

Centre Number		
71		
Cano	didate Number	

General Certificate of Secondary Education 2013–2014

Double Award Science: Chemistry

Unit C1

Foundation Tier

[GSD21]

THURSDAY 15 MAY 2014, MORNING



TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

Write your answers in the spaces provided in this question paper. Answer **all ten** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 70.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question. Quality of written communication will be assessed in Question 5. A Data Leaflet, which includes a Periodic Table of the Elements, is included in this question paper.

For Examiner's use only		
Question Number	Marks	
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Total	
Marks	

1 A list of substances and their uses is given below.

Draw a line from each substance to the correct use.

Examiner Only

Marks Remark

Substance	Use
anhydrous copper sulfate	chemical test for water
magnesium	test for an alkali
	test for an acid
blue litmus paper	
	cutting tool
copper	high strength alloys for aircraft

[5]

electrical wiring

9475

diamond

	lo	dine	
Property	Solid	Gas	
has a fixed shape	✓		
takes the shape of the bottom of the container			
takes the volume and shape of the container			
can be compressed easily		✓	
cannot be compressed easily			
			[2]
) Name the Group in the Period	ic Table where iod	dine is placed.	
			[1]

	ydrated copper(II) sulfate is added to a beaker of water and stirred un ome solid copper(II) sulfate remains at the bottom of the beaker.	til	Examin Marks	er Only Remarl
(a) What colour is hydrated copper(II) sulfate?			
		[1]		
(k	Explain what is meant by the term hydrated .			
		[1]		
(0) Draw a labelled diagram with assembled apparatus to show how th solid copper(II) sulfate, which is left at the bottom of the beaker, is separated from the solution.	e		
		[4]		

(a)	What is the name given to the process of decomposing a compound using electricity?
	[
(b)	Balance the equation below which describes the decomposition of water.
	$2H_2O \rightarrow H_2 + O_2$
(c)	Describe a test for hydrogen gas.
	[2
(d)	(i) Hydrogen is a flammable gas. Which hazard symbol shown below should be placed on a cylinder of hydrogen gas? Circle the correct hazard symbol.

Examiner Only

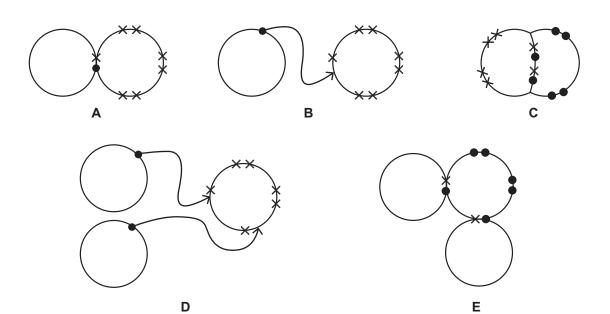
Marks Remark

		© Crown Copyright	[1]
(ii)	Give two reasons why hazard symbols are in	mportant.	
	1		
	2		

____[2]

Describe in words the structure of an atom of boron whose atomic number is 5. You may find your Data Leaflet helpful.	Examiner Only Marks Remark
Your answer should include the number and position of all of the different types of particles in a boron atom.	
You will be assessed on your written communication skills including the use of specialist science terms.	
[6]	

6 Five bonding diagrams, A–E, are drawn below. **Outer electrons are shown.**



(a) Which diagram, A, B, C, D or E, is a dot and cross diagram of a substance with one single covalent bond?

_____[1]

(b) (i) Which diagram, A, B, C, D or E, could show the transfer of electrons between atoms of sodium and oxygen to form the ionic compound sodium oxide?

_____[1]

(ii) Name the type of particles formed when electrons are **transferred** between atoms. Circle the correct answer in the list below.

neutrons allotropes ions isotopes [1]

(c) Which diagram, A, B, C, D or E, could show the covalent bonding between atoms of hydrogen and chlorine in hydrogen chloride?

_____[1]

(d) Which diagram, A, B, C, D or E, could show the sharing of electrons in a molecule of oxygen?

_____[1]

Potassium is a soft metal which can be cut with a knife. It reacts violently with chlorine to form potassium chloride.	Examiner Only Marks Remark
(a) Complete and balance the symbol equation below for the reaction of potassium with chlorine.	
$K + Cl_2 \rightarrow \qquad \qquad$	
(b) Describe the appearance of a piece of freshly cut potassium.	
[1]	
(c) What happens to the freshly cut potassium when it is left in the air for a few minutes?	
[1]	
(d) Why is potassium stored under oil in the laboratory?	
[1]	
 (e) Before reacting Group 1 elements with water a risk assessment is carried out. Give two safety precautions, apart from wearing safety glasses, which must be included in the risk assessment. 1	
2 [2]	

(f) Equal sized pieces of three Group 1 metals are added to separate troughs of water which contain universal indicator.

The observations made are recorded in the table below.

Name of Group 1 metal	Observation when the metal is added to water	Colour of universal indicator
potassium	 catches fire burns with a lilac flame on the surface of the water quickly disappears 	changes colour from green to blue
lithium	floatsmoves about the surface of the watereventually disappears	changes colour from green to blue
sodium	melts into a silvery ball on the surface of the waterdisappears	changes colour from green to blue

Read the information in the table carefully.

	, , , , , , , , , , , , , , , , , , , ,	
(i)	What happens to the reactivity of the Group 1 elements as the Group is descended? You may find your Data Leaflet helpful.	[1]
(ii)	Explain fully why the universal indicator changed colour from green to blue.	
		[3]
(iii)	Give one more observation which could be added to the table feall three reactions.	
		[1]
(iv)	Write a word equation to describe the reaction between sodiun and water.	1

9475 9 [Turn over

[2]

	nents which reacted in a sign meant by the term eleme r		
			[1]
mplete the sente	ence.		
In his Periodic	Table, Mendeleev arrange	d the elements in order	of
increasing		·	[1]
Name	Symbol	Metal/Non-metal	
phosphorus			
	Bi		
			[2]
Nitrogen is also	o a Group 5 element. What	: Period is nitrogen in?	
Period			[1]
	an electronic configuratior Group 5 of the Periodic Tab		
			[2]

a	ction of acid A and the base, magnesium hydroxide.		
a)	Name acid A which reacts with magnesium hydroxide to produce magnesium chloride.		
		[1]	
(b)	Suggest a reason why magnesium hydroxide is described as a base and not as an alkali.	е	
		[1]	
(c)	Explain why the reaction between acid A and magnesium hydroxide a neutralisation reaction.	e is	
		[1]	
		[1]	
	gnesium chloride is also formed by the reaction of magnesium oxide		
anc	gnesium chloride is also formed by the reaction of magnesium oxide		
anc	gnesium chloride is also formed by the reaction of magnesium oxide d acid A. What would you expect to observe when acid A is added to		
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(e) A solution of 0.05 mol/dm³ acid Y was tested using a pH meter and universal indicator paper. The results are recorded in the table below.

Examiner Only			
Marks	Remark		

Test	Result
pH meter	pH = 3.03
Universal indicator	orange pH = 3

(i)	Explain how the colour of universal indicator is used to give a
	pH value.

		[1]
		111

(ii) How do the results show that acid Y is a weak acid?

		ra
		11

(iii) Give one example of a weak acid.

[1				
				[1
				- 11

(iv) Which property of the acid is measured in the units mol/dm³? Circle the correct answer.

mass volume concentration strength [1]

10 (a) An investigation was carried out to find the solubility (g/100 g H₂O) of potassium chloride at different temperatures. The results are given in the table below.

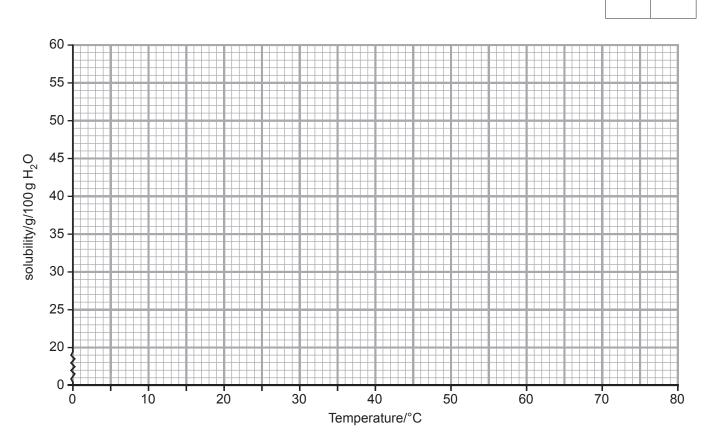
Temperature (°C)	0	10	20	30	40	50	60	80
Solubility (g/100 g H ₂ O)	27.8	30.9	34.0	37.1	40.0	42.9	45.8	51.2

(i) At 70 °C, 12.1 g of potassium chloride will saturate 25 g of water. Calculate the solubility of potassium chloride at 70 °C. (You must show your working out.)

(ii) On the grid below draw the solubility curve for potassium chloride.

[3]

Examiner Only



(b) The table below gives the solubility (g/100 g $\rm H_2O$) at different temperatures for four **solid** compounds, A, B, C and D.

Solid	Solubility (g/100 g H ₂ O)								
Solid	0°C	10 °C	20 °C	30 °C	40 °C	60 °C	80 °C		
Α	60.0	66.7	73.9	81.8	88.7	106.0	132.0		
В	12.3	16.4	18.6	25.0	31.6	40.4	49.0		
С	0.22	0.24	0.25	0.26	0.26	0.24	0.23		
D	79.2	85.4	94.2	105.0	119.0	158.0	187.0		

(i)	Use the data in the table to complete the following general	rule.	Examine Marks	er Only Remark
	For most solids the solubility	as the		
	temperature	[1]		
(ii)	One of the compounds in the table does not follow this sol rule. Describe fully what happens to the solubility of this solid as temperature is increased from 0 °C to 80 °C.	•		

THIS IS THE END OF THE QUESTION PAPER

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