CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CHEMISTRY **0620/01**

Paper 1 Multiple Choice

October/November 2003

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.

This document consists of **19** printed pages and **1** blank page.

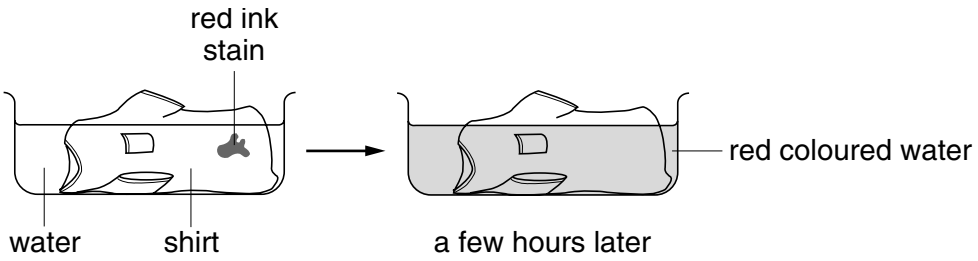
SPA (NH/PW) S42589/3

UNIVERSITY of CAMBRIDGE
Local Examinations Syndicate

[Turn over

1 A shirt is stained with red ink from a pen.

The shirt is left to soak in a bowl of water.



Which process causes the red colour to spread?

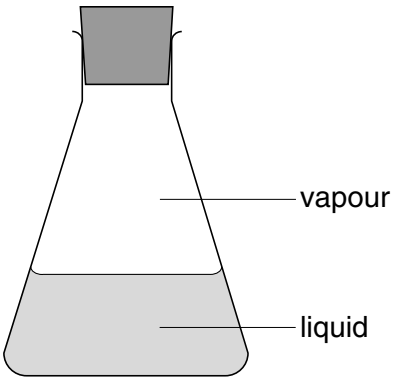
A diffusion

B evaporation

C melting

D neutralisation

2 A sealed conical flask contains a liquid and its vapour, as shown.



What happens when a molecule in the vapour enters the liquid?

	the molecule stops moving	the molecule becomes smaller
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

3 Which mixture can be separated by adding water, stirring and filtering?

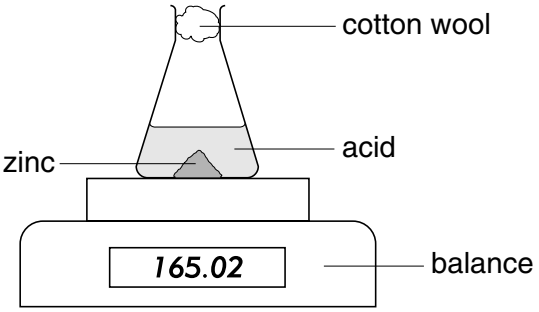
A barium chloride and sodium chloride

B calcium carbonate and sodium chloride

C copper and magnesium

D ethane and ethene

4 A student investigates the speed of the reaction between a lump of zinc and an acid at room temperature.



Which other item of apparatus does the student need for this experiment?

A Bunsen burner

B measuring cylinder

C stop clock

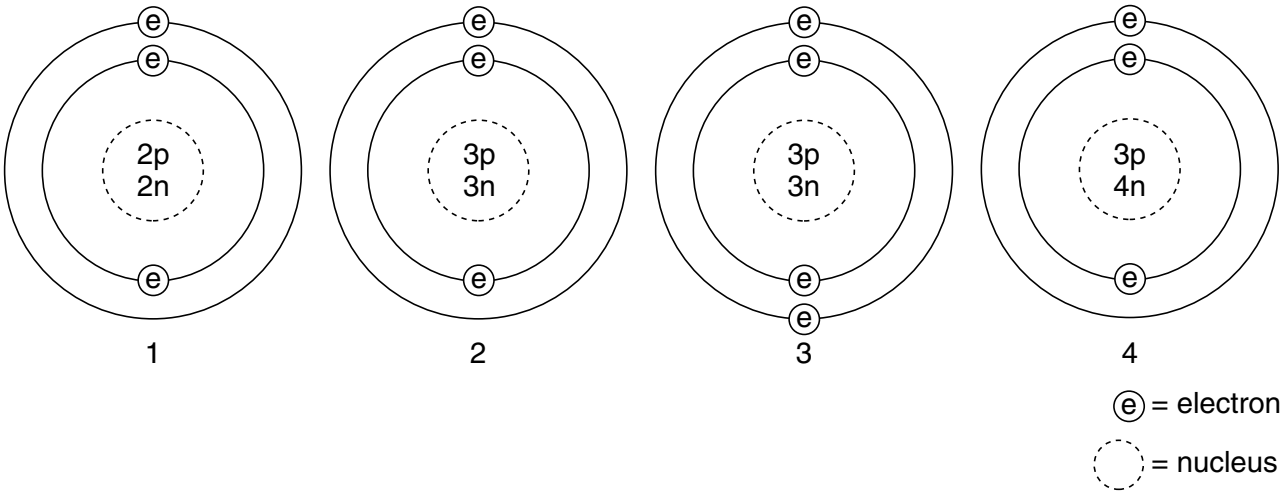
D thermometer

5 The table shows the electronic structures of four elements.

Which element is a noble gas?

element	number of electrons	
	shell 1	shell 2
A	1	0
B	2	0
C	2	2
D	2	6

6 The diagrams show four particles.



Which two diagrams show **atoms** that are isotopes of each other?

A 1 and 2

B 1 and 3

C 2 and 3

D 2 and 4

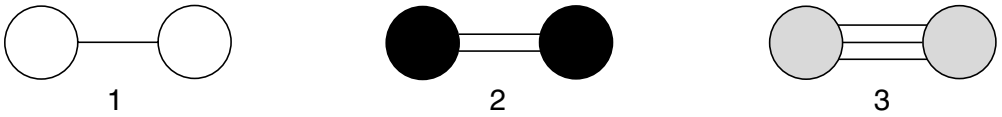
7 Which of the following can be used as a lubricant?

	graphite	a liquid fraction from petroleum
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

8 Which element is a solid non-metal?

element	melting point / °C	boiling point / °C	electrical conductance
A	–210	–183	no
B	–7	58	no
C	119	445	no
D	1539	2887	yes

9 The diagrams show the bonding in three covalent molecules.



1 2 3

Which of these molecules combine to form ammonia?

A 1 and 2

B 1 and 3

C 2 and 3

D 1, 2 and 3

10 Two gases react as shown.

$$\underset{\text{reactants}}{X_2 + Y_2} \rightarrow \underset{\text{product}}{2XY}$$

When measured at the same temperature and pressure, what is the value of

$$\frac{\text{volume of product}}{\text{volume of reactants}} ?$$

A $\frac{1}{2}$

B 1

C 2

D 4

11 Carbon and chlorine form a chloride.

What is the formula of this chloride?

A CCl_2

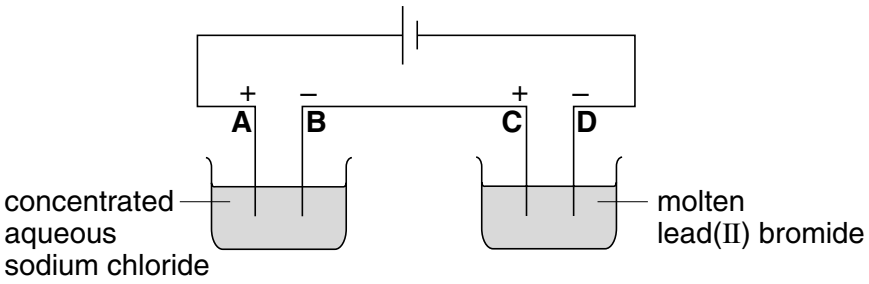
B CCl_4

C $CaCl_2$

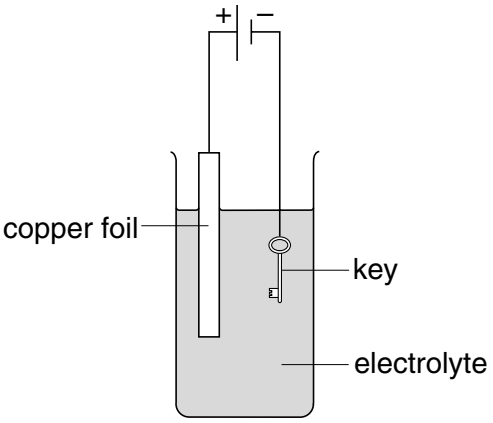
D $CaCl_4$

12 The following electrolysis circuit is set up, using inert electrodes.

At which electrode is a metal deposited?



13 The diagram shows a method used to electroplate a key with copper.



Which aqueous solution is most suitable for the electrolyte?

A copper(II) sulphate

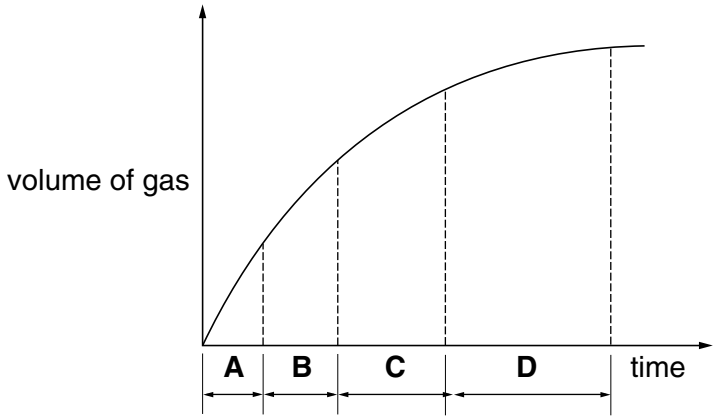
B ethanol

C sodium hydroxide

D sulphuric acid

14 The graph shows how the total volume of a gas given off from a reaction changes with time.

In which time interval is **least** gas given off?



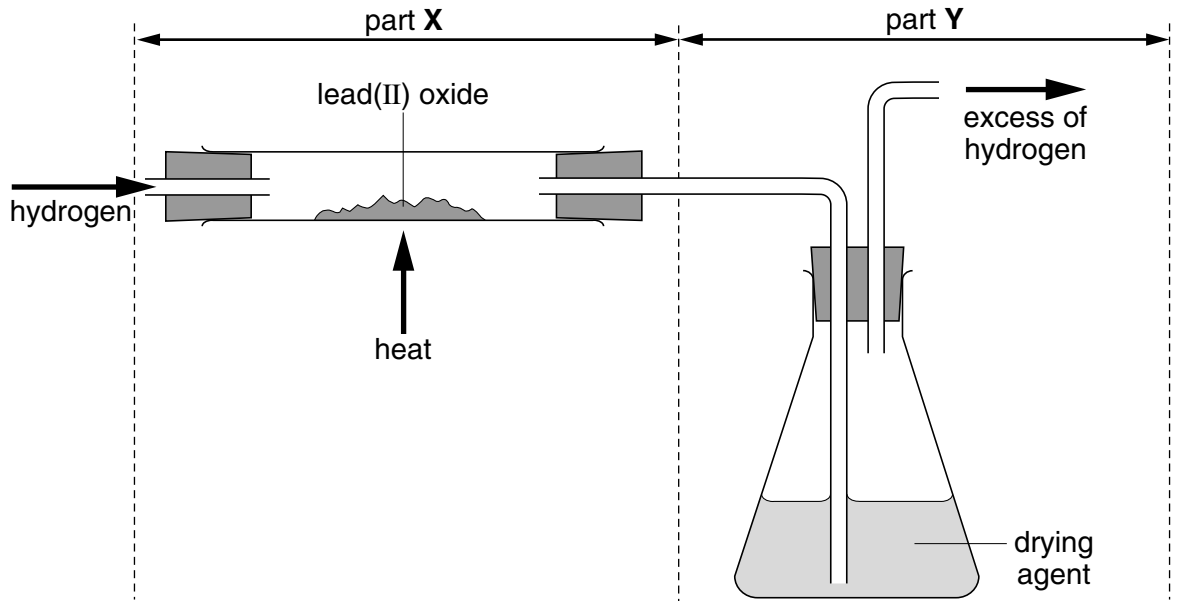
15 Potassium nitrate is a salt and dissolves in water in an endothermic process.

What happens to the temperature and pH of the water as the salt dissolves?

	temperature increases	pH falls
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

[Turn over

16 Lead(II) oxide is reduced in the apparatus shown.



How do the masses of parts **X** and **Y** of the apparatus change?

	X	Y
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

17 The equation shows what happens when hydrated copper(II) sulphate is heated.

$$CuSO_4.5H_2O(s) \rightleftharpoons CuSO_4(s) + 5H_2O(g)$$

What can be deduced from the equation?

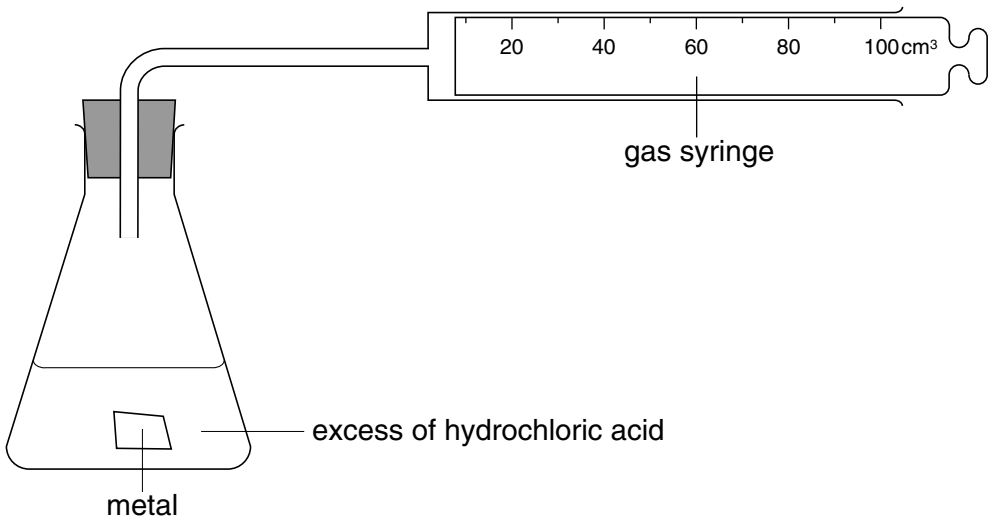
A The hydrated copper(II) sulphate is oxidised.

B The hydrated copper(II) sulphate is reduced.

C The reaction is reversible.

D There is no colour change.

18 The diagram shows an experiment.



Which metal would fill the syringe with 100 cm^3 of gas in the shortest time?

A 5 g of copper

B 5 g of iron

C 5 g of magnesium

D 5 g of zinc

19 Which two processes are involved in the preparation of magnesium sulphate crystals from dilute sulphuric acid and an excess of magnesium oxide?

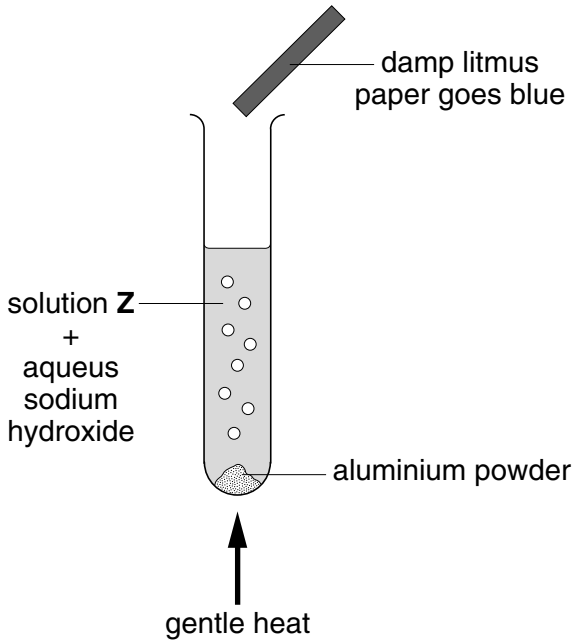
A decomposition and filtration

B decomposition and oxidation

C neutralisation and filtration

D neutralisation and oxidation

20 The diagram shows the result of testing an aqueous solution **Z**.



Which ion is present in solution **Z**?

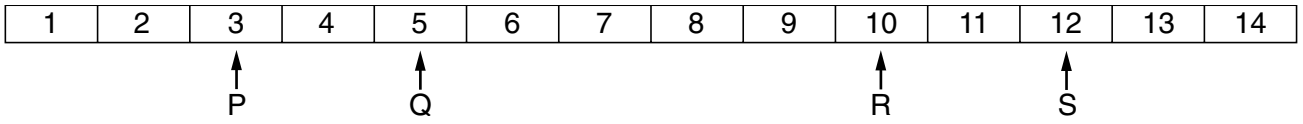
A carbonate

B chloride

C nitrate

D sulphate

21 The pH values of four solutions are shown.



Mixing combinations of these solutions can give a solution of pH 6.

Which combination of solutions could **not** do this?

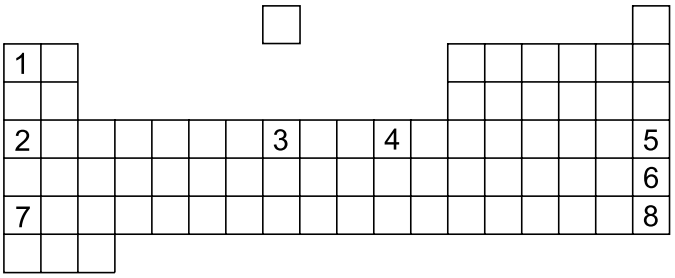
A P and R

B P and S

C Q and R

D R and S

22 Eight elements are numbered in the diagram of a Periodic Table.



Which numbers represent two relatively soft metals in the same group?

A 1 and 2

B 3 and 4

C 5 and 6

D 7 and 8

23 Vanadium is a transition metal.

What are its likely properties?

	density	appearance of compounds
A	0.61 g / cm^3	coloured
B	0.61 g / cm^3	white
C	6.1 g / cm^3	coloured
D	6.1 g / cm^3	white

24 The table gives information about four elements.

Which element could be in Group I in the Periodic Table?

element	metallic or non-metallic	reaction with water
A	metal	reacts
B	metal	no reaction
C	non-metal	reacts
D	non-metal	no reaction

[Turn over

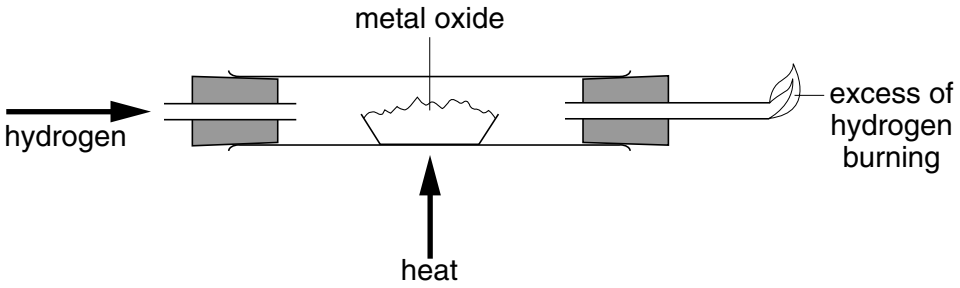
25 Element **X**

- forms an alloy.
- has a basic oxide.
- is below hydrogen in the reactivity series.

What could **X** and the alloy be?

	X	alloy
A	carbon	steel
B	copper	brass
C	iron	steel
D	sulphur	brass

26 The diagram shows a method for changing a metal oxide into a metal.



Which oxide can be changed into a metal by using this method?

A calcium oxide

B copper(II) oxide

C magnesium oxide

D potassium oxide

27 The table shows properties of four elements.

Which element is used to make aircraft bodies?

element	density g/cm^3	brittle or malleable
A	2.1	brittle
B	2.7	malleable
C	4.9	brittle
D	7.9	malleable

28 Three metals **X**, **Y**, and **Z** are correctly placed in the reactivity series as shown.

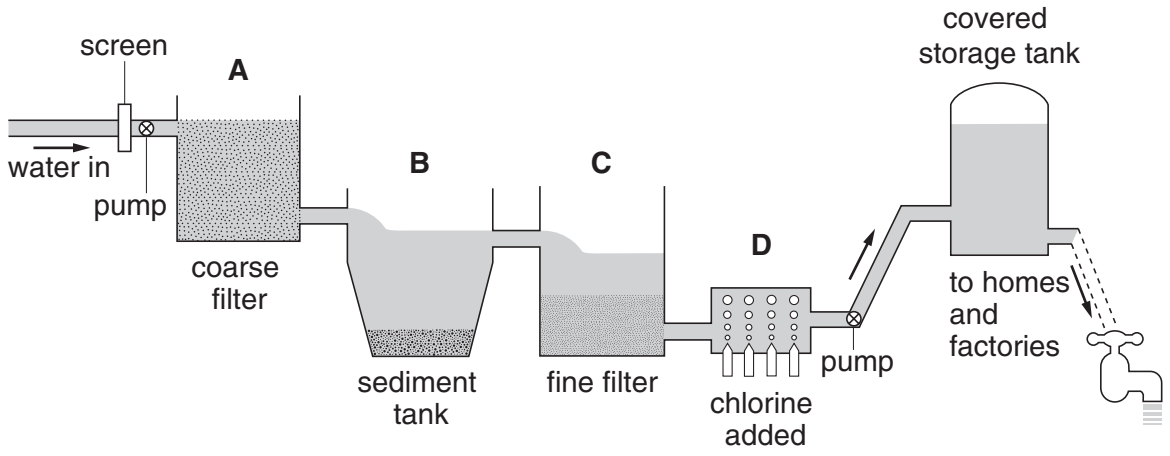
most reactive	potassium
	X
	sodium
	zinc
	Y
	iron
	copper
least reactive	**Z**

How are **X**, **Y** and **Z** obtained from their ores?

	electrolysis	reduction with carbon	found uncombined
A	X	Y	Z
B	X	Z	Y
C	Y	X	Z
D	Z	X	Y

29 The diagram shows how water is purified.

At which stage are bacteria in the water killed?



30 Which two fuels each produce both carbon dioxide and water when separately burned in air?

A charcoal and hydrogen

B charcoal and petrol

C natural gas and hydrogen

D natural gas and petrol

[Turn over

31 Which compound in polluted air can damage stonework and kill trees?

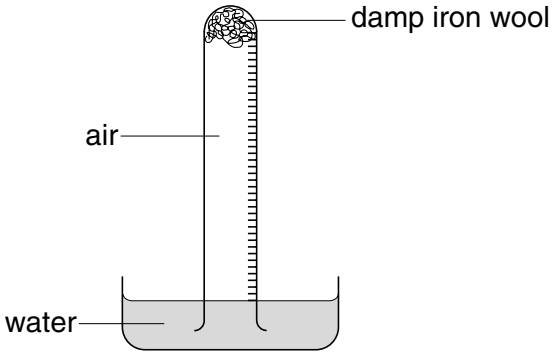
A carbon dioxide

B carbon monoxide

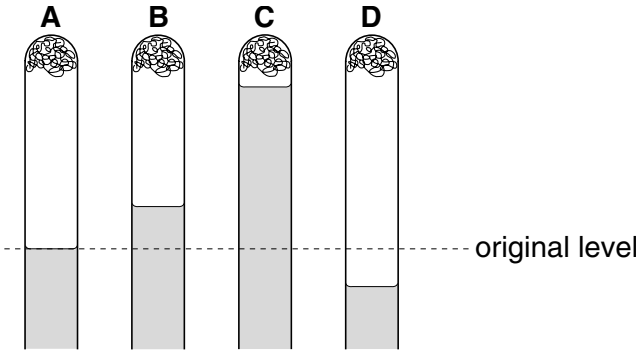
C lead compounds

D sulphur dioxide

32 The apparatus shown is set up and left for a week.



Where would the water level be at the end of the week?



33 An NPK fertiliser contains three elements required for plant growth.

Which two compounds, when mixed, provide the three elements?

A ammonium phosphate + potassium nitrate

B ammonium sulphate + potassium nitrate

C ammonium sulphate + sodium nitrate

D sodium phosphate + potassium chloride

34 Two processes are listed.

1 treating acidic soil with slaked lime

2 using limestone to extract iron

In which of these processes is carbon dioxide produced?

	1	2
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

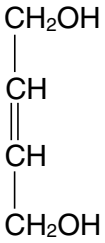
35 Organic compounds may have names ending in –ane, -ene, -ol or –oic acid.

How many of these endings indicate the compounds contain double bonds in their molecules?

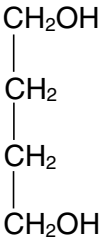
A 1 **B** 2 **C** 3 **D** 4

36 Which compound is unsaturated and forms a neutral solution in water?

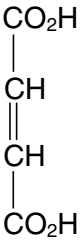
A



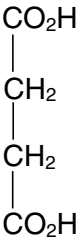
B



C



D



37 Which fraction produced by the distillation of petroleum is used as aircraft fuel?

A bitumen

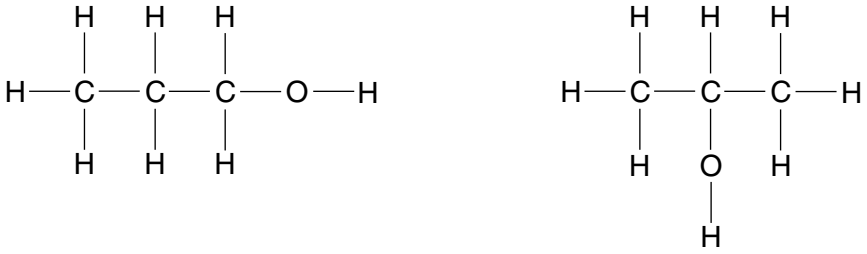
B diesel

C paraffin

D petrol

[Turn over

38 The diagram shows the structures of two compounds.



The two compounds have similar chemical properties.

Why is this?

Their molecules have the same

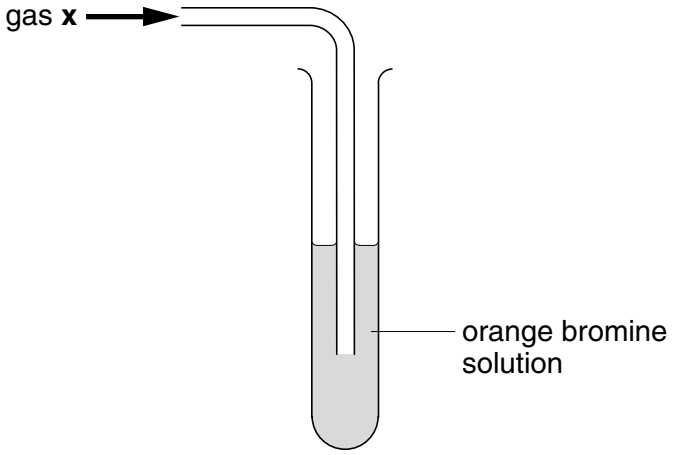
A functional group.

B number of carbon atoms.

C number of oxygen atoms.

D relative molecular mass.

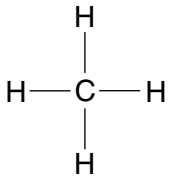
39 The apparatus shows an experiment used to test gas **X**.



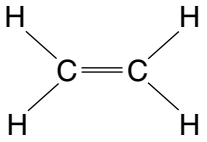
The bromine solution quickly becomes colourless.

What is the structure of gas **X**?

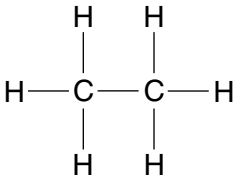
A



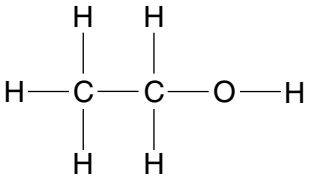
B



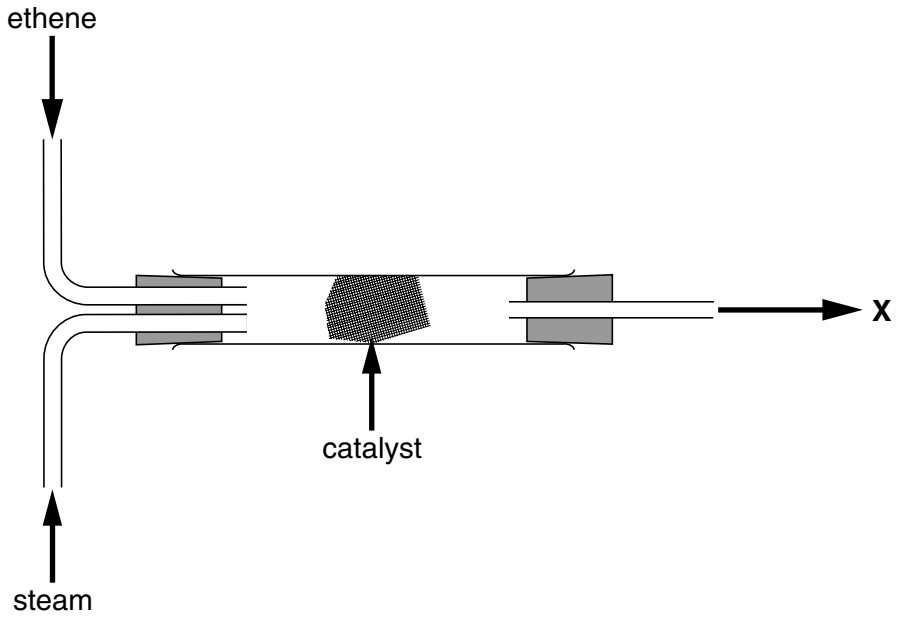
C



D



40 The diagram shows the manufacture of an important organic chemical **X**.



What is **X**?

A ethane

B ethanol

C methane

D methanol

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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	55 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 Radius 88	227 Ac Actinium 89 †															

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

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60
232 Th Thorium 90	Pa Protactinium 91	238 U Uranium 92

Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63
Np Neptunium 93	Pu Plutonium 94	Am Americium 95

157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66
Cm Curium 96	Bk Berkelium 97	Cf Californium 98

165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69
Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101

173 Yb Ytterbium 70	175 Lu Lutetium 71
No Nobelium 102	Lr Lawrencium 103

Key

a
X
b

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.).