Centre Number	Candidate Number	Name

UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE
General Certificate of Education Ordinary Level

SCIENCE **5124/03, 5126/03**

Paper 3 Chemistry

October/November 2005

1 hour 15 minutes

Additional Materials: Answer paper

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a soft pencil for any diagrams, graphs, tables or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

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, fasten all your work securely together.
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.

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

FOR EXAMINER'S USE	
Section A	
Section B	
TOTAL	

This document consists of **9** printed pages and **3** lined pages.

Section A

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

Answer **all** the questions.

1 Complete Fig. 1.1 by adding the description and positive result of a test for each substance.

substance	test description	positive result
oxygen		
carbon dioxide		
hydrogen		
an ammonium salt		

[4]

Fig. 1.1

2 **(a)** Potassium is in Group I of the Periodic Table. Bromine is in Group VII of the Periodic Table.

(i) What is the general name given to elements in Group I?

.....

(ii) What is the general name given to elements in Group VII?

.....

(iii) Write the chemical formula of the compound that is formed when potassium reacts with bromine.

.....

[3]

(b) Aluminium, chlorine, nitrogen and sodium are elements.

Which **two** of these elements are

(i) metals,

.....

(ii) non-metals?

.....

[2]

(c) Describe **one** difference between the arrangement of electrons in these metals and the arrangement of electrons in these non-metals.

.....

..... [2]

3 Complete Fig. 3.1. The first row has been completed as an example.

	classification			
substance	element	compound	mixture	names of atoms/ions present in substance
lead oxide	✗	✓	✗	lead, oxygen
ammonia				
graphite				
steel				
water				

Fig. 3.1 [8]

[Turn over

4 The structures in Fig. 4.1 are of five organic compounds.

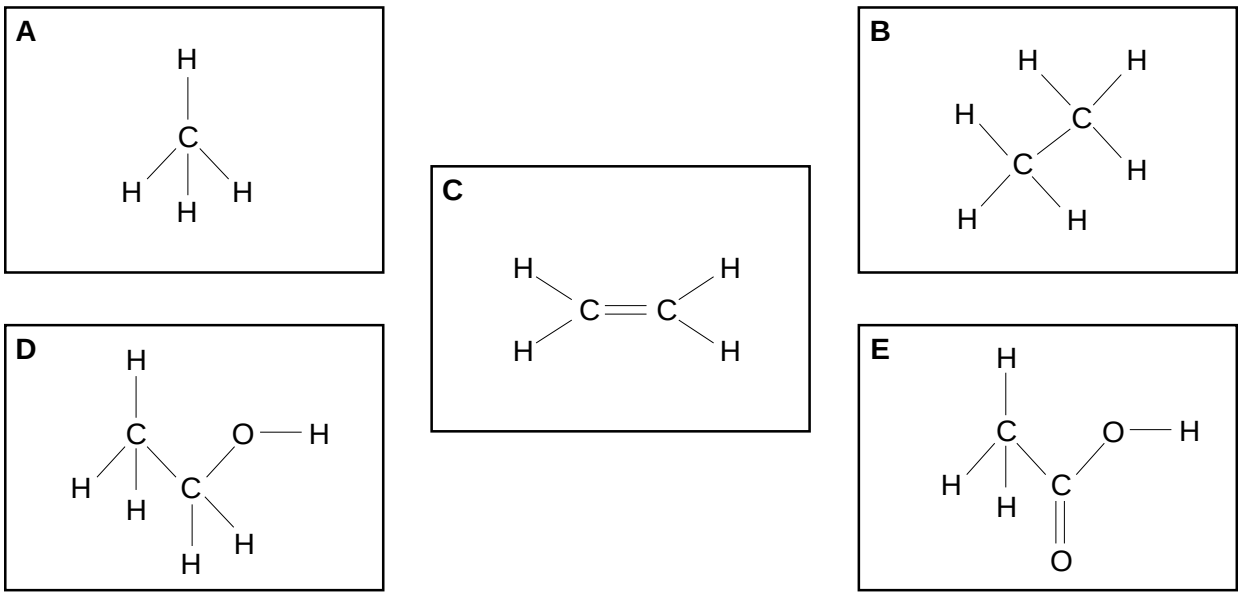

Fig.4.1

Answer each of the following questions using letters **A**, **B**, **C**, **D** or **E**.

(a) Which compound is ethane?

..... [1]

(b) Which compound is unsaturated?

..... [1]

(c) Which compound has the molecular formula C_2H_6O?

..... [1]

(d) Which compound forms an acidic solution when mixed with water?

..... [1]

(e) Which compound, when oxidised, becomes **E**?

..... [1]

(f) Which compound can be converted by the catalytic addition of steam into compound **D**?

..... [1]

(g) Which two compounds react together to form an ester?

..... [1]

5 Germanium, Ge, is extracted from germanium(IV) oxide by heating with hydrogen. This is the **unbalanced** chemical equation for the reaction.

$$GeO_2 + \ldots\ldots H_2 \rightarrow Ge + \ldots\ldots H_2O$$

(a) Balance the above equation. [1]

(b) During this reaction hydrogen removes oxygen from germanium(IV) oxide. What is the name given to the change of germanium(IV) oxide to germanium?

..... [1]

(c) The following relative atomic masses should be used for these calculations.

[Relative atomic masses: A_r: O, 16; Ge, 73]

(i) Calculate the percentage by mass of germanium in germanium(IV) oxide.

.....

.....

.....

(ii) Calculate the smallest mass of germanium(IV) oxide needed to produce 300 g of germanium by this reaction.

.....

.....

.....

[4]

[Turn over

6 Fig. 6.1 contains drawing of the nuclei of five different atoms **F**, **G**, **H**, **I** and **J**.

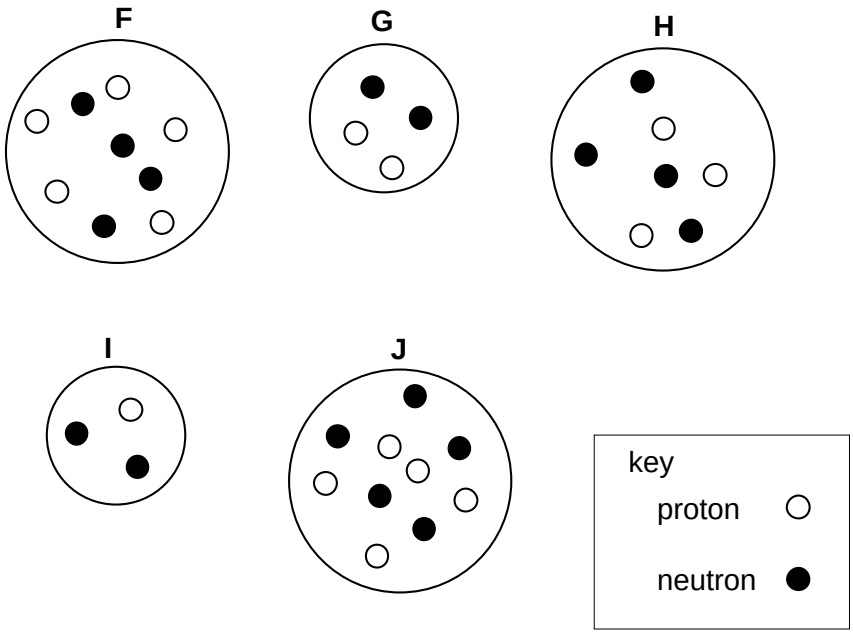

Fig. 6.1

Which of the atoms **F**, **G**, **H**, **I** and **J**

(a) are isotopes of the same element,

..... [1]

(b) has a nucleon number of three,

..... [1]

(c) have one electron in their outermost electron shell,

..... [1]

(d) is given the symbol $^{7}_{3}Li$?

..... [1]

7 Some metal pellets react with dilute acid to form hydrogen.

(a) (i) Draw and label an apparatus you would use to prepare, collect and measure the volume of gas formed over a period of time.

(ii) How would your results show that the rate of reaction decreases with time?

.....

[4]

(b) (i) Give **three** ways of increasing the rate of this chemical reaction.

.....

.....

.....

(ii) Choose **one** of your answers to **(b)(i)**. Suggest why this increases the rate of reaction. Use your knowledge of the movement of particles in your answer.

.....

.....

[5]

Section B

Answer any **two** questions.

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

8 **(a)** Covalent bonds can be formed between two non-metal atoms. Briefly describe, using a named substance, how these bonds are formed. [4]

(b) Compounds that have covalent bonds normally have different properties from those that have ionic bonds.

(i) List **three** of these differences.

(ii) Suggest reasons for any **one** of the differences given in your answer to **(b)(i)**.

[6]

9 Fig. 9.1 gives the properties and reactions of several substances.

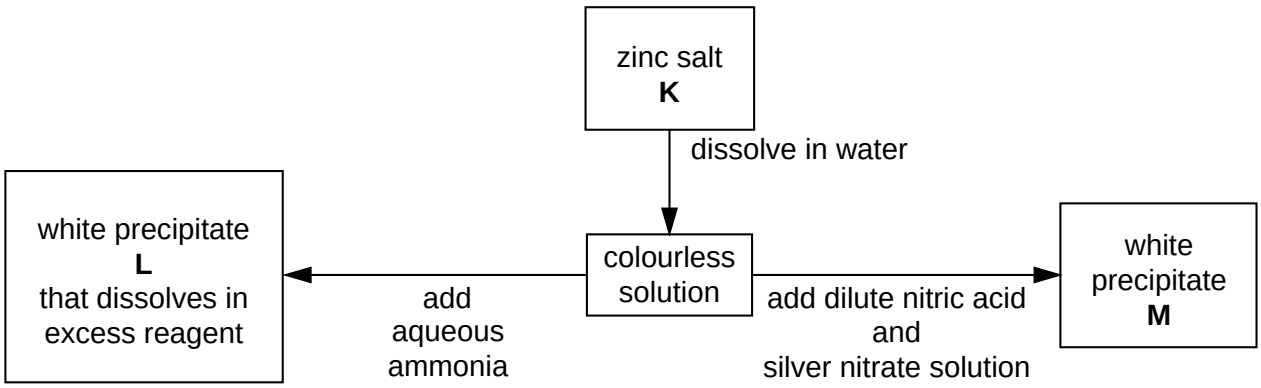

Fig. 9.1

(a) Give **two** uses of metallic zinc. [2]

(b) Identify and name substances **K**, **L** and **M**. [3]

(c) Write a full chemical equation for any **one** of the reactions in Fig. 9.1. [3]

(d) Name **two** substances you would react together to form zinc salt **K**. [2]

10 **(a)** A student is asked to find an order of reactivity for the three elements: calcium, copper and sodium.

Suggest simple chemical experiments that could be used to find this order.

Write a chemical equation for the reaction of **one** of the elements in **one** of your experiments. State symbols are **not** required. [6]

(b) What is meant by *recycling*? Give **two** reasons why copper is recycled. [4]

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	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															

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
232 Th Thorium 90	Pa Protactinium 91	238 U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Bk Berkelium 97	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101	No Nobelium 102	Lr Lawrencium 103

*58-71 Lanthanoid series
90-103 Actinoid series

Key

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

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