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

Paper Reference(s)

4335/1F

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Chemistry

Paper 1F

Foundation Tier

Wednesday 9 June 2010 – Afternoon

Time: 1 hour 30 minutes

Materials required for examination
Nil

Items included with question papers
Nil

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

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname and initial(s) and your signature.
The paper reference is shown at the top of this page. Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
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 total mark for this paper is 100. The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 11 questions in this question paper.
There are 24 pages in this question paper. Any 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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2

THE PERIODIC TABLE

Period	1	2	Group								3	4	5	6	7	0
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 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	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

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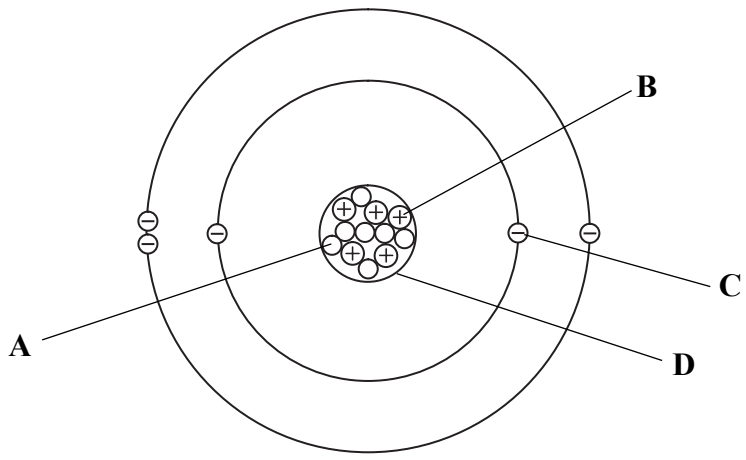
SECTION A

1. (a) The diagram represents the particles present in an atom of an element. Where appropriate, the charges on the particles are shown.



(i) Give the names of the particles labelled:

A .....

B .....

C .....

(3)

(ii) Name the part of the atom labelled **D**.

.....

(1)

(iii) State the mass number of this atom.

.....

(1)

(iv) State the atomic number of this atom.

.....

(1)

(v) State the electronic configuration of this atom.

.....

(1)

Leave blank

(b) Use the Periodic Table on page 2 to help you answer these questions.

(i) Identify an element whose atoms have two electrons in their outer energy level (shell).

.....

(1)

(ii) Identify an element whose atoms have only one energy level (shell) that contains electrons.

.....

.....

(1)

(c) Suggest why the relative atomic mass of chlorine is not a whole number.

.....

.....

(1)

Q1

(Total 10 marks)

Leave blank

2. Ammonia is made industrially by the reaction between nitrogen and hydrogen.

(a) Name the raw material from which:

(i) nitrogen is obtained;

.....

(1)

(ii) hydrogen is obtained.

.....

(1)

(b) The equation for the industrial production of ammonia is

$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$$

(i) Name the catalyst used in this reaction.

.....

(1)

(ii) State the temperature and pressure used in this reaction.

Temperature in °C.....

Pressure in atmospheres .....

(2)

(iii) Place crosses (☒) in **three** boxes to show how the reaction can be made to go faster.

decrease the concentration of the nitrogen and hydrogen	☒
decrease the temperature	☒
increase the concentration of the nitrogen and hydrogen	☒
increase the surface area of the catalyst	☒
increase the temperature	☒
remove the catalyst	☒

(3)

Q2

(Total 8 marks)

Leave blank

3. Ammonia is used to manufacture nitric acid and NPK fertilisers.

(a) **Name** two elements, other than nitrogen, that must be in an NPK fertiliser.

Element 1 .....

Element 2 .....

(2)

(b) Ammonia is converted to oxides of nitrogen during the manufacture of nitric acid.

(i) Place a cross (☒) in one box to indicate the main environmental problem caused by oxides of nitrogen.

acid rain ☒

destruction of the ozone layer ☒

enhanced greenhouse effect ☒

(1)

(ii) Place a cross (☒) in one box to indicate the effect of the environmental problem you have chosen in (b)(i).

fish in lakes die ☒

increased ultraviolet rays cause more sunburn ☒

weather patterns change ☒

(1)

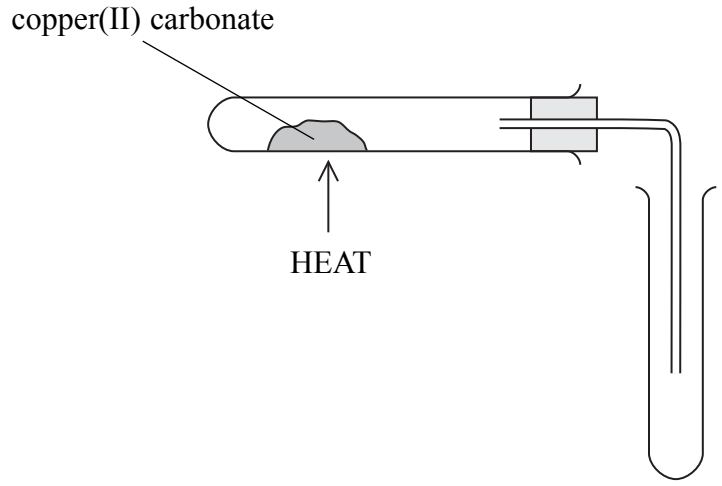
Q3

(Total 4 marks)

Leave blank

4. When copper(II) carbonate is heated it produces carbon dioxide gas and a solid residue of the metal oxide.

The diagram shows a sample of copper(II) carbonate being heated and carbon dioxide gas being collected.



(a) On what property of carbon dioxide gas does this method of collection depend?

.....

(1)

(b) Describe a chemical test, and its result, to show that the gas is carbon dioxide.

Test .....

Result .....

(2)

(c) Write a word equation for the reaction that takes place when the copper(II) carbonate is heated.

.....

.....

(1)

(d) What colour change is seen as the copper(II) carbonate is heated?

Colour at start .....

Colour at end .....

(2)

Q4

(Total 6 marks)

Leave blank

5. Barium carbonate is insoluble. It can be formed as a precipitate when two solutions are mixed together.

(a) Solutions of two of the following compounds can be used to prepare barium carbonate in this way.

Place crosses (☒) in **two** boxes to indicate these solutions.

barium nitrate ☒

barium sulphate ☒

calcium chloride ☒

sodium carbonate ☒

zinc carbonate ☒

(2)

(b) How could the barium carbonate be separated from the mixture at the end of the reaction?

.....

.....

(1)

(c) The barium carbonate is contaminated with a solution of the soluble substance also made in the reaction.

How could a sample that contains only barium carbonate be obtained from the contaminated barium carbonate?

.....

.....

.....

.....

.....

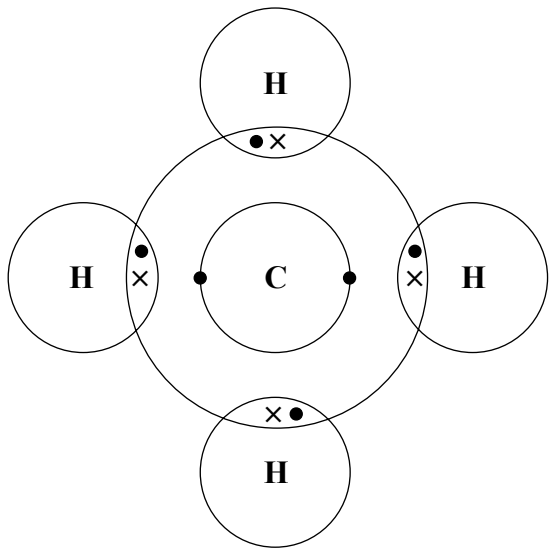
.....

(2) Q5

(Total 5 marks)

Leave blank

6. (a) The diagram represents a molecule of methane.



Name the type of bond that joins the atoms together in a molecule of methane.

.....

(1)

(b) Use words from the box to complete the sentences.
Each word may be used once, more than once or not at all.

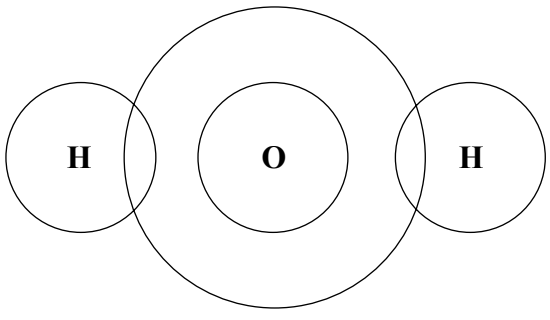
atoms	**high**	**low**	**many**
molecules	**strong**	**weak**	

Methane has a ..... boiling point.

This is because there are ..... forces between the .....

(3)

(c) Hydrogen has 1 electron.
Oxygen has 8 electrons and its electronic configuration is 2.6
Complete the diagram to show the electrons in a molecule of water.



(2)

Leave blank

(d) When hydrated copper(II) sulphate is heated there is a colour change and water is given off.

(i) Describe the colour change.

Colour before heating .....

Colour after heating .....

(2)

(ii) **Name** the solid formed when hydrated copper(II) sulphate is heated.

.....

(1)

(iii) This reaction is reversible.

What will happen if water is added to the solid formed in (d)(ii)?

.....

.....

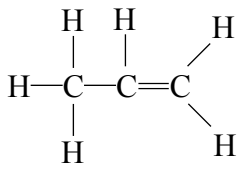
(1)

Q6

(Total 10 marks)

Leave blank

7. (a) The diagram represents an alkene.



(i) What is the name of this alkene?

.....

(1)

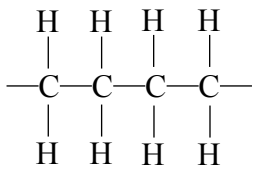
(ii) What colour change would be seen when this alkene is bubbled into bromine water?

.....

.....

(2)

(b) Alkenes form addition polymers.
Part of an addition polymer made from two monomer units is shown.



(i) Why can this polymer be described as a hydrocarbon?

.....

.....

(2)

(ii) Why can this polymer be described as saturated?

.....

.....

(1)

Leave blank

(iii) Draw the structure of the monomer from which this polymer was formed.

(2)

(c) Poly(chloroethene) is another addition polymer.
Poly(chloroethene) is waterproof, does not conduct electricity and melts when heated.
Place crosses in two boxes to show possible uses of poly(chloroethene).

insulation on electrical wires ☒

non-stick coating on pans ☒

overhead power cables ☒

railway tracks ☒

rainwear ☒

(2)

(d) Ethene reacts with steam to form ethanol.
Complete the chemical equation for this reaction.

..... + ... → C_2H_5OH

(2)

Q7

(Total 12 marks)

TOTAL FOR SECTION A: 55 MARKS

Leave blank

SECTION B

8. Calcium and sodium are both reactive metals.
A small piece of each metal is added to separate troughs of water.
The metals react with water as shown in these equations:

calcium + water → compound **A** + gas **X**

sodium + water → compound **B** + gas **X**

(a) (i) State one observation that would be the same during both reactions.

.....

.....

(1)

(ii) State one observation that could be made during the reaction between sodium and water, but not during the reaction between calcium and water.

.....

.....

(1)

(b) (i) What is the **name** of compound **A**?

.....

(1)

(ii) What is the **formula** of compound **B**?

.....

(1)

(c) Identify gas **X** and describe a test, and the result, for this gas.

Identity of **X** .....

Test .....

.....

(2)

Leave blank

(d) (i) State the colour of universal indicator in a solution of compound **B**.
Which ion causes universal indicator to turn this colour?

Colour of universal indicator .....

Ion .....

(2)

(ii) What colour does compound **B** give in a flame test?

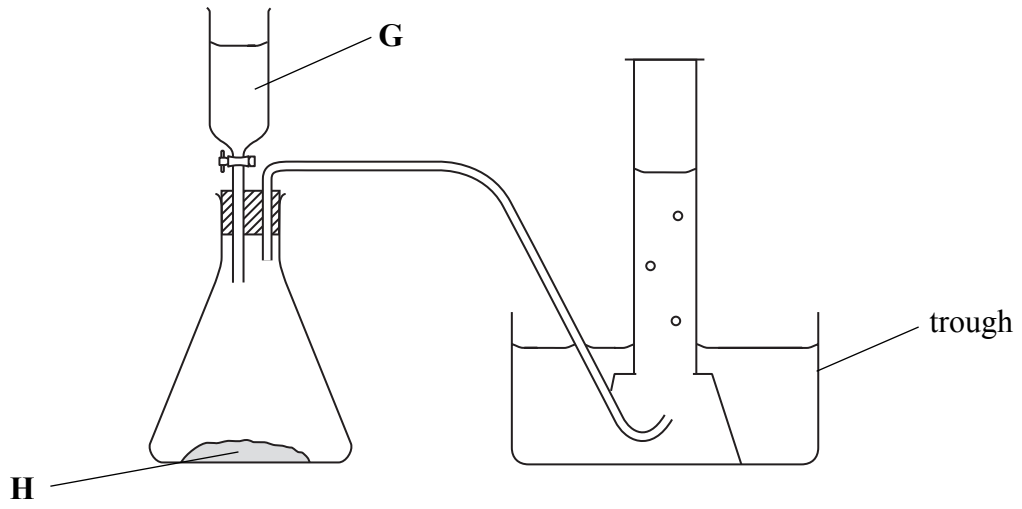
.....

(1) **Q8**

(Total 9 marks)

Leave blank

9. The diagram shows apparatus for preparing oxygen gas in the laboratory using a colourless solution **G** and a black powder **H**.



(a) **Name** the substances **G** and **H**.

G .....

H .....

(2)

(b) The diagram shows oxygen gas being collected over water.
Suggest one other way to collect the gas.

.....

.....

(1)

(c) Substance **H** is unchanged at the end of the reaction.
What is the role of **H** in the reaction?

.....

(1)

Leave blank

(d) Solution **G** is used in the restoration of old paintings. It makes them lighter by converting black lead(II) sulphide in the paints into white lead(II) sulphate. The chemical equation for this reaction is

$$PbS(.....) + 4H_2O_2(.....) \rightarrow PbSO_4(.....) + 4H_2O(.....)$$

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

(2)

(ii) The reaction is a redox reaction because both reduction and oxidation occur. Identify the substance that is oxidised in the reaction, giving a reason for your choice.

Substance oxidised .....

Reason .....

(2)

(e) Some sulphur is burned in a gas jar of oxygen. The gas formed is sulphur dioxide. The sulphur dioxide is tested with damp blue litmus paper and with filter paper soaked in potassium dichromate(VI) solution.

(i) Write a chemical equation for the reaction between sulphur and oxygen.

.....

(1)

(ii) The damp litmus paper turns red when placed in the sulphur dioxide.
What does this indicate about sulphur dioxide?

.....

(1)

(iii) The potassium dichromate(VI) paper changes colour when placed in the sulphur dioxide.
State the colour change observed.

Starting colour .....

Final colour .....

(2)

Q9

(Total 12 marks)

Leave blank

10. The reaction between magnesium and chlorine forms the ionic compound magnesium chloride, $MgCl_2$.

(a) By reference to electrons, describe how magnesium and chlorine atoms form magnesium chloride.

.....

.....

.....

.....

.....

.....

.....

.....

(3)

(b) Oxidation occurs in this reaction.

Identify the substance that is oxidised in the reaction, giving a reason for your choice.

Substance oxidised .....

Reason.....

.....

(2)

(c) Explain why magnesium chloride has a high melting point.

.....

.....

.....

.....

.....

.....

(3) **Q10**

(Total 8 marks)

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11. Crude oil is a mixture of many different compounds.

(a) During industrial refining, crude oil is first separated into fractions.

(i) What is the name of the process used to obtain fractions from crude oil?

.....

(1)

(ii) Describe how the fractions are obtained.

.....

.....

.....

.....

.....

.....

(4)

(b) Four of the fractions obtained from crude oil are:

bitumen
diesel
gasoline
kerosene

(i) Which of these four fractions is the most viscous?

.....

(1)

(ii) Which of these four fractions is the most volatile?

.....

(1)

(iii) Which of these four fractions is used in making roads?

.....

(1)

(iv) Name two other fractions obtained from crude oil.

1 .....

2 .....

(2)

Leave blank

(c) Octane is a hydrocarbon in the gasoline fraction.

Write the names of the substances in the word equation for the complete combustion of octane.

octane + ... → ..... + ...

(3)

(d) Octane belongs to a homologous series called the alkanes.
One characteristic of a homologous series is that each member of the series has the same general formula.

(i) What is the general formula of the alkanes?

.....

(1)

(ii) State two other characteristics of a homologous series.

1 .....

.....

2 .....

.....

(2)

Q11

(Total 16 marks)

TOTAL FOR SECTION B: 45 MARKS

TOTAL FOR PAPER: 100 MARKS

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