

Centre No.						Paper Reference						Surname	Initial(s)
Candidate No.						4	3	3	5	/	1	F	Signature

Paper Reference(s)

4335/1F

London Examinations IGCSE

Chemistry

Paper 1F

Foundation Tier

Tuesday 6 November 2007 – Morning

Time: 1 hour 30 minutes

Examiner's use only

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Team Leader's use only

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Question Number	Leave Blank
1	
2	
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12	
13	
Total	

Materials required for examination
Nil

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname and initial(s) and your signature.

Answer **ALL** questions in the spaces provided in this book.

Show all stages in any calculations and state the units. Calculators may be used.

Some questions must be answered with a cross in a box (☒). If you change your mind about an answer, put a line through the box (☒) and then mark your new answer with a cross (☒).

Information for Candidates

The marks for individual questions are shown in round brackets: e.g. (2).

There are 13 questions in this question paper. The total mark for this paper is 100.

There are 20 pages in this question paper. All blank pages are indicated.

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																	4	He Helium 2
2	7	9											11	12	14	16	19	20
	Li Lithium 3	Be Beryllium 4											B Boron 5	C Carbon 6	N Nitrogen 7	O Oxygen 8	F Fluorine 9	Ne Neon 10
3	23	24											27	28	31	32	35.5	40
	Na Sodium 11	Mg Magnesium 12											Al Aluminium 13	Si Silicon 14	P Phosphorus 15	S Sulphur 16	Cl Chlorine 17	Ar Argon 18
4	39	40											70	73	75	79	80	84
	K Potassium 19	Ca Calcium 20											Ga Gallium 31	Ge Germanium 32	As Arsenic 33	Se Selenium 34	Br Bromine 35	Kr Krypton 36
5	86	88											115	119	122	128	127	131
	Rb Rubidium 37	Sr Strontium 38											In Indium 49	Sn Tin 50	Sb Antimony 51	Te Tellurium 52	I Iodine 53	Xe Xenon 54
6	133	137											204	207	209	210	210	222
	Cs Caesium 55	Ba Barium 56											Tl Thallium 81	Pb Lead 82	Bi Bismuth 83	Po Polonium 84	At Astatine 85	Rn Radon 86
7	223	226											201	204	204	204	204	222
	Fr Francium 87	Ra Radium 88											Hg Mercury 80	Tl Thallium 81	Pb Lead 82	Bi Bismuth 83	Po Polonium 84	At Astatine 85
			45	48	51	52	55	56	59	59	63.5	65	70	73	75	79	80	
			Sc Scandium 21	Ti Titanium 22	V Vanadium 23	Cr Chromium 24	Mn Manganese 25	Fe Iron 26	Co Cobalt 27	Ni Nickel 28	Cu Copper 29	Zn Zinc 30	Ga Gallium 31	Ge Germanium 32	As Arsenic 33	Se Selenium 34	Br Bromine 35	
			89	91	93	96	99	101	103	106	108	112	115	119	122	128	127	
			Y Yttrium 39	Zr Zirconium 40	Nb Niobium 41	Mo Molybdenum 42	Tc Technetium 43	Ru Ruthenium 44	Rh Rhodium 45	Pd Palladium 46	Ag Silver 47	Cd Cadmium 48	In Indium 49	Sn Tin 50	Sb Antimony 51	Te Tellurium 52	I Iodine 53	
			139	179	181	184	186	190	192	195	197	201	204	207	209	210	210	
			La Lanthanum 57	Hf Hafnium 72	Ta Tantalum 73	W Tungsten 74	Re Rhenium 75	Os Osmium 76	Ir Iridium 77	Pt Platinum 78	Au Gold 79	Hg Mercury 80	Tl Thallium 81	Pb Lead 82	Bi Bismuth 83	Po Polonium 84	At Astatine 85	
			227															
			Ac Actinium 89															

Key

Relative atomic mass
Symbol
Name
Atomic number



SECTION A

Leave
blank

1. Look at the Periodic Table on page 2.

(a) How many elements are there in Period 2?

..... (1)

(b) How many noble gases are there?

..... (1)

(c) Give the symbol of the element whose atoms each contain 14 protons.

..... (1)

(d) Give the symbol of the element that has a relative atomic mass of 14.

..... (1)

(e) Which group contains elements that form ions with a 2- charge?

..... (1)

(Total 5 marks)

Q1



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blank

2. Use words from the box to complete the sentences.

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

allotropes	carbon	compounds	electrons
elements	hydrogen	neutrons	protons

(a) Atoms of the same element always contain the same number of

..... (1)

(b) Isotopes are atoms of the same element which contain different numbers of

..... (1)

(c) Substances containing only one type of atom are (1)

(d) Substances whose molecules contain more than one element are

..... (1)

(e) The negatively-charged particles in an atom are (1)

(f) In the definition of relative atomic mass, the mass of an atom is compared to the mass of an atom of (1)

(Total 6 marks)

Q2



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3. The method used to separate the substances in a mixture depends on the properties of the substances in the mixture.

For each of the following, name a suitable method for obtaining

(a) water from potassium chloride solution

..... (1)

(b) potassium chloride from potassium chloride solution

..... (1)

(c) water from a mixture of calcium carbonate and water

..... (1)

(d) a red food dye from a mixture of coloured food dyes

..... (1)

(e) gasoline from crude oil.

..... (1)

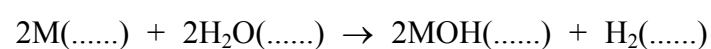
(Total 5 marks)

Q3



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4. The Group 1 elements all react with water to form hydrogen and an alkaline solution. In the following equation, the letter **M** represents one of the Group 1 elements.



- (a) Complete the equation using the correct state symbols (aq, g, l, s).
Each state symbol may be used once, more than once or not at all. (2)

- (b) Describe **two** observations you would make when a small piece of sodium is added to a trough of water.

1

.....

2

.....

(2)

- (c) Name a Group 1 element that reacts **less** vigorously with water than sodium does.

.....

(1)

- (d) Describe a test to show that the solution formed is alkaline.

Test

Result

(2)

Q4

(Total 7 marks)



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5. A student left a piece of iron in the open air for one week. At the end of the week, he noticed a colour change which showed that rust had formed on the iron.

(a) What colour shows that rust had formed?

.....
(1)

(b) Name the **two** substances needed for iron to rust.

1

2

(2)

(c) What is the chemical name of rust?

.....
(1)

(d) What type of reaction does the iron undergo when it rusts?

Put a cross (☒) in the correct box.

combustion

decomposition

oxidation

reduction

(1)

(e) Rust does not form on iron that is coated with zinc. Name this method of rust prevention.

.....
(1)

(f) State **one** other way to prevent iron from rusting.

.....
(1)

Q5

(Total 7 marks)



6. A student adds a solution to solid samples of two different sodium compounds.

The equations for the reactions occurring are:



(a) Name the solution she adds to each sample.

..... (1)

(b) Describe **one** observation the student could make in Reaction 1.

.....
..... (1)

(c) Describe a test for the carbon dioxide that forms in Reaction 1.

Test

Result (2)

(d) The sulphur dioxide formed in Reaction 2 turns damp blue litmus paper to red.

Explain why this colour change does not prove that the gas is sulphur dioxide.

.....
..... (1)

(e) The sulphur dioxide formed in Reaction 2 combines with water in the atmosphere to form an acid.

Write a word equation for the formation of this acid.

..... (1)



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blank

(f) In the atmosphere the reaction in part (e) contributes to acid rain.

Describe **two** effects of acid rain on the environment.

1

.....

2

.....

(2)

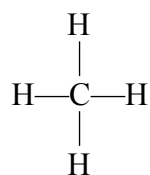
Q6

(Total 8 marks)



7. The alkanes are a homologous series of saturated hydrocarbons.

The displayed formula of the first member of this series is



(a) Draw the displayed formula of the second member of this series.

(1)

(b) Give the molecular formula of the alkane with three carbon atoms.

..... (1)

(c) Draw a ring round the general formula for alkanes.

C_nH_{n+3} $\text{C}_n\text{H}_{2n+2}$ C_nH_{3n} C_nH_{4n} (1)

(d) Which **one** of the following is a characteristic of all homologous series?

Put a cross (☒) in the correct box.

all are gases at room temperature

same empirical formula

similar chemical properties.

(1)



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blank

(e) Explain why alkanes are described as hydrocarbons.

.....

.....

(1)

(f) Write a word equation for the complete combustion of butane.

.....

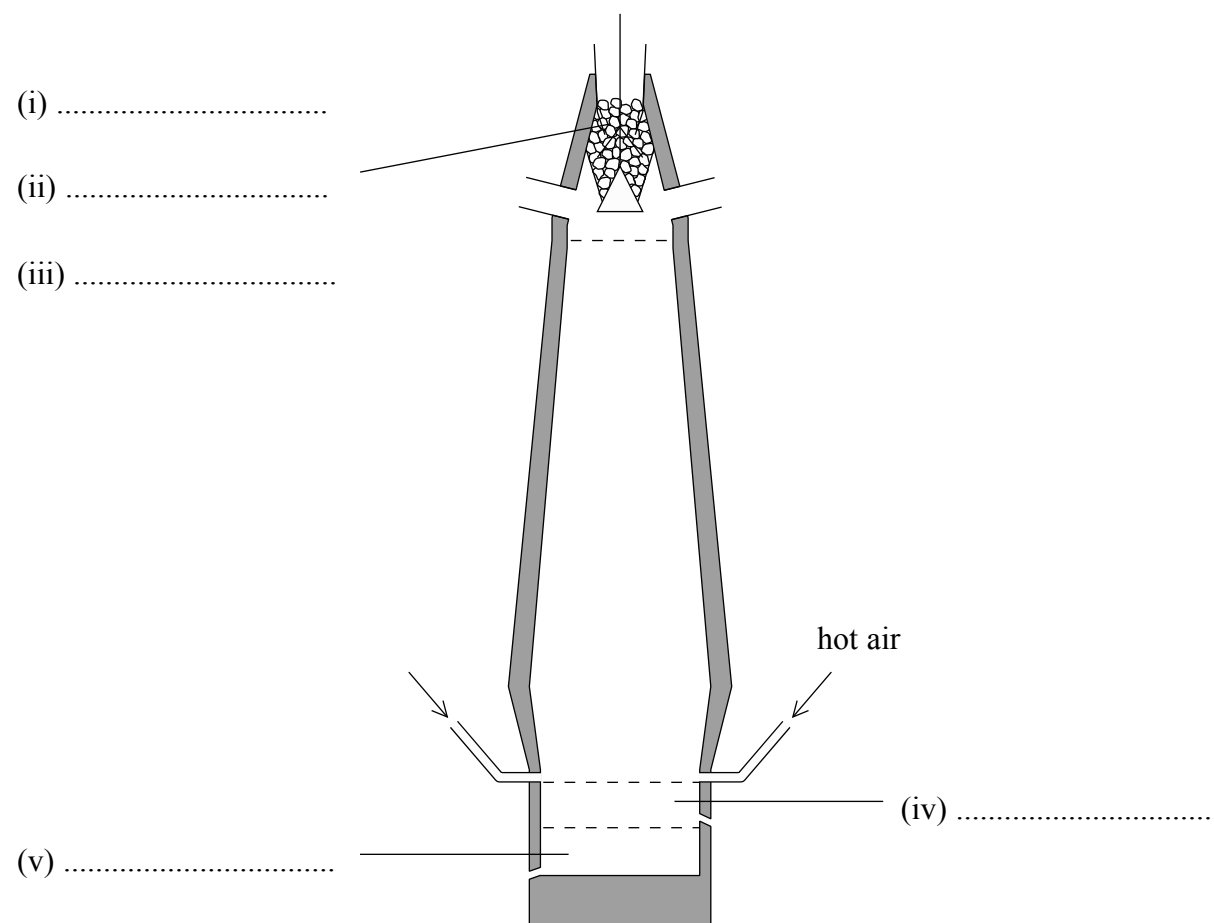
(2)

Q7

(Total 7 marks)



8. The diagram shows a blast furnace used to extract iron from its ore. The name of one of the raw materials is shown.



(a) Complete the labelling of the diagram using the names or formulae of the substances.

(5)



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blank

(b) The word equations for two reactions occurring in the blast furnace are:

Reaction 1 carbon + oxygen → carbon dioxide

Reaction 2 carbon dioxide + carbon → carbon monoxide

(i) Which of these reactions (**1** or **2**) produces a high temperature in the blast furnace?

.....
(1)

(ii) State, with a reason, which substance in Reaction **2** undergoes reduction.

Substance

Reason

.....
(2)

(c) Why is it important that carbon monoxide is **not** released into the atmosphere?

.....
.....
(1)

(d) Why is aluminium not extracted from its ore using a blast furnace?

.....
.....
(1)

Q8

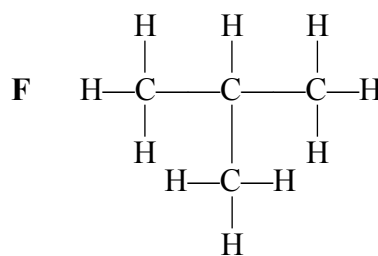
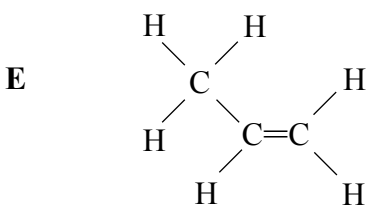
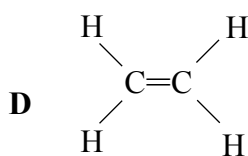
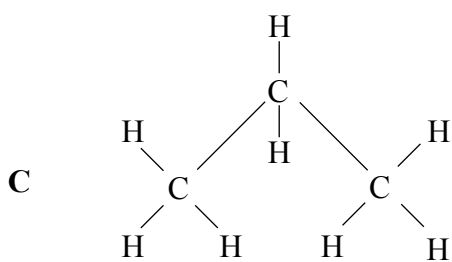
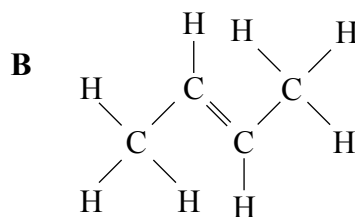
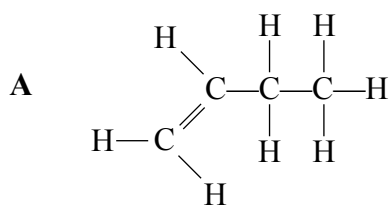
(Total 10 marks)

TOTAL FOR SECTION A: 55 MARKS



SECTION B

9. These are the structures of six hydrocarbons.



(a) Use the letters of the hydrocarbons to answer these questions.

(i) Give the letter of a hydrocarbon which is **not** an alkene. (1)

(ii) Which **two** hydrocarbons are isomers? (1)

(iii) Which structure is propene? (1)

(b) Hydrocarbon **D** forms a polymer. Give the name of this polymer and draw a diagram to represent the structure of the polymer.

Name of polymer

Structure of polymer

(3)

Q9

(Total 6 marks)



10. (a) Atoms contain smaller particles. Complete the table to show the relative mass and relative charge of each particle.

Particle	Relative mass	Relative charge
electron		
neutron	1	
proton		+1

(4)

(b) Use the Periodic Table on page 2 to name an element whose atoms

(i) contain equal numbers of protons and neutrons (1)

(ii) have the electronic configuration 2.8.4 (1)

(iii) have no neutrons. (1)

(c) Scientists think they will soon make an element that will go directly below astatine in the Periodic Table. Suggest how many electrons an atom of this element would have in its outer electron shell.

..... (1)

(d) The diagrams show the electronic configuration of helium and of neon.



(i) What is the similarity in the outer electron shells of these two atoms?
..... (1)

(ii) What effect does this similarity have on the chemical reactivity of helium and neon?
..... (1)

(Total 10 marks)

Q10

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11. Use information from the table to answer this question.

↑ increasing reactivity	Name of metal	Colour of solid metal	Colour of a solution of the metal(II) sulphate
	magnesium	grey	colourless
	zinc	grey	colourless
	iron	dark grey	green
	copper	pink-brown	blue

(a) When zinc is added to magnesium sulphate solution, no reaction occurs. Explain why.

.....

 (1)

(b) When iron filings are added to copper(II) sulphate solution, a reaction takes place.

(i) Write a chemical equation for this reaction.

.....
 (2)

(ii) Describe the colour changes during this reaction.

Colour change of solid

.....

Colour change of solution

.....
 (4)

(c) When copper is added to dilute sulphuric acid, no reaction occurs. When iron is added to dilute sulphuric acid, hydrogen gas and iron(II) sulphate solution are formed. What does this show about the reactivity of hydrogen compared to the reactivity of copper and the reactivity of iron?

.....

 (2)

(Total 9 marks)

Q11



12. Magnesium sulphate and hydrogen are formed when magnesium reacts with dilute sulphuric acid.

(a) The ΔH value for this reaction is negative.

(i) What does ΔH represent?

..... (2)

(ii) What happens to the temperature of the reaction mixture during this reaction?

..... (1)

(b) Hydrogen gas burns in oxygen to produce a colourless liquid. Name this colourless liquid.

..... (1)

(c) Magnesium sulphate can be prepared in a laboratory using the reaction between magnesium carbonate and dilute sulphuric acid.



Describe how you would make magnesium sulphate crystals using this reaction.

.....

 (5)

(Total 9 marks)

Q12



13. Hydrogen chloride, HCl, is a covalent compound. It is a colourless gas and is soluble in a number of solvents.

(a) (i) Draw a dot and cross diagram to show the covalent bonding in a molecule of hydrogen chloride. Show outer electrons only.

(2)

(ii) Hydrogen chloride has a low boiling point. Put a cross (☒) in the correct box to show the reason for this.

The covalent bonds are strong

The covalent bonds are weak

There are weak forces between the ions

There are weak forces between the molecules

(1)

(b) (i) Hydrochloric acid is a solution of hydrogen chloride in water. Give the **formula** of the species that makes the solution acidic.

.....
(1)

(ii) Explain why there is no colour change when universal indicator paper is added to a solution of hydrogen chloride in methylbenzene.

.....
(1)



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blank

- (c) (i) When concentrated hydrochloric acid is added to solid potassium manganate(VII), chlorine gas is given off. Describe what is seen if a piece of damp universal indicator paper is held in the gas.

.....
.....
(2)

- (ii) Chlorine exists as two isotopes. Why do these isotopes have identical chemical properties?

.....
(1)

- (d) Iron forms two chlorides, iron(II) chloride and iron(III) chloride. Describe a chemical test that you could use to distinguish between these compounds.

Test

.....

Result with iron(II) chloride

Result with iron(III) chloride

(3)

Q13

(Total 11 marks)

TOTAL FOR SECTION B: 45 MARKS

TOTAL FOR PAPER: 100 MARKS

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