

**GENERAL CERTIFICATE OF SECONDARY EDUCATION
TWENTY FIRST CENTURY SCIENCE
ADDITIONAL APPLIED SCIENCE A**

A335/02

Unit 4: Harnessing Chemicals (Higher 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 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]

(c) Toilet cleaners contain an acid to remove limescale. They also contain a small quantity of detergent. 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]

[Total: 10]

2 Nitrogen and hydrogen are used in a continuous process to make ammonia.

(a) Give **one** advantage and **one** disadvantage of making ammonia by a continuous process.

advantage

.....

disadvantage

..... [2]

(b) A catalyst is used in the process.

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

.....

.....

..... [2]

(c) This reaction is exothermic.

What is meant by the term **exothermic**?

.....

..... [1]

(d) Suggest one **other** way of changing the rate at which ammonia can be produced by this process.

..... [1]

[Total: 6]

3 Many of the products that are used in our homes are complex mixtures of chemicals.

They are made by mixing ingredients in fixed amounts.
The product is called a formulation.

(a) One type of formulation is called a solid mixture.

This consists of two or more dry ingredients mixed together.

Give **one** example of a solid mixture.

..... [1]

(b) Another type of formulation is called an emulsion.

Why is an emulsifying agent added to an emulsion?

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

(c) One type of formulation consists of a solid dispersed in a liquid.

Write the name of this type of formulation.

..... [1]

[Total: 4]

4 The pharmaceutical industry manufactures drugs on a small scale.

(a) When manufacturing drugs it is important to develop a sustainable process.

What factors need to be considered when judging how **sustainable** a manufacturing process is?

.....

.....

..... [2]

(b) Developing new drugs is a long and expensive process.

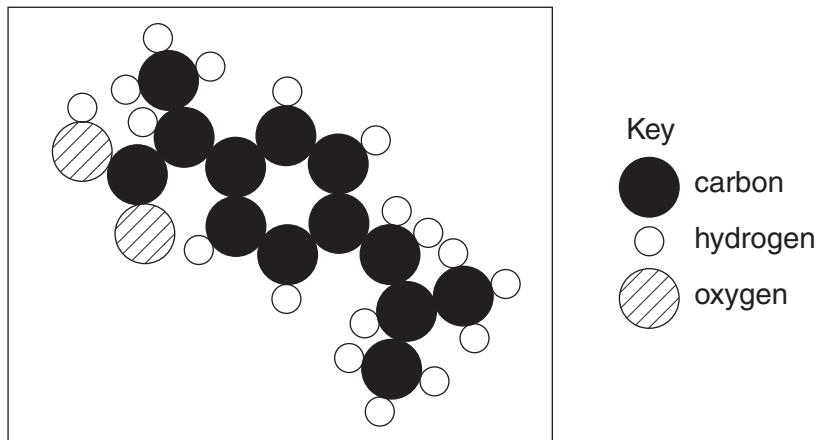
Suggest why.

.....

..... [1]

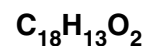
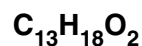
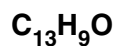
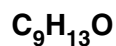
(c) Ibuprofen is a pain-relieving drug.

The picture below shows a molecule of ibuprofen.



(i) Select from the list the chemical formula of ibuprofen.

Put a ring round the correct answer.



[1]

(ii) Ibuprofen contains the functional group, COOH.

What is meant by the term **functional group**?

.....

..... [2]

(d) Paracetamol is another pain-relieving drug.

The formula of paracetamol is $C_8H_9NO_2$.

What is the relative formula mass of paracetamol?

Show your working.

(relative atomic masses: H = 1, C = 12, O = 16, N = 14)

relative formula mass of paracetamol = [2]

[Total: 8]

5 (a) Different salts have different solubilities in water.

types of salt	which ones are soluble	which ones are insoluble
carbonates	sodium carbonate potassium carbonate	all other carbonates
nitrates	all of them	none of them
sulfates	nearly all of them	barium sulfate lead sulfate

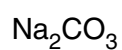
Which **two** of the following salts can be made by precipitation?

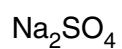
Put ticks (✓) in the boxes next to the **two** correct answers.











[2]

(b) When salts are made by precipitation it is important that the filtered precipitate is washed.

Explain why.

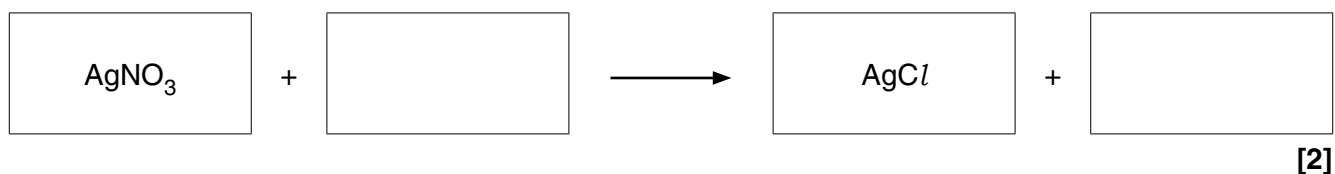
.....

.....

..... [2]

- (c) Silver chloride is formed as a precipitate when silver nitrate solution is reacted with hydrochloric acid.

Finish the symbol equation for this reaction.



- (d) Sam makes some silver chloride at school.
Sam is told that the theoretical yield is 7.5 g.
His actual yield is 6.0 g.

Calculate his **percentage yield** of silver chloride.
Show your working.

percentage yield = % [2]

[Total: 8]

END OF QUESTION PAPER

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