Write your name here

Surname	Other names

Edexcel GCSE

Centre Number	Candidate Number

Chemistry/Science

Unit C1: Chemistry in Our World

Higher Tier

Wednesday 9 November 2011 – Morning **Time: 1 hour**	Paper Reference **5CH1H/01**

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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P 4 0 1 7 7 A 0 1 1 6

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The Periodic Table of the Elements

1	2											3	4	5	6	7	0
																	4 **He** helium 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
23 **Na** sodium 11	24 **Mg** magnesium 12											27 **Al** aluminium 13	28 **Si** silicon 14	31 **P** phosphorus 15	32 **S** sulfur 16	35.5 **Cl** chlorine 17	40 **Ar** argon 18
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
85 **Rb** rubidium 37	88 **Sr** strontium 38	89 **Y** yttrium 39	91 **Zr** zirconium 40	93 **Nb** niobium 41	96 **Mo** molybdenum 42	[98] **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
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	[209] **Po** polonium 84	[210] **At** astatine 85	[222] **Rn** radon 86
[223] **Fr** francium 87	[226] **Ra** radium 88	[227] **Ac*** actinium 89	[261] **Rf** rutherfordium 104	[262] **Db** dubnium 105	[266] **Sg** seaborgium 106	[264] **Bh** bohrium 107	[277] **Hs** hassium 108	[268] **Mt** meitnerium 109	[271] **Ds** darmstadtium 110	[272] **Rg** roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

Key

1
H
hydrogen
1

relative atomic mass
atomic symbol
name
atomic (proton) number

**** The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.***

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.

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Answer ALL questions.

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 ☒.

Coins

1 Modern European coins contain mixtures of metals.
The 1 cent and 1 euro coins are shown.

1 cent coin

1 euro coin

(a) (i) Suggest why the 1 cent coin is coated with copper.

(1)

.....

(ii) The 1 euro coin has a silver-coloured centre and a gold-coloured rim.

Compare the compositions of the two parts of the coin to suggest which metal causes the alloy to become gold-coloured.

(1)

.....

.....

(b) The diagrams show the structure of a pure metal and an alloy it forms with another metal.

pure metal

alloy

Use these diagrams to help you explain why alloying increases the strength of the pure metal.

(3)

(c) Aluminium and iron are both extracted from their oxides.

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

Iron is extracted from its oxide by heating the oxide with carbon.
In this process the iron oxide is

(1)

☒ **A** thermally decomposed

☒ **B** oxidised

☒ **C** neutralised

☒ **D** reduced

(ii) Aluminium cannot be extracted from its oxide by heating the oxide with carbon. Electrolysis must be used.

Explain why electrolysis must be used to extract aluminium from its oxide.

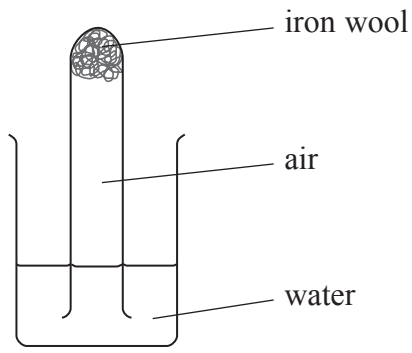
(2)

(Total for Question 1 = 8 marks)

The atmosphere

2 (a) Iron reacts with oxygen to form iron oxide.
Iron wool was placed in the bottom of a wet test tube.

The test tube was then put in a beaker of water as shown in the diagram.



After some time the water level in the test tube rose and some of the iron wool had formed iron oxide.

(i) Write the word equation for the reaction of iron with oxygen.

(1)

(ii) Explain why the water level in the test tube rose during the experiment.

(2)

(iii) The volume of air in the test tube at the start of the reaction was 10 cm^3.

Calculate the volume of gas that should be present in the test tube at the end of the reaction.

(2)

answer = ...

(iv) Complete the sentence by putting a cross (☒) in the box next to your answer.

Most of the gas remaining in the test tube at the end of the experiment would be

(1)

☒ **A** argon

☒ **B** carbon dioxide

☒ **C** nitrogen

☒ **D** oxygen

(b) Several processes change the composition of the Earth's atmosphere.

Explain how the use of fossil fuels affects the composition of the atmosphere.

(2)

.....

.....

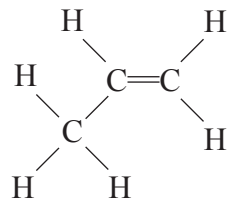
.....

.....

(Total for Question 2 = 8 marks)

Propene

3 The diagram shows the structure of a propene molecule.



(a) Which row of the table describes propene?

Put a cross (☒) in the box next to your answer.

(1)

	hydrocarbon	unsaturated
☒ **A**	yes	no
☒ **B**	no	yes
☒ **C**	yes	yes
☒ **D**	no	no

(b) Propene can form the polymer poly(propene).

Draw a diagram to show the part of a poly(propene) molecule formed from two propene molecules.

(2)

(c) Describe a test that shows that molecules of propene contain carbon to carbon double bonds.

(2)

(d) Propene can be made by cracking fractions obtained from crude oil.

(i) This equation shows the cracking of decane to produce propene and butane.

$$\underset{\text{decane}}{C_{10}H_{22}} \rightarrow \underset{\text{propene}}{2C_3H_6} + \underset{\text{butane}}{C_4H_{10}}$$

Give the total mass of products formed if 17 g of decane is cracked in this way.

(1)

(ii) Explain what is meant by **cracking**.

(2)

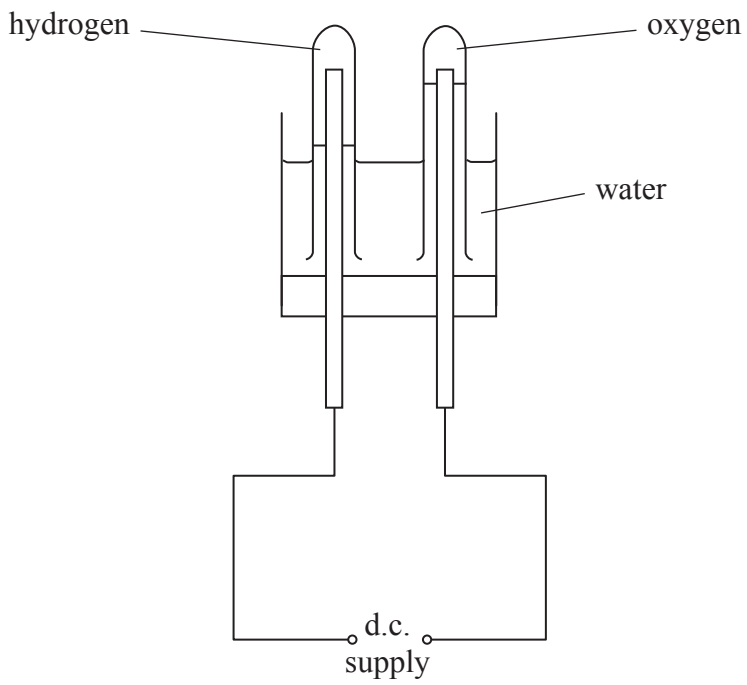
(iii) Explain why it is necessary to crack crude oil fractions that contain large molecules.

(2)

(Total for Question 3 = 10 marks)

Useful liquids

4 (a) Water can be decomposed by electrolysis.
Hydrogen and oxygen are formed.
This apparatus can be used to carry out the electrolysis.



(i) Write the balanced equation for water decomposing to form hydrogen and oxygen.

(3)

(ii) Describe the test to show that a gas is hydrogen.

(2)

(iii) Describe the test to show that a gas is oxygen.

(2)

(b) Seawater can also be decomposed using electrolysis.
Seawater is sodium chloride solution.
When this is decomposed one product is a toxic gas.

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The toxic gas produced is

(1)

☒ **A** hydrogen

☒ **B** chlorine

☒ **C** oxygen

☒ **D** carbon monoxide

(ii) Give a safety precaution that should be taken when collecting this toxic gas.

(1)

.....

.....

(c) Sodium chloride solution can be prepared by reacting sodium hydroxide solution with an acid.

Give the name of the acid that must be used.

(1)

.....

(Total for Question 4 = 10 marks)

Limestone

5 The photograph shows a limestone cliff face.

(a) What is formed from limestone when it is subjected to heat and pressure?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** chalk

☒ **B** granite

☒ **C** marble

☒ **D** fossils

(b) Large quantities of limestone are extracted from quarries.

Give an advantage and a disadvantage, to local communities, of a nearby limestone quarry.

(2)

advantage .....

.....

disadvantage .....

.....

(c) Limestone is a natural form of calcium carbonate.
Limewater is calcium hydroxide solution.

Describe how limewater can be made from calcium carbonate.

(3)

*(d) Limestone is a sedimentary rock.

The limestone shown in the photograph was originally formed beneath the sea and then earth movements forced the rock upwards to form the cliff.

Describe how the limestone was originally formed and has become the cliff face shown in the photograph.

(6)

(Total for Question 5 = 12 marks)

Fuels

6 The photograph shows a multifuel camping stove designed to use various fuels.

This stove can burn the hydrocarbon fuels, propane gas, petrol, kerosene or diesel.

(a) Suggest **two** reasons why it is usually difficult to burn different hydrocarbon fuels efficiently in the same appliance.

(2)

reason 1 .....

.....

reason 2 .....

.....

(b) The fuels that can be used in the stove are obtained by the fractional distillation of crude oil.

Which of these statements about the fractions obtained by the fractional distillation of crude oil is correct?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** each fraction is a pure substance

☒ **B** fuel oil is used as fuel for cars

☒ **C** diesel oil is used as a fuel for some trains

☒ **D** some fractions are biofuels

(c) Ethane, C_2H_6, is present in crude oil.

Write the balanced equation for the complete combustion of ethane.

(3)

*(d) Petrol is the fuel used in many car engines.
Research is being carried out into the use of hydrogen instead of petrol.

Evaluate the advantages and disadvantages of using hydrogen rather than petrol as a fuel for cars.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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