

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**CHEMISTRY**

**0620/01**

Paper 1 Multiple Choice

October/November 2005

**45 minutes**

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.

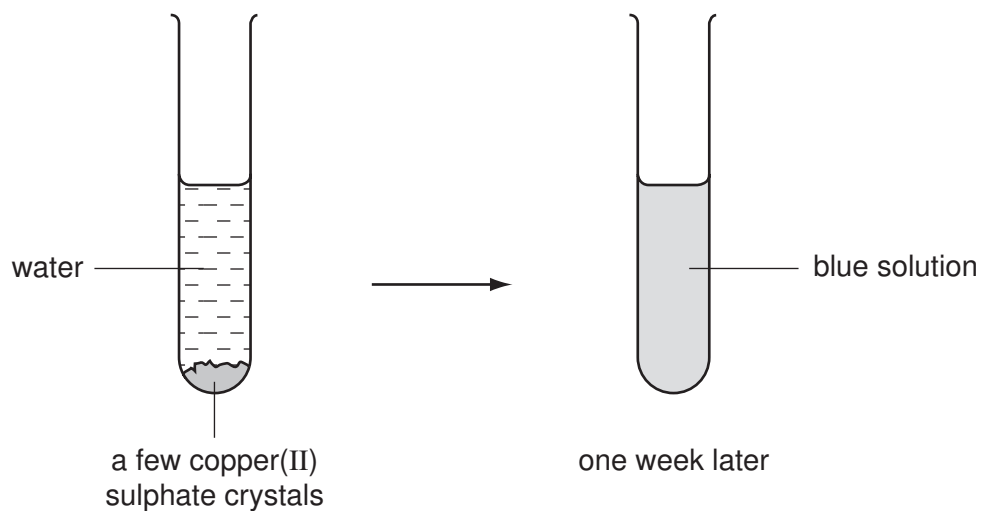
A copy of the Periodic Table is printed on page 20.

You may use a calculator.

This document consists of **17** printed pages and **3** blank pages.



- 1 Blue copper(II) sulphate crystals are soluble in water.



What has happened after one week?

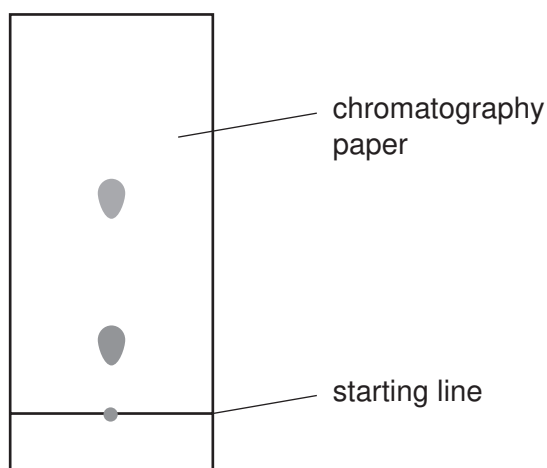
- A crystallisation
  - B diffusion
  - C distillation
  - D filtration
- 2 The reaction between solution **P** and solution **Q** is exothermic.

A student is told to test this statement by mixing equal volumes of the two solutions and measuring the temperature change.

Which two pieces of apparatus should the student use?

- A balance and clock
- B balance and thermometer
- C pipette and clock
- D pipette and thermometer

- 3 A coin is dissolved in an acid. Chromatography is used to test the solution formed. The diagram shows the chromatogram obtained.

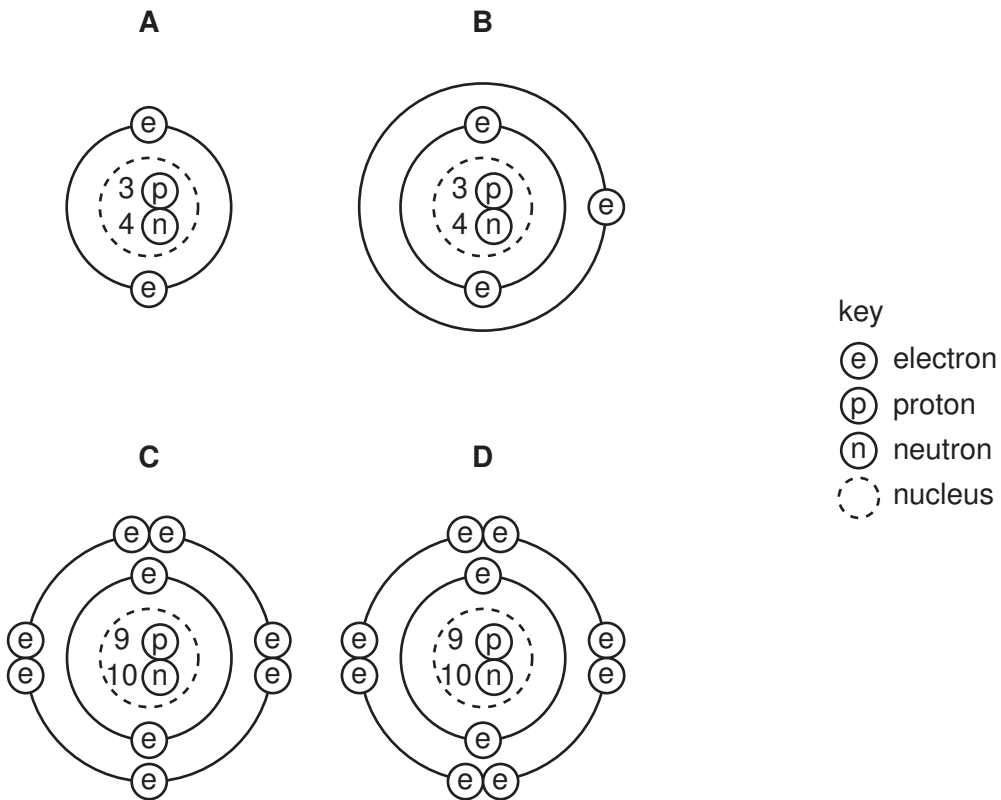


What is the coin made from?

- A** a metal element  
**B** a non-metal element  
**C** a mixture of metals  
**D** a mixture of non-metals
- 4 What do the nuclei in hydrogen molecules contain?
- A** electrons and neutrons  
**B** electrons and protons  
**C** neutrons only  
**D** protons only
- 5 Which statements about isotopic atoms of the same element are correct?

	different number of electrons	different number of neutrons
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

6 Which diagram shows a positively charged ion?



7 Bottles of sodium hydroxide, sodium chloride and sugar have lost their labels.

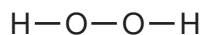
Students test a sample from each bottle. Their results are shown in the table.

bottle	addition of water	conductivity of solution
1	forms an alkaline solution	conducts electricity
2	forms a neutral solution	conducts electricity
3	forms a neutral solution	does not conduct electricity

What are the correct labels for each bottle?

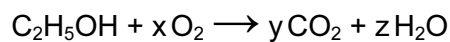
	bottle 1	bottle 2	bottle 3
<b>A</b>	sodium hydroxide	sodium chloride	sugar
<b>B</b>	sodium hydroxide	sugar	sodium chloride
<b>C</b>	sodium chloride	sugar	sodium hydroxide
<b>D</b>	sugar	sodium hydroxide	sodium chloride

- 8 The diagram shows the structure of hydrogen peroxide.



What is the total number of electrons used for bonding in this molecule?

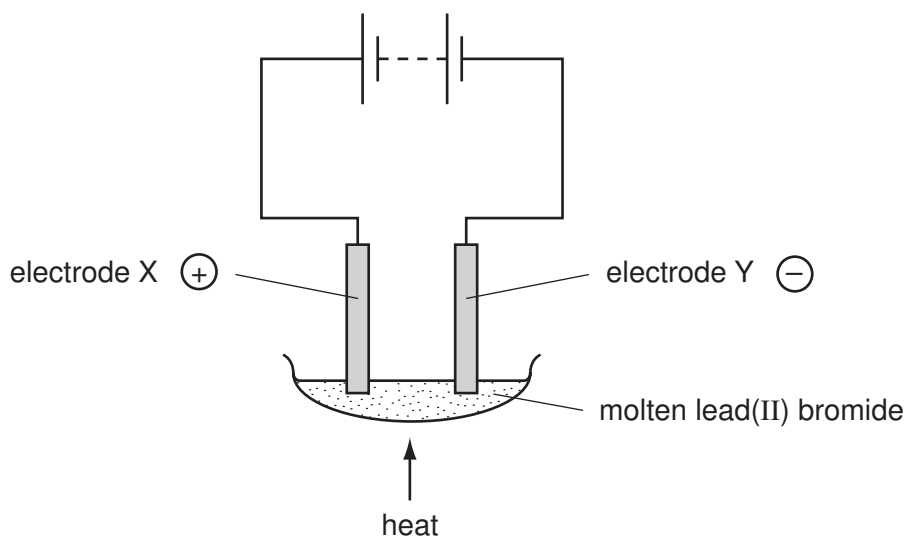
- A** 3                      **B** 4                      **C** 6                      **D** 8
- 9 The equation shows the reaction that occurs when ethanol burns in air.



Which values of x, y and z are needed to balance this equation?

	x	y	z
<b>A</b>	2	2	2
<b>B</b>	2	2	3
<b>C</b>	2	3	3
<b>D</b>	3	2	3

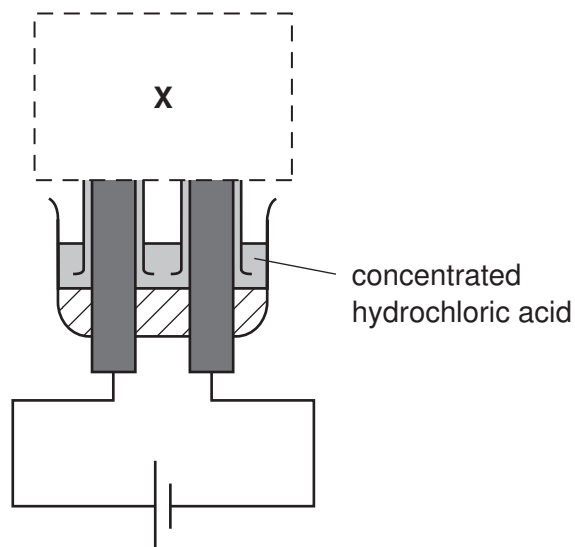
- 10 The diagram shows the electrolysis of molten lead(II) bromide.



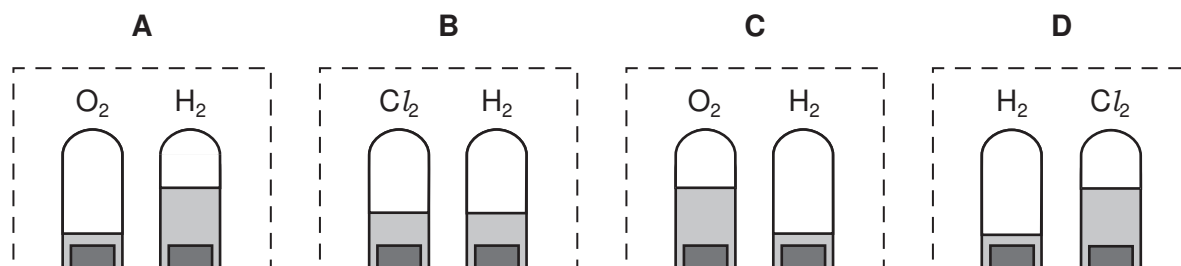
What is seen at each electrode?

	electrode X	electrode Y
<b>A</b>	brown gas	silvery metal
<b>B</b>	brown metal	green gas
<b>C</b>	green gas	brown metal
<b>D</b>	silvery metal	brown gas

11 The diagram shown is not complete.



What should be shown at **X** when the solution has been electrolysed for some time?



12 Which process is endothermic?

- A burning hydrogen to form water
- B condensing steam to water
- C melting ice to form water
- D reacting sodium with water

13 The elements H<sub>2</sub> and <sup>235</sup>U are both used as fuels.

In these processes, the reactions are .....1..... and .....2..... oxidised.

Which words correctly complete gaps 1 and 2?

	1	2
<b>A</b>	endothermic	both elements are
<b>B</b>	endothermic	only hydrogen is
<b>C</b>	exothermic	both elements are
<b>D</b>	exothermic	only hydrogen is

14 Why does the powdering of calcium carbonate increase the speed of its reaction with an acid?

- A It increases the mass of calcium carbonate.
- B It increases the surface area of the calcium carbonate.
- C The powder becomes more concentrated.
- D The powder floats on top of the acid.

15 Which process does **not** involve either oxidation or reduction?

- A burning methane in the air
- B extracting iron from hematite
- C heating copper(II) oxide with carbon
- D reacting sodium carbonate with dilute hydrochloric acid

16 An excess of acid in the stomach causes indigestion that can be cured by an anti-indigestion tablet.

What should the tablet contain to decrease the acidity?

- A an acidic substance
- B an alkaline substance
- C a neutral substance
- D Universal Indicator

17 A solution is made by adding sodium oxide to water.

Which pH change can occur?

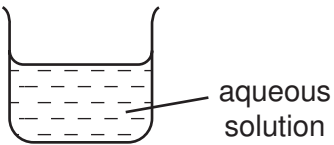
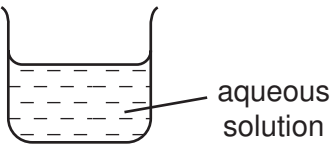
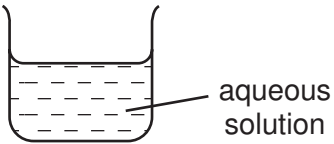
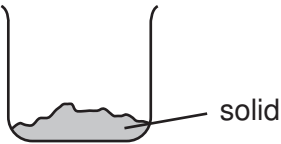
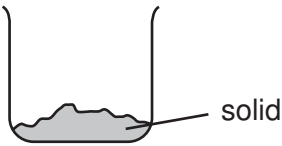
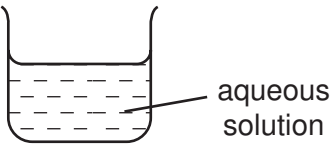
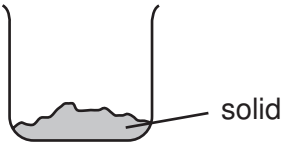
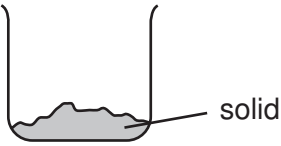
	pH change		
<b>A</b>	1	→	7
<b>B</b>	7	→	1
<b>C</b>	7	→	12
<b>D</b>	12	→	7

18 Which element has an oxide that forms a salt with an alkali?

- A N
- B Na
- C Ne
- D Ni

- 19 Pure zinc sulphate can be prepared by adding an excess of either zinc carbonate or an excess of zinc hydroxide to dilute sulphuric acid.

In which form are these zinc compounds used?

	zinc carbonate	zinc hydroxide
<b>A</b>		
<b>B</b>		
<b>C</b>		
<b>D</b>		

- 20 Which aqueous ion causes a yellow precipitate to form when acidified aqueous lead(II) nitrate is added to it?

- A chloride
- B iodide
- C nitrate
- D sulphate

- 21 Which information about an element can be used to predict its chemical properties?

- A colour of its compounds
- B density
- C melting point
- D position in the Periodic Table



22 The table shows some properties of four gases.

Which gas is most suitable for filling weather balloons?

	density compared with air	chemical reactivity
<b>A</b>	higher	reactive
<b>B</b>	higher	unreactive
<b>C</b>	lower	reactive
<b>D</b>	lower	unreactive

23 A data book gives the following information about an element.

appearance	silver-grey solid
melting point	63°C
density	0.86 g/cm <sup>3</sup>
reaction with water	vigorous reaction with cold water

Where is the element likely to be found in the Periodic Table?

- A** Group 0
- B** Group I
- C** Group VII
- D** transition elements

24 Calcium, on the left of Period 3 of the Periodic Table, is more metallic than bromine on the right of this Period.

Why is this?

Calcium has

- A** fewer electrons.
- B** fewer protons.
- C** fewer full shells of electrons.
- D** fewer outer shell electrons.

- 25 Brass, an alloy of copper with another element, is used to make the contact pins of electrical plugs because it is harder than copper.

In brass, the other element is a .....**X**..... that .....**Y**..... with the copper.

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

	<b>X</b>	<b>Y</b>
<b>A</b>	metal	mixes
<b>B</b>	metal	reacts
<b>C</b>	non-metal	mixes
<b>D</b>	non-metal	reacts


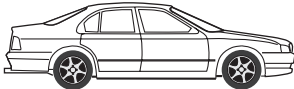

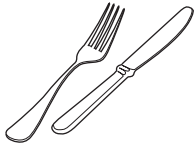
- 26 A student added dilute hydrochloric acid to four metals and recorded his results. Not all of his results are correct.

	results	
	metal	gas given off
1	copper	yes
2	iron	yes
3	magnesium	no
4	zinc	yes

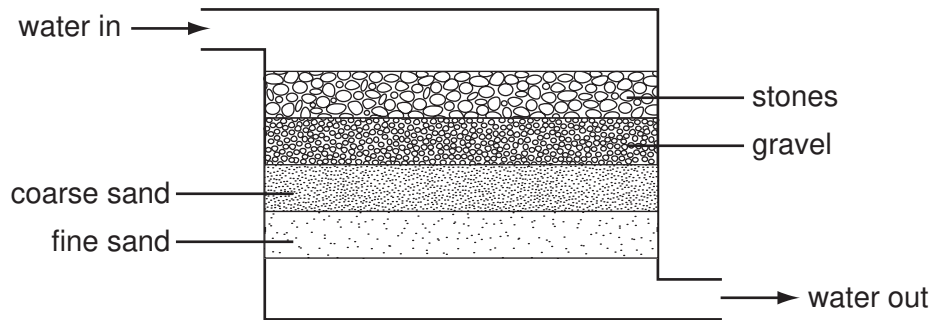
Which two results are correct?

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

- 27 Which of the following is made from stainless steel?

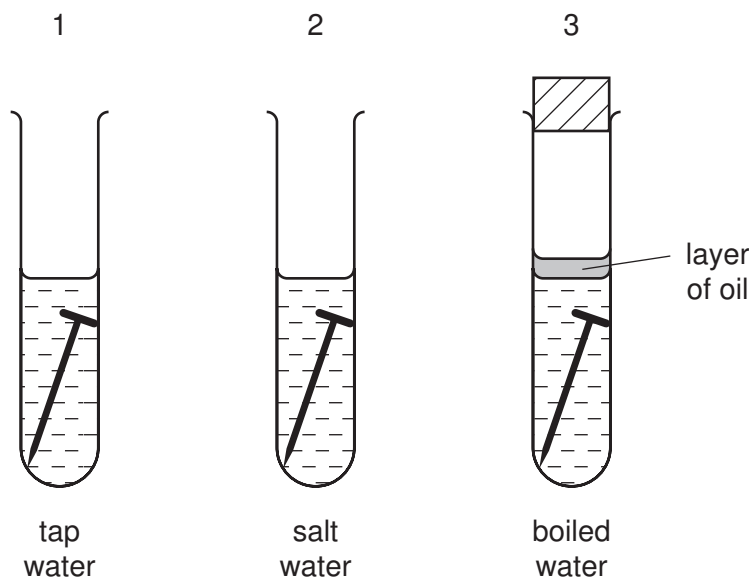
<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
			
aircraft frames	car bodies	electrical cables	knives and forks

28 What is the purpose of the fine sand filter in the purification of the water?



- A to allow particles to settle
  - B to sort particles into layers
  - C to trap large particles
  - D to trap small particles
- 29 What is formed when ethane burns incompletely but **not** when it burns completely?
- A carbon dioxide
  - B carbon monoxide
  - C ethene
  - D hydrogen

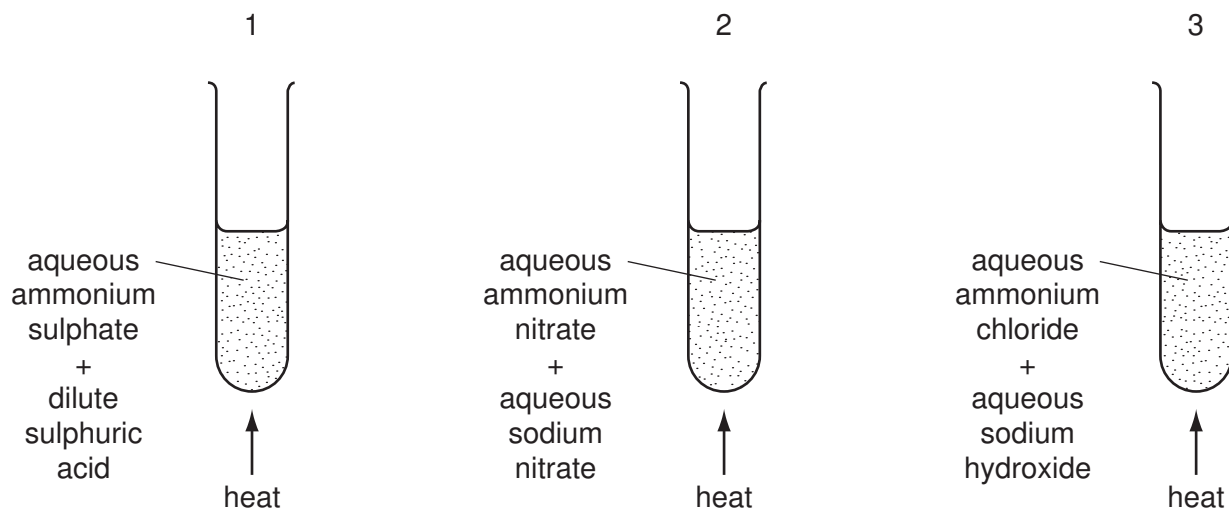
30 The diagrams show experiments to investigate rusting of iron nails.



In which test-tubes do the nails rust?

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

31 The diagrams show three experiments.



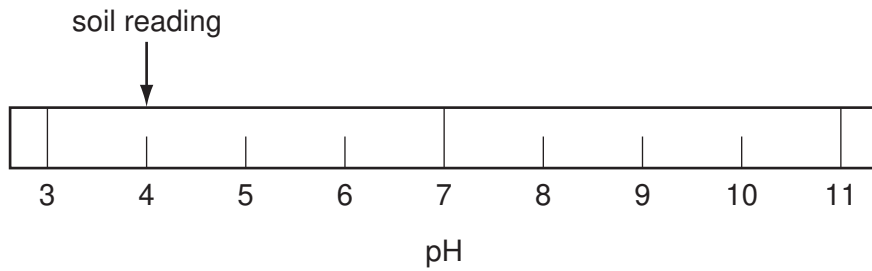
In which experiments is ammonia formed?

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

32 In which process is carbon dioxide **not** formed?

- A blast furnace extraction of iron
- B burning of natural gas
- C heating lime
- D oxy-acetylene welding

33 The diagram shows the results of a pH test on a sample of garden soil.



What could be added to the soil to change its pH to 7?

- A ammonium nitrate
- B lime
- C sand
- D sodium chloride



36 The table shows the composition of natural gas.

gas	% of natural gas
<b>X</b>	93.1
ethane	3.4
nitrogen	2.3

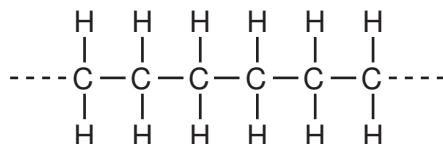
What is **X**?

- A ethanol
- B ethene
- C methane
- D propane

37 Which pair of compounds belong to the same homologous series?

- A  $\text{CH}_3\text{CH}_3$  and  $\text{CH}_3\text{CH}_2\text{CH}_3$
- B  $\text{CH}_3\text{CH}_2\text{OH}$  and  $\text{CH}_3\text{OCH}_2\text{CH}_3$
- C  $\text{CH}_2\text{CHCH}_2\text{CH}_3$  and  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$
- D  $\text{CH}_3\text{CH}_2\text{OH}$  and  $\text{CH}_2\text{CHCH}_2\text{OH}$

38 The diagram shows the structure of an important product.

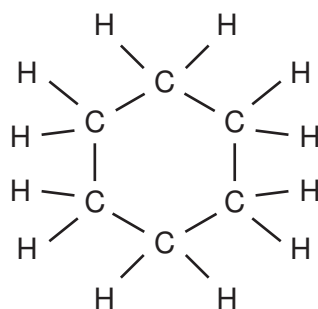


This product is formed by .....1..... of an .....2.....

Which words correctly complete gaps 1 and 2?

	1	2
<b>A</b>	addition polymerisation	alkane
<b>B</b>	addition polymerisation	alkene
<b>C</b>	cracking	alkane
<b>D</b>	cracking	alkene

39 An organic compound has the structure shown.



From knowledge of the properties of alkanes and alkenes, which reactions would be predicted for this compound?

	burn	decolourise aqueous bromine
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

40 Ethanol can be formed by

- 1 fermentation,
- 2 reaction between steam and ethene.

Which of these processes uses a catalyst?

	1	2
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x







**BLANK PAGE**

## 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	45 <b>Sc</b> Scandium 21	48 <b>Ti</b> Titanium 22	51 <b>V</b> Vanadium 23	52 <b>Cr</b> Chromium 24	55 <b>Mn</b> Manganese 25	56 <b>Fe</b> Iron 26	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	89 <b>Y</b> Yttrium 39	91 <b>Zr</b> Zirconium 40	93 <b>Nb</b> Niobium 41	96 <b>Mo</b> Molybdenum 42	96 <b>Tc</b> Technetium 43	101 <b>Ru</b> Ruthenium 44	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	139 <b>La</b> Lanthanum 57 *	178 <b>Hf</b> Hafnium 72	181 <b>Ta</b> Tantalum 73	184 <b>W</b> Tungsten 74	186 <b>Re</b> Rhenium 75	190 <b>Os</b> Osmium 76	192 <b>Ir</b> Iridium 77	195 <b>Pt</b> Platinum 78	197 <b>Au</b> Gold 79	201 <b>Hg</b> Mercury 80	204 <b>Tl</b> Thallium 81	207 <b>Pb</b> Lead 82	209 <b>Bi</b> Bismuth 83	209 <b>Po</b> Polonium 84	209 <b>At</b> Astatine 85	209 <b>Rn</b> Radon 86					
87 <b>Fr</b> Francium	88 <b>Ra</b> Radium	89 <b>Ac</b> Actinium †																				

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

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

140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	144 <b>Nd</b> Neodymium 60	147 <b>Pm</b> Promethium 61	150 <b>Sm</b> Samarium 62	152 <b>Eu</b> Europium 63	157 <b>Gd</b> Gadolinium 64	159 <b>Tb</b> Terbium 65	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	238 <b>Np</b> Neptunium 93	238 <b>Pu</b> Plutonium 94	244 <b>Am</b> Americium 95	247 <b>Cm</b> Curium 96	247 <b>Bk</b> Berkelium 97	251 <b>Cf</b> Californium 98	252 <b>Es</b> Einsteinium 99	257 <b>Fm</b> Fermium 100	258 <b>Md</b> Mendelevium 101	259 <b>No</b> Nobelium 102	259 <b>Lr</b> Lawrencium 103

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