Commentary on candidate evidence

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

Candidate 3

1 Aim

The candidate was awarded **1 out of 1 mark** because the aim clearly describes the purpose of the investigation; 'To investigate the effects of different metal pairings on voltage.'

2 Underlying chemistry

The candidate was awarded **2 out of 3 marks** because they have demonstrated a reasonable understanding of the chemistry at National 5 level, that is relevant to their investigation.

The correct relevant chemistry provided includes information about electrochemical cells and the effect of the position of the metals in the electrochemical series on the voltage produced. Definitions for oxidation and reduction have also been given.

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 experiment. They have used three metal pairs and have recorded three repeat measurements for each pair.

3(c)   **0 out of 1 mark** was awarded because the candidate has not provided correct column headings. The headings should be Voltage or Average Voltage. 'Volts' on its own is not an acceptable heading as it is a unit.

3(d)   **1 out of 1 mark** was awarded because the average voltages have been correctly calculated and placed in the final column of the table. The copper - aluminium average is accepted as it is correct for the shown one decimal place value.

3(e)   **1 out of 1 mark** was awarded because although the source range is not an exact match, the candidate has provided data/information from an internet source that illustrates information related to the voltages when different metal pairs are connected in a cell.

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

4 Graphical presentation

The candidate was awarded **3 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 y-axis of the bar graph has a suitable scale.

4(c)   **1 out of 1 mark** was awarded because both axes have labels, and the y-axis has a correct unit. The word 'Voltage' is acceptable as a label on the y-axis and does not require to be average voltage.

4(d)   **0 out of 1 mark** was awarded because the candidate has not plotted all bars accurately. The bar for copper and aluminium is at 0.61 not 0.6, so is incorrect. The bar for copper and zinc is borderline.

5 Analysis

The candidate was awarded **0 out of 1 mark** because they have not identified a correct and valid relationship between the results of their experiment and their internet source. They made a statement that their copper-zinc pairing is lower than the copper-zinc pairing of the source, however, this is not sufficient.

6 Conclusion

The candidate was awarded **0 out of 1 mark** because they have not given a valid conclusion that relates to the aim and is supported by all the data in the report. The candidate's conclusion statement that 'metals further apart on the electrochemical series will create a higher voltage' is not supported by the experimental data, which shows the voltage for the aluminium-copper pairing to be lower than the zinc-copper pairing.

7 Evaluation

The candidate was awarded **1 out of 2 marks** because they have correctly identified a factor expected to have a significant effect on the reliability, accuracy, or precision of the experiment. The candidate has identified oxidation of the metals as a factor, but they have not provided a suitable explanation or method to minimise the effects.

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 an informative title was provided.

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

Overall

The candidate was awarded a total of **14 out of 20 marks**.