Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						4	4	3	7	/	2	F	Signature	

Paper Reference(s)

4437/2F

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Science (Double Award)

Chemistry

Paper 2F

Foundation Tier

Tuesday 10 November 2009 – Afternoon

Time: 1 hour 15 minutes

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
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.
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 75. 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 20 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.

Printer's Log. No.
N34946A
W850/U4337/57570 5/7/6/3/

Turn over

edexcel
advancing learning, changing lives

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 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

Leave blank

SECTION A

1. Use the Periodic Table on page 2 to help you answer the following questions.

(a) What is the symbol of the element that has an atomic number of 16?

.....

(1)

(b) What is the symbol of the element that has a relative atomic mass of 16?

.....

(1)

(c) Which group contains elements whose atoms form ions with a 1+ charge?

.....

(1)

(d) How many protons are in an atom of helium?

.....

(1)

(e) Which element is in both Period 3 and Group 3?

.....

(1)

Q1

(Total 5 marks)

Leave blank

2. Crude oil is a source of many useful substances.

Use words from the box to complete the information about crude oil.

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

burned	**bottom**	**carbohydrates**	**condenses**
decomposition	**distillation**	**freezes**	
heated	**hydrocarbons**	**top**	

Crude oil is a mixture of compounds, most of which are .....

because they contain only the two elements hydrogen and carbon.

Crude oil is ..... to separate it into fractions by a process

called fractional .....

In this process, fractions with lower boiling ranges are collected near

the ..... of a fractionating column.

To collect a fraction, its vapour is cooled so that it .....

to a liquid.

Q2

(Total 5 marks)

Leave blank

3. Use the following shortened form of the reactivity series to help you answer this question.

Most reactive	sodium
	magnesium
	iron
	hydrogen
Least reactive	copper

(a) Name one metal in this series that:

(i) does not react with dilute hydrochloric acid;

.....

(1)

(ii) has an ion which can be detected using a flame test;

.....

(1)

(iii) forms ions with 2+ and 3+ charges;

.....

(1)

(iv) has a sulphate which dissolves in water to give a blue solution.

.....

(1)

(b) Put a cross (☒) in **two** boxes next to correct statements about the elements in this reactivity series.

copper reacts with iron(III) oxide	☒
hydrogen reacts with copper(II) oxide	☒
iron reacts with copper(II) oxide	☒
magnesium oxide reacts with copper	☒
sodium oxide reacts with copper	☒

(2)

Q3

(Total 6 marks)

BLANK PAGE

Leave blank

4. The following equation represents a reversible reaction.

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

The reaction is described as reversible because it can be made to go in either direction.

(a) Use words from the box to describe this reaction.

Each word may be used once or not at all.

black	**colourless**	**decomposition**
neutralisation	**white**	

The reactant is a ..... solid.

The products are ..... gases.

The forward reaction is .....

(3)

(b) Give the name of NH_4Cl.

.....

(1)

(c) When $NH_4Cl(s)$ dissolves in water, the solution that forms contains $NH_4^+(aq)$ and $Cl^-(aq)$ ions.

(i) What is seen when silver nitrate solution is added to the solution of NH_4Cl?

.....

(1)

(ii) Which gas is given off when the solution of NH_4Cl is warmed with sodium hydroxide solution?

.....

(1) **Q4**

(Total 6 marks)

Leave blank

5. Dilute sulphuric acid reacts with solid zinc carbonate to form water, carbon dioxide gas and a zinc compound.

(a) Write a **word** equation for this reaction.

.....

.....

(2)

(b) Describe a test to show that the gas is carbon dioxide.

Test .....

Result .....

(2)

(c) When a teacher demonstrates this reaction, the gas is given off slowly.

State two changes the teacher could make so that the gas will be given off more quickly when the experiment is repeated.

Change 1 .....

Change 2 .....

(2)

Leave blank

(d) Some of the carbon dioxide gas is bubbled through pure water.

The solution formed is slightly acidic.

(i) Name the acid that forms.

.....

(1)

(ii) Put a cross (☒) in the box next to the most likely pH value of the solution.

2 ☒

5 ☒

7 ☒

9 ☒

12 ☒

(1)

(iii) A sample of the solution is tested with universal indicator paper. State the final colour of the indicator.

.....

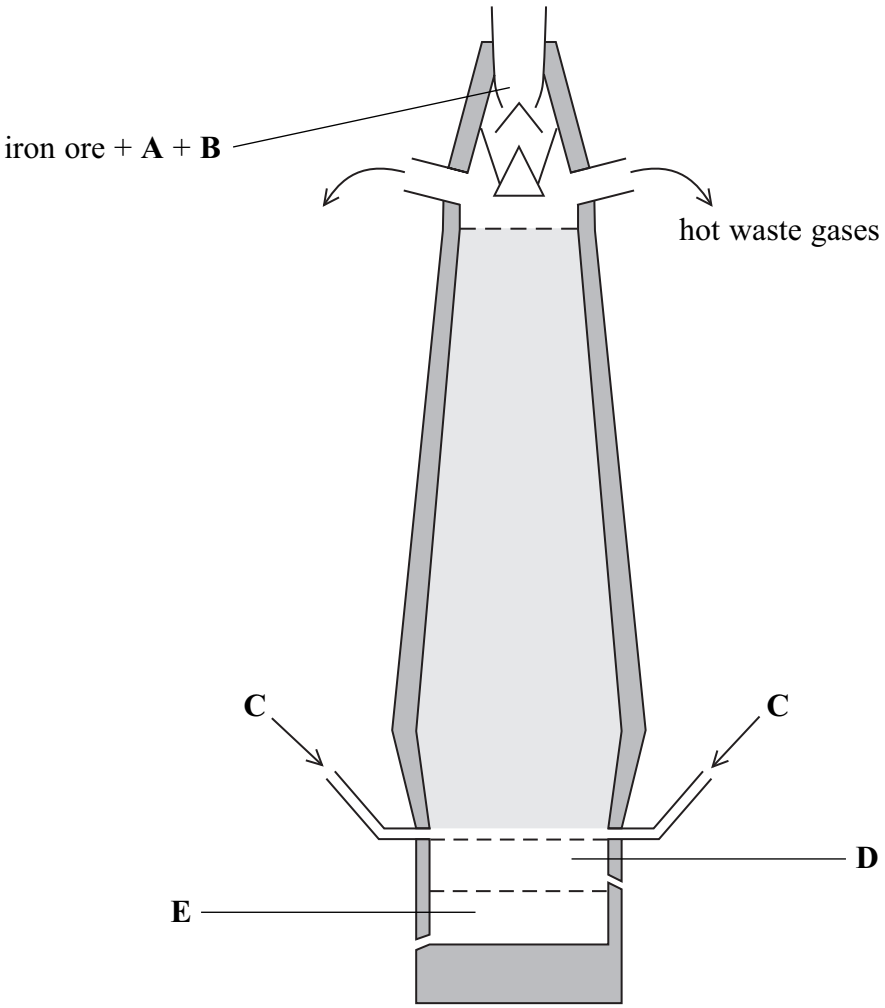
(1)

Q5

(Total 9 marks)

Leave blank

6. The diagram shows how iron is extracted from its ore in a blast furnace.



(a) The letters on the diagram show where three substances, other than iron ore, are added to the blast furnace, and where two products collect.

Write the name of each of these substances and products opposite the correct letter.

A .....

B .....

C .....

D .....

E .....

(5)

Leave blank

(b) One substance added to the blast furnace is composed mostly of carbon.

(i) Carbon burns in air to form carbon dioxide.

Write a **chemical** equation for this reaction.

.....

(1)

(ii) The carbon dioxide formed then reacts with more carbon to form a different oxide of carbon.

Write a **word** equation for this reaction.

.....

.....

(1)

(iii) The oxide of carbon formed in (b)(ii) acts as a reducing agent when it reacts with the iron ore, Fe_2O_3.

Explain why this is a reduction reaction.

.....

.....

(1) **Q6**

(Total 8 marks)

Leave blank

7. The following equation represents a reaction used in the preparation of crystals of copper(II) nitrate.

$$CuO(s) + 2HNO_3(aq) \rightarrow Cu(NO_3)_2(aq) + H_2O(l)$$

(a) State the colour of:

$CuO(s)$ .....

$Cu(NO_3)_2(aq)$ .....

(2)

(b) A pupil wrote these instructions for the preparation of copper(II) nitrate crystals.

Step 1 Pour some dilute nitric acid into a beaker and warm it

Step 2 Add some copper(II) oxide to the acid and stir with a glass rod

Step 3 Keep adding copper(II) oxide with stirring until the solution stays cloudy

Step 4 Filter the contents of the beaker into an evaporating basin

Step 5 Leave the evaporating basin in a warm place for a couple of days

Step 6 Remove the crystals and place them on filter paper

Explain the purpose of each of the following:

(i) adding copper(II) oxide until the solution goes cloudy in Step 3;

.....

(1)

(ii) filtering in Step 4;

.....

(1)

(iii) using a warm place in Step 5;

.....

(1)

(iv) using filter paper in Step 6.

.....

(1) **Q7**

(Total 6 marks)

TOTAL FOR SECTION A: 45 MARKS

Leave blank

SECTION B

8. (a) Complete the table of information about the three types of particle found in an atom.

Name of particle	Relative mass	Relative charge
electron		–1
neutron	1	
proton		

(4)

(b) An atom of chlorine can be represented by the symbol

$$^{35}_{17}\mathrm{Cl}$$

(i) Explain the meaning of the term **mass number**. State the mass number of this chlorine atom.

.....

.....

.....

.....

(2)

(ii) How many neutrons are in this atom of chlorine?

.....

(1)

(c) There are two types of boron atoms. Some contain 5 protons and 5 neutrons while others contain 6 neutrons.

(i) How many protons do the second type of boron atoms contain?

.....

(1)

(ii) What name is given to atoms of the same element with different numbers of neutrons?

.....

(1) **Q8**

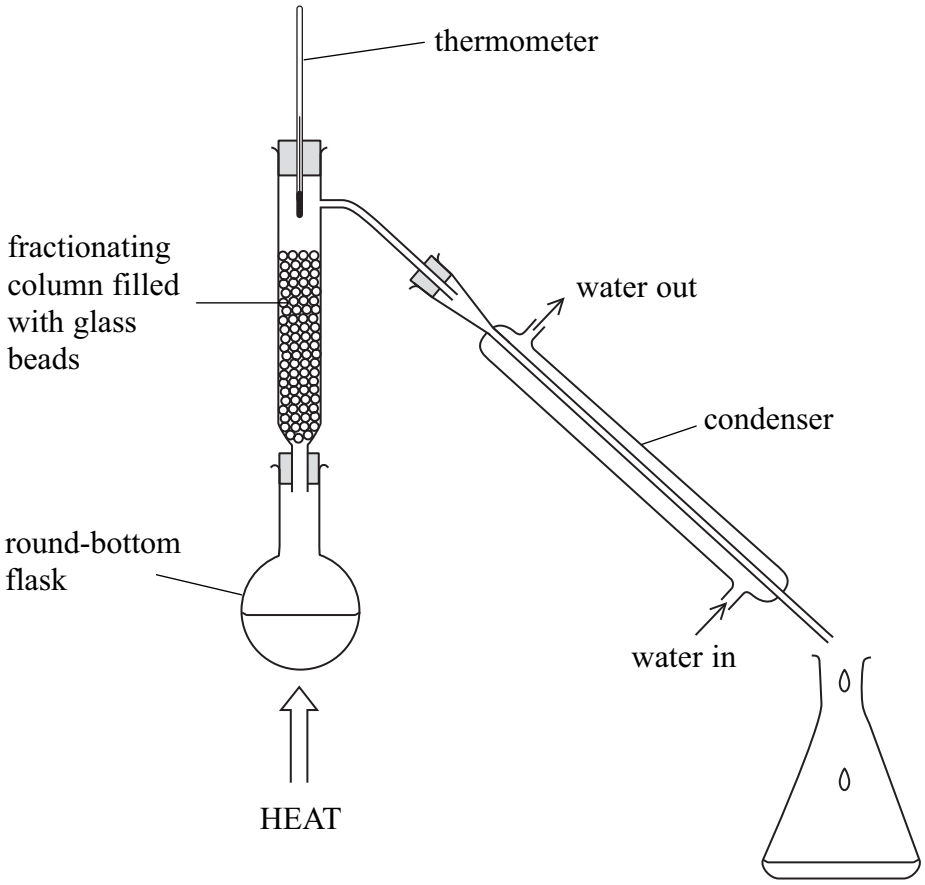
(Total 9 marks)

Leave blank

9. Propanone and water are both covalently bonded compounds. The table shows their boiling points.

Compound	Boiling point (°C)
propanone	56
water	100

(a) Propanone can be obtained from a mixture of propanone and water using the apparatus shown.



(i) Why can propanone and water be separated by this method?

.....

(1)

(ii) Outline how a sample of pure propanone can be obtained from the mixture.

.....

.....

.....

.....

.....

(3)

Leave blank

(b) Propanone and water both have simple molecular structures. They have low boiling points. Place a cross (☒) in **one** box from **each** column of statements to explain why they have low boiling points.

the covalent bonds between their atoms are strong	☒		these require a lot of energy to be overcome	☒
the covalent bonds between their atoms are weak	☒	**AND**	these require little energy to be overcome	☒
the attractive forces between their molecules are strong	☒		these get weaker as the temperature increases	☒
the attractive forces between their molecules are weak	☒			

(2) **Q9**

(Total 6 marks)

Leave blank

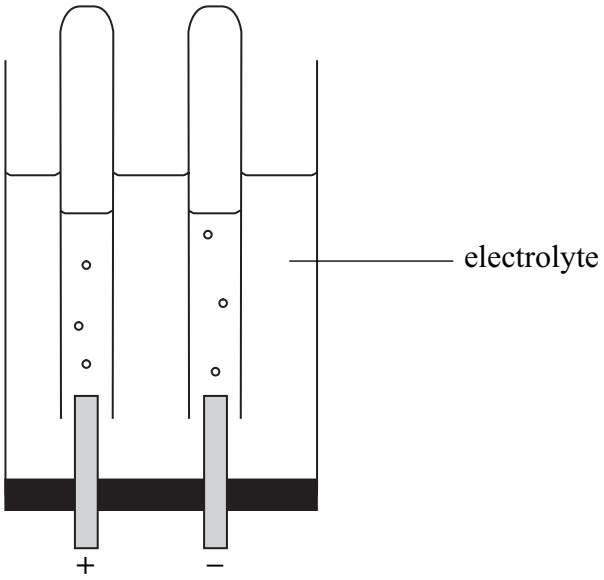
10. This question is about chlorine and other elements in Group 7 of the Periodic Table.

(a) Complete the table to show the colours and states of some elements in Group 7.

Name of element	Colour	State at room temperature
chlorine	green	gas
bromine	brown	
iodine		solid

(2)

(b) The diagram shows the electrolysis of an aqueous solution of a compound.
The electrolysis produces chlorine and another gas.



(i) Add a label to the diagram to show the chlorine gas.

(1)

(ii) Identify the other gas produced during the electrolysis.

.....

(1)

(iii) What is the electrolyte used in the industrial production of chlorine?

.....

(1)

Leave blank

(c) When chlorine gas is bubbled into colourless sodium bromide solution a reaction takes place. The solution becomes brown.

Write a word equation for the reaction which takes place.

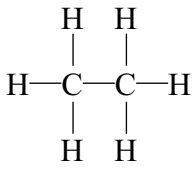
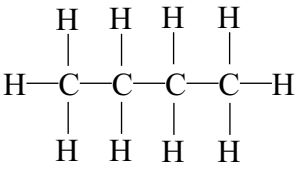
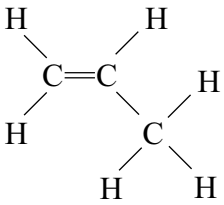
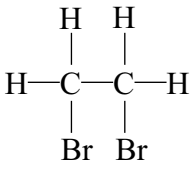
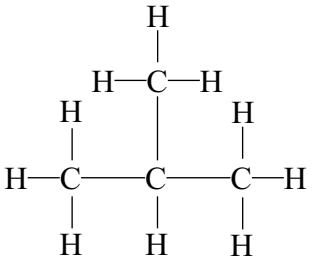
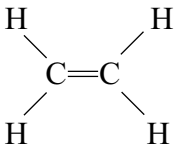
.....

(2) **Q10**

(Total 7 marks)

Leave blank

11. The table shows the structures of some organic compounds.

 **A**	 **B**
 **C**	 **D**
 **E**	 **F**

(a) Explain why compound **C** is not a saturated hydrocarbon.

.....

.....

(1)

(b) Explain why compound **D** is not a hydrocarbon.

.....

.....

(1)

(c) Give the letters of two compounds that are isomers of each other.

.....

(1)

Leave blank

(d) Give the letters of two compounds that are members of the same homologous series but have different molecular formulae.

.....

(1)

(e) Name and give the general formula of the homologous series to which compound **E** belongs.

Name of homologous series .....

General formula .....

(2)

(f) What colour change is seen when bromine water is added to compound **F**?

.....

.....

(2) **Q11**

(Total 8 marks)

TOTAL FOR SECTION B: 30 MARKS

TOTAL FOR PAPER: 75 MARKS

END

BLANK PAGE