

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.

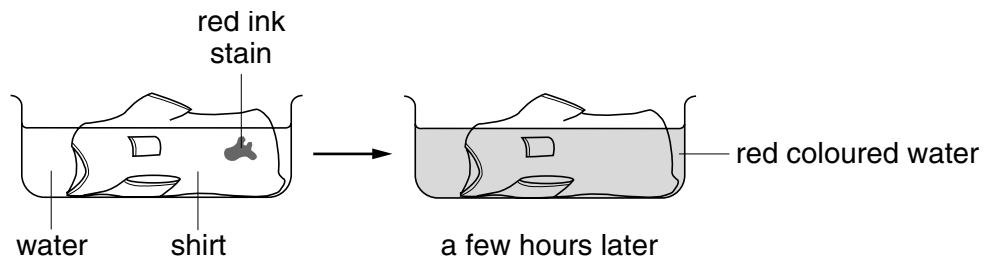
Any rough working should be done in this booklet.

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

2

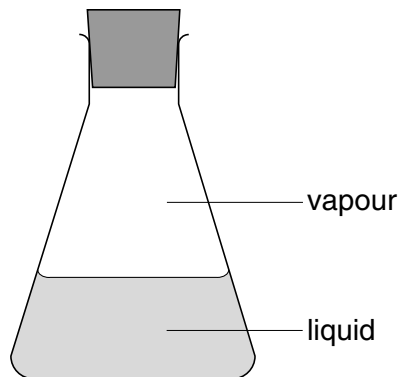
- 1 A shirt is stained with red ink from a pen.

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.

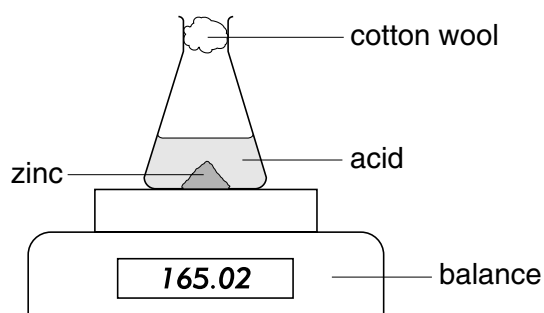


What happens when a molecule in the vapour enters the liquid?

	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

- 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?

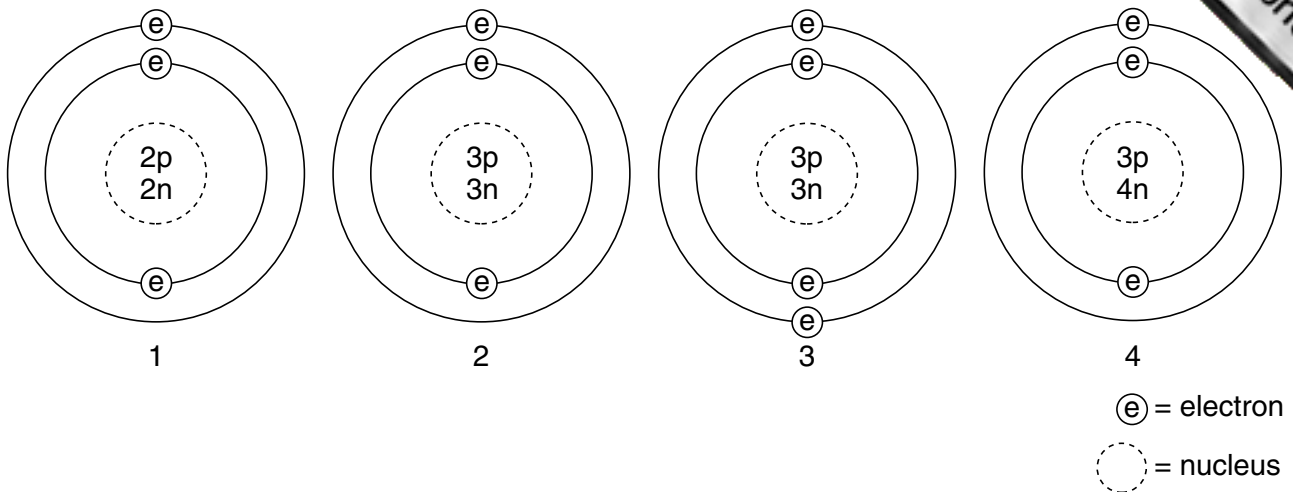
- A Bunsen burner
  - B measuring cylinder
  - C stop clock
  - D thermometer
- 5 The table shows the electronic structures of four elements.

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

4

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

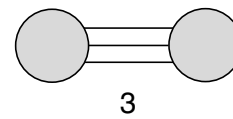
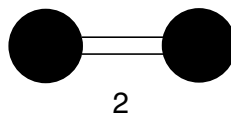
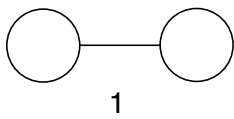
7 Which of the following can be used as a lubricant?

	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

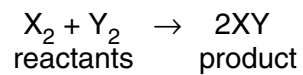
9 The diagrams show the bonding in three covalent molecules.



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

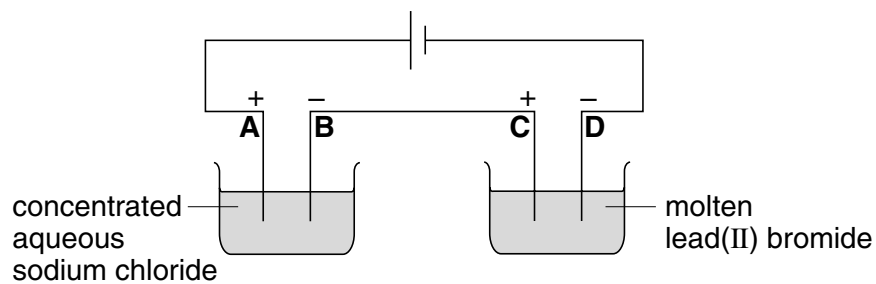
11 Carbon and chlorine form a chloride.

What is the formula of this chloride?

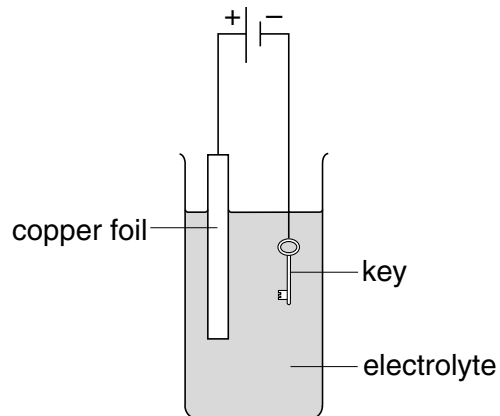
- A  $CCl_2$
- B  $CCl_4$
- C  $CaCl_2$
- D  $CaCl_4$

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.

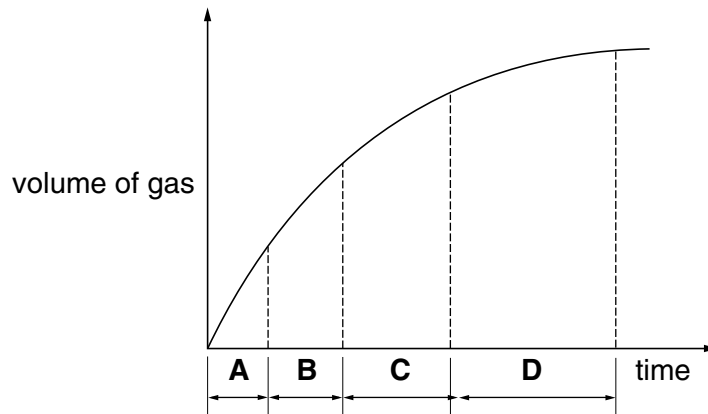


Which aqueous solution is most suitable for the electrolyte?

- A copper(II) sulphate
- B ethanol
- C sodium hydroxide
- D sulphuric acid

7

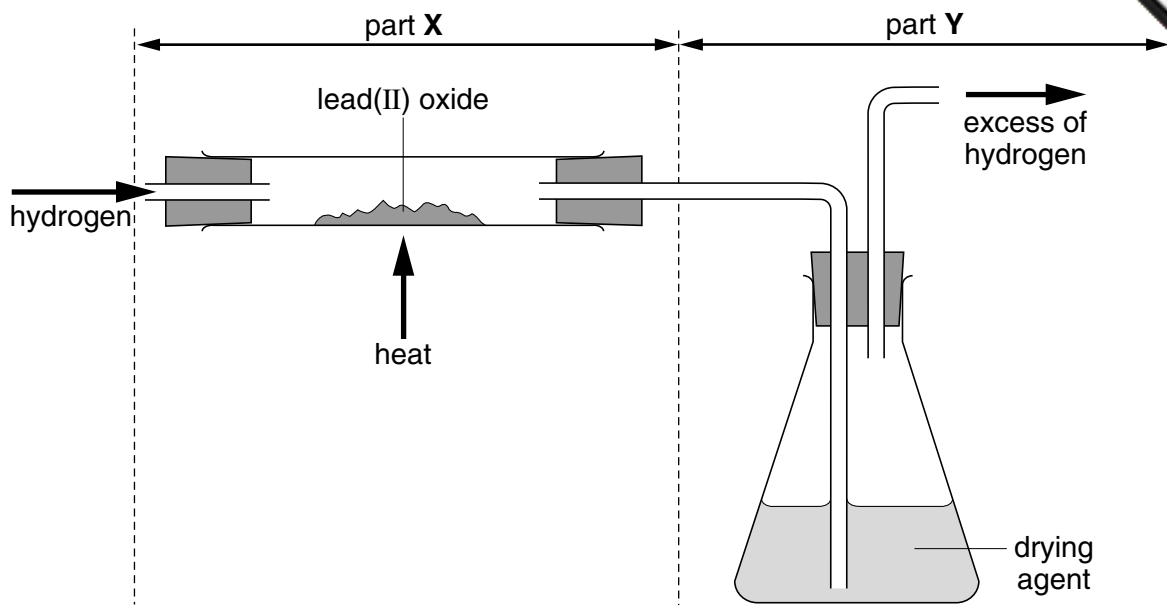
- 14 The graph shows how the total volume of a gas given off from a reaction changes with time. In which time interval is **least** gas given off?



- 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>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

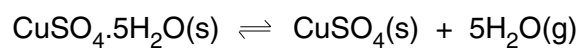
16 Lead(II) oxide is reduced in the apparatus shown.



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.



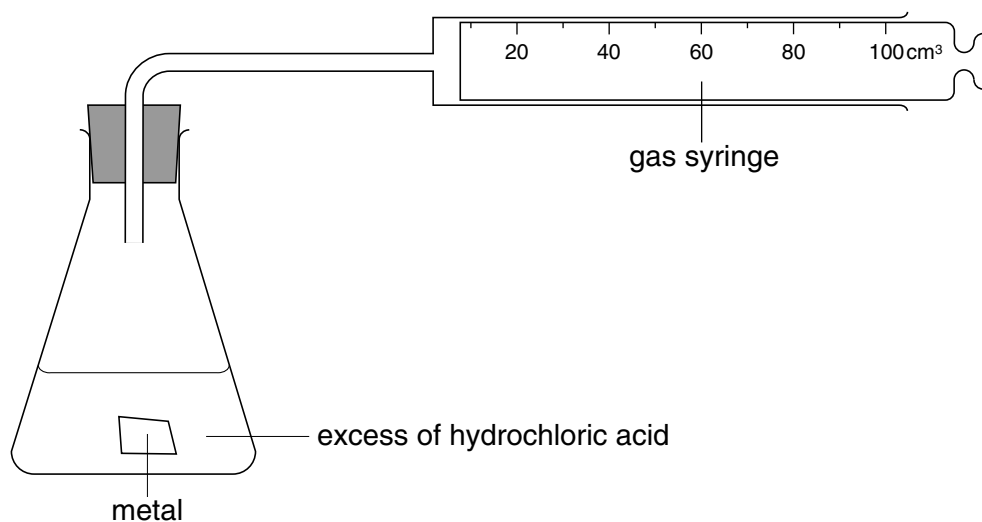
What can be deduced from the equation?

- 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.



9

18 The diagram shows an experiment.

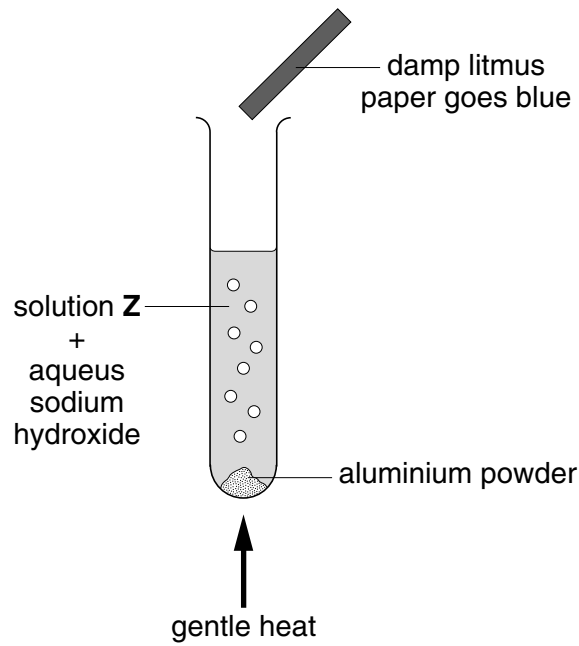


Which metal would fill the syringe with 100 cm<sup>3</sup> of gas in the shortest time?

- 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

10

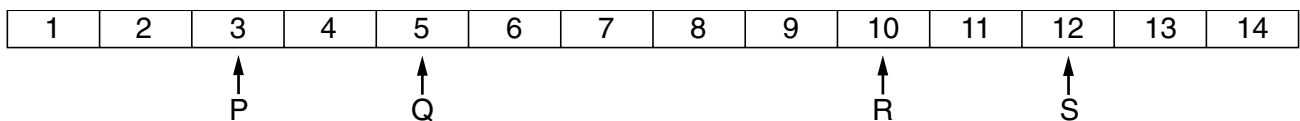
20 The diagram shows the result of testing an aqueous solution Z.



Which ion is present in solution Z?

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

21 The pH values of four solutions are shown.

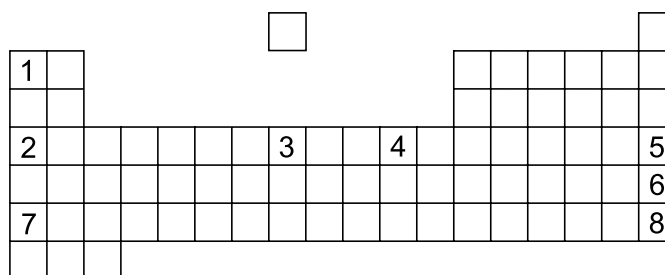


Mixing combinations of these solutions can give a solution of pH 6.

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.



The diagram shows a simplified periodic table with four rows. Row 1 has two cells, with the first cell containing the number '1'. Row 2 has two cells, with the first cell containing '2'. Row 3 has 16 cells, with the 11th cell containing '3' and the 16th cell containing '5'. Row 4 has 16 cells, with the 16th cell containing '8'. There are also two empty cells above the first column and one empty cell above the 11th column.

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
<b>A</b>	0.61 g/cm <sup>3</sup>	coloured
<b>B</b>	0.61 g/cm <sup>3</sup>	white
<b>C</b>	6.1 g/cm <sup>3</sup>	coloured
<b>D</b>	6.1 g/cm <sup>3</sup>	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
<b>A</b>	metal	reacts
<b>B</b>	metal	no reaction
<b>C</b>	non-metal	reacts
<b>D</b>	non-metal	no reaction

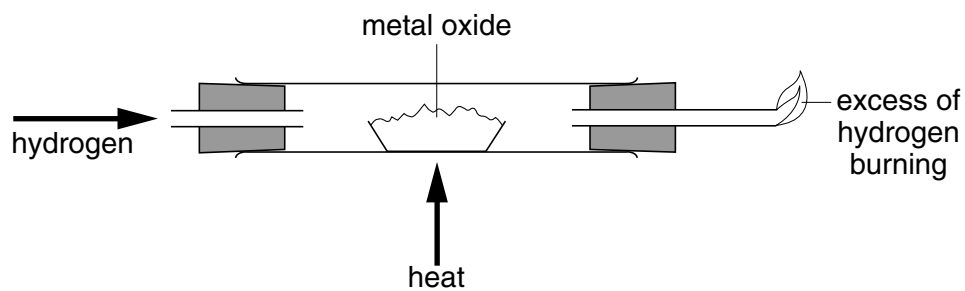
## 25 Element X

- 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.

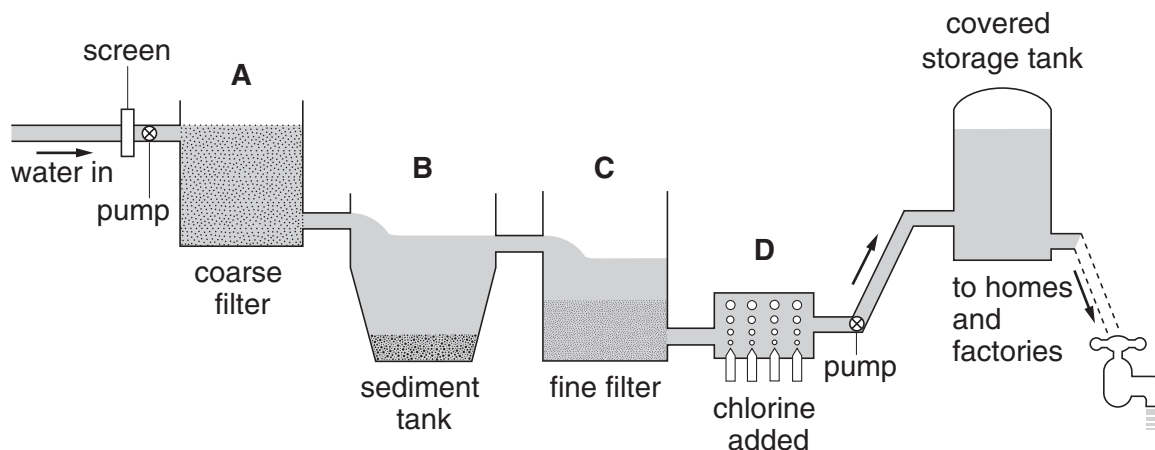
- most reactive potassium
- X**
- sodium
- zinc
- Y**
- iron
- copper
- least reactive **Z**

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?



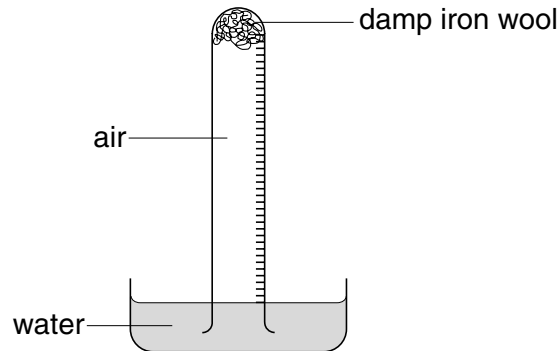
30 Which two fuels each produce both carbon dioxide and water when separately burned in air?

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

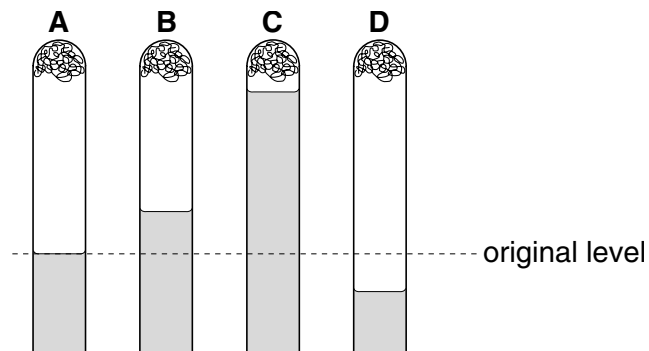
31 Which compound in polluted air can damage stonework and kill trees?

- 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?

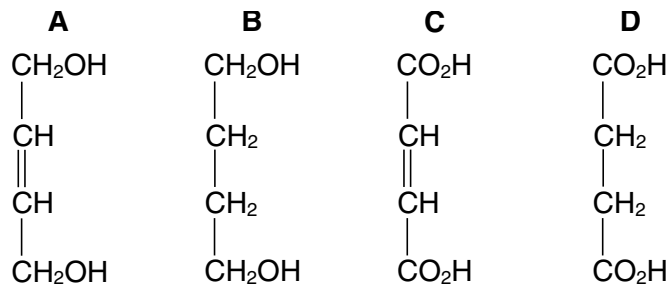
	1	2
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

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

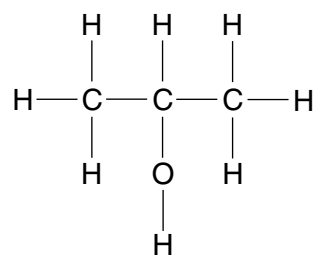
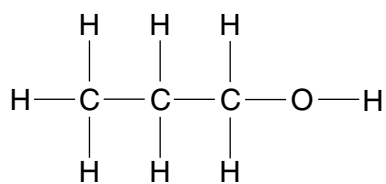
36 Which compound is unsaturated and forms a neutral solution in water?



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.

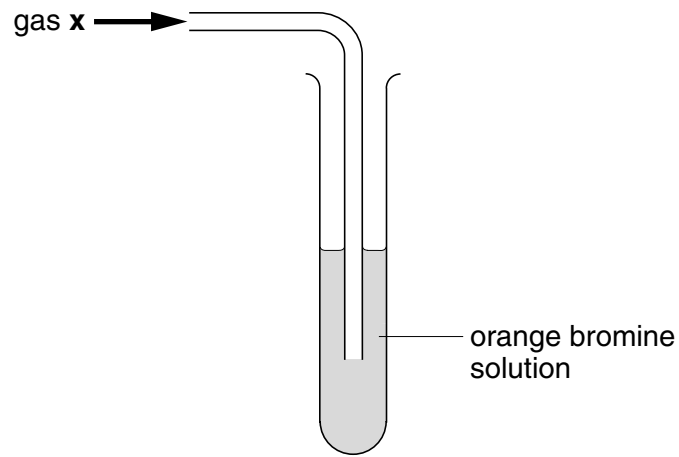
Why is this?

Their molecules have the same

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

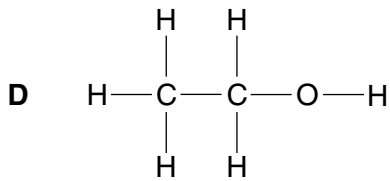
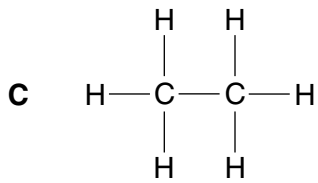
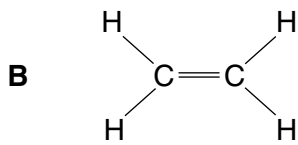
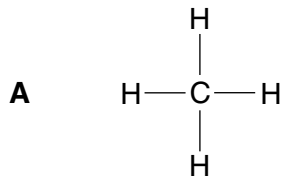


39 The apparatus shows an experiment used to test gas X.

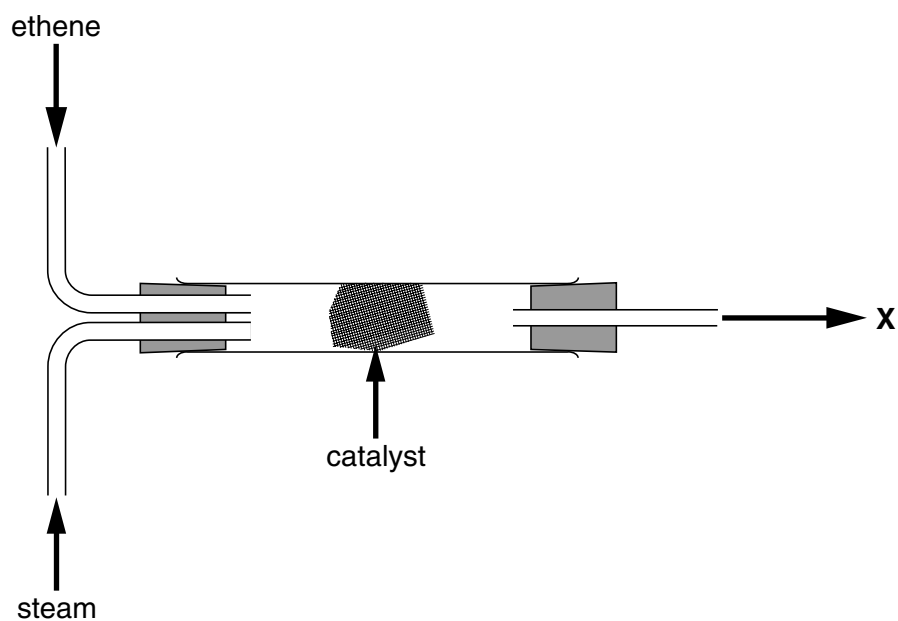


The bromine solution quickly becomes colourless.

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																																																																																				
7 <b>Li</b> Lithium 4	9 <b>Be</b> Beryllium 4	1 <b>H</b> Hydrogen 1	11 <b>B</b> Boron 5	12 <b>C</b> Carbon 6	13 <b>Al</b> Aluminium 13	14 <b>N</b> Nitrogen 7	15 <b>O</b> Oxygen 8	16 <b>F</b> Fluorine 9	17 <b>Ne</b> Neon 10	18 <b>Ar</b> Argon 18	20 <b>Ca</b> Calcium 20	22 <b>Ti</b> Titanium 22	23 <b>V</b> Vanadium 23	24 <b>Cr</b> Chromium 24	25 <b>Mn</b> Manganese 25	26 <b>Fe</b> Iron 26	27 <b>Co</b> Cobalt 27	28 <b>Ni</b> Nickel 28	29 <b>Cu</b> Copper 29	30 <b>Zn</b> Zinc 30	31 <b>Ga</b> Gallium 31	32 <b>Ge</b> Germanium 32	33 <b>As</b> Arsenic 33	34 <b>Se</b> Selenium 34	35 <b>Br</b> Bromine 35	36 <b>Kr</b> Krypton 36	38 <b>Sr</b> Strontium 38	39 <b>Y</b> Yttrium 39	40 <b>Zr</b> Zirconium 40	41 <b>Nb</b> Niobium 41	42 <b>Mo</b> Molybdenum 42	43 <b>Tc</b> Technetium 43	44 <b>Ru</b> Ruthenium 44	45 <b>Rh</b> Rhodium 45	46 <b>Pd</b> Palladium 46	47 <b>Ag</b> Silver 47	48 <b>Cd</b> Cadmium 48	49 <b>In</b> Indium 49	50 <b>Sn</b> Tin 50	51 <b>Sb</b> Antimony 51	52 <b>Te</b> Tellurium 52	53 <b>I</b> Iodine 53	54 <b>Xe</b> Xenon 54	56 <b>Ba</b> Barium 56	57 <b>La</b> Lanthanum 57	72 <b>Hf</b> Hafnium 72	73 <b>Ta</b> Tantalum 73	74 <b>W</b> Tungsten 74	75 <b>Re</b> Rhenium 75	76 <b>Os</b> Osmium 76	77 <b>Ir</b> Iridium 77	78 <b>Pt</b> Platinum 78	79 <b>Au</b> Gold 79	80 <b>Hg</b> Mercury 80	81 <b>Tl</b> Thallium 81	82 <b>Pb</b> Lead 82	83 <b>Bi</b> Bismuth 83	84 <b>Po</b> Polonium 84	85 <b>At</b> Astatine 85	86 <b>Rn</b> Radon 86	88 <b>Ra</b> Radium 88	89 <b>Ac</b> Actinium 89	90 <b>Th</b> Thorium 90	91 <b>Pa</b> Protactinium 91	92 <b>U</b> Uranium 92	93 <b>Np</b> Neptunium 93	94 <b>Pu</b> Plutonium 94	95 <b>Am</b> Americium 95	96 <b>Cm</b> Curium 96	97 <b>Bk</b> Berkelium 97	98 <b>Cf</b> Californium 98	99 <b>Es</b> Einsteinium 99	100 <b>Fm</b> Fermium 100	101 <b>Md</b> Mendelevium 101	102 <b>No</b> Nobelium 102	103 <b>Lr</b> Lawrencium 103	104 <b>Rf</b> Rutherfordium 104	105 <b>Db</b> Dubnium 105	106 <b>Sg</b> Seaborgium 106	107 <b>Bh</b> Bohrium 107	108 <b>Hs</b> Hassium 108	109 <b>Mt</b> Meitnerium 109	110 <b>Ds</b> Darmstadtium 110	111 <b>Rg</b> Roentgenium 111	112 <b>Cn</b> Copernicium 112	113 <b>Nh</b> Nihonium 113	114 <b>Fl</b> Flerovium 114	115 <b>Mc</b> Moscovium 115	116 <b>Lv</b> Livermorium 116	117 <b>Ts</b> Tennessine 117	118 <b>Og</b> Oganesson 118
133 <b>Cs</b> Caesium 56	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	210 <b>Po</b> Polonium 84	210 <b>At</b> Astatine 85	210 <b>Rn</b> Radon 86	226 <b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89	232 <b>Th</b> Thorium 90	232 <b>Pa</b> Protactinium 91	238 <b>U</b> Uranium 92	238 <b>Np</b> Neptunium 93	238 <b>Pu</b> Plutonium 94	238 <b>Am</b> Americium 95	238 <b>Cm</b> Curium 96	238 <b>Bk</b> Berkelium 97	238 <b>Cf</b> Californium 98	238 <b>Es</b> Einsteinium 99	238 <b>Fm</b> Fermium 100	238 <b>Md</b> Mendelevium 101	238 <b>No</b> Nobelium 102	238 <b>Lr</b> Lawrencium 103	238 <b>Rf</b> Rutherfordium 104	238 <b>Db</b> Dubnium 105	238 <b>Sg</b> Seaborgium 106	238 <b>Bh</b> Bohrium 107	238 <b>Hs</b> Hassium 108	238 <b>Mt</b> Meitnerium 109	238 <b>Ds</b> Darmstadtium 110	238 <b>Rg</b> Roentgenium 111	238 <b>Cn</b> Copernicium 112	238 <b>Nh</b> Nihonium 113	238 <b>Fl</b> Flerovium 114	238 <b>Mc</b> Moscovium 115	238 <b>Lv</b> Livermorium 116	238 <b>Ts</b> Tennessine 117	238 <b>Og</b> Oganesson 118																																											

3-71 Lanthanoid series  
0-103 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.).