Centre No.						Paper Reference (complete below)							Surname	Initial(s)
Candidate No.										/	4	C	Signature	

Paper Reference(s)

5638/4C 5658/4C

Edexcel GCSE

Science: Single Award B (1535)

Science: Double Award B (1536)

Chemistry B (1539)

(Modules 3 and 4)

Paper 4C

Higher Tier

Monday 6 June 2005 – Afternoon

Time: 30 minutes

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, initial(s) and signature, and complete the paper reference.
Answer ALL questions in the spaces provided in this question paper.
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**).
There are 4 questions in this question paper. The total mark for this paper is 30.
There are 8 pages in this question paper. Any blank pages are indicated.
The question paper has a copy of the periodic table on page 2.

Advice to Candidates


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

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4	
Total	

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THE PERIODIC TABLE

Period	1	2	Group									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															

Key

Relative atomic mass
Symbol
Name
Atomic number

Leave blank

Answer ALL the questions. Write your answers in the spaces provided.

1. The table gives information about some of the halogens.

name	atomic number	physical state at room temperature (20 °C)	melting point (°C)	boiling point (°C)
fluorine	9	gas	–220	–188
chlorine		gas	–101	–35
bromine	35		–7	59
iodine	53	solid	114	187

(a) Complete the table.

(2)

(b) Sea water contains bromide ions.
Bromine is obtained by passing chlorine into sea water.

(i) Explain why this reaction occurs.

.....

.....

.....

(2)

(ii) Suggest why fluorine is not used to obtain bromine from sea water.

.....

(1)

(c) Chlorine reacts with sodium to form sodium chloride.

Write the balanced equation for this reaction.

.....

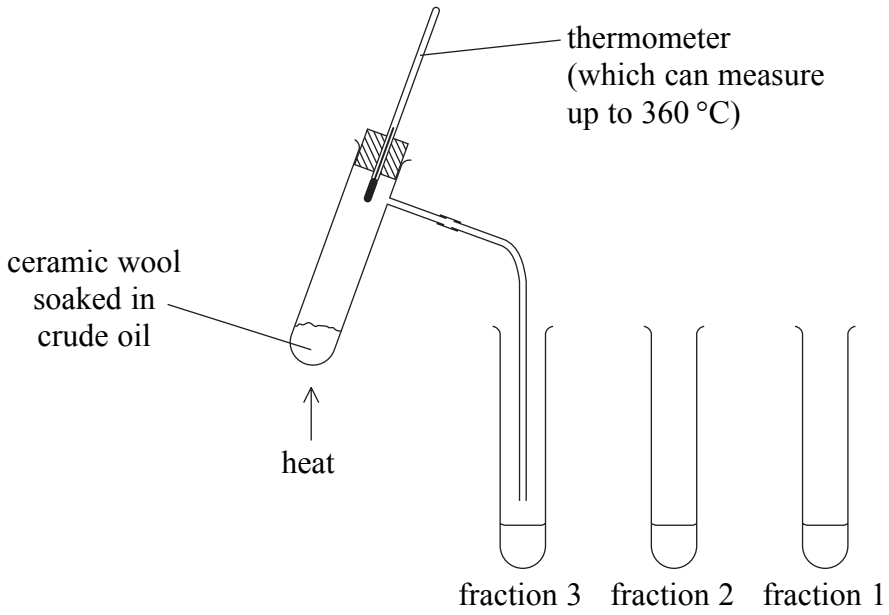
(3)

Q1

(Total 8 marks)

Leave blank

2. Crude oil is an important raw material.
This apparatus can be used in the laboratory to separate crude oil into fractions.



The table gives information about four fractions that were separated using this apparatus.

fraction	boiling point range	thickness	how it burns	number of carbon atoms in molecule
1	below 70 °C	runny	easily with no smoke	4–6
2	between 70 °C and 120 °C	fairly runny	quite easily with some smoke	6–8
3	between 120 °C and 170 °C	thicker	harder to burn with some smoke	8–10
4	between 170 °C and 240 °C	very thick	very hard to burn with smoky flame	10–16

(a) What name is given to the process used to separate crude oil into fractions?

.....

(1)

Leave blank

(b) (i) Explain, in terms of molecules, why fraction 4 is less runny than fraction 1.

.....

(1)

(ii) Suggest why fraction 4 burns with a smoky flame.

.....

(1)

(c) Most scientists believe that crude oil is a fossil fuel formed millions of years ago from small sea creatures called plankton.
Professor Thomas Gold claims that this is not true. He believes that the oil was formed at the same time as the Earth and continues to rise from deep below the Earth's surface.

Suggest why it is difficult for Professor Gold to have his ideas accepted.

.....

(1)

(d) The following was printed on a plastic bag.

100% degradable

From date of production this bag degrades in a maximum of 18 months, unlike conventional plastic which potentially lasts one million years

Biodegradable plastics are made from plant materials.
Explain why it is better for the environment if we use biodegradable rather than non-biodegradable plastics.

.....

.....

.....

(3)

Q2

(Total 7 marks)

Leave blank

3. (a) Calcium oxide is made by heating limestone

$$CaCO_3 \rightarrow CaO + CO_2$$

What name is given to this type of reaction?

.....

(2)

(b) If water is slowly added to lumps of calcium oxide, calcium hydroxide is formed.

(i) Describe what you would **see** during this reaction.

.....

.....

.....

(2)

(ii) Write the balanced equation for this reaction.

.....

(2)

Leave blank

(c) Another important reaction which needs heat is the cracking of certain crude oil fractions.

(i) State **two** reasons why cracking is important.

1. .....

2. .....

(2)

(ii) Explain why catalysts are used when crude oil fractions are cracked.

.....

.....

(1)

(iii) Explain why the catalysts used in cracking can be used more than once.

.....

.....

(1)

(iv) Ethene can be obtained by cracking.

Describe a test to show ethene is unsaturated.

.....

.....

.....

(2)

Q3

(Total 12 marks)

Leave blank

4. Lightsticks give out light when two chemicals react together.

The instructions state that the lightsticks are best used at temperatures between 21°C and 32 °C.
Below 21 °C the light is less bright but lasts for longer.
Above 32 °C the light is brighter but lasts for a shorter time.

Use your knowledge of chemical reactions to explain why both the brightness and length of use are affected by temperature.

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Q4

(Total 3 marks)

TOTAL FOR PAPER: 30 MARKS

END