

# Commentary on candidate evidence

The candidate evidence has achieved the following marks for each question in this course component.

## Question 1(b)(i)

### Candidate 1

The candidate was awarded **1 mark**.

The candidate has given an incorrect response but can be awarded up to 1 partial mark.

The candidate has correctly identified three half-lives and can be awarded the first partial mark option.

### Candidate 2

The candidate was awarded **1 mark**.

The candidate has given an incorrect response but can be awarded up to 1 partial mark.

The candidate has correctly identified three half-lives and can be awarded the first partial mark option.

### Candidate 3

The candidate was awarded **1 mark**.

The candidate has given a correct numerical response and was awarded 1 mark, but they have included incorrect units.

The unit's penalty would only be applied if this was the first instance of incorrect units and would only be applied once per paper.

### Candidate 4

The candidate was awarded **2 marks**.

The candidate has given a correct response.

## Question 2(a)

### Candidate 1

The candidate was awarded **1 mark**.

The candidate has correct scales on both axes, so the first mark has been awarded. They have incorrect plotting for two points (46 and 48), so cannot be awarded the second mark.

### Candidate 2

The candidate was awarded **1 mark**.

The candidate has correct scales on both axes, so the first mark has been awarded. They have correct plotting but an incorrect line as they have not included the first point, so cannot be awarded the second mark.

The candidate has joined the points together by straight lines rather than a curve, this would also be a reason for not awarding the second mark.

### Candidate 3

The candidate was awarded **1 mark**.

The candidate has correct scales on both axes, so the first mark has been awarded. They have correct plotting but an incorrect line as they have joined the points together by straight lines rather than a curve, so cannot be awarded the second mark.

### Candidate 4

The candidate was awarded **1 mark**.

The candidate has correct scales on both axes, so the first mark has been awarded. They have correct plotting but have not joined the point with any line, so cannot be awarded the second mark.

### Candidate 5

The candidate was awarded **1 mark**.

The candidate has correct scales on both axes, so the first mark has been awarded. They have correct plotting but an incorrect line as they have included 'feathering', so cannot be awarded the second mark.

## Question 2(b)

### Candidate 1

The candidate was awarded **0 marks**.

The candidate has given an incorrect response and cannot be awarded the full 2 marks.

The candidate has given a correct value for the change in volume, however, they have an incorrect value for the change in time. As they have not provided evidence of subtraction of values, a partial mark cannot be awarded.

### Candidate 2

The candidate was awarded **0 marks**.

The candidate has given an incorrect response and cannot be awarded the full 2 marks.

The candidate has not provided evidence of subtraction of values, so a partial mark cannot be awarded.

### Candidate 3

The candidate was awarded **2 marks**.

The candidate has given a correct response.

## Question 3(e)(ii)

### Candidate 1

The candidate was awarded **1 mark**.

The candidate has given an incorrect response but can be awarded partial marks.

The candidate has correctly calculated the gram formula mass (GFM), so can be awarded 1 partial mark. They have not used the correct concept as they have not multiplied by 100, so cannot be awarded a second partial mark. The candidate cannot be awarded a mark for arithmetic follow through as they have an incorrect concept.

## Candidate 2

The candidate was awarded **0 marks**.

The candidate has incorrectly calculated the GFM, so cannot be awarded 1 partial mark. The candidate has not used the correct concept. They have not used their mass of nitrogen in the GFM in the expression, using 14 instead of 28, so cannot be awarded a second partial mark. The candidate cannot be awarded a mark for arithmetic follow through as they have used an incorrect concept.

## Candidate 3

The candidate was awarded **0 marks**.

The candidate has incorrectly calculated the GFM, so cannot be awarded this partial mark. The candidate has not used the correct concept. They have not used their mass of nitrogen in the GFM in the expression, using 14 instead of 28, so cannot be awarded this partial mark. The candidate cannot be awarded a mark for arithmetic follow through as they have used an incorrect concept.

## Candidate 4

The candidate was awarded **2 marks**.

The candidate has given an incorrect response but can be awarded partial marks.

The candidate has incorrectly calculated the GFM, so cannot be awarded this partial mark. The candidate has used the correct concept. They have used their mass of nitrogen in the GFM in the expression, so can be awarded 1 partial mark. As the candidate has used a correct concept and has correctly calculated from an incorrect GFM they can be awarded 1 mark for arithmetic follow through.

## Candidate 5

The candidate was awarded **2 marks**.

The candidate has given an incorrect response but can be awarded partial marks.

The candidate has incorrectly calculated the GFM, so cannot be awarded this partial mark. The candidate has used the correct concept. They have used their mass of nitrogen in the GFM in the expression, so can be awarded 1 partial mark. As the candidate has used a correct concept and has correctly calculated from an incorrect GFM they can be awarded 1 mark for arithmetic follow through.

## Candidate 6

The candidate was awarded **0 marks**.

The candidate has incorrectly calculated the GFM as they have used an incorrect formula, so cannot be awarded this partial mark. The candidate has not used the correct concept. They have not used their mass of nitrogen in the GFM in the expression, using 2 instead of 14, so cannot be awarded this partial mark. The candidate cannot be awarded a mark for arithmetic follow through as they have used an incorrect concept.

## Question 4(a)(ii)

### Candidate 1

The candidate was awarded **0 marks**.

The candidate has given an incorrect response as there is only one electron shown on the line or in the overlapping area.

### Candidate 2

The candidate was awarded **0 marks**.

The candidate has given an incorrect response as there is one electron too many in the circle representing hydrogen.

### Candidate 3

The candidate was awarded **1 mark**.

The candidate has given a correct response.

## Question 6(b)(iii)

### Candidate 1

The candidate was awarded **2 marks**.

The candidate has given an incorrect response but can be awarded partial marks.

The candidate has used a correct concept of  $cm\Delta T$  with a value of 4.18, so can be awarded this partial mark. They have an incorrect value for temperature difference, so cannot be awarded the second partial mark. As the candidate has used a correct concept and has correctly calculated from an incorrect temperature difference, they can be awarded 1 mark for arithmetic follow through.

## Candidate 2

The candidate was awarded **2 marks**.

The candidate has given an incorrect response but can be awarded partial marks.

The candidate has used a correct concept of  $cm\Delta T$  with a value of 4.18, so can be awarded this partial mark. They have an incorrect value for the mass of water having used the mass of isopentane instead, so cannot be awarded the second partial mark. As the candidate has used a correct concept and has correctly calculated from an incorrect temperature difference, they can be awarded 1 mark for arithmetic follow through.

## Candidate 3

The candidate was awarded **0 marks**.

The candidate used an incorrect concept as they have used four values instead of three, so cannot be awarded this partial mark. They have used an incorrect value for the mass of water, so cannot be awarded the second partial mark. The candidate cannot be awarded a mark for arithmetic follow through as they have used an incorrect concept.

## Candidate 4

The candidate was awarded **0 marks**.

The candidate used an incorrect concept as they have not used 4.18 as the specific heat capacity value for water, so cannot be awarded this partial mark. They have used an incorrect value for the mass of water, so cannot be awarded the second partial mark. The candidate cannot be awarded a mark for arithmetic follow through as they have used an incorrect concept.

## Candidate 5

The candidate was awarded **3 marks**.

The candidate has given a correct response.

## Question 6(b)(iv)

### Candidate 1

The candidate was awarded **1 mark**.

The candidate has given a partially correct response.

The candidate has given a workable labelled method, so is awarded 1 partial mark.

The candidate has not included a thermometer, so cannot be awarded the second mark.

### Candidate 2

The candidate was awarded **1 mark**.

The candidate has given a partially correct response.

The candidate has given a workable labelled method, so is awarded 1 partial mark.

The candidate has not included a thermometer, so cannot be awarded the second mark.

### Candidate 3

The candidate was awarded **0 marks**.

The candidate has given an incorrect response.

The candidate has not given a workable labelled method as they have included isopentane inside the copper can and have not included a thermometer, so cannot be awarded any partial marks.

### Candidate 4

The candidate was awarded **2 marks**.

The candidate has given a fully correct response.

The candidate has used loose spelling for the labelling of the thermometer with 'theromenter'. This is acceptable in this case as there is no confusion with any other terms.

## Question 7(a)(i)

### Candidate 1

The candidate was awarded **1 mark**.

The candidate has given an incorrect response but can be awarded partial marks.

The candidate has not calculated a value for the number of moles of sodium chloride. The candidate has used 1.5 which is the value for the concentration given in the question. Therefore, the first and third partial mark options cannot be awarded. They have correctly calculated the GFM, so can be awarded the second partial mark.

### Candidate 2

The candidate was awarded **2 marks**.

The candidate has given an incorrect response but can be awarded partial marks.

The candidate has correctly calculated a value for the number of moles of sodium chloride, so can be awarded the first partial mark. They have correctly calculated the GFM, so can be awarded the second partial mark.

### Candidate 3

The candidate was awarded **2 marks**.

The candidate has given an incorrect response but can be awarded partial marks.

The candidate has incorrectly calculated a value for the number of moles of sodium chloride, so cannot be awarded the first partial mark. They have correctly calculated the GFM, so can be awarded the second partial mark. The candidate has correctly calculated the mass of sodium chloride from an incorrect number of moles, so can be awarded the final partial mark.

## Question 7(b)(i)

### Candidate 1

The candidate was awarded **0 marks**.

The candidate has given an incorrect response. The candidate has incorrectly rounded their final numerical answer to 106.6 instead of 106.7.



## Candidate 2

The candidate was awarded **0 marks**.

The candidate has given an incorrect response.

## Candidate 3

The candidate was awarded **0 marks**.

The candidate has given a correct response but has included an incorrect unit.

This penalty would only be applied if this is the first instance of incorrect units and would only be applied once per paper.

## Question 7(b)(ii)

### Candidate 1

The candidate was awarded **1 mark**.

The candidate has given a partially correct response.

The candidate has not provided a heading for the concentration column, so cannot be awarded the first mark. They have correctly matched the data, so the second mark can be awarded.

### Candidate 2

The candidate was awarded **1 mark**.

The candidate has given an incorrect response.

The candidate has not presented the data as a table, so cannot be awarded the first mark. The candidate has correctly matched the data including their incorrect value from question 7(b)(i), so the second mark can be awarded.

### Candidate 3

The candidate was awarded **1 mark**.

The candidate has given a partially correct response.

The candidate has not provided a unit for the average boiling point column heading, so cannot be awarded the first mark. They have correctly matched the data, so the second mark can be awarded.

### Candidate 4

The candidate was awarded **1 mark**.

The candidate has given a partially correct response.

The candidate has not provided units as part of the headings for the columns. They have included units with each table entry, and this would be acceptable, however they have given incorrect units of mol<sup>-1</sup> for concentration, so cannot be awarded the first mark. They have correctly matched the data, so the second mark can be awarded.

### Candidate 5

The candidate was awarded **1 mark**.

The candidate has given a partially correct response.

The candidate has not provided units as part of the headings for the columns. They have included units with each table entry, and this is acceptable, so the first mark can be awarded. They have not included all the required data, so the second mark cannot be awarded.

## Question 8(e)

### Candidate 1

The candidate was awarded **0 marks**.

The candidate has given an incorrect response.

### Candidate 2

The candidate was awarded **0 marks**.

The candidate has given an incorrect response.

### Candidate 3

The candidate was awarded **0 marks**.

The candidate has given an incorrect response.

### Candidate 4

The candidate was awarded **1 mark**.

The candidate has given a correct response.

## Question 9(a)

### Candidate 1

The candidate was awarded **0 marks**.

The candidate has given an incorrect response.

### Candidate 2

The candidate was awarded **0 marks**.

The candidate has given a correct definition but has used the term molecules which is a cancelling error, so cannot be awarded the mark.

### Candidate 3

The candidate was awarded **0 marks**.

The candidate has given an incorrect response as they have given the definition of isomers, so cannot be awarded the mark.

### Candidate 4

The candidate was awarded **1 mark**.

The candidate has given a correct response.

## Question 9(c)(iii)(B)

### Candidate 1

The candidate was awarded **0 marks**.

The candidate has given an incorrect response as they have used the GFM as the mass of nickel fluoride.

### Candidate 2

The candidate was awarded **0 marks**.

The candidate has given an incorrect response as the minimum number of tubs purchased should have been four. The candidate has an incorrect unit of 'g' but this is not relevant since the final answer is given in £.

### Candidate 3

The candidate was awarded **0 marks**.

The candidate has not given a monetary value as their final answer, so cannot be awarded a mark. They have given £277.6 but this should have been £277.60.

## Question 10(a)

### Candidate 1

The candidate was awarded **0 marks**.

The candidate has given an incorrect response. They have correctly stated 'compounds with the same general formula' but have not mentioned chemical properties, so cannot be awarded the mark.

### Candidate 2

The candidate was awarded **0 marks**.

The candidate has given an incorrect response. They have incorrectly stated 'similar chemical formula', so cannot be awarded the mark. The candidate has also incorrectly stated 'different' chemical properties.

### Candidate 3

The candidate was awarded **0 marks**.

The candidate has given an incorrect response. They have incorrectly stated 'certain' instead of similar chemical properties, so cannot be awarded the mark. The candidate also has not mentioned same general formula.

### Candidate 4

The candidate was awarded **0 marks**.

The candidate has given an incorrect response. They have correctly stated 'molecules with similar chemical properties' but have also said 'similar structural formulae' which is not acceptable instead of general formula, so cannot be awarded the mark.

## Candidate 5

The candidate was awarded **0 marks**.

The candidate has given an incorrect response. They have correctly stated 'similar chemical properties' but have used the term 'elements' which is incorrect. The candidate also has not stated that the general formula should be the same, so cannot be awarded the mark.

## Candidate 6

The candidate was awarded **0 marks**.

The candidate has given an incorrect response. They have correctly stated 'compounds with the same general formula' but have said 'similar chemical structures' instead of chemical properties, so cannot be awarded the mark.

## Candidate 7

The candidate was awarded **1 mark**.

The candidate has given a correct response.

## Question 11(c)

### Candidate 1

The candidate was awarded **2 marks**.

The candidate has given an incorrect response but can be awarded partial marks.

The candidate has incorrectly calculated the GFM of glucose as 100g and have therefore obtained an incorrect value for moles of glucose, so the first partial mark option cannot be awarded. They have correctly applied the mole ratio to obtain a correct stoichiometric mass of oxygen (192) and although they have not explicitly written down the number of moles of oxygen, this must be correct, so the second of the partial mark options can be awarded. The candidate has correctly multiplied their calculated mass of oxygen by their incorrectly calculated moles of glucose, so the third partial mark option can be awarded.

## Candidate 2

The candidate was awarded **2 marks**.

The candidate has given an incorrect response but can be awarded partial marks.

The candidate has correctly calculated the number of moles of glucose, so the first partial mark option can be awarded. They have correctly applied the mole ratio to obtain a correct number of moles of oxygen, so the second of the partial mark options can be awarded. The candidate has incorrectly multiplied the moles of oxygen by 192 (the mass of 6 moles of oxygen) and therefore has effectively applied the mole ratio twice, so the third partial mark option cannot be awarded.

## Candidate 3

The candidate was awarded **2 marks**.

The candidate has given an incorrect response but can be awarded partial marks.

The candidate has correctly calculated the moles of glucose (0.0125), so can be awarded the first partial mark. The candidate has not applied the correct mole ratio, so the second partial mark option cannot be awarded. The candidate has correctly multiplied their calculated moles of oxygen (0.0125) by the GFM (32), so the third partial mark option can be awarded.

## Candidate 4

The candidate was awarded **0 marks**.

The candidate has not calculated the moles of glucose, applied the mole ratio or calculated the moles of oxygen but has instead used the mass of glucose in place of the number of moles in their calculation, so no partial marks can be awarded.

## Candidate 5

The candidate was awarded **3 marks**.

The candidate has given a fully correct response.