

GENERAL CERTIFICATE OF SECONDARY EDUCATION

TWENTY FIRST CENTURY SCIENCE

A335/01

ADDITIONAL APPLIED SCIENCE A

Unit 4: Harnessing Chemicals (Foundation Tier)

Tuesday 7 June 2011

Afternoon

Duration: 45 minutes

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)



Candidate forename		Candidate surname	
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Centre number						Candidate number				
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INSTRUCTIONS TO CANDIDATES

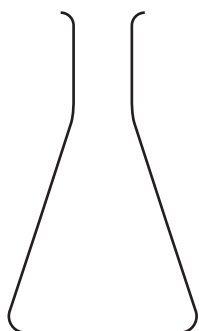
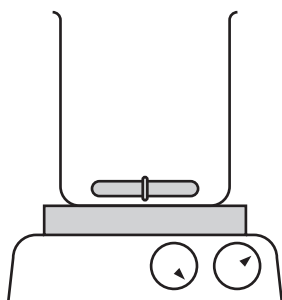
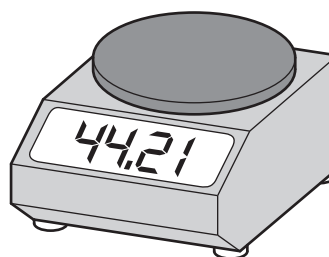
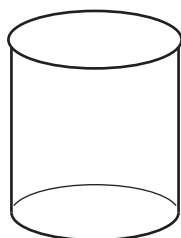
- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer 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 Fred follows a procedure to make magnesium sulfate crystals. He reacts dilute sulfuric acid with magnesium ribbon. Here is some apparatus which he could use.

**A****B****C****D****E**

(a) Choose from **A, B, C, D** or **E** to answer these questions.

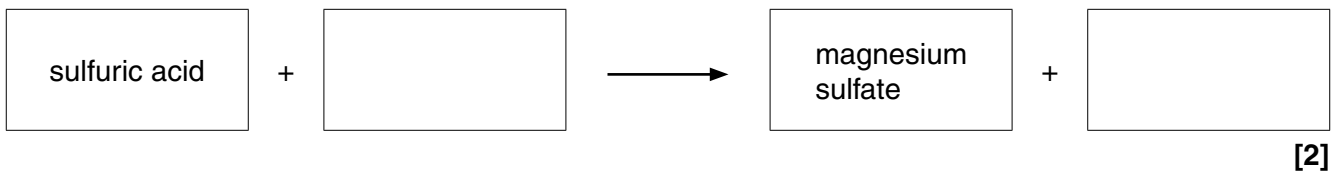
(i) Which piece of apparatus is **best** for measuring out the volume of acid?

answer [1]

(ii) Which piece of apparatus is used to find the mass of the magnesium ribbon?

answer [1]

(b) Complete the word equation for the formation of magnesium sulfate.



(c) One of the steps in the procedure tells Fred to heat the solution gently. This is to evaporate some of the water until crystals start to form.

Fred wants to make larger magnesium sulfate crystals.

Put a tick (✓) in the box next to the **best** method of achieving this.

add more reactants

boil to dryness

do not heat the solution

[1]

(d) The crystals have to be separated from the solution.

Put a (ring) round the term that **best** describes this process.

evaporation

filtration

neutralisation

precipitation

[1]

- (e) (i) Fred weighs the dried crystals.
The mass of dry magnesium sulfate crystals is 3.0g.
The **theoretical yield** of dry magnesium sulfate crystals is 5.0g.

Calculate Fred's percentage yield.
Use this equation.

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

Show your working.

percentage yield = % [2]

- (ii) If Fred's crystals were not dry when he weighed them, what affect would this have on the value that he calculated for his percentage yield?

..... [1]

[Total: 9]

2 The chemical industry manufactures some chemicals on a large scale.

Ethanol is one example.

(a) (i) Name **one** other chemical that is used in a school laboratory which is made on a large scale.

..... [1]

(ii) Which word is used to describe chemicals that are made on a large scale?

Put a **ring** round the correct answer.

bulk **fine** **rare** **speciality**

[1]

(b) Ethanol can be made by several different methods.

Information on two of these methods is given below.

	method 1	method 2
raw material	crude oil	sugar cane
reaction	ethene reacts with steam in the presence of a catalyst	yeast is used to ferment sugar

(i) Method 2 is a **sustainable process** and method 1 is not.

Explain why.

.....

 [2]

- (ii) Method 1 uses a catalyst.
What happens when a catalyst is added to a reaction?

Put a tick (✓) in the box next to the **best** answer.

makes more catalyst

uses less reactant

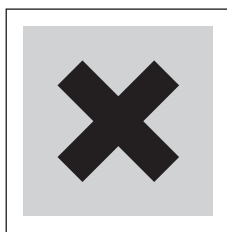
makes the reaction go faster

makes a cleaner product

[1]

[Total: 5]

- 3 (a) This symbol is on the label of a bottle of toilet cleaner used to remove limescale.



Put a tick (✓) in the box next to the **best** description of the meaning of this symbol.

corrosive

irritant

oxidising

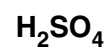
toxic

[1]

- (b) The limescale remover contains hydrochloric acid.

Put a (ring) round the correct formula of hydrochloric acid.

Choose from this list.



[1]

- (c) Limescale contains calcium carbonate.

Name the gas that is produced when hydrochloric acid reacts with calcium carbonate.

..... [1]

- (d) The toilet cleaner contains 5 g of detergent per 100 ml.

Calculate the concentration of detergent in grams per litre (g/l).
Show your working.

concentration g/l [2]

- (e) The toilet cleaner contains perfume.
Many perfumes are esters.

- (i) What type of chemicals are esters?

Put a ring round the correct answer.

batch bulk fine small

[1]

- (ii) Use words from the list to complete the following sentence.

an alkali an alcohol a carboxylic acid a hydrocarbon a salt a solvent

An ester is made by reacting

with

[2]

[Total: 8]

4 This question is about emulsions.

(a) What is an emulsion?

Use the following words in your answer

- different liquids
- dispersed.

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

(b) Give an example of an emulsion used in food or cosmetics.

..... [1]

(c) Before an emulsion can be sold, quality control tests must be carried out.
Why are these tests carried out?

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

(d) The tests that are carried out usually follow national standard procedures.

Explain why.

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

[Total: 6]

5 It is important that the people employed in the chemical industry work as safely as possible.

(a) Name the UK organisation that is responsible for the regulation of risks to health and safety in the chemical industry.

..... [1]

(b) This list shows some of the chemicals used in industry.

<u>name</u>	<u>formula</u>
ammonia	NH_3
butane	C_4H_{10}
potassium chloride	KCl
potassium hydroxide	KOH
potassium sulfate	K_2SO_4
propanoic acid	$\text{C}_2\text{H}_5\text{COOH}$
sulfuric acid	H_2SO_4
water	H_2O

Choose **only** from this list to answer the following questions.

Each chemical may be used once, more than once or not at all.

(i) Write down the name of a hydrocarbon.

..... [1]

(ii) Write down the names of **two** chemicals each of which give a pH greater than 7 when dissolved in water.

.....
 [2]

(iii) Write down the names of the two chemicals that are made when sulfuric acid and potassium hydroxide react.

.....
 [2]

(iv)



Write down the name of the chemical that should have this hazchem symbol on its label.

..... [1]

(v) Name the chemical that contains only the elements nitrogen and hydrogen.

..... [1]

[Total: 8]

END OF QUESTION PAPER

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