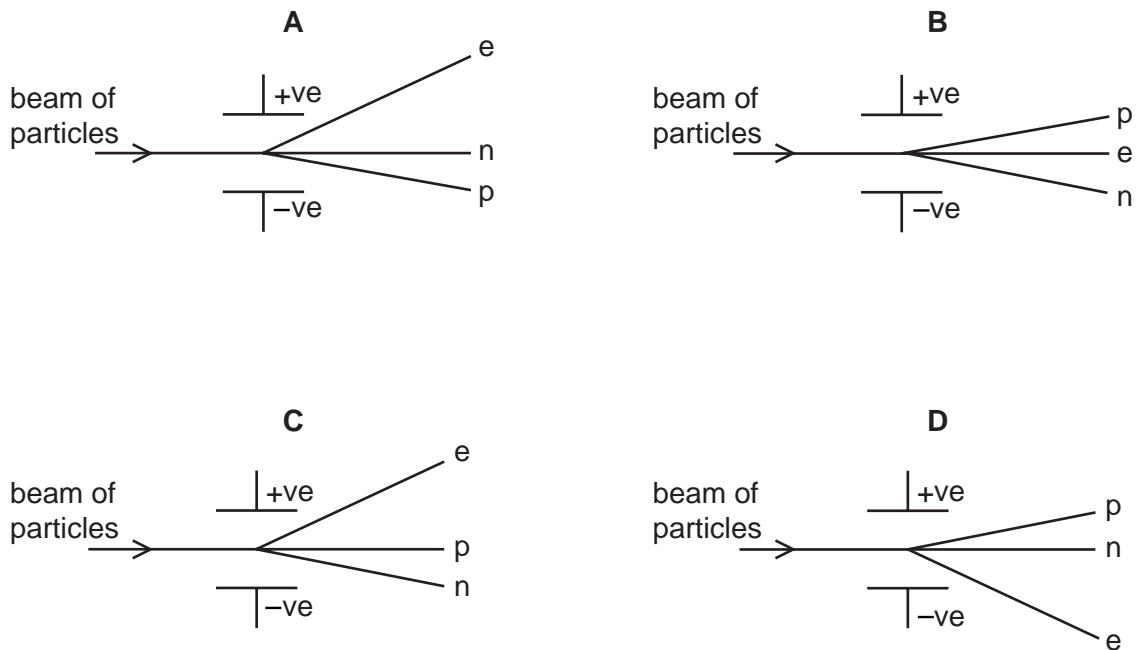
What could the compound Y be?

- 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?

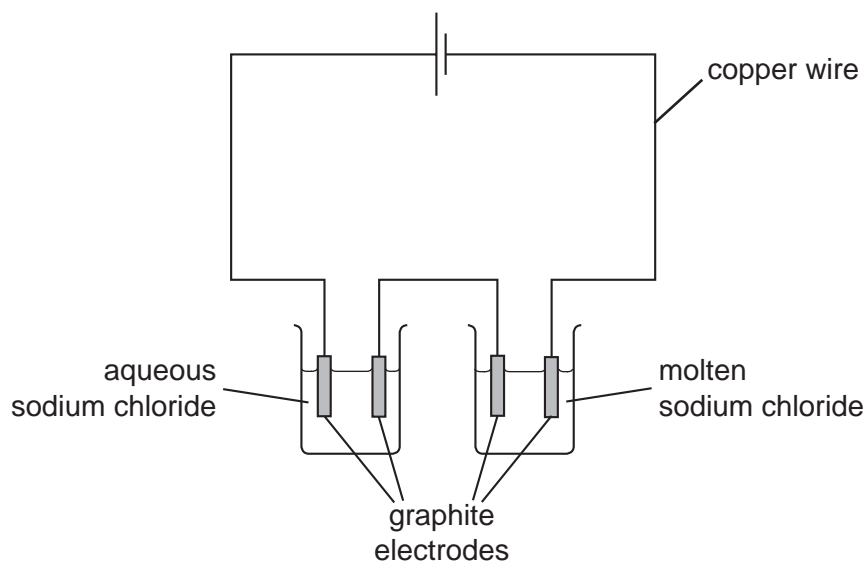


- 7 The table shows the properties of some substances.

Which substance is a covalent compound?

	melting point /°C	electrical conductivity	
		of solid	of liquid
<b>A</b>	-38	conducts	conducts
<b>B</b>	-7	does not conduct	does not conduct
<b>C</b>	801	does not conduct	conducts
<b>D</b>	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?

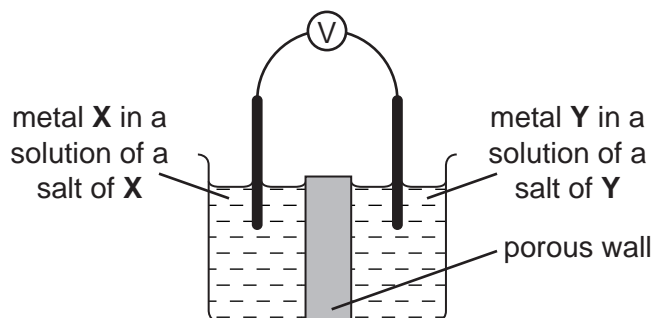
- A  $\text{SrCl}$       B  $\text{SrCl}_2$       C  $\text{SrCl}_3$       D  $\text{Sr}_2\text{Cl}$

12 Aqueous copper(II) sulphate is electrolysed using copper electrodes.

Which observations will be made?

	at anode (+ve)	at cathode (-ve)	electrolyte
<b>A</b>	anode dissolves	pink solid forms	blue colour fades
<b>B</b>	anode dissolves	pink solid forms	no change
<b>C</b>	colourless gas forms	colourless gas forms	no change
<b>D</b>	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 X	metal Y
<b>A</b>	copper	silver
<b>B</b>	magnesium	silver
<b>C</b>	magnesium	zinc
<b>D</b>	zinc	copper

14 On combustion, which fuel **never** produces pollutants?

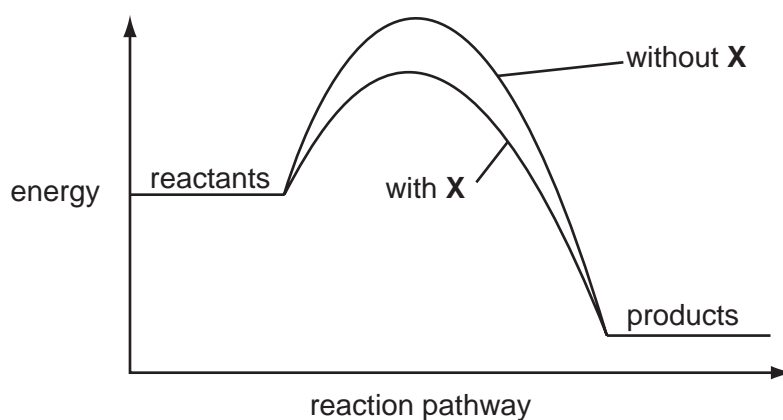
- A diesel  
 B hydrogen  
 C methane  
 D petrol

- 15 The reversible reaction below has reached dynamic equilibrium.



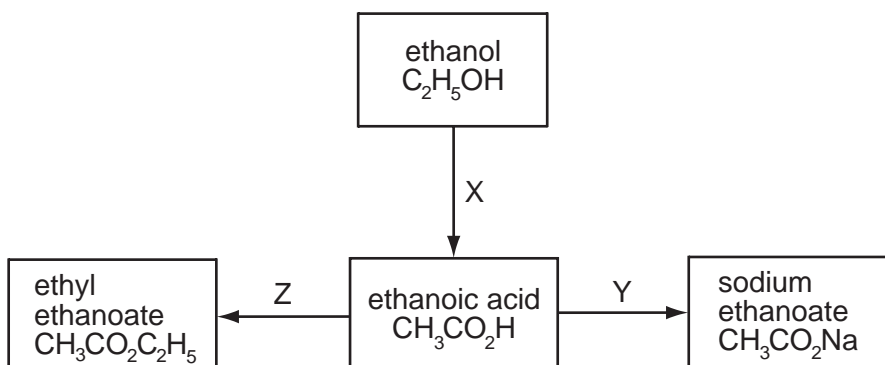
What does the term *dynamic equilibrium* mean?

- A** The reaction has stopped.  
**B** The rate of the forward reaction is now zero.  
**C** The concentrations of  $\text{NO}_2$  and  $\text{N}_2\text{O}_4$  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.



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?



- A** X only      **B** X and Y      **C** Y only      **D** Y and Z





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.

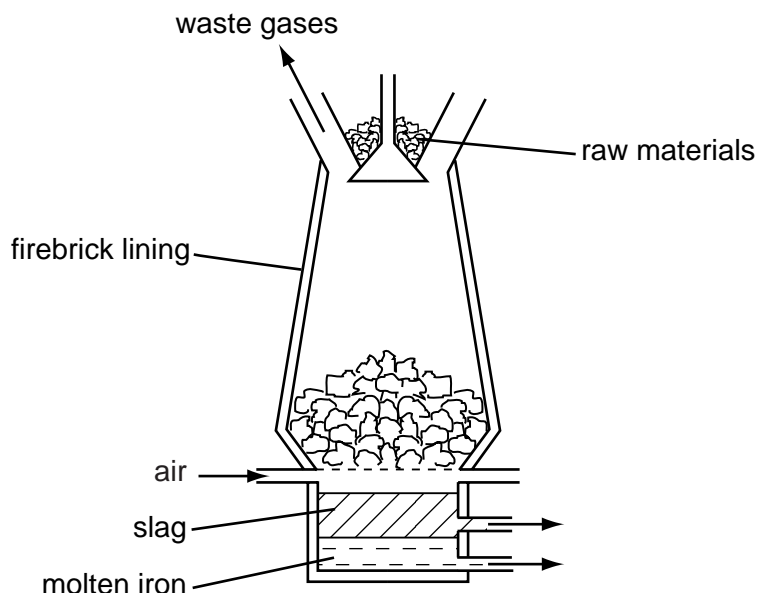
If element X is a noble gas, what will be the symbol for the ions of element Z in its compounds?

- 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.



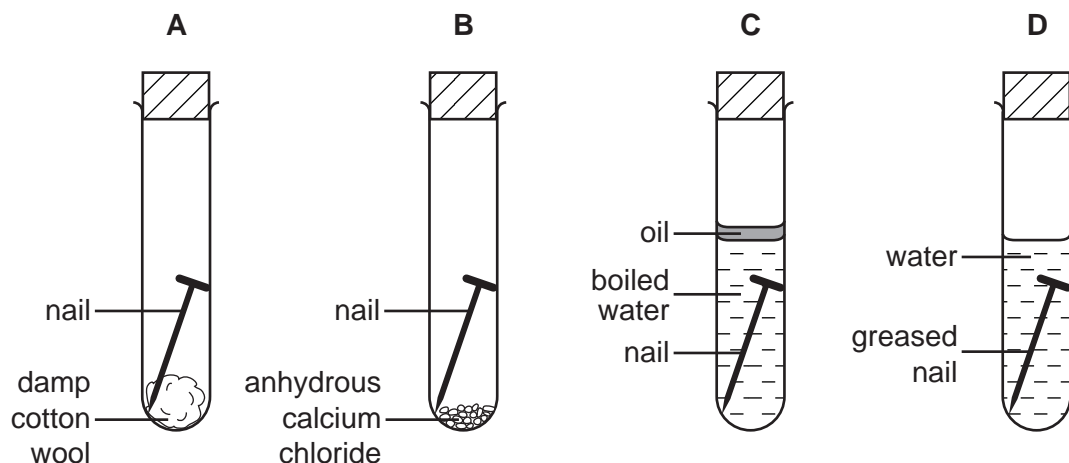
Which substance undergoes thermal decomposition?

- 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

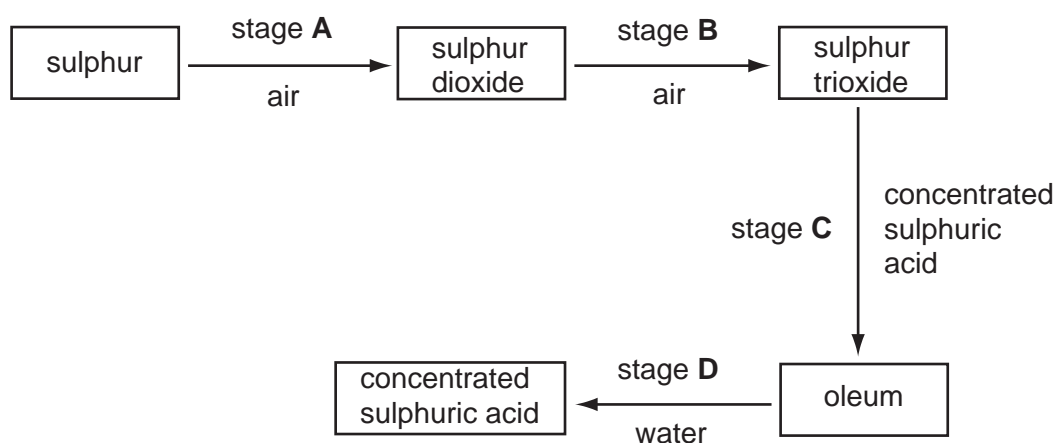
30 The table shows the solubility of some salts of metal Y in cold water.

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<sub>4</sub>H<sub>8</sub>O<sub>2</sub> and can be prepared by the reactions shown.



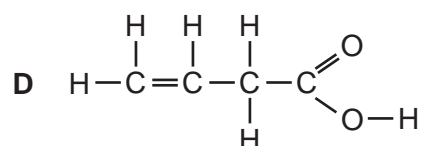
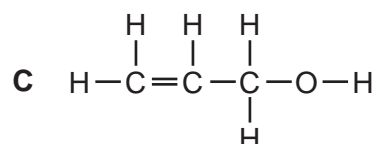
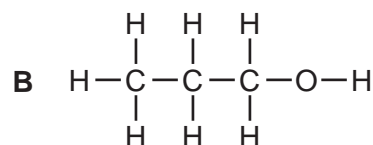
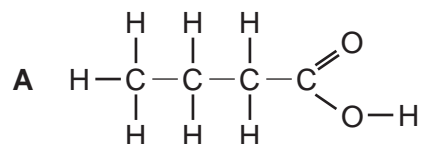
What is the structural formula of **X**?

- 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

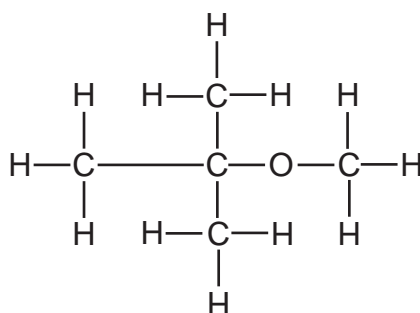
36 The results of tests on compound **Z** are shown.

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

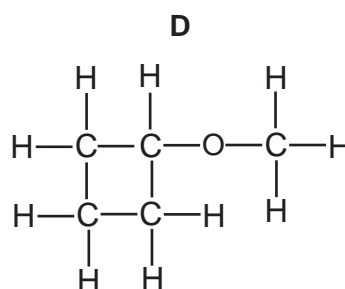
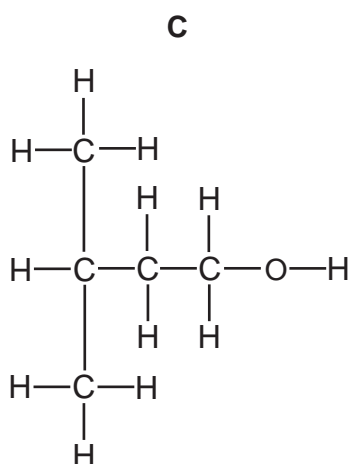
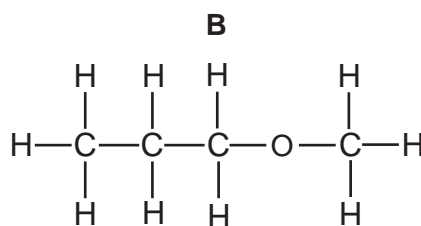
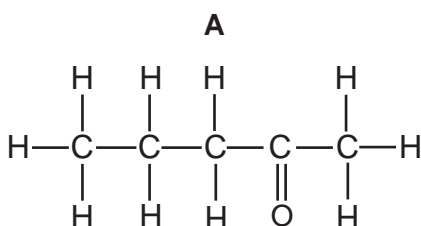
What is compound **Z**?



- 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?

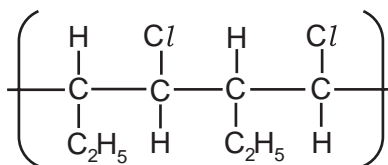


- 38 A liquid reacts with each of sodium carbonate, potassium hydroxide and ethanol.

What is the liquid?

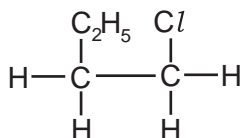
- A aqueous ammonia
- B ethanoic acid
- C ethyl ethanoate
- D hydrochloric acid

39 The structural formula of a polymer is shown below.

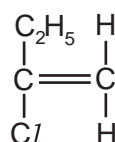


Which one of the following will form this polymer?

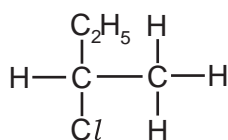
**A**



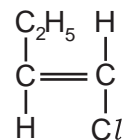
**B**



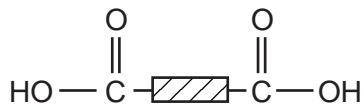
**C**



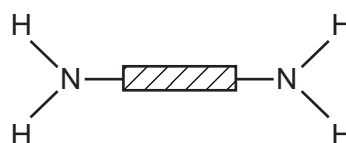
**D**



40 A polymer **X** was hydrolysed and the two products were



and



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*.

**DATA SHEET**  
**The Periodic Table of the Elements**

		Group															
I	II	III	IV	V	VI	VII	0										
		1 <b>H</b> Hydrogen 1												4 <b>He</b> Helium 2			
7 <b>Li</b> Lithium 3	9 <b>Be</b> Beryllium 4											11 <b>B</b> Boron 5	12 <b>C</b> Carbon 6	14 <b>N</b> Nitrogen 7	16 <b>O</b> Oxygen 8	19 <b>F</b> Fluorine 9	20 <b>Ne</b> Neon 10
23 <b>Na</b> Sodium 11	24 <b>Mg</b> Magnesium 12	27 <b>Al</b> Aluminium 13	28 <b>Si</b> Silicon 14	31 <b>P</b> Phosphorus 15	32 <b>S</b> Sulphur 16	35.5 <b>Cl</b> Chlorine 17	40 <b>Ar</b> Argon 18										
39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20	56 <b>Fe</b> Iron 26	55 <b>Mn</b> Manganese 25	59 <b>Co</b> Cobalt 27	59 <b>Ni</b> Nickel 28	64 <b>Cu</b> Copper 29	65 <b>Zn</b> Zinc 30	70 <b>Ga</b> Gallium 31	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34	80 <b>Br</b> Bromine 35	84 <b>Kr</b> Krypton 36				
85 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38	101 <b>Ru</b> Ruthenium 44	101 <b>Tc</b> Technetium 43	103 <b>Rh</b> Rhodium 45	106 <b>Pd</b> Palladium 46	108 <b>Ag</b> Silver 47	112 <b>Cd</b> Cadmium 48	115 <b>In</b> Indium 49	119 <b>Sn</b> Tin 50	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52	127 <b>I</b> Iodine 53	131 <b>Xe</b> Xenon 54				
133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	186 <b>Os</b> Osmium 76	186 <b>Re</b> Rhenium 75	184 <b>W</b> Tungsten 74	192 <b>Ir</b> Iridium 77	195 <b>Pt</b> Platinum 78	201 <b>Hg</b> Mercury 80	204 <b>Tl</b> Thallium 81	207 <b>Pb</b> Lead 82	209 <b>Bi</b> Bismuth 83	210 <b>Po</b> Polonium 84	210 <b>At</b> Astatine 85	210 <b>Rn</b> Radon 86				
226 <b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89																
		140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	144 <b>Nd</b> Neodymium 60	150 <b>Sm</b> Samarium 62	152 <b>Eu</b> Europium 63	157 <b>Gd</b> Gadolinium 64	162 <b>Dy</b> Dysprosium 66	165 <b>Ho</b> Holmium 67	167 <b>Er</b> Erbium 68	169 <b>Tm</b> Thulium 69	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71				
		232 <b>Th</b> Thorium 90	238 <b>Pa</b> Protactinium 91	238 <b>U</b> Uranium 92	244 <b>Pu</b> Plutonium 94	254 <b>Am</b> Americium 95	261 <b>Cm</b> Curium 96	269 <b>Bk</b> Berkelium 97	277 <b>Cf</b> Californium 98	285 <b>Es</b> Einsteinium 99	293 <b>Fm</b> Fermium 100	301 <b>Md</b> Mendelevium 101	309 <b>No</b> Nobelium 102	315 <b>Lr</b> Lawrencium 103			

\*58-71 Lanthanoid series  
†90-103 Actinoid series

a	<b>X</b>	b
Key	a = relative atomic mass	X = atomic symbol
		b = proton (atomic) number

The volume of one mole of any gas is 24 dm<sup>3</sup> 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.