New Specification

Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2011–2012

Double Award Science: Chemistry

Unit C1

Foundation Tier

[GSD21]

TUESDAY 28 FEBRUARY 2012
11.00 am–12.00 noon

GSD21

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 nine** 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(b)**.
A Data Leaflet which includes a Periodic Table of the elements is provided.

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

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Examiner Only	
Marks	Remark

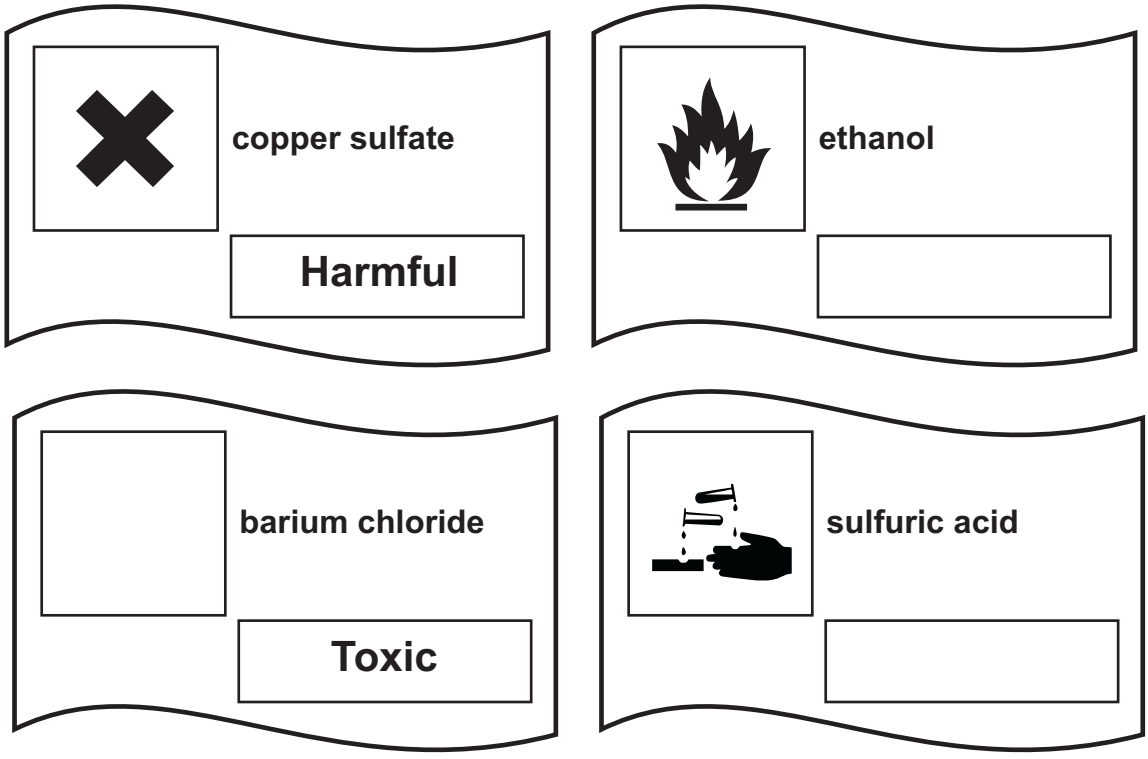
1 Hazard **symbols** are used instead of words to warn about the dangers of chemicals.

(a) Give one reason why hazard **symbols** are used instead of words.

_____

_____ [1]

Jars of chemicals in the laboratory may be labelled with the name of the chemical, the hazard and the hazard symbol. Four labels are shown below.



(b) Complete the labels by drawing the missing hazard symbol and filling in the missing words.
The first label is done for you. [3]

(c) **(i)** From the labels above name a chemical which can catch fire easily.

_____ [1]

(ii) Name a chemical which may damage any living tissue it touches.

_____ [1]

Examiner Only	
Marks	Remark

2 This question is about the three states of matter, **solid**, **liquid and gas**.

(a) Complete the table below which gives 5 properties of solids, liquids and gases.
Place a tick (✓) in the correct column(s). The first one has been done for you.

Property	Solid	Liquid	Gas
Will melt when heated	✓		
Takes the shape of the container			
Takes the volume and shape of the container			
Has a definite shape			
Can be compressed			

[5]

(b) The table below lists the melting points and boiling points of four substances, A, B, C and D.

Substance	Melting point (°C)	Boiling point (°C)
A	114	444
B	–220	–118
C	–7	59
D	3500	4827

(i) What is meant by the term melting point?

_____

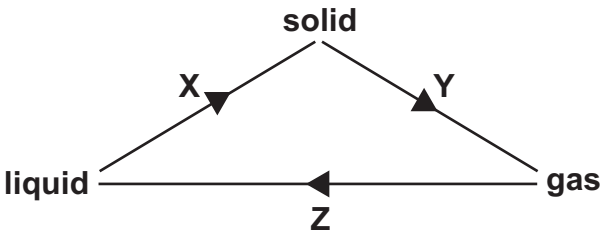
_____ [2]

(ii) At room temperature, which of the substances A, B, C or D:

are solids? _____

is a liquid? _____ [3]

The diagram below shows three **changes of state** labelled X, Y and Z.



(c) Name each change of state.

X _____

Y _____

Z _____ [3]

Examiner Only	
Marks	Remark

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Marks	Remark

3 **(a)** Food cans are made mainly from steel. Steel is an **alloy** of iron and carbon. The inside of a food can is coated with a thin layer of tin and a layer of white plastic.

(i) Name **two elements** used to make the food can.

_____ and _____ [1]

(ii) Explain why steel is an **alloy**.

_____

_____ [2]

The layer of white plastic is a special **compound** used to stop the tin reacting with acidic foods.

(b) Explain why the white plastic is described as a **compound**.

_____

_____ [2]

4 The atom is the smallest part of an element which can exist on its own.

Four terms associated with atoms are given below. Place a tick (✓) beside the correct description of the term. The first one has been done for you.

Term	Description	
atomic structure	A central nucleus surrounded by electrons in shells	✓
	A central nucleus containing moving electrons	
	A mass number and an atomic number	
proton	Has a relative mass of 1 and a charge of +1	
	Has a mass of 0 and a charge of +1	
	Has a relative mass of 1 and a charge of –1	
mass number	The total number of elements in an atom	
	Total number of protons and neutrons in an atom	
	Total number of protons, neutrons and electrons in an atom	
atomic number	The number of protons in an atom	
	The number of electrons in an atom	
	The total number of protons and neutrons in an atom	

[3]

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Marks	Remark

5 Daffodils, such as the ones in the picture below, like to grow in soil which is slightly acidic.

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Marks	Remark

Image of a pot of daffodils removed due to copyright.

(a) The following test was used to find out if a sample of soil was suitable for planting daffodils.

Step 1 Add the soil sample to water. Shake to mix.

Step 2 Filter the soil from the soil and water mixture.

Step 3 Test the filtrate with substance X.

(i) Draw a labelled diagram, in the space below, of the apparatus used to carry out Step 2.

[3]

(ii) On your diagram label the **filtrate**. [1]

Substance **X** was used to find out the pH of the soil sample.

(b) Which of the following substances could be substance **X**?
Place a tick (✓) in the correct box.

☐ Red litmus paper

☐ Universal Indicator

☐ Blue litmus paper [1]

The table below shows the pH range of 4 soil samples, A, B, C and D.

Soil sample	pH range
A	0–2
B	3–6
C	7
D	8–11

(c) Which soil sample, A, B, C or D, is the most suitable for growing daffodils in?

Soil sample _____ [1]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

6 The box below shows the chemical symbols for some different types of ions.

K^+	S^{2-}	Mg^{2+}
Al^{3+}	Cl^-	NO_3^-
SO_4^{2-}	Na	N^{3-}

(a) From the box above choose

(i) a cation with a charge of 2 _____ [1]

(ii) a molecular ion _____ [1]

(iii) a symbol which is not an ion _____ [1]

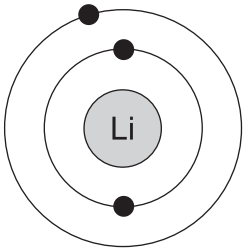
(iv) the symbol for the nitrate ion _____ [1]

Lithium reacts with oxygen to form a solid white compound.

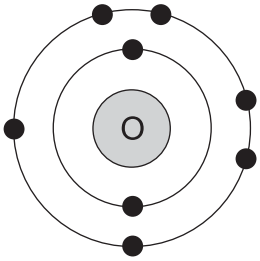
(b) Name the compound formed when lithium reacts with oxygen.

_____ [1]

The structures of the lithium atom and the oxygen atom are shown below.



lithium atom



oxygen atom

(c) Explain how lithium and oxygen react to form a compound.

_____

_____

_____

_____

_____ [3]

(d) Give **two** physical properties of the compound formed between lithium and oxygen.

1. _____

2. _____ [2]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

7 A selection of colourless solvents used in the laboratory is shown in the photograph below. One of the liquids is water.

Image of a selection of colourless solvents removed due to copyright.

(a) What is meant by the term solvent? Place a tick (✓) in the box beside the correct answer.

A substance which is dissolved ☐

A substance which is able to dissolve another substance ☐

A mixture of one substance dissolved in another ☐

[1]

In Part (b) you will be assessed on your written communication skills including the use of specialist science terms.

Examiner Only	
Marks	Remark

(b) Explain how you would identify which liquid is water. Give the full chemical name for any substance used to test the liquids.

[6]

Examiner Only	
Marks	Remark

8 Chemists have collected a vast amount of information about the atoms of elements and have displayed it on a table called the Periodic Table.

The table below gives information about the atomic number, group number and electronic configuration of the atoms of elements A, B, C and D.

Elements	Atomic Number	Electronic configuration	Group Number
A	12	2,8,2	
B	6		4
C		2,7	7
D	15		5

(a) Complete the table above. [4]

(b) How many electrons would you expect an atom of strontium to have in its outer shell?

_____ [1]

(c) Name the element in Group 6 and Period 3 of the Periodic Table.

_____ [1]

(d) The elements in Group 1 of the Periodic Table, such as lithium, sodium and potassium, are found in the laboratory stored in oil.

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(i) What name is given to the elements in Group 1 of the Periodic Table?

_____ [1]

(ii) Why are these metals stored in oil?

_____ [1]

Lithium, sodium and potassium are soft metals and can be cut easily into small pieces.

(e) Describe the surface of these metals when

(i) freshly cut

_____ [1]

(ii) 60 seconds after they are cut

_____ [1]

(f) Other than wearing safety glasses, state **two** safety precautions which you would take when using a Group 1 metal.

1. _____

2. _____ [2]

Examiner Only

Marks	Remark

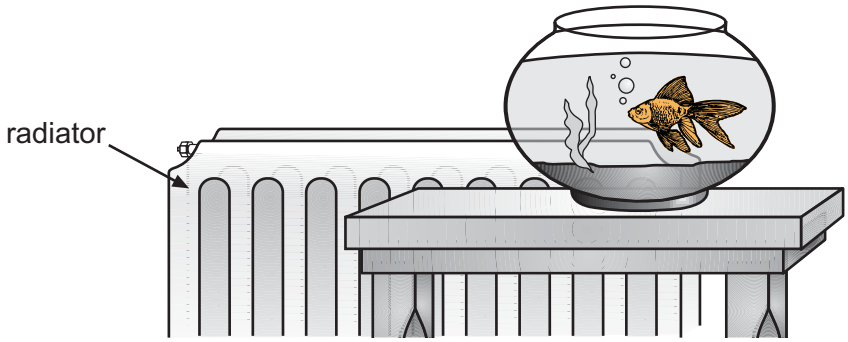
9 The table below shows the solubility of different substances in water at 15 °C and 20 °C.

Substance	Solubility (g/100g water)	
	at 15 °C	at 20 °C
salt	28.0	36.0
oxygen	0.005	0.004
carbon dioxide	0.18	0.14
sugar	176.0	204.0

(a) Which substances shown in the table decrease in solubility as the temperature increases?

_____ [1]

During spells of cold weather some goldfish owners place their goldfish near a warm radiator.



(b) Suggest, using the information in the table, why this may not be such a good idea.

_____

_____

_____ [3]

Examiner Only

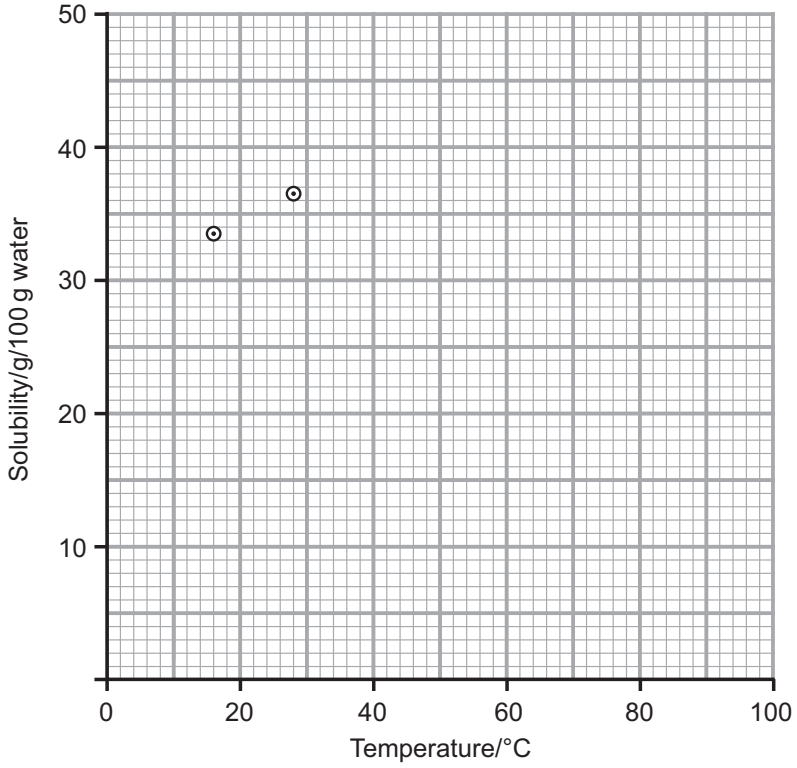
Marks	Remark

Examiner Only	
Marks	Remark

(c) Use the values in the table below to plot the solubility curve for potassium chloride.
The first two points have been done for you.

Temperature (°C)	16	28	41	58	80
Solubility (g/100 g water)	33.3	36.4	40	44.4	50.0

[2]



(d) Use your graph to answer the following questions.

(i) What is the solubility of potassium chloride at 50 °C?

_____ [1]

(ii) A solution of potassium chloride at 20 °C contains 30 g of potassium chloride dissolved in 100 g of water. State whether the solution is saturated or unsaturated.

_____ [1]

THIS IS THE END OF THE QUESTION PAPER

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