AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 5.10.1.3

Waste water treatment

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**3**
Available paper years	**2021–2025**

Using this booklet

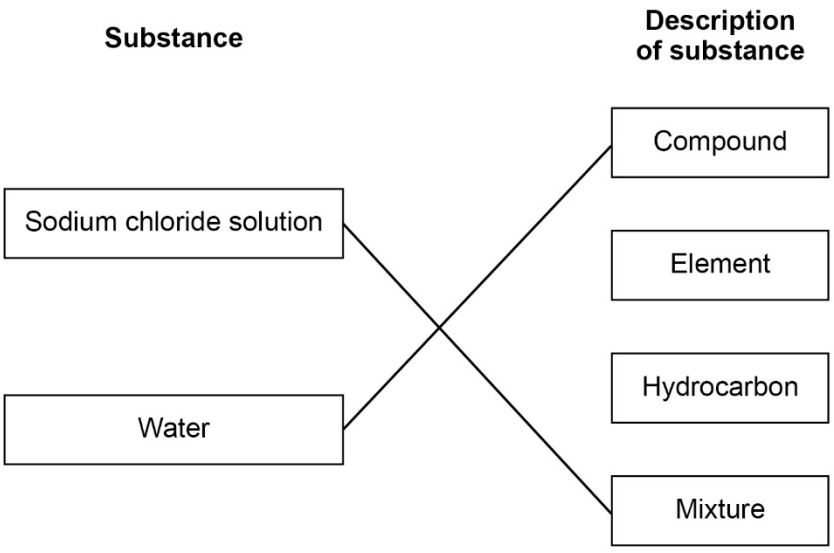
1. Booklet answer numbers match the question booklet.
2. Use the original question number within marking tables.
3. Examiner comments are included where available.

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.

5.10.1.3 Waste water treatment

Answer 01 · Mark scheme November 2021 | 8464/C/2F | Original Q1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	(the symbol) ⇌	allow description of reversible sign	1	AO1 5.6.2.1
01.2	white blue	must be in this order	1 1	AO1 5.6.2.2
01.3	to prevent reaction with water vapour (in the air)	allow to prevent reaction with moisture allow to keep water out	1	AO3 5.6.2.2
01.4	 do **not** accept more than one line from a box on the left		1 1	AO2 5.1.1.2
01.5	evaporation **or** crystallisation		1	AO1 RPA 13
01.6	(filtering) to remove solids (sterilising) to kill bacteria	 allow to kill microbes	1 1	AO1 5.10.1.2

5.10.1.3 Waste water treatment

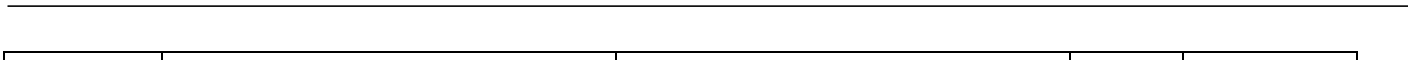
Answer 01 · Mark scheme

01.7	ground water		1	AO1 5.10.1.3
01.8	screening and removal of grit		1	AO1 5.10.1.3
Total			**11**	

5.10.1.3 Waste water treatment

Answer 01 · Mark scheme

November 2021 | 8464/C/2F | Original Q1



5.10.1.3 Waste water treatment

Answer 02 · Mark scheme

June 2022 | 8464/C/2F | Original Q7

Question 7

<table>
<tr><th>Question</th><th>Answers</th><th>Mark</th><th>AO / Spec. Ref.</th></tr>
<tr><td rowspan="4">07.1</td><td>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.</td><td>4–6</td><td rowspan="4">AO1
5.10.1.3</td></tr>
<tr><td>Level 1: Relevant features are identified and differences noted.</td><td>1–3</td></tr>
<tr><td>No relevant content</td><td>0</td></tr>
<tr><td>Indicative content
<table>
<tr><th>ground water</th><th>waste water</th></tr>
<tr><td>easier to obtain</td><td>more difficult to obtain</td></tr>
<tr><td>fewer processes</td><td>more processes</td></tr>
<tr><td>takes less time</td><td>takes more time</td></tr>
<tr><td>filtered through filter beds

to remove insoluble particles</td><td>screening and grit removal

to remove large particles</td></tr>
<tr><td></td><td>sedimentation

to produce sewage sludge and effluent</td></tr>
<tr><td></td><td>aerobic biological treatment of effluent

to reduce solid waste</td></tr>
<tr><td>sterilised

using chlorine, ozone or uv light

to kill bacteria</td><td>and then sterilised

using chlorine, ozone or uv light

to kill bacteria</td></tr>
<tr><td></td><td>sludge is anaerobically digested

by specific bacteria

to remove organic matter</td></tr>
</table></td><td></td></tr>
</table>

5.10.1.3 Waste water treatment

Answer 02 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.2	distillation		1	AO1 5.10.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.3	(conversion) ($\frac{150}{1000}$ =) 0.15 (dm^3) (concentration =) $\frac{2.40}{0.15}$ = 16 (g/dm^3) **OR** (conversion) $\frac{1000}{150}$ (1) = 6.67 (1) (6.67 × 2.4) = 16 (g/dm^3) (1) **OR** (concentration =) $\frac{2.4}{150}$ (1) = 0.016 (1) (conversion) (0.016 × 1000) = 16 (g/dm^3) (1)	allow correct use of incorrect / no conversion	1 1 1	AO2 5.3.2.5

Total Question 7		**10**

5.10.1.3 Waste water treatment

Answer 03 · Mark scheme

June 2025 | 8464/C/2F | Original Q4

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	water that is safe to drink		1	AO1 5.10.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.2	to remove large solid objects		1	AO1 5.10.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.3	(conversion 4.5 kg =) 4500 (g) (number of hats =) $\frac{4500}{50}$ = 90 **alternative approach** (conversion 50 g =) 0.05 (kg) (1) (number of hats =) $\frac{4.5}{0.05}$ (1) = 90 (1)	 allow correct use of incorrect / no conversion allow correct use of incorrect / no conversion	1 1 1	AO2 5.10.1.1

5.10.1.3 Waste water treatment

Answer 03 · Mark scheme

Question	Answers	Mark	AO / Spec. Ref.
04.4	**Level 2:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account	3–4	AO3 5.10.1.1
	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 (poly(propene) has) • higher level of insulation ○ (so) keeps the wearer warmer • lower cost ○ (so) the clothes are cheaper • higher durability ○ (so) the clothes last longer (wool is) • sheep are a renewable resource ○ so are sustainable for **Level 2** there must be an advantage for both poly(propene) and wool plus a linked explanation		

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.5	reused	must be in this order	1	AO2 5.10.2.2
	recycled		1	

5.10.1.3 Waste water treatment

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.6	a catalyst steam		1 1	AO1 5.7.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.7	bromine water		1	AO1 5.7.1.4

Total Question 4	14

5.10.1.3 Waste water treatment

Answer 01 · Examiner comments November 2021 | 8464/C/2F | Original Q1

Question 1 (low and standard demand)

The reversible symbol was well known, but many students did not recognise that the starting point for the reaction was the anhydrous form of copper sulfate, so were unable to identify the colours of the salts. They did not appreciate the link between the reversible reaction and the storage of the anhydrous salt. Most students referred incorrectly to the toxicity of the salt.

The topic of water treatment was not well understood. Credit was given for the idea of filtering removing large insoluble solid material from the water and sterilising removing bacteria and pathogens, but not germs.

Answer 02 · Examiner comments June 2022 | 8464/C/2F | Original Q7

Question 7

The topic of water purification was generally not well known.

07.1 Over 60% of students were able to score at least 1 mark comparing the methods of treatment of ground and wastewater to make potable water. This was usually for a simple statement that both waters need to be filtered. Responses were lacking in specific detail in this recall question. The idea that both waters need to be distilled was very commonly seen, mistaking this with sea water.

07.2 About one third of students were able to identify distillation to desalinate sea water. The most common incorrect response was filtration.

07.3 About a quarter of students were able to score two of the three marks on this item, the conversion of cm^3 to dm^3 being the most likely mark missed.

5.10.1.3 Waste water treatment

Answer 02 · Examiner comments

June 2022 | 8464/C/2F | Original Q7

Use of statistics

Statistics used in this report may be taken from incomplete processing data. However, this data still gives a true account on 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.

5.10.1.3 Waste water treatment

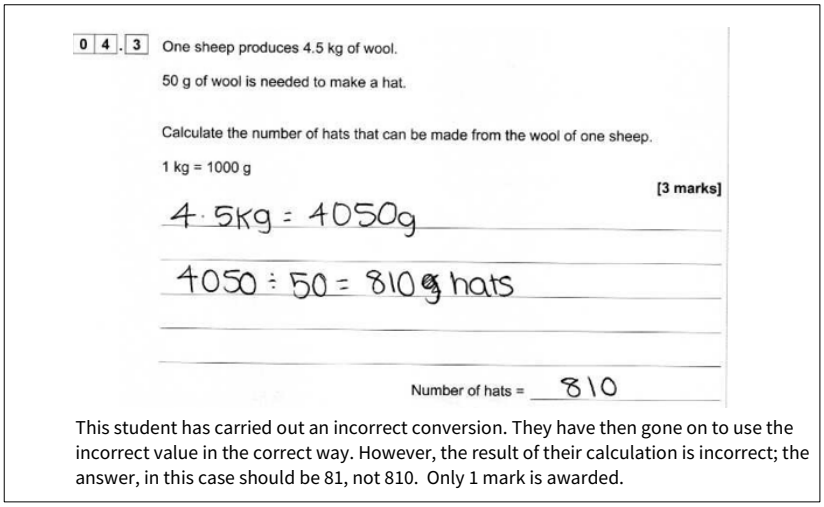
Answer 03 · Examiner comments June 2025 | 8464/C/2F | Original Q4

Question 4 (Low and Standard demand)

04.1 Almost 70% of students correctly selected 'water that is safe to drink'.

04.2 Nearly three quarters of students knew that the metal grids in water treatment were to 'remove large solid objects'.

04.3 This question was answered well. Most students used the first approach where they converted 45 kg to 4500 g and then divided that number by 50 to arrive at 90 hats.
Some students who did the conversion incorrectly, usually by multiplying by 100 instead of 1000, could still access 2 marks providing the calculation was carried out correctly.



0 4 . 3 One sheep produces 4.5 kg of wool.

50 g of wool is needed to make a hat.

Calculate the number of hats that can be made from the wool of one sheep.

1 kg = 1000 g

[3 marks]

4·5kg = 4050g

4050 ÷ 50 = 810 hats

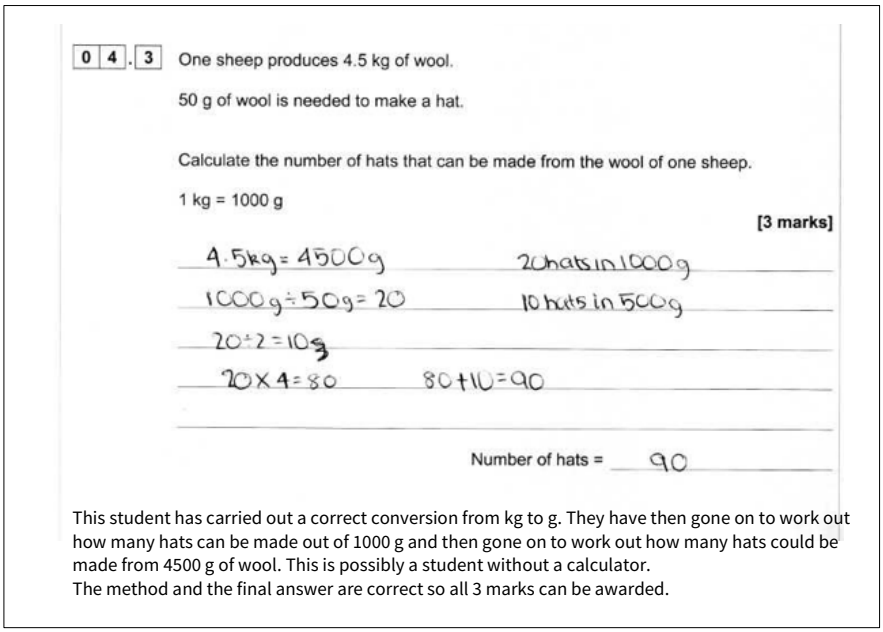
Number of hats = 810

This student has carried out an incorrect conversion. They have then gone on to use the incorrect value in the correct way. However, the result of their calculation is incorrect; the answer, in this case should be 81, not 810. Only 1 mark is awarded.

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5.10.1.3 Waste water treatment

Answer 03 · Examiner comments



0 4 . 3 One sheep produces 4.5 kg of wool.

50 g of wool is needed to make a hat.

Calculate the number of hats that can be made from the wool of one sheep.

1 kg = 1000 g

[3 marks]

4.5kg = 4500g
1000g ÷ 50g = 20
20 ÷ 2 = 10g
20 × 4 = 80
20 hats in 1000g
10 hats in 500g
80 + 10 = 90

Number of hats = 90

This student has carried out a correct conversion from kg to g. They have then gone on to work out how many hats can be made out of 1000 g and then gone on to work out how many hats could be made from 4500 g of wool. This is possibly a student without a calculator.
The method and the final answer are correct so all 3 marks can be awarded.

04.4 This was an 'extended response' style of question. Such questions are marked holistically. There are overall generic descriptions for the two levels of response at the top of the mark scheme, giving a hierarchy of response. Within each level there are 2 marks.

Level 1 could be accessed simply by offering any relevant comparison of either poly(propene) or wool, and over half of all students were able to do this. A large number of responses however merely offered a repetition of the information given and consequently could not gain credit.

For Level 2 there needed to be an advantage of both poly(propene) and wool, with a linked explanation. The table offered more information on poly(propene) than wool and consequently very few students were able to access Level 2, as they focussed purely on poly(propene) and did not mention any advantages of using wool.

Many students abbreviated poly(propene) to either poly or propene. Poly was credited, however propene was not, which resulted in some responses which were otherwise good not accessing either Level.

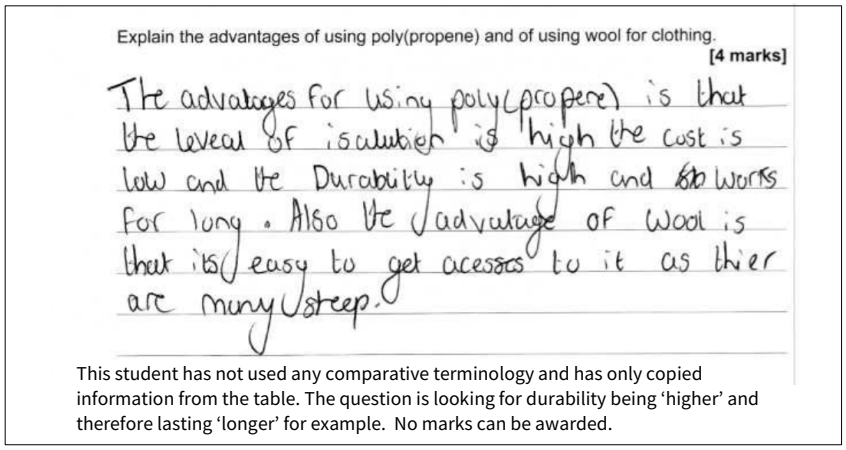
There appeared to be a common misconception that we would 'run out of sheep' therefore making wool a non-renewable source. This limited students to Level 1.

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5.10.1.3 Waste water treatment

Answer 03 · Examiner comments

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This student has not used any comparative terminology and has only copied information from the table. The question is looking for durability being 'higher' and therefore lasting 'longer' for example. No marks can be awarded.

04.5 This was well answered. All options were used by students, and over three quarters of all students gained both marks.

04.6 Less than a quarter of all students gained both marks in this question. A catalyst was the most common response, but it was often paired with sulfuric acid rather than with steam.

04.7 Half of all students were able to recall bromine water as the test for alkenes with all other answers being equally spread between the other 3 options.