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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 17 JANUARY 2011: 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, centre number and candidate number in the boxes on the first page. 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.**

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 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 cm³ 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 cm³ 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]

(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 _____

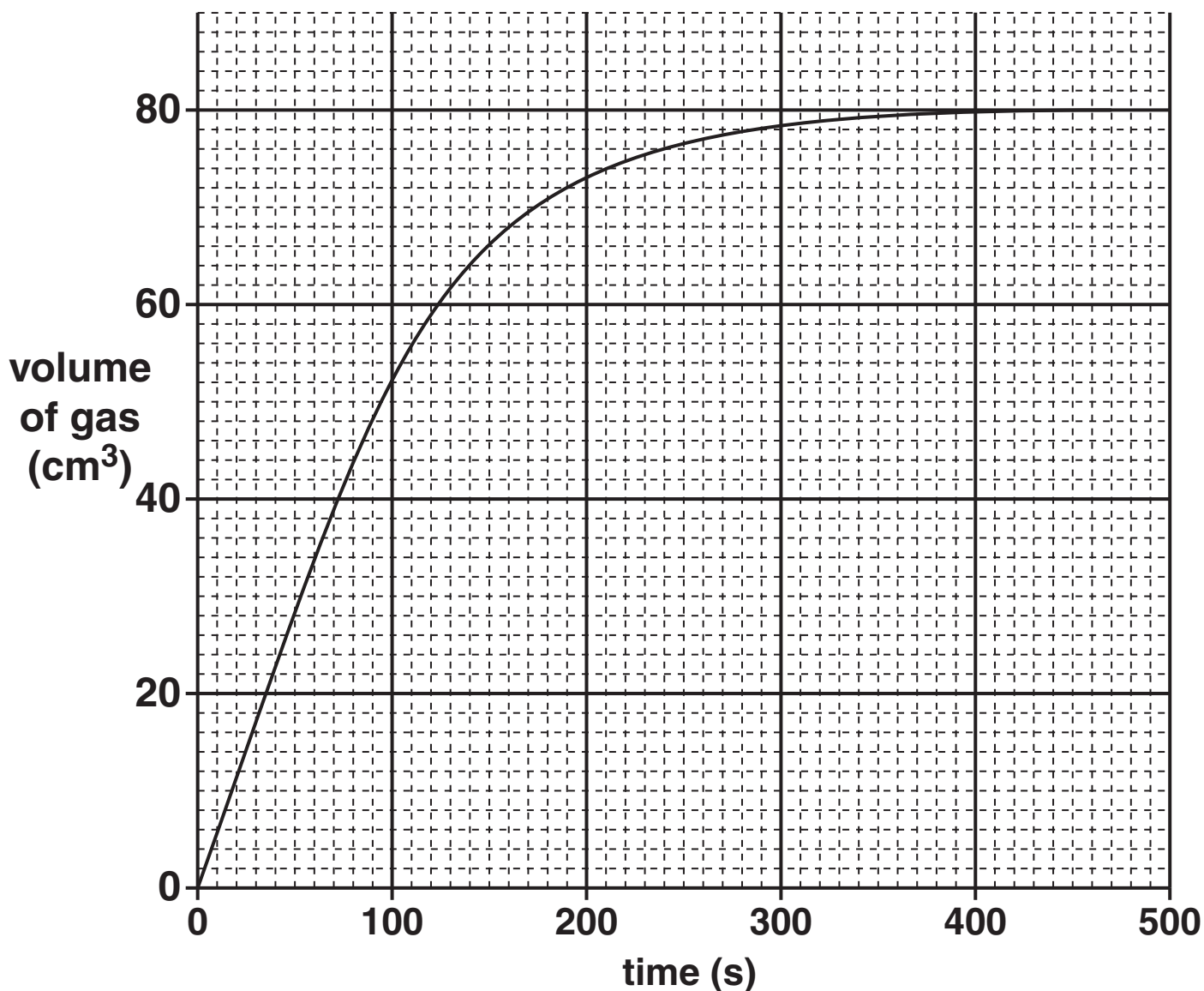
[1]

(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 in order 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, Na_2SO_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]

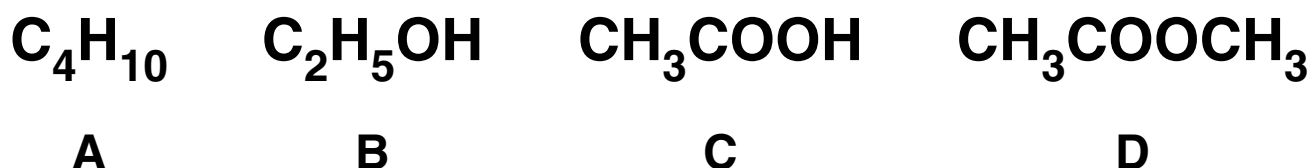
[Total: 9]

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.



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

(i) a hydrocarbon?

answer _____ [1]

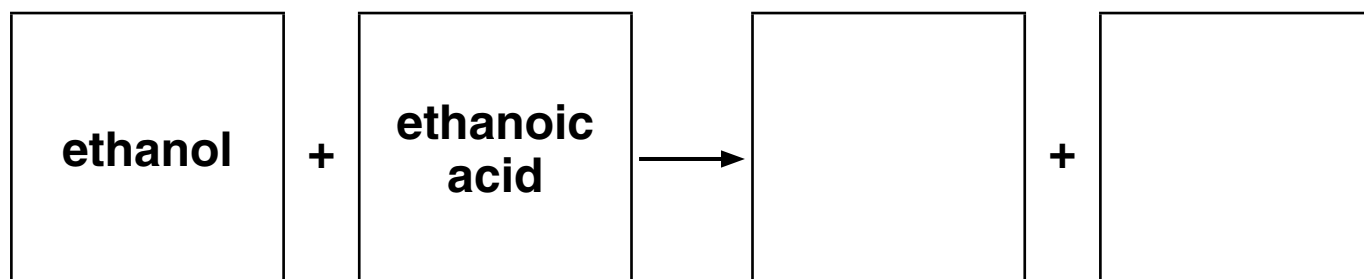
(ii) a carboxylic acid?

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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