

**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 17 January 2011**  
**Morning**

**Duration: 45 minutes**



Candidate forename		Candidate surname	
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Centre number						Candidate number				
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**MODIFIED LANGUAGE**

**INSTRUCTIONS TO CANDIDATES**

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Answer **all** the questions.
- Do **not** write in the bar codes.

**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 **12** pages. Any blank pages are indicated.

Answer **all** the questions.

- 1 Peter prepares an aqueous solution of sodium chloride using the following steps.

The steps are in the wrong order.

step **A** Stopper the graduated flask and mix well.

step **B** Transfer the sodium chloride solution into a 100 cm<sup>3</sup> graduated flask.

step **C** Dissolve the sodium chloride in a small amount of water.

step **D** Accurately weigh 2.5 g of solid sodium chloride and transfer to a beaker.

step **E** Rinse the beaker with water and add to the graduated flask.

step **F** Add water carefully until the solution in the flask is up to the 100 cm<sup>3</sup> mark.

- (a) Write down the steps in the correct order.

The first and last ones have been done for you.

**D** ..... **A**

[3]

- (b) It is important that the sodium chloride solution is transferred to the graduated flask without any spillage.

Describe **two** ways step **B** can be carried out to avoid any spillage of the solution.

.....

.....

..... [2]

- (c) Name the **solute** used in this procedure.

..... [1]

- (d) Name the **solvent** used in this procedure.

..... [1]

**3**

**(e)** 100 ml of the solution contains 2.5 g of sodium chloride.

Calculate the concentration of the solution in grams per litre (g/l).

Show your working.

$$\text{concentration (g/l)} = \frac{\text{mass (g)}}{\text{volume (l)}}$$

concentration = ..... g/l [2]

**[Total: 9]**

2 Sam wants to investigate the rates of chemical reactions.

(a) What is meant by the term **rate** of a chemical reaction?

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

(b) (i) Sam investigates the reaction between hydrochloric acid and magnesium.

Name the gas produced in this reaction.

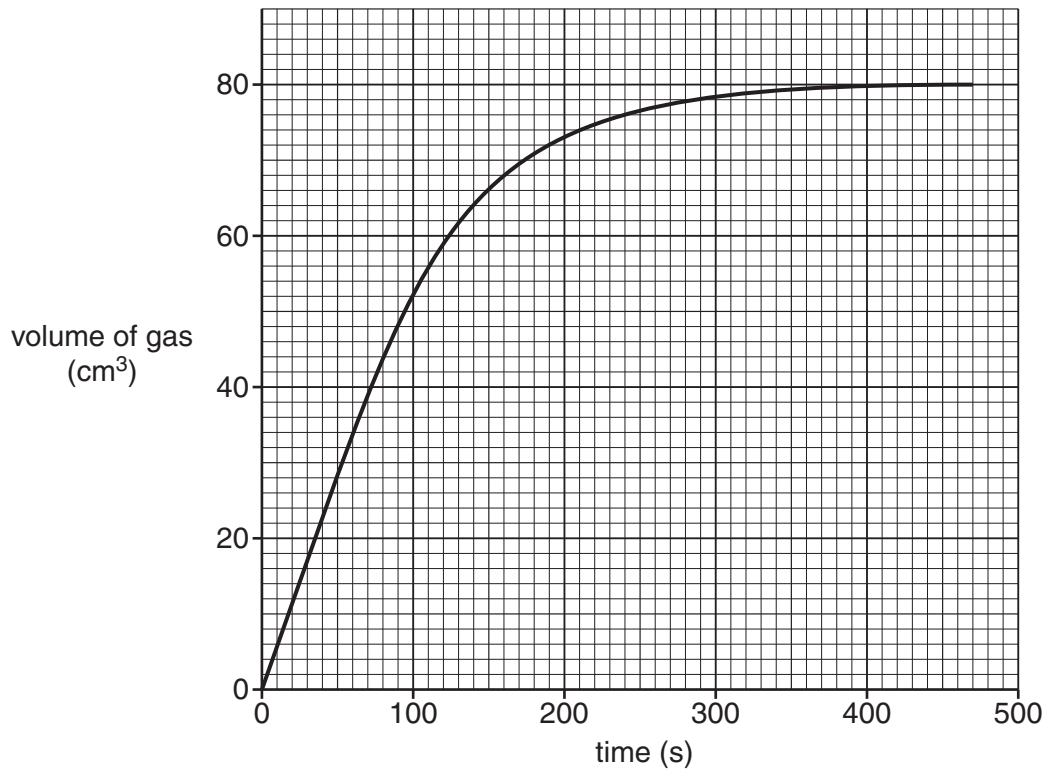
answer ..... [1]

(ii) This reaction can be observed by measuring the amount of gas produced.

Draw a diagram to show how the apparatus would be set up to make and collect the gas.

[2]

- (c) The graph shows the volume of gas formed against time for the reaction between hydrochloric acid and magnesium.



The experiment was repeated at a **higher temperature** whilst keeping all other conditions the same.

On the graph draw the curve that you would expect for this reaction.

Label this line **A**.

[2]

- (d) Some chemical reactions, such as the manufacture of ethanoic acid from methanol and carbon monoxide, are only possible in the presence of a catalyst.

Explain what is meant by the term **catalyst**.

.....

.....

..... [2]

[Total: 9]

3 Imran carries out a reaction between nitric acid and sodium hydroxide to make sodium nitrate and water.

(a) Write the **symbol** equation for the reaction.

[2]

(b) This reaction is a neutralisation reaction.

Imran adds acid a little at a time to the alkali.

How can he check the reaction to see when all the alkali has been used up?

test .....

result .....

..... [2]

(c) Imran carries out another reaction to make sodium sulphate,  $\text{Na}_2\text{SO}_4$ .

Calculate the **relative formula mass** of sodium sulphate.

Show your working.

(relative atomic masses: Na = 23; O = 16; S = 32)

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

(d) Sodium sulphate is a soluble salt that is obtained by crystallisation.

(i) What is meant by the term **soluble**?

.....

..... [1]

(ii) Describe the process of **crystallisation**.

.....

.....

..... [2]

[Total: 9]

4 Some chemicals are organic compounds.

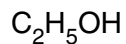
(a) What is meant by the term **organic compound**?

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

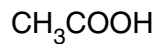
(b) Here are the formulae of four different organic compounds.



**A**



**B**



**C**



**D**

Which of the formulae **A**, **B**, **C** or **D** represents the formula of

(i) a hydrocarbon?

answer ..... [1]

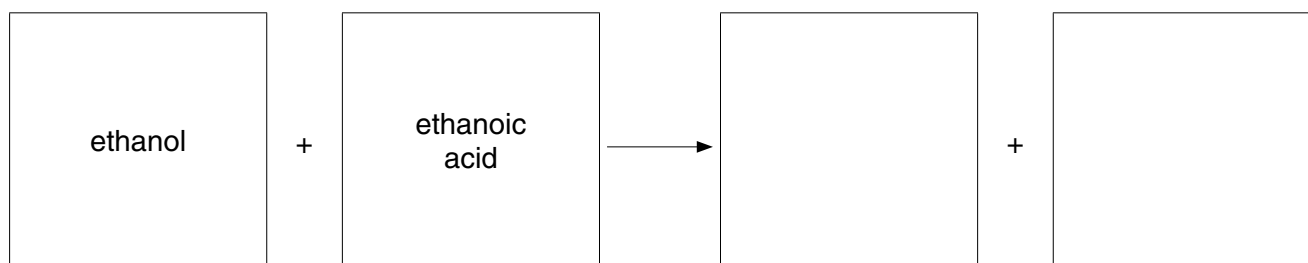
(ii) a carboxylic acid?

answer ..... [1]

(c) Esters are organic compounds.

An ester is formed when ethanol is reacted with ethanoic acid.

Write the word equation for this reaction.



[2]

(d) Use words from the list to complete the following sentences.

**condensing    distilling    evaporating    filtering    refluxing**

The ester is made by ..... the ethanol and ethanoic acid together.

The product is a liquid that is obtained by ..... the reaction mixture. [2]



(e) This is a **batch** process.

Give **one** example of an advantage of batch processes and a different example of a disadvantage.

advantage .....

.....

disadvantage .....

..... [2]

[Total: 9]

**END OF QUESTION PAPER**

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