



# AQA Chemistry GCSE

## Practical Skills

### Notes

Definitions taken from the AQA specific vocabulary resource



## Key Definitions

- **Accuracy** - A measured result that is close to the true value.
- **Calibration** - Marking a scale on a measuring instrument.
- **Data** - Qualitative or quantitative information that has been collected.
- **Evidence** - Data which can be used to support hypothesis.
- **Fair test** - A test in which the only independent variable has been allowed to affect the dependent variable.
- **Hypothesis** - A proposal intended to explain certain facts or observations.
- **Interval** - The quantity between readings, e.g. a set of 5 readings equally spaced over a distance.
- **Prediction** - its an intelligent guess based on some knowledge

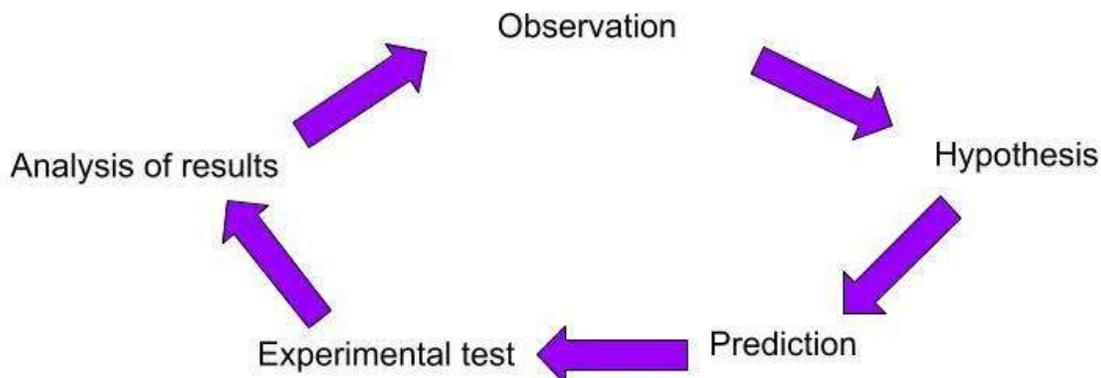
## Errors

- **Measurement error** - The difference between a measured value and the true value.
- **Anomalies** - Values in a set of results which differ from the expected and variation caused by random uncertainty.
- **Random error** - Causes a reading to be spread about the true value due to results varying in an unpredictable way from one measurement to the next. The effect of random error can be reduced by making more measurements and calculating a new mean.
- **Systematic error** - Readings which differ from the true value by a consistent amount each time a measurement is made, they are usually due to the way measuring instruments have been read. If a systematic error is suspected, the data collection should be repeated using a different technique or a different set of equipment, and the results compared.
- **Zero error** - When a measuring system gives a false reading when the measured quantity is zero, e.g. the needle on an ammeter failing to return to zero when no current flows.



## How is an Investigation Carried Out?

Observations are often the starting points of an investigation.



## Experimental Tests

### Variables

- **Independent variable** - In an investigation this is the thing that is actively changed.
- **Dependent variable** - This variable depends on the independent variable. As the independent variable changes so does the dependent variable.
- **Control variable** - This is the thing that is kept the same and not changed during the investigation.
- **Categoric variable** - This is a variable described by a label (qualitative data) such as; the colour of solution which could be green or blue.
- **Continuous variable** - This is measured variable with a numerical value (quantitative data) such as; temperature which is measured by thermometer.

## Planning an investigation

When planning an investigation it is important to ensure its a **fair test**. To ensure this, **control variables** must be kept the same during the investigation to ensure that only the independent variable is being tested. Control groups must also be set up to allow you to make comparisons.

A **risk assessment** must also be made to ensure the investigation is **safe to carry out**. For example, when working with corrosive substances scientists may wear gloves to protect their hands.



## Designing an Investigation

When designing an investigation it's important to:

- Choose the best values of your variables and this can be achieved by carrying out **trial runs**. This can be seen with titrations; a trial run is carried out first and a suitable interval is chosen around the trial titre to start adding the solution dropwise. This means a **more precise** titre reading is obtained.
- Select a **suitable range** for the independent variable because a change in the dependent variable may not be observed if the range is not sensible.
- Obtain **accurate** data by **repeating measurements**, identifying and discarding anomalies and calculating a mean or by using high-quality instruments that measure accurately.
- Obtain **precise** data. This can be achieved by using measuring instruments with sufficiently small scale divisions.

## Presenting data

Tables are used when recording results from experiment. It is important to include a **title** and **headings** with **units** when writing data into a table.

Bar charts are used when you have **categoric variables** whereas when the data is **continuous** you use a line graph. When drawing graphs remember to:

- Use a **sensible scale** so it is easy to work out.
- Use as much of the graph paper as possible.
- **Label** both axes. The independent variable on the x-axis and the dependent variable on the y-axis.
- Draw a **line of best fit** if drawing a line graph.
- **Label each bar** if it is a bar chart.