

Write your name here

Surname

Other names

Centre Number

Candidate Number

Edexcel GCSE

Chemistry/Additional Science

Unit C2: Discovering Chemistry

Foundation Tier

Monday 21 May 2012 – 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 ►

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PEARSON

The Periodic Table of the Elements

	1	2	3	4	5	6	7	0									
	7 Li lithium 3	9 Be beryllium 4	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> 1 H hydrogen 1 </div>					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	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> Key relative atomic mass atomic symbol name atomic (proton) number atomic (proton) number </div>					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	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	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	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					

* 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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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 ☒.

Temperature changes

1 (a) When a small amount of solid ammonium chloride is shaken with water, a colourless solution forms.

(i) What type of change has occurred?

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

(1)

- A** dissolving
- B** displacement
- C** neutralisation
- D** precipitation

(ii) When this change takes place there is a decrease in temperature.

Describe how you could measure this change in temperature.

(2)

.....

.....

.....

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(iii) Some chemical reactions cause a decrease in temperature.

Give the name of the type of chemical reaction that causes a decrease in temperature.

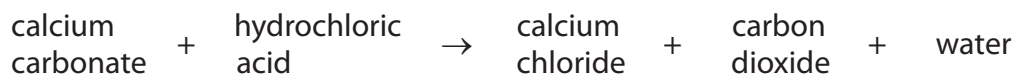
(1)

.....



(b) Marble is a form of calcium carbonate.
When marble chips are added to cold, dilute hydrochloric acid, the mixture fizzes.

The word equation for the reaction is



(i) Give the name of the product that causes the mixture to fizz. (1)

(ii) The experiment is repeated using warm, instead of cold, acid.

State the difference you would **see** when the marble chips react with warm, instead of cold, acid.

(1)

(iii) Explain what must be done to the marble chips so that the reaction with the warm, dilute hydrochloric acid is even faster.

(2)

(Total for Question 1 = 8 marks)



Salts

2 The table shows some salts that are soluble and some that are insoluble in water.

soluble salts	insoluble salts
copper chloride lead nitrate sodium carbonate	barium sulfate lead carbonate

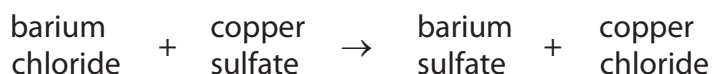
(a) An insoluble salt can be prepared by mixing two salt solutions.

Choose **two** salts from the table that can be reacted together to form lead carbonate.

(2)

..... and

(b) Barium chloride solution reacts with copper sulfate solution.



Explain what is **seen** when solutions of barium chloride and copper sulfate are mixed.

(2)

.....

.....

.....

.....

(c) A 'barium meal' may be given to a patient before an X-ray is taken.
A 'barium meal' is a suspension of barium sulfate in water.

Give **one** reason why barium sulfate is used in this way.

(1)

.....

.....



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

(i) The table shows that copper chloride is soluble in water.

This suggests that the structure of copper chloride is

(1)

- A** simple molecular, covalent
- B** giant molecular, covalent
- C** ionic
- D** metallic

(ii) Sodium carbonate is an ionic compound.

The most likely melting point of sodium carbonate is

(1)

- A** $-85\text{ }^{\circ}\text{C}$
- B** $17\text{ }^{\circ}\text{C}$
- C** $146\text{ }^{\circ}\text{C}$
- D** $851\text{ }^{\circ}\text{C}$

(e) Sodium carbonate contains sodium ions, Na^+ , and carbonate ions, CO_3^{2-} .

Give the formula for sodium carbonate.

(1)

(Total for Question 2 = 8 marks)



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Mixtures

3 (a) Water and oil do not mix.

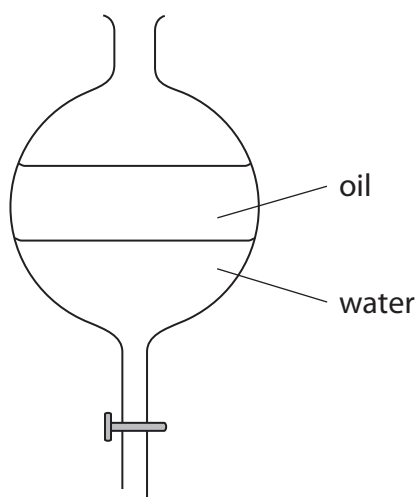
(i) What term is used to describe two liquids that do not mix?

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

(1)

- A ionic
- B inflammable
- C immiscible
- D insoluble

(ii) The water and oil mixture can be separated using a separating funnel.



Describe how the separating funnel is used to separate samples of water and oil from the mixture.

(2)

.....

.....

.....

.....



(b) Wax and sand are both solids at room temperature.

The wax has a melting point of 64 °C.

The sand has a melting point of 1610 °C.

(i) State what will happen to the wax when it is heated using a Bunsen burner.

(1)

(ii) When the sand is heated using a Bunsen burner there is no visible change.

Explain why.

(2)

(iii) The wax has a low melting point because there are only weak forces between the molecules in the wax.

What type of structure does wax have?

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

(1)

- A** simple molecular, covalent
- B** giant molecular, covalent
- C** ionic
- D** metallic



(c) A written note was found at a crime scene.
Forensic scientists used chromatography to investigate the dyes in the ink used to write the note.

They put spots of four substances on chromatography paper.

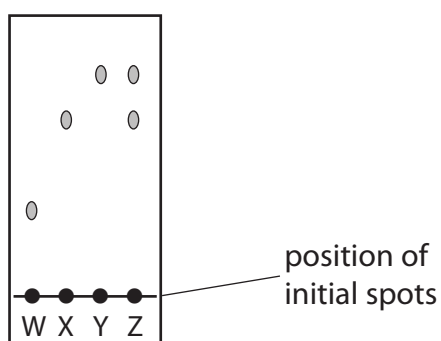
W was pure red dye

X was pure blue dye

Y was pure yellow dye

Z was the ink used on the note

The result of the chromatography is shown.



(i) State how you can tell that dyes W, X and Y are pure.

(1)

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(ii) Explain what you can deduce about the ink Z used on the note.

(2)

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.....

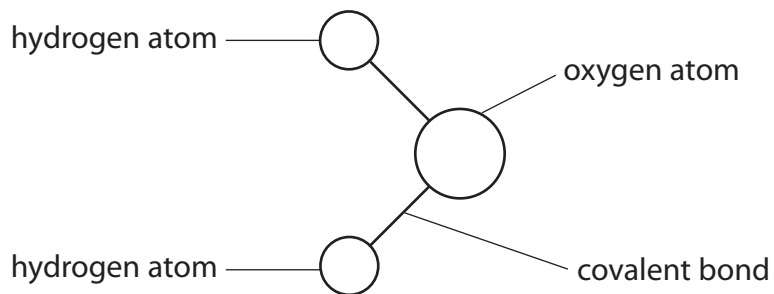
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(Total for Question 3 = 10 marks)



Water

4 The diagram shows a model of a water molecule.



(a) Explain, in terms of electrons, how a covalent bond is formed between an oxygen atom and a hydrogen atom.

(2)

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.....

.....

(b) Calculate the relative formula mass of water, H_2O .
(Relative atomic masses: $\text{H} = 1.0$, $\text{O} = 16$)

(2)

.....

.....

answer =



(c) Hydrogen burns in oxygen to form water.

(i) Write the balanced equation for this reaction.

(3)

(ii) In an experiment the mass of water obtained was 2.0 g.
The theoretical yield for this experiment was calculated to be 4.0 g.

Calculate the percentage yield.

(2)

percentage yield =%

(iii) Suggest **one** reason why less than 4.0 g of water was obtained in this experiment.

(1)

(Total for Question 4 = 10 marks)



Atoms

- 5 The positions of five elements, **A**, **B**, **C**, **D** and **E**, are shown in the periodic table. These letters are not the atomic symbols of these elements.

1	2							3	4	5	6	7	0
A													
B													E
							C	D					

(a) Which element, **A**, **B**, **C**, **D** or **E**, is a transition metal? (1)

.....

(b) State why elements **A** and **B** have similar reactions. (1)

.....

.....

(c) When Mendeleev produced his periodic table, the element labelled **D** had not been discovered.
 He predicted the properties of the element and left a space for it in his table.
 Explain how Mendeleev was able to predict the properties of element **D**. (2)

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Metals and their compounds

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

Sodium is an alkali metal.

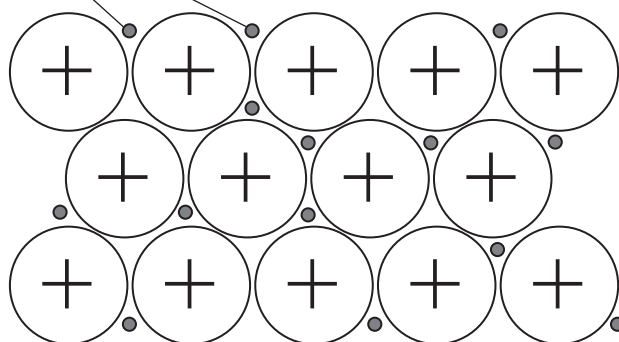
In the periodic table, sodium is in group

(1)

- A 0
 B 1
 C 4
 D 7

- (b) The diagram shows the structure of a metal.

delocalised electrons



positively charged ions

Explain how metals conduct electricity.

(2)

.....

.....

.....

.....



(c) A sodium chloride crystal contains sodium cations and chloride anions.

(i) State the colour produced by sodium compounds in a flame test.

(1)

(ii) Describe how silver nitrate solution can be used to show that solid sodium chloride contains chloride ions.

(2)

*(iii) Sodium reacts with chlorine to form sodium chloride.

Describe how the reaction can be carried out, explaining what happens when a sodium atom reacts with a chlorine atom.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS



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