Centre No.					
Candidate No.					

Paper Reference						
1	5	3	0	/	4	H

Surname	Initial(s)
Signature	

Paper Reference(s)

1530/4H

Edexcel GCSE

Chemistry A [1530]

Paper 4H

Higher Tier

Wednesday 18 June 2003 – Afternoon

Time: 1 hour

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4	
5	
Total	

Materials required for examination
Calculator

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
The paper reference is shown above.
Answer ALL questions in the spaces provided in this book.
Show all stages in any calculations and state the units. Calculators may be used.
Include diagrams in your answers where these are helpful.

Information for Candidates

The marks for the various parts of questions are shown in round brackets, e.g. (**2**).
This paper has five questions. There are four blank pages.

Advice to Candidates

This symbol shows where the quality of your written answer will also be assessed.

Printer's Log. No.
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Turn over

W850/R1530/57570 7/8/8/9/9/1/

Edexcel
Success through qualifications

THE PERIODIC TABLE

Period	Group 1	2											3	4	5	6	7	0
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	85 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	178 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															

1 H Hydrogen 1

Key

Relative atomic mass
Symbol
Name
Atomic number

TURN OVER FOR QUESTION 1

Leave blank

1. Soy sauce is made from soya beans in a fermentation process.

Yeast is used in this process.

(a) Explain why yeast is used in this process.

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(2)

(b) When sufficient fermentation has taken place, the mixture is strongly heated.

Suggest why the mixture is strongly heated.

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(3)

(c) Soy sauce also contains sodium chloride.

Colourless crystals, obtained from soy sauce, are tested to see if sodium and chloride ions are present.

Describe the test to show the presence of

(i) sodium ions

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.....

.....

(2)

(ii) chloride ions

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.....

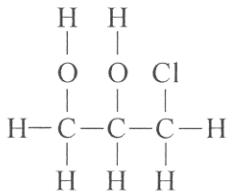
(3)

(d) Soy sauce contains an impurity.

Leave blank

The amount of this impurity is limited by the European Union.

One molecule of the impurity is shown.



(i) State the molecular formula for this impurity.

.....

(1)

(ii) Calculate the relative formula mass of one molecule of this impurity.

(Relative atomic masses: H = 1.0; C = 12; O = 16; Cl = 35.5)

.....

(1)

Q1

(Total 12 marks)

TURN OVER FOR QUESTION 2

Leave blank

2. Metals are used to conduct electricity.

(a) Aluminium is used to make wires that carry electricity across the country. The aluminium wires have a steel core. They are suspended between pylons.

Suggest why a steel core is needed.

.....

.....

(1)

(b) Pure metals are often converted into alloys.
Why are alloys sometimes used instead of pure metals?

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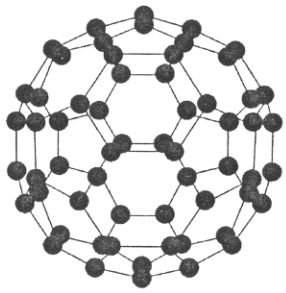
(1)

(c) Sir Harry Kroto was one of the discoverers of buckminsterfullerene. This is a form of carbon in which the molecules contain sixty carbon atoms arranged in the shape of a ball.



Metal atoms can be put inside the molecules of buckminsterfullerene. Under the right conditions, the product can conduct electricity.

Scientists hope to use this property of buckminsterfullerene to make tiny electronic components for computers. The computers could then be smaller and faster than those used today.

(i) Suggest **two** ways in which Sir Harry Kroto could have informed other scientists of his work.

1 .....

2 .....

(2)

(ii) Suggest how other scientists could have confirmed that Sir Harry Kroto's ideas were correct.

.....

(1)

(iii) Suggest a benefit to society from this discovery.

Leave blank

.....

(1)

(d) When buckminsterfullerene is completely burnt in oxygen, a gas is formed.

(i) Give the name of the gas.

.....

(1)

(ii) State how this gas can be collected.

.....

(1)

Q2

(Total 8 marks)

TURN OVER FOR QUESTION 3

Leave blank

3. Sodium sulphate (Na_2SO_4) can be made by titrating sodium hydroxide solution with dilute sulphuric acid.

(a) Write the equation for the reaction, including state symbols.

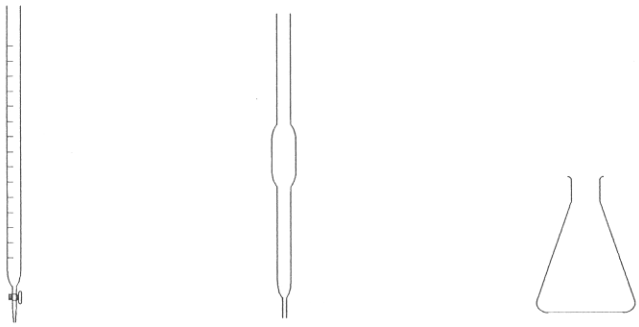
.....

(4)

(b) 25.0 cm^3 of sodium hydroxide solution was used and a suitable indicator was added.

At the end point, 22.4 cm^3 of dilute sulphuric acid had been added.

Some of the apparatus used in the titration is shown below.



(i) Give the name of the apparatus that is used to measure 25.0 cm^3 of sodium hydroxide solution.

.....

(1)

(ii) Give the name of the apparatus that is used to measure 22.4 cm^3 of dilute sulphuric acid.

.....

(1)

(iii) Give the name of a suitable indicator for the titration.

.....

(1)

(iv) Give the colour of the sodium hydroxide solution and indicator mixture at the start of the titration.

.....

(1)

(v) Give the colour of the titration mixture at the end point.

Leave blank

.....

(1)

(c) In another titration 25.0 cm^3 of 0.200 mol dm^{-3} sodium hydroxide solution, NaOH, required 42.3 cm^3 of dilute nitric acid for neutralisation.

Calculate the concentration of the dilute nitric acid, HNO_3, in mol dm^{-3}.

$$NaOH + HNO_3 \longrightarrow NaNO_3 + H_2O$$

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(3)

Q3

(Total 12 marks)

TURN OVER FOR QUESTION 4

Leave blank

4. Wine is an alcoholic drink containing 10%–15% ethanol.

(a) Draw the structure of one molecule of ethanol, showing **all** the bonds.

(2)

(b) A wine bottle is half empty. It has been left open for a few days. It now tastes of vinegar.

What reaction has occurred and why has it caused the taste of vinegar?

.....

.....

.....

(3)

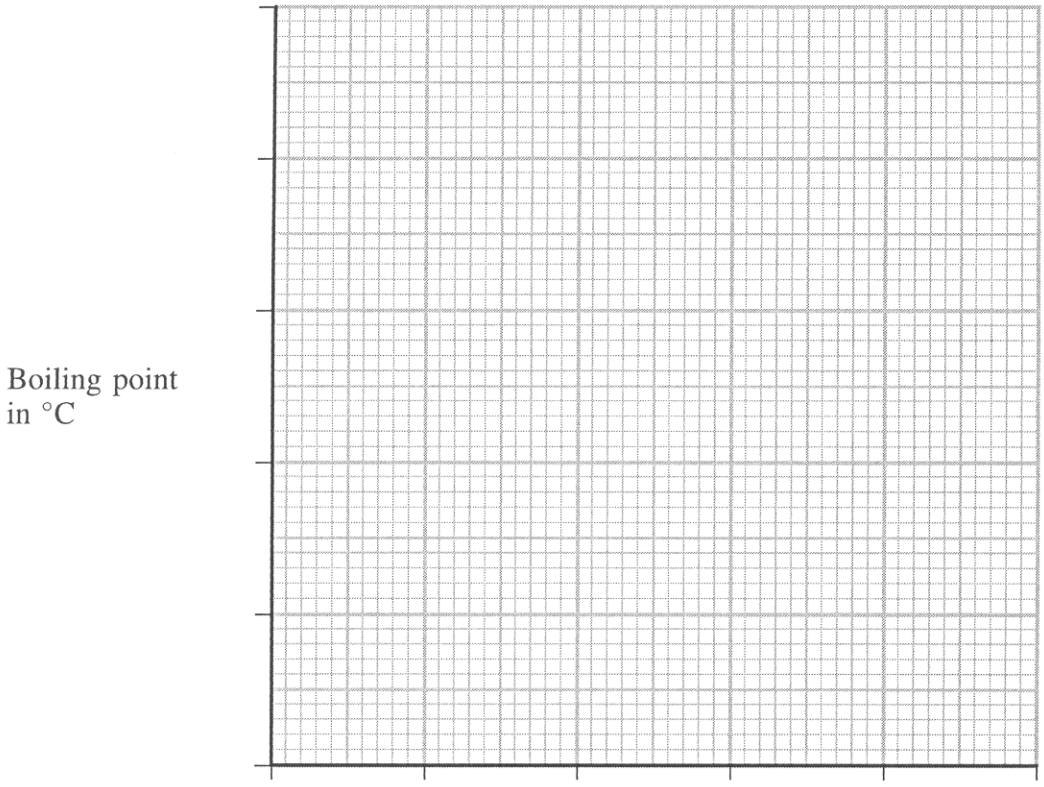
(c) The first five members of the alcohol homologous series are shown.

The boiling points of four of them are given.

alcohol	**number of carbon atoms in one molecule**	**boiling point (°C)**
methanol	1	65
ethanol	2	79
propanol	3	97
butanol	4	
pentanol	5	138

(i) Use the grid to draw a graph of boiling point against the number of carbon atoms in one molecule for the alcohols listed.

Leave blank



(3)

(ii) Use your graph to suggest the boiling point of butanol.

boiling point of butanol .....

(1)

QUESTION 4 CONTINUES ON THE NEXT PAGE

(iii) What is meant by the term **homologous series**?

Leave blank

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(2)

(iv) Describe **two** chemical reactions that **all** alcohols undergo.

reaction 1

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.....

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reaction 2

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.....

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(6)

Q4

(Total 17 marks)

5. When iron(II) chloride solution is mixed with sodium hydroxide solution, iron(II) hydroxide is formed.

Leave blank

(a) Write the ionic equation for this reaction.

.....

(3)

(b) Describe what you would **see** during the reaction.

.....

.....

(1)

(c) When iron(III) hydroxide is heated to a high temperature, iron(III) oxide is formed.

$$2Fe(OH)_3(s) \longrightarrow Fe_2O_3(s) + 3H_2O(g)$$

Calculate the maximum volume of gaseous water formed at this temperature from 5.35 g of iron(III) hydroxide.

(Relative atomic masses: H = 1.0; O = 16; Fe = 56
1 mol of a gas occupies 60.0 dm^3 under these conditions of temperature and pressure)

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(3)

(d) Another oxide of iron consists of 72.4% iron by mass.
Calculate the empirical formula of this oxide.

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.....

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.....

(4)

Q5

(Total 11 marks)

TOTAL FOR PAPER: 60 MARKS

END