Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2010–2011

Science: Double Award (Modular)

Using Materials and Understanding Reactions
End of Module Test

Higher Tier

B **[GDB02]**

GDB02

WEDNESDAY 10 NOVEMBER 2010, AFTERNOON

TIME

45 minutes.

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 thirteen** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 50.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
A Data Leaflet, which includes a Periodic Table of the elements, is provided for your use.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
Total Marks	

1 This question is about chemical formulae.

You may find your Data Leaflet helpful.

(a) What is the chemical symbol for potassium?

_____ [1]

(b) Glucose has the formulae $C_6H_{12}O_6$.

How many atoms are present in a glucose molecule?

_____ [1]

(c) Ethanoic acid has the formula CH_3COOH.

How many **different** elements are present in an ethanoic acid molecule?

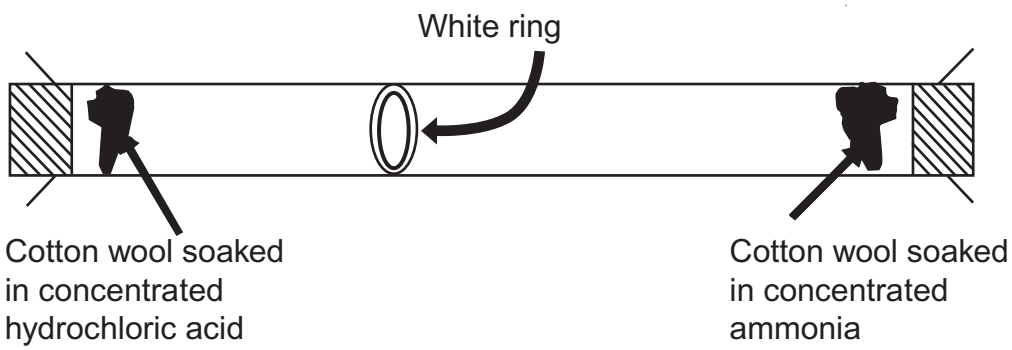
_____ [1]

(d) Name the substance whose formula is $Ca(HCO_3)_2$.

_____ [1]

Examiner Only	
Marks	Remark

2 The apparatus below is used in a warm room to investigate the movement of particles.



After about **5 minutes**, a white ring of ammonium chloride forms.

(a) What **word** is used to describe the movement of particles shown by using this apparatus?

_____ [1]

(b) If this experiment was repeated in a **colder** room what effect would this have on the formation of the white ring?

_____

_____ [1]

(c) Why is the white ring formed closer to the cotton wool soaked in concentrated hydrochloric acid?

_____

_____ [1]

(d) What is the formula of ammonium chloride? (You may find your Data Leaflet useful.)

_____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

3 The table below shows the atomic number, mass number and electronic arrangement (configuration) of four particles.

(a) Complete the table by filling in the blank spaces.
(You will need your Data Leaflet to find the missing mass numbers.)

Particle	Atomic Number	Mass Number	Electronic arrangement
A	6		2,4
B	1	2	1
C			2,3
D	1	3	

[4]

(b) (i) Which of the particles, A, B, C or D are isotopes?

_____ and _____ are isotopes [1]

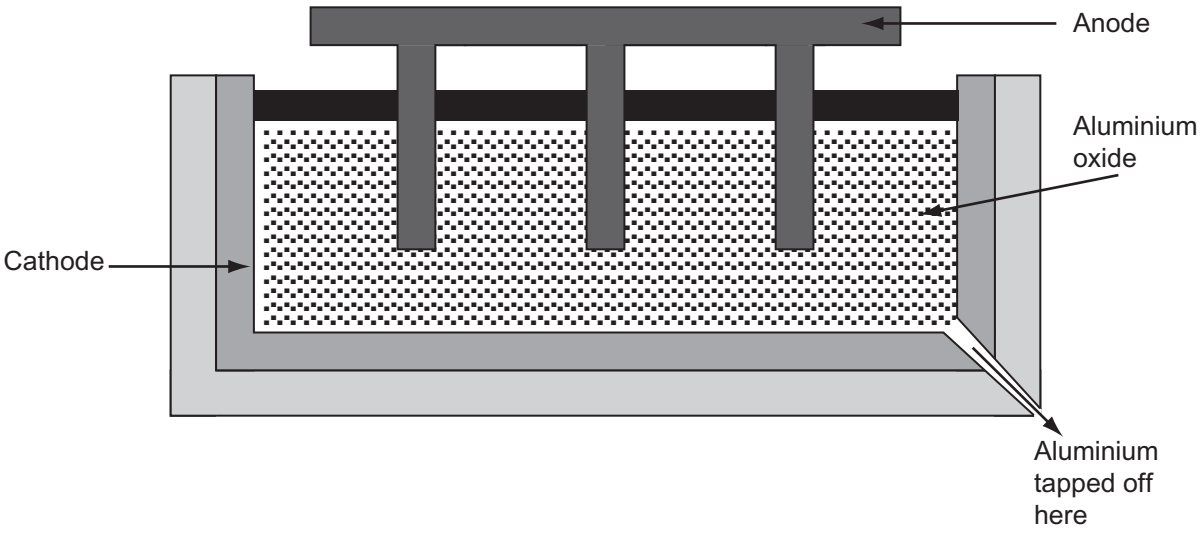
(ii) Explain your answer to **(b)(i)**.

_____

_____ [1]

Examiner Only	
Marks	Remark

4 Aluminium metal is produced by passing electricity through a cell containing molten aluminium oxide.



(a) At which electrode is aluminium formed.

_____ [1]

(b) Name the substance which is used to make the anode.

_____ [1]

(c) Give a **disadvantage** of using this method to produce aluminium.

_____ [1]

Examiner Only	
Marks	Remark

5 **(a)** Copper sulphate is a blue salt which can be prepared by the reaction of an acid with a base.

Complete the word equation below by naming the acid, the base and any other substance formed.

\+ ⟶ copper sulphate +

[3]

(b) Copper sulphate can also be prepared by the reaction of an acid with a carbonate.

What gas is formed when an acid reacts with a carbonate?

_____ [1]

6 Magnesium fluoride is an ionic compound with the formula MgF_2.

Explain carefully, in terms of electron transfer, why two fluorine atoms are needed to bond with one atom of magnesium.

_____

_____

_____

_____

_____

_____

_____ [3]

Examiner Only	
Marks	Remark

7 Oxygen gas is made up of molecules which are represented by the formula O_2.

(a) Draw a diagram to show how **all** the electrons are arranged in a molecule of oxygen gas.

[2]

Oxygen combines with other elements to form oxides.

(b) Explain fully, in terms of the electrons, what happens when oxygen combines with hydrogen to form water.

_____

_____

_____ [2]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

8 Carbon fibre reinforced plastic is a composite material which is used in making aircraft structures.

© NASA http://www.nasa.gov/images/content/117378main_gulfstream_aircraft.jpg

(a) Explain fully why carbon fibre reinforced plastic can be described as a composite material.

_____

_____

_____

_____ [2]

(b) Explain why the use of carbon fibre reinforced plastic has reduced the cost of air travel.

_____

_____

_____ [2]

(c) What is the main disadvantage of using composite materials?

_____ [1]

Examiner Only	
Marks	Remark

9 Farmers add lime to neutralise acid in the soil.

© N Herendeen

Write an **ionic** equation, including state symbols to show what happens to the ions involved in a neutralisation reaction.

_____ [3]

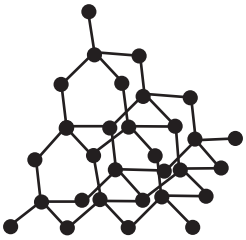
10 A gas syringe contained 100 cm^3 of air at a pressure of 20 kPa and a temperature of 300 K.

If the volume of air in the syringe was changed to 80 cm^3 and the pressure became 22 kPa calculate what the new temperature must have been.

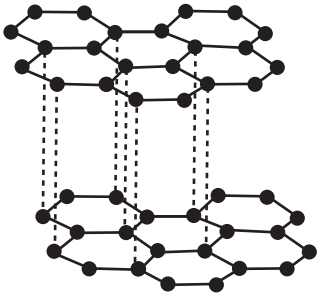
$$\frac{PV}{T} = \text{a constant}$$

Answer = _____ K [3]

11 Diamond and graphite are pure forms of the same element. Diamond is the hardest naturally occurring substance known and graphite is soft enough to leave grey marks on paper when it is used in pencils.



diamond



graphite

(a) Explain, with reference to its structure, why diamond is such a hard substance.

_____

_____

_____ [2]

(b) Explain, with reference to its structure, why graphite is used to draw sketches.

_____

_____

_____ [2]

Examiner Only

Marks	Remark

12 Water can be described as hard or soft depending on how it reacts with soap.

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Hard water can be softened by passing it through an ion exchange column.

Explain fully, with reference to the ions involved, how ion exchange works.

_____

_____

_____

_____

_____

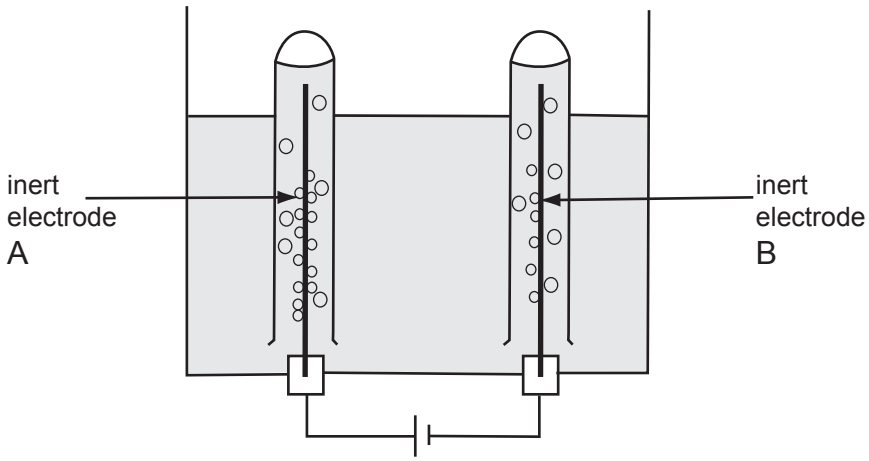
_____

_____ [3]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

13 The diagram below shows the apparatus which can be used in the laboratory for the electrolysis of concentrated sodium chloride solution.



(a) Name the gas formed at the negative electrode, B.

_____ [1]

(b) Write an **ionic** equation for the formation of the gas at electrode A.

_____ [2]

(c) What is the name of the substance which remains in solution at the end of this electrolysis?

_____ [1]

THIS IS THE END OF THE QUESTION PAPER

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