Paper Reference(s) 5CH2F/01

Edexcel GCSE

Chemistry/Additional Science

Unit C2: Discovering Chemistry

Foundation Tier

Monday 21 May 2012 – Morning

Time: 1 hour plus your additional time allowance

INSTRUCTIONS TO CANDIDATES

Write your centre number, candidate number, surname, initials and your signature in the boxes below. Check that you have the correct question paper.

Centre No.							
Candidate No.							
Surname							
Initial(s)							
Signature							
Paper Reference	5	С	Н	2	F	0	1

- Use BLACK ink or ball-point pen.
- Answer ALL questions.
- Answer the questions in the spaces provided
 - there may be more space than you need.

MATERIALS REQUIRED FOR EXAMINATION Calculator, ruler

ITEMS INCLUDED WITH QUESTION PAPERS Nil

INFORMATION FOR CANDIDATES

- The total mark for this paper is 60.
- 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.
- A Periodic Table is provided.

ADVICE TO CANDIDATES

- 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.

Answer ALL questions

Some questions must be answered with a cross in a box \boxtimes . If you change your mind about an answer, put a line through the box \boxtimes and then mark your new answer with a cross \boxtimes .

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? (1 mark)

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

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 marks)
(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 mark)
(Question c	ontinues on next page)

(b) Marble is a form of calcium carbonate.

When marble chips are added to cold, dilute hydrochloric acid, the mixture

The word equation for the reaction is

dioxide carbon chloride calcium hydrochloric acid carbonate calcium

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

(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 mark)
(iii)	Explain what must be done to the marble chips so that the reaction with the warm, dilute hydrochloric acid is even faster. (2 marks)
	(Total for Question 1 = 8 marks)

(Questions continue on next page)

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 marks)

and

(b) Barium chloride solution reacts with copper

sulfate solution.

barium chloride	+	copper sulfate	\rightarrow	barium sulfate	+	copper chloride
	_	in what is S ide and cop				
(Question continues on next page)						

(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 mark)					
(d)	Complete the sentences by putting a cross (☒) in the box next to your answer.					
	(i)	(i) The table shows that copper chloride is soluble in water.				
			s suggests that the structure of copper oride is			
		Α	simple molecular, covalent			
		В	giant molecular, covalent			
		С	ionic			
		D	metallic			
		(1 n	nark)			

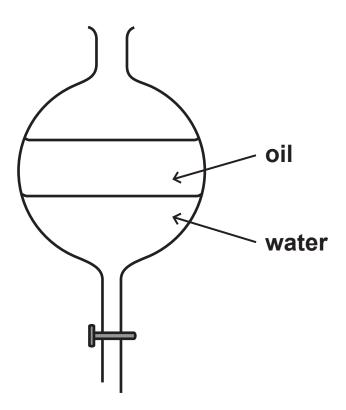
(Question continues on next page)

	(ii)	Sod	ium carbonate	is an ionic	compound	l.
			most likely me onate is	lting point	of sodium	
		A	−85 °C			
		В	17 °C			
		С	146 °C			
		D	851 °C			
		(1 m	ark)			
(e)			carbonate cont e ions, CO ₃ ^{2–} .	ains sodiu	m ions, Na	[†] , and
	Giv	e the	formula for so	dium carbo	onate. (1 m	ark)
						<u> </u>
			(Tot	al for Ques	stion 2 = 8	marks)
Questions continue on next page)						

Λ	Λ	IY'	ГП	D	
N	/		ΙU	$\mathbf{\Gamma}$	

3	(a)	Water and oil do not mix.						
		(i)	What term is used to describe two liquids that do not mix? (1 mark)					
			Put	a cross (⊠) in the box next to your answer.				
			A	ionic				
			В	inflammable				
			С	immiscible				
			D	insoluble				
(Qı	uesti	on c	onti	nues on next page)				

(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 marks)

(Question continues on next page)	(Turn over)

(b)	Wax and sand are both solids at room temperature. The wax has a melting point of 64 °C.							
	The	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 mark)						
	(ii)	When the sand is heated using a Bunsen burner there is no visible change.						
		Explain why. (2 marks)						
	-::							
(Questi	ion c	ontinues on next page)						

(111)	are	only weak forces between the molecules in wax.			
		at type of structure does wax have? nark)			
	Put	a cross (☒) in the box next to your answer.			
	A	simple molecular, covalent			
	В	giant molecular, covalent			
	С	ionic			
	D	metallic			
(Question continues on next page)					

(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.

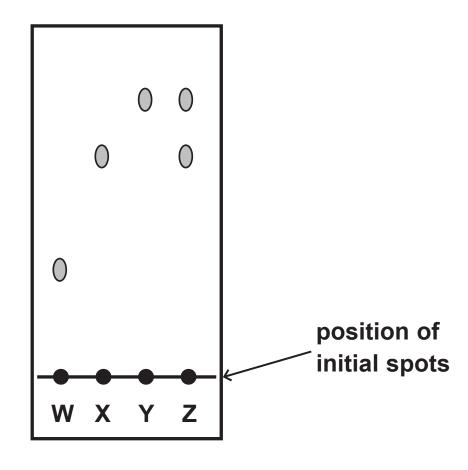
W was pure red dye

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.



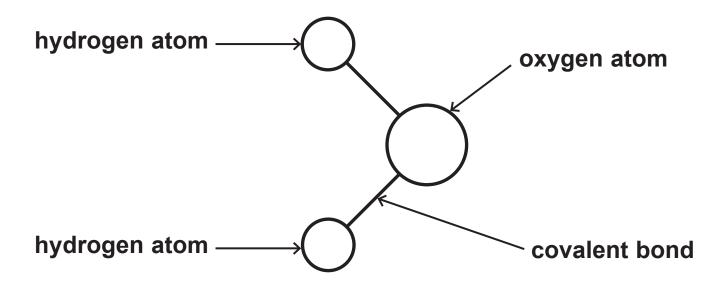
(Question continues on next page)

(i)	State how you can tell that dyes W, X and Y are pure. (1 mark)
(ii)	Explain what you can deduce about the ink Z used on the note. (2 marks)
	(Total for Question 3 = 10 marks)

(Questions continue on next page)

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 marks)

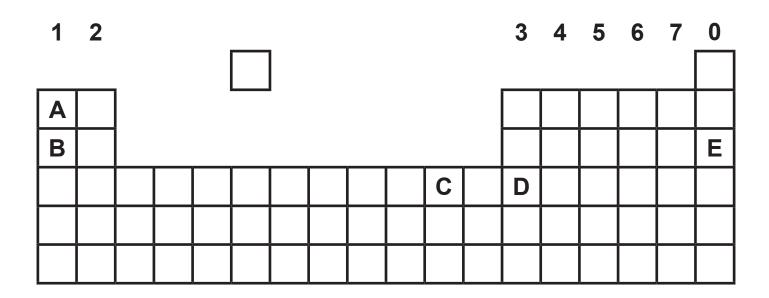
(b)	Calculate the relative formula mass of water, H ₂ O. (2 marks)				
	(Relative atomic masses: H = 1·0, O = 16)				
	answer =				
(c)	Hydrogen burns in oxygen to form water.				
	(i) Write the balanced equation for this reaction. (3 marks)				
(Questi	on continues on next page)				

(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 marks)
	percentage yield = %
(iii)	Suggest ONE reason why less than 4·0 g of water was obtained in this experiment. (1 mark)
	(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.



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

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

(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 marks)					
(Questi	on continues on next page)					

(d)	An atom of element C contains 29 protons.					
	Explain how you can use this information to calculate the number of protons in an atom of element D. (2 marks)					
(Questia	on continues on next nage)					

*(e)	An atom has an atomic number of 9 and a mass number of 19.
	Describe the numbers and positions of electrons, protons and neutrons in this atom. (6 marks)
(Contin	ue your answer on next page)

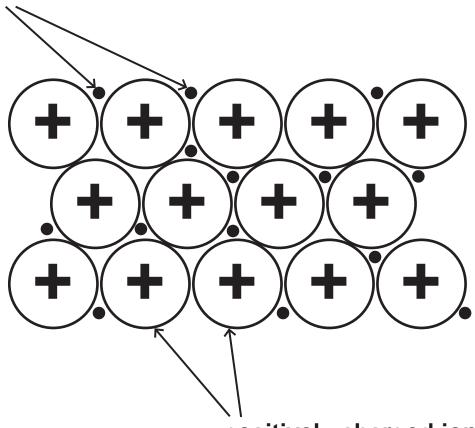
 (Total for Question 5 = 12 marks)
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METALS AND THEIR COMPOUNDS

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					
		□ A 0					
		□ B 1					
	C 4						
		□ D 7					
		(1 mark)					
(Qı	uesti	on continues on next page)					

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

delocalised electrons



positively charged ions

Explain how metals conduct electricity. (2 marks)

(c)	A sodium chloride crystal contains sodium cations and chloride anions.				
	(i)	State the colour produced by sodium compounds in a flame test. (1 mark)			
	(ii)	Describe how silver nitrate solution can be used to show that solid sodium chloride contains chloride ions. (2 marks)			
(Questi	on c	continues on next page)			

*(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 marks)
	
	
	
(Continue ye	our answer on next page)

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END

The Periodic Table of the Elements

0 4 He helium 2	20 Ne neon 10	40 Ar argon 18	84 Kr krypton 36	131 Xe xenon 54	[222] Rn radon 86	fully
7	19 F fluorine 9	35.5 CI chlorine 17	80 Br bromine 35	127 	[210] At astatine 85	orted but not
9	16 O oxygen 8	32 \$ sulfur 16	79 Se selenium 34	128 Te tellurium 52	[209] Po polonium 84	ave been rep
2	14 N nitrogen 7	31 P phosphorus 15	75 As arsenic 33	122 Sb antimony 51	209 Bi bismuth 83	rs 112-116 har authenticated
4	12 C carbon 6	28 Si silicon	73 Ge gemanium 32	119 Sn tin	207 Pb lead 82	Elements with atomic numbers 112-116 have been reported but not fully authenticated
ဇ	11 B boron 5	27 AI aluminium 13	70 Ga gallium 31	115 In indium 49	204 TI thallium 81	nents with at
			65 Zn zinc 30	112 Cd cadmium 48	201 Hg mercury 80	Elen
			63.5 Cu copper 29	108 Ag silver 47	197 Au gold 79	[272] Rg roentgenium
			59 nickel 28	106 Pd palladium 46	195 Pt platinum 78	[271] Ds damstadtium 110
			59 Co cobalt 27	103 Rh modium 45	192 Ir iridium 77	[268] Mt meitnerium 109
H hydrogen			56 iron 26	101 Ru ruthenium 44	190 Os osmium 76	[277] Hs hassium 108
			55 Mn manganese 25	[98] Tc technetium 43	186 Re menium 75	[264] Bh bohrium 107
	mass bol number		52 Cr chromium 24	96 Mo molybdenum 42	184 W tungsten 74	[266] Sg seaborgium 106
Key	relative atomic mass atomic symbol name atomic (proton) number		51 V vanadium 23	93 Nb niobium 41	181 Ta tantalum 73	[262] Db dubnium 105
	relati atc atomic			91 Zr zirconium 40		[261] Rf rutherfordium 104
			45 Sc scandium 21	89 ************************************	139 La* lanthanum 57	[227] Ac* actinium 89
2	9 Be beryllium 4	24 Mg magnesium 12	40 Ca calcium 20	88 Sr strontium 38	137 Ba barium 56	[226] Ra radium 88
-	7 Li lithium 3	Na sodium	39 K potassium 19	85 Rb rubidium 37	133 Cs caesium 55	[223] Fr francium 87

* 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.