

Candidate Name \_\_\_\_\_

Centre Number

Candidate

Number

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**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**Joint Examination for the School Certificate  
and General Certificate of Education Ordinary Level**

**SCIENCE**

**5124/3, 5126/3**

**PAPER 3 Chemistry**

**OCTOBER/NOVEMBER SESSION 2002**

1 hour 15 minutes

Additional materials:

Answer paper

**TIME** 1 hour 15 minutes

**INSTRUCTIONS TO CANDIDATES**

Write your name, Centre number and candidate number in the spaces at the top of this page and on all separate answer paper used.

**Section A**

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

**Section B**

Answer any **two** questions.

Write your answers on the lined pages provided and, if necessary, continue on separate answer paper.

At the end of the examination,

1. fasten any separate answer paper securely to the question paper;
2. enter the numbers of the **Section B** questions you have answered in the grid below.

**INFORMATION FOR CANDIDATES**

The number of marks is given in brackets [ ] at the end of each question or part question.

A copy of the Periodic Table is printed on page 12.

FOR EXAMINER'S USE	
Section A	
Section B	
<b>TOTAL</b>	

**This question paper consists of 9 printed pages and 3 lined pages.**



## Section A

Answer **all** the questions.

Write your answers in the spaces provided on the question paper.

- 1 Use the names of the substances in Fig. 1.1 to answer this question.

ammonium sulphate	ethanoic acid	graphite	helium
lime	methanol	oxygen	steel

Fig. 1.1

Name

- (a) an allotrope of carbon, .....[1]
- (b) an alloy, .....[1]
- (c) a fertiliser, .....[1]
- (d) a noble gas, .....[1]
- (e) an oxide. ....[1]

- 2 The process of photosynthesis takes place in green plants.

- (a) Why are **green** plants essential to this process?  
.....[1]
- (b) Name **two** substances that react together to produce glucose during this process.  
.....  
..... [2]
- (c) What type of energy is converted into chemical energy during this process?  
..... [1]

- 3 Fig. 3.1 lists the solubility in water of several substances.

substances	solubility in water
lead(II) carbonate	insoluble
sodium sulphate	soluble
calcium carbonate	insoluble
sodium hydroxide	soluble
lead(II) chloride	insoluble
lead(II) nitrate	soluble
sodium carbonate	soluble
hydrochloric acid	soluble
nitric acid	soluble
sulphuric acid	soluble

**Fig. 3.1**

- (a) Name **two** substances from Fig. 3.1 that when mixed as aqueous solutions form lead(II) carbonate.

..... and .....[1]

- (b) (i) Name **two** substances from Fig. 3.1 that when mixed as aqueous solutions form sodium sulphate.

..... and .....[1]

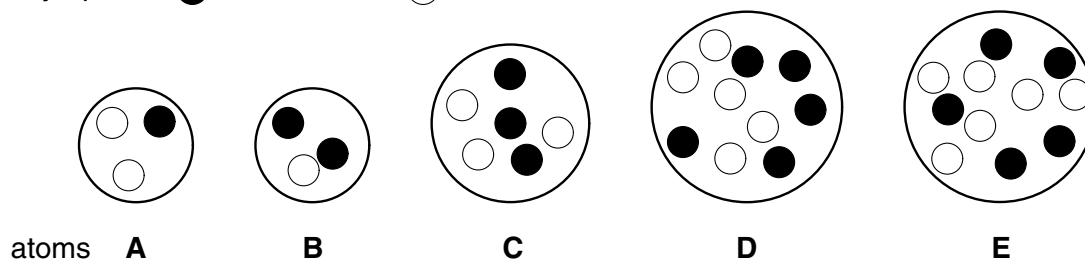
- (ii) How would you obtain pure crystals of sodium sulphate from the mixture of solutions in (i)?

.....  
 .....  
 .....[3]

4 The diagram in Fig. 4.1 represents the nuclei of five different atoms, **A**, **B**, **C**, **D** and **E**.

key:- proton ●

neutron ○



**Fig. 4.1**

Choose from the letters **A**, **B**, **C**, **D** and **E**, to answer the following questions.

(a) Which atom has a nucleon number of 6?

.....[1]

(b) Which **two** atoms have three electrons in their **outermost** electron shell?

..... and .....[2]

(c) Which **two** atoms are isotopes of the same element?

..... and .....[1]

(d) Which atom is an isotope of hydrogen?

.....[1]

5 Use the Periodic Table on page 12 to help answer this question.

(a) State one way in which the elements in Group I differ from the elements in Group VII.

.....[1]

(b) Which Group contains only

(i) relatively soft metals, .....[1]

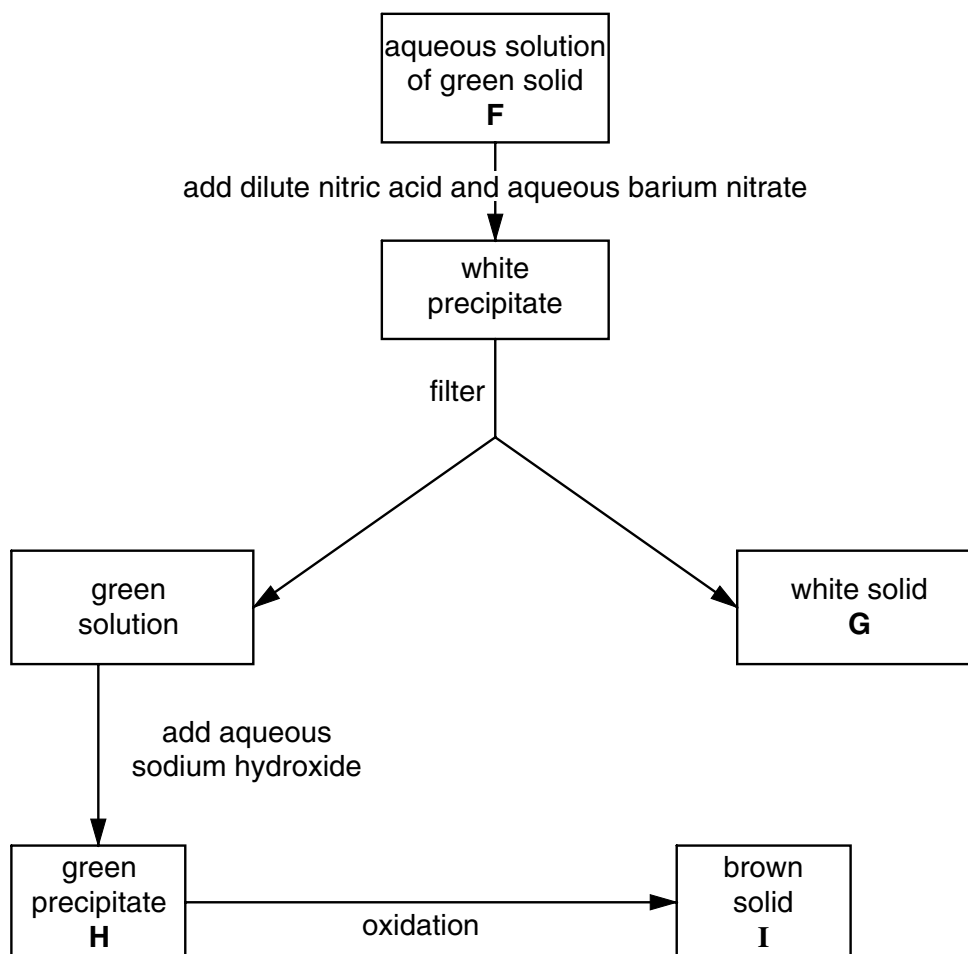
(ii) diatomic non-metals? .....[1]

(c) Which element

(i) is in Group V and in period 3, .....[1]

(ii) has a proton number of 79? .....[1]

- 6 Fig. 6.1 shows some properties and reactions of several substances.



**Fig. 6.1**

- (a) Identify:

- (i) white solid **G**, .....[1]
- (ii) green precipitate **H**, .....[1]
- (iii) brown solid **I**, .....[1]
- (iv) green solid **F**. .....[1]

- (b) Write an equation for any **one** of the reactions in Fig. 6.1.

.....[2]

7 (a) Complete the table in Fig. 7.1.

solution	colour with Universal Indicator solution
(i) 0.1 mol/dm <sup>3</sup> hydrochloric acid	
(ii) 0.1 mol/dm <sup>3</sup> sodium hydroxide solution	
(iii) a mixture of equal volumes of (i) and (ii)	

Fig. 7.1

[3]

(b) Calculate the relative molecular mass of sodium hydroxide, NaOH.

[Relative atomic masses:  $A_r$ : H, 1; O, 16; Na, 23]

.....  
 .....[1]

(c) Calculate the mass of sodium hydroxide in

(i) 1000 cm<sup>3</sup> of 1.0 mol/dm<sup>3</sup> sodium hydroxide solution,

.....  
 .....[1]

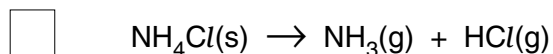
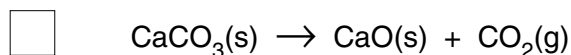
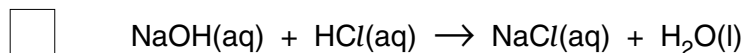
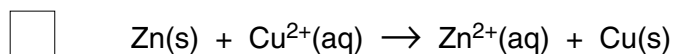
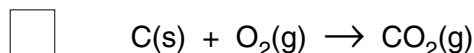
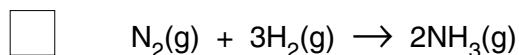
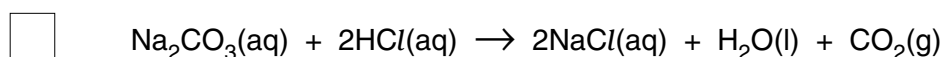
(ii) 1000 cm<sup>3</sup> of 0.1 mol/dm<sup>3</sup> sodium hydroxide solution,

.....  
 .....[1]

(iii) 20 cm<sup>3</sup> of 0.1 mol/dm<sup>3</sup> sodium hydroxide solution.

.....  
 .....[1]

8 Which three of the reactions below involve **both** oxidation **and** reduction?  
 Show these reactions by ticking **three** of the boxes.



[3]

9 The diagrams in Fig. 9.1 show the structures of five compounds.

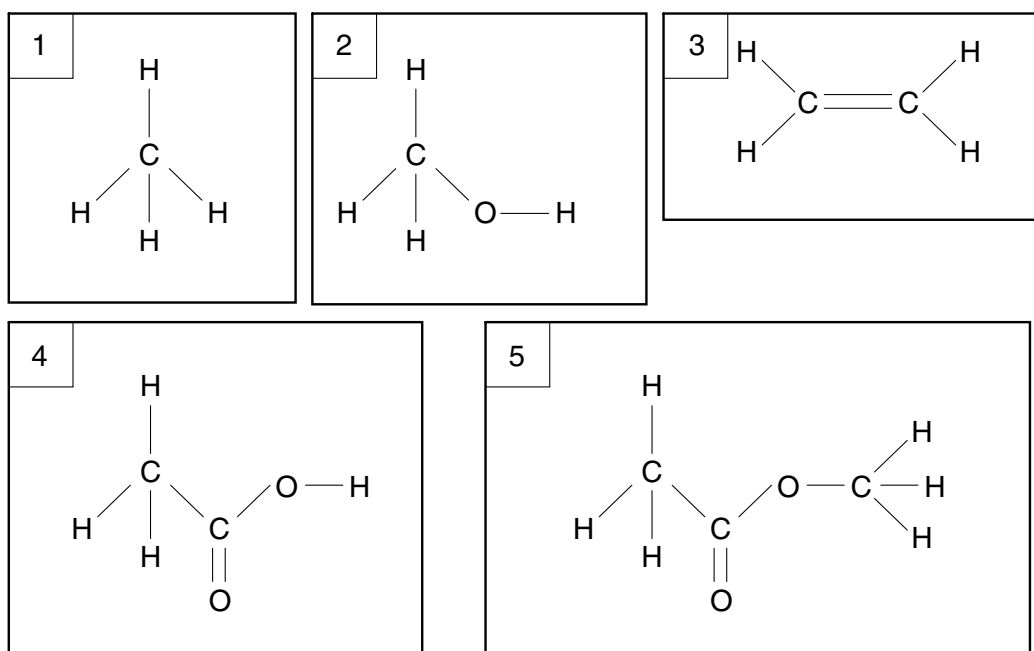


Fig. 9.1

Answer the questions below by stating the numbers of the diagrams.

(a) Which diagram shows

- (i) methane, .....[1]
- (ii) a compound which is acidic, .....[1]
- (iii) a compound which decolourises aqueous bromine, .....[1]
- (iv) an alcohol? .....[1]

(b) Which **two** compounds react together to form the compound shown in diagram 5?

..... and .....[1]

## Section B

Answer any **two** questions.

Write your answers on the lined pages provided, and, if necessary, continue on separate answer paper.

- 10 (a)** Describe, using **one** suitable example, the formation of covalent bonds between two non-metals. [4]
- (b)** Describe how ionic and covalent compounds differ in solubility and electrical conductivity. Use suitable examples to illustrate your answer. [6]
- 11 (a)** A solid and a liquid react to form a gas which is insoluble in water. Design and draw a labelled diagram of an apparatus that could be used to collect this gas. [3]
- (b)** Explain how your apparatus can be used to measure the **rate of reaction** between the solid and the liquid. [3]
- (c)** How can your results from **(b)** be displayed to show how the rate of reaction gradually slows down and eventually stops? [4]
- 12 (a)** Describe how iron can be manufactured from a named ore using coke, C, and limestone,  $\text{CaCO}_3$ . Write equations for the decomposition of limestone and for the reduction of the ore. [6]
- (b)** Calculate the maximum mass of carbon dioxide that will be formed by decomposing 25 tonnes of limestone.
- [Relative atomic masses:  $A_r$ : C, 12; O, 16; Ca, 40] [4]









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

Group		I	II	III	IV	V	VI	VII	0	
		1 <b>H</b> Hydrogen 1							4 <b>He</b> Helium 2	
7 3	9 4	3 <b>Li</b> Lithium	4 <b>Be</b> Beryllium		5 <b>B</b> Boron	6 <b>C</b> Carbon	7 <b>N</b> Nitrogen	8 <b>O</b> Oxygen	9 <b>F</b> Fluorine	10 <b>Ne</b> Neon
11 23	12 24	11 <b>Na</b> Sodium	12 <b>Mg</b> Magnesium		13 <b>Al</b> Aluminium	14 <b>Si</b> Silicon	15 <b>P</b> Phosphorus	16 <b>S</b> Sulphur	17 <b>Cl</b> Chlorine	18 <b>Ar</b> Argon
19 39	20 40	19 <b>K</b> Potassium	20 <b>Ca</b> Calcium		27 <b>Ga</b> Gallium	28 <b>Ge</b> Germanium	29 <b>As</b> Arsenic	30 <b>Se</b> Selenium	31 <b>Br</b> Bromine	32 <b>Kr</b> Krypton
37 85	38 88	37 <b>Rb</b> Rubidium	38 <b>Sr</b> Strontium		31 <b>In</b> Indium	32 <b>Sn</b> Tin	33 <b>Sb</b> Antimony	34 <b>Te</b> Tellurium	35 <b>I</b> Iodine	36 <b>Xe</b> Xenon
55 133	56 137	55 <b>Cs</b> Caesium	56 <b>Ba</b> Barium		49 <b>Tl</b> Thallium	50 <b>Pb</b> Lead	51 <b>Bi</b> Bismuth	52 <b>Po</b> Polonium	53 <b>At</b> Astatine	54 <b>Rn</b> Radon
87 <b>Fr</b> Francium	88 <b>Ra</b> Radium	87 <b>Fr</b> Francium	88 <b>Ra</b> Radium		81 <b>Tl</b> Thallium	82 <b>Pb</b> Lead	83 <b>Bi</b> Bismuth	84 <b>Po</b> Polonium	85 <b>At</b> Astatine	86 <b>Rn</b> Radon
					29 <b>Cu</b> Copper	30 <b>Zn</b> Zinc	47 <b>Ag</b> Silver	79 <b>Au</b> Gold	80 <b>Hg</b> Mercury	
					27 <b>Co</b> Cobalt	28 <b>Ni</b> Nickel	46 <b>Pd</b> Palladium	78 <b>Pt</b> Platinum	80 <b>Hg</b> Mercury	
					25 <b>Mn</b> Manganese	26 <b>Fe</b> Iron	44 <b>Ru</b> Ruthenium	76 <b>Os</b> Osmium	80 <b>Hg</b> Mercury	
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					21 <b>Sc</b> Scandium	22 <b>Ti&lt;/</b>				