

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.

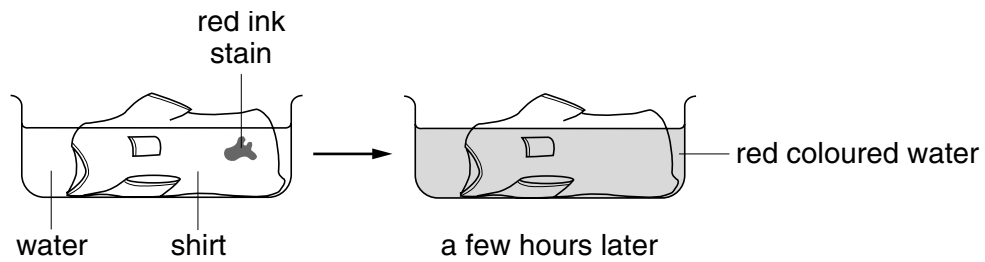
A copy of the Periodic Table is printed on page 20.

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



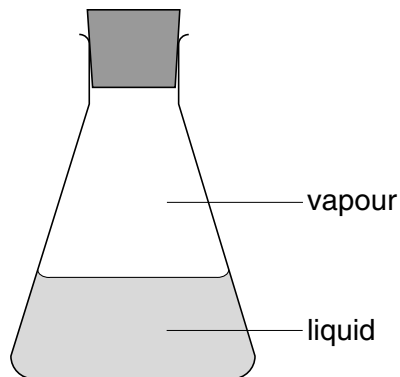
- 1 A shirt is stained with red ink from a pen.

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.



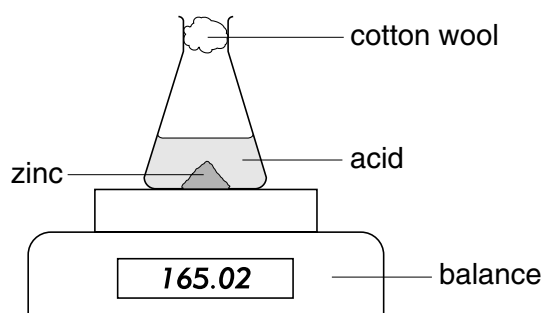
What happens when a molecule in the vapour enters the liquid?

	the molecule stops moving	the molecule becomes smaller
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

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?

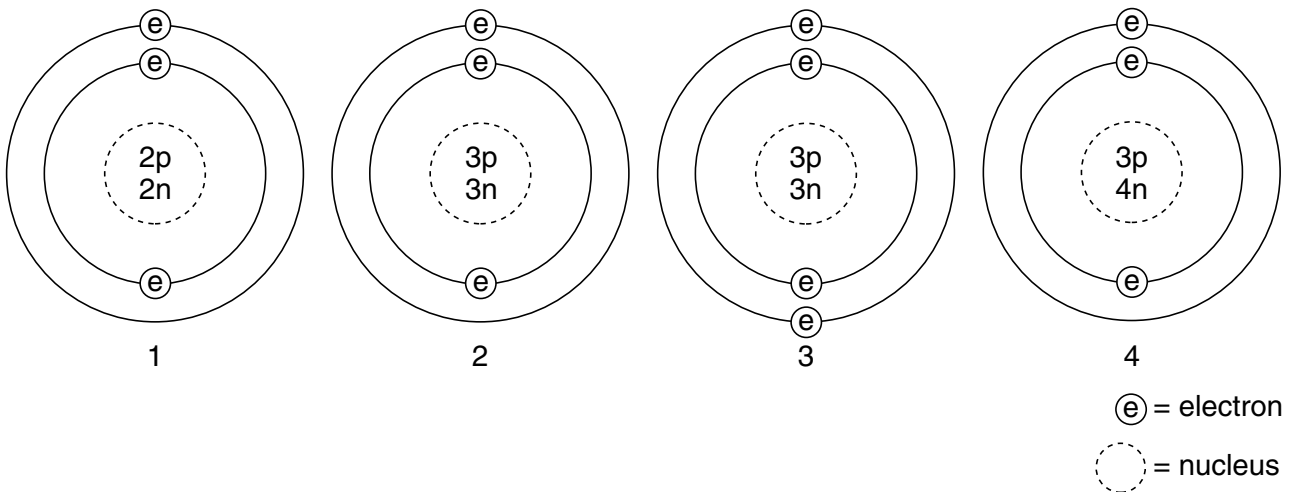
- A Bunsen burner
- B measuring cylinder
- C stop clock
- D thermometer

5 The table shows the electronic structures of four elements.

Which element is a noble gas?

element	number of electrons	
	shell 1	shell 2
<b>A</b>	1	0
<b>B</b>	2	0
<b>C</b>	2	2
<b>D</b>	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

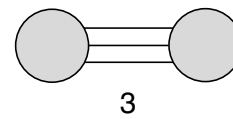
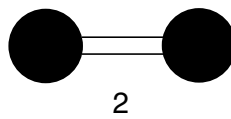
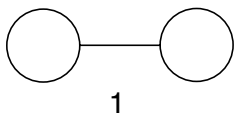
7 Which of the following can be used as a lubricant?

	graphite	a liquid fraction from petroleum
<b>A</b>	✓	✓
<b>B</b>	✓	✗
<b>C</b>	✗	✓
<b>D</b>	✗	✗

8 Which element is a solid non-metal?

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

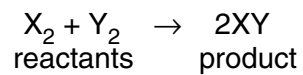
9 The diagrams show the bonding in three covalent molecules.



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.



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

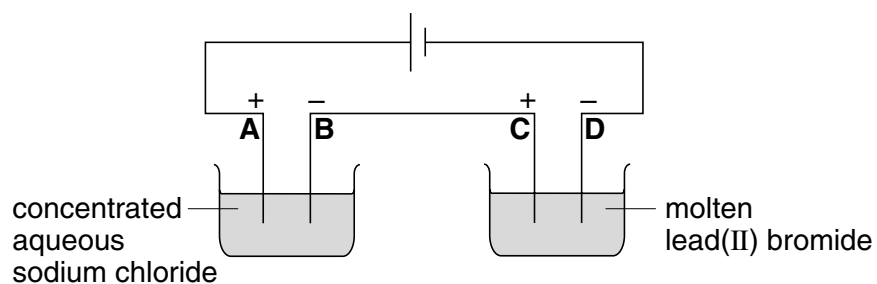
11 Carbon and chlorine form a chloride.

What is the formula of this chloride?

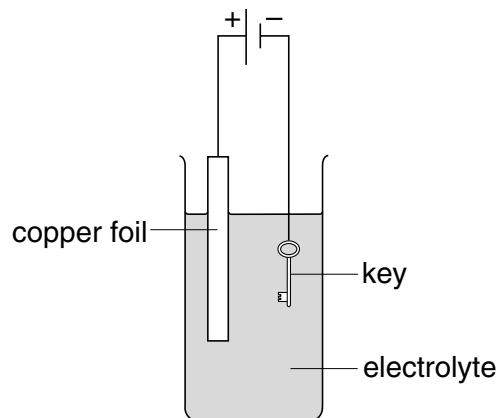
- A  $CCl_2$
- B  $CCl_4$
- C  $CaCl_2$
- D  $CaCl_4$

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.

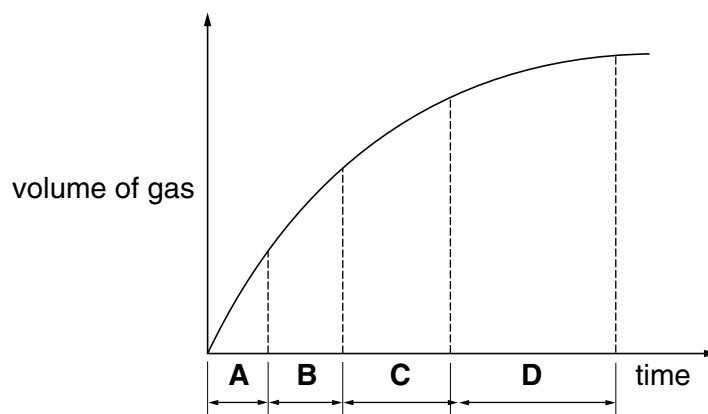


Which aqueous solution is most suitable for the electrolyte?

- 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?

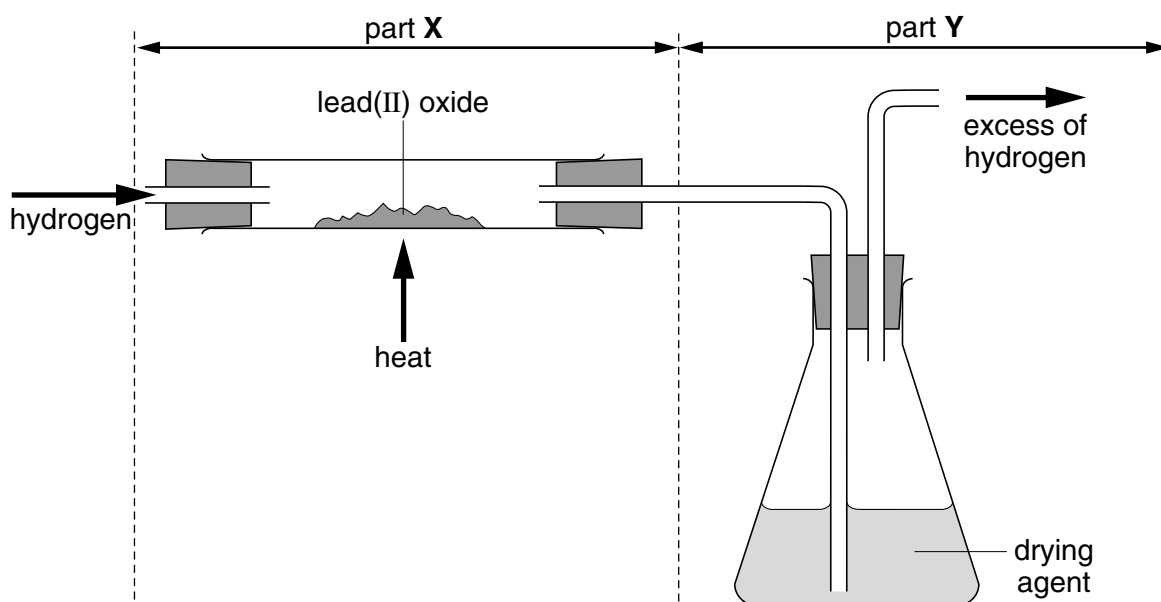


15 Potassium nitrate is a salt and dissolves in water in an endothermic process.

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

	temperature increases	pH falls
<b>A</b>	✓	✓
<b>B</b>	✓	✗
<b>C</b>	✗	✓
<b>D</b>	✗	✗

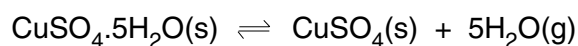
16 Lead(II) oxide is reduced in the apparatus shown.



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

	X	Y
<b>A</b>	decreases	decreases
<b>B</b>	decreases	increases
<b>C</b>	increases	decreases
<b>D</b>	increases	increases

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

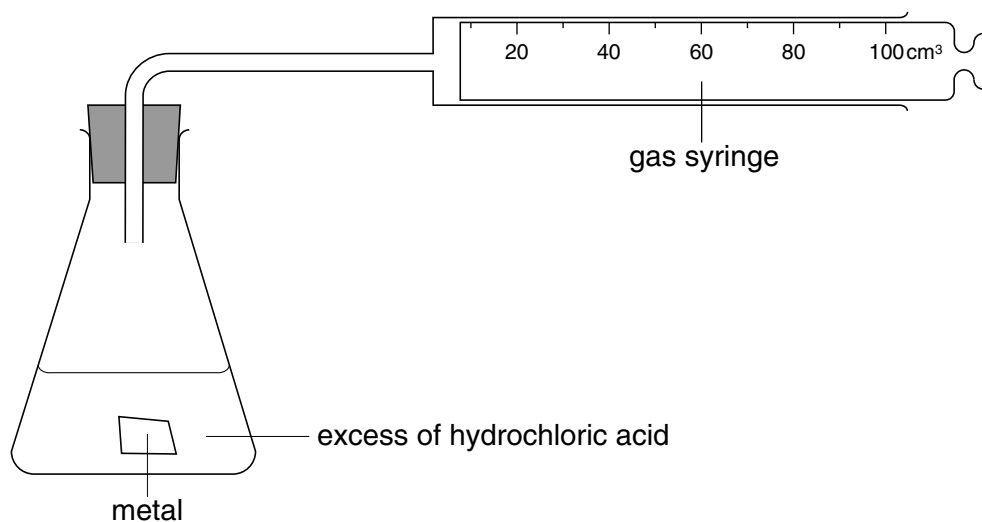


What can be deduced from the equation?

- 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.



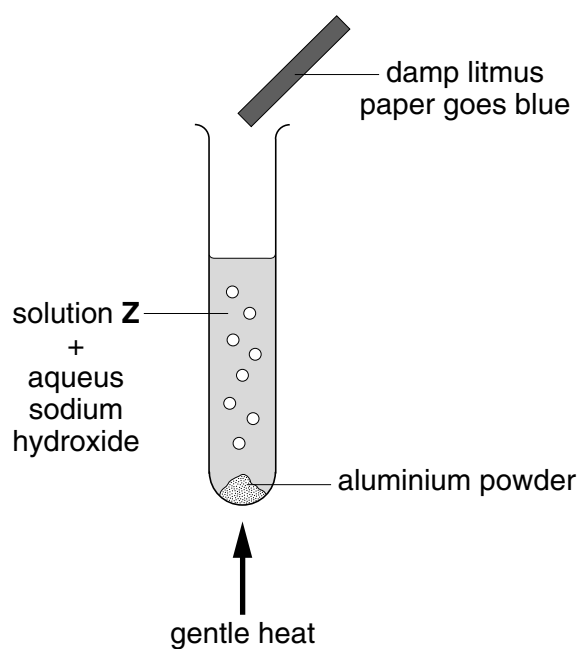
18 The diagram shows an experiment.



Which metal would fill the syringe with 100 cm<sup>3</sup> 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

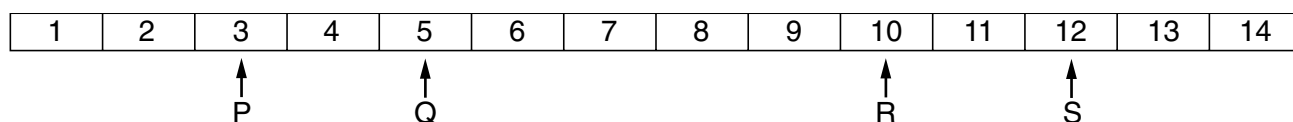
20 The diagram shows the result of testing an aqueous solution **Z**.



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



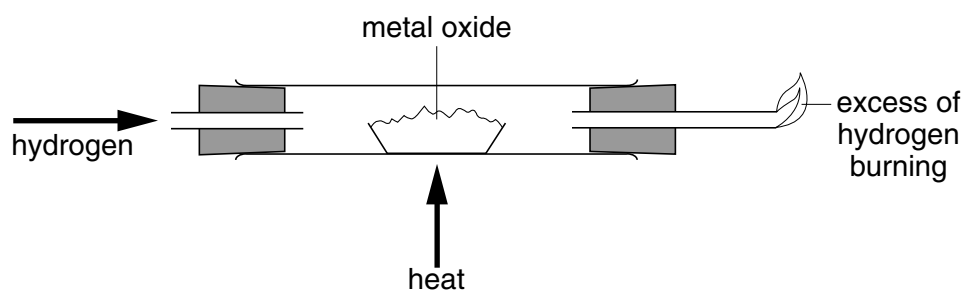
## 25 Element X

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

What could X and the alloy be?

	X	alloy
<b>A</b>	carbon	steel
<b>B</b>	copper	brass
<b>C</b>	iron	steel
<b>D</b>	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 <sup>3</sup>	brittle or malleable
<b>A</b>	2.1	brittle
<b>B</b>	2.7	malleable
<b>C</b>	4.9	brittle
<b>D</b>	7.9	malleable

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

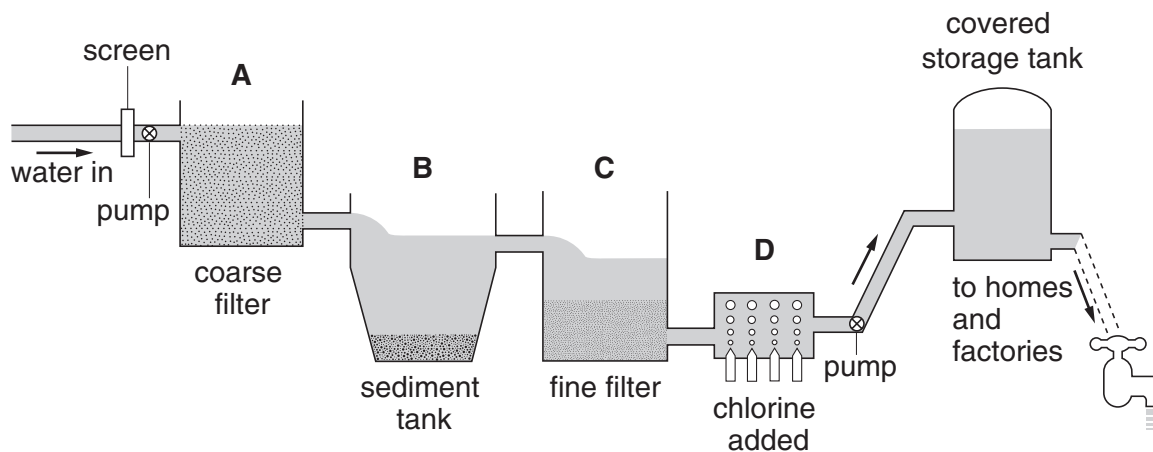
most reactive    potassium  
                       **X**  
                       sodium  
                       zinc  
                       **Y**  
                       iron  
                       copper  
 least reactive    **Z**

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

	electrolysis	reduction with carbon	found uncombined
<b>A</b>	X	Y	Z
<b>B</b>	X	Z	Y
<b>C</b>	Y	X	Z
<b>D</b>	Z	X	Y

29 The diagram shows how water is purified.

At which stage are bacteria in the water killed?



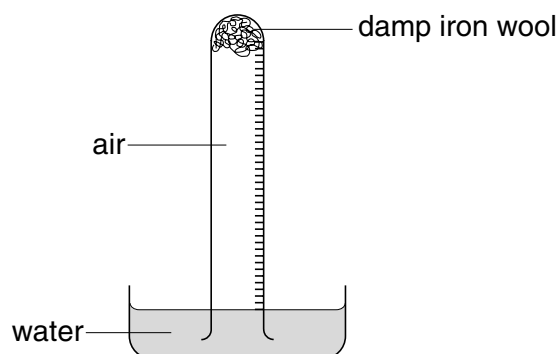
30 Which two fuels each produce both carbon dioxide and water when separately burned in air?

- A** charcoal and hydrogen
- B** charcoal and petrol
- C** natural gas and hydrogen
- D** natural gas and petrol

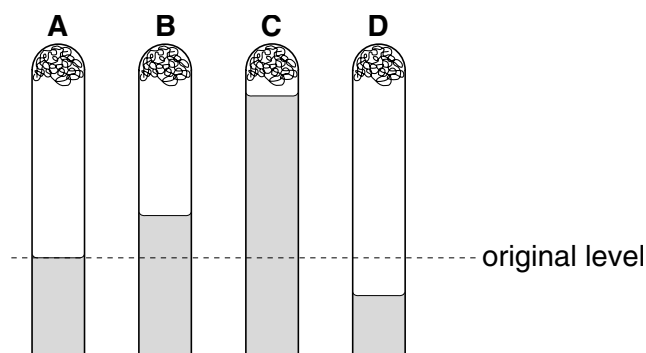
31 Which compound in polluted air can damage stonework and kill trees?

- 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?

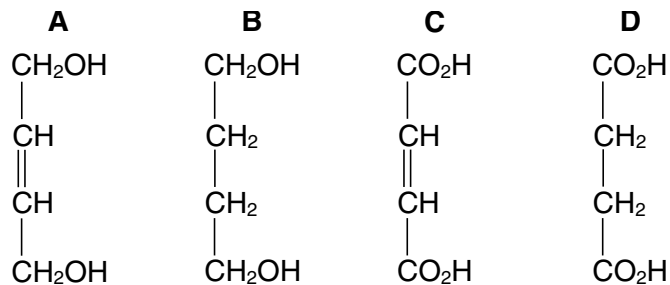
	1	2
<b>A</b>	✓	✓
<b>B</b>	✓	✗
<b>C</b>	✗	✓
<b>D</b>	✗	✗

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

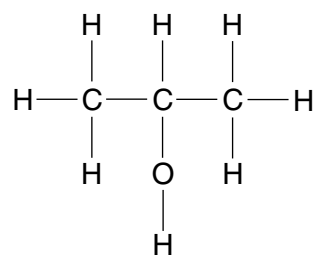
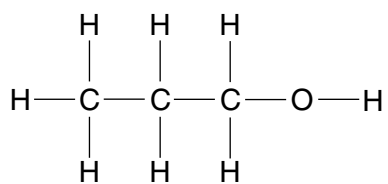
36 Which compound is unsaturated and forms a neutral solution in water?



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

- A** bitumen  
**B** diesel  
**C** paraffin  
**D** petrol

38 The diagram shows the structures of two compounds.



The two compounds have similar chemical properties.

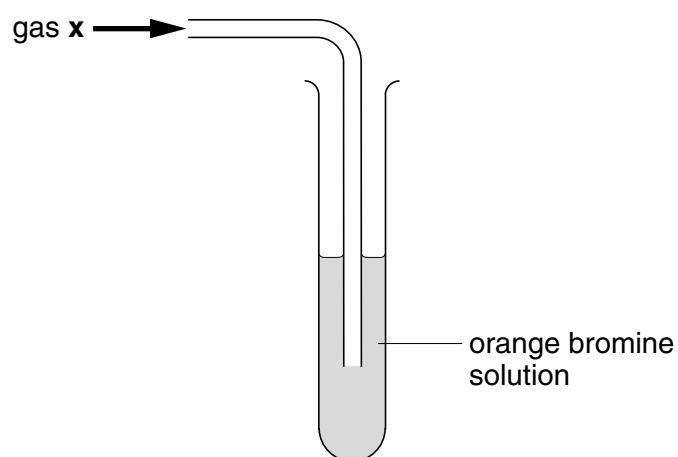
Why is this?

Their molecules have the same

- A functional group.
- B number of carbon atoms.
- C number of oxygen atoms.
- D relative molecular mass.

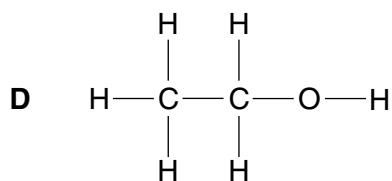
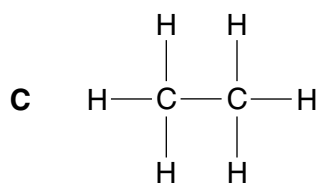
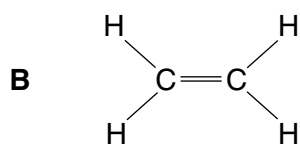
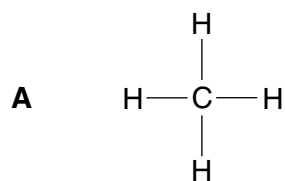


39 The apparatus shows an experiment used to test gas X.

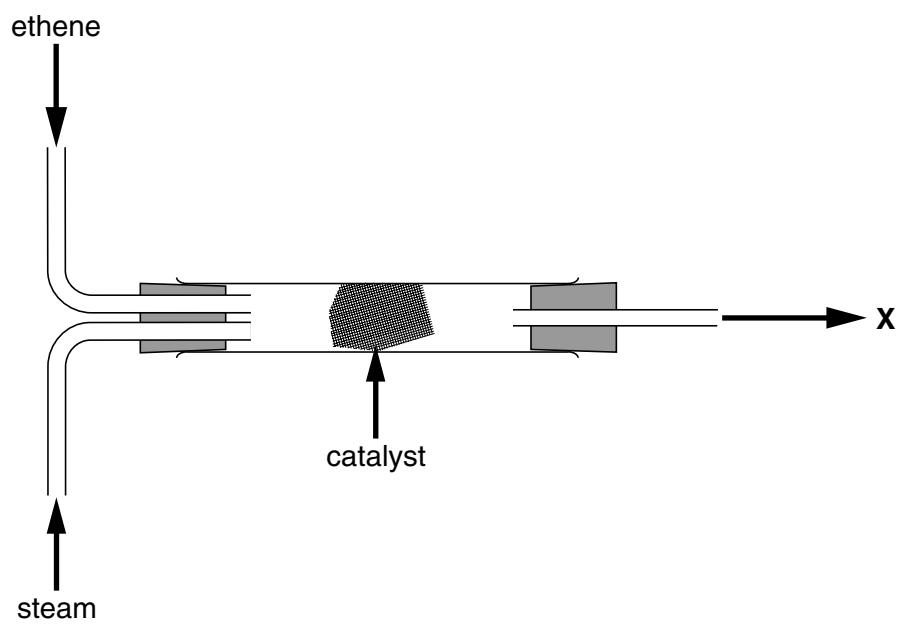


The bromine solution quickly becomes colourless.

What is the structure of gas X?



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



What is X?

- A ethane
- B ethanol
- C methane
- D methanol



## DATA SHEET

### The Periodic Table of the Elements

Group		I	II	III	IV	V	VI	VII	0																				
		<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 20px;">1</td> <td style="width: 20px;"><b>H</b></td> <td colspan="6"></td> <td style="width: 20px;">2</td> <td style="width: 20px;"><b>He</b></td> </tr> <tr> <td colspan="2"></td> <td colspan="6"></td> <td colspan="2"></td> </tr> </table>								1	<b>H</b>							2	<b>He</b>										
1	<b>H</b>							2	<b>He</b>																				
7	9	3	4							20																			
<b>Li</b>	<b>Be</b>	<b>Li</b>	<b>Be</b>							<b>F</b>																			
Lithium	Beryllium	Lithium	Beryllium							Fluorine																			
23	24	11	12							35.5																			
<b>Na</b>	<b>Mg</b>			27	28	31	32	35.5	40																				
Sodium	Magnesium			Aluminium	Silicon	Phosphorus	Sulphur	Chlorine	Argon																				
39	40	19	20	13	14	15	16	17	18																				
<b>K</b>	<b>Ca</b>	<b>K</b>	<b>Ca</b>	Gallium	Germanium	Arsenic	Selenium	Bromine	Krypton																				
Potassium	Calcium	Potassium	Calcium	Gallium	Germanium	Arsenic	Selenium	Bromine	Krypton																				
85	88	37	38	70	73	75	79	80	84																				
<b>Rb</b>	<b>Sr</b>	<b>Rb</b>	<b>Sr</b>	Gallium	Germanium	Arsenic	Selenium	Bromine	Krypton																				
Rubidium	Strontium	Rubidium	Strontium	Gallium	Germanium	Arsenic	Selenium	Bromine	Krypton																				
133	137	55	56	115	119	122	128	127	131																				
<b>Cs</b>	<b>Ba</b>	<b>Cs</b>	<b>Ba</b>	Indium	Tin	Antimony	Tellurium	Iodine	Xenon																				
Caesium	Barium	Caesium	Barium	Indium	Tin	Antimony	Tellurium	Iodine	Xenon																				
226	227	87	88	204	207	209	208	209	222																				
<b>Fr</b>	<b>Ra</b>	<b>Fr</b>	<b>Ra</b>	Thallium	Lead	Bismuth	Polonium	Astatine	Radon																				
Francium	Radium	Francium	Radium	Thallium	Lead	Bismuth	Polonium	Astatine	Radon																				
				65	64	59	59	59	56																				
				Zinc	Copper	Nickel	Cobalt	Iron	Manganese																				
				30	29	28	27	26	25																				
				Zinc	Copper	Nickel	Cobalt	Iron	Manganese																				
				112	108	106	103	101	96																				
				Cadmium	Silver	Palladium	Rhodium	Ruthenium	Technetium																				
				48	47	46	45	44	43																				
				Cadmium	Silver	Palladium	Rhodium	Ruthenium	Technetium																				
				201	197	195	192	190	186																				
				Mercury	Gold	Platinum	Iridium	Osmium	Rhenium																				
				80	79	78	77	76	75																				
				Mercury	Gold	Platinum	Iridium	Osmium	Rhenium																				
				159	157	152	150	144	141																				
				Terbium	Gadolinium	Europium	Samarium	Neodymium	Praseodymium																				
				65	64	63	62	60	59																				
				Terbium	Gadolinium	Europium	Samarium	Neodymium	Praseodymium																				
				238	238	238	238	238	238																				
				Uranium	Plutonium	Americium	Curium	Berkelium	Californium																				
				92	94	95	96	97	98																				
				Uranium	Plutonium	Americium	Curium	Berkelium	Californium																				
				140	141	144	150	152	157																				
				Cerium	Praseodymium	Neodymium	Samarium	Europium	Gadolinium																				
				58	59	60	62	63	64																				
				Cerium	Praseodymium	Neodymium	Samarium	Europium	Gadolinium																				
				232	232	232	232	232	232																				
				Thorium	Protactinium	Uranium	Neptunium	Plutonium	Americium																				
				90	91	92	93	94	95																				
				Thorium	Protactinium	Uranium	Neptunium	Plutonium	Americium																				
				162	165	167	169	173	175																				
				Dysprosium	Holmium	Erbium	Thulium	Ytterbium	Lutetium																				
				66	67	68	69	70	71																				
				Dysprosium	Holmium	Erbium	Thulium	Ytterbium	Lutetium																				
				209	209	209	209	209	209																				
				Bismuth	Lead	Bismuth	Polonium	Astatine	Radon																				
				83	82	83	84	85	86																				
				Bismuth	Lead	Bismuth	Polonium	Astatine	Radon																				

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

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

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