

# Commentary on candidate evidence

The candidate evidence has achieved the following marks for each section of the assignment.

## Candidate 1

### 1 Aim

The candidate was awarded **1 out of 1 mark** because the aim clearly describes the purpose of the investigation; 'To find out how increasing particle size affects the rate of reaction.'

### 2 Underlying chemistry

The candidate was awarded **3 out of 3 marks** because they have demonstrated a good understanding of the chemistry at National 5 level, that is relevant to their investigation.

The correct relevant chemistry includes factors affecting the rate of reactions, correct examples of equations for a reaction of a metal carbonate and an acid, a possible method for measuring the carbon dioxide gas produced by the reaction and the correct relationship for calculating the average rate.

### 3 Data collection and handling

The candidate was awarded **5 out of 6 marks**. The marks were awarded as follows:

3(a) **1 out of 1 mark** was awarded because the candidate has given a brief description of the approach used to collect experimental data, which allows the marker to visualise what the candidate has done.

3(b) **1 out of 1 mark** was awarded because the candidate has provided sufficient raw data from their experiments. They have used three different particle sizes and have recorded duplicate values for each.

3(c) **1 out of 1 mark** was awarded because the raw data has been tabulated with correct headings and units given.

3(d) **0 out of 1 mark** was awarded because the average volume of gas was correctly calculated, but the average rate used a value for time not previously provided.

3(e) **1 out of 1 mark** was awarded because the candidate's internet data source matches their sample range (whole table, chunks and crushed versus large medium and small particles). It is noted that the source does not illustrate a trend

related to average rate, but instead shows reaction time in seconds. However, the candidate has shown that they have correctly interpreted the source with respect to their experimental data.

3(f) **1 out of 1 mark** was awarded because the candidate has provided a valid URL for their internet source.

## 4 Graphical presentation

The candidate was awarded **4 out of 4 marks**. The marks were awarded as follows:

4(a) **1 out of 1 mark** was awarded because the candidate has used an appropriate graph format (bar graph).

4(b) **1 out of 1 mark** was awarded because the candidate has provided a suitable scale on the y-axis.

4(c) **1 out of 1 mark** was awarded because the candidate has used suitable labels and units for both axes.

4(d) **1 out of 1 mark** was awarded because the candidate has plotted all three bars accurately.

## 5 Analysis

The candidate was awarded **1 out of 1 mark** because they have provided a valid comparison and identified a valid and correct relationship between their experimental results and the internet data source. The candidate has given statements linking the data, stating that small particles 'produced the most within 2 minutes' and that the source shows small particles 'took the least time to react' and that both statements 'prove that the smallest particle is the fastest'. They have made a similar set of statements for larger particles indicating that they are the 'slowest' and have identified that the medium sized particles in both sources lie somewhere in between.

It is noted that the candidate does not refer specifically to rate however, their statement 'produced the most within 2 minutes' is accepted as such, since it describes a quantity within a time period (average rate).

## 6 Conclusion

The candidate was awarded **1 out of 1 mark** because they have given a valid conclusion that relates to the aim of the investigation, and this is supported by the experimental data given.

## 7 Evaluation

The candidate was awarded **1 out of 2 marks** because they have correctly identified loss of gas as a factor expected to have a significant effect on the reliability, accuracy or precision of the experiment, so the first mark is awarded. The candidate has not provided a suitable explanation of how to minimise this effect. The candidate has indicated placing a stopper 'on top of the test tube as soon as the chips are added'. The use of a stopper is a requirement of their gas collection experiment, so this explanation of how to minimise the effect is not sufficient, therefore the second mark cannot be awarded.

## 8 Structure

The candidate was awarded **2 out of 2 marks**. The marks were awarded as follows:

8(a) **1 out of 1 mark** was awarded because the candidate has provided an informative title.

8(b) **1 out of 1 mark** was awarded because the report is clear and concise.

## Overall

The candidate was awarded a total of **18 out of 20 marks**.