

**GENERAL CERTIFICATE OF SECONDARY EDUCATION**  
**TWENTY FIRST CENTURY SCIENCE**  
**ADDITIONAL APPLIED SCIENCE A**  
Harnessing Chemicals (Higher Tier)

**A335/02**

Candidates answer on the Question Paper  
A calculator may be used for this paper

**OCR Supplied Materials:**  
None

**Other Materials Required:**

- Pencil
- Ruler (cm/mm)

**Monday 18 January 2010**  
**Morning**

**Duration: 45 minutes**



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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**INSTRUCTIONS TO CANDIDATES**

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

**INFORMATION FOR CANDIDATES**

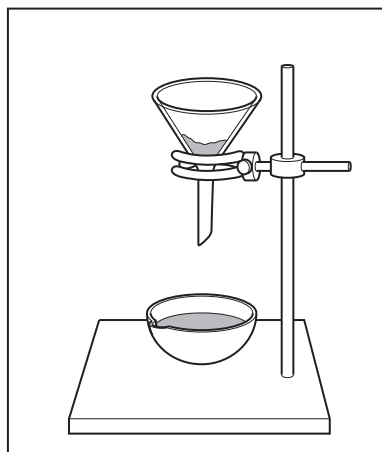
- The number of marks is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is **36**.
- This document consists of **8** pages. Any blank pages are indicated.

Answer **all** the questions.

- 1 (a) Amina follows a standard procedure to make magnesium sulfate crystals from magnesium oxide.

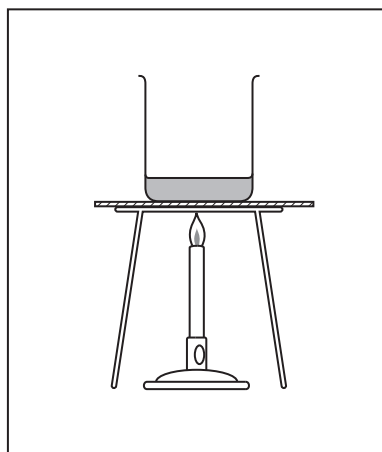
Amina uses the following steps.  
The steps are in the **wrong** order.

step A



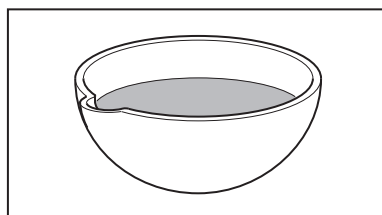
filter the mixture into an evaporating dish

step B



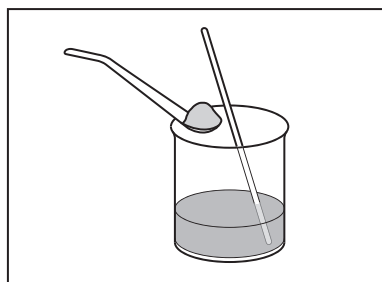
warm 100 cm<sup>3</sup> of dilute sulfuric acid

step C



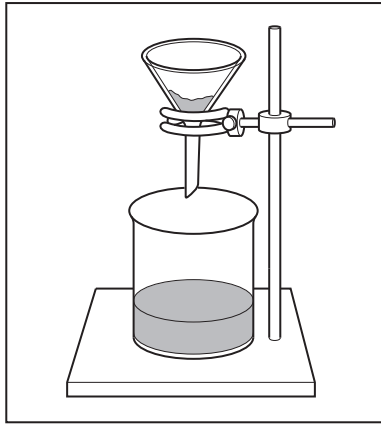
leave to cool

step D



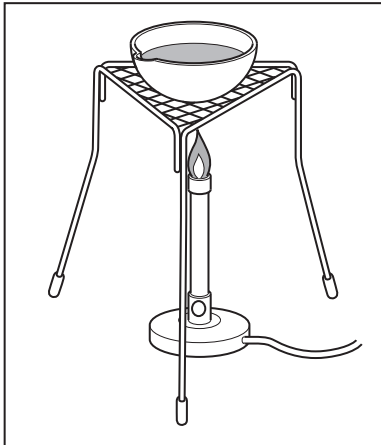
stir and add magnesium oxide a bit at a time until it is in excess

step E



remove small white crystals of magnesium sulfate by filtration

step F



gently heat, to evaporate some of the water, until crystals start to form

- (i) Write down the steps in the correct order. The first one has been done for you.

<b>B</b>					
----------	--	--	--	--	--

[4]

- (ii) Why is the sulfuric acid warmed in **step B**?

.....  
 ..... [1]

- (iii) Why is the mixture filtered in **step A**?

.....  
 ..... [1]

- (b) Amina wants to make larger crystals of magnesium sulfate.

How could the standard procedure be changed to do this?

.....  
 ..... [1]

[Total: 7]

Turn over

- 2 (a) Ammonia is manufactured on a large scale.  
What word is used to describe chemicals manufactured on a large scale?

Put a **ring** around the correct word.

**bulk**

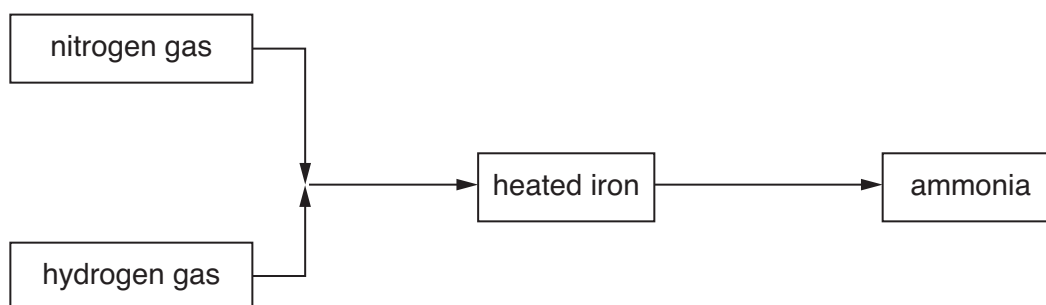
**fine**

**laboratory**

**speciality**

[1]

- (b) Ammonia is made by passing nitrogen gas and hydrogen gas over heated iron using a continuous process.



- (i) Give **one** advantage of a **continuous process** instead of a batch process.

.....  
 ..... [1]

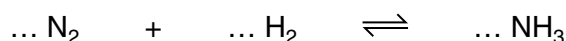
- (ii) The iron is a catalyst for the reaction.  
Explain what is meant by the term **catalyst**.

.....  
 .....  
 ..... [2]

- (iii) The reaction is exothermic.  
What is meant by the term **exothermic**?

.....  
 ..... [1]

- (c) The unbalanced symbol equation for the reaction that takes place between nitrogen and hydrogen is:



Balance the equation.

[2]

- (d) A factory made 8000 g of ammonia.  
This was a percentage yield of 40%.

Use this information to calculate the theoretical yield of ammonia.  
Use the equation below. Show your working.

$$\text{theoretical yield} = \frac{\text{actual yield}}{\text{percentage yield}} \times 100$$

theoretical yield of ammonia = ..... g [2]

[Total: 9]

3 Emma finds out information about ethanol.

(a) She finds that the chemical formula for ethanol is  $C_2H_5OH$ .

(i) Ethanol contains a functional group.  
What is meant by the term **functional group**?

.....  
 .....  
 ..... [2]

(ii) What is the formula of the functional group in ethanol?

..... [1]

(iii) What is the relative formula mass of ethanol ( $C_2H_5OH$ )?  
(relative atomic mass: H = 1, C = 12, O = 16)

Show your working.

relative formula mass = ..... [2]

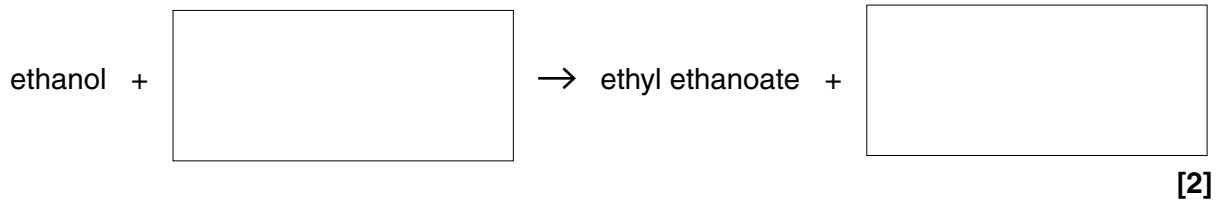
(b) Ethanol can be made by several different methods.  
Two common methods are either from crude oil or cane sugar.  
Using cane sugar is a sustainable process.

Explain why making ethanol from cane sugar is a **sustainable process**.

.....  
 .....  
 .....  
 ..... [2]

- (c) Ethanol can be used in the formation of the ester, ethyl ethanoate.

Complete the following word equation for the reaction to make ethyl ethanoate.



[Total: 9]

- 4 People use emulsions at home.

- (a) Explain the term **emulsion**.

.....  
 ..... [1]

- (b) Give **two** examples of an emulsion used in the home.

1 .....

2 ..... [2]

- (c) Why is an **emulsifying agent** added to an emulsion?

.....  
 ..... [1]

- (d) Suspensions are also used at home.

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

.....  
 ..... [1]

- (ii) Suspensions that are used in the home have to undergo tests before they can be sold to the public.

Suggest **one** reason why these suspensions have to be tested.

.....  
 ..... [1]

[Total: 6]

5 Chris investigates the reaction between sodium hydroxide and hydrochloric acid.

(a) This reaction is a **neutralisation reaction**.

How can Chris be sure that the solution is neutral after he has added the acid?

test .....

result .....

..... [2]

(b) Chris needs to find out how much hydrochloric acid to add to a given amount of sodium hydroxide to make the solution neutral.

Name the piece of apparatus that Chris could use to measure out the acid **accurately**.

..... [1]

(c) Chris was given sodium hydroxide solution of concentration 4 g/litre.  
Find out how many grams of sodium hydroxide there would be in 50 cm<sup>3</sup> of this solution.

Show your working.

answer ..... grams [2]

[Total: 5]

**END OF QUESTION PAPER**



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