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

Paper Reference(s)

4437/2F

London Examinations IGCSE

Science (Double Award)

Chemistry

Paper 2F

Foundation Tier

Tuesday 7 November 2006 – Morning

Time: 1 hour 15 minutes

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
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 75. The marks for parts of questions are shown in round brackets: e.g. (**2**).
A Periodic Table is given on page 2.
This paper has 10 questions. All blank pages are indicated.

Advice to Candidates

Write your answers neatly and in good English.

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Turn over

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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. Iron is a metal which can rust.

(a) Name the **two** substances that must be present for iron to rust.

1 .....

2 .....

(2)

(b) The table gives three methods of preventing rusting. Choose words from the box to complete the table. Each word may be used only once, or not at all.

bicycle chain	**bridge**
bucket	**car body**
food can	

Method of preventing rusting	Example of where used
galvanising	
oiling	
painting	

(3)

(Total 5 marks)

Q1

Leave blank

2. (a) The table shows different methods of separating mixtures. Tick (✓) **one** box in each row to show the best method for each mixture.

Method / Mixture	Filtration	Distillation	Chromatography	Fractional distillation
different coloured inks				
sand and water				
copper(II) sulphate and water				

(3)

(b) State a simple physical test to show that a sample of water is pure. Give the result of the test.

Test .....

Result .....

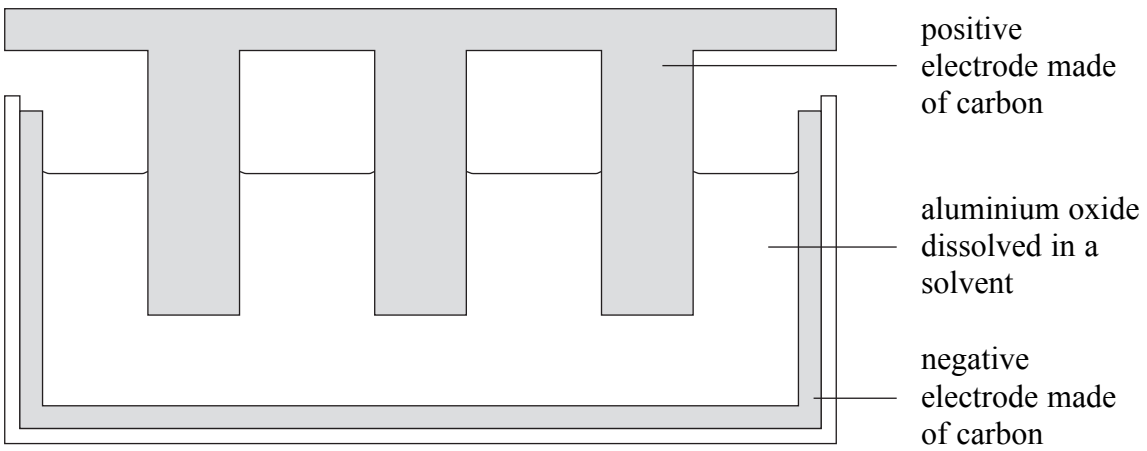
(2)

(Total 5 marks)

Q2

Leave blank

3. (a) Aluminium is extracted from aluminium oxide by electrolysis.
The diagram shows a cross-section through an electrolysis cell.



(i) Name the solvent used.

.....

(1)

(ii) The positive and negative electrodes are made of carbon. What property of carbon makes it suitable for this purpose?

.....

(1)

(iii) The positive electrodes need to be replaced regularly. This is because they react with one of the products of the electrolysis.

Which product reacts with the positive electrodes?

.....

What substance is formed during this reaction?

.....

(2)

(b) Give **one** large-scale use of aluminium.

.....

(1)

Q3

(Total 5 marks)

Leave blank

4. This question is about atoms and the Periodic Table.

(a) In which part of an atom are protons and neutrons found?

.....

(1)

(b) Which particle in an atom has a negative charge?

.....

(1)

(c) Which particle in an atom has the lowest mass?

.....

(1)

(d) (i) The table gives some information about different atoms. Complete the table.

Atom	Mass number	Atomic number	Number of protons	Number of neutrons	Number of electrons
W	35	17	17		17
X		11	11	12	11
Y	39		19	20	19
Z	37	17	17	20	

(4)

(ii) From the table select

- two atoms which are isotopes of the same element

  .....

- two atoms of different elements which are in the same period.

  .....

(2)

Leave blank

(iii) Give the electronic configuration of atom X.

.....

(1)

(e) Bromine is in Group 7 of the Periodic Table. Each bromine atom has 7 electrons in its outer shell.

Iodine is directly below bromine in the Periodic Table. How many electrons does an atom of iodine have in its outer shell?

.....

(1)

Q4

(Total 11 marks)

Leave blank

5. (a) Crude oil is a mixture of many different compounds.

(i) Place ticks (✓) in the boxes next to the names of **three** substances that can be obtained **directly** from crude oil.

bitumen	☐
ethanoic acid	☐
ethanol	☐
gasoline	☐
graphite	☐
kerosene	☐

(3)

(ii) What process is used to separate the compounds in crude oil?

.....

(2)

(b) Draw the displayed formula of ethene.

(1)

(c) When bromine water is added to ethene a reaction occurs. What colour change is seen?

.....

.....

(2)

(d) (i) Give the name of the polymer formed from ethene.

.....

(1)

(ii) Give **one** use of this polymer.

.....

(1)

Q5

(Total 10 marks)

TURN OVER FOR QUESTION 6

Leave blank

6. This question is about sulphuric acid and substances made using sulphuric acid.

(a) Place ticks (✓) in the boxes next to the **two** statements that are correct.

sulphuric acid has a pH value of more than 7 ☐

sulphuric acid has the formula H_2SO_4 ☐

sulphuric acid reacts with copper(II) carbonate to form hydrogen gas ☐

sulphuric acid turns red litmus blue ☐

sulphuric acid turns universal indicator red ☐

(2)

(b) A teacher gives the following instructions for making hydrated copper(II) sulphate crystals.

Place 50 cm^3 of dilute sulphuric acid in a beaker.
Add a spatula full of copper(II) carbonate to the acid and stir.
Continue to add copper(II) carbonate until all the acid has reacted.
Filter the mixture into an evaporating dish.
Evaporate the filtrate until the crystallisation point.
Leave the evaporating dish to cool.
Dry the crystals using filter paper.

(i) How can you tell when all the acid has reacted?

.....

(1)

(ii) Why is the mixture filtered?

.....

(1)

(iii) Give the names of the **two** substances in the filtrate.

1 .....

2 .....

(2)

Leave blank

(c) A student follows the instructions but heats the evaporating dish until all the water has gone. He has made anhydrous copper(II) sulphate. His teacher tells him to add water to the anhydrous solid to make hydrated copper(II) sulphate.

(i) What colour change does he see as he adds the water?

.....

.....

(2)

(ii) What is the name given to reactions which can go in either direction?

.....

(1) **Q6**

(Total 9 marks)

TOTAL FOR SECTION A: 45 MARKS

Leave blank

SECTION B

7. (a) In industry, chlorine and sodium hydroxide are manufactured from brine.

(i) Name the compound in brine that is the source of chlorine.

.....

(1)

(ii) What method is used to obtain chlorine and sodium hydroxide from brine?

.....

(1)

(iii) State **one** large-scale use of sodium hydroxide.

.....

.....

(1)

(b) What colour is chlorine gas?

.....

(1)

(c) Damp red litmus paper changes colour when placed in separate samples of chlorine and sodium hydroxide.

(i) State the colour of red litmus paper in chlorine gas.

.....

(1)

(ii) What property of chlorine is shown by this colour change?

.....

(1)

(iii) State the colour of red litmus paper in sodium hydroxide solution.

.....

(1)

(iv) What property of sodium hydroxide is shown by this colour change?

.....

(1)

Q7

(Total 8 marks)

Leave blank

8. The formulae CH_4 and C_4H_{10} represent two organic compounds.

(a) State why these compounds are described as

(i) saturated.....

.....

(1)

(ii) hydrocarbons.....

.....

(1)

(b) CH_4 and C_4H_{10} are members of the same homologous series. All members of the same homologous series can be represented by a general formula.

(i) What is the general formula of this homologous series?

.....

(1)

(ii) To which homologous series do CH_4 and C_4H_{10} belong?

.....

(1)

(iii) Give **two** other features of members of the same homologous series.

1 .....

2 .....

(2)

(c) The compound C_4H_{10} exists as isomers. What is meant by the term **isomers**?

.....

.....

(2)

Q8

(Total 8 marks)

Leave blank

9. The Periodic Table on page 2 may be useful in answering parts of this question.

The symbols of some atoms and ions are shown below.

Al Cl^- Mg Mg^{2+} Na^+ O^{2-}

(a) Which **one** of these is formed by the loss of one electron from an atom?

.....

(1)

(b) Which **one** of these is formed by the gain of two electrons by an atom?

.....

(1)

(c) Which **one** of these has the same electronic configuration as an atom of argon?

.....

(1)

(d) Which **one** of these has an electronic configuration of 2.8.2?

.....

(1)

(e) Which **three** of these have the same electronic configuration?

.....

(1)

Q9

(Total 5 marks)

Leave blank

10. The equation shows the formation of hydrogen chloride.

$$H_2 + Cl_2 \rightarrow 2HCl \qquad \Delta H = -184 \text{ kJ}$$

(a) (i) What does the symbol ΔH represent?

.....

(1)

(ii) ΔH is negative for this reaction. What does this indicate?

.....

(1)

(b) Draw a dot and cross diagram to show the bonding in H_2.

(1)

(c) H_2 molecules contain strong bonds. Explain why the boiling point of H_2 is low.

.....

.....

.....

(2)

(d) A student carries out a test to show that a solution of hydrogen chloride contains chloride ions. First she adds dilute nitric acid.

(i) Name the other solution she adds.

.....

(1)

(ii) Describe what she observes.

.....

(1)

(iii) Complete the equation to show the reaction that occurs.

..... + HCl → ..... + ...

(2) **Q10**

(Total 9 marks)

TOTAL FOR SECTION B: 30 MARKS

TOTAL FOR PAPER: 75 MARKS

END

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