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

Paper Reference(s)

4335/1F

London Examinations IGCSE

Chemistry

Paper 1F

Foundation Tier

Wednesday 16 May 2007 – Morning

Time: 1 hour 30 minutes

Examiner's use only

Team Leader's use only

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 question paper.
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. Look at the Periodic Table on page 2.

(a) Give the symbol of the element that has the atomic number of 12.

.....

(1)

(b) Give the symbol of the element that has a relative atomic mass of 12.

.....

(1)

(c) Give the number of the group that contains the noble gases.

.....

(1)

(d) Which group contains elements whose atoms form ions with a 2+ charge?

.....

(1)

(e) Which group contains elements whose atoms form ions with a 1– charge?

.....

(1) **Q1**

(Total 5 marks)

Leave blank

2. Atoms contain three types of particle: proton, neutron and electron.

(a) Where in the atom are the protons and neutrons?

.....

(1)

(b) Which type of particle in the atom is in orbits (shells)?

.....

(1)

(c) Which **one** of the particles has a positive charge?

.....

(1)

(d) Which **two** particles have approximately the same mass?

.....

(1)

(e) What name is given to atoms of the same element which contain different numbers of neutrons?

.....

(1) **Q2**

(Total 5 marks)

Leave blank

3. A piece of iron is left in damp air for some time.
A brown layer forms on the iron.

(a) Name the **two** substances in damp air that react with the iron.

1 .....

2 .....

(2)

(b) What is the brown layer?

.....

(1)

(c) The reaction between iron and damp air can be prevented by covering the iron with another material. Name **two** materials that can be used.

1 .....

2 .....

(2)

Q3

(Total 5 marks)

Leave blank

4. (a) A molecule of hydrogen contains a covalent bond.

(i) What is a covalent bond?

.....

(1)

(ii) Draw a dot and cross diagram to show the covalent bond in a hydrogen molecule.

(1)

(b) Describe a test for hydrogen gas.

Test .....

Result .....

(2)

(c) Give **one** industrial use of hydrogen.

.....

(1)

(d) The only product of the combustion of hydrogen is water. Write a word equation for the combustion of hydrogen.

.....

(1)

Leave blank

(e) Anhydrous copper(II) sulphate can be used to test for water.

(i) Use words from the box to complete the sentence.

blue	**brown**	**colourless**
green	**red**	**white**

Water is a ..... liquid which changes the colour of the copper(II) sulphate from ..... to ..... .

(3)

(ii) What type of reaction occurs in this test? Put a cross (☒) in the correct box.

condensation ☒

hydration ☒

neutralisation ☒

(1)

Q4

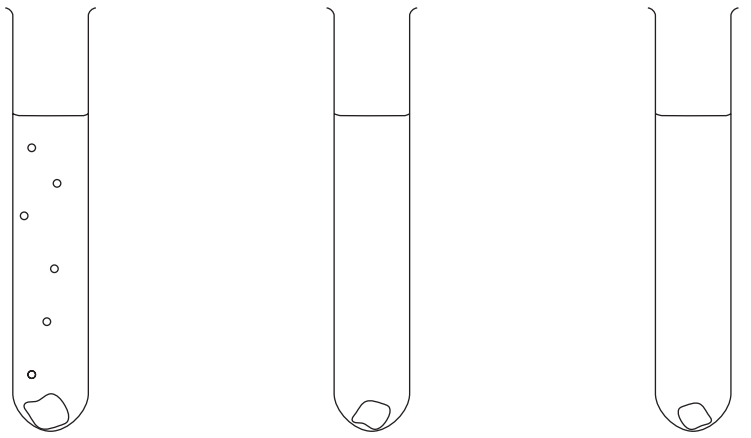
(Total 10 marks)

Leave blank

5. The reactivity of metals can be compared by their reactions with dilute hydrochloric acid.
Three different metals are added to separate test tubes containing this acid.

The diagram shows bubbles of hydrogen gas forming when a piece of zinc is added to dilute hydrochloric acid.

(a) Complete the diagram to show the bubbles forming in the other two test tubes.



zinc iron magnesium

(2)

(b) Write a word equation for the reaction between zinc and dilute hydrochloric acid.

.....

(1)

(c) Name **one** metal that does not form bubbles when it is added to dilute hydrochloric acid.

.....

(1)

(d) Identify **two** substances, other than acids, that can be used in reactions to compare the reactivity of metals.

1 .....

2 .....

(2)

Q5

(Total 6 marks)

Leave blank

6. A student tests a solution to see if it contains CO_3^{2-} ions.

The first part of this test involves this reaction:

$$2H^+(.....) + CO_3^{2-}(aq) \rightarrow H_2O(.....) + CO_2(.....)$$

(a) One state symbol is given in the equation. Write the other state symbols in the spaces provided.

(3)

(b) **Name** a reagent that can be used to provide the H^+ ions in the reaction.

.....

(1)

(c) Give the name for each of the following formulae:

CO_3^{2-} .....

CO_2 .....

(2)

(d) The second part of the test involves using $Ca(OH)_2$ to detect the CO_2.

(i) What is the chemical name for $Ca(OH)_2$?

.....

(1)

(ii) The $Ca(OH)_2$ is dissolved in water to make a solution when doing the test for CO_2. What is the common name for this solution?

.....

(1)

(iii) What is **seen** during this test for CO_2?

.....

(1)

(iv) Complete the chemical equation for the reaction between these two substances.

$Ca(OH)_2 + CO_2 \rightarrow$ ..... + ...

(2)

(e) CO_2 is present in air. What effect does it have on rain water?

.....

(1)

Q6

(Total 12 marks)

Leave blank

7. Crude oil is a mixture of hydrocarbons.

(a) Which **two** elements are present in the compounds in crude oil?

..... and .....

(2)

(b) Crude oil is separated into fractions by heating and passing the vapour into a fractionating column. Explain why the fractions separate in the column.

.....

.....

.....

.....

(2)

(c) Two of the fractions are gasoline and bitumen. Give **one** use of each.

Use of gasoline .....

Use of bitumen .....

(2)

(d) Name **two** fractions formed in the fractional distillation of crude oil, other than gasoline and bitumen.

1 .....

2 .....

(2)

(e) (i) Identify the **two** products of **complete** combustion of hydrocarbons.

1 .....

2 .....

(2)

(ii) Explain why the **incomplete** combustion of hydrocarbons is harmful to humans.

.....

.....

(2)

Q7

(Total 12 marks)

TOTAL FOR SECTION A: 55 MARKS

Leave blank

SECTION B

8. Hydrogen peroxide decomposes into water and oxygen.

$$2H_2O_2 \rightarrow 2H_2O + O_2$$

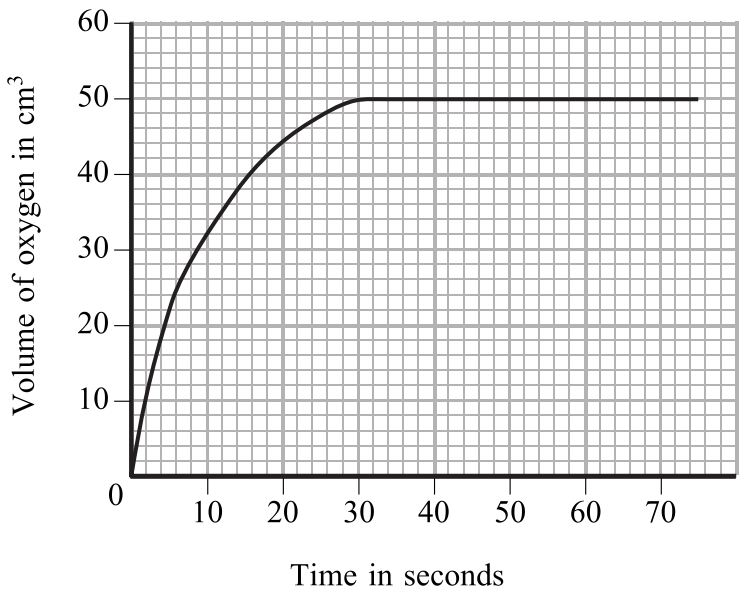
The reaction is very slow but becomes faster if manganese(IV) oxide is added. The manganese(IV) oxide does not get used up during the reaction.

(a) What is the role of the manganese(IV) oxide in this reaction?

.....

(1)

(b) The graph shows how the volume of oxygen collected changed with time when 1 g of small lumps of manganese(IV) oxide were added to 10 cm^3 of hydrogen peroxide.



Sketch on the axes above the results obtained when

(i) the experiment is repeated using 1 g of powdered manganese(IV) oxide.
Label this sketch **A**.

(2)

(ii) the same volume of hydrogen peroxide is used but 5 cm^3 of water is added to it before the manganese(IV) oxide is added.
Label this sketch **B**.

(2)

(c) Describe a test for oxygen gas.

Test .....

Result .....

(2) **Q8**

(Total 7 marks)

Leave blank

9. The decomposition of ammonium chloride is a reversible reaction.

$$NH_4Cl(s) \rightleftharpoons NH_3(g) + HCl(g)$$

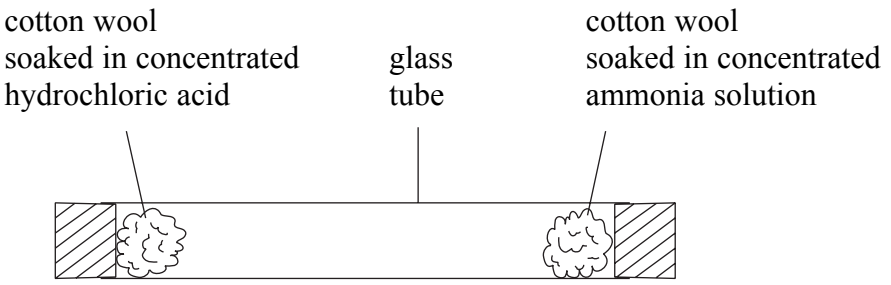
(a) How is this reaction made to go in the **forward** direction?

.....

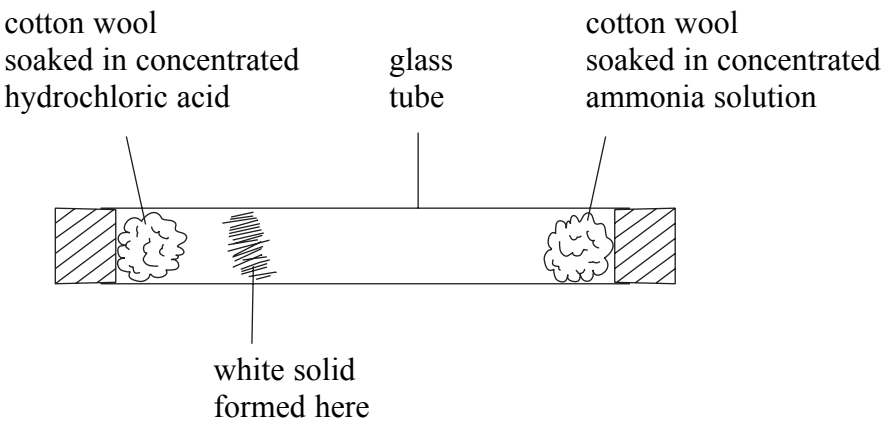
(1)

(b) Concentrated hydrochloric acid gives off hydrogen chloride gas.
Concentrated ammonia solution gives off ammonia gas.

An experiment is set up.



After a few minutes a white solid forms inside the tube. The solid forms when ammonia gas reacts with hydrogen chloride gas.



(i) Name the process by which the ammonia and hydrogen chloride particles move inside the tube.

.....

(1)

(ii) What is the white solid that forms inside the tube?

.....

(1)

Leave blank

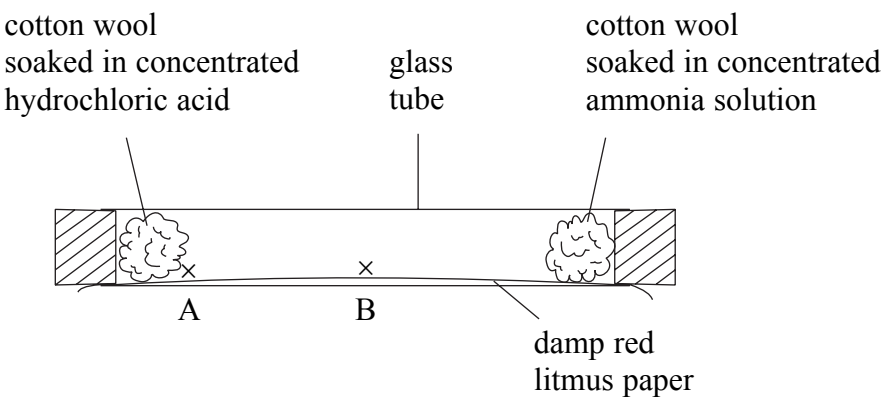
(iii) What does the position of the white solid tell you about the relative speeds at which the ammonia and hydrogen chloride particles move?

.....

.....

(1)

(iv) The experiment is repeated with a strip of damp red litmus paper placed along the inside of the tube.



State the colour of the litmus paper at A and B when the white solid forms.

A .....

B .....

(2)

Q9

(Total 6 marks)

Leave blank

10. The alkenes are a **homologous series** of **unsaturated** hydrocarbons.

(a) (i) Tick **two** boxes that are correct statements about members of an homologous series.

They have similar chemical properties ☐

They have the same displayed formula ☐

They have the same general formula ☐

They have the same physical properties ☐

They have the same relative formula masses ☐

(2)

(ii) What is meant by the term **unsaturated**?

.....

.....

(1)

(b) Alkenes react with bromine water. Ethene is the simplest alkene.

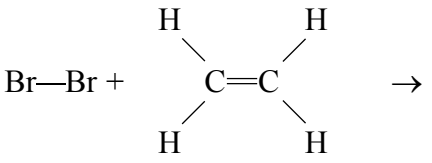
(i) Bromine water is added to ethene. State the starting and finishing colours of the reaction mixture.

Colour at start .....

Colour at finish .....

(2)

(ii) Complete the equation by drawing the displayed formula of the product.



(1)

Leave blank

(c) Isomers are compounds that have the same molecular formula but different displayed formulae.

Draw the displayed formulae of **two** isomers that have the molecular formula C_4H_8.

(2) **Q10**

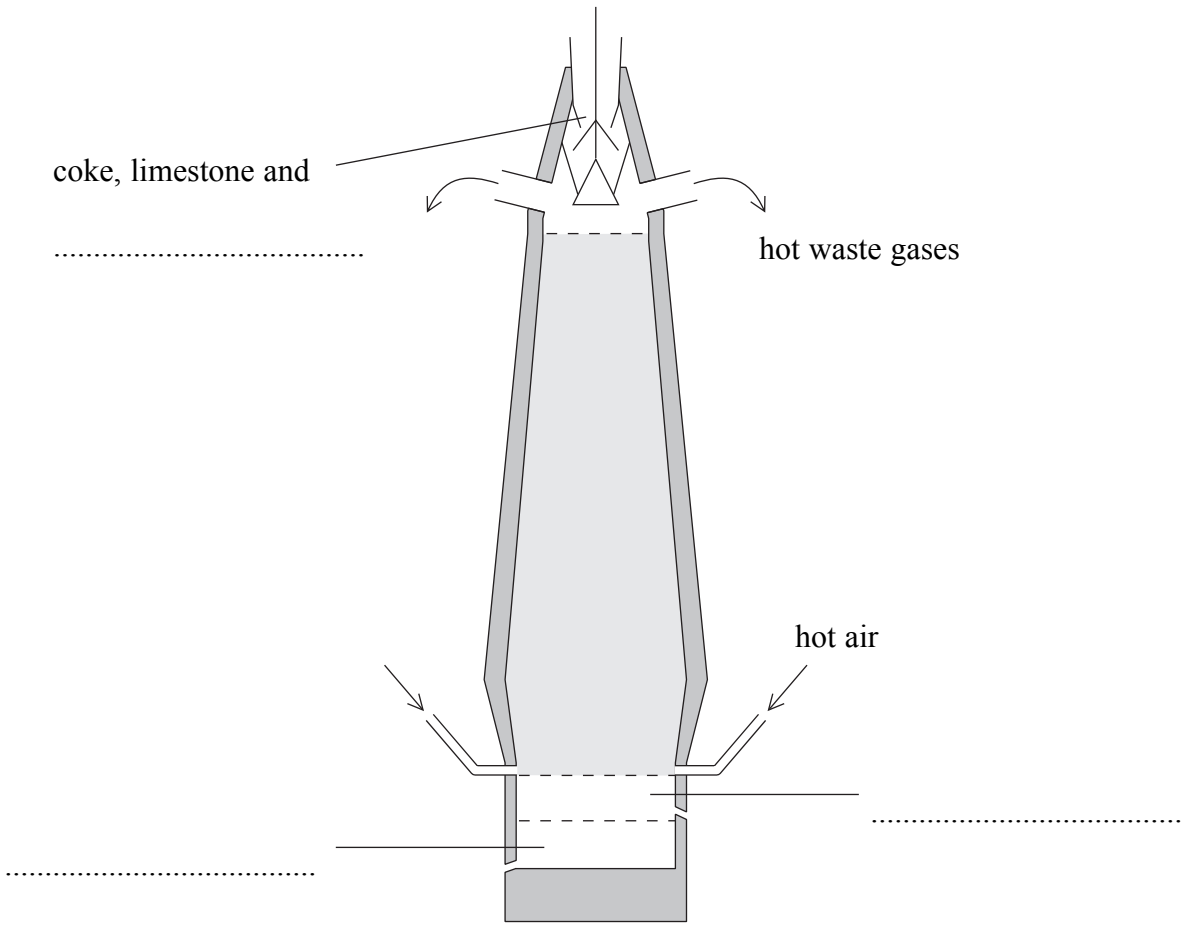
(Total 8 marks)

Leave blank

11. Iron is extracted from iron ore in a blast furnace.

(a) Label the diagram of the blast furnace. Use only words from the box. Each word may be used once, more than once or not at all.

bauxite	**cryolite**	**haematite**
molten iron	**sand**	**slag**



(3)

(b) Coke is mainly carbon which burns in the oxygen in the hot air.

(i) Write a chemical equation for the reaction.

.....

(1)

(ii) Why is this reaction important in the blast furnace?

.....

.....

(1)

Leave blank

(c) Limestone is mainly calcium carbonate. In the blast furnace it decomposes to give carbon dioxide and calcium oxide.

(i) Write a chemical equation for the reaction.

.....

(1)

(ii) Calcium oxide is a base. It removes silicon dioxide impurities. Explain how the calcium oxide removes the silicon dioxide.

.....

.....

.....

(2)

(d) Iron is produced by the reduction of iron(III) oxide. An equation for the reaction is

$$Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$$

Why is this reaction described as the reduction of iron(III) oxide?

.....

(1)

(e) Aluminium is another important metal.

(i) Unlike iron, aluminium cannot be extracted from its ore using a blast furnace. Explain why.

.....

(1)

(ii) State **one** large scale use of aluminium. Give a property of aluminium on which this use depends.

Use .....

Property .....

(2)

Q11

(Total 12 marks)

Leave blank

12. Sodium is a very reactive metal. It floats on water and reacts rapidly with water.

A small piece of sodium is placed in a trough of water. A reaction takes place and hydrogen gas is given off.

(a) (i) Give **two** observations, other than the sodium floating, that you could make during the reaction.

1 .....

2 .....

(2)

(ii) Write a word equation for the reaction.

.....

(1)

(iii) Universal indicator is added to the water in the trough. State what colour it turns and explain why.

Colour .....

Explanation .....

.....

.....

(2)

(b) A piece of platinum wire is dipped into the solution in the trough and then held in a roaring Bunsen flame. The Bunsen flame becomes coloured.

(i) What colour does the flame become?

.....

(1)

(ii) What name is given to this method of identification?

.....

(1)

Leave blank

(c) A piece of sodium is heated in a Bunsen flame. The sodium catches fire and reacts with the oxygen in the air. The product is sodium oxide.

(i) The diagrams show the electron arrangement in an atom of sodium and an atom of oxygen.

Sodium oxide contains ionic bonds. Describe what happens, in terms of electrons, when sodium reacts with oxygen.

.....

.....

.....

.....

.....

.....

(3)

(ii) Draw circles round the symbols that represent the two ions produced.

Na^+ Na^{2+} Na^- Na^{2-}

O^{2-} O_2^- O^- O^{2+}

(2) **Q12**

(Total 12 marks)

TOTAL FOR SECTION B: 45 MARKS

TOTAL FOR PAPER: 100 MARKS

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