Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2014–2015

Double Award Science: Chemistry

Unit C1
Foundation Tier

[GSD21]

GSD21

THURSDAY 14 MAY 2015, MORNING

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page or on blank pages.
Complete in blue or black ink only. **Do not write with a gel pen.**
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 **7(a)**.
A Data Leaflet, which includes a Periodic Table of the elements is provided.

10080

1 **(a)** Lists of substances and statements are given below.
Draw a line from each substance to the correct statement about that substance.

Substance	Statement
	Is a white solid
hydrogen	
	Turns limewater milky white
copper oxide	
	Makes a popping sound with a lighted splint
aluminium sulfate	
	Reacts with sulfuric acid to produce a salt and water only
copper carbonate	
	Is a green solid
carbon dioxide	
	Relights a glowing splint

[5]

(b) In the box below draw the hazard symbol that would be found on a bottle of a **corrosive** substance, such as sulfuric acid.

[1]

2 Below is a list of words which are often used in chemistry.

melts	**sublimes**	**condenses**	**dissolves**
evaporates	**boils**	**freezes**	**mixes**

Complete each of the sentences below by choosing a correct word from the list.

(i) Sugar _____ when it is put into hot tea.

(ii) Water _____ on the cold surface of windows in hot kitchens.

(iii) Ice cream _____ when it is taken out of the freezer.

(iv) An iodine crystal _____ when it changes from solid to gas. [4]

[Turn over

3 Read the information below and then answer the questions which follow.

*Potassium iodide crystals dissolve in water to form colourless solution **A**.*
*Lead nitrate crystals dissolve in water to form colourless solution **B**.*

(a) From the information above name:

(i) a solute _____

(ii) a solvent _____ [2]

*If solutions **A** and **B** are mixed together two new substances are formed.*

One of these substances is a yellow solid, lead iodide, which lies at the bottom of the beaker. The other substance is potassium nitrate which forms a colourless solution.

(b) From the information above name an insoluble substance.

_____ [1]

(c) Draw a **labelled** diagram of the assembled apparatus you would use to separate the yellow solid formed from the colourless solution.

[4]

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(Questions continue overleaf)

4 This question is about alloys.

(a) Read the passage below and then answer the questions which follow.

Chromium is used in making stainless steel to help keep the steel shiny.
Solder is used to help join metals together.
Electrum, known as white gold is an alloy of gold, silver, and copper.

(i) Name four metal elements mentioned in the passage.

1. _____

2. _____

3. _____

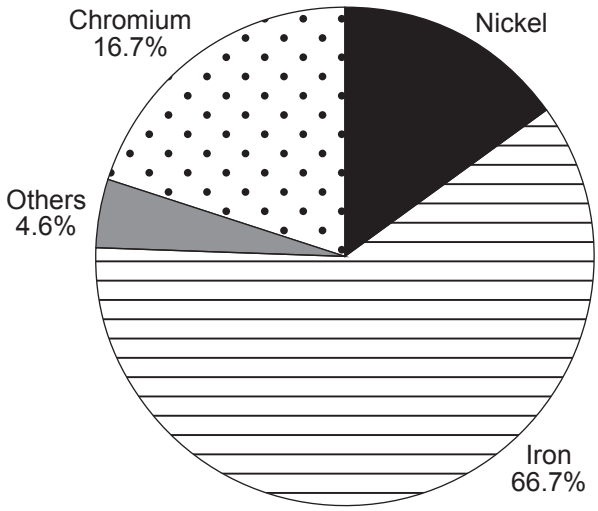
4. _____ [2]

(ii) Why can white gold be described as an alloy?

_____

_____ [2]

(b) The pie chart below shows the composition of stainless steel.

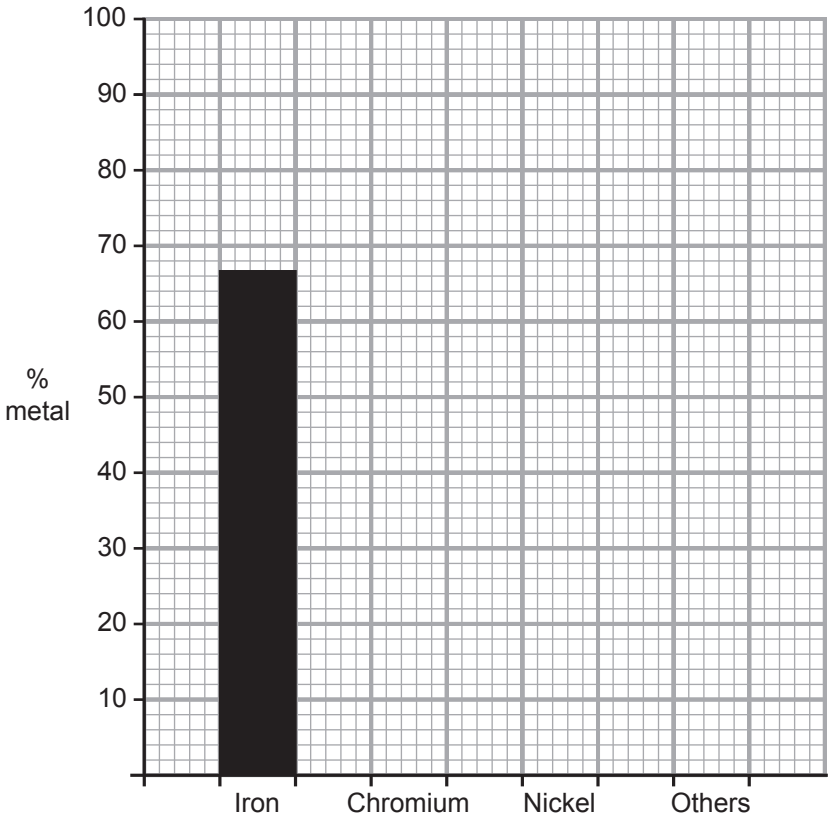


(i) Calculate the percentage of nickel in stainless steel.

Show your working out.

Answer _____ % [2]

(ii) Use the information in the pie chart to complete the bar chart below.



[2]

[Turn over

(c) Give one important use for:

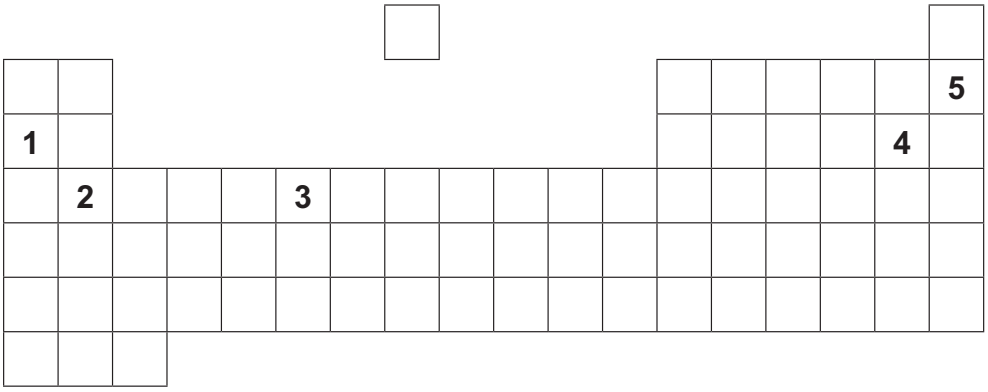
iron: _____

copper: _____ [2]

(d) Suggest one reason why aluminium alloys are used in aircraft manufacture.

_____ [1]

5 An outline of part of the Periodic Table is shown below. The numbers **1**, **2**, **3**, **4** and **5** represent the position of five elements.



(a) Which element **1**, **2**, **3**, **4** or **5** is:

(i) an alkali metal? _____ [1]

(ii) a halogen? _____ [1]

(iii) a transition metal? _____ [1]

(iv) calcium? _____ [1]

(b) **(i)** Which of the electronic structures below is that of an element in the same Group as element **4**? Circle the correct answer.

2, 8, 2 **2, 7** **2, 8, 6** **2, 8, 1**

[1]

(ii) In which Period are elements **1** and **4**?

_____ [1]

(c) Explain, **in terms of its electronic configuration**, why element **5** is very unreactive.

_____

_____ [1]

[Turn over

6 **(a)** Complete the table below which gives information about acids and alkalis.

	solution	pH range	Colour with universal indicator	Strength acid/alkali
A	sodium hydroxide	12–14		strong alkali
B	hydrochloric acid		red	strong acid
C	ammonia	8–11	blue	
D		3–6	orange	weak acid

[4]

(b) Explain why blue litmus paper could not be used to distinguish between solutions **B** and **D**.

_____

_____ [2]

7 **(a)** Describe in words the structure of an atom of carbon with an atomic number of 6 and a mass number of 14.

Your answer should include the number and position of all the different particles in this carbon atom.

You will be assessed on your written communication skills including the use of specialist science terms.

[6]

(b) Carbon also has atoms with a mass number of 12.
What name is given to atoms with the same atomic number but different mass numbers?

[1]

(c) When carbon atoms join together to form molecules they share electrons.
What name is given to this type of bonding?

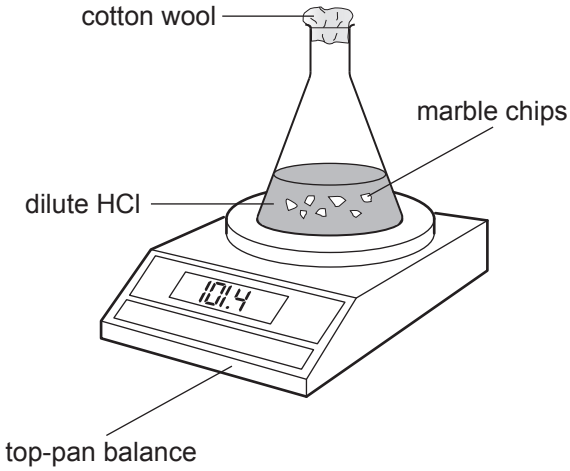
[1]

[Turn over

8 A pupil investigated the reaction between calcium carbonate (marble chips) and dilute hydrochloric acid. He used excess calcium carbonate.

The equation for this reaction is:

$$CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2$$



The student measured the mass of the flask and its contents every minute for 8 minutes. The results are shown in the table below.

Mass/g	102.8	101.4	100.3	99.5	99.3	99.2	99.1	99.0	99.0
Time/min	0	1	2	3	4	5	6	7	8

(a) What is the name of the salt produced during the reaction?

_____ [1]

(b) What caused the mass of the flask and contents to decrease?

_____ [1]

(c) Suggest why the student used **excess** calcium carbonate.

_____

_____ [1]

(d) Give an **accurate** way of checking that the resulting solution was neutral.

_____ [1]

(e) Another student in the same class used calcium oxide instead of calcium carbonate. She observed no drop in mass. Explain why this would be the case.

_____

_____ [2]

[Turn over

9 **(a)** The following table shows the solubilities of three gases in water, at different temperatures:

Gas	solubility (mg per 100 g water)* at:			
	0 °C	20 °C	40 °C	50 °C
carbon dioxide	348	169	97	76
nitrogen	2.9	1.9	1.5	1.2
oxygen	7.0	4.3	3.0	2.7

* mg = milligrams

(i) What is the solubility of carbon dioxide at 20 °C?

_____ mg/100 g water [1]

(ii) Which gas is **least** soluble at 50 °C?

_____ [1]

(iii) How does the solubility of the three gases change as the temperature increases?

_____ [1]

(iv) Use the table to help you explain why fish may die if the water in a river becomes too warm.

_____

_____

_____

_____ [2]

(b) How does the solubility of most solids in water change as the temperature increases?

_____ [1]

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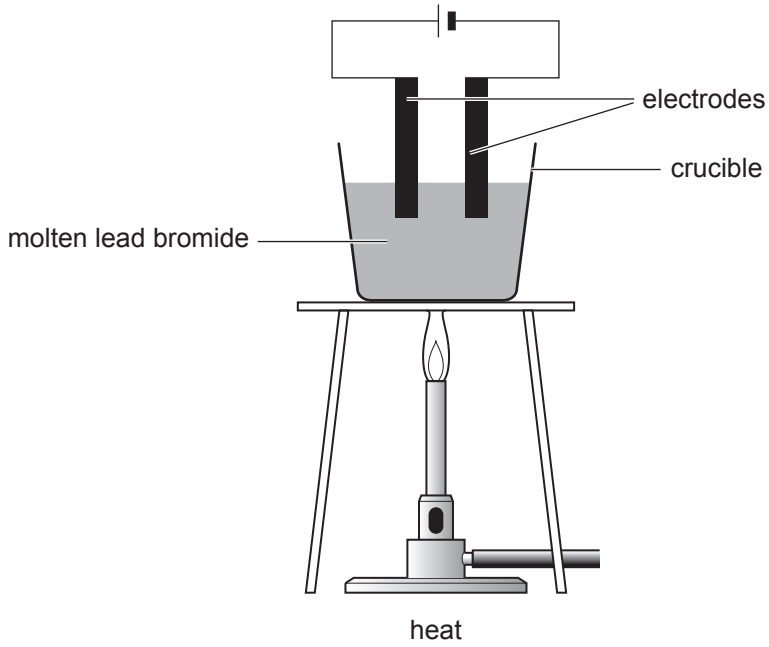
10 The diagram below shows the apparatus used to pass an electric current through molten lead bromide.



(a) What name is given to the process which happens in the crucible?

_____ [1]

(b) What is the **electrolyte** in this experiment?

_____ [1]

(c) Give **two** reasons, other than cost, why graphite is a suitable material for making the electrodes.

1. _____

2. _____ [2]

(d) Complete the table below by predicting the products and observations at the electrodes for the molten salts given.

name of substance	observations at anode	observations at cathode	product at anode	product at cathode
lead bromide		beads of metal	bromine	lead
lithium chloride	bubbles of greenish/ yellow gas	beads of metal		lithium
potassium iodide	bubbles/purple vapour			

[5]

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For Examiner's use only	
Question Number	Marks
1	
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