

Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION**

A335/02

**TWENTY FIRST CENTURY SCIENCE
ADDITIONAL APPLIED SCIENCE A**

Harnessing Chemicals (Higher Tier)

MONDAY 18 JANUARY 2010: Morning

DURATION: 45 minutes

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

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)

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

- **Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes on the first page.**
- **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.**
- **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.**

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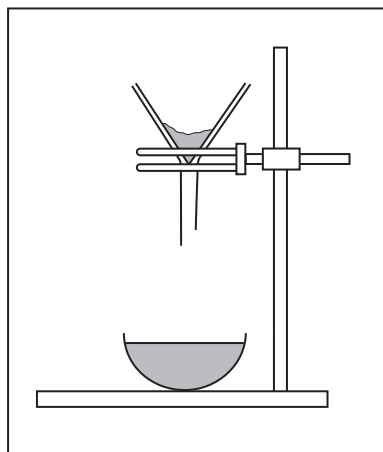
Answer ALL the questions.

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

Amina uses the following steps.

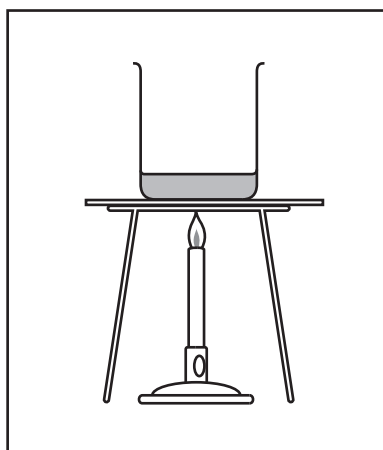
The steps are in the WRONG order.

STEP A



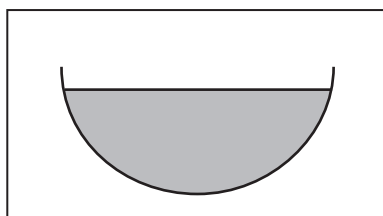
filter the mixture into an evaporating dish

STEP B



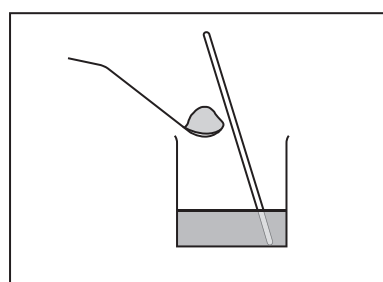
warm 100 cm³ of dilute sulfuric acid

STEP C



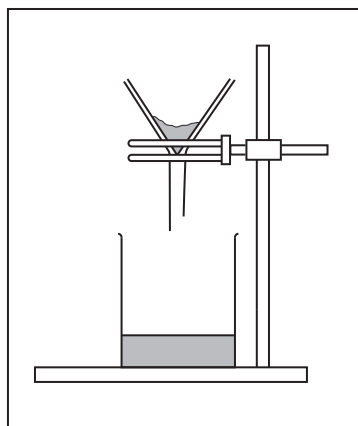
leave to cool

STEP D



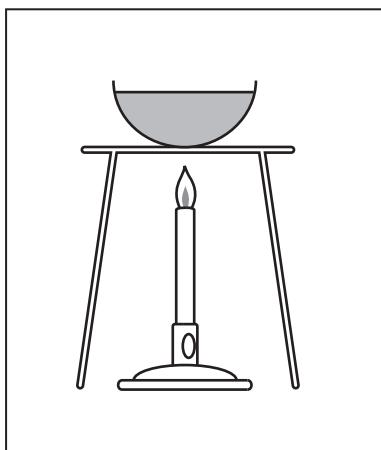
stir and add magnesium oxide a bit at a time until it is in excess

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					
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[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]

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

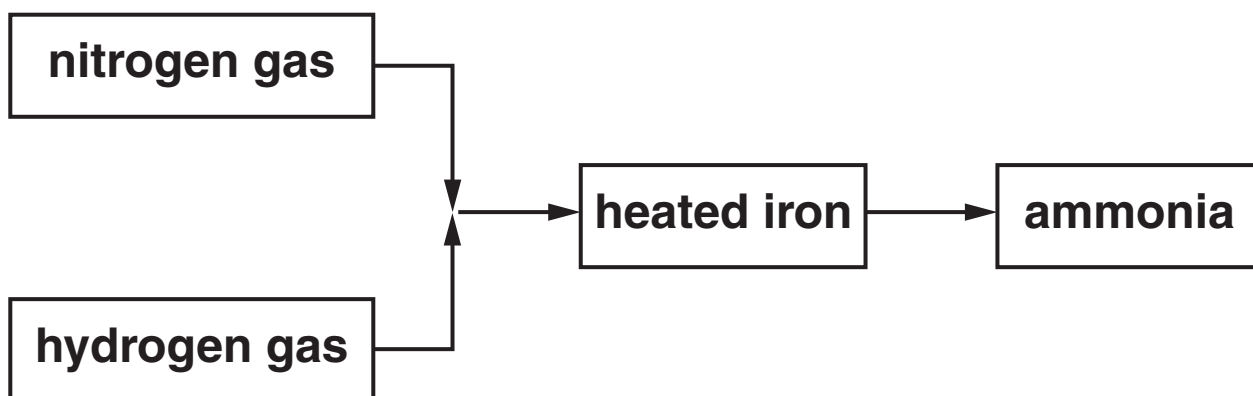
FINE

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]

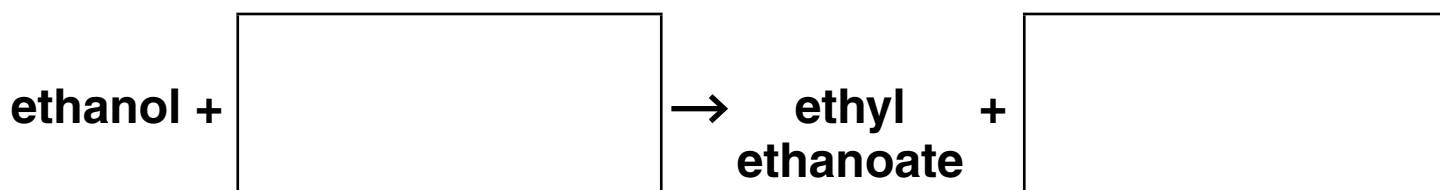
- (b) Ethanol can be made by several different methods. Two common methods are either from crude oil or cane sugar. Using cane sugar is a sustainable process.

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.



[2]

[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 cm³ of this solution.

Show your working.

answer _____ grams [2]

[Total: 5]

END OF QUESTION PAPER



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