

**General Certificate of Secondary Education**  
**APPLIED SCIENCE: DOUBLE AWARD**

Science for the needs of society

FOUNDATION TIER

**FRIDAY 19 JANUARY 2007**

Candidates answer on the question paper.

Calculators may be used.

Additional materials: Pencil  
 Ruler (cm/mm)

**F** **1497**  
**4882/01**

Afternoon

Time: 1 hour 30 minutes



Candidate  
 Name

Centre  
 Number

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Candidate  
 Number

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**INSTRUCTIONS TO CANDIDATES**

- Write your name, Centre number and Candidate number in the boxes above.
- Answer **all** the questions.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Do **not** write in the bar code.
- Do **not** write outside the box bordering each page.
- **WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED.**  
**ANSWERS WRITTEN ELSEWHERE WILL NOT BE MARKED.**

**INFORMATION FOR CANDIDATES**

- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- The marks allocated and the spaces provided for your answers are a good indication of the length of answers required.

**FOR EXAMINER'S USE**

Qu.	Max.	Mark
1	12	
2	12	
3	11	
4	11	
5	13	
6	11	
<b>TOTAL</b>	<b>70</b>	

This document consists of **18** printed pages and **2** blank pages.

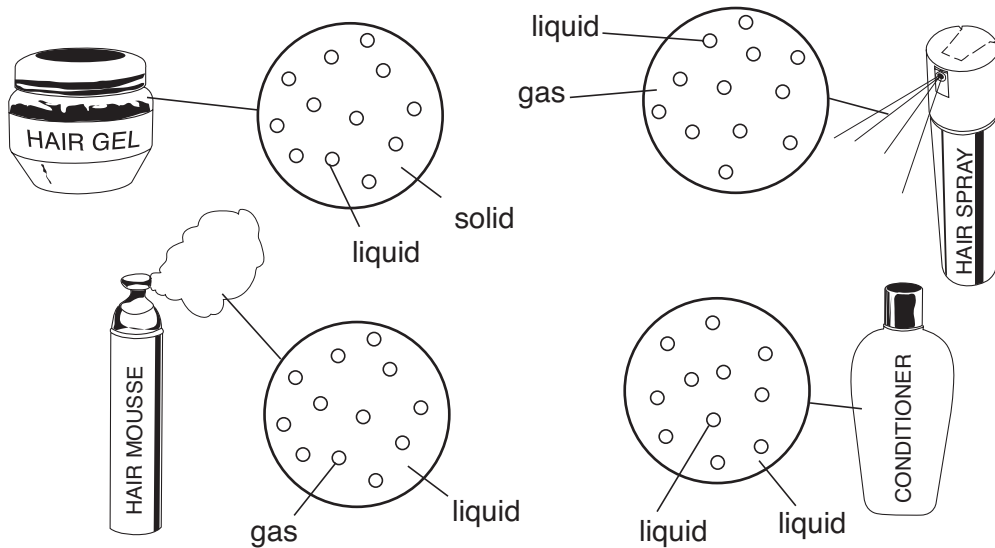
Answer **all** the questions.

1 Julia is training to be a hairdresser.

Julia visits a factory that makes hair products.

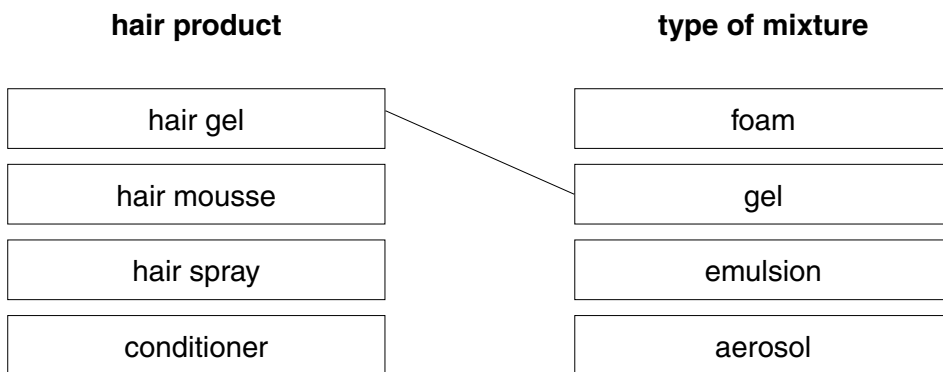
These are some of the hair products that the factory makes.

The type of mixture of each product is shown in the circles.



(a) Draw lines to connect each **hair product** to the correct **type of mixture**.

One has been done for you.



[2]

(b) Complete the table to show what each hair product contains.

Use the diagram to help you.

hair product	continuous phase	dispersed phase
gel	solid	liquid
hair mousse	liquid	
hair spray		
conditioner		

[3]

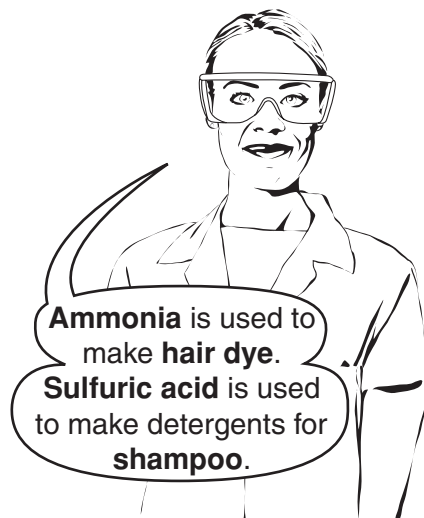
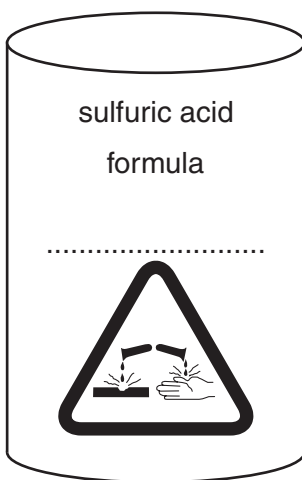
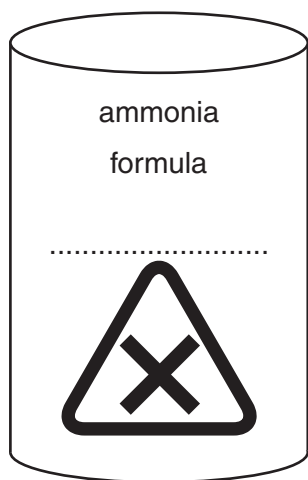
(c) The factory also make a special hair treatment.

The treatment contains oils and water.

Explain why it is important to shake the bottle before using the treatment.

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

(d) The person taking Julia around the factory shows her some of the raw materials that the factory uses.



(i) Suggest what safety precautions the workers at the factory should take when handling these chemicals.

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

(ii) Fill in the **formula** missing from each container.

Choose from this list.

- $\text{CH}_4$        $\text{NH}_3$        $\text{H}_2\text{S}$        $\text{H}_2\text{SO}_4$  [2]

(iii) Complete the table to show which are **bulk chemicals** and which are **fine chemicals**.

Use the examples below.

ammonia      hair dye      shampoo      sulfuric acid

bulk chemicals	fine chemicals
.....	.....
.....	.....

[2]

[Total: 12]

5  
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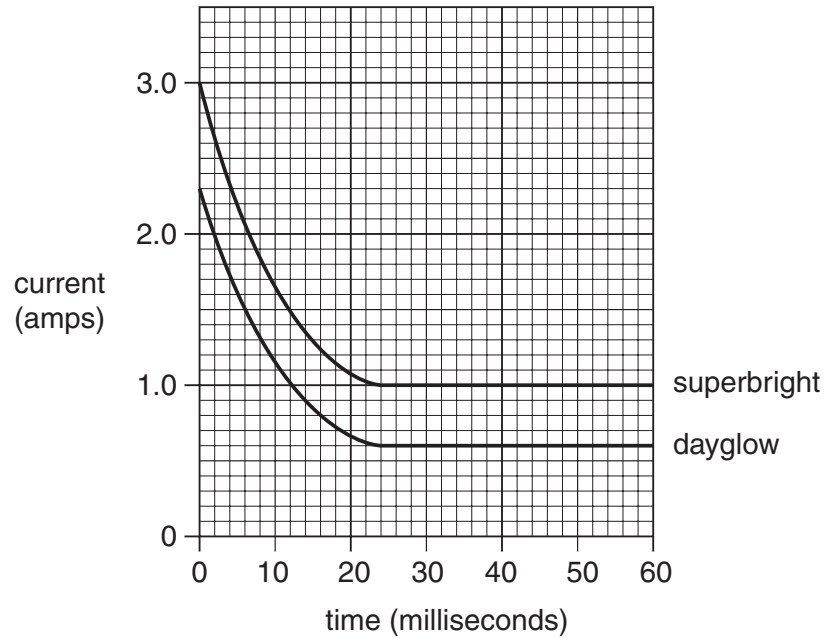
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2 Neil's job is to test light bulbs.

He tests two bulbs, **superbright** and **dayglow**.

He records how the current in each bulb changes when it is switched on.

Neil plots the results on a graph.



Neil then tests a new bulb called **sunburst**.

These are his results.

time (milliseconds)	current (amps)
0	1.5
5	1.0
10	0.7
15	0.5
20	0.4
30	0.4
60	0.4

(a) Plot these results on Neil's graph and draw the line of best fit.

[3]

(b) Describe the pattern of Neil's results for the **sunburst** bulb.

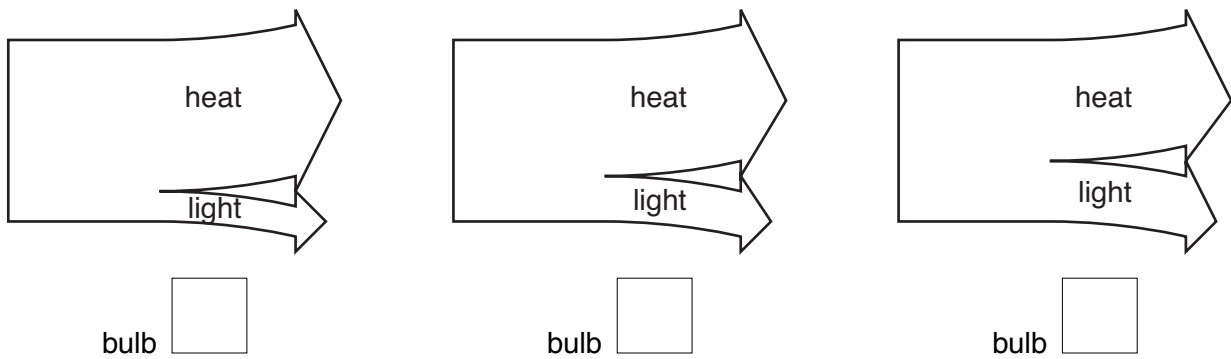
.....  
 .....  
 ..... [2]

(c) Neil measures the brightness of three sunburst bulbs, **A**, **B** and **C**.

Here are his results.

- Each bulb uses 0.1 kWh of electrical energy each hour.
- Bulb **B** is the brightest.
- Bulb **A** is the dimmest.

(i) Neil draws an energy arrow for each bulb.



Label the diagrams by putting **A**, **B** and **C** in the correct boxes. [2]

(ii) Which of the three bulbs **A**, **B** or **C** is the most energy efficient?

In your answer write about:

- input energy
- output energy.

.....  
 .....  
 ..... [3]

(d) Bulbs **A**, **B** and **C** are filament bulbs.

The factory also makes fluorescent bulbs which are more energy efficient.

These bulbs cost less to use.

Put ticks (✓) next to the **two** correct statements which explain why.

last longer

produce light

use less power

easier to fit

don't get hot

[2]

[Total: 12]

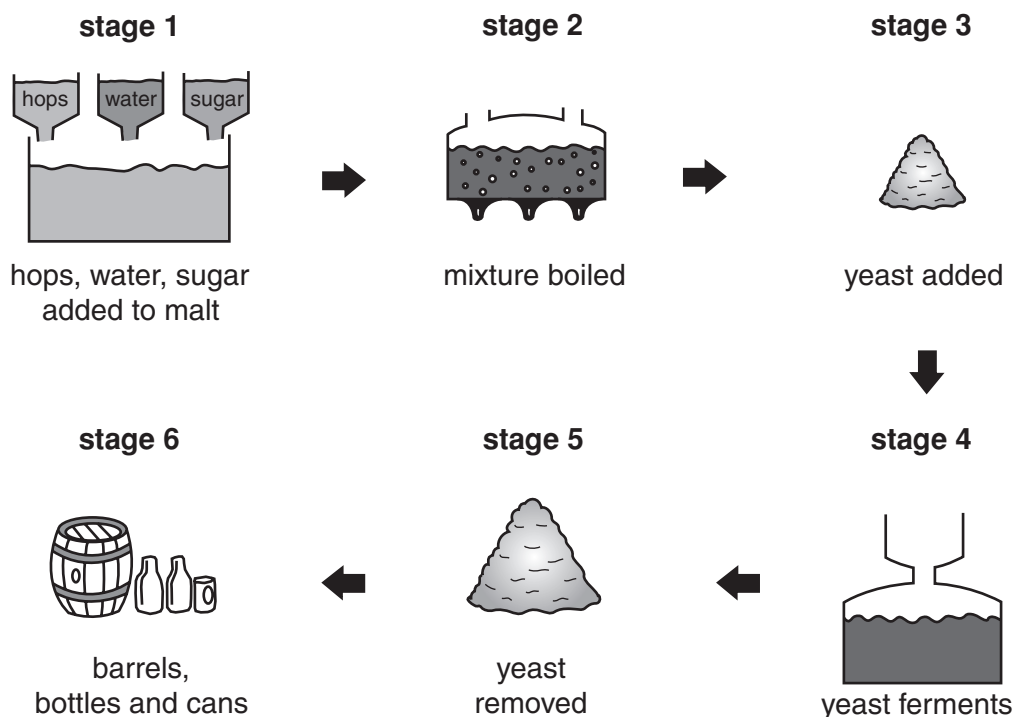


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3 Susan is a Master Brewer.

She brews beer.



(a) The diagram shows six stages in the brewing of beer.

(i) Live yeast is used in **stage 3**.

To which of the following types of microorganisms does yeast belong?

Put a ring around the correct answer.

**bacteria      fungi      viruses** [1]

(ii) Suggest why yeast is not added during **stage 2**.

..... [1]

(iii) Yeast is removed from the beer at **stage 5**.

Suggest why there is more yeast at **stage 5** than **stage 3**.

..... [1]

(iv) The yeast makes two new substances during **stage 4**.

What are the names of these two substances?

Put rings around the **two** correct answers.

**alcohol      carbon dioxide      hops      nitrogen      oxygen      sugar** [2]

(b) Susan also uses yeast when she makes bread.

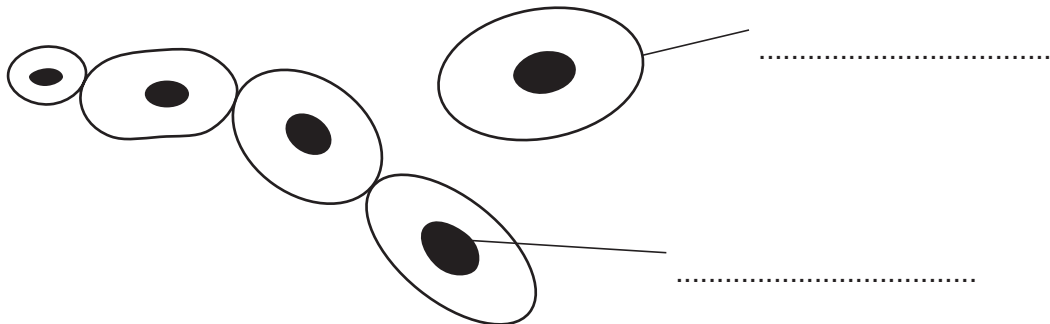
Suggest why she needs to add a small quantity of sugar to the dough when she makes bread.

..... [1]

(c) Susan looks at some yeast through a microscope.



She draws this diagram of yeast cells.



(i) Complete the labels on the diagram. [2]

(ii) Some people think that yeast is a plant.

Write down **two** differences between yeast cells and plant cells.

1. ....  
.....

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

(iii) Name the process by which yeast takes in water.

..... [1]

[Total: 11]

[Turn over

4 Jake works in a laboratory where blood tests are done.

To work in the lab, he must be vaccinated against different types of diseases.



(a) Explain how vaccination works.

The following words may help you.

**antibody**      **antigen**      **vaccine**

.....

.....

.....

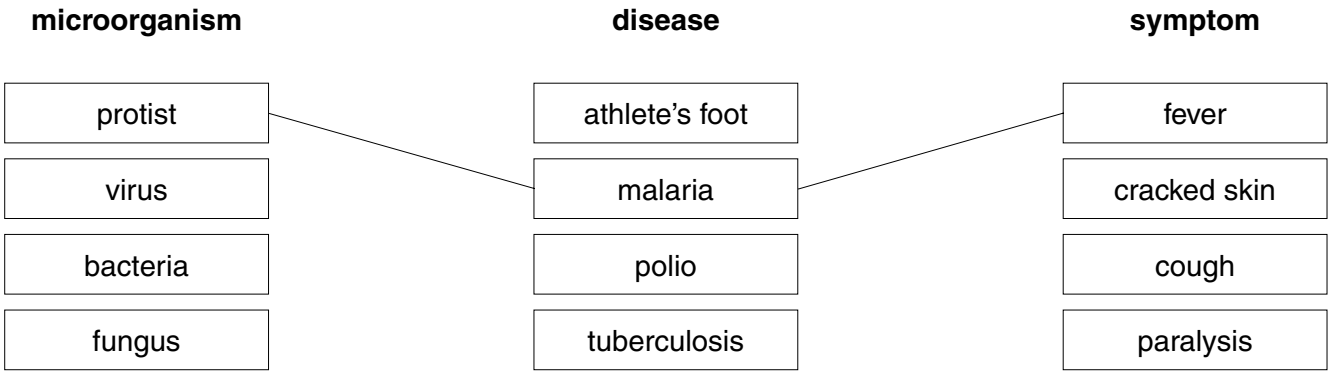
..... [3]

(b) Jake studies the effects of different diseases.

He knows that different diseases are caused by different microorganisms.

Draw a straight line linking the **microorganism** with the correct **disease** and the disease with the correct **symptom**.

One has been done for you.



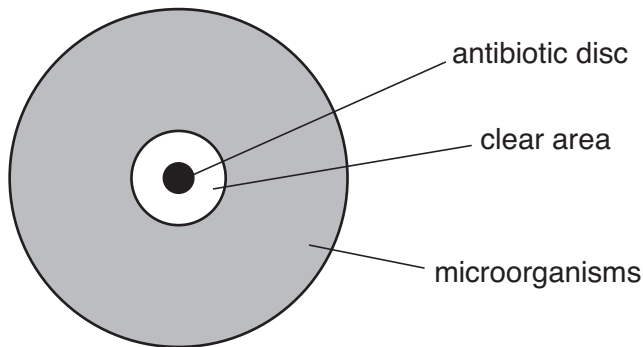
[4]

(c) Jake is carrying out a test in the lab.

He places an antibiotic disc in the centre of agar jelly in a Petri dish.

He then grows some microorganisms on the agar jelly in the dish.

This is what he sees.



Suggest what type of microorganism Jake is growing.

Explain your answer.

.....

.....

..... [2]

(d) Write down **two** simple ways in which Jake could stop the spread of microorganisms in his everyday life.

1. ....

.....

2. ....

..... [2]

[Total: 11]

5 Drilling rigs extract oil and gas from under the North Sea.



(a) Oil and gas are fossil fuels.

Which **two** of the following statements best describe fossil fuels?

Put a tick (✓) in the **two** correct boxes.

always black in colour

useful source of energy

supplies are limited

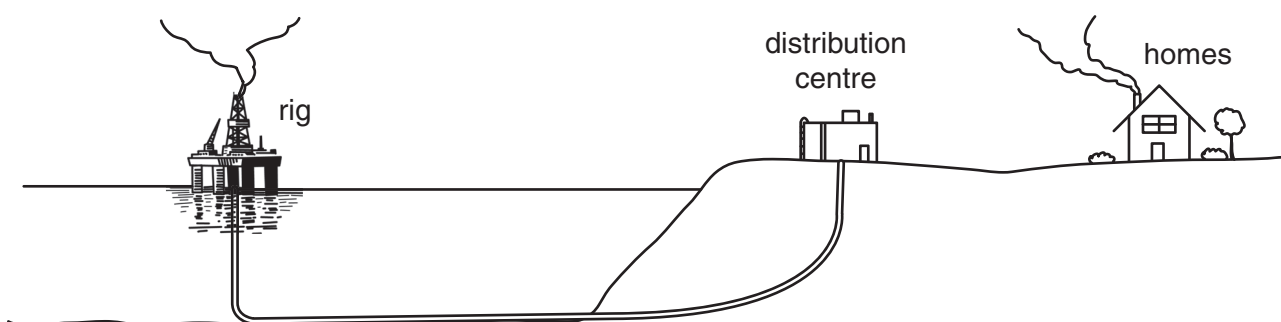
they are all renewable

they do not contribute to global warming

[2]

(b) The gas from the rig is pumped to a distribution centre.

It is then sent to homes, offices and factories.



(i) Is there any change to the chemical energy stored in the gas as it is piped between the rig and the distribution centre?

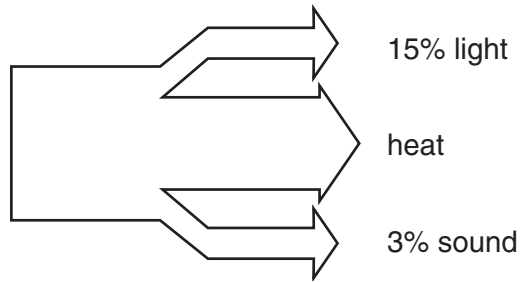
Explain your answer

.....

..... [2]

(ii) When the gas arrives in people's homes, it is burnt.

The diagram shows what happens to the chemical energy in the gas.



Calculate the percentage (%) of the energy that is used as heat.

Show your working.

.....% [2]

(iii) The energy used to heat the house cannot be used again.

Explain why we cannot keep using this heat energy over and over again.

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

(iv) In what form is most of the energy **lost** from the house?

..... [1]



(c) Modern homes use condensing gas boilers.

They are much more efficient than older types of boiler.

Which **two** of the following statements best describes why these boilers are more efficient?

Put a tick (✓) in the **two** correct boxes.

more chemical energy in the gas is converted to useful heat energy

the gas contains more chemical energy

the gas burns at a lower temperature

the burning gas has a brighter flame

much less heat energy is lost into the atmosphere

[2]

(d) When fossil fuels are burnt carbon dioxide gas is produced.

This is released into the atmosphere.

Write about what effect this is having on the Earth.

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

(e) As fossil fuels run out more nuclear fuel could be used.

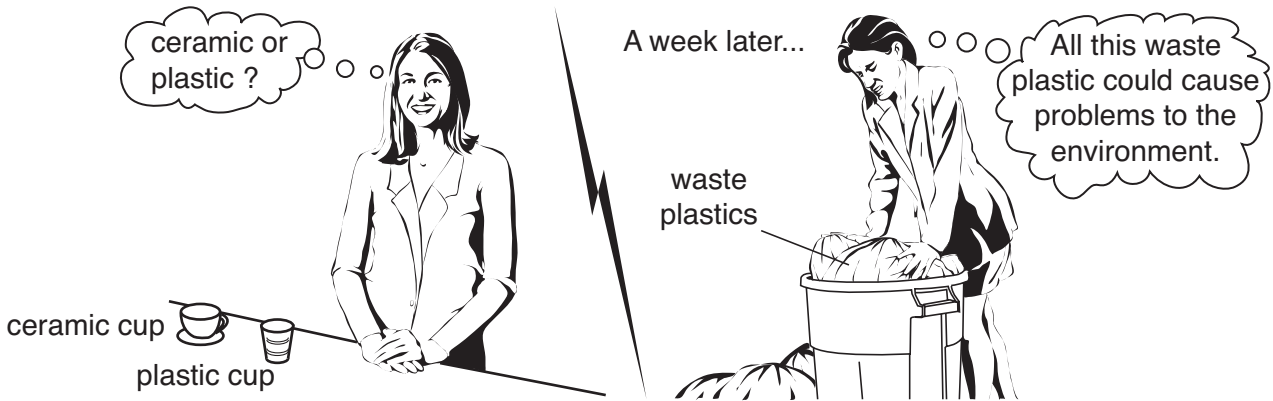
State whether nuclear fuel is a renewable form of energy.

Give a reason.

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

[Total: 13]

- 6 Rose runs a coffee shop. She sells coffee in ceramic cups.  
She decides to start to use throw-away plastic cups instead.



- (a) Write down **two advantages**, other than cost, of using plastic coffee cups.

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

- (b) What problems to the environment do waste plastics cause?

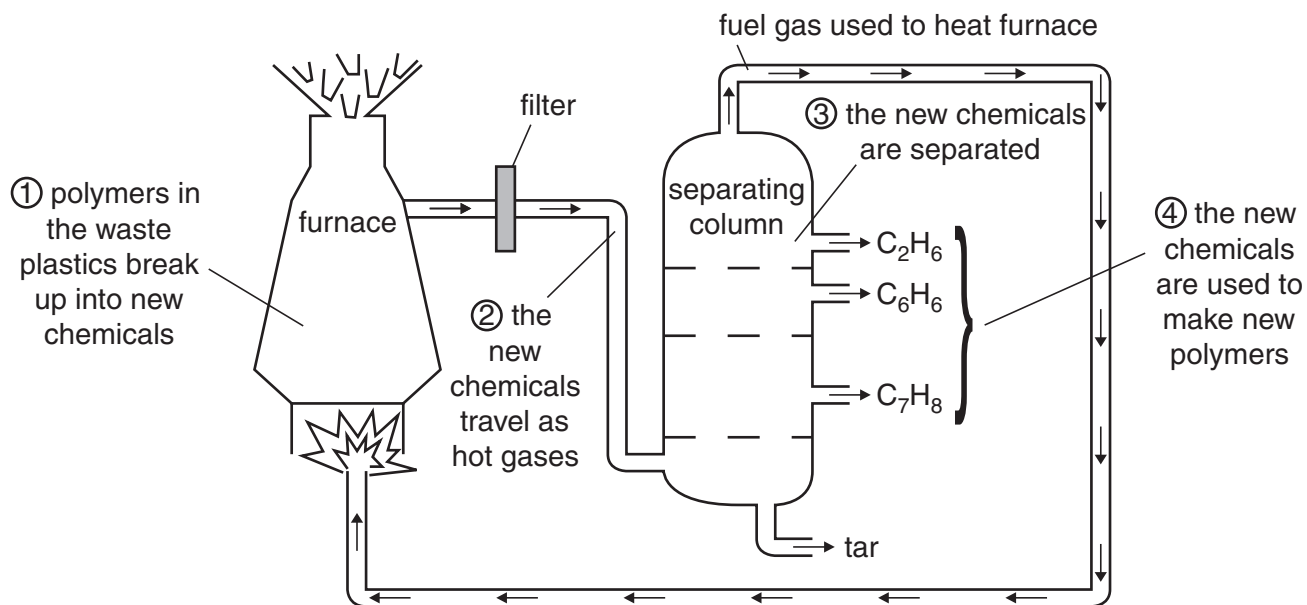
.....  
.....  
..... [2]

(c) Rose decides to find out what happens to waste plastics.

She finds a website that shows a recycling process for waste plastics.

The process breaks down the polymers in the plastics into new chemicals.

These new chemicals can be used to make new polymers.



(i) Suggest why the gases coming out of the furnace must be filtered.

..... [1]

(ii) What is the name for the process that happens in the separating column?

Put a **ring** around the best answer.

**evaporation**      **fractional distillation**      **polymerisation**      **reduction**      [1]

(iii) Put an **X** on the separating column to show where the temperature is the highest. [1]

(d) The sentences below show what happens during the process.

The sentences are in the wrong order.

Use the letters **A**, **B**, **C** and **D** to show the correct order for the sentences.

The first has been done for you.

<b>A</b>	The chemicals are used to make new polymers.
<b>B</b>	The chemicals travel as hot gases.
<b>C</b>	Polymers in waste plastics break up into new chemicals.
<b>D</b>	The chemicals are separated.

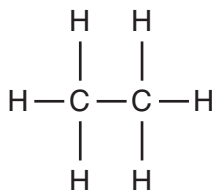
correct order

**C**




[2]

(e) This is the structure of one of the chemicals.



(i) How can you tell that this chemical is organic?

..... [1]

(ii) What is the formula of this chemical?

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



[1]

[Total: 11]

**END OF QUESTION PAPER**