Centre No.						Surname	Initial(s)
Candidate No.						Signature	

Paper Reference(s)

4335/1F

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Chemistry

Paper 1F

Foundation Tier

Monday 9 May 2005 – Morning

Time: 1 hour 30 minutes

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
Total	

Materials required for examination
Nil

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number and candidate number, your surname, initial(s) and signature.
The paper reference is shown at the top of this page. Check that you have the correct question paper.
Answer **ALL** the questions in the spaces provided in this book.
Show all the steps in any calculations and state the units.
Calculators may be used.

Information for Candidates

The total mark for this paper is 100. The marks for parts of questions are shown in round brackets: e.g. (**2**).
There are 20 pages in this question paper. All blank pages are indicated.
A Periodic Table is given on page 2.

Advice to Candidates

Write your answers neatly and in good English.

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THE PERIODIC TABLE

Period	1	2											3	4	5	6	7	0
	Group																	
1	1 H Hydrogen 1																	4 He Helium 2
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
3	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
4	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	63.5 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
5	86 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	99 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
6	133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57	179 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Indium 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	210 Po Polonium 84	210 At Astatine 85	222 Rn Radon 86
7	223 Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89															

Key

Relative atomic mass
Symbol
Name
Atomic number

Leave blank

SECTION A

1. Atoms are made up of three types of particle: proton, neutron and electron.

(a) Which **one** of these particles has the smallest mass?

.....

(1)

(b) Which **one** of these particles has a negative charge?

.....

(1)

(c) Which **two** of these particles are present in the nucleus of an atom?

.....

(1)

(d) Which **two** of these particles are present in equal numbers in an atom?

.....

(1)

(e) Isotopes of an element have different numbers of **one** of these particles. Name this particle.

.....

(1)

Q1

(Total 5 marks)

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2. Use the Periodic Table on page 2 to help answer this question.

(a) Which number increases from 3 to 10 in Period 2?

.....

(1)

(b) Which number increases from 11 to 204 in Group 3?

.....

(1)

(c) Which group contains elements whose ions all have a 1+ charge?

.....

(1)

(d) Which group contains elements whose ions have a 2– charge?

.....

(1)

(e) Give the number of a period that contains transition metals.

.....

(1)

Q2

(Total 5 marks)

Leave blank

3. (a) Rain-water is slightly acidic because it contains dissolved carbon dioxide.

(i) What is a possible pH value for rain-water? Circle the correct value.

1 5 7 9 13

(1)

(ii) The acid formed in rain-water is carbonic acid. Write a **word** equation for its formation.

.....

(1)

(b) Give **two** uses of carbon dioxide.

1 .....

2 .....

(2)

(c) A carbon dioxide molecule contains double bonds and has a linear shape. Draw a diagram to show the bonds in a carbon dioxide molecule.

(1)

Q3

(Total 5 marks)

Leave blank

4. (a) Some elements combine together to form ionic compounds. Use words from the box to complete the sentences.

Each word may be used once, more than once or not at all.

gained	**high**	**lost**	**low**
medium	**metals**	**non-metals**	**shared**

Ionic compounds are formed between ..... and

.....

Electrons are ..... by atoms of one element and

..... by atoms of the other element.

The ionic compound formed has a ..... melting

point and a ..... boiling point.

(6)

(b) Two elements react to form an ionic compound with the formula $MgCl_2$.

(i) Give the electronic configurations of the two elements in this compound **before** the reaction.

.....

(2)

(ii) Give the electronic configurations of the two elements in this compound **after** the reaction.

.....

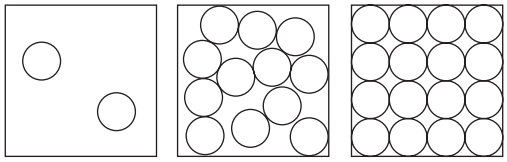
(2)

Q4

(Total 10 marks)

Leave blank

5. (a) The diagrams show the arrangement of particles in the three states of matter. Each circle represents a particle.



A **B** **C**

Use the letters **A**, **B** and **C** to give the starting and finishing states of matter of each of the changes in the table.

Change	**Starting state**	**Finishing state**
The formation of water vapour from a puddle of water on a hot day		
The formation of solid iron from molten iron		
The manufacture of poly(ethene) from ethene		
The reaction whose equation is ammonium chloride(s) $\rightarrow$ ammonia(g) + hydrogen chloride(g)		

(4)

(b) Which state of matter is the **least** common for the elements of the Periodic Table at room temperature?

.....

(1)

Leave blank

(c) The manufacture of sulphuric acid can be summarised by the equation

$$2S(s) + 3O_2(g) + 2H_2O(l) \rightarrow 2H_2SO_4(l)$$

Tick one box in each line to show whether the formulae in the table represent a compound, an element or a mixture.

	Compound	**Element**	**Mixture**
$2S(s)$			
$2S(s) + 3O_2(g)$			
$3O_2(g) + 2H_2O(l)$			
$2H_2SO_4(l)$			

(4) **Q5**

(Total 9 marks)

Leave blank

6. A student made some copper(II) sulphate solution by adding copper(II) carbonate to dilute sulphuric acid.

(a) (i) Complete the equation by writing the correct state symbol after each formula.

$CuCO_3(….) + H_2SO_4(….) \rightarrow CuSO_4(….) + H_2O(....) + CO_2(....)$

(2)

(ii) State the colours of the copper compounds in the equation.

copper(II) carbonate .....

copper(II) sulphate .....

(2)

(iii) Apart from a colour change, what does the student **see** during the reaction?

.....

(1)

(b) Use words from the box to complete the sentences. The sentences explain the method the student used to make copper(II) sulphate.

Each word may be used once, more than once or not at all.

an acid	**an alkali**	**a carbonate**	
neutralisation	**oxidation**	**reduction**	**a salt**

When ..... reacts with .....

the solution formed contains .....

The type of reaction occurring is .....

(4)

Leave blank

(c) The teacher told the student to add an excess of copper(II) carbonate and remove it after the reaction had finished.

(i) Why is an excess of copper(II) carbonate added?

.....

(1)

(ii) How is the excess copper(II) carbonate removed after the reaction has finished?

.....

(1)

(d) What method would the student use to obtain a sample of copper(II) sulphate crystals, $CuSO_4.5H_2O(s)$, from the solution formed in the reaction?

.....

(1)

Q6

(Total 12 marks)

Leave blank

7. (a) An experiment is carried out to illustrate a reversible reaction. The experiment uses a test tube containing a small amount of copper(II) sulphate crystals.

$$CuSO_4.5H_2O(s) \rightleftharpoons CuSO_4(s) + 5H_2O(g)$$

(i) State how the reaction is made to go in the **forward** direction.

.....

(1)

(ii) Describe **two** observations you could make during the reaction.

.....

.....

.....

(2)

(iii) What type of reaction occurs when the reaction goes in the **backward** direction?

Tick **one** box.

condensing ☐

cooling ☐

hydration ☐

reduction ☐

(1)

Leave blank

(b) The backward reaction in (a) can be used as a chemical test for water. Solutions containing water also give a positive result in this test.

(i) State a physical test to show that an unknown liquid is pure water and not a solution containing water.

.....

(1)

(ii) State the result of the test.

.....

(1)

(c) Strong heating of copper(II) sulphate produces sulphur dioxide gas. Sulphur dioxide readily reacts with water as follows.

$$SO_2(g) + H_2O(l) \rightarrow H_2SO_3(aq)$$

(i) Name the environmental problem caused when sulphur dioxide dissolves in water vapour in the atmosphere.

.....

(1)

(ii) Describe **two** effects this produces on the environment.

.....

.....

.....

.....

(2) **Q7**

(Total 9 marks)

TOTAL FOR SECTION A: 55 MARKS

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SECTION B

8. This question is about the properties and uses of some everyday materials.

Here is a list of possible uses for different materials, and a list of properties.

Use
coins
injection moulding of bottles
insulation on electrical wires
overhead electricity cables
railway tracks
window frames

Property
brittle
does not conduct electricity
good conductor of electricity
low melting point
resists corrosion
strong

Write **one** use for each material in the table. For each use, give a related property.

Each use and property may be used once, more than once or not at all.

Material	Use	Property
aluminium		
copper		
poly(chloroethene)		
poly(ethene)		
steel (contains iron)		

Q8

(Total 5 marks)

Leave blank

9. A mixture contains an insoluble compound and a soluble compound.
The mixture is separated by adding hot water and then filtering.
This produces a **white** solid, **A**, and a **green** solution, **B**.

The white solid and the green solution were tested to find out what they were. The tables show the tests used and the results.

Tests on white solid A	
Test	**Result**
Carry out flame test	The flame was coloured brick red
Add dilute hydrochloric acid Test the gas produced	Bubbles seen Found to be carbon dioxide

(a) (i) **Name** the cation in solid **A**.

.....

(1)

(ii) The gas produced is carbon dioxide.

Give the test for carbon dioxide.

.....

Give the result of this test.

.....

(2)

(iii) **Name** the anion in solid **A**.

.....

(1)

Leave blank

Tests on green solution B	
Test	**Result**
Add sodium hydroxide solution	Green precipitate
Add dilute nitric acid Then add silver nitrate solution	No change No change
Add barium chloride solution Then add dilute hydrochloric acid	White precipitate No change

(b) (i) Give the **formula** of the cation in solution **B**.

.....

(1)

(ii) Give the **name** of the green precipitate.

.....

(1)

(iii) **Name** the anion in solution **B**.

.....

(1)

(iv) Give the **formula** of the white precipitate.

.....

(1)

(c) There are three anions that give a precipitate when dilute nitric acid and silver nitrate solution are added. Name **two** of these anions.

.....

.....

(2)

(d) (i) Give the **formula** of solid **A**.

.....

(1)

(ii) Give the **formula** of the compound in solution **B**.

.....

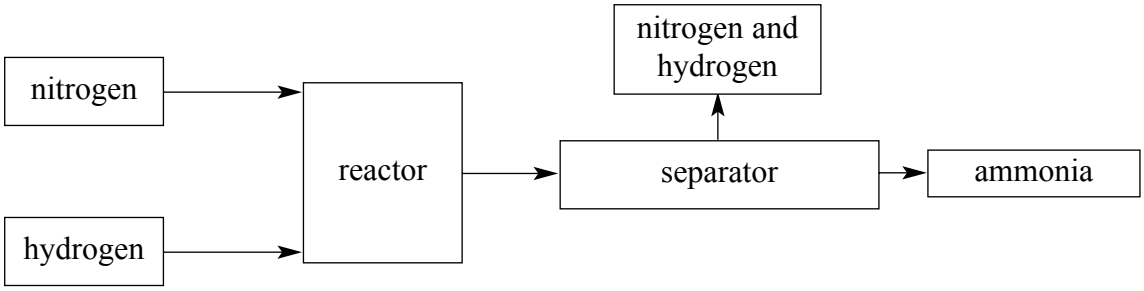
(1)

Q9

(Total 12 marks)

Leave blank

10. (a) Ammonia is made industrially by the Haber process. In this process nitrogen is reacted with hydrogen. The flow diagram shows what happens in the Haber process.



(i) Give the names of the raw materials from which the nitrogen and hydrogen are obtained.

Raw material from which nitrogen is obtained .....

Raw material from which hydrogen is obtained .....

(2)

(ii) State the conditions used in the reactor.

.....

.....

.....

(3)

(iii) How is the ammonia separated from the unreacted nitrogen and hydrogen?

.....

(1)

(iv) What is done with the unreacted nitrogen and hydrogen?

.....

(1)

(b) Ammonium nitrate can be used as a fertiliser to increase plant growth. It is made by reacting ammonia solution with nitric acid. Write a chemical equation for this reaction.

.....

(2)

Q10

(Total 9 marks)

Leave blank

11. Crude oil is a mixture of hydrocarbons. The mixture can be separated into fractions by the process of fractional distillation.

(a) Fractional distillation of crude oil produces the fractions bitumen, diesel, fuel oil, gasoline, kerosene and refinery gases.

State **one** use of bitumen and **one** use of kerosene.

Use of bitumen .....

Use of kerosene .....

(2)

(b) Gasoline is used as a fuel for cars. When gasoline undergoes complete combustion the products are carbon dioxide and water.

(i) Write a word equation for the complete combustion of gasoline.

.....

(1)

(ii) In car engines, incomplete combustion takes place.
Why is the combustion incomplete?

.....

(1)

(iii) Explain why the incomplete combustion of gasoline can be harmful to humans.

.....

.....

.....

(3)

(c) Fractional distillation works because each fraction has a different boiling range.

Describe how you could obtain a fraction with a boiling range of 80 °C to 120 °C **in the laboratory** from a sample of crude oil. Name the items of apparatus you would need.

.....

.....

.....

.....

.....

.....

(3)

Q11

(Total 10 marks)

Leave blank

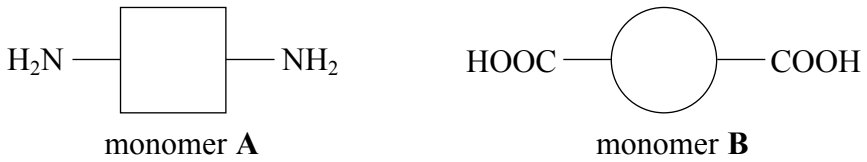
12. This question is about the synthetic polymer nylon.

(a) Poly(ethene) is an addition polymer. What type of polymer is nylon?

.....

(1)

(b) Nylon can be made using the monomers **A** and **B** represented in the diagrams.



monomer **A** monomer **B**

(i) What type of compound is monomer **A**?

.....

(1)

(ii) What type of compound is monomer **B**?

.....

(1)

(iii) Draw a diagram to show the structure of the polymer formed from **A** and **B**. You must draw enough of the structure to make the repeat unit clear.

(3)

(c) Nylon has a simple molecular structure. Use words from the box to complete the sentences.

Each word may be used once, more than once or not at all.

ions	**high**	**low**
molecules	**strong**	**weak**

Nylon has a ..... melting point. This is because there are

..... forces between the ..... that make up

the structure.

(3)

Q12

(Total 9 marks)

TOTAL FOR SECTION B: 45 MARKS

END