AQA GCSE Chemistry | 8462

SPECIFICATION POINT 4.10.2.1

Life cycle assessment

Past-paper questions

Tier	**Higher**
Question groups	**3**
Available paper years	**2018–2022**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

4.10.2.1 Life cycle assessment

Question 01

June 2018 | 8462/2H | Original Q10

1 0 Disposable cups are made from coated paper or poly(styrene).

Table 6 shows information on the life cycle assessments (LCAs) of disposable cups.

Table 6

	Coated paper cups	Poly(styrene) cups
Raw materials	Wood	Crude oil
Mass of 1 cup in g	8.3	1.9
Energy to produce 1 cup in kJ	550	200
Energy released when 1 cup is burned in kJ	166	76
Biodegradable	Yes	No
Recyclable	No	Yes

1 0 . 1 Evaluate the use of coated paper compared with poly(styrene) to make disposable cups.

Use **Table 6** and your knowledge and understanding of LCAs.

[6 marks]

4.10.2.1 Life cycle assessment

Question 01 · continued June 2018 | 8462/2H | Original Q10

10.2 Calculate the energy needed to produce 1.00 kg of coated paper cups.

Use **Table 6**.

Give your answer in standard form.

[2 marks]

Energy = _____ kJ

10.3 Melamine is a polymer used to make non-disposable cups.

Melamine does **not** melt when it is heated.

Explain why.

[2 marks]

10

4.10.2.1 Life cycle assessment

Question 02

0 5 This question is about materials used to make food plates.

Food plates are made from paper, polymers or ceramics.

Table 2 shows information about plates of the same diameter made from each of these materials.

Table 2

	Food plate material		
	Paper	**Polymers**	**Ceramics**
Raw material	Wood	Crude oil	Mined clay
Number packaged in 10 dm^3 cardboard box	500	100	50
Average number of times used	1	400	1000
Biodegradable?	Yes	No	No
Recyclable?	Yes	Yes	No

0 5 . 1 **Table 2** does **not** show information about energy usage.

Suggest **two** pieces of information about energy usage which would help to produce a complete life cycle assessment (LCA) for the three food plate materials.

[2 marks]

1 _____

_____

2 _____

_____

4.10.2.1 Life cycle assessment

Question 02 · continued

0 5 . 2 Evaluate the use of these materials for making food plates.

You should use features of life cycle assessments (LCAs).

Use **Table 2**.

[4 marks]

0 5 . 3 Describe how ceramic food plates are produced from clay.

[2 marks]

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4.10.2.1 Life cycle assessment

Question 03

0 3 This question is about life cycle assessments (LCAs).

0 3 . 1 Milk bottles can be made from glass or from a polymer.

Table 2 shows information about milk bottles of equal volume.

Table 2

	Glass	Polymer
Raw materials	Limestone Sand Sodium carbonate	Crude oil
Energy needed to process raw materials in kilojoules	6750	1710
Energy needed to manufacture bottle in kilojoules	750	90
Mass of bottle in grams	200	20
Mean number of times used during lifetime of bottle	25	1
One disposal method at end of useful life	Recycled to make different glass products	Recycled to make different polymer products

Evaluate the use of glass for milk bottles compared with the use of a polymer for milk bottles.

Use features of life cycle assessments (LCAs) in your answer.

Use **Table 2**.

[6 marks]

4.10.2.1 Life cycle assessment

Question 03 · continued

0 3 . 2 Milk is also sold in cardboard cartons.

A carton is made using 40 cm^3 of cardboard.

The density of the cardboard is 0.40 g/cm^3.

Calculate the mass of the carton.

Use the equation:

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

[3 marks]

Mass = _____ g

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