Write your name here

Surname	Other names

Edexcel GCSE

Centre Number	Candidate Number

Chemistry/Additional Science

Unit C2: Discovering Chemistry

Foundation Tier

Tuesday 5 March 2013 – Morning
Time: 1 hour

Paper Reference
5CH2F/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 ▶

P41964A

1/1/1/

P 4 1 9 6 4 A 0 1 2 0

PEARSON

The Periodic Table of the Elements

1	2											3	4	5	6	7	0
							1 **H** hydrogen 1										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

**** 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.

BLANK PAGE

Questions begin on next page.

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 ☒.

Salts

1 (a) Lead iodide is an insoluble salt.

Use words from the box to complete the sentences.

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

(4)

dried	filtered	gas	metal	precipitate	solution

(i) Lead iodide can be prepared by mixing potassium iodide solution and lead nitrate .....

(ii) The lead iodide forms as a solid .....

(iii) To separate the solid lead iodide, the mixture is .....

(iv) To obtain a pure sample of solid lead iodide, the solid is washed and then .....

(b) Solid zinc carbonate reacts with dilute hydrochloric acid.

The word equation for the reaction is

zinc carbonate + hydrochloric acid → zinc chloride + carbon dioxide + water

(i) Describe what is **seen** during this reaction.

(2)

.....

.....

.....

.....

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

(2)

.....

.....

.....

.....

(Total for Question 1 = 8 marks)

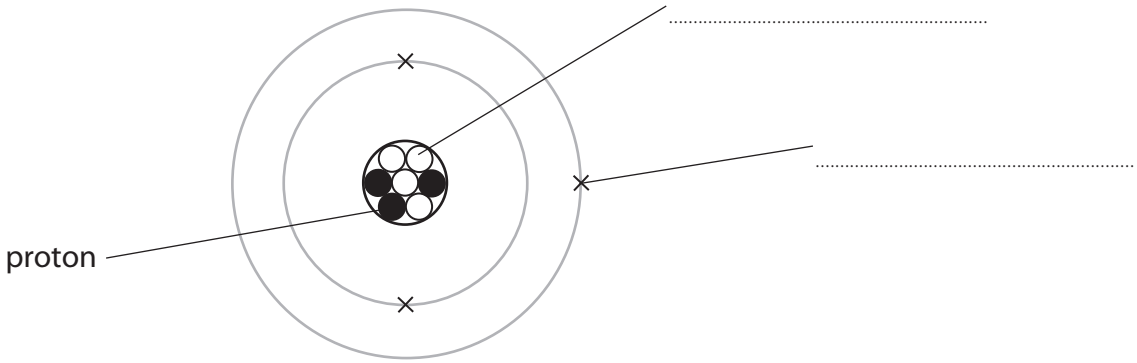
Atomic structure

2 (a) The diagram shows an atom of lithium.

(i) A proton has been labelled.

Complete the diagram by labelling the other two particles shown.

(2)



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

The atomic number of lithium is

(1)

☒ **A** 3

☒ **B** 6

☒ **C** 7

☒ **D** 10

(b) (i) Which row of the table shows the charge on a proton and the charge on an electron?

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

(1)

	proton	electron
☒ **A**	positive	positive
☒ **B**	negative	negative
☒ **C**	negative	positive
☒ **D**	positive	negative

(ii) Use a number from the box to complete the sentence.

(1)

0	$\frac{1}{1837}$	1

The relative mass of a proton is .....

(c) The electronic configuration of lithium is 2.1.
The electronic configuration of sodium is 2.8.1.

(i) Explain, in terms of their electronic configurations, why lithium and sodium are both in group 1 of the periodic table.

(2)

.....

.....

.....

.....

(ii) Explain, in terms of their electronic configurations, why lithium is placed in period 2 and sodium is placed in period 3 of the periodic table.

(2)

.....

.....

.....

.....

(Total for Question 2 = 9 marks)

Investigating a reaction

3 Zinc is a metal.

Zinc reacts with dilute hydrochloric acid to produce zinc chloride and hydrogen.

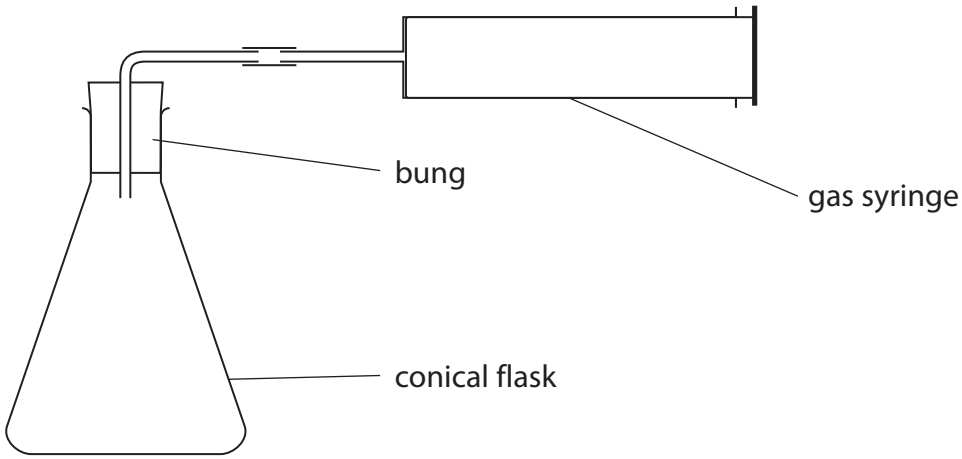
(a) Write the word equation for the reaction of zinc with dilute hydrochloric acid.

(1)

.....

(b) A student wanted to investigate the speed of the reaction between zinc and dilute hydrochloric acid.

Describe how the student could use this apparatus to obtain the results in the table.



time after start of experiment / minutes	volume of hydrogen produced / cm^3
0	0
1	30
2	42
3	50

(3)

.....

.....

.....

.....

.....

.....

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

(i) For a reaction to take place the reacting particles must

(1)

☒ **A** dissolve

☒ **B** boil

☒ **C** collide

☒ **D** evaporate

(ii) The reaction can be slowed down by

(1)

☒ **A** using a bigger volume of the same acid

☒ **B** cooling the hydrochloric acid

☒ **C** increasing the concentration of the hydrochloric acid

☒ **D** adding a catalyst

(d) When zinc powder is used, instead of larger pieces of zinc, the reaction is faster.

Explain, using ideas about particles, why the reaction is faster when zinc powder is used.

(2)

.....

.....

.....

.....

(e) The reaction is exothermic.

Describe how you could prove that this reaction is exothermic.

(2)

.....

.....

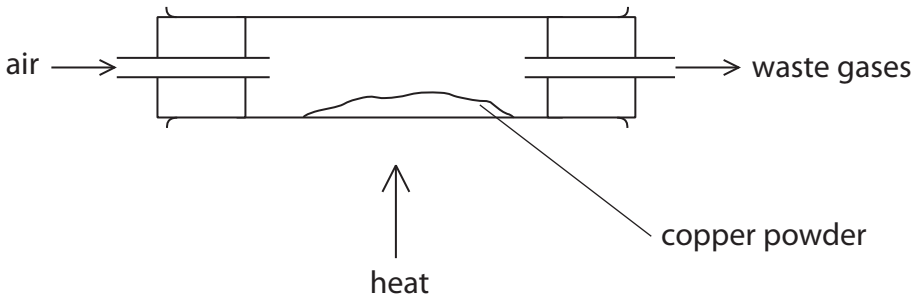
.....

.....

(Total for Question 3 = 10 marks)

Reactions with oxygen

4 Rosie used this apparatus to prepare a sample of copper oxide.



Oxygen from the air reacted with the hot copper to form copper oxide.

These are Rosie's results

mass of copper used = 3.2 g

mass of copper oxide formed = 3.6 g

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

The yield of copper oxide in Rosie's experiment was

(1)

☒ **A** 0.4 g

☒ **B** 3.2 g

☒ **C** 3.6 g

☒ **D** 6.8 g

(b) What mass of oxygen combined with 3.2 g of copper in this experiment?

(1)

.....

mass oxygen = ... g

(c) The theoretical yield for Rosie's experiment was 4.0 g of copper oxide.

She only obtained 3.6 g of copper oxide.

Calculate the percentage yield of Rosie's experiment.

(2)

.....

.....

percentage yield .....

(d) Balance the equation for this reaction by putting numbers in the spaces provided.

(2)

.....Cu + O_2 → .....CuO

(e) Calculate the percentage of oxygen in copper oxide, CuO.

(Relative atomic masses: Cu = 64, O = 16)

(2)

.....

.....

.....

.....

percentage of oxygen = ...

(f) Many oxides contain oxide ions, O^{2-}.

Explain how an oxygen atom becomes an oxide ion.

(2)

.....

.....

.....

.....

(Total for Question 4 = 10 marks)

Chromatography

5 (a) Some food colourings are a mixture of coloured substances.

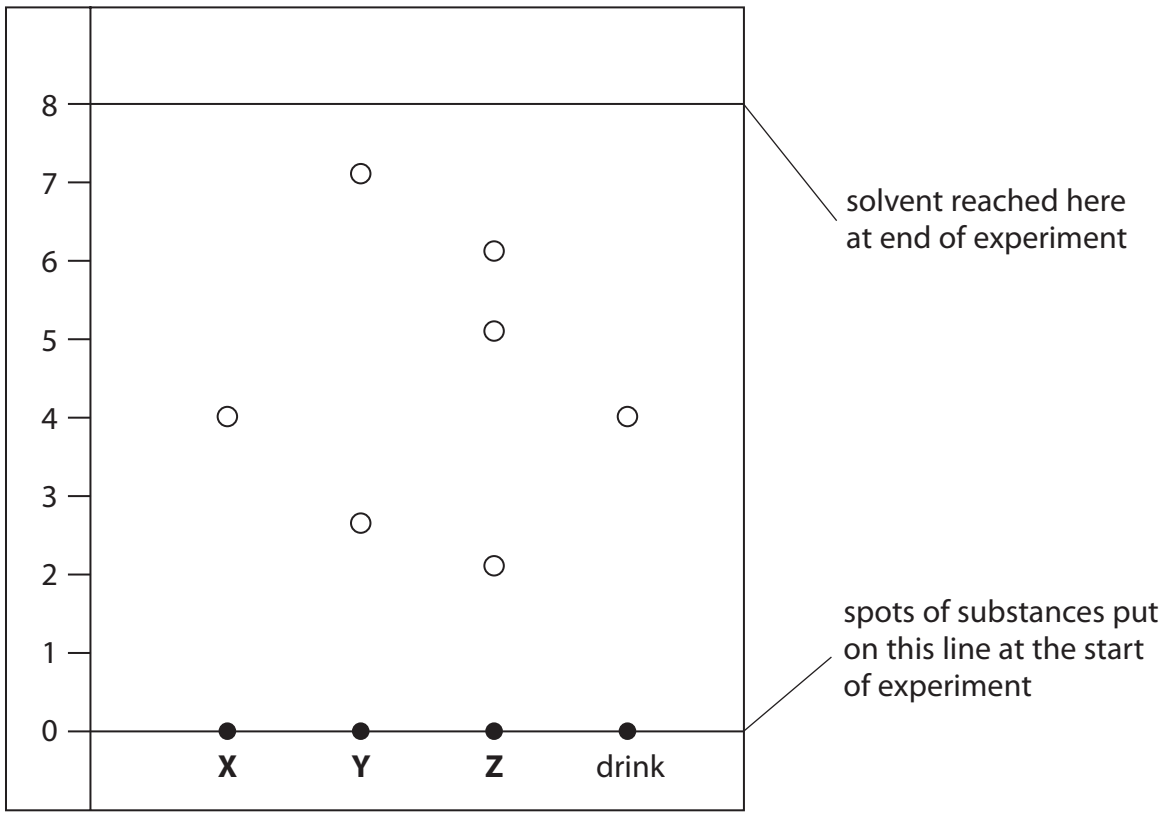
Paper chromatography can be used to separate the coloured substances in food colourings.

Charles carried out a chromatography experiment to test which food colouring was present in a coloured drink.

He used samples of three food colourings, **X**, **Y** and **Z**.

He also tested a sample of the colouring in the drink.

Charles obtained this chromatogram.



(i) Charles looked at the chromatogram to find out which food colourings contained more than one coloured substance.

State all the food colourings that contain more than one coloured substance.

(1)

.....

(ii) Food colouring **Y** is banned.

Explain how Charles can tell that the drink that he tested did **not** contain the banned food colouring.

(2)

(iii) Calculate the R_f value for the coloured substance in food colouring **X**.

(2)

R_f = ...

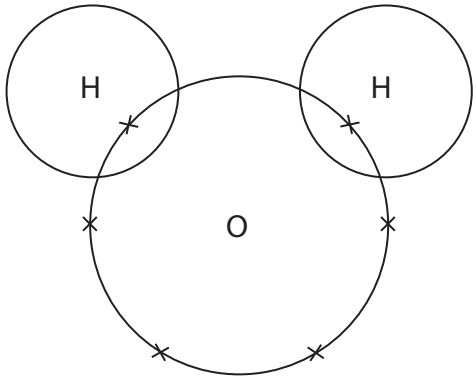
*(b) Describe in detail how the experiment should be carried out to produce the chromatogram shown in (a).

(6)

(c) The drink contained water.

Complete the dot and cross diagram for water by adding the electrons of the hydrogen atoms.

(1)



(Total for Question 5 = 12 marks)

BLANK PAGE

Patterns in the periodic table

6 (a) The table shows information about the first four elements in group 0 of the periodic table.

name	atomic number	density / g dm^{-3}
helium	2	0.15
neon	10	1.2
argon	18	
krypton	36	2.2

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

The elements in group 0 of the periodic table are

(1)

☒ **A** alkali metals

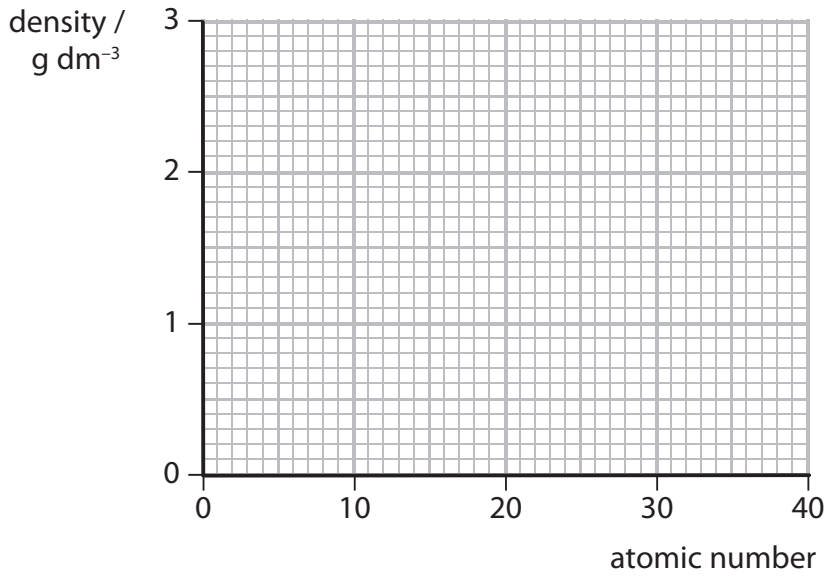
☒ **B** transition metals

☒ **C** halogens

☒ **D** noble gases

(ii) On this grid draw a graph of density against atomic number for the elements helium, neon and krypton.

(3)



(iii) Use your graph to estimate the density of argon.

(1)

density of argon = ... g dm^{-3}

*(b) Two elements in group 1 of the periodic table are lithium and sodium.

Very small pieces of lithium and sodium were reacted separately with water.

Describe the similarities and differences in what is seen and in the products of the reactions.

(6)

(Total for Question 6 = 11 marks)

TOTAL FOR PAPER = 60 MARKS

BLANK PAGE

BLANK PAGE

BLANK PAGE