CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CHEMISTRY **5070/01**

Paper 1 Multiple Choice

October/November 2003

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 20.

This document consists of **18** printed pages and **2** blank pages.

MML 5269 3/03 S60199/1

UNIVERSITY *of* CAMBRIDGE
Local Examinations Syndicate

[Turn over

1 What is the most suitable way of investigating the different food colourings in some drinks?

A crystallisation

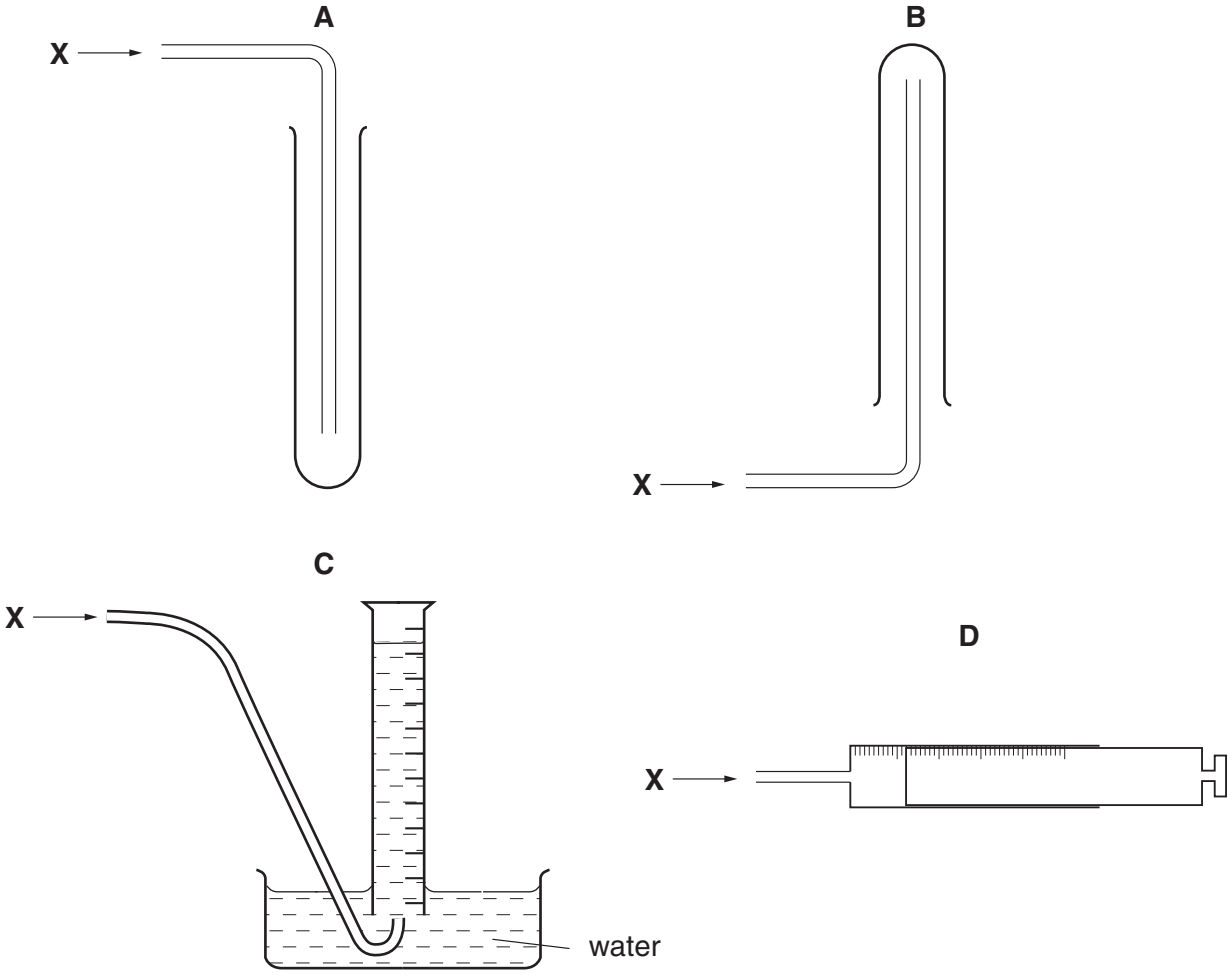
B filtration

C fractional distillation

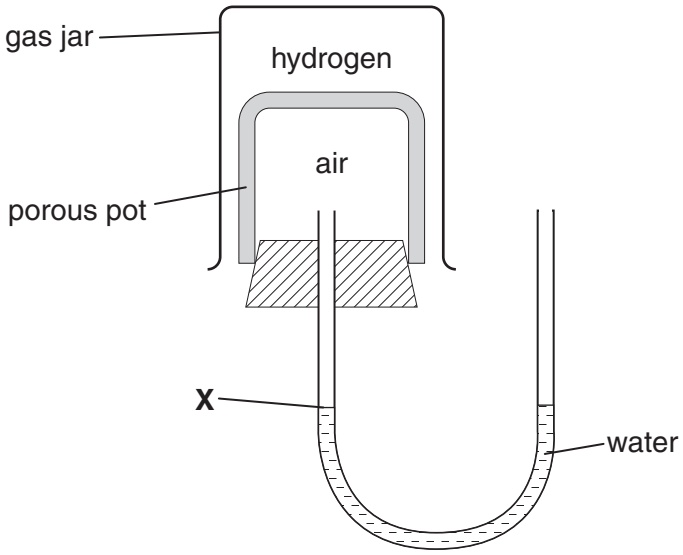
D paper chromatography

2 A gas, **X**, is less dense than air and insoluble in water.

Which method **cannot** be used to collect the gas?



3 The apparatus shown in the diagram was set up.



Over a period of time how will the water level at **X** change?

A It will fall, then rise and return to **X**.

B It will fall and remain at a lower level.

C It will rise, then fall then return to **X**.

D It will rise and remain at a higher level.

4 A salt is dissolved in water. The results of two separate tests on it are shown in the table.

	test	result
1	add aqueous ammonia	a white precipitate which dissolves when an excess of aqueous ammonia is added
2	add dilute nitric acid then aqueous barium nitrate	a white precipitate

What is the salt?

A aluminium chloride

B aluminium sulphate

C zinc chloride

D zinc sulphate

5 A researcher notices that atoms of an element **X** are releasing energy.

Why does this happen?

A The atoms are affected by light.

B The atoms are radioactive.

C The atoms react with argon in the air.

D The atoms are evaporating.

6 An atom of element **X** is represented by $^{7}_{3}\mathbf{X}$.

Which statement about an atom of **X** is correct?

A It is in Group III of the Periodic Table.

B It is in Group VII of the Periodic Table.

C The total number of protons and electrons is 6.

D The total number of protons and neutrons is 10.

7 In which pair of substances, does each have a giant molecular structure?

A diamond, iodine

B diamond, silica (sand)

C iodine, methane

D methane, silica (sand)

8 In which substance is each carbon atom **covalently** bonded to only three other atoms?

A carbon dioxide

B diamond

C graphite

D methane

9 How many electrons are shared in the covalent bonding of a methane molecule?

A 2

B 4

C 6

D 8

10 The table gives information about the ability of four substances to conduct electricity.

substance	
W	does not conduct under any conditions
X	conducts only in aqueous solution
Y	conducts when molten and when solid
Z	conducts when molten and when in aqueous solution

What could these four substances be?

	W	**X**	**Y**	**Z**
A	Pb	HC*l*	NaC*l*	S
B	S	HC*l*	NaC*l*	Pb
C	S	HC*l*	Pb	NaC*l*
D	S	NaC*l*	HC*l*	Pb

11 What is the mass of magnesium which completely reacts with 250 cm^3 of 1.0 mol/dm^3 sulphuric acid?

A 6 g **B** 12 g **C** 48 g **D** 96 g

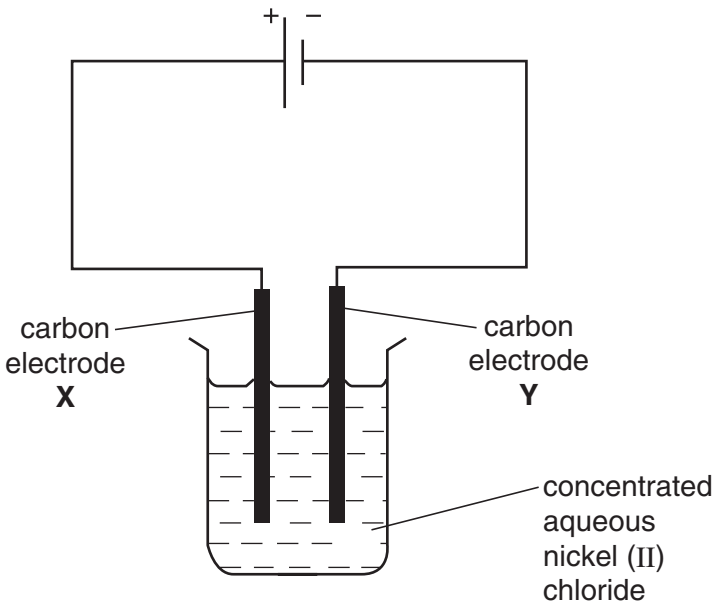
12 A volume of ethane, C_2H_6, at r.t.p. has a mass of 20 g.

What is the mass of an equal volume of propene, C_3H_6, at r.t.p.?

A 20 g **B** 21 g **C** 28 g **D** 42 g

[Turn over

13 Apparatus is set up as shown in the diagram.



What occurs at electrode **X**?

A Chloride ions are oxidised.

B Chloride ions are reduced.

C Nickel ions are oxidised.

D Nickel is deposited.

14 Which of the following, when added to water, makes a solution that is a good conductor of electricity?

A calcium carbonate

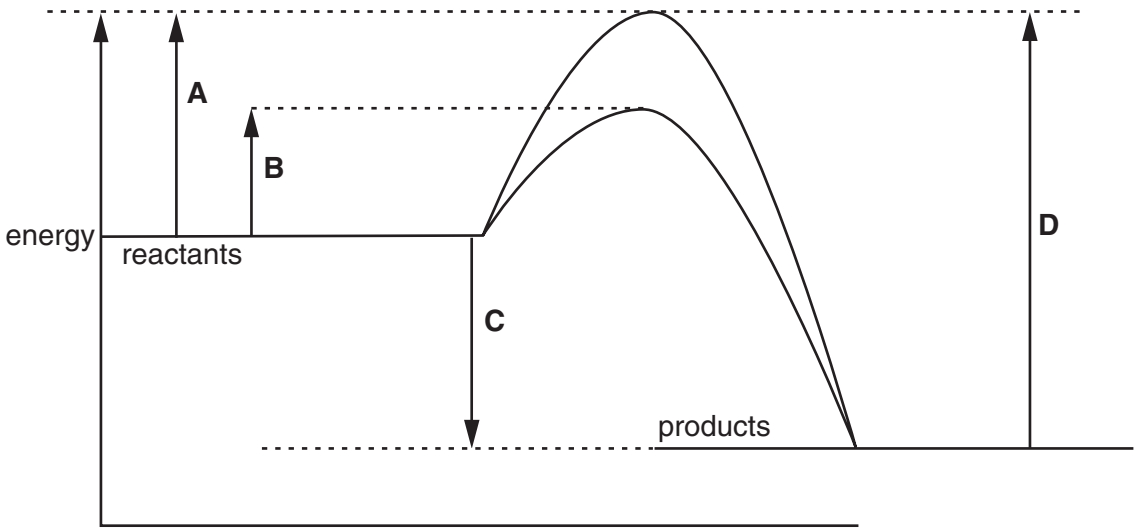
B copper

C ethanol

D sodium hydroxide

15 The diagram shows an energy profile diagram for a chemical reaction.

Which energy change is the activation energy for the catalysed reaction?



16 The formation of hydrogen iodide from hydrogen and iodine is an endothermic reaction.

$$H-H \quad + \quad I-I \quad \longrightarrow \quad H-I \quad + \quad H-I$$

What may be deduced from this information?

A The number of bonds broken is greater than the number of bonds formed.

B The formation of H – I bonds absorbs energy.

C The products possess less energy than the reactants.

D The total energy change in bond formation is less than that in bond breaking.

[Turn over

17 Calcium carbonate was reacted with an excess of dilute hydrochloric acid at room temperature.

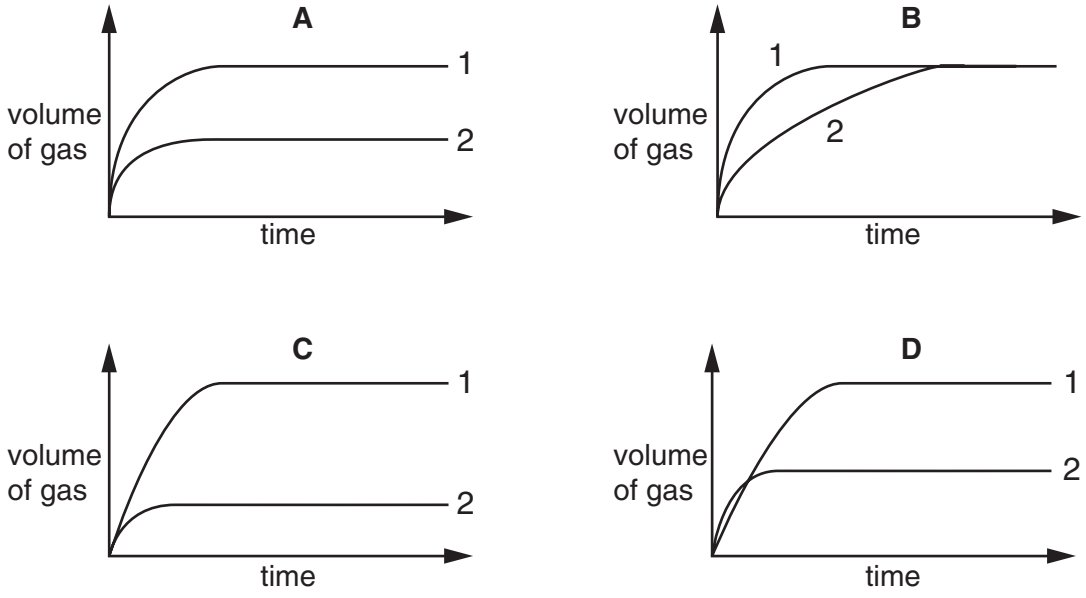
$$CaCO_3 + 2HCl \longrightarrow CaCl_2 + H_2O + CO_2$$

Two experiments were carried out.

Experiment 1 100 g of calcium carbonate in large lumps.

Experiment 2 50 g of calcium carbonate as a fine powder.

Which of the graphs is correct?



18 When acidified potassium manganate(VII) is reduced, which colour change occurs?

A from colourless to purple

B from green to orange

C from orange to green

D from purple to colourless

19 The pH of an aqueous solution of hydrochloric acid is 2.

What will be the pH of the acid after the addition of 10 g of sodium chloride?

A 1

B 2

C 7

D 9

20 An acid, **X**, was added to a solution of the nitrate of metal **Y**. A dense white precipitate was formed.

What are **X** and **Y**?

	acid **X**	metal **Y**
A	hydrochloric	calcium
B	nitric	zinc
C	sulphuric	aluminium
D	sulphuric	barium

21 Aluminium sulphate is used in water treatment. Aqueous aluminium sulphate is acidic.

The table shows the results of tests on four different samples of treated water.

To which sample had an excess of aluminium sulphate been added?

sample	pH of sample	reaction with an excess of aqueous ammonia
A	3	white precipitate
B	3	no reaction
C	7	no reaction
D	11	white precipitate

22 Which statement about the alkali metals is true?

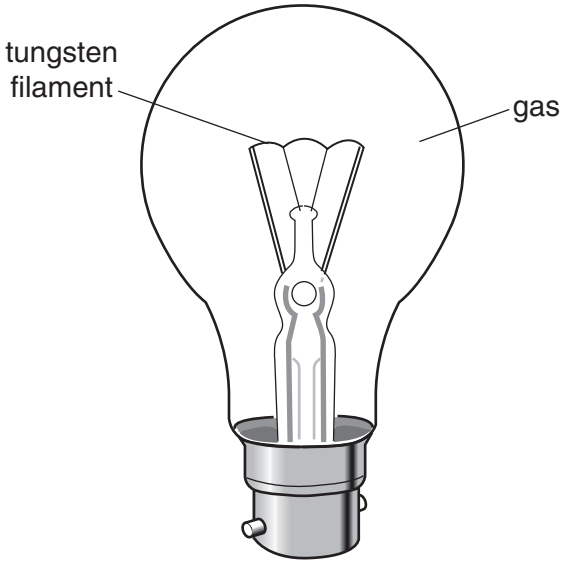
A they form covalent bonds with Group VII elements

B they form oxides on reacting with water

C their melting points decrease on descending Group I

D their reactivities decrease on descending Group I

23 Which gas is present in the light bulb?



A argon

B krypton

C nitrogen

D oxygen

24 Which shows the correct catalyst for each industrial process?

	manufacture of sulphuric acid	manufacture of ammonia	manufacture of margarine
A	nickel	iron	vanadium(V) oxide
B	nickel	vanadium(V) oxide	iron
C	vanadium(V) oxide	iron	nickel
D	vanadium(V) oxide	nickel	iron

25 Which statement is **not** a reason for the importance of recycling aluminium?

A Aluminium is a rare metal in the Earth's crust.

B The demand for aluminium continues to rise annually.

C The extraction of aluminium from its ore is expensive.

D The properties of aluminium make it one of the most useful of all metals.

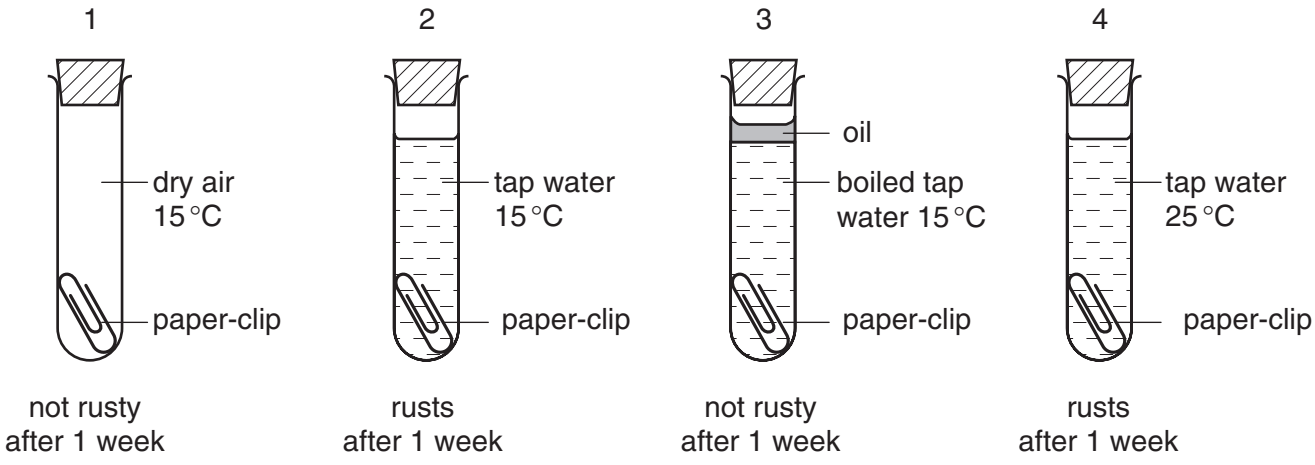
26 Three types of steel have different properties.

steel 1	easily shaped
steel 2	brittle
steel 3	resistant to corrosion

What are the names of these three types of steel?

	steel 1	steel 2	steel 3
A	high carbon	mild	stainless
B	high carbon	stainless	mild
C	mild	high carbon	stainless
D	mild	stainless	high carbon

27 Four experiments on rusting are shown.



Which two experiments can be used to show that air is needed for iron to rust?

A 1 and 3

B 1 and 4

C 2 and 3

D 2 and 4

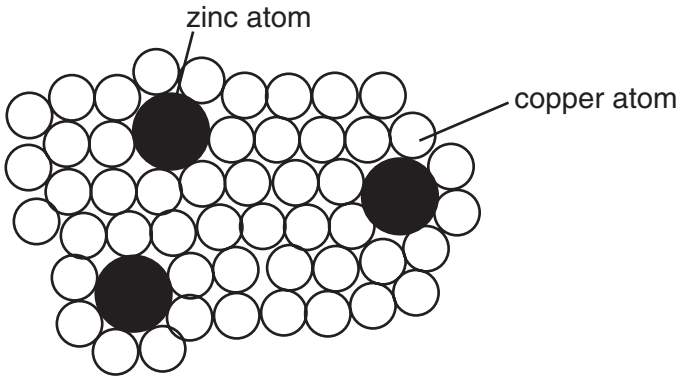
[Turn over

28 The metals iron, lead and zinc can each be manufactured by the reduction of the oxides with coke.

What is the correct order of the ease of reduction of the metal oxides?

	oxides becoming more difficult to reduce →
A	iron, lead, zinc
B	iron, zinc, lead
C	lead, iron, zinc
D	zinc, iron, lead

29 The diagram shows the structure of brass.



Why is brass harder than pure copper?

A The zinc atoms form strong covalent bonds with copper atoms.

B The zinc atoms prevent layers of copper atoms from slipping over each other easily.

C The zinc atoms prevent the 'sea of electrons' from moving freely in the lattice.

D Zinc atoms have more electrons than copper atoms.

30 Which of the following methods would **not** produce ammonia?

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

31 Aqueous copper(II) sulphate is electrolysed using carbon electrodes.

What happens to the electrolyte?

A It becomes more acidic.

B It becomes more alkaline.

C It turns deeper blue.

D It remains unchanged.

32 The water in a lake showed signs of eutrophication.

What could be the cause of this?

A increasing the amount of dissolved fertiliser

B increasing the amount of dissolved oxygen

C decreasing the amount of dissolved mineral salts

D decreasing the number of bacteria

33 Methane, sulphur dioxide and carbon dioxide are gases which affect the atmosphere and the environment.

In what way do these gases affect the environment?

	methane	sulphur dioxide	carbon dioxide
A	depletion of the ozone layer	acid rain	global warming
B	global warming	photochemical smog	acid rain
C	photochemical smog	global warming	depletion of the ozone layer
D	global warming	acid rain	global warming

34 The macromolecules of proteins, fats and carbohydrates can all be broken down into their simple units by a similar process.

What is the process called?

A esterification

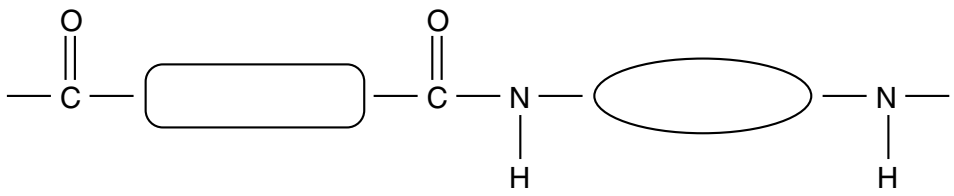
B hydrolysis

C oxidation

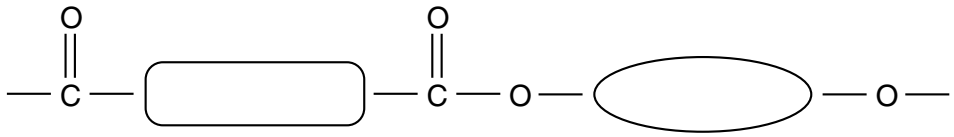
D reduction

35 The repeating units of two polymers, **X** and **Y**, are shown below.

X



Y



What are **X** and **Y**?

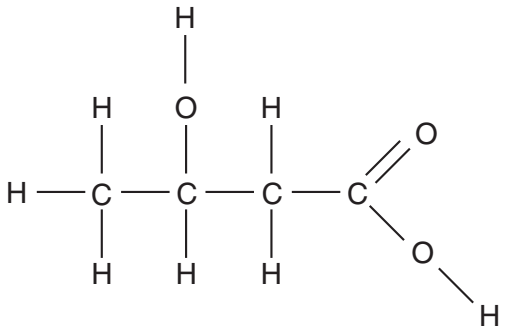
	X	**Y**
A	nylon	*Terylene*
B	starch	*Terylene*
C	protein	starch
D	nylon	protein

36 The table shows the results of tests carried out on compound **X**.

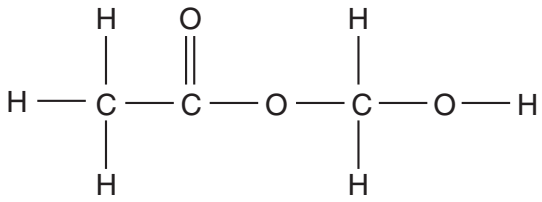
test	result
bromine water added	decolourised
sodium carbonate added	colourless gas evolved

Which formula represents compound **X**?

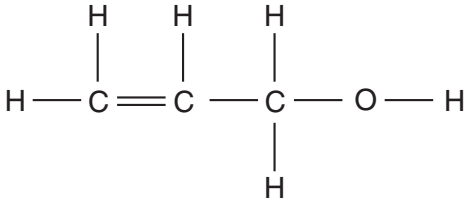
A



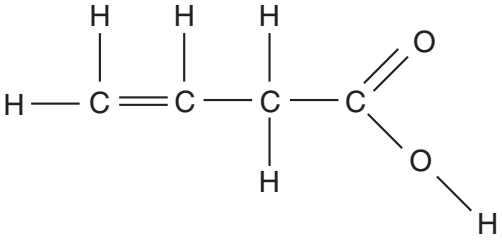
B



C



D



37 Butane and methylpropane are isomers.

Which formula is different for the two isomers?

A empirical formula

B general formula

C molecular formula

D structural formula

[Turn over

38 What is the general formula of the homologous series of carboxylic acids?

methanoic acid	HCO_2H
ethanoic acid	CH_3CO_2H
propanoic acid	$C_2H_5CO_2H$
butanoic acid	$C_3H_7CO_2H$

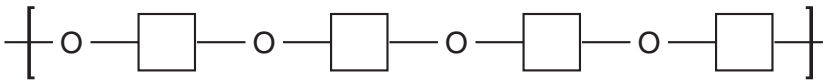
A CHO

B $C_nH_{2n}O$

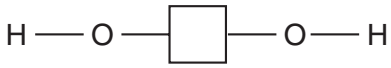
C $C_nH_nO_n$

D $C_nH_{2n}O_2$

39 A section of a polymer is shown.



The monomer is



The monomer undergoes condensation polymerisation. What is made each time a monomer adds to the polymer?

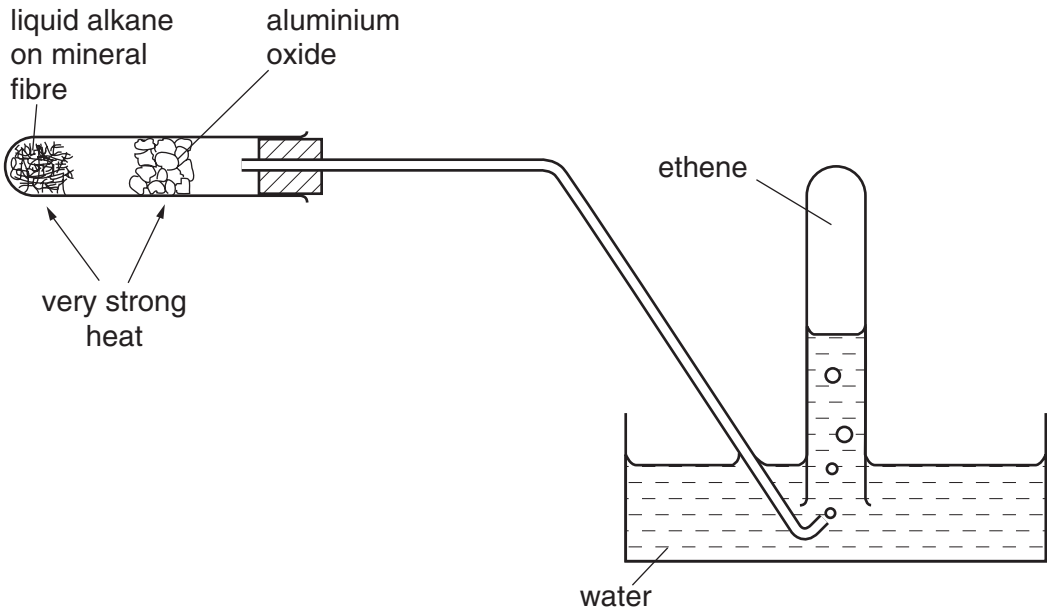
A hydrogen molecules, H_2

B hydroxide ions, OH^-

C oxygen atoms, O

D water molecules, H_2O

40 The experiment shown is carried out.



What process occurs?

A cracking

B dehydrogenation

C distillation

D polymerisation

BLANK PAGE

BLANK PAGE

DATA SHEET
The Periodic Table of the Elements

Group																	
I	II											III	IV	V	VI	VII	0
							1 H Hydrogen 1										4 He Helium 2
7 Li Lithium 3	9 Be Beryllium 4											11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
23 Na Sodium 11	24 Mg Magnesium 12											27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulphur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54
133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57 *	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	Po Polonium 84	At Astatine 85	Rn Radon 86
Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89 †															

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
232 Th Thorium 90	Pa Protactinium 91	238 U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Bk Berkelium 97	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101	No Nobelium 102	Lr Lawrencium 103

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

Key: a = relative atomic mass; X = atomic symbol; b = proton (atomic) number

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