



General Certificate of Secondary Education
2010–2011

Centre Number

71

Candidate Number

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Science: Double Award (Modular)

Using Materials and Understanding Reactions
End of Module Test

Higher Tier

B

[GDB02]



THURSDAY 24 FEBRUARY 2011, MORNING

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 twelve** 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	

Total
Marks

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3 When sulphuric acid is added to copper carbonate a chemical reaction occurs.

(a) (i) Complete the symbol equation for the reaction of copper carbonate with dilute sulphuric acid.



(ii) What colour change would you observe during this reaction?

_____ to _____ [2]

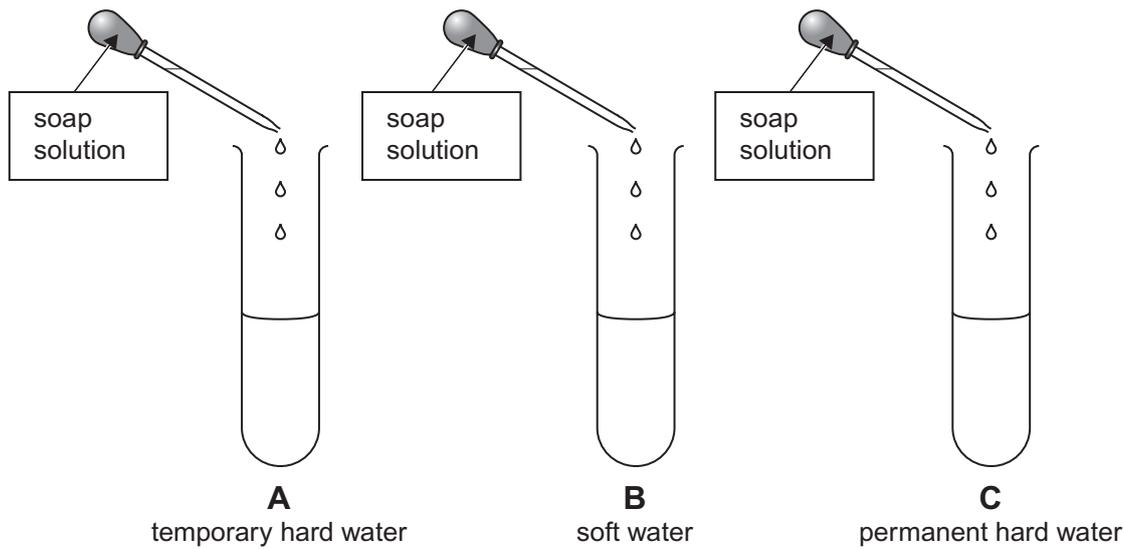
(b) If hydrochloric acid is added to copper carbonate, what gas would be produced?

_____ [1]

Examiner Only

Marks Remark

- 4 An experiment was carried out to investigate the effect of soap and detergent on three different water samples **A**, **B** and **C**.



Each test tube was shaken after the three drops of soap solution were added. The experiment was then repeated with fresh water samples, using detergent instead of soap.

- (a) Complete the results table below to show what would be observed for each water sample.

Water sample	Observation with soap	Observation with detergent
A temporary hard	no lather	
B soft		lather
C permanent hard		

[2]

- (b) Explain what is meant by the term **temporary** hard water.

_____ [1]

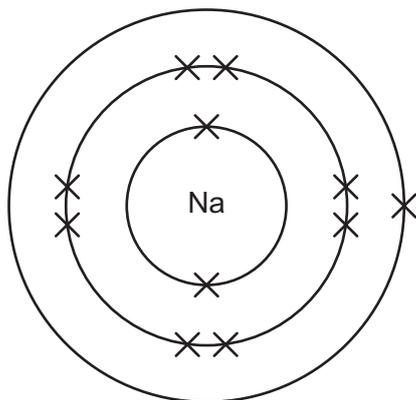
- (c) Give one advantage and one disadvantage of hard water.

Advantage _____

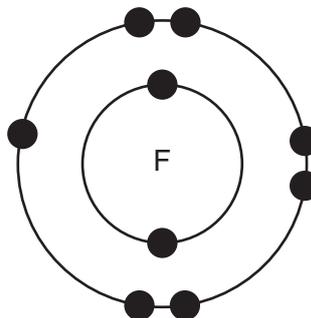
Disadvantage _____ [2]

Examiner Only	
Marks	Remark

- 5 When sodium reacts with fluorine it forms a compound called sodium fluoride. The electronic structures of a sodium atom and fluorine atom are shown below.



sodium atom



fluorine atom

- (a) Draw the electronic structures for the **ions** produced from these atoms in the space below and include their charges.

sodium ion

fluoride ion

[2]

Charge on sodium ion _____

Charge on fluoride ion _____ [1]

- (b) The force joining these ions together is described as:

electrostatic

electronic

magnetic

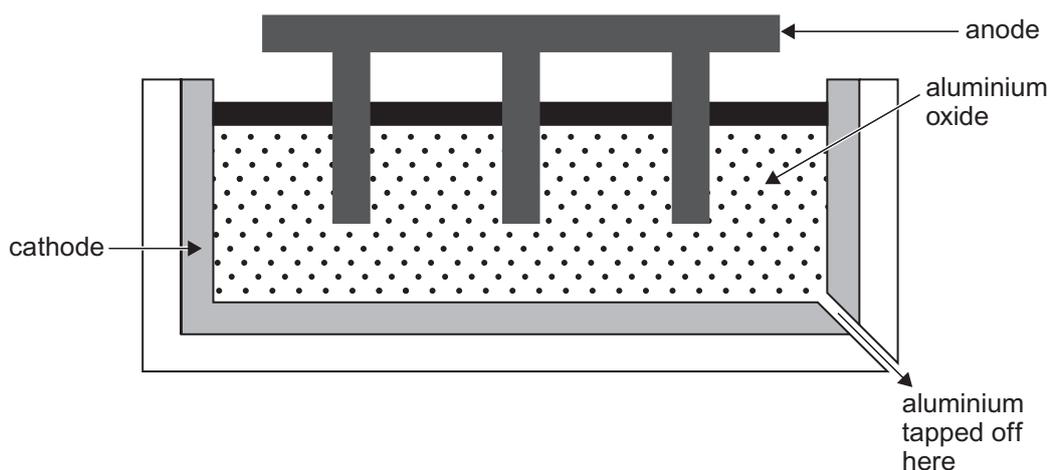
Circle the correct answer.

[1]

Examiner Only

Marks Remark

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



The aluminium is formed at the cathode.

- (a) What is the meaning of the term **cathode**?

_____ [1]

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

_____ [1]

- (c) What substance is formed at the **anode** during this reaction?

_____ [1]

Examiner Only

Marks Remark

7 Methane is the chemical name for the natural gas which is piped into many homes in Northern Ireland. It has the chemical formula CH_4 .

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

[2]

(b) Name the type of bonding in methane.

[1]

(c) Which one of the following would you expect to have the same kind of bonding as methane? Tick the correct box.

sodium chloride

sulphur dioxide

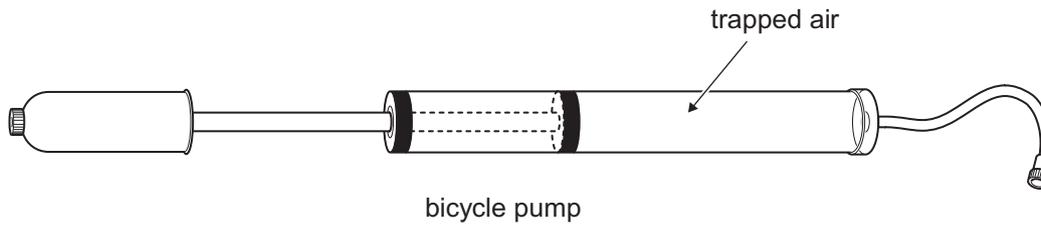
magnesium chloride

[1]

Examiner Only

Marks Remark

- 8 The diagram shows a bicycle pump containing 50 cm^3 of trapped air at a temperature of 280 K when a student pushed on the handle causing a pressure of 9240 Pa .



What would the volume of air be if the pressure was increased to 16000 Pa at a temperature of 320 K ?

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

Show your working out and **give the units**.

Answer: _____ [4]

Examiner Only	
Marks	Remark

- 9 Peter is very proud of his new motorbike. He is determined to protect it from rusting.



- (a) What is the full chemical name for rust?

_____ [2]

The manufacturers have galvanised the iron spokes.

- (b) (i) What is meant by the term **galvanised**?

 _____ [1]

- (ii) How does galvanising protect the iron spokes from rusting?

 _____ [2]

Examiner Only	
Marks	Remark

- 10 The substances below may be classified as ionic, metallic, covalent, molecular or giant covalent in terms of their properties.

Substance	Melting point °C	Boiling point °C	Electrical conductivity	
			When solid	When molten
A	3730	4830	Poor	Poor
B	1083	2600	Good	Good
C	119	445	Poor	Poor
D	975	1465	Poor	Good
E	-182	-161	Poor	Poor

- (a) Which substance, A, B, C, D or E could be made up of oppositely charged ions joined together?

_____ [1]

- (b) Which substance A, B, C, D or E has a simple molecular structure and is a solid at room temperature?

_____ [1]

- (c) Which substance A, B, C, D or E could be used as a conductor in an electrical circuit?

_____ [1]

- (d) Give the name of a substance which could be A and explain your answer.

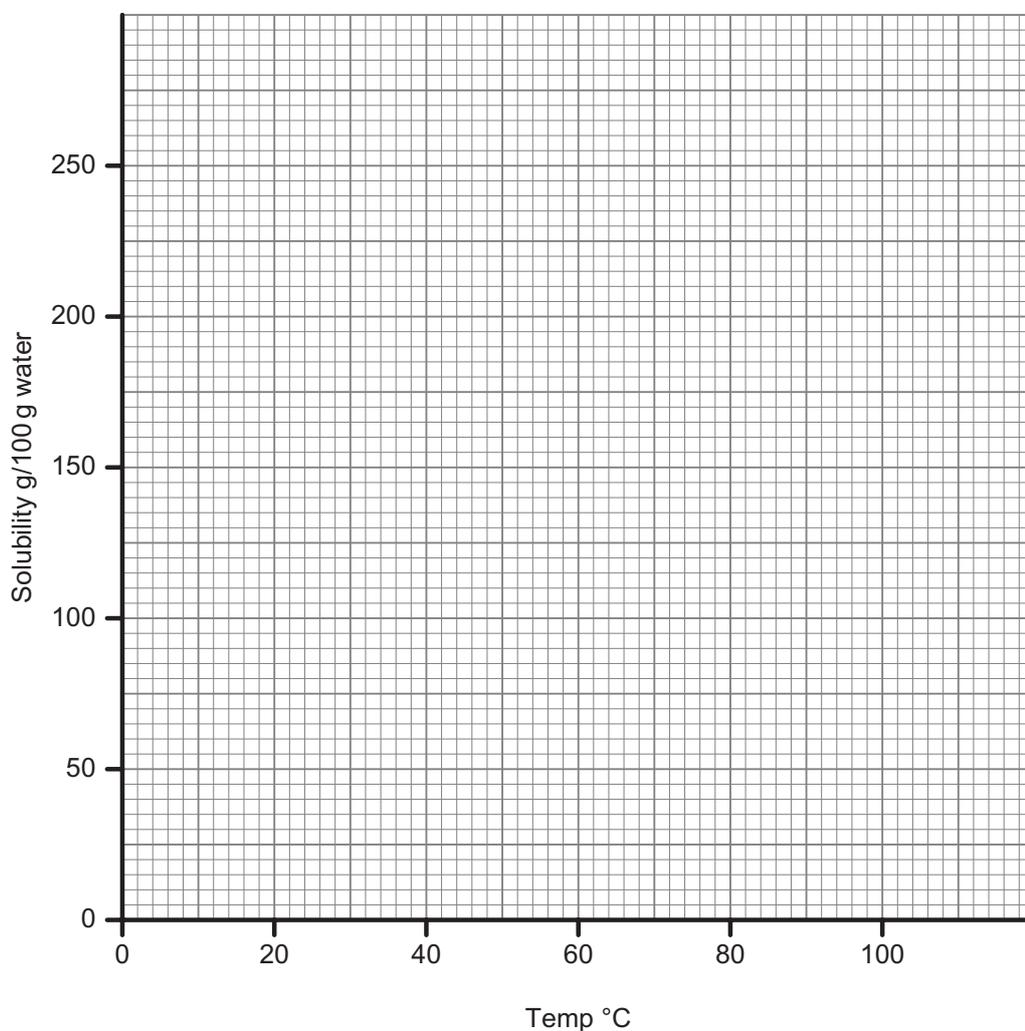
_____ [2]

Examiner Only

Marks Remark

- 11 (a) Use the data given to draw a solubility curve for potassium nitrate on the grid below.

Temperature °C	0	10	20	40	60	80	100
Solubility g/100g water	13	20	30	67	110	170	245



[3]

- (b) Use the graph to find the solubility of potassium nitrate at 90 °C.

Solubility _____ g/100g water [1]

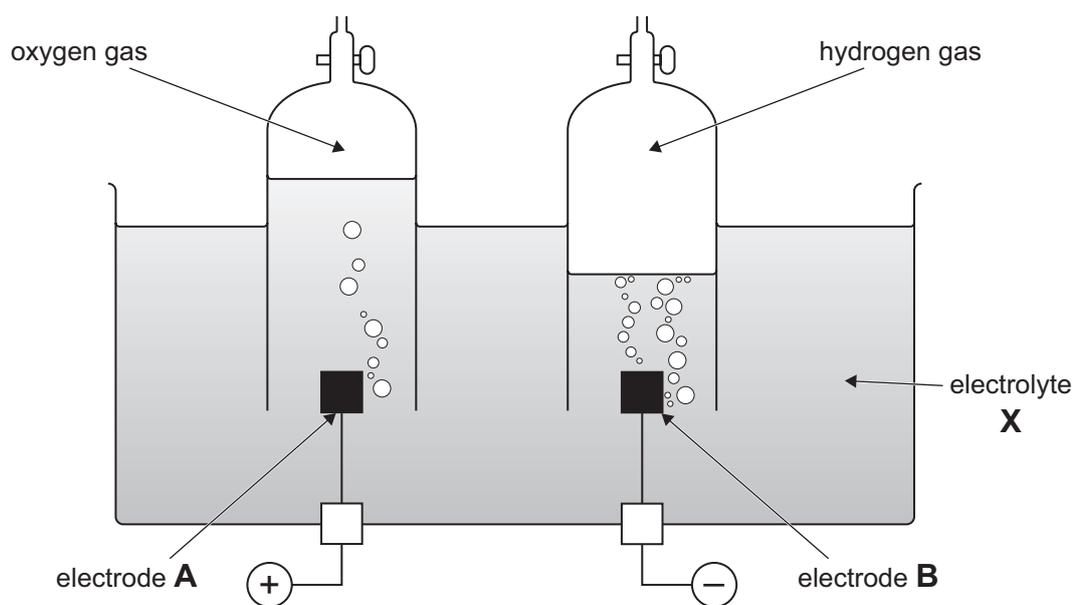
- (c) If a saturated solution is cooled in 100g water from 90 °C to 30 °C, how much potassium nitrate would be precipitated?

Answer _____ g [2]

Examiner Only

Marks Remark

- 12 This diagram shows apparatus used to collect gases formed when electricity is passed through the electrolyte X.



- (a) During this electrolysis, hydrogen gas and oxygen gas are produced. Sulphate ions (SO_4^{2-}) remain in the solution.

What is the name of electrolyte X?

_____ [1]

- (b) Write an ionic equation to show how hydrogen is produced at electrode B.

_____ [2]

THIS IS THE END OF THE QUESTION PAPER

Examiner Only	
Marks	Remark

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