

N5

National 5
Coursework
Assessment Task



National 5 Chemistry Assignment Assessment task

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Introduction

This document contains instructions for teachers and lecturers, marking instructions and instructions for candidates for the National 5 Chemistry assignment. It must be read in conjunction with the course specification.

This assignment is worth 20 marks (scaled to 25). The marks contribute 20% of the overall marks for the course assessment.

This is one of two course assessment components. The other component is a question paper.

Instructions for teachers and lecturers

General information

This information applies to the assignment for National 5 Chemistry.

The purpose of the assignment is to assess the application of skills of scientific inquiry and related chemistry knowledge and understanding.

The assignment gives candidates an opportunity to demonstrate the following skills, knowledge and understanding:

- ◆ applying knowledge of chemistry to new situations, interpreting information and solving problems
- ◆ planning, designing and safely carrying out experiments/practical investigations to test given hypotheses or to illustrate particular effects
- ◆ selecting information from a variety of sources
- ◆ presenting information appropriately in a variety of forms
- ◆ processing the information (using calculations and units, where appropriate)
- ◆ making predictions and generalisations based on evidence/information
- ◆ drawing valid conclusions and giving explanations supported by evidence/justification
- ◆ suggesting improvements to experiments/practical investigations
- ◆ communicating findings/information

The assignment offers challenge by requiring skills, knowledge and understanding to be applied in a context that is one or more of the following:

- ◆ unfamiliar
- ◆ familiar but investigated in greater depth
- ◆ integrates a number of familiar contexts

Candidates research and report on a topic that allows them to apply skills and knowledge in chemistry at a level appropriate to National 5.

The topic should be chosen with guidance from teachers or lecturers and must involve experimental work.

The assignment has two stages:

- ◆ research
- ◆ report

The research stage must involve an experiment that allows measurements to be made. Candidates must also gather data/information from the internet, books and/or journals to compare against their experimental results. The candidate's research may also involve gathering extracts from internet/literature sources to support their descriptions and/or explanations of the underlying chemistry.

Candidates must produce a report on their research.

Assessment should take place when candidates are ready to be assessed. It is not advisable to undertake the assignment too early, as it is important that candidates are adequately prepared in the skills needed to undertake all parts of the assignment.

Conditions of assessment

Setting, conducting and marking the assignment

Setting

The assignment is:

- ◆ set by centres within SQA guidelines
- ◆ set at a time appropriate to the candidates' needs
- ◆ set within teaching and learning and includes experimental work at a level appropriate to National 5

Conducting

The assignment is:

- ◆ an individually produced piece of work from each candidate
- ◆ started at an appropriate point in the course
- ◆ conducted under controlled conditions

Marking

The report is submitted to SQA for external marking.

All marking is quality assured by SQA.

Controlled assessment conditions

Controlled assessment is designed to:

- ◆ ensure that all candidates spend approximately the same amount of time on their assignments
- ◆ prevent third parties from providing inappropriate levels of guidance and input
- ◆ mitigate concerns about plagiarism and improve the reliability and validity of SQA awards

- ◆ allow centres a reasonable degree of freedom and control
- ◆ allow candidates to produce an original piece of work

There are two levels of control.

| Under a high degree of supervision and control | Under some supervision and control |
|---|--|
| <ul style="list-style-type: none"> ◆ the use of resources is tightly prescribed ◆ all candidates are within direct sight of the supervisor throughout the session(s) ◆ display materials that might provide assistance are removed or covered ◆ there is no access to e-mail, the internet or mobile phones ◆ candidates complete their work independently ◆ interaction with other candidates does not occur ◆ no assistance of any description is provided | <ul style="list-style-type: none"> ◆ candidates do not need to be directly supervised at all times ◆ the use of resources, including the internet, is not tightly prescribed ◆ the work an individual candidate submits for assessment is their own ◆ teachers and lecturers can provide reasonable assistance |

The assignment has two stages.

| Stage | Level of control |
|------------|--|
| ◆ research | conducted under some supervision and control |
| ◆ report | conducted under a high degree of supervision and control |

Instructions

Teachers and lecturers must exercise their professional responsibility to ensure that the report submitted is the candidate's own work.

It is recommended that no more than 8 hours is spent on the **whole** assignment.

A maximum of 1 hour and 30 minutes is allowed for the report stage.

Teachers and/or lecturers must ensure candidates understand the requirements of the task. The instructions for candidates outline the requirements for the assignment and must be issued to candidates at the outset. These must not be altered or supplemented by centre-devised material.

It is not permitted, **at any stage**, to provide candidates with a template or model answers.

Research stage

The research stage is conducted under some supervision and control. See conditions of assessment section.

Choosing the topic

At the start of the research stage, the teacher or lecturer must agree the choice of topic with the candidate to ensure that it:

- ◆ is appropriate for National 5 Chemistry
- ◆ has associated experimental work that can generate numerical data
- ◆ allows candidates the opportunity to access all of the available marks

The teacher and/or lecturer must ensure that a **range** of topics is available for candidates to choose from. A range of topics means that it is acceptable for the same general topic to be investigated in a class and across classes, providing that a variety of independent variables are being investigated, or a variety of experiments are being carried out, or both. This is to ensure that centres do not use a whole-class experiment.

Teachers and/or lecturers must minimise the number of candidates within a class:

- ◆ investigating the same topic
- ◆ investigating the same independent variable
- ◆ carrying out the same experiment.

A range of topics chosen for investigation will create the climate in which candidates can produce original work within the conditions of assessment.

Once candidates have agreed the topic with their teacher and/or lecturer, the candidate must formulate an aim.

Formulating the aim

The teacher or lecturer must provide advice on the suitability of the candidate's aim, taking into account the factors below:

- ◆ health and safety considerations
- ◆ availability of resources

availability of data/information from the internet/literature source

Any advice on the suitability of an aim is only to ensure that it is achievable, taking into account these factors.

Teachers and lecturers are **not** permitted to provide an aim.

After the candidate has formulated an aim, they can progress through the research stage.

The order in which the research is carried out need not be the order outlined below.

Experimental research

Teachers and lecturers can supply instructions for the experimental procedure. This must **only** be a basic list of instructions. These instructions must not include the range, number or interval of values or measurements nor should there be any reference to repeats. Candidates must decide these for themselves. Where there is a safety issue, a maximum value for the range can be provided.

Teachers and/or lecturers are responsible for ensuring that appropriate risk assessment has been carried out and that candidates have guidance on the safe and correct use of chemicals and equipment.

Teachers and lecturers must not provide candidates with a set of experimental data.

Teachers and lecturers must not provide candidates with a blank or pre-populated table for experimental results.

Candidates must carry out the experimental work individually or as part of a small group. (A small group is defined as having two, three or four candidates.)

Group work may be an appropriate approach in a number of circumstances, for example:

- ◆ to encourage diversity of research topic
- ◆ where experiments are labour- or time-intensive
- ◆ where resources are limited

Where group work is undertaken, teachers and lecturers must ensure every candidate participates in the experimental work. Within the small group, it is acceptable for candidates to share experimental data but experimental data

must not be shared between groups. Where candidates in a small group have the same raw data, any calculations and analysis must be done individually.

Teachers and/or lecturers must not provide feedback to candidates on their results. However, where **candidates** identify a problem with their results and indicate that they wish to repeat the experiment, candidates may do so.

Internet/literature research

The internet/literature research must be the work of the individual candidate; candidates cannot work in a group to carry out this research.

Candidates may carry out research to find comparative data/information and information on underlying chemistry outwith the direct supervision of teachers or lecturers.

Candidates must undertake research using only websites, journals and/or books, to find comparative data/information.

Candidates must not have access to lists of potential sources of comparative data or lists of sources to support their description of the underlying chemistry. Candidates must not be directed to specific websites, journals or textbooks. Candidates must not be provided with whole articles or extracts from websites, journals or textbooks, selected by a third party.

Candidates must find internet/literature data/information to compare against their experimental data and record the reference to the source.

This can be data/information that:

- ◆ matches the sample range used
- ◆ is not an exact match for the sample range used
- ◆ is generic and illustrates a trend or pattern expected in the experimental data

Teachers and lecturers must not provide candidates with a set of experimental data to compare with the candidates' own data.

Teachers and lecturers must not provide feedback to candidates on their research.

Report stage

The report stage is conducted under a high degree of supervision and control. See 'conditions of assessment' section.

Candidates must be given a maximum of 1 hour and 30 minutes to produce the report.

- ◆ This can be a continuous period of time or split over a number of successive subject lessons.
- ◆ It is the responsibility of the centre to ensure that candidates are given no more than the maximum time.
- ◆ If the report is produced over a number of successive lessons, then the teacher or lecturer must retain candidates' work and store it securely between lessons to ensure that candidates do not add any additional materials to those they had at the start of the report stage. Teachers and lecturers must not provide any additional teaching or coaching in relation to the assignments between reporting sessions.

Candidates may word-process their report and use appropriate software to produce graphs – providing that the assessment conditions are met.

Teachers or lecturers must check that the materials (in any format) that each and every candidate will use in the report stage fit the following criteria.

The **only** materials that can be used in the report stage are:

- ◆ the instructions for candidates, which must not have been altered
- ◆ the candidate's raw experimental data which may be tabulated, however must not have additional blank or pre-populated columns for mean and derived values
- ◆ comparative data/information from the internet or literature or the SQA data booklet, which must not include sample calculations
- ◆ a record of the source of the comparative data/information
- ◆ the instructions used for the experimental procedure
- ◆ extract(s) from internet/literature source(s) or the SQA data booklet to support the underlying chemistry, which must not include sample calculations

An extract must be:

- ◆ chosen by the candidate – they must select what information to extract
- ◆ verbatim – it must be a direct copy, which can be a printout, photocopy or handwritten (and word for word)
- ◆ from an internet/literature source – not from centre-devised course material or class notes. Candidate notes of any description are not permitted
- ◆ checked by the teacher or lecturer to ensure that it is an extract (unannotated), and not notes or a draft

There is no size limit on an extract; however, it must be an extract and not the full document.

Candidates **must not** have access to a previously prepared draft of a report or any part of a report.

In addition, candidates **must not** have access to the assignment marking instructions during the report stage.

Candidates **must not** have access to the internet during the report stage.

Teachers and lecturers **must not** read the reports or provide any form of feedback to candidates during the report stage.

Following completion of the report stage candidates **must not** be given an opportunity to redraft their report.

Evidence to be gathered

The following candidate evidence is required for this assessment:

- ◆ a report

The report is submitted to SQA, within a given time frame, for marking.

The same report cannot be submitted for more than one subject.

Marking instructions

In line with SQA's normal practice, the following marking instructions for the National 5 Chemistry assignment are addressed to the external marker. They will also be helpful for those preparing candidates for course assessment.

Candidates' evidence is submitted to SQA for external marking.

General marking principles

Always apply these general principles. Use them in conjunction with the detailed marking instructions, which identify the key features required in candidates' responses.

- a Always use positive marking. This means candidates accumulate marks for the demonstration of relevant skills, knowledge and understanding; marks are not deducted for errors or omissions.

Read the whole report before assigning any marks.

Credit should be given for appropriate information wherever it is given in the report.

| Section | Max mark | Expected response and marking instructions |
|-----------------------|----------|---|
| 1 Aim (1 mark) | | |
| | 1 | <p>An aim that describes clearly the purpose of the investigation.</p> <p>The word 'aim' is not required but the statement of the aim should be separate from the title.</p> <p>Acceptable versions of an aim could be:</p> <ul style="list-style-type: none"> ◆ 'to determine the effect of different de-icers on depressing the freezing point of water' ◆ 'to find out how increasing the temperature affects the rate of the reaction between oxalic acid and potassium permanganate' <p>Note: 'investigate de-icers' or 'investigate rates' or 'investigate effectiveness of alcohols as fuels' would not be acceptable.</p> |

| Section | Max mark | Expected response and marking instructions |
|---|----------|---|
| 2 Underlying chemistry (3 marks) | | |
| | 3 | <p>An account of chemistry relevant to the aim of the investigation.</p> <p>This section is marked holistically and is an opportunity to give marks for the ‘quality’ of underlying chemistry at a depth appropriate to National 5 Chemistry. Underlying chemistry may be found anywhere in the assignment report but the marks are awarded in this section.</p> <p>Candidates must demonstrate an understanding of relevant chemistry and use their own words wherever possible. It is acceptable, however, to include complex diagrams and structural formulae from a internet/literature source.</p> <ul style="list-style-type: none"> ◆ 3 marks should be awarded for demonstrating a good understanding of relevant chemistry. The account does not need to be what might be termed ‘excellent’ or ‘complete’ ◆ 2 marks should be awarded for demonstrating a reasonable understanding of relevant chemistry ◆ 1 mark should be awarded for demonstrating a limited understanding of relevant chemistry ◆ 0 marks should be awarded for demonstrating no understanding of relevant chemistry <p>Credit should only be given for underlying chemistry not general information, eg historical or socio-economic.</p> |

| Section | Max mark | Expected response and marking instructions |
|---|----------|--|
| 3 Data collection and handling (6 marks) | | |
| 3(a) | 1 | <p>A brief description of the approach used to collect experimental data.</p> <p>This mark is awarded for demonstrating the ability to summarise the method. If a full procedure is provided, the mark will not be awarded.</p> <p>The description need only include sufficient detail for a marker to be able to visualise the nature of the experiment. Details, such as the concentrations and volumes of solutions, do not need to be included in the description.</p> <p>A diagram without annotation is insufficient to gain this mark.</p> <p>Acceptable descriptions of an experimental approach would include:</p> <ul style="list-style-type: none"> ◆ ‘The voltage was measured for cells made using different pairs of metals as electrodes.’ ◆ ‘The concentration of ethanoic acid was measured by titrating samples of different vinegars using sodium hydroxide solution.’ |

| Section | Max mark | Expected response and marking instructions |
|---------|----------|--|
| 3(b) | 1 | <p>Sufficient raw data from the candidate's experiment.</p> <p>Where appropriate, repeated measurements must be included.</p> <p>The number and range of values must be appropriate to the aim. While a minimum of three values will be appropriate in some investigations, the number will depend on the aim of the investigation. For example:</p> <ul style="list-style-type: none"> ◆ Where the aim is to investigate the ethanoic acid content of different types of vinegar, a minimum of three different brands would be acceptable. ◆ Where the aim is to compare the level of halides present in sea water with the level present in freshwater, it would be acceptable for the candidate to use one source of sea water and one source of river water. <p>Errors in the presentation of the data, such as missing headings or units from tables are not penalised in this section.</p> <p>This mark is awarded for raw, unprocessed data and not mean or derived values calculated from raw data.</p> |

| Section | Max mark | Expected response and marking instructions |
|---------|----------|---|
| 3(c) | 1 | <p>Data presented in a correctly produced table.</p> <p>Experimental data must be tabulated with correct headings and units of measurement.</p> <p>Every column in the table must have a clear heading.</p> <p>Units must be indicated in the heading of the columns or given after every data entry.</p> |
| 3(d) | 1 | <p>Mean and/or derived values calculated correctly.</p> <p>Mean and derived values must be based on the candidate's experimental data.</p> |
| 3(e) | 1 | <p>Data/information relevant to the experiment from an internet/literature source.</p> <p>This could be data that:</p> <ul style="list-style-type: none"> ◆ matches the sample range used in the experimental data ◆ is not an exact match for the sample range ◆ is generic and illustrates a trend or pattern expected in the experimental data |

| Section | Max mark | Expected response and marking instructions | | | | | | | | | | |
|---------------|--|--|--------|-----------|---------|--|---------|--|------|---|---------------|---|
| 3(f) | 1 | <p>A reference for the source of the internet/literature data/information.</p> <p>A reference to the source of the internet/literature data/information must be given in sufficient detail to allow it to be retrieved by a third party.</p> <p>The reference must appear beside the internet/literature data or be cited and referenced later in the report.</p> <table border="1" data-bbox="725 644 1845 999"> <thead> <tr> <th data-bbox="725 644 1039 683">Source</th> <th data-bbox="1039 644 1845 683">Reference</th> </tr> </thead> <tbody> <tr> <td data-bbox="725 683 1039 836">website</td> <td data-bbox="1039 683 1845 836">full URL for the page or pages, ie the URL 'www.bbc.co.uk' is not acceptable, but www.bbc.co.uk/education/topics/z2snb9q is an acceptable reference</td> </tr> <tr> <td data-bbox="725 836 1039 874">journal</td> <td data-bbox="1039 836 1845 874">title, author, journal title, volume and page number</td> </tr> <tr> <td data-bbox="725 874 1039 912">book</td> <td data-bbox="1039 874 1845 912">title, author, page number and either edition or ISBN</td> </tr> <tr> <td data-bbox="725 912 1039 999">data booklets</td> <td data-bbox="1039 912 1845 999">title, page number and either year of publication or ISBN or full URL</td> </tr> </tbody> </table> | Source | Reference | website | full URL for the page or pages, ie the URL 'www.bbc.co.uk' is not acceptable, but www.bbc.co.uk/education/topics/z2snb9q is an acceptable reference | journal | title, author, journal title, volume and page number | book | title, author, page number and either edition or ISBN | data booklets | title, page number and either year of publication or ISBN or full URL |
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| book | title, author, page number and either edition or ISBN | | | | | | | | | | | |
| data booklets | title, page number and either year of publication or ISBN or full URL | | | | | | | | | | | |

| Section | Max mark | Expected response and marking instructions |
|---|----------|--|
| 4 Graphical presentation (4 marks) | | |
| | | <p>The graph produced must be based on the candidate's experimental data.</p> <p>Computer-generated graphs are marked in the same way as hand-drawn graphs.</p> <p>Graphs should be of a size that allows the scaling and labelling of the axes, and the accuracy of the plotting of the data points, to be readily checked.</p> <p>It may not be possible to check the accuracy of plotting if data points are excessively large, minor gridlines are omitted or graph paper has not been used.</p> |
| 4(a) | 1 | An appropriate format from the options of scatter graph, line graph or bar graph. |
| 4(b) | 1 | The axis/axes of the graph has/have suitable scale(s). |

| Section | Max mark | Expected response and marking instructions |
|----------------------------|----------|--|
| 4(c) | 1 | <p>The axes of the graph have suitable labels and units.</p> <p>Spelling mistakes or the use of abbreviations must not be penalised if the meaning of an axis label can be clearly understood within the context of the investigation.</p> |
| 4(d) | 1 | <p>Accurately plotted data points and, where appropriate, a line of best fit.</p> <p>If it is not possible to check the accuracy of plotting, this mark must not be awarded.</p> |
| 5 Analysis (1 mark) | | |
| | 1 | <p>A valid comparison of the experimental data with data from the internet/literature source.</p> <p>A correct and valid relationship is identified between the results of the experiment and the data/information from the internet/literature source. Similarities and/or differences between these sources should also be given.</p> |

| Section | Max mark | Expected response and marking instructions |
|-------------------------------|----------|---|
| 6 Conclusion (1 mark) | | |
| | 1 | <p>A valid conclusion that relates to the aim and is supported by all the data in the report.</p> <p>If the candidate has stated multiple aims then the conclusion must relate to all of the aims.</p> <p>Where no aim has been stated, this mark cannot be awarded.</p> |
| 7 Evaluation (2 marks) | | |
| | 2 | <p>An evaluation of the experimental procedure.</p> <p>1 mark should be awarded for identifying a factor that can be expected to have a significant effect on the reliability, accuracy or precision of the experiment.</p> <p>1 mark should be awarded for an explanation of:</p> <ul style="list-style-type: none"> ◆ what could have been done to minimise the effect of the identified factor or ◆ what was done to minimise the effect of the identified factor or ◆ the evidence supporting the identification of the factor |

| Section | Max mark | Expected response and marking instructions |
|------------------------------|-----------|--|
| 8 Structure (2 marks) | | |
| 8(a) | 1 | An informative title. |
| 8(b) | 1 | A clear and concise report. The structure of the report does not need to follow the structure suggested in the marking instructions or instructions for candidates, but should flow in a logical manner. |
| Total | 20 | |

Instructions for candidates

These instructions apply to the assignment for National 5 Chemistry.

This assignment is worth 20 marks. The marks contribute 20% of the overall marks for the course assessment.

It assesses the following skills, knowledge and understanding:

- ◆ applying knowledge of chemistry to new situations, interpreting information and solving problems
- ◆ planning, designing and safely carrying out experiments/practical investigations to test given hypotheses or to illustrate particular effects
- ◆ selecting information from a variety of sources
- ◆ presenting information appropriately in a variety of forms
- ◆ processing the information (using calculations and units, where appropriate)
- ◆ making predictions and generalisations based on evidence/information
- ◆ drawing valid conclusions and giving explanations supported by evidence/justification
- ◆ suggesting improvements to experiments/practical investigations
- ◆ communicating findings/information

Your teacher or lecturer will tell you how the assignment will be carried out and any required conditions for doing it.

In this assignment you have to investigate a topic in chemistry by doing research.

Your research involves gathering data/information from an experiment and comparative data/information from internet/literature sources.

In addition, you may gather extracts about the underlying chemistry from internet/literature sources.

You then produce a report on your investigation.

Your report is not marked at any point by your teacher or lecturer. It is sent to SQA for marking.

Your assignment has two stages:

- ◆ research
- ◆ report

Research stage

Choosing your topic

- ◆ You need to choose a relevant topic in chemistry to investigate.
- ◆ Your topic must be agreed with your teacher or lecturer.

Deciding your aim

- ◆ Once you have chosen your topic you need to decide what the aim of your investigation is. Remember that you need to do an experiment **and** find data/information to compare with your experimental results.
- ◆ Your teacher or lecturer will provide advice on the suitability of your aim, in terms of safety and availability of resources. They will not assess your aim.

Experimental research

- ◆ When choosing your experiment, remember it must allow measurements to be taken.
- ◆ When carrying out your experiment, you must either work on your own or as part of a small group. If you are working as part of a small group, you must take an active part.
- ◆ Make sure you take a sufficient number of measurements over a wide enough range to meet the aim of your investigation.
- ◆ You must repeat measurements, if possible.
- ◆ Your raw experimental data may be tabulated, however tables must not have additional blank or pre-populated columns for mean and derived values.
- ◆ You will use your raw experimental data during the report stage.

Internet/literature research

You must carry out your own internet/literature research.

- ◆ You need to find data/information from the internet, books and/or journals that you can compare to your experimental data. This could be a table or a graph, or information from diagrams or text. This does not need to exactly match your experimental data, but could illustrate the trend or pattern expected.
- ◆ It is important that you record where you get your data/information from in enough detail that another person could find it. This is known as a reference.
- ◆ In your report you will need to describe the chemistry relevant to your aim. You can gather extracts from the internet, books and/or journals to help you write your account of the underlying chemistry. Extracts must be from an internet/literature source – not from centre-devised course material or class notes. An extract must be a direct copy, which can be a printout, photocopy or handwritten (word for word) and must not be annotated
- ◆ There is no size limit on an extract; however, it must be an extract and not the full document and must not be annotated.

- ◆ Your extracts can include any formulae or relationships you may need but must not include sample calculations.
- ◆ During the report stage you will need to show your understanding by writing your description of the chemistry relevant to your aim using your own words.

Report stage

Producing the report

- ◆ The report must be all your own work.
- ◆ When producing your report, you are supervised by your teacher or lecturer at all times.
- ◆ You have 1 hour and 30 minutes to complete your report.

Resources

| In the report stage, the only materials you are allowed to have are: | In the report stage, you cannot have a previously prepared: |
|--|--|
| <ul style="list-style-type: none">◆ these instructions for candidates◆ extracts you have gathered from the internet, books and/or journals to help you describe the chemistry relevant to your aim◆ the instructions used in the experimental procedure◆ your raw experimental data, which may be tabulated◆ your internet or literature data/information, including the reference to the source of the data/information | <ul style="list-style-type: none">◆ draft of your report◆ draft of any part of your report◆ sample calculations from any source◆ a table containing additional blank or pre-populated columns for mean and derived values |

Your teacher or lecturer cannot provide you with feedback or tell you how to improve your report.

Guidance on producing your report

Your report must be easy to follow.

You may find that using headings will help to make your report clear.

Title

- ◆ Your title must tell the reader what your report is about.

Aim

- ◆ Your aim must describe clearly the purpose of your investigation.

Underlying chemistry

- ◆ You must describe the chemistry relevant to your aim.
- ◆ You must use your own words as much as possible.
- ◆ You may choose to include:
 - formulae or balanced equations
 - an explanation of properties
 - explanations of relationships or trends
 - an explanation of the meaning of any chemical terms used
 - copies of diagrams which you would find difficult to draw, for example, complicated structural formulae
- ◆ You can quote from extracts as long as you also give a description or explanation, in your own words, showing that you understand the chemistry.
- ◆ Other than quoting from your extracts, you must not copy directly from them. Copying directly from your extracts would not show that you understand the chemistry.

Description of experiment

- ◆ You must give only a **brief** description of the experiment you carried out.
- ◆ You must show that you can summarise your experimental procedure. You must not give a full description/set of instructions and you must avoid giving too much detail. Details such as the range, number or interval of values or measurements, or information about repeats are not required.

Experimental data

- ◆ You must include a table showing **all** of the raw data measurements you recorded in your experiment (for example, start and end values).
- ◆ Make sure you include column headings. You must also include units where appropriate.
- ◆ You must use the data from your table to carry out calculations.
- ◆ If you have repeated measurements, you should calculate average values. These can be included in your table of results.
- ◆ If you've used the results from your experiment to determine further values, you should show at least one sample calculation.

Graphical presentation

- ◆ You must produce a graph of your experimental results.
- ◆ The graph must:
 - be a scatter graph, line graph or a bar graph, whichever is appropriate for your data
 - be large enough to allow points to be read accurately
 - have suitable scales, labels and units on the axes
- ◆ You must use graph paper or a computer graphing package.
- ◆ If you are using a computer graphing package, you must include both major and minor gridlines, and use plotting symbols that are clear but not too large.
- ◆ If you are plotting a scatter graph, a line or curve of best fit should usually be drawn. However, if there is no obvious pattern to your plotted data points, you should not draw a line or curve of best fit.

Data/information from an internet/literature source

- ◆ You must include data/information obtained from an internet/literature source that you can compare with the data from your experiment.
- ◆ You must include a reference to this source of data/information, which would allow another person to find it. For example:

| Source | Reference |
|---------------|---|
| website | full URL for the page or pages |
| journal | title, author, journal title, volume and page number |
| book | title, author, page number and either edition or ISBN |
| data booklets | title, page number and either year of publication or ISBN or full URL |

Analysis

- ◆ You must state a relationship between your experimental results and the data/information from your internet/literature source.
- ◆ This should include similarities **and** differences between them, if there are any.

Conclusion

- ◆ You must state a conclusion that relates to your aim. The conclusion must be based on **all** the data/information in your report.

Evaluation

- ◆ You must identify a factor in your experiment that had a significant effect on the reliability, accuracy or precision of your experiment.
- ◆ You must then explain:
 - what you did to minimise the effect of this factor
 - or**
 - what you could have done to minimise the effect of this factor

or

— how you know this factor had a significant effect

You do not need to use the words reliability, accuracy or precision in your explanation but if you do use them they must be used correctly.

Summary

You can use this table to check you have covered all sections in your report.

| Section | Description | Marks |
|------------------------------|--|-----------|
| Title | The report has an informative title. | 1 |
| Aim | A description of the purpose of your investigation. | 1 |
| Underlying chemistry | A description of the chemistry relevant to your aim, which shows your understanding. | 3 |
| Data collection and handling | A brief description of your experimental method. | 1 |
| | Sufficient data from your experiment. | 1 |
| | Data from your experiment presented in a table with headings and units. | 1 |
| | Values correctly calculated from your experimental data. | 1 |
| | Comparative data/information from an internet/literature source. | 1 |
| | A reference for the internet/literature source. | 1 |
| Graphical presentation | Appropriate type of graph used to present your experimental data. | 1 |
| | Suitable scales. | 1 |
| | Suitable labels and units on axes. | 1 |
| | All data plotted accurately, with line or curve of best fit if appropriate. | 1 |
| Analysis | Experimental data compared to data/information from internet/literature source. | 1 |
| Conclusion | A conclusion relating to your aim, based on all the data in your report. | 1 |
| Evaluation | Identification of a factor affecting the reliability, accuracy or precision of your experiment and a related explanation. | 2 |
| Structure | A report that can be easily followed. | 1 |
| Total | | 20 |

Once complete, your report should be given to your teacher or lecturer for submission to SQA.

Administrative information

Published: June 2020 (version 4.0)

History of changes

| Version | Description of change | Date |
|---------|--|----------------|
| 2.0 | <p>‘Instructions for teachers and lecturers’ and ‘Instructions for candidates’ sections: minor amendments throughout to clarify the research and report stages.</p> <p>‘Marking instructions’ section: minor clarifications throughout based on 2017-18 exam diet.</p> | October 2018 |
| 3.0 | <p>‘Instructions for teachers and lecturers’ section updated as follows:</p> <ul style="list-style-type: none">◆ ‘Internet/literature research’ sub-section:<ul style="list-style-type: none">— this must be the work of the individual candidate— provision of a wide list of URLs or a wide list of journals and/or books should be the exception— provision of the full content of a wide list of sources should be the exception◆ ‘Report stage’ sub-section:<ul style="list-style-type: none">— teachers/lecturers must check the materials of each and every candidate— information added to the bullet points about raw experimental data, internet/literature data and extracts— information added on extracts— list of items that candidates cannot have access to in the report stage replaced with ‘Candidates must not have access to a previously prepared draft of a report or any part of a report.’◆ ‘Instructions for candidates’ sections: assignment assessment conditions clarified throughout to reflect the changes in the course specification and the ‘Instructions for teachers and lecturers.’ | September 2019 |
| 4.0 | <p>Clarification of a ‘range of topics’ on page 5.</p> <p>Additional details on ‘Formulating the aim’ and ‘Experimental research’ on page 6.</p> | June 2020 |

| | | |
|--|---|--|
| | <p>Removal of the provision of lists of potential sources on page 7.</p> <p>Additional information on conducting the 'Report stage' over successive lessons and the inclusion of the SQA N5 Chemistry data booklet on page 8.</p> <p>Clarification of the 'Analysis' in the Marking Instructions on page 18.</p> <p>Additional details for the 'Description of Experiment' in the instructions for candidates on page 25.</p> <p>Clarification of the 'Analysis' in the instructions for candidates on page 26.</p> | |
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