

Commentary on candidate evidence

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

3(a) Summary

Candidate 1

The candidate was awarded **0 out of 1 mark** because they have not provided a brief summary. Although they have not given volumes and concentrations, they have given excessive details for the dilution of the vinegar by pipetting into a standard flask and for carrying out a titration by mentioning taking initial readings.

Candidate 2

The candidate was awarded **1 out of 1 mark** because they have demonstrated the ability to summarise their method. They have also included an additional safety measure stating that gloves were worn to prevent iodine solution staining the skin.

Candidate 3

The candidate was awarded **0 out of 1 mark** because although they have demonstrated the ability to summarise their method, they have not included any additional safety measures or stated that none were required and so the mark cannot be awarded.

Candidate 4

The candidate was awarded **0 out of 1 mark** because they have not given the independent variable. The candidate has stated 'Heat the mixture to a specific temperature ...', but they have not made any reference to repeating at different temperatures. The safety statement given would have been acceptable.

5 Analysis

Candidate 1

The candidate was awarded **0 out of 1 mark** because they have not stated a valid relationship between their experiment and the internet source values or made a comparison of their results with each other. They have stated that their results were 'very close to percentages' however this is not sufficient for the mark.

The candidate could have stated that their experimental values were slightly higher than those obtained from the internet source with pickling vinegar being the highest value for both and the two malt vinegar brands being the same.

Candidate 2

The candidate was awarded **0 out of 1 mark** because although they have made a valid comparison of their experimental data with that of the internet source, they have incorrectly calculated the percentage increase between their values and those of the internet source.

Candidate 3

The candidate was awarded **1 out of 1 mark** because they have identified a correct and valid relationship, stating '...as you move up the alcohols (number of carbons) more energy is produced'. They have also made comparisons of their results with those of their internet source by giving correctly calculated percentage increases of their experimental values with those of the internet source.

Candidate 4

The candidate was awarded **0 out of 1 mark** because they have not identified a correct and valid relationship between their experimental data and the internet source. The candidate has stated that both sets of data 'show the same trend ...'. This simple comparison of trends in data is insufficient, so no mark is awarded.

7 Evaluation

Candidate 1

The candidate was awarded **1 out of 3 marks** because they have made one evaluative statement with an appropriate justification. The candidate stated that the indicator 'clearly showed when the experiment had finished' with the justification that 'the pH indicator that was used was very brightly' (accepting 'brightly' as meaning bright and easy to observe).

The candidate made two other statements however these were not valid. They stated 'the results I obtained were fairly accurate' with the justification that they 'matched' the internet source values. This was not true since their results were higher than those quoted by the source. They also stated that if they were to carry out the experiment again, they would not use the Asda vinegar as they were 'unable to find an exact acidity of vinegar percentage'. This is not valid since they have not included an appropriate justification or stated the impact this would have on their results.

Candidate 2

The candidate was awarded **1 out of 3 marks**. The candidate has made several evaluative statements however not all are valid.

1 mark is awarded for the evaluation of the internet source. The candidate has stated that 'it is reliable' with the justification that it 'must comply with EU regulations' and that it 'is peer reviewed' and is 'monitored by the Food Standards Agency'. They have made a second valid evaluative statement about the internet source being an average and so may not be completely reliable for their samples, however a maximum of 1 mark can be awarded for evaluation of the internet source.

There are a further two evaluative statements that are not supported by the appropriate justification and so no marks can be awarded for these.

Using freshly opened cartons would not have any effect on the accuracy of their results since this comes from the procedure. It would however give an even higher Vitamin C concentration than those originally obtained.

Using magnetic stirrers would not prevent the addition of 'too much' iodine solution since improperly mixed samples would result in an early colour change meaning less iodine solution was actually added.

Candidate 3

The candidate was awarded **2 out of 3 marks**. The marks were allocated as follows:

- ◆ 1 mark is awarded for the evaluation of the internet source. The candidate has stated that Doc Brown's website is trustworthy with the justification that it is written by scientists and chemistry teachers.
- ◆ 1 mark is awarded for stating that their 'results are on average 92% lower than the theoretical' and that this was due to heat loss which could be reduced by the use of heat shielding.

Candidate 4

The candidate was awarded **0 out of 3 marks** because they have not made any valid evaluative statements that are supported by appropriate justifications. The candidate has made some evaluative statements, however, these are not evidenced in the experimental results. Repeating an experiment is standard practice and is a requirement for the 'Raw data' mark at section 3(b), so would not be awarded again here.

Modifications to the experiment suggested (use of pipettes or class A glassware) are not linked to experimental results.

Stating that a change to procedure would 'help improve the accuracy' is not accepted unless linked directly to experimental results.

The internet source chosen by the candidate is accepted (section 3(c)) and shows the correct trend in the relationship between temperature and rate. No impact on the data would be evidenced if the second source used 'degrees' instead of 'Kelvins'