OCR
RECOGNISING ACHIEVEMENT

F

A335/01

GENERAL CERTIFICATE OF SECONDARY EDUCATION

TWENTY FIRST CENTURY SCIENCE

ADDITIONAL APPLIED SCIENCE A

Harnessing Chemicals (Foundation Tier)

WEDNESDAY 18 JUNE 2008

Afternoon

Time: 45 minutes

Candidates answer on the question paper.
Additional materials (enclosed):
None

Calculators may be used.
Additional materials: Pencil
Ruler (cm/mm)

CUP/T45997

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or 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.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is **36**.

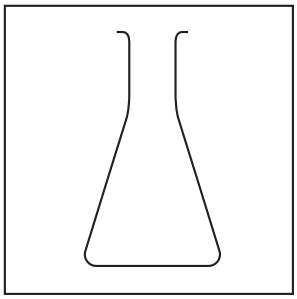
FOR EXAMINER'S USE		
Qu.	**Max.**	**Mark**
1	**3**	
2	**5**	
3	**8**	
4	**10**	
5	**10**	
TOTAL	**36**	

This document consists of **12** printed pages.

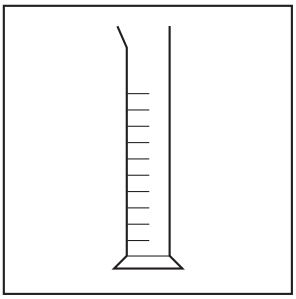
[Turn over

Answer **all** the questions.

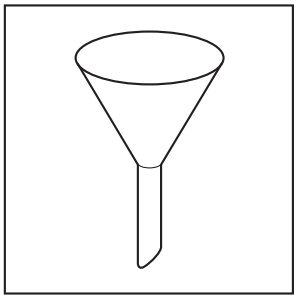
1 Chemists use the apparatus shown below to carry out practical work in the laboratory.



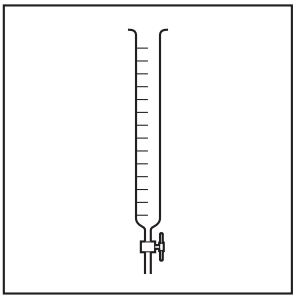
A



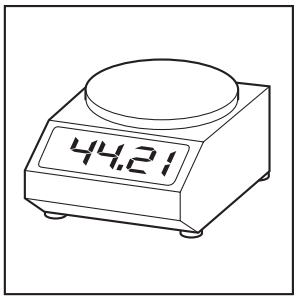
B



C



D



E

Choose from **A**, **B**, **C**, **D** and **E** to answer these questions.

(a) Which diagram shows a balance?

..... [1]

(b) Which piece of apparatus is used to measure out an amount of liquid **accurately**?

..... [1]

(c) Which piece of apparatus is used for filtration?

..... [1]

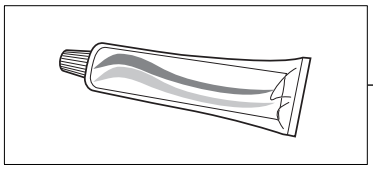
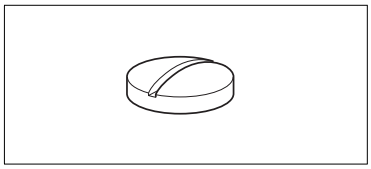
[Total: 3]

2 Most bathroom products are made from a mixture of ingredients.

These are combined according to a fixed formula, called a formulation.

(a) Draw a straight line from each **product** to its correct **type of formulation** and draw a straight line from each **type of formulation** to its correct **description**.

One example has been done for you.

product	type of formulation	description
	emulsion	an oily liquid finely dispersed in a watery liquid
	suspension	a soluble solid dissolved in a liquid
	solution	an insoluble solid dispersed in a liquid
	solid mixture	two or more dry ingredients mixed together

[3]

(b) Give one other example of an emulsion and a suspension.

emulsion .....

suspension ..... [2]

[Total: 5]

3 Esters are chemicals with sweet, often fruity, smells.

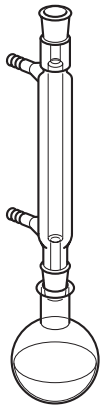
They are used to make the ink in scented pens.

Brogan works as a technician for a manufacturer of scented inks.

He follows a standard procedure to make the esters.

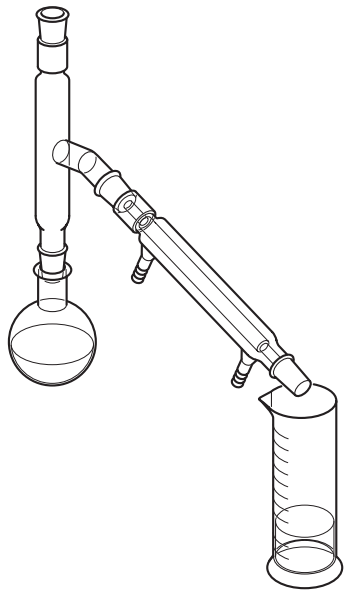
The diagrams show the steps in the procedure.

Step 1



- add 10 cm^3 of alcohol to 10 cm^3 of carboxylic acid in a distillation flask
- add 2 cm^3 of concentrated sulfuric acid to the flask
- swirl the flask to mix
- add the condenser and heat gently for 10 minutes

Step 2



- rearrange the equipment for distillation
- heat the mixture up to 82 °C and collect the distillate

(a) Sulfuric acid helps speed up the reaction and is not used up in the process.

What is this **type** of chemical called?

Put a (ring) around the correct answer.

bulk **catalyst** **fine** **soluble**

[1]

(b) The distillate is poured into a beaker of sodium carbonate solution to react with any unreacted acids. A salt, water and carbon dioxide is made in the process.

(i) Complete the general word equation for this **type** of reaction.

	+	acid	→		+		+	

[2]

(ii) How will Brogan know when the reaction has stopped?

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

a solid is made ☐

the fizzing stops ☐

the solution changes colour ☐

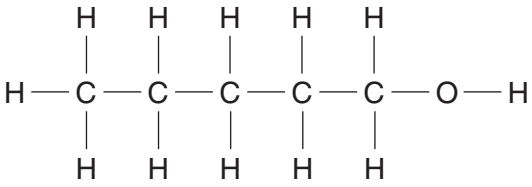
the reaction goes cold ☐

[1]

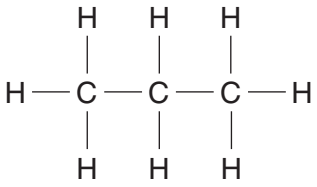
(c) The ester found in an apple-scented pen is pentyl pentanoate.

Pentyl pentanoate is made from the **alcohol** pentanol, $C_5H_{11}OH$.

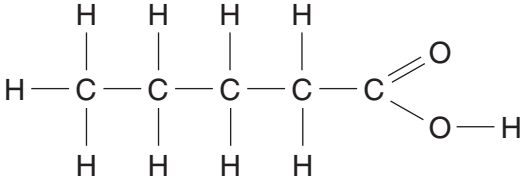
The diagrams show different molecules.



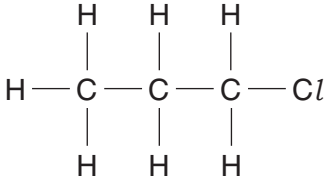
A



B



C



D

Which diagram shows a molecule of the alcohol, pentanol?

Choose **A**, **B**, **C** or **D** to answer the question.

..... [1]

(d) Pentyl pentanoate is made in **small** amounts.

What term is used to describe this type of chemical?

..... [1]

(e) The scented ink pens have to be tested before they can be sold.

Give **two** reasons why.

.....

.....

.....

..... [2]

[Total: 8]

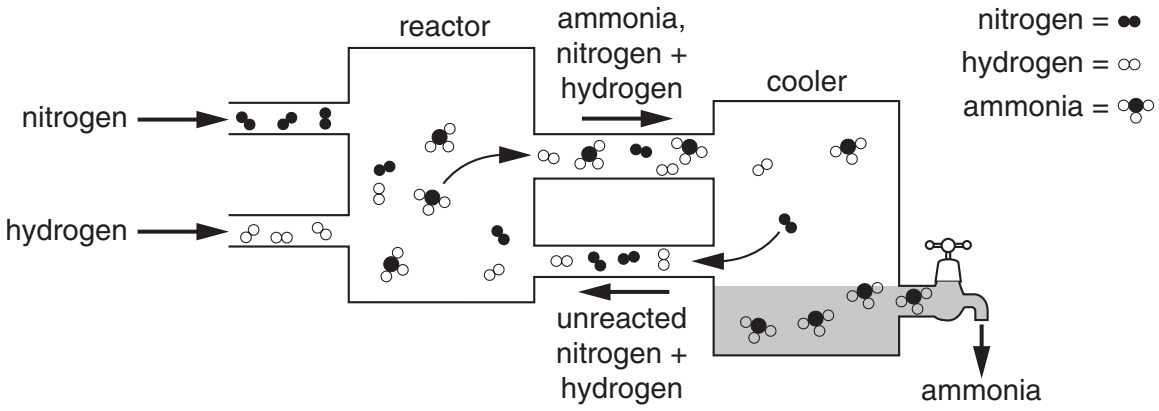
4 Ammonia is a bulk chemical.

(a) Ammonia has the formula NH_3.

Which **two** elements does ammonia contain?

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

(b) Ammonia is made using a continuous process.



(i) Not all the nitrogen and hydrogen reacts to make ammonia in the reactor.

What happens to the nitrogen and hydrogen which hasn't reacted?

.....

..... [1]

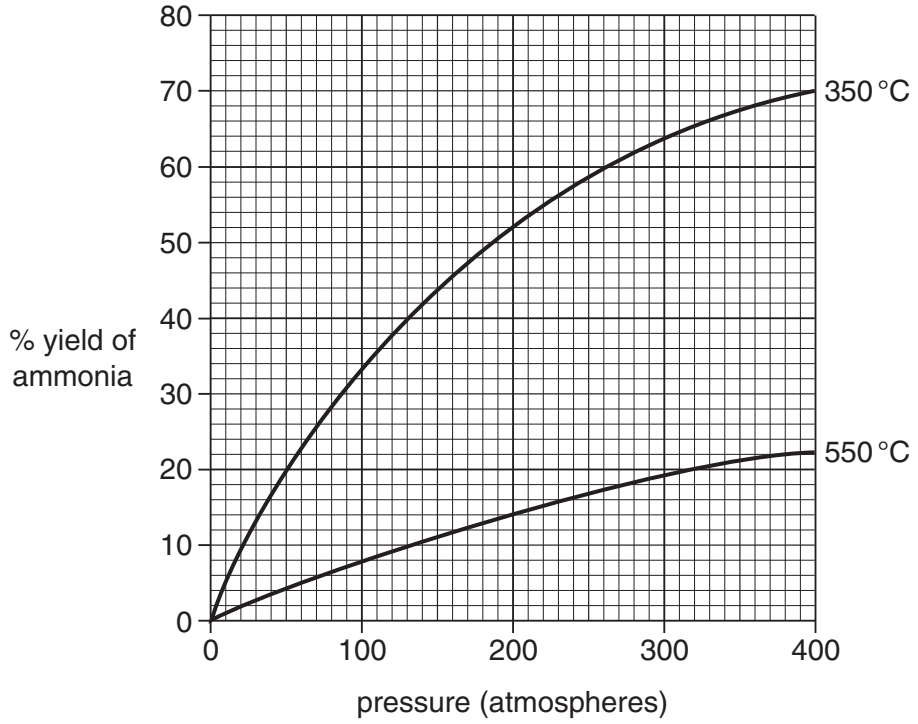
(ii) Explain what is meant by a **continuous** process.

.....

.....

..... [2]

(c) The graph below shows the amount of ammonia produced under different conditions.



Look at the graph. Which **two** conditions produce more ammonia?

Put a tick (✓) in the box next to each of the **two** correct answers.

a lower temperature ☐

a higher temperature ☐

a low pressure ☐

a high pressure ☐

a small particle size ☐

a large particle size ☐

[2]

(d) Ammonia gas is **toxic**.

(i) Put a tick (✓) in the box next to the correct hazard symbol for a toxic substance.



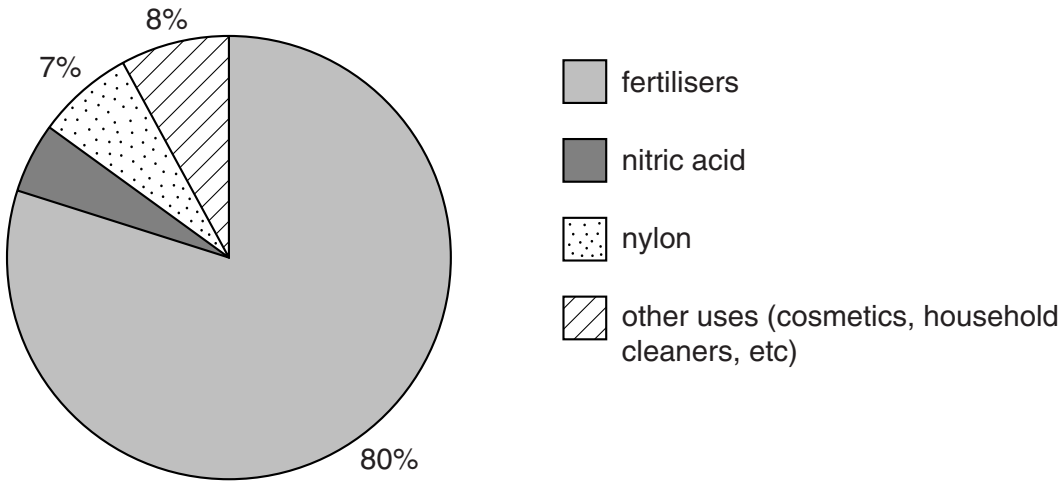

[1]

(ii) It is important to protect the health and safety of people who work in the chemical industry. Which organisation in the UK does this?

..... [1]

(e) Ammonia can be used to make many different products.

Look at the chart.



What proportion of ammonia in the chemical industry is used to make **nitric acid**?

..... % [1]

[Total: 10]

5 An aqueous solution of potassium chloride is prepared using the following steps.

The steps are in the wrong order.

A Dissolve the potassium chloride in the smallest amount of water possible.

B Rinse the beaker with water and add to the graduated flask.

C Stopper the graduated flask and mix well.

D Transfer the potassium chloride solution into a 100 cm^3 graduated flask.

E Accurately weigh 1.5 g of the solid potassium chloride and transfer into a beaker.

F Add water drop by drop until the solution is up to the 100 cm^3 mark.

(a) Write down the correct order of the statements.

The first one has been done for you.

E ....

[4]

(b) It is important that the chemicals are transferred from one container to another with minimum loss.

Describe **two** ways of transferring the potassium chloride solution to the graduated flask **without spillage**.

.....

.....

..... [2]

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

..... [1]

(d) What is meant by the term **aqueous**?

..... [1]

(e) 100 cm^3 of the solution contains 1.5 g of potassium chloride.

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

You are advised to show how you work your answer out.

$$\text{concentration (g/l)} = \frac{\text{mass (g)}}{\text{volume (l)}} \qquad 100\,cm^3 = 100\,ml$$

concentration = ... g/l [2]

[Total: 10]

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE