

Thursday 26 January 2012 – Morning

**GCSE TWENTY FIRST CENTURY SCIENCE
CHEMISTRY A**

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

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)

Duration: 40 minutes



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**.
- The Periodic Table is printed on the back page.
- This document consists of **12** pages. Any blank pages are indicated.

Answer **all** the questions.

- 1 The centre of Town **A** is traffic-free. Shoppers can walk in these streets but cars are not allowed to drive along them.

Cars are allowed to drive along the streets in the centre of Town **B**.

Scientists compare the concentration of carbon particulates in samples of air from the centres of these two towns.

Samples were collected at one place in each town. They were collected at the same time on the same day.

Their results are shown in the table.

	concentration of carbon particulates in $\mu\text{g}/\text{m}^3$						
	sample 1	sample 2	sample 3	sample 4	sample 5	sample 6	best estimate
Town A	13	11	14	10	12	24	12
Town B	64	66	66	65	67	68	

- (a) The scientists work out the mean (average) of the concentration of carbon particulates for Town **A**. They use this as the best estimate.

They decide that sample 6 for Town **A** is an outlier. They do not use this measurement when working out the mean for this town.

- (i) Why do the scientists think that the measurement for sample 6 for Town **A** is an outlier?

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

It is the highest measurement.

It is the last sample that they measured.

It is higher than the mean.

It is well outside the range of the other measurements.

[1]

(ii) Why do the scientists choose not to use the outlier when working out the mean for Town **A**?

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

- It would make the best estimate less accurate.
- It is the highest value in the range.
- They only need five measurements to calculate the mean.
- It is likely to have resulted from an error in measurement.
- The last measurement is never used to work out the mean.
- It is easier to divide by 5 than divide by 6.

[2]

(b) (i) What is the range of the results for Town **B**?

The range is from to $\mu\text{g}/\text{m}^3$. [1]

(ii) Work out the best estimate for the concentration of carbon particulates for Town **B**.

Show your working.

best estimate = $\mu\text{g}/\text{m}^3$ [2]

(c) The scientists think that carbon particulates come from cars.

How do their results support this idea?

.....

.....

.....

.....

.....

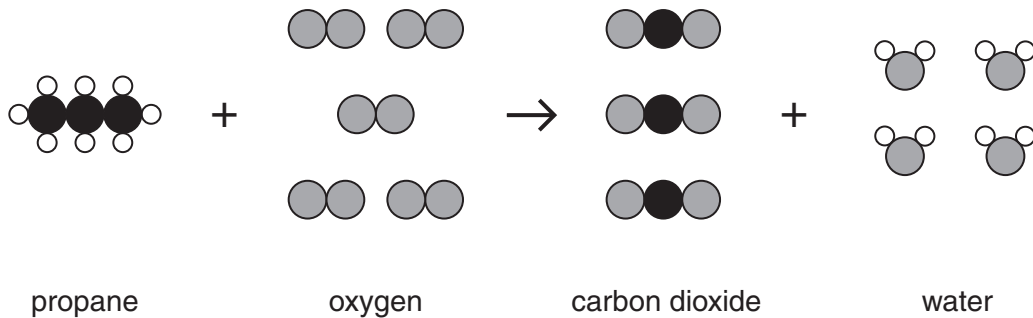
..... [3]

[Total: 9]

2 Propane is a fuel used for central heating.

When propane burns completely it produces carbon dioxide, CO_2 , and water, H_2O .

The diagram shows this reaction.



(a) Finish this table to show the number of **molecules**, of reactants and of products, when **one** molecule of propane burns completely.

	reactants		products	
	propane	oxygen	carbon dioxide	water
number of molecules	1		3	

[2]

(b) Finish this table to show the total number of **atoms** of each element, in the reactants and in the products, when **one** molecule of propane burns completely.

	elements		
	carbon	hydrogen	oxygen
total number of atoms in reactants	3	8	10
total number of atoms in products			

[1]

(c) When there is not enough air, propane does not burn completely.

Two other products are formed, as well as carbon dioxide and water.

These other products cause air pollution.

Name these two other products.

..... and

[2]

[Total: 5]

3 This question is about the chemicals in crude oil and polymers made from them.

(a) The chemicals in crude oil are hydrocarbons.

Name the elements in hydrocarbons.

..... [1]

(b) Some of the chemicals in crude oil are used to make polymers such as poly(ethene).

(i) What is the name of the process used to make polymers?

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

combustion crystallisation polymerisation photosynthesis

[1]

(ii) Describe what happens to the molecules in the process used to make polymers.

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

(c) Some of the polymers made from crude oil have replaced older materials.

(i) Give an example of something now made from a polymer that used to be made from another material.

example

old material

new material

[3]

(ii) Explain how the new material is better for making your example than the old material.

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

[Total: 9]

4 (a) (i) Different types of additives may be added to food.

For each **additive** in the first column draw a straight line to its best **description** in the second column.

additive	description
preservative	has passed a safety test
artificial sweetener	mixes ingredients together
emulsifier	reduces the amount of sugar
additive with an E number	prevents growth of microbes

[3]

(ii) Antioxidants are added to some foods.

Explain why.

Your answer should include

- the type of food that antioxidants are added to
- why it is necessary to add antioxidants to this type of food
- what reaction they prevent.

.....

.....

.....

..... [3]

(b) Some processed foods contain high levels of sugar.

Use words from this list to complete the sentences about what happens to sugar after it is eaten.

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

- absorbed air blood condensed decrease**
evaporated fall rise urine

Sugar is quickly into the stream.

This causes a rapid in sugar level.

[3]

[Total: 9]

5 Modern intensive farming methods use pesticides to increase crop yield.

(a) Explain how pesticides increase crop yield.

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

(b) Pesticides may remain on food or get into water supplies.

Some students are talking about the risk posed by the use of pesticides.

Cheryl
Pesticides are not the only danger. Harmful chemicals may be formed as food is cooked.

Stan
I wash fruit before I eat it and I use a water filter for all the water that I drink.

Peter
Before pesticides were invented pests were removed from crops by safer methods.

Mary
I am not concerned about pesticides. Everything is harmful to you in some way. You cannot avoid every risk.

Tania
Before a new pesticide is used a scientific advisory committee carries out a risk assessment.

- (i) Which student is explaining why it is impossible for anything to be completely safe?
..... [1]
- (ii) Which student is suggesting ways to reduce the risk from pesticides?
..... [1]
- (iii) Which student is describing how the safe levels of chemicals in food are decided?
..... [1]

[Total: 5]

Turn over

- 6 Window frames can be made from wood or uPVC (unplasticized polyvinylchloride).

Data from a Life Cycle Assessment (LCA) for window frames of the same size, made from each of these two materials, are shown in the table.

part of LCA		wood	uPVC
A	total energy used	9150 MJ	9700 MJ
B	fossil fuel used	5.6 kg	18.2 kg
C	carbon dioxide produced	450 kg	500 kg
D	air pollutants formed (arbitrary units)	890	380
E	acid rain formed (arbitrary units)	29	38
F	water pollution (arbitrary units)	67	2

- (a) The results of the LCA as a whole can help to decide whether it is more sustainable to make window frames from uPVC rather than wood.

Look at the data in the table.

Which two parts of the table show that it may be more sustainable to make a window frame from uPVC?

Put a ring around each of the **two** correct letters.

A B C D E F

[2]

- (b) Which of the following statements support the idea that making window frames from wood is more sustainable than making them from uPVC?

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

Wood can be painted or stained to the required colour.

Wood can be cut and joined to make window frames.

Trees can be grown to get more wood.

uPVC can be coloured as it is made.

uPVC is made from chemicals in crude oil, which is not renewable.

uPVC can be moulded to make any shape.

[2]

- (c) PVC is much more flexible than uPVC because it contains a plasticizer.

PVC is used to make covering material for sofas and chairs.

Which statement explains why the plasticizer makes this PVC more flexible than uPVC?

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

The polymer chains are shorter.

There are fewer cross-links between polymer chains.

The forces of attraction between polymer chains are reduced.

Different molecules are joined together to make the polymer.

[1]

[Total: 5]

END OF QUESTION PAPER

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