Write your name here

Surname	Other names

Edexcel GCSE

Centre Number	Candidate Number

Chemistry/Science

Unit 1: Chemistry in Our World

Higher Tier

Thursday 1 March 2012 – 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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2

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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

relative atomic mass
atomic symbol
name
atomic (proton) number

1 **H** hydrogen 1

**** 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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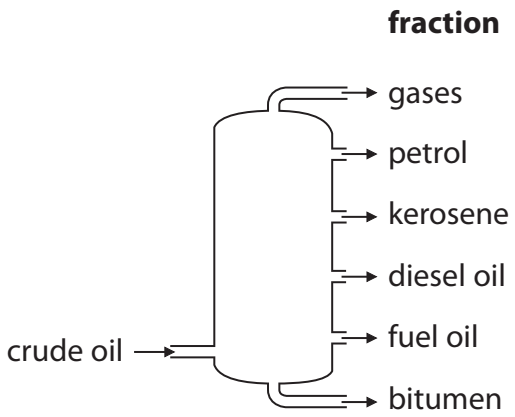
TURN OVER FOR QUESTION 1

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 ☒.

Useful products from crude oil

1 Fractional distillation is used to separate crude oil into fractions.
A fractionating column is used for the process.
The diagram shows a fractionating column and the fractions obtained when crude oil is fractionally distilled.



(a) Which of the following statements is true?

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

(1)

☒ **A** fuel oil has a lower boiling point than petrol

☒ **B** kerosene is more viscous than bitumen

☒ **C** molecules in diesel oil are larger than molecules in petrol

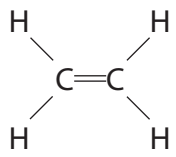
☒ **D** diesel oil is easier to ignite than petrol

(b) Some fractions obtained from crude oil are cracked to produce alkenes.

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

(2)

(ii) One alkene obtained is ethene.
The diagram shows the structure of a molecule of ethene.



Ethene is unsaturated.
Ethene is a hydrocarbon.

Explain why ethene is described as an **unsaturated hydrocarbon**.

(3)

(iii) Describe what you would **see** when a sample of ethene is shaken with bromine water.

(2)

(Total for Question 1 = 8 marks)

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Gases in the atmosphere

2 (a) The table shows possible percentages of some of the gases in the Earth's early atmosphere.

gas	percentage in early atmosphere (%)
oxygen	small amount
nitrogen	small amount
carbon dioxide	12
water vapour	77

(i) Some time after the early atmosphere had been formed, oceans appeared on the Earth's surface.

State how these oceans were formed.

(1)

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.....

(ii) The amount of carbon dioxide in today's atmosphere is much lower than that in the early atmosphere.

State how the formation of the oceans caused this reduction.

(1)

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.....

(iii) The amount of oxygen in today's atmosphere is much higher than that in the early atmosphere.

Describe the process that has caused this increase.

(2)

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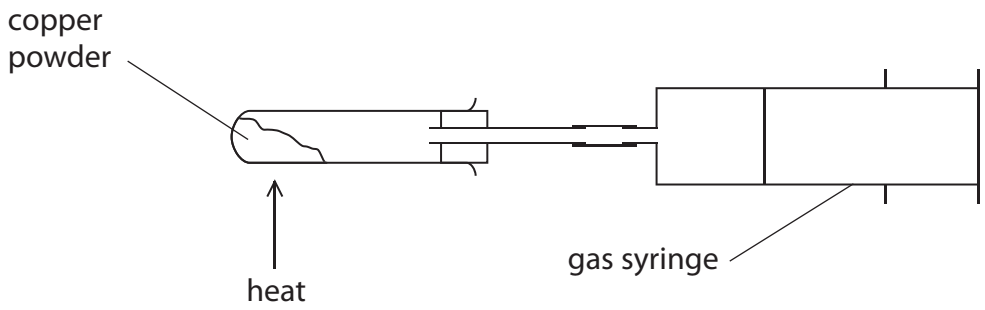
(b) John was doing an experiment to find the percentage of oxygen in air at room temperature.
He used this apparatus.



The copper powder in the test tube was heated strongly so that it could react with oxygen in the air in the apparatus.
John stopped heating the copper when there was no further change in the reading on the gas syringe.

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

At the end of the experiment the apparatus was allowed to cool before the final reading on the syringe was recorded.

This is because

(1)

☒ **A** reading the volume while the apparatus is hot is dangerous

☒ **B** the apparatus must be left to allow the reaction to finish

☒ **C** the gas must be at room temperature when its volume is measured

☒ **D** the copper expands when it is hot

(ii) At the end of the experiment not all of the copper had reacted.

Suggest a reason for this.

(1)

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(iii) John's results were
initial volume of gas in syringe = 32 cm^3
final volume of gas in syringe = 24 cm^3

Calculate the percentage decrease in the volume of gas originally in the syringe.

(2)

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.....

.....

percentage decrease = ...

(iv) The percentage of oxygen in air at room temperature is 21%.
John thought the answer to part (iii) was the percentage of oxygen in air and was surprised that the value was too high.

John confirmed that he had not made an error when doing his experiment.
Suggest why the answer calculated in part (iii) is higher than John expected.

(1)

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(Total for Question 2 = 9 marks)

Metals

3 Metals have many uses.

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

Aluminium and magnesium are melted together to form magnalium.

Magnalium is

(1)

☒ **A** an element

☒ **B** an ore

☒ **C** an alloy

☒ **D** a type of steel

(b) Describe how iron is extracted from its ore.

(2)

(c) Copper oxide reacts with hydrogen to form copper and water.

The equation for the reaction is

$$CuO + H_2 \rightarrow Cu + H_2O$$

Explain how this reaction involves both oxidation and reduction.

(3)

(d) Some modern spectacle frames are made of shape memory alloys.

Explain why shape memory alloys are better than other alloys for making spectacle frames.

(2)

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

Alloys are usually stronger than the pure metals from which they are made because they

(1)

☒ **A** have stronger bonds between the molecules they contain

☒ **B** combine the properties of the metals from which they are made

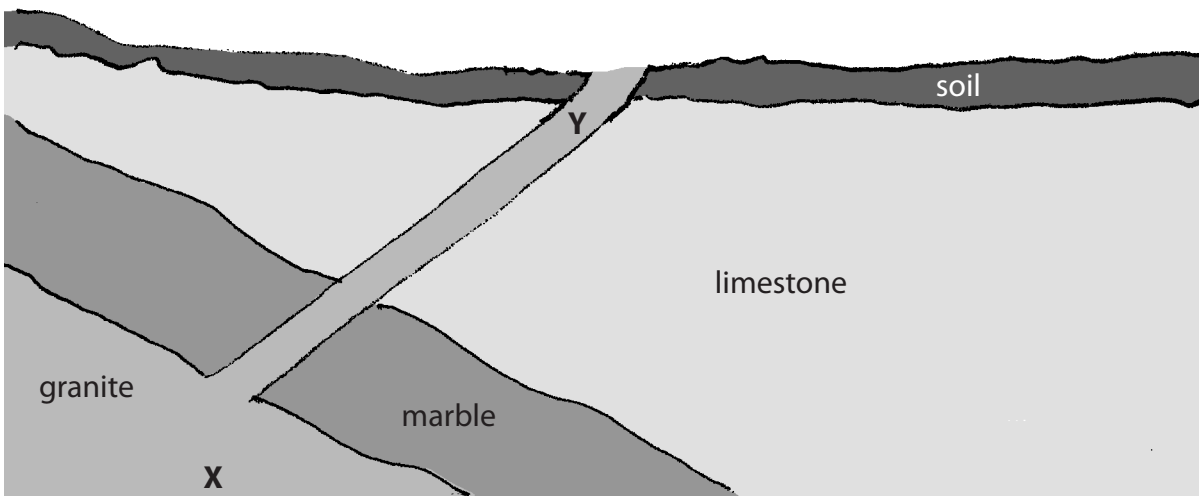
☒ **C** have atoms of different sizes in their structures

☒ **D** are made using electrolysis

(Total for Question 3 = 9 marks)

Rocks

4 A student produced this sketch of a quarry face.



(a) The limestone shown was originally formed in layers.

State what type of rock limestone is.

(1)

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(b) Granite is an igneous rock formed from magma.

(i) Explain how the marble has formed above the granite.

(2)

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(ii) Explain why the rock at **X** contained larger crystals than the rock at **Y**.

(2)

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(c) Limestone is a natural form of calcium carbonate.
When calcium carbonate, $CaCO_3$, is heated it decomposes.

(i) Complete the equation for this reaction.

(1)

$$CaCO_3 \rightarrow CaO + \text{.....}$$

(ii) Calcium oxide reacts with water to form calcium hydroxide.

Write the balanced equation for this reaction.

(2)

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(iii) Explain why calcium hydroxide (slaked lime) is spread on fields.

(2)

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(Total for Question 4 = 10 marks)

Chemical reactions

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

When dilute hydrochloric acid reacts with copper oxide one of the products is

(1)

☒ **A** copper

☒ **B** copper hydroxide

☒ **C** copper chlorate

☒ **D** copper chloride

(b) Chlorine is manufactured by electrolysis.

Explain what is meant by **electrolysis**.

(2)

(c) Chlorine gas reacts with sodium hydroxide solution to form sodium chlorate(I), NaOCl, sodium chloride and water.

Write the balanced equation for this reaction.

(3)

*(d) Sulfur is an impurity in some fossil fuels.

Explain how the presence of sulfur in fossil fuels can lead to damage to the environment and how the amount of damage can be reduced.

(6)

(Total for Question 5 = 12 marks)

Burning fuels

6 The picture shows a gas water heater.
The fuel used in this heater is natural gas which is mainly methane.

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

Natural gas is a good fuel because

(1)

☒ **A** supplies of it will never run out

☒ **B** it always burns with a yellow flame that is easily seen

☒ **C** it produces no waste gases on complete combustion

☒ **D** it produces no solid waste on complete combustion

(b) The complete combustion of fossil fuels releases gases into the atmosphere.

Explain how these gases could cause an increase in the temperature of the Earth.

(2)

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(c) Biofuels, made from plants, can be used as alternatives to fossil fuels.

(i) State an advantage of replacing fossil fuels with biofuels made from plants.

(1)

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(ii) Explain a disadvantage of replacing fossil fuels with biofuels made from plants.

(2)

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*(d) Incomplete combustion of methane can occur in gas heaters such as the one shown in the photograph.

Explain how incomplete combustion occurs and the problems it can cause.

(6)

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(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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