

CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Ordinary Level

**CHEMISTRY**

**5070/01**

Paper 1 Multiple Choice

May/June 2003

**1 hour**

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.

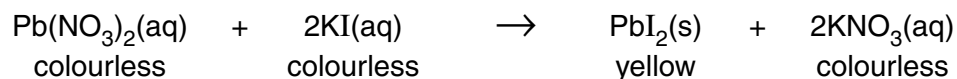
Any rough working should be done in this booklet.

A copy of the Periodic Table is to be found on page 16.

This document consists of **16** printed pages.



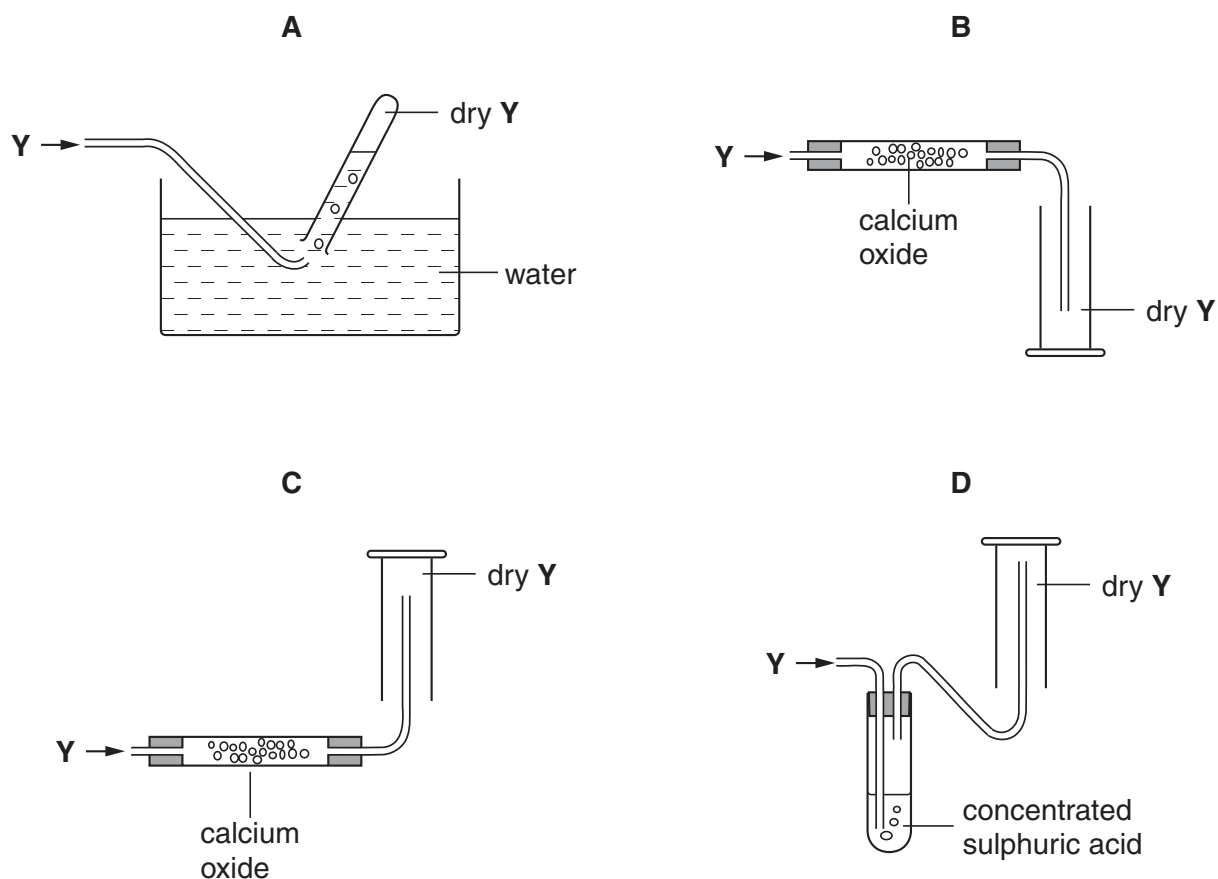
- 1 The equation for the reaction between aqueous lead(II) nitrate and aqueous potassium iodide is shown.



Which method could be used to separate the products?

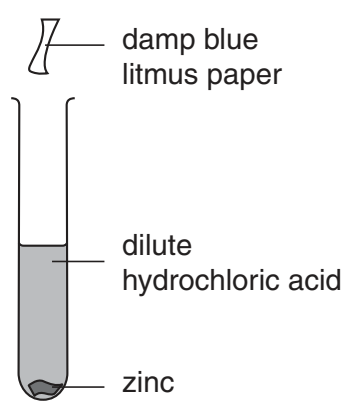
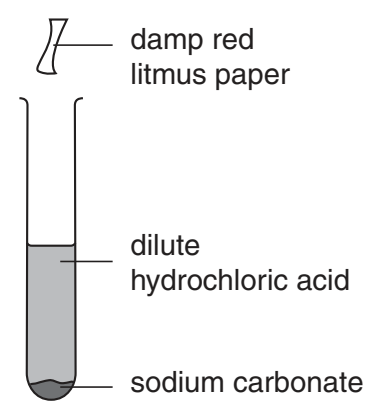
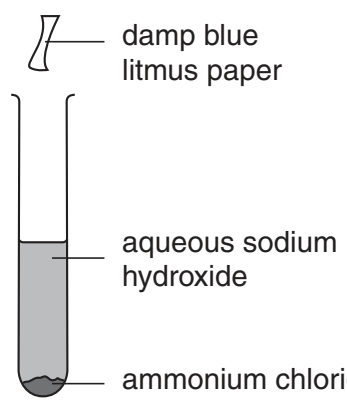
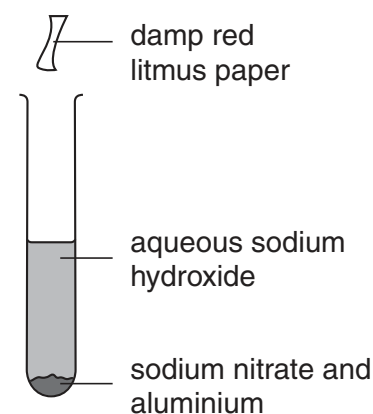
- A chromatography  
 B crystallisation  
 C distillation  
 D filtration
- 2 A gas Y, is less dense than air, very soluble in water and is an alkali.

Which method is used to collect a dry sample of the gas?



3 The diagrams show mixtures of chemicals that react to produce gases.

In which reaction will the litmus paper change colour?

<p><b>A</b></p>  <p>damp blue litmus paper</p> <p>dilute hydrochloric acid</p> <p>zinc</p>	<p><b>B</b></p>  <p>damp red litmus paper</p> <p>dilute hydrochloric acid</p> <p>sodium carbonate</p>
<p><b>C</b></p>  <p>damp blue litmus paper</p> <p>aqueous sodium hydroxide</p> <p>ammonium chloride</p>	<p><b>D</b></p>  <p>damp red litmus paper</p> <p>aqueous sodium hydroxide</p> <p>sodium nitrate and aluminium</p>

4 Methylamine,  $\text{CH}_3\text{NH}_2$  ( $M_r = 31$ ), and hydrogen chloride,  $\text{HCl}$  ( $M_r = 36.5$ ) are both gases which are soluble in water.

The gases react together to form a white solid, methylammonium chloride.

In an experiment to demonstrate rates of diffusion the following apparatus is set up.

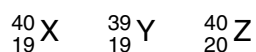
Where will the white solid form?

<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
			
<p>cotton wool soaked in concentrated methylamine solution</p>			<p>cotton wool soaked in concentrated hydrochloric acid</p>

- 5 A 25 cm<sup>3</sup> sample of dilute sulphuric acid contains 0.025 moles of the acid.

What is the hydrogen ion concentration in the solution?

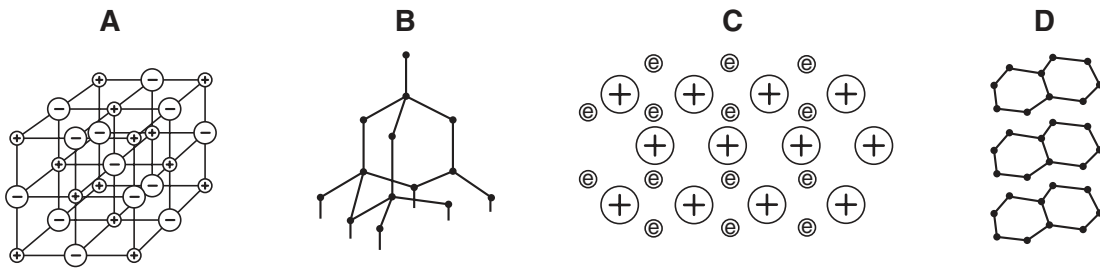
- A 0.25 mol/dm<sup>3</sup>
  - B 0.50 mol/dm<sup>3</sup>
  - C 1.00 mol/dm<sup>3</sup>
  - D 2.00 mol/dm<sup>3</sup>
- 6 For which of the following can graphite be used?
- A as an abrasive only
  - B as an abrasive and as an electrode
  - C as an electrode and as a lubricant
  - D as a lubricant only
- 7 The letters X, Y and Z represent different atoms.



What can be deduced from the proton numbers and nucleon numbers of X, Y and Z?

- A X and Y are the same element.
  - B X and Z are the same element.
  - C X has more protons than Y.
  - D Z has more neutrons than Y.
- 8 How does a magnesium atom form a bond with an oxygen atom?
- A by giving one pair of electrons to the oxygen atom
  - B by sharing one pair of electrons, both electrons provided by the magnesium atom
  - C by sharing two pairs of electrons, both pairs provided by the oxygen atom
  - D by sharing two pairs of electrons, each atom donating one pair of electrons

9 Which diagram represents the structure of the metal sodium?



10 Elements X and Y combine to form the gas  $XY_2$ .

What are X and Y?

	X	Y
<b>A</b>	calcium	chlorine
<b>B</b>	carbon	hydrogen
<b>C</b>	carbon	oxygen
<b>D</b>	hydrogen	oxygen

11 Which of the following contains the same number of electrons as an atom of neon?

- A**  $Cl^-$
- B** Li
- C**  $Li^+$
- D**  $O^{2-}$

12 Which sulphide contains the greatest mass of sulphur in a 10 g sample?

sulphide	formula	mass of one mole / g
<b>A</b>	NiS	90
<b>B</b>	$FeS_2$	120
<b>C</b>	$MoS_2$	160
<b>D</b>	PbS	239

- 13** 124 g of phosphorus vapour has the same volume as 71 g of chlorine gas at the same temperature and pressure.

What is the formula of a molecule of phosphorus?

- A** P<sub>8</sub>      **B** P<sub>4</sub>      **C** P<sub>2</sub>      **D** P

- 14** A piece of metal is to be electroplated.

Which set of conditions give the thickest plate?

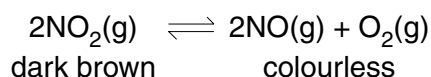
	type of current	size of current	time
<b>A</b>	a.c.	low	short
<b>B</b>	d.c.	high	long
<b>C</b>	a.c.	high	short
<b>D</b>	d.c.	low	long

- 15** Rubidium is above sodium in the reactivity series.

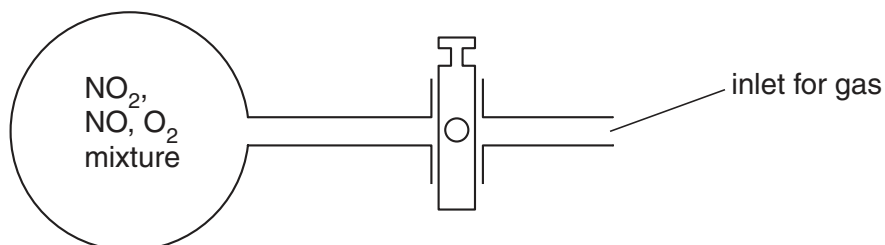
What is formed when concentrated aqueous rubidium chloride is electrolysed?

products		
	cathode (-)	anode (+)
<b>A</b>	chlorine	hydrogen
<b>B</b>	hydrogen	rubidium
<b>C</b>	hydrogen	chlorine
<b>D</b>	rubidium	chlorine

- 16 Nitrogen dioxide,  $\text{NO}_2$ , is a dark brown gas that decomposes as shown by the equilibrium equation.



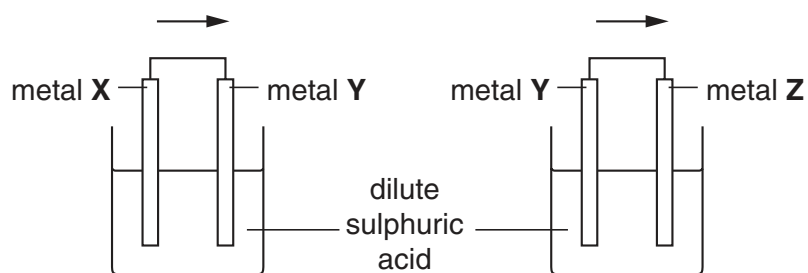
The diagram shows a glass flask containing a mixture of the three gases. The mixture is pale brown.



More oxygen is forced into the flask.

What colour change is seen in the mixture?

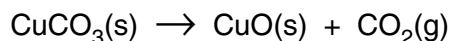
- A** there is no change  
**B** it turns colourless  
**C** it becomes darker brown  
**D** it becomes a paler brown
- 17 Two cells were set up as shown in the diagram. The arrow shows the direction of electron flow in the external circuit.



Which set of metals would give the electron flows in the direction shown?

	metal X	metal Y	metal Z
<b>A</b>	Ag	Cu	Zn
<b>B</b>	Ag	Zn	Cu
<b>C</b>	Cu	Zn	Ag
<b>D</b>	Zn	Cu	Ag

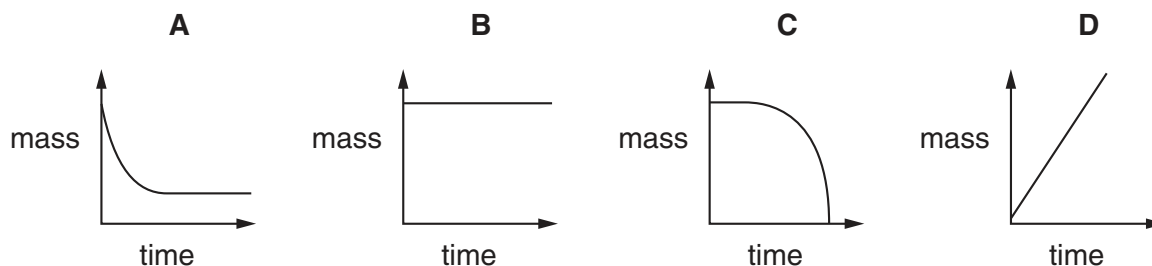
- 18 The equation shows the effect of heat on copper(II) carbonate.



A known mass of copper(II) carbonate was placed in an open crucible and heated until no more change occurred.

The mass of the crucible and contents was weighed every minute during the heating.

Which graph shows what happens to the mass of the crucible and contents?



- 19 Substance X liberates iodine from aqueous potassium iodide and decolourises acidified aqueous potassium manganate(VII).

How is the behaviour of X described?

- A** as an oxidising agent only  
**B** as an oxidising agent and a reducing agent  
**C** as neither an oxidising agent nor a reducing agent  
**D** as a reducing agent only
- 20 Salts are made by reacting acids with bases.

For which combination of acids and bases is the titration method of preparation suitable?

- A** an insoluble acid with an insoluble base  
**B** an insoluble acid with a soluble base  
**C** a soluble acid with an insoluble base  
**D** a soluble acid with a soluble base
- 21 The following equations represent reactions of dilute sulphuric acid.

Which reaction is not 'typical' of a dilute acid?

- A**  $2\text{KOH}(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{K}_2\text{SO}_4(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$   
**B**  $\text{CuO}(\text{s}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{CuSO}_4(\text{aq}) + \text{H}_2\text{O}(\text{l})$   
**C**  $\text{Pb}(\text{NO}_3)_2(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{PbSO}_4(\text{s}) + 2\text{HNO}_3(\text{aq})$   
**D**  $\text{ZnCO}_3(\text{s}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{ZnSO}_4(\text{aq}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$



22 A black powder is burned in air.

The gas produced dissolves in water to form solution **R**. The pH of **R** is close to 7.

The gas is readily absorbed in aqueous sodium hydroxide.

What type of substance is present in solution **R**?

- A strong acid
- B strong base
- C weak acid
- D weak base

23 The results of three halogen displacement experiments are shown.

The table shows the results.

experiment	halogen added	halide solution		
		X <sup>-</sup>	Y <sup>-</sup>	Z <sup>-</sup>
1	X <sub>2</sub>	–	Y <sub>2</sub> displaced	Z <sub>2</sub> displaced
2	Y <sub>2</sub>	no reaction	–	no reaction
3	Z <sub>2</sub>	no reaction	Y <sub>2</sub> displaced	–

What are halogens X, Y and Z?

	X	Y	Z
<b>A</b>	Br	Cl	I
<b>B</b>	Br	I	Cl
<b>C</b>	Cl	Br	I
<b>D</b>	Cl	I	Br

24 Which statement about the Periodic Table is correct?

- A the melting point of the elements increases down Group I
- B the reactivity of the elements increases down Group VII
- C the reactivity of the elements decreases down Group I
- D the colour of the elements becomes darker down Group VII

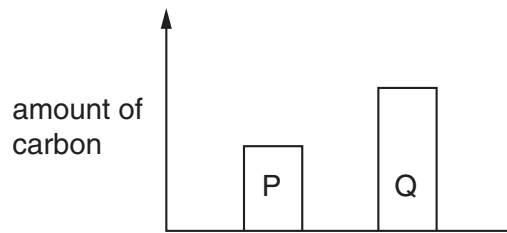
- 25 In which process is a catalyst **not** used?
- A The Blast furnace for the manufacture of iron.
  - B The Contact process for the manufacture of sulphuric acid.
  - C The Haber process for the manufacture of ammonia.
  - D The manufacture of margarine from unsaturated vegetable oils.
- 26 The table shows the results of two tests carried out on separate portions of a solution of salt **X**.

	test	observation
1	acidified aqueous barium nitrate added	white precipitate
2	aqueous sodium hydroxide added	white precipitate soluble in an excess of aqueous sodium hydroxide

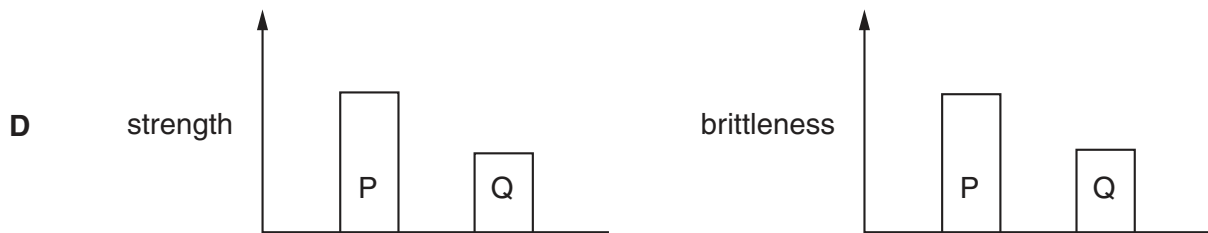
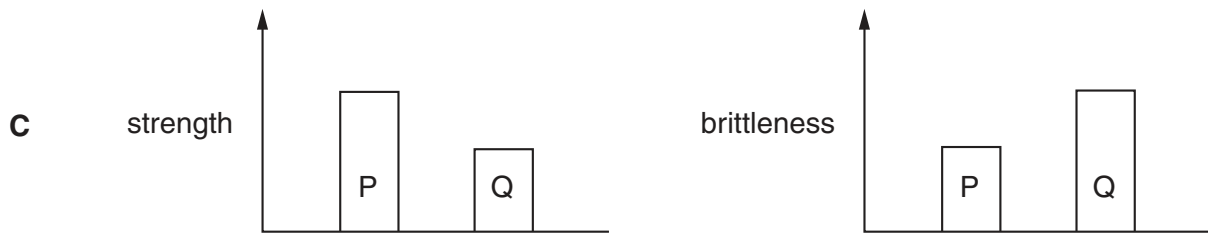
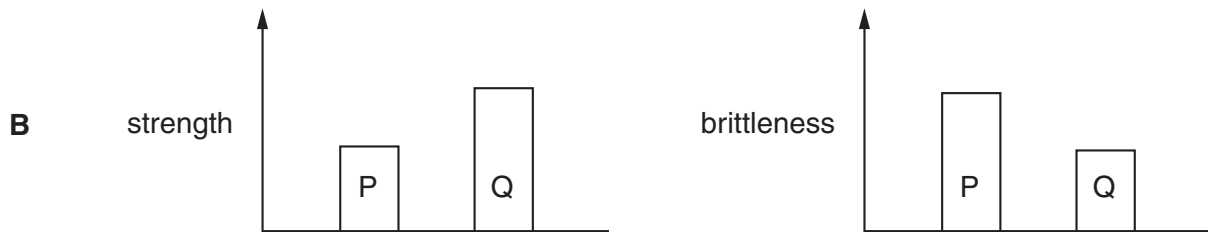
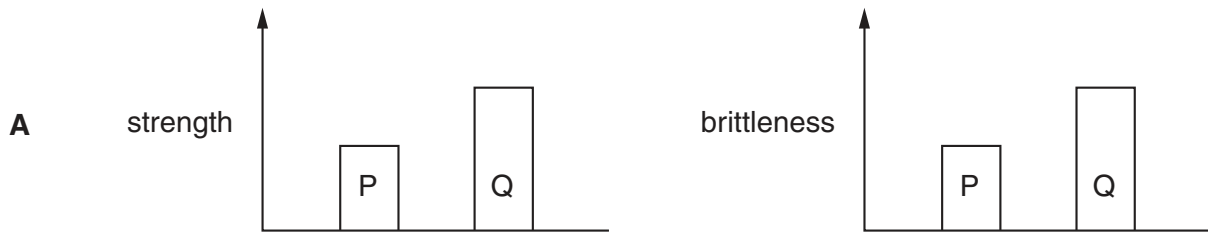
What is **X**?

- A calcium chloride
  - B iron(II) sulphate
  - C lead(II) nitrate
  - D zinc sulphate
- 27 Why is cryolite,  $\text{Na}_3\text{AlF}_6$ , used in the extraction of aluminium from aluminium oxide?
- A to dissolve aluminium oxide
  - B to prevent the anodes from burning away
  - C to prevent the oxidation of aluminium
  - D to remove the impurities from the aluminium oxide

28 The diagram compares the amount of carbon in two steels, P and Q.



Which two diagrams correctly compare the strength and brittleness of P and Q?



29 An experiment is carried out to find the order of reactivity of some metals.

Three metals are placed in solutions containing aqueous metal ions.

The results are shown.

metal	aqueous metal ions			
	Mg <sup>2+</sup>	Al <sup>3+</sup>	Fe <sup>2+</sup>	Zn <sup>2+</sup>
Mg		✓	✓	✓
Fe	✗	✗		✗
Zn	✗	✗	✓	

key

✓ = reaction observed

✗ = no reaction observed

What is the order of reactivity (most reactive first)?

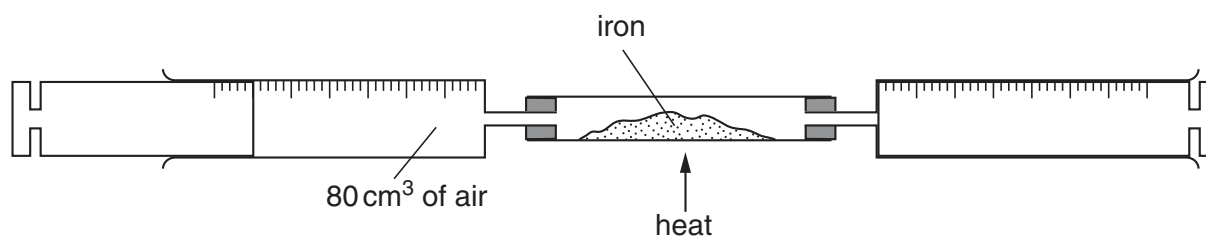
- A Mg Zn Fe Al
- B Fe Zn Al Mg
- C Mg Al Zn Fe
- D Mg Al Fe Zn

30 The carbonate of metal X is a white solid. It decomposes when heated. Carbon dioxide and a yellow solid oxide are formed.

What is metal X?

- A copper
- B iron
- C lead
- D sodium

31 An 80 cm<sup>3</sup> sample of air is trapped in a syringe. The air is slowly passed over heated iron in a tube until there is no further decrease in volume.



When cooled to the original temperature, which volume of gas remains?

- A 80 cm<sup>3</sup>
- B 64 cm<sup>3</sup>
- C 20 cm<sup>3</sup>
- D 16 cm<sup>3</sup>

32 In the Haber process, nitrogen and hydrogen react to form ammonia.

What is the source of the hydrogen?

- A air
- B oil
- C limestone
- D sulphuric acid

33 Which reaction will **not** occur using cold, dilute sulphuric acid?

- A formation of copper(II) sulphate from copper(II) oxide
- B formation of copper(II) sulphate from copper
- C formation of hydrogen from magnesium metal
- D formation of carbon dioxide from sodium carbonate

34 Why are catalytic converters fitted to car exhausts?

- A to decrease the amount of carbon dioxide emitted
- B to decrease the amount of nitrogen oxides emitted
- C to improve energy conservation
- D to reduce global warming

35 Why is carbon used in the purification of drinking water?

- A disinfects the water
- B filters out solids
- C removes tastes and odours from the water
- D desalinates the water

36 What is produced when ethanol is boiled with an excess of acidified potassium dichromate(VI)?

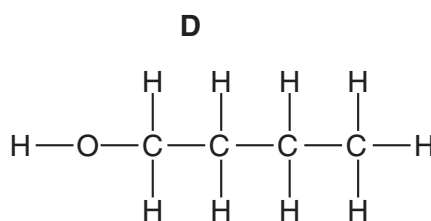
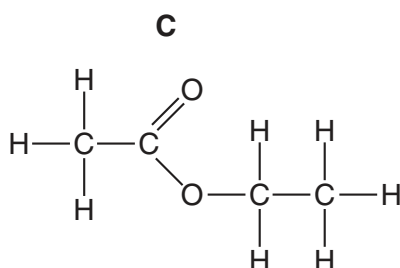
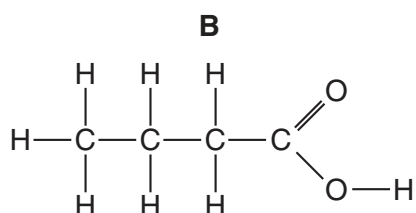
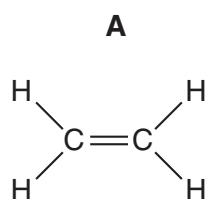
- A ethane
- B ethanoic acid
- C ethene
- D ethyl ethanoate

- 37 When 1 volume of gas X reacts with exactly 5 volumes of oxygen it forms carbon dioxide and water only.

What is gas X?

- A methane,  $\text{CH}_4$   
 B ethane,  $\text{C}_2\text{H}_6$   
 C propane,  $\text{C}_3\text{H}_8$   
 D butane,  $\text{C}_4\text{H}_{10}$

- 38 Which structure shows a compound that reacts with ethanol to give a sweet-smelling liquid?



- 39 The tables shows the properties of four compounds.

Which compound could be ethanoic acid?

compound	degree of ionisation in water	addition of an aqueous solution of the compound to magnesium
<b>A</b>	high	hydrogen produced
<b>B</b>	high	no reaction
<b>C</b>	low	hydrogen produced
<b>D</b>	low	no reaction

40 Amino acids are produced when proteins are

- A hydrolysed.
- B oxidised.
- C polymerised.
- D substituted.

**DATA SHEET**  
**The Periodic Table of the Elements**

		Group																	
I	II	III	IV	V	VI	VII	0												
7 <b>Li</b> Lithium 3	9 <b>Be</b> Beryllium 4	1 <b>H</b> Hydrogen 1	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	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	101 <b>Ru</b> Ruthenium 44	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	190 <b>Os</b> Osmium 76	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						
226 <b>Ra</b> Radium 88	227 <b>Ac</b> Actinium †																		
*58-71 Lanthanoid series													175 <b>Lu</b> Lutetium 71						
†90-103 Actinoid series													102 <b>No</b> Nobelium 102						
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 20px;">a</td> <td style="width: 20px;"><b>X</b></td> </tr> <tr> <td style="width: 20px;">b</td> <td style="width: 20px;"><b>X</b></td> </tr> </table>													a	<b>X</b>	b	<b>X</b>	102 <b>No</b> Nobelium 102		
a	<b>X</b>																		
b	<b>X</b>																		
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 20px;">a</td> <td style="width: 20px;">= relative atomic mass</td> </tr> <tr> <td style="width: 20px;">X</td> <td style="width: 20px;">= atomic symbol</td> </tr> <tr> <td style="width: 20px;">b</td> <td style="width: 20px;">= proton (atomic) number</td> </tr> </table>													a	= relative atomic mass	X	= atomic symbol	b	= proton (atomic) number	102 <b>No</b> Nobelium 102
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.).