



Questions & Answers

Changes to assessment in Higher Chemistry

1 Revised National Qualification course assessment

The hydrogenation of oils isn't mentioned in the new Higher Chemistry Course Specification, has it been removed?

In the previous course, candidates needed to be familiar with addition reactions, and were required to understand the link between the degree of unsaturation of an edible oil, and its melting point. These key concepts are still very much part of the Higher course.

In the previous course support notes, the hydrogenation of edible oils was given as an example of an addition reaction. However, as a result of action taken by the UK Department of Health in response to concerns over food safety, by 2013 all major food manufacturers and retailers had given an undertaking that they will not produce or sell any products containing artificial trans fats. As it is now relatively rare to find food products in the UK containing hydrogenated oils, the decision was made not to include this outdated process as an example of an addition reaction.

2 Assignment — research stage

Can you give an example of underlying chemistry relevant to aim?

The underlying chemistry section provides candidates with the opportunity to be awarded marks for showing an understanding of the chemistry underpinning their experimental investigation.

For example, for the determination of Vitamin C using a redox titration, the ion-electron equations or the action of Vitamin C as an antioxidant, are examples of chemistry relevant to the aim. The structure of vitamin E and its ability to act as a free radical scavenger are examples of chemistry that is not relevant to the aim of this investigation.

If a candidate gets concordant titration results, do they still need to do the experiment again to get repeat values?

When titrations are being carried out to determine a quantity of substance in a product, eg the mass of vitamin C in fruit juice, if concordant results are obtained there is no need to repeat the experiment.

When investigating the effect of temperature on reaction rate it can be difficult to exactly match the temperature originally used when repeating the experiment. Can candidates increase the size of sample rather than doing repeats?

In the instructions for candidates, it tells candidates to make sure that they use a sufficient number of values over a wide enough range to meet the aim of their experiment, and it also states that they must repeat the experiment if possible.

If candidates choose to investigate the effect of temperature on relative rate, then it would be practicable to run repeat samples at the same time in the same water-bath. Repeat measurements should not be sacrificed in order to measure the rate for additional temperatures.

Can candidates reference labels from juice or vinegar bottles as the source of data to compare with their experimental results?

Candidates are required to produce data from an internet or literature source. This is defined as data from; a website, journal, book or data booklet. Product packaging is not an internet/literature source.

However, the information that is provided on food product labels can also be found on manufacturer websites, and on the online shopping pages of leading supermarkets. Candidates can cite and reference these product information webpages.

Can candidates prepare a draft of their report?

During the research stage, candidates may reflect on their findings but teachers and lecturers must not, at any point, give feedback to candidates on their experimental results, and this precludes teachers and lecturers assisting candidates in performing calculations on their results. Teachers and lecturers must also take care not to direct candidates towards the selection of any particular piece of internet/literature data.

Candidates may not take drafts of the report, the underlying chemistry, the comparison of experimental and internet/literature data, the conclusion, or the evaluation into the report writing stage. Candidates cannot take any specimen calculations or any pre-calculated values into the report writing stage.

3 Assignment — report stage

Do references for the underlying chemistry have to be included in the report?

Candidates do not need to cite or reference information provided in the underlying chemistry section.

At Higher, can candidates summarise the experimental approach using a diagram?

A diagram on its own is insufficient to gain the mark for a brief summary of the approach used to collect experimental data.

In the description of the experimental approach, do candidates need to mention a specific chemical, the hazard it presents, and how it was controlled?

One mark is available where the candidate has given a brief summary of the approach used to collect experimental data, and has described any additional safety measures that were taken to minimise risk. To be awarded this mark, the candidate must describe appropriate precautions, but the candidate does not need to state the hazards that these precautions are intended to mitigate.

Examples of acceptable summaries include:

‘Tea samples were titrated with iodine solution using starch as the indicator. We wore gloves when handling iodine solution.’

‘The alcohol concentration of different drinks was measured by distilling the drink and measuring the density of the distillate. A hot plate was used and there were no flames nearby.’

Can the candidate’s raw experimental data be taken into the reporting stage in a tabulated form?

Candidates may take a table containing their experimental measurements into the report stage, but this table cannot contain any calculated values.

Teachers and lecturers must not have provided any feedback to the candidate regarding this table.

Can candidates take the results of their experiment home?

If candidates produce the report over a number of lessons, then the teacher or lecturer must retain and store candidate’s work securely between lessons. Candidates should not take home any data or information during the report stage.

Why are average rates included in the list of chemical calculations when they are taught as part of National 5?

By the time a candidate has completed the Higher course, they will have encountered a wide-range of chemical calculations, some of which they will meet at National 5, and others that are only introduced at Higher level.

The list of chemical calculations given in the *Higher Chemistry Assignment Assessment task* recognises the breadth of chemical calculations that will have been mastered by Higher candidates.

To ensure that candidates are offered the opportunity to engage in a diverse range of experimental activities, the choice of topic is not restricted to only those investigations directly relating to Higher content statements.

Interesting and ambitious practical investigations involving the determination of average rates can be carried out that require the levels of practical skills and analytical thinking appropriate to a Higher Chemistry assignment.

Do candidates need to provide a sample calculation?

The instructions for candidates states that candidates should show at least one sample calculation. While the chemical calculation mark may be awarded without a sample calculation, the inclusion of such a calculation is good practice.

Do the calculated values need to be added to the table showing the experimental data?

The results of calculations do not need to be presented in a table.

Can candidates use a data booklet during the reporting stage?

A data booklet may be used as the source of internet/literature data for comparison with the candidate's experimental results, or to provide relative atomic masses, or other values, required to carry out chemical calculations during the report writing stage.

What is the difference between a line graph and a scatter graph?

Line graphs and scatter graphs are types of graphs that many chemistry candidates will be familiar with from their study of National 4 and National 5 Mathematics or Applications of Mathematics. In these courses, candidates learn that the term 'scatter graph' is used to describe a graph in which data points are plotted in order to establish the relationship between two numerical variables. Where the points appear to show that a relationship exists, a best-fit line, or curve can be drawn. 'Line graph' is the term used to describe a graph plotted to provide a visual representation of how the value of one variable changes over successive measurements.

If candidates have calculated the enthalpy of combustion, what format should their graph take?

The graph format selected will depend on the candidate's aim. Where the aim is to measure the enthalpy of combustion for different compounds, it would be acceptable for the candidates to plot a bar graph in which the enthalpy of combustion for each compound is represented by the height of a bar, and the names of the compounds are used as labels on the horizontal axis. If the aim of the experiment is to find the relationship between the enthalpy of combustion and the number of carbon atoms, this is an example of a graph plotted to establish the relationship between two numerical variables, and a scatter graph can be produced. In this graph, points would be plotted where the y-value of each point represents the enthalpy of combustion, and the x-value represents the number of carbon atoms. If the points appear to show that a relationship exists between enthalpy of combustion and the number of carbons, a best-fit line or curve should be drawn.