AQA GCSE Chemistry | 8462

SPECIFICATION POINT 4.10.1.3

Waste water treatment

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**5**
Available paper years	**2009–2024**

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.

4.10.1.3 Waste water treatment

Answer 01 · Mark scheme June 2009 | CHY1F | Original Q5 | Legacy

Question 5

question	answers	extra information	mark
5(a)(i)	C_2H_4		1
5(a)(ii)	poly(ethene)		1
5(b)(i)	is not biodegradable		1
5(b)(ii)	not enough landfill sites / space	accept landfill sites are filling up **or** plastics remain for <u>years</u> **or** plastics not broken down ignore cost / waste of resources / not biodegradable / wildlife	1
5(b)(iii)	less (crude) oil / fuels / energy used	accept (crude) <u>oil</u> is a non-renewable resource	1
Total			**5**

4.10.1.3 Waste water treatment

Answer 01 · Mark scheme

June 2009 | CHY1F | Original Q5 | Legacy

CHY1F

4.10.1.3 Waste water treatment

Answer 02 · Mark scheme

Question 8

question	answers	extra information	mark
8(a)	hydrogen / H^+ /$2H^+$ / H_3O^+	allow H / 2H do **not** accept H_2 apply list principle	1
8(b)(i)	143	correct answer with or without working = **2** marks ignore units if answer is not correct 40 + (2 × 35.5) + (2 × 16) gains **1** mark	2
8(b)(ii)	49.7% (49.6 to 50)	correct answer with or without working = **2** marks answer 49 gains **1** mark if answer is not correct: (71 ÷ 143) × 100 gains **1** mark allow error carried forward from part (b)(i) ie. (71 or their (2 × 35.5) ÷ answer to (b)(i)) × 100 gains **2** marks if calculated correctly and **1** mark if not calculated correctly. **Special case** 35.5 ÷ 143 × 100 = 24.8 to 25% **or** 35.5 ÷ answer to (b)(i) x 100 correctly calculated for **1** mark	2
8(b)(iii)	9.9 to 10g	allow ecf from (b)(i) or (b)(ii)	1

Question 8 continued on next page…

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CHY2F

Question 8

question	answers	extra information	mark
8(c)(i)	an alkali	apply list principle accept named alkali accept hydroxide accept soluble base ignore base	1
8(c)(ii)	a solid / insoluble substance (owtte)		1
8(c)(iii)	filter / filtration	allow decant / centrifuge accept filtration followed by evaporation **or** filtration and evaporation do **not** accept filtration or evaporation do **not** accept evaporation and filtration	1
Total			**9**

4.10.1.3 Waste water treatment

Answer 03 · Mark scheme

November 2010 | CHY1AP | Original Q3 | Legacy

Three	**A**	Biodiesel	**3**
	B	Methane	**2**
	C	Animal waste	**1**
	D	Dried sludge	**4**

4.10.1.3 Waste water treatment

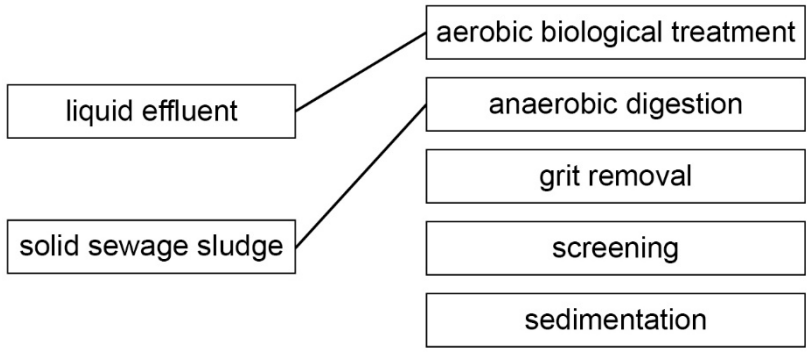
Answer 04 · Mark scheme

November 2020 | 8462/2F | Original Q9

Question 9

Question	Answers	Mark	AO/ Spec. Ref
09.1	**Level 2**: Relevant points (reasons/causes) are identified, given in detail and logically linked to form a clear account.	3–4	AO1 4.10.1.2
	Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1–2	
	No relevant content	0	
	Indicative content • choose an appropriate source of fresh water • such as rivers, streams, lakes, boreholes • pass through filter beds • (which) removes undissolved solids • sterilise • using chlorine / ozone / UV light • (which) destroys harmful microbes		

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.2	any **one** from: • distillation • reverse osmosis	allow use of membranes allow desalination	1	AO3 4.10.1.2

09.3	 additional line from a box on the left negates the mark for that box	1 1	AO1 4.10.1.3

Question 9 (continued)

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.4	$\frac{260}{1413}$ x 100 = 18.40056617 (%) = 18.4 (%)	 allow an answer correctly calculated to 3 significant figures from an incorrect percentage calculation which uses values in the question	1 1 1	AO2 4.10.1.3
09.5	any **one** from: • the population increased • more waste water produced • less untreated sewage discharged		1	AO3 4.10.1.3
09.6	any **two** from: • increased demand for food (due to increasing population) • conserves energy / resources • landfill space is running out • increased demand for organic fertiliser	ignore references to cost allow more farming allow more sustainable allow more awareness of the negative environmental impacts of landfill ignore less sent to landfill allow lifestyle choice for organic food	2	AO3 4.10.1.3
Total			**13**	

4.10.1.3 Waste water treatment

Answer 05 · Mark scheme

June 2024 | 8462/2F | Original Q10

Question 10

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10.1	combustion reversible		1 1	AO2 4.6.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10.2	water molecules break down and reform at the same rate		1	AO2 4.6.2.3

4.10.1.3 Waste water treatment

Answer 05 · Mark scheme

Question	Answers	Mark	AO / Spec. Ref.
10.3	**Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.	5–6	AO1 4.10.1.2 4.10.1.3
	Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.	3–4	
	Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1–2	
	No relevant content	0	
	Indicative content **Potable water production** • pass water through filter beds • to remove solids • use chlorine / ozone / UV light • to sterilise water • to destroy microbes **Waste water treatment** • screening • using a metal grid • to remove solids • to remove grit • sedimentation • to produce sewage sludge and effluent • anaerobic digestion of sewage sludge • aerobic biological treatment of effluent access to **Level 3** requires reference to **both** potable water production **and** waste water treatment.		

Total Question 10	9

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Answer 05 · Examiner comments June 2024 | 8462/2F | Original Q10

Question 10 (standard demand)

10.1 More than 15% of students correctly identified the words that are used to describe the reaction between hydrogen and oxygen with a further 70% being able to correctly identify one of the words. It is important that students read the question carefully as there was a significant number of students who ticked one box instead of two.

10.2 Over 65% of students were able to correctly identify the sentence that described the reversible reaction in the question.

10.3 Few students demonstrated a good overall understanding of the sequence of steps involved in potable water production and wastewater treatment. Weaker responses tended to focus on wastewater treatment, for which the diagram in the stem provided more scaffolding.

Most students recognised that ground water needed to be filtered initially. A few responses referred to screening before the use of filter beds, although only referring to screening in potable water production was considered insufficient. Sometimes the descriptions of things removed by filter beds did not make it clear that they were solid. The process of sterilisation was generally well described, although removal of microbes rather than their destruction was not creditworthy.

In waste water treatment removal of solids using a metal grid was included by most students, making use of the diagram where a metal grid was featured. Fewer students referred to this step

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4.10.1.3 Waste water treatment

Answer 05 · Examiner comments

as screening and again things removed by screening were not always clearly identified as solid. Organic matter in sewage is not removed by screening as this is treated subsequently. The final steps were poorly addressed overall. Most students referred to sludge and effluent (again these featured in the diagram) but many failed to recognise that these were separated by sedimentation. Some responses confused the separation of sludge and effluent with their biological treatment afterwards. Some students recognised that sludge is treated anaerobically and effluent aerobically but did not refer to digestion or biological treatment or an equivalent description of microbial action.

References to flocculation, desalination, fluoridation or pH adjustment were considered irrelevant and ignored in the marking of this item.

Over 30% of students simply described what they could see in the picture and gained no marks. A further 40% achieved Level 1 by describing the diagram but also making a link between the use of the metal grid and the removal of solids like toilet paper or stones rather than organic waste. Most students appeared not to understand the use of the word process and failed to add any detail about how ground water is treated to produce potable water. Many students describing potable water treatment failed to identify ground water as fresh water and described desalination.

Only 10% of students achieved Level 2, usually by successfully linking the removal of solids using the metal grid and including some detail of either filtering ground water to remove solids or adding chlorine to sterilise the water or to kill microbes.

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Mark Ranges and Award of Grades

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

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