CIE Chemistry IGCSE

AO3 Practical Skills 3: Make and record observations, measurements and estimates

Flashcards

What is the difference between qualitative and quantitative data?

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Qualitative - non-numerical data that is collected by observation

Quantitative - numerical data

Give some examples of qualitative data

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- Colour of a solution
- Observations of precipitates
- pH when using an acid-alkali indicator

Give some examples of quantitative data

Give some examples of quantitative data

- Height
- Temperature
- Mass

What is the meaning of accuracy and precision?

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Accuracy - the closeness of recorded data to the true value.

Precision - how close a number of measurements are to one another, regardless of accuracy.

What can be used to accurately and precisely measure pH?

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pH probe

- Precise: The pH probe will give results to 2 decimal places.
- Accurate: it is not subjective like universal indicator.

Why does repeating an experiment increase the accuracy?

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Gaining more data for the experiment allows easy identification of anomalous data which can be removed from the data set. A mean average can be calculated from a set of data which will be closer to the true value.

What is the meniscus?

What is the meniscus?

The curve of the liquid.

Describe how to take a reading from a burette?

Describe how to take a reading from a burette?

- The measurement should be read at eye level to the burette.
- A piece of paper may be placed behind the burette to make it easier to read.
- The measurement should be read from the bottom of the meniscus (curve of the liquid).

What is interpolation?

What is interpolation?

If the value being measured does not fall exactly on a scale division, you can interpolate and estimate a more precise reading.

E.g. If you were measuring a distance with a ruler with millimetre divisions and the length fell evenly between 77 mm and 78 mm, it could be recorded as 77.5 mm.

What are anomalies?

What are anomalies?

Pieces of data that do not fit the trend

Why are anomalous results not included in mean calculations?

Why are anomalous results not included in mean calculations?

They lie outside of the data set so will skew the mean making it unrepresentative.

How can the mass of a solid added to a reaction mixture be accurately recorded?

How can the mass of a solid added to a reaction mixture be accurately recorded?

Use the weigh-by-difference method:

Measure the total mass of the solid in a weighing boat. Add the solid to the mixture. Reweigh the empty weighing boat. The difference between these values is the mass of solid added to the mixture.

What apparatus can be used to measure the volume of gas produced in an experiment?

What apparatus can be used to measure the volume of gas produced in an experiment?

Gas syringe

Upside down water-filled measuring cylinder in a water trough

How can pH be measured?

How can pH be measured?

Universal indicator

pH probe

How can a pH probe be calibrated?

How can a pH probe be calibrated?

Using buffer solutions of known pH.

Why are pH values measured using universal indicator sometimes unreliable?

Why are pH values measured using universal indicator sometimes unreliable?

When using universal indicator, you have to match the colour of the solution to a pH value using a colour scale. This can be subjective and lead to inaccuracies as people may disagree about the colour of the solution.

Why is it important that all observations are written down during an experiment?

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Observations are important and help to explain the reactions occurring in the experiment when it comes to writing the conclusion.

What is an estimation? Why are they used in experiments?

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Estimations are rough calculations of values.

Estimations are useful in experiments because they quickly show a rough relationship between variables.

How are approximations used in titrations?

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In an acid-alkali titration, an estimate is used to get the rough point at which neutralisation occurs. It identifies the approximate volume of solution that needs to be added from the burette so that in future titrations, care can be taken around this region by adding the solution dropwise to get a value which is as accurate as possible.