AQA GCSE Chemistry | 8462

SPECIFICATION POINT 4.5.2.1

Cells and batteries

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**2**
Available paper years	**2007–2018**

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.

4.5.2.1 Cells and batteries

Answer 01 · Mark scheme

June 2007 | CHY1A | Original Q9 | Legacy

Nine	**2**	**3**	**2**	**3**

4.5.2.1 Cells and batteries

Answer 02 · Mark scheme

June 2018 | 8462/1H | Original Q3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	copper, zinc, sodium chloride solution		1	AO2 4.5.2.1
03.2	a reactant is used up	allow the reaction stops allow electrolyte / electrode / ions / metal / metal hydroxide / alkali for reactant	1	AO1 4.5.2.1
03.3	the reaction is not reversible		1	AO1 4.5.2.1
03.4	$2H_2 + O_2 \rightarrow 2H_2O$	allow fractions / multiples allow **1** mark for O_2	2	AO1 AO2 4.1.1.1 4.5.2.2

Answer 02 · Mark scheme

June 2018 | 8462/1H | Original Q3

<table>
<tr><th>Question</th><th>Answers</th><th>Mark</th><th>AO / Spec. Ref.</th></tr>
<tr><td rowspan="5">03.5</td><td>Level 3: A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.</td><td>5–6</td><td>AO3</td></tr>
<tr><td>Level 2: Some logically linked reasons are given. There may also be a simple judgement.</td><td>3–4</td><td>AO3</td></tr>
<tr><td>Level 1: Relevant points are made. This is not logically linked.</td><td>1–2</td><td>AO2</td></tr>
<tr><td>No relevant content</td><td>0</td><td></td></tr>
<tr><td>Indicative content

reasons why fuel cells could be judged as better

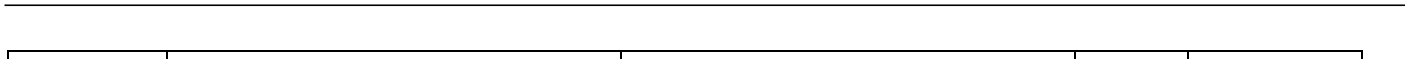
<table><tr><th>from the table</th><th>from other knowledge</th></tr><tr><td>• time for refuelling a fuel cell is faster than recharging
or
a fuel cell does not need to be recharged
• a fuel cell has a greater range</td><td>• hydrogen can be renewable if made by electrolysis using renewable energy
• lithium-ion batteries can catch fire
• produces only water
or
no pollutants produced
• lithium-ion batteries may release toxic chemicals on disposal
• lithium-ion batteries (eventually cannot be recharged so) have a finite life</td></tr></table>
reasons why the lithium-ion battery could be judged as better

<table><tr><th>from the table</th><th>from other knowledge</th></tr><tr><td>• lithium-ion uses energy more efficiently
• cost of lithium-ion car much less
• cost of recharging much less than refuelling with hydrogen</td><td>• hydrogen is often made from fossil fuels so is not renewable
• charging points are more widely available than hydrogen filling stations
• hydrogen takes up a lot of space
or
is difficult to store
• hydrogen can be highly flammable / explosive
• no emissions produced
• (catalyst in the hydrogen fuel-cell eventually becomes poisoned so) have a finite life</td></tr></table></td><td></td><td>4.4.3.4
4.5.2.1
4.5.2.2</td></tr>
<tr><td>Total</td><td></td><td></td><td>11</td></tr>
</table>

4.5.2.1 Cells and batteries

Answer 02 · Mark scheme

June 2018 | 8462/1H | Original Q3



Answer 02 · Examiner comments

June 2018 | 8462/1H | Original Q3

Question 3 (standard demand)

03.1 This was well answered with 67% of students recognising that there had to be two different metals, and that water alone would not be suitable as the electrolyte. A significant number of students incorrectly ticked more than one box.

03.2 62% of students answered this question on a new area of the specification correctly. Many, however, mixed up the answers to questions **03.2** and **03.3**. Many thought that charge, energy, or a product run out.

03.3 52% of students could answer in terms of the lack of reversibility of the chemical reaction in the cell.

03.4 This was well answered, with 70% of students able to give the formula for oxygen and then to balance the equation.

03.5 96% of students achieved three or more marks. However, many students limited themselves to level 2 as they just used the information from the table, without bringing in any of their own knowledge. Others failed to give a judgement on which method is better; a judgement is an essential part of a question where the command word is ‘evaluate’.

Some students wasted space and time requoting data from the table. A comment such as ‘you can go much further with a hydrogen fuel cell before having to stop to refuel’ is a better answer than ‘you can go 415 miles between refuelling with a hydrogen cell car but only 240 miles between recharges of a lithium-ion battery car’.