AQA GCSE Chemistry | 8462

SPECIFICATION POINT 4.10.2.1

Life cycle assessment

Mark schemes and examiner comments

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

Using this booklet

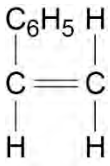
1. Booklet answer numbers match the question booklet.
2. Use the original question number within marking tables.
3. Examiner comments are included where available.

Name: _____ **Date:** _____

Where a precise marking extract is unavailable, the full source document is included in an appendix. Any missing mark scheme is explicitly identified.

4.10.2.1 Life cycle assessment

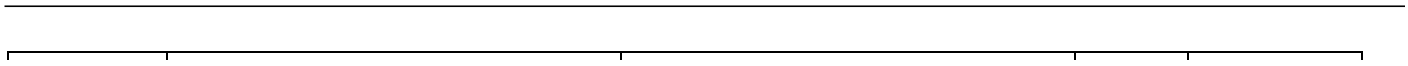
Answer 01 · Mark scheme June 2018 | 8462/2F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1			1	AO2 4.7.3.1
06.2	polymerisation		1	AO2 4.7.3.1
06.3	monomers many polymers	must be in this order	1 1 1	AO1 4.7.3.1
06.4	**Level 2:** Scientifically relevant features are identified; the way(s) in which they are similar / different is made clear and (where appropriate) the magnitude of the similarity / difference is noted.		3–4	AO3
	Level 1: Relevant features are identified and differences noted.		1–2	AO2
	No relevant content		0	
	Indicative content for coated paper cups – accept converse for poly(styrene) **advantages** • produced from a renewable resource • biodegradable so breaks down **disadvantages** • higher energy costs • greater use of fossil fuels and consequent pollution • not recyclable so uses landfill			4.10.1.1 4.10.2.1
Total			**9**	

4.10.2.1 Life cycle assessment

Answer 01 · Mark scheme

June 2018 | 8462/2F | Original Q6



4.10.2.1 Life cycle assessment

Answer 02 · Mark scheme

November 2020 | 8462/2F | Original Q6

Question 6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	disposal at the end of useful life		1	AO3 4.10.2.1
06.2	heating in a furnace shaping wet clay		1 1	AO1 4.10.3.3
06.3	polymers propene	allow (a) monomer	1 1	AO1 AO2 4.7.3.1
06.4	cracking fractional distillation		1 1	AO2 4.7.1.2 4.7.1.4
06.5	covalent		1	AO1 4.2.2.5 4.7.3.1
06.6	thermosetting		1	AO3 4.10.3.3
06.7	polymer **A** has crosslinks (between polymer molecules) **or** polymer **B** has no crosslinks (between polymer molecules)		1	AO3 4.10.3.3
Total			**10**	

4.10.2.1 Life cycle assessment

Question 10

Question	Answers	Mark	AO / Spec. Ref
10.1	**Level 3:** A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.	5–6	AO3 4.10.1.1 4.10.2.1
	Level 2: Some logically linked reasons are given. There may also be a simple judgement.	3–4	
	Level 1: Relevant points are made. They are not logically linked.	1–2	
	No relevant content	0	
	Indicative content **raw materials** • crude oil is finite • quarrying / mining pollute the environment • glass uses more energy to process raw materials **manufacturing** • glass uses more energy to make bottles • glass is heavier so takes more energy to transport **use and operation** • glass bottles are reusable • reuse of glass conserves (natural) resources • reuse of glass consumes energy during washing • reuse of glass consumes water during washing **disposal** • both glass and polymer bottles can be recycled • recycling polymer conserves finite resources • recycling glass and polymer uses less energy than making new glass and polymer • both methods reduce use of landfill **other points** • energy needed may be derived from fossil fuels • use of fossil fuels causes (specified) pollution • total energy for glass (bottle) (7500 kJ) is greater than total energy for polymer (bottle) (1800 kJ) **reasoned judgement**		

4.10.2.1 Life cycle assessment

Answer 03 · Mark scheme

June 2022 | 8462/2F | Original Q10

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10.2	mass = density × volume mass = 0.40 × 40 = 16 (g)		1 1 1	AO2 4.10.1.1 4.10.2.1

Total Question 10		**9**

4.10.2.1 Life cycle assessment

Answer 01 · Examiner comments June 2018 | 8462/2F | Original Q6

Question 6 (low demand)

06.1 65% of students correctly identified the correct monomer.

06.2 79% of students correctly identified the correct process.

06.3 This question differentiated well, with a good spread of marks. 36% of students achieved full marks.

Answer 01 · Examiner comments June 2018 | 8462/2F | Original Q6

06.4 This question required an ‘extended response’ and was marked holistically using a ‘levels’ mark scheme. The command word was ‘compare’. Lower-attaining students simply repeated the information in the question and gained no credit.

As a guideline, those who only identified the various properties as advantages and disadvantages were probably in level 1. 53% of responses moved beyond this into level 2, by explaining why. For example, that being made out of wood was an advantage because wood is renewable or that being non-recyclable was a disadvantage because it fills up landfill sites.

4.10.2.1 Life cycle assessment

Answer 03 · Examiner comments

June 2022 | 8462/2F | Original Q10

Question 10 (Standard demand)

10.1 In this extended response question, the command word was 'evaluate'. This command word demands a reasoned judgement to be given for a fully complete answer and therefore for access to a Level 3 mark. Isolated comments such as 'I think polymer is a better material than glass' are not reasoned judgments. The vast majority of students did not go further than this and were therefore capped at four marks. Very few students gained 5 or 6 marks.

Most students scored a Level 1 mark (merely by comparing the values given in the table) or a Level 2 mark (by introducing one or two pieces of 'added value' information about the impacts of the data provided). Nearly 30% of students gained a Level 2 mark, whilst a further 15% or so did not attempt the question.

10.2 This straightforward calculation presented no difficulties for the majority of students. Well over 70% of the students gained all three marks.

4.10.2.1 Life cycle assessment

Use of statistics

Statistics used in this report may be taken from incomplete processing data. However, this data still gives a true account of how students have performed for each question.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.