

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.

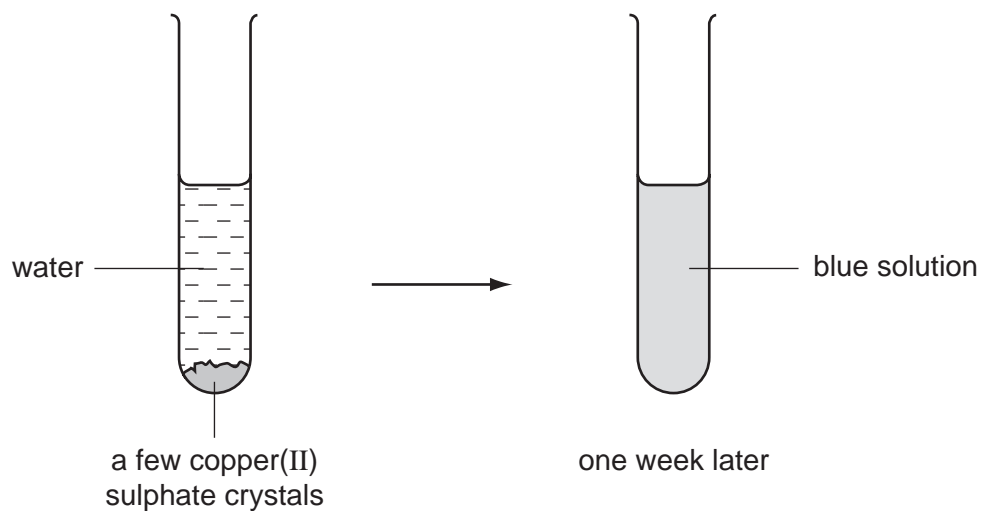
A copy of the Periodic Table is printed on page 20.

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?

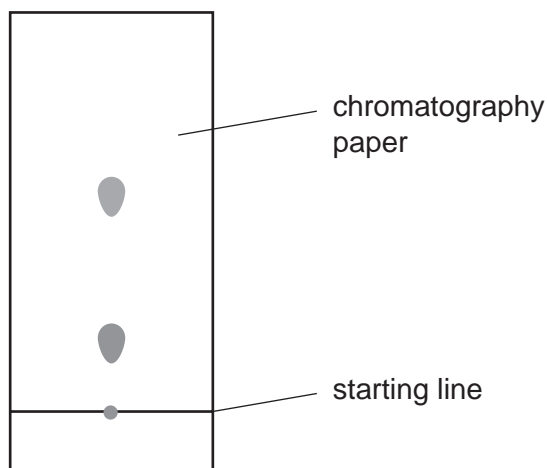
- A crystallisation
 - B diffusion
 - C distillation
 - D filtration
- 2 The reaction between solution **P** and solution **Q** is exothermic.

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.

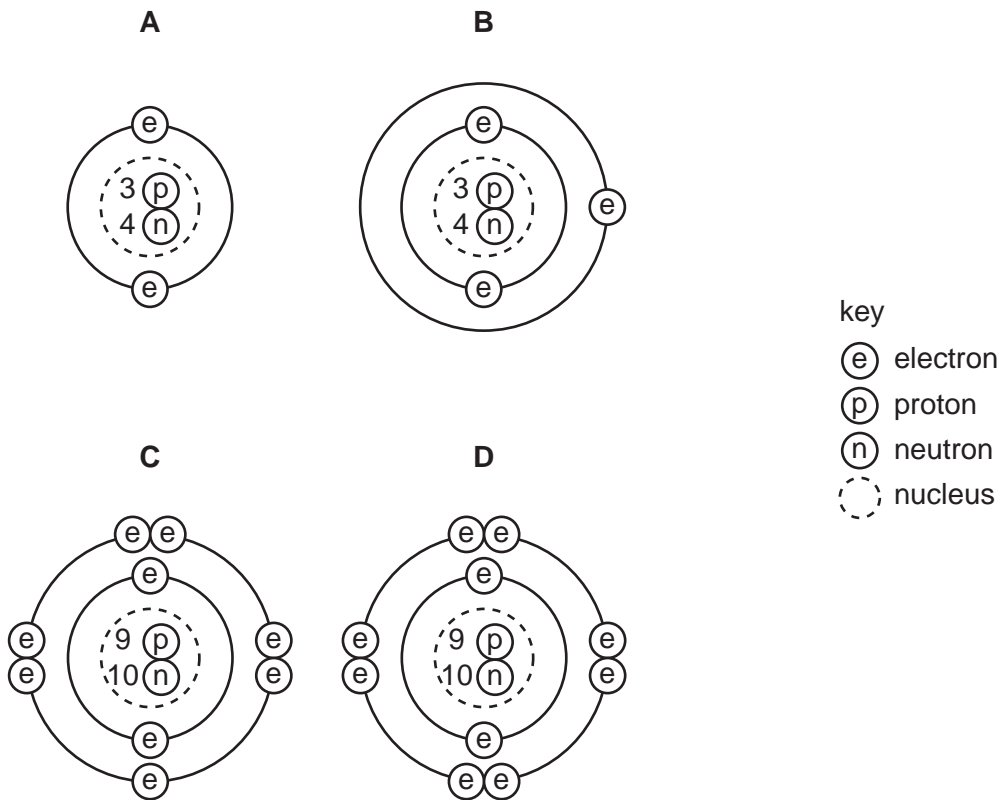


What is the coin made from?

- 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
A	✓	✓
B	✓	x
C	x	✓
D	x	x

6 Which diagram shows a positively charged ion?



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

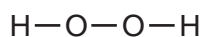
Students test a sample from each bottle. Their results are shown in the table.

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?

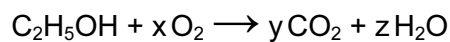
	bottle 1	bottle 2	bottle 3
A	sodium hydroxide	sodium chloride	sugar
B	sodium hydroxide	sugar	sodium chloride
C	sodium chloride	sugar	sodium hydroxide
D	sugar	sodium hydroxide	sodium chloride

- 8 The diagram shows the structure of hydrogen peroxide.



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

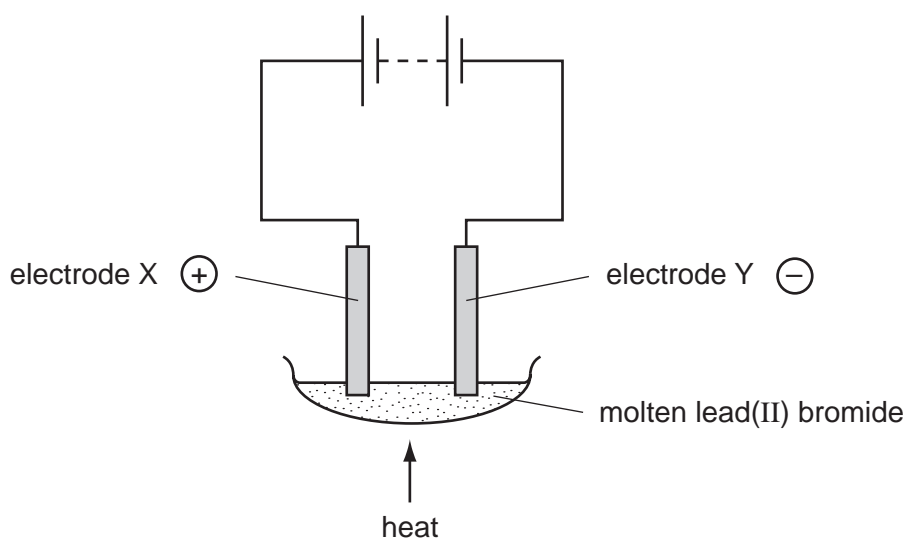
- A** 3 **B** 4 **C** 6 **D** 8
- 9 The equation shows the reaction that occurs when ethanol burns in air.



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

	x	y	z
A	2	2	2
B	2	2	3
C	2	3	3
D	3	2	3

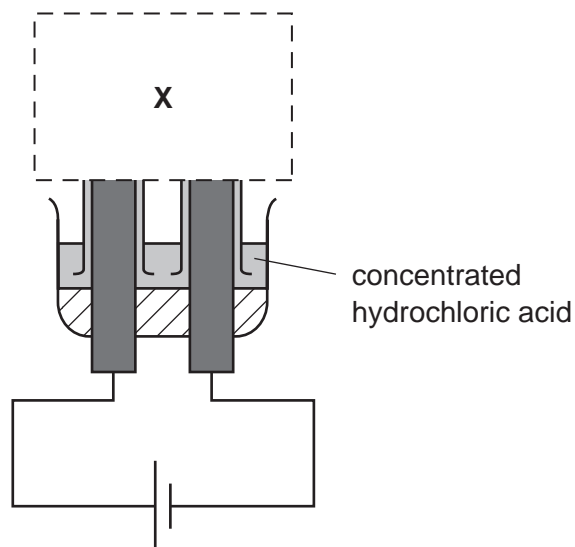
- 10 The diagram shows the electrolysis of molten lead(II) bromide.



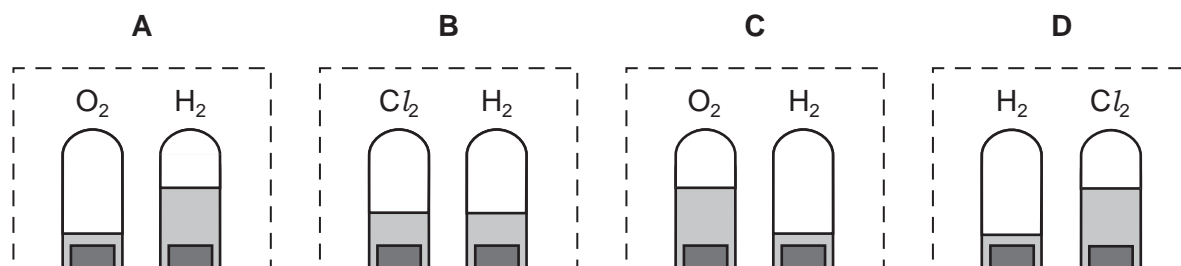
What is seen at each electrode?

	electrode X	electrode Y
A	brown gas	silvery metal
B	brown metal	green gas
C	green gas	brown metal
D	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_2 and ^{235}U are both used as fuels.

In these processes, the reactions are1..... and2..... oxidised.

Which words correctly complete gaps 1 and 2?

	1	2
A	endothermic	both elements are
B	endothermic	only hydrogen is
C	exothermic	both elements are
D	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?

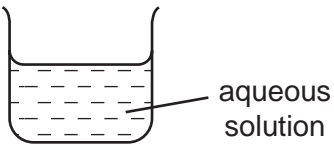
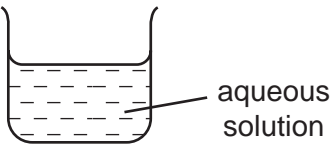
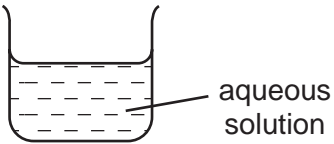
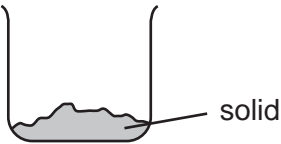
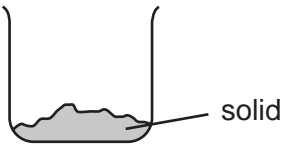
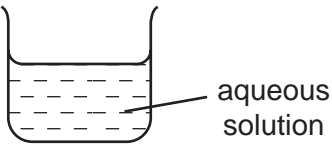
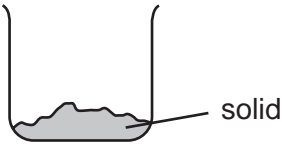
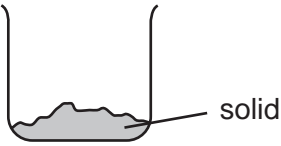
	pH change		
A	1	→	7
B	7	→	1
C	7	→	12
D	12	→	7

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
A		
B		
C		
D		

- 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
A	higher	reactive
B	higher	unreactive
C	lower	reactive
D	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 ³
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**?

	X	Y
A	metal	mixes
B	metal	reacts
C	non-metal	mixes
D	non-metal	reacts


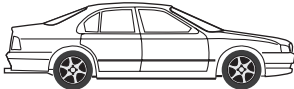

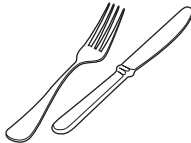
- 26 A student added dilute hydrochloric acid to four metals and recorded his results. Not all of his results are correct.

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

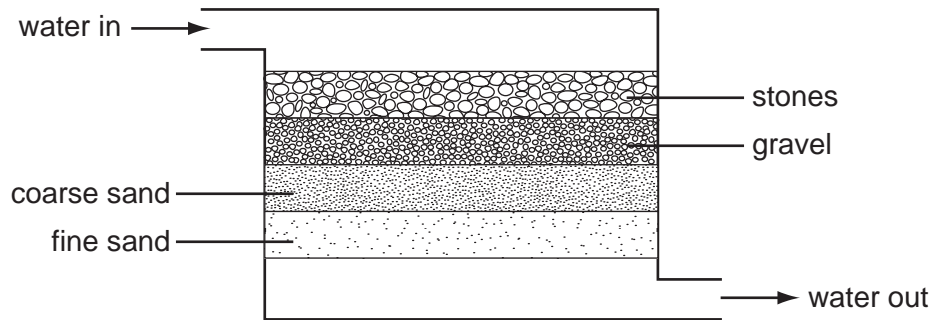
Which two results are correct?

- 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?

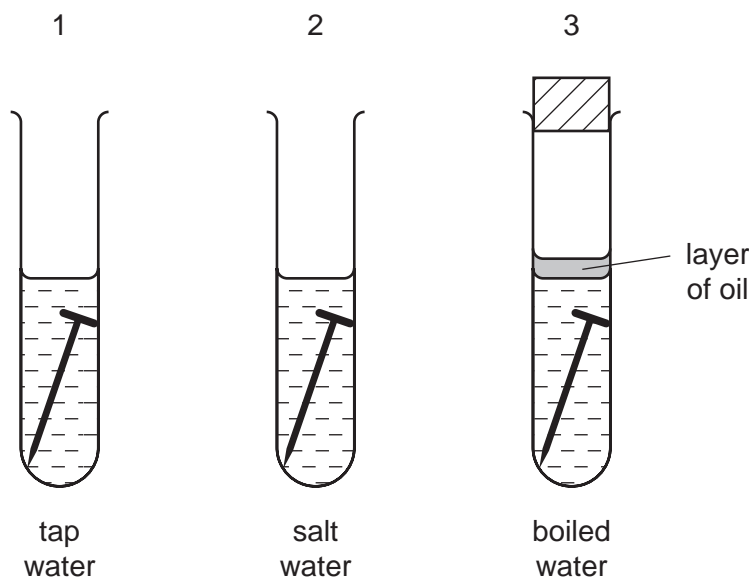
A	B	C	D
			
aircraft frames	car bodies	electrical cables	knives and forks

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

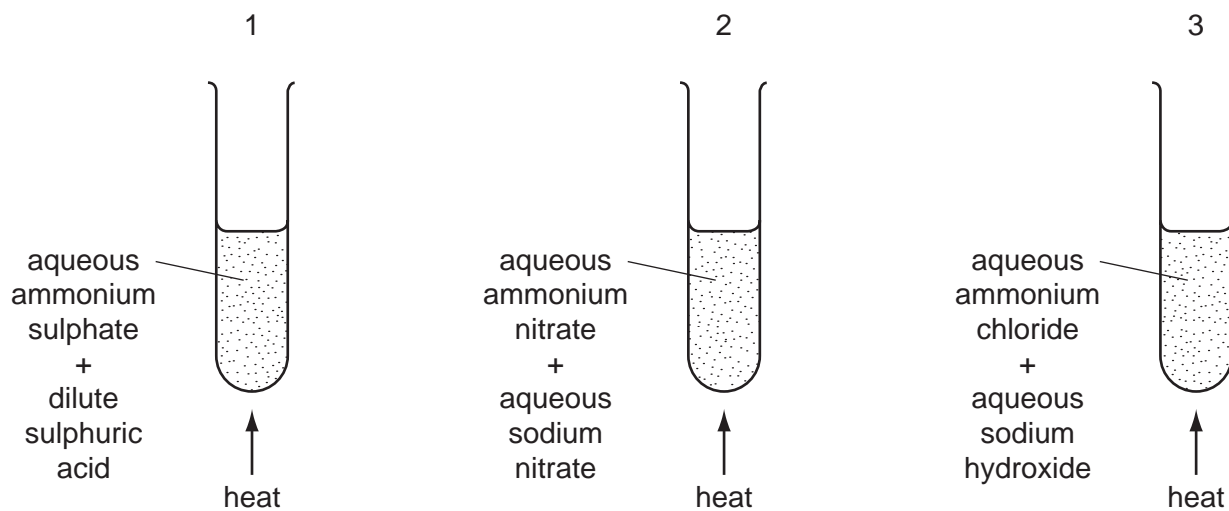
30 The diagrams show experiments to investigate rusting of iron nails.



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.



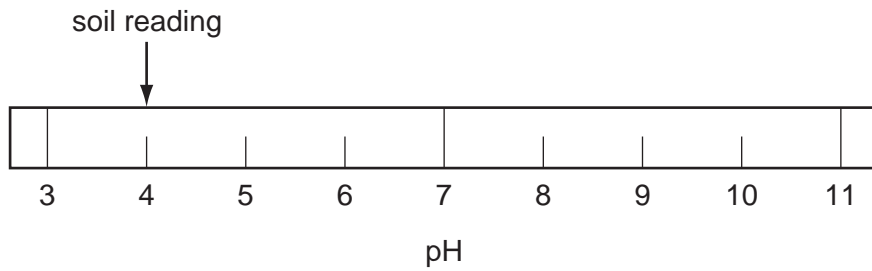
In which experiments is ammonia formed?

- 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.

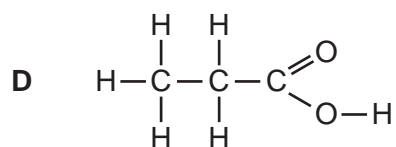
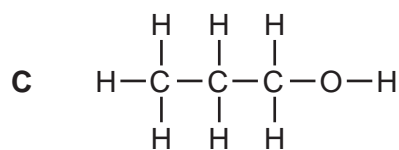
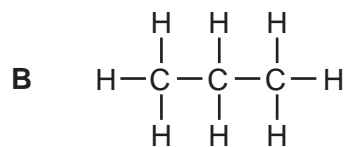
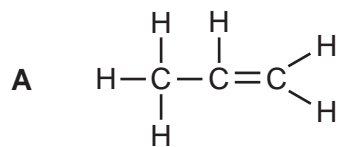


What could be added to the soil to change its pH to 7?

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

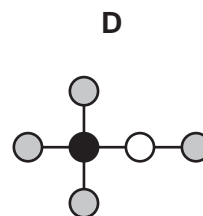
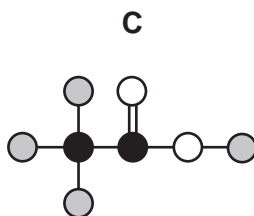
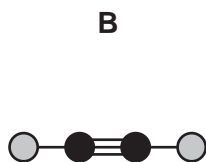
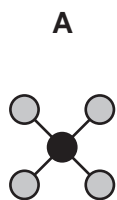
34 Some students are asked to draw the structure of propanol.

Which diagram should the students draw?



35 Acetylene is an unsaturated hydrocarbon used with oxygen in a welding torch.

Which diagram shows a molecule of acetylene?



key
 ● = C
 ● = H
 ○ = O

36 The table shows the composition of natural gas.

gas	% of natural gas
X	93.1
ethane	3.4
nitrogen	2.3

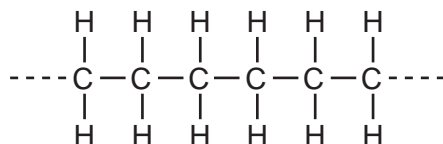
What is **X**?

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

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

- A CH_3CH_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.

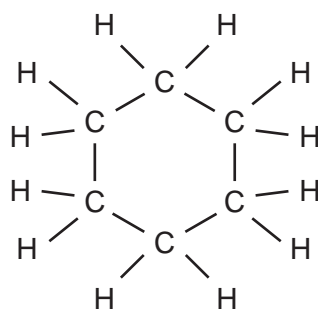


This product is formed by1..... of an2.....

Which words correctly complete gaps 1 and 2?

	1	2
A	addition polymerisation	alkane
B	addition polymerisation	alkene
C	cracking	alkane
D	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
A	✓	✓
B	✓	x
C	x	✓
D	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
A	✓	✓
B	✓	x
C	x	✓
D	x	x

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DATA SHEET
The Periodic Table of the Elements

		Group														
I	II	III	IV	V	VI	VII	0						0			
		1 H Hydrogen 1											4 He Helium 2			
7 Li Lithium 3	9 Be Beryllium 4											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						84 Kr Krypton 36			
39 K Potassium 19	40 Ca Calcium 20	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36						131 Xe Xenon 54			
85 Rb Rubidium 37	88 Sr Strontium 38	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54						227 Ac Actinium 89			
133 Cs Caesium 55	137 Ba Barium 56	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	210 At Astatine 85	227 Ac Actinium 89						227 Ac Actinium 89			
226 Ra Radium 88	227 Ac Actinium 89											227 Ac Actinium 89				
<p>*58-71 Lanthanoid series †90-103 Actinoid series</p>																
<p>Key</p> <table style="display: inline-table; border: 1px solid black; padding: 5px;"> <tr> <td style="padding: 2px 5px;">a</td> <td style="padding: 2px 5px;">X</td> </tr> <tr> <td style="padding: 2px 5px;">b</td> <td style="padding: 2px 5px;"></td> </tr> </table> <p style="margin-left: 20px;">a = relative atomic mass X = atomic symbol b = proton (atomic) number</p>													a	X	b	
a	X															
b																
140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71	103 Lr Lawrencium 103				
232 Th Thorium 90	238 U Uranium 92	238 U Uranium 92	94 Pu Plutonium 94	95 Am Americium 95	96 Cm Curium 96	98 Cf Californium 98	99 Es Einsteinium 99	100 Fm Fermium 100	101 Md Mendelevium 101	102 No Nobelium 102	103 Lr Lawrencium 103	103 Lr Lawrencium 103				

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).