

Friday 15 June 2012 – Afternoon

**GCSE TWENTY FIRST CENTURY SCIENCE
CHEMISTRY A**

A321/01 Unit 1: Modules C1 C2 C3 (Foundation Tier)

Candidates answer on the Question Paper.
A calculator may be used for this paper.

Duration: 40 minutes

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. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- 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).
- 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 **42**.
- This document consists of **12** pages. Any blank pages are indicated.




Answer **all** the questions.

1 This question is about gases in the air.

(a) The table shows information about gases in the air.

Complete the table by filling in the empty boxes.

Use the key below the table to help you.

Name	Percentage in air	Formula	Diagram
	1%	Ar	
carbon dioxide	very low		
nitrogen		N ₂	
oxygen	21%	O ₂	

Key

			
carbon	nitrogen	oxygen	argon

[4]

(b) Carbon dioxide is released into the air when fossil fuels burn.

Most of this carbon dioxide does not stay in the air.

Give two natural processes that remove carbon dioxide from the air.

.....

.....

..... [2]

(c) Burning fossil fuels adds other pollutant gases to the air, as well as carbon dioxide.

One of these pollutant gases is sulfur dioxide.

Name two other pollutant gases that are made when fossil fuels burn.

1

2

[2]

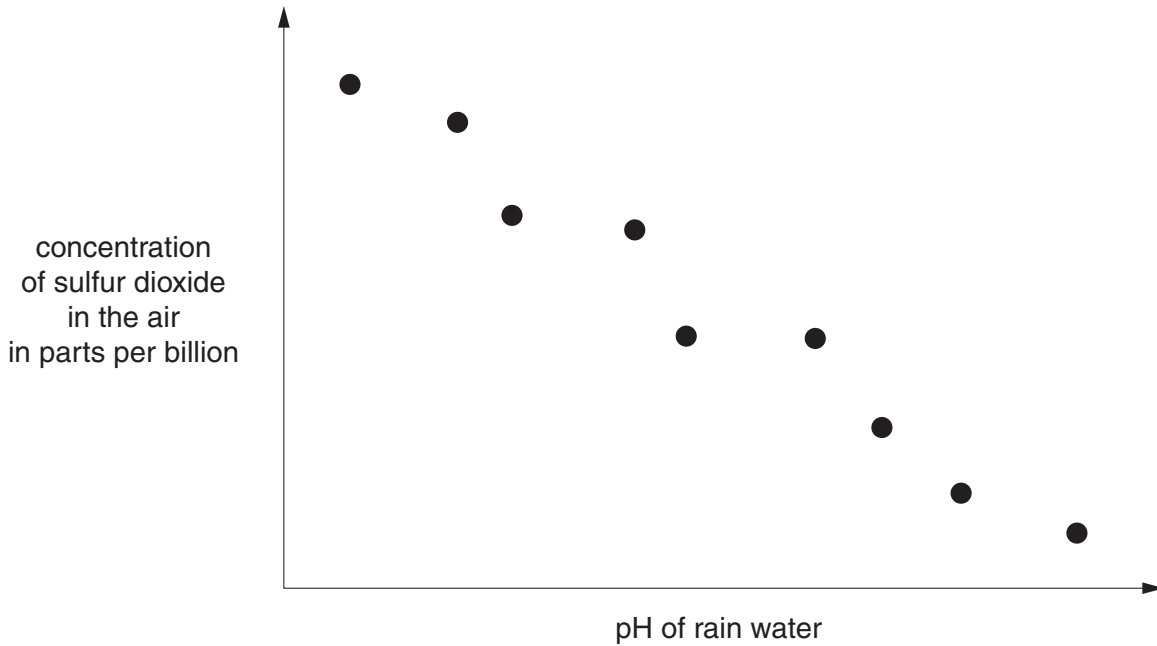
[Total: 8]

- 2 Scientists want to know if there is a link between the concentration of sulfur dioxide in the air and the pH of rain water.

They take measurements of the sulfur dioxide concentration in the air just before it rains on several days. On the same days they also collect some rain water and measure its pH.

They use these measurements to work out the mean values for sulfur dioxide concentration in the air and the pH of rain water.

They plot their results on a scatter graph.



- (a) The scatter graph shows a correlation.

Finish this sentence to describe this correlation.

As the sulfur dioxide concentration the
pH of the rain water

[2]

- (b) On each day the scientists take several measurements of sulfur dioxide concentration and pH.

The measurements taken on one day are shown in the table.

They were all taken in the same place at the same time.

	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Best estimate
Concentration of sulfur dioxide in parts per billion	35	32	31	33	34	33
pH	5.3	5.4	5.0	5.1	5.2	

- (i) Work out a best estimate for the pH.

Show your working.

best estimate for the pH = [2]

- (ii) Measurements taken at the same place but one hour later were different.

Suggest reasons why.

.....

.....

.....

..... [2]

[Total: 6]

3 Both polythene and glass are materials which can be used for making bottles to contain milk.

Scientists carry out Life Cycle Assessments to decide which type of material is better.

Table 1 shows part of the Life Cycle Assessment for the bottles.

It gives the mass of pollutant gases released into the air as each bottle is made.

Table 1

Pollutant gas		Mass of pollutant produced as bottles are made in g	
		Polythene	Glass
carbon dioxide	CO ₂	1792	490
nitrogen oxides	NO _x	1.091	1.586
sulfur dioxide	SO ₂	0.987	2.652
carbon monoxide	CO	0.670	0.057

(a) Use this data to suggest which type of bottle is likely to cause more acid rain as a result of its manufacture.

Explain your answer.

.....

.....

.....

..... [2]

(b) Glass bottles are collected, washed and refilled.

Polythene bottles are used only once.

Table 2 shows the energy used in making, filling and delivering bottles.

Table 2

	Polythene	Glass
Energy used to make one bottle in MJ	4.7	7.2
Energy used to fill and deliver one bottle in MJ	2.2	2.5

(i) Work out how much energy is used to make, fill and deliver five polythene bottles.

energy = MJ [1]

(ii) Work out how much energy is used to make one glass bottle, then fill and deliver this five times.

energy = MJ [1]

(iii) What do your calculations suggest about the sustainability of using these two types of bottle?

.....

.....

.....

..... [2]

(iv) Which parts of a Life Cycle Assessment can be looked at using the data in Table 2?

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

The environmental impact of making the material.

The energy input for making the material.

The cost of disposal of the product.

The energy input for making the product.

The environmental impact of using the product.

The energy input for using the product.

[2]

[Total: 8]

- 4 (a) Some of the materials we use are made of **one** chemical and others are made of **mixtures** of chemicals.

Put a tick (✓) in each row of the table to show whether each material is **one chemical** or a **mixture of chemicals**.

	One chemical	Mixture of chemicals
Copper		
Milk		
Paint		
Petrol		

[2]

- (b) Many of the materials we use are made from crude oil.

Fill in the blanks to finish these sentences about crude oil.

Use words from this list.

antioxidants**carbohydrates****carbon****heights****hydrocarbons****hydrogen****lengths****nitrogen****oxygen****sulfur**

Crude oil is a mixture of compounds called

These compounds are made of the elements

and

These compounds have chain molecules with different [4]

[Total: 6]

(c) (i) Some crop treatments are not allowed in organic farming.

Put a tick (✓) in each row of the table to show which crop treatments **can be used** in organic farming and which **cannot be used**.

Crop treatment	Can be used	Cannot be used
spread manure		
spread synthetic fertiliser		
spray synthetic pesticides and herbicides		
weed by hand		

[2]

(ii) Farmers using organic farming methods do not use metaldehyde.

Suggest an alternative method they could use to prevent slugs eating their crops.

..... [1]

[Total: 8]

6 There are natural polymers in the food we eat.

Digestion breaks down these polymers into smaller molecules.

(a) Explain why we have to break food down into smaller molecules.

.....

.....

.....

.....

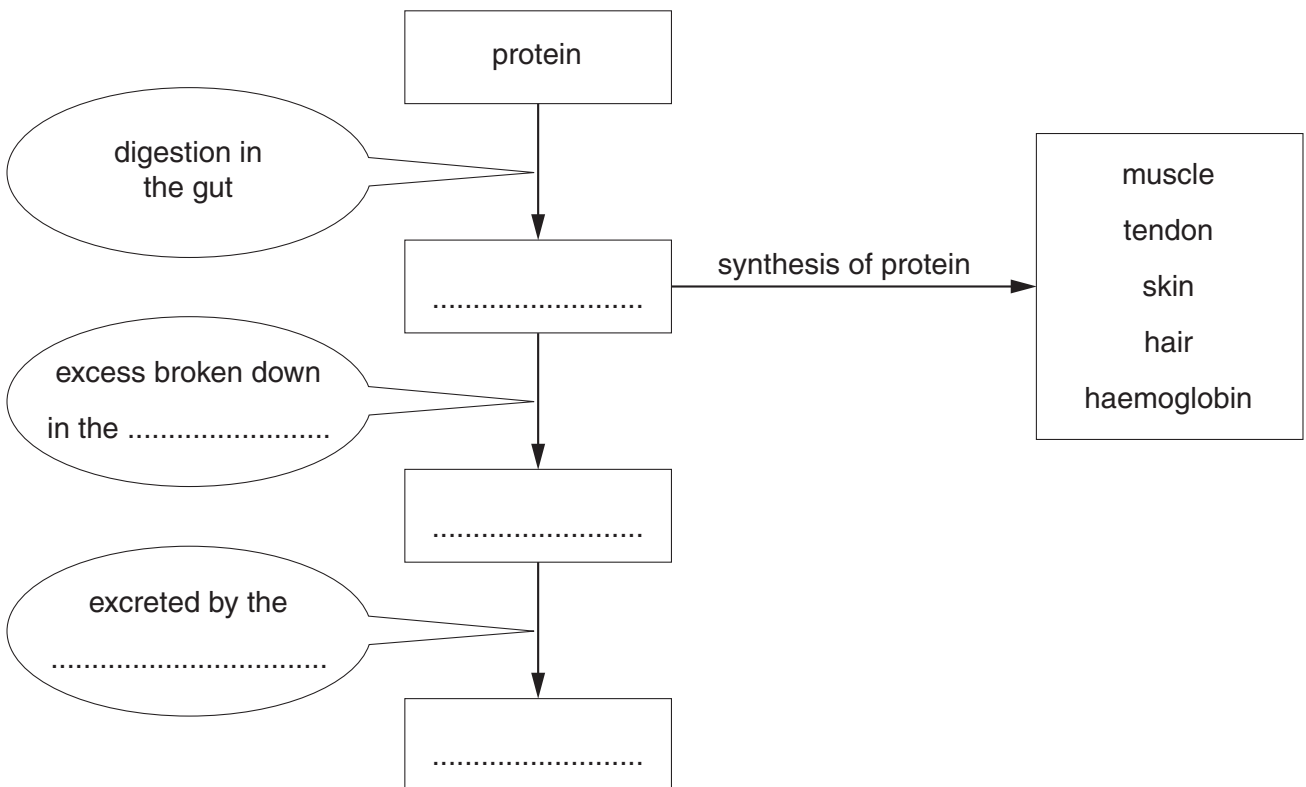
..... [3]

(b) The flow chart shows the digestion of protein and what happens to the smaller molecules that are made.

Fill in the gaps to complete the flow chart.

Use words from this list.

- amino acids carbohydrates kidneys liver urea urine**



[3]

[Total: 6]

END OF QUESTION PAPER

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