

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.

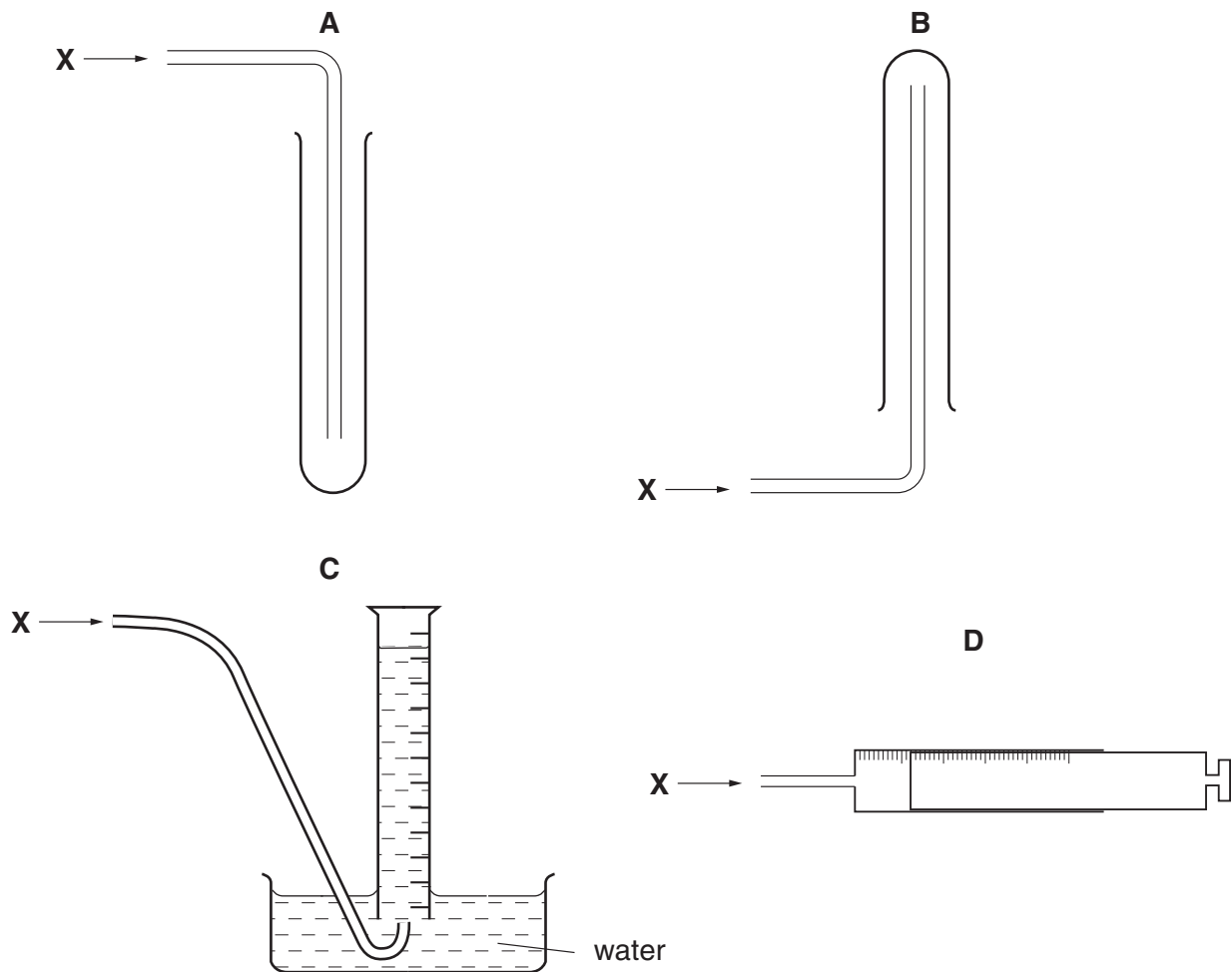
This document consists of **18** printed pages and **2** blank pages.

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

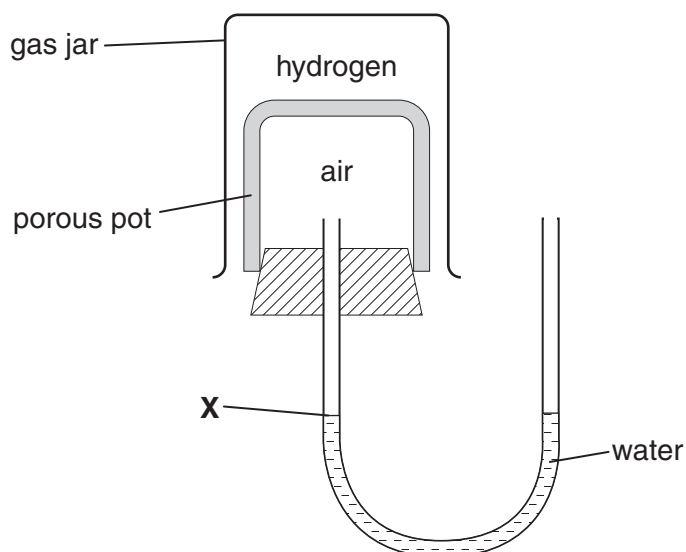
- A crystallisation
- B filtration
- C fractional distillation
- D paper chromatography

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  ${}^7_3\text{X}$ .
- 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	
<b>W</b>	does not conduct under any conditions
<b>X</b>	conducts only in aqueous solution
<b>Y</b>	conducts when molten and when solid
<b>Z</b>	conducts when molten and when in aqueous solution

What could these four substances be?

	<b>W</b>	<b>X</b>	<b>Y</b>	<b>Z</b>
<b>A</b>	Pb	HCl	NaCl	S
<b>B</b>	S	HCl	NaCl	Pb
<b>C</b>	S	HCl	Pb	NaCl
<b>D</b>	S	NaCl	HCl	Pb

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

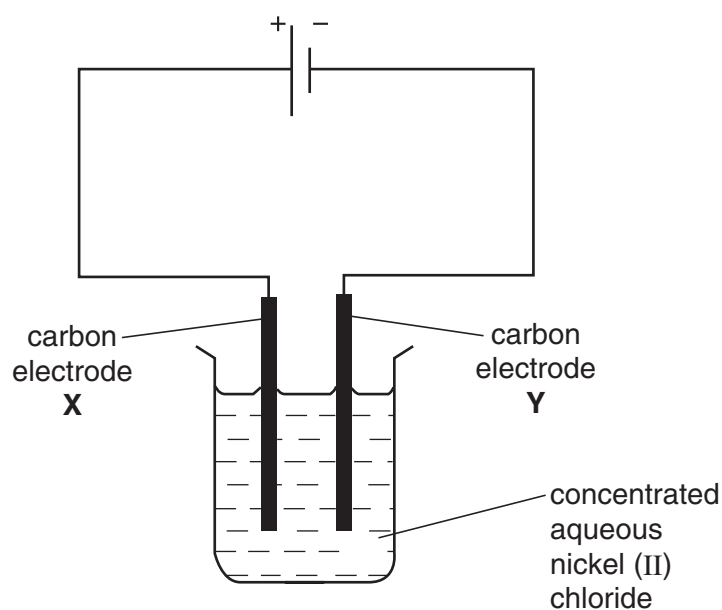
- A 6 g                      B 12 g                      C 48 g                      D 96 g

12 A volume of ethane, C<sub>2</sub>H<sub>6</sub>, at r.t.p. has a mass of 20 g.

What is the mass of an equal volume of propene, C<sub>3</sub>H<sub>6</sub>, at r.t.p.?

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

13 Apparatus is set up as shown in the diagram.

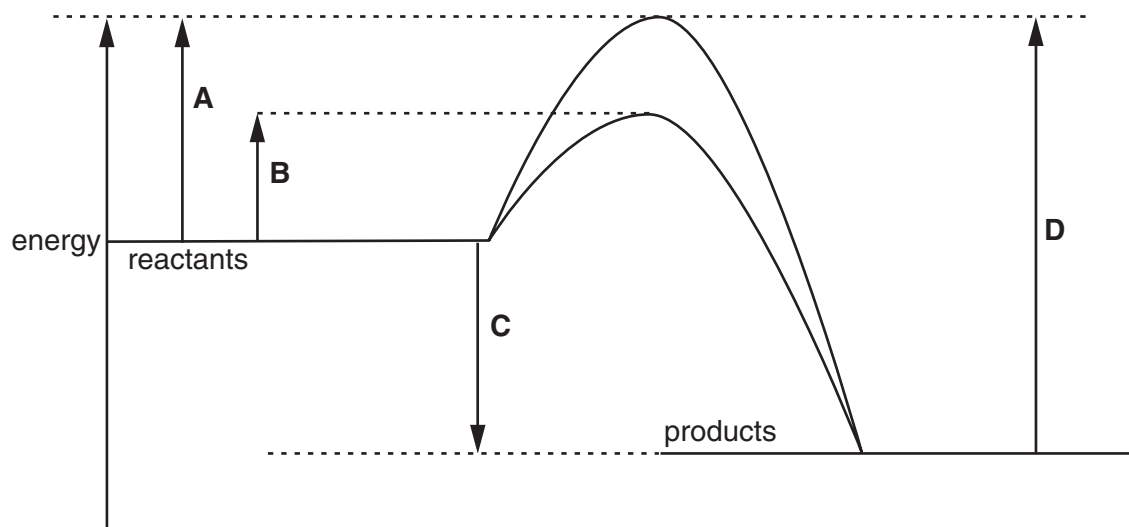


What occurs at electrode **X**?

- 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?



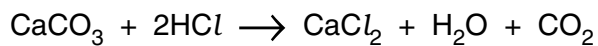
16 The formation of hydrogen iodide from hydrogen and iodine is an endothermic reaction.



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.

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

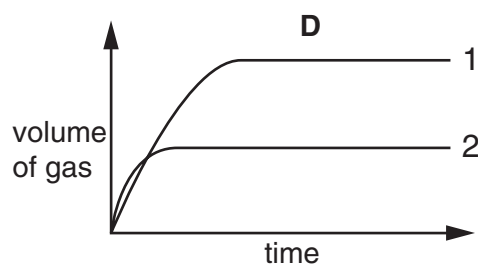
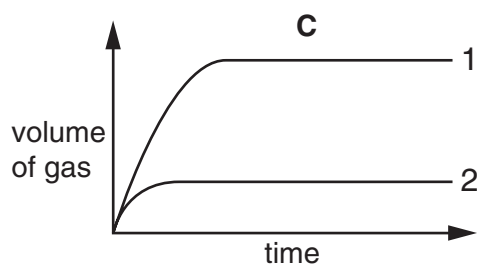
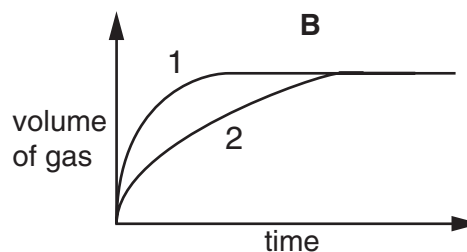
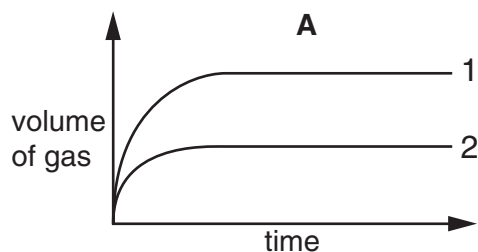


Two experiments were carried out.

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.

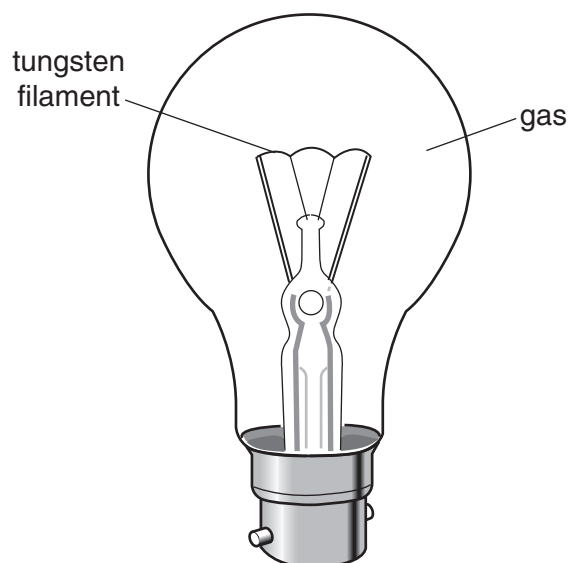
To which sample had an excess of aluminium sulphate been added?

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
<b>A</b>	nickel	iron	vanadium(V) oxide
<b>B</b>	nickel	vanadium(V) oxide	iron
<b>C</b>	vanadium(V) oxide	iron	nickel
<b>D</b>	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
<b>A</b>	high carbon	mild	stainless
<b>B</b>	high carbon	stainless	mild
<b>C</b>	mild	high carbon	stainless
<b>D</b>	mild	stainless	high carbon

27 Four experiments on rusting are shown.

1	2	3	4
dry air 15°C	tap water 15°C	oil boiled tap water 15°C	tap water 25°C
paper-clip	paper-clip	paper-clip	paper-clip
not rusty after 1 week	rusts after 1 week	not rusty after 1 week	rusts after 1 week

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

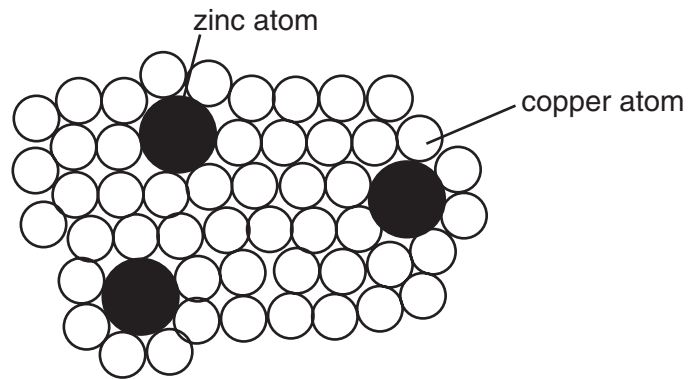
- A 1 and 3
- B 1 and 4
- C 2 and 3
- D 2 and 4

- 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 →
<b>A</b>	iron, lead, zinc
<b>B</b>	iron, zinc, lead
<b>C</b>	lead, iron, zinc
<b>D</b>	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.

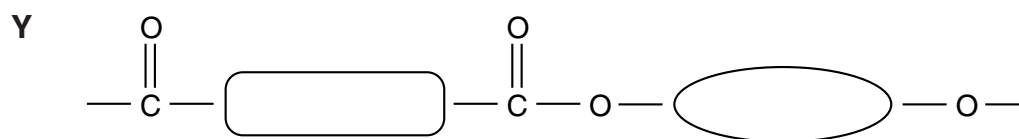
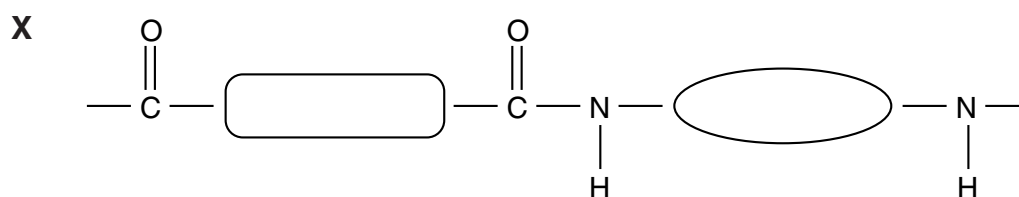
In what way do these gases affect the environment?

	methane	sulphur dioxide	carbon dioxide
<b>A</b>	depletion of the ozone layer	acid rain	global warming
<b>B</b>	global warming	photochemical smog	acid rain
<b>C</b>	photochemical smog	global warming	depletion of the ozone layer
<b>D</b>	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.



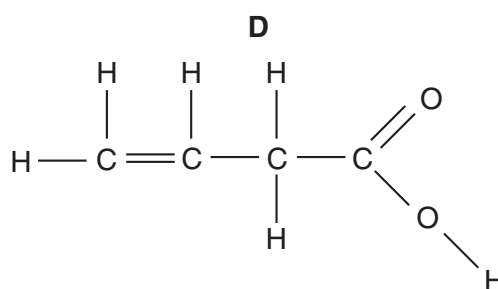
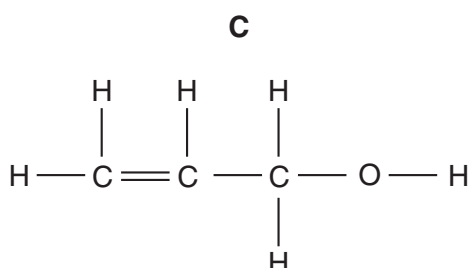
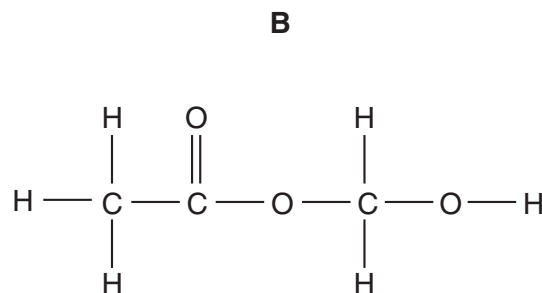
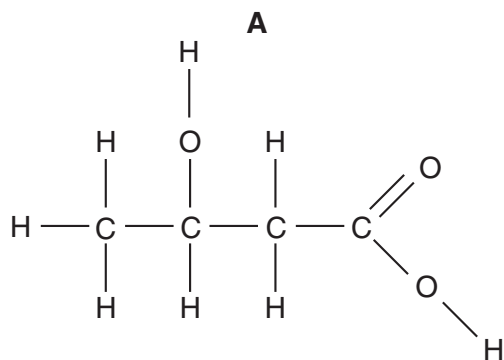
What are **X** and **Y**?

	<b>X</b>	<b>Y</b>
<b>A</b>	nylon	<i>Terylene</i>
<b>B</b>	starch	<i>Terylene</i>
<b>C</b>	protein	starch
<b>D</b>	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**?



37 Butane and methylpropane are isomers.

Which formula is different for the two isomers?

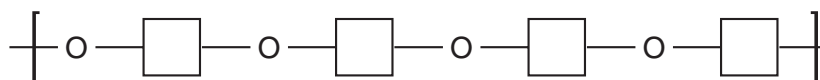
- A empirical formula
- B general formula
- C molecular formula
- D structural formula

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

methanoic acid	$\text{HCO}_2\text{H}$
ethanoic acid	$\text{CH}_3\text{CO}_2\text{H}$
propanoic acid	$\text{C}_2\text{H}_5\text{CO}_2\text{H}$
butanoic acid	$\text{C}_3\text{H}_7\text{CO}_2\text{H}$

- A CHO
- B  $\text{C}_n\text{H}_{2n}\text{O}$
- C  $\text{C}_n\text{H}_n\text{O}_n$
- D  $\text{C}_n\text{H}_{2n}\text{O}_2$

39 A section of a polymer is shown.



The monomer is

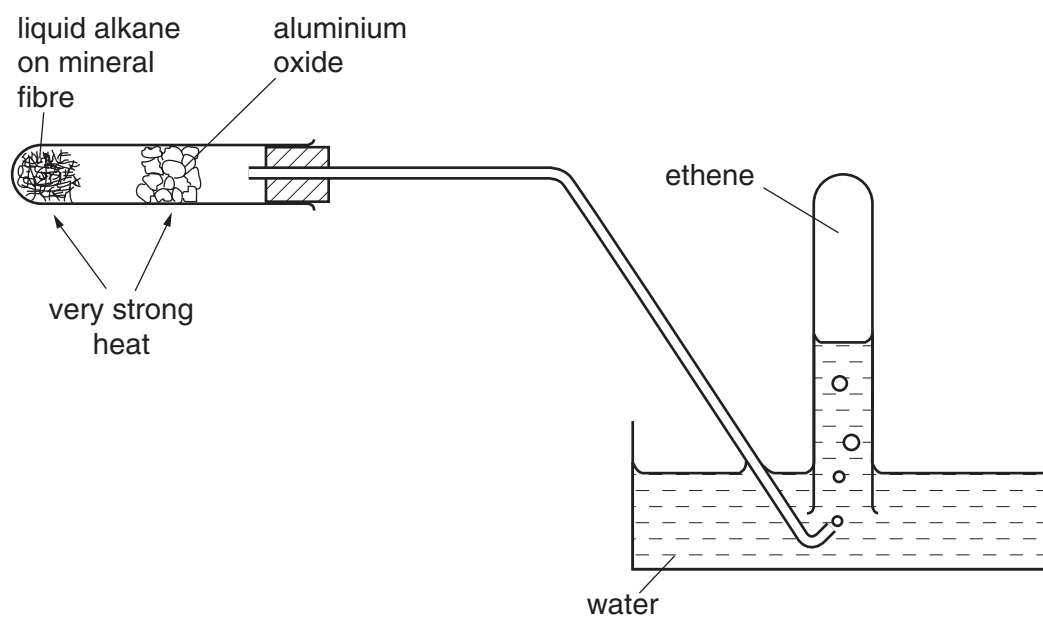


The monomer undergoes condensation polymerisation. What is made each time a monomer adds to the polymer?

- A hydrogen molecules,  $\text{H}_2$
- B hydroxide ions,  $\text{OH}^-$
- C oxygen atoms, O
- D water molecules,  $\text{H}_2\text{O}$



40 The experiment shown is carried out.



What process occurs?

- A cracking
- B dehydrogenation
- C distillation
- D polymerisation





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

I	II	III	IV	V	VI	VII	O						
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	45 <b>Sc</b> Scandium 21	48 <b>Ti</b> Titanium 22	59 <b>Co</b> Cobalt 27	64 <b>Cu</b> Copper 29	79 <b>Br</b> Bromine 35	84 <b>Kr</b> Krypton 36						
85 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38	89 <b>Y</b> Yttrium 39	91 <b>Zr</b> Zirconium 40	103 <b>Rh</b> Rhodium 45	108 <b>Ag</b> Silver 47	127 <b>I</b> Iodine 53	131 <b>Xe</b> Xenon 54						
133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	139 <b>La</b> Lanthanum 57	178 <b>Hf</b> Hafnium 72	192 <b>Ir</b> Iridium 77	197 <b>Au</b> Gold 79	209 <b>Po</b> Polonium 84	226 <b>Ra</b> Radium 88						
226 <b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89	†	†	†	†	†	†						
<p>*58-71 Lanthanoid series †90-103 Actinoid series</p>													
<p><b>Key</b></p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="border: 1px solid black; padding: 2px;">a</td> <td style="padding: 2px;">X</td> </tr> <tr> <td style="padding: 2px;">a = relative atomic mass</td> <td style="padding: 2px;">X = atomic symbol</td> </tr> <tr> <td style="padding: 2px;">b</td> <td style="padding: 2px;">b = proton (atomic) number</td> </tr> </table>								a	X	a = relative atomic mass	X = atomic symbol	b	b = proton (atomic) number
a	X												
a = relative atomic mass	X = atomic symbol												
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The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).