

# CIE Chemistry IGCSE

AO3 Practical Skills 5: Evaluate methods  
and suggest possible improvements

Flashcards



What might be considered in an evaluation of an experiment?



# What might be considered in an evaluation of an experiment?

- How the method could be improved
- How the apparatus could be improved
- How the control variables could be better controlled
- Identification of any erroneous steps



How can you confirm that a result is anomalous?



How can you confirm that a result is anomalous?

Repeat the experiment for that data value twice more. If the new values match each other but not the original reading, the original reading is an anomaly.



How can experimental apparatus  
generally be improved?



How can experimental apparatus generally be improved?

Use apparatus with a higher resolution to improve the precision of the results.

E.g. use a pH probe rather than universal indicator



A  $50 \text{ cm}^3$  measuring cylinder is used to measure  $20 \text{ cm}^3$  in an experiment. How could this apparatus be improved?



A  $50 \text{ cm}^3$  measuring cylinder is used to measure  $20 \text{ cm}^3$  in an experiment. How could this apparatus be improved?

- Use a  $25 \text{ cm}^3$  measuring cylinder
- If a very accurate reading is required, use a burette or  $20 \text{ cm}^3$  pipette



In a titration, acid is added from a burette to a beaker of alkali until neutralisation. Suggest ways in which this method could be improved



In a titration, acid is added from a burette to a beaker of alkali until neutralisation. Suggest ways in which this method could be improved

- Use a conical flask instead of a beaker to allow for the mixture to be swirled.
- Put a white tile under the reaction mixture so that the colour change can be observed more easily.
- Do an initial rough titration to find the approximate end point.
- Make sure there is no air bubble in the end of the burette before starting.



A black cross is observed until it disappears in the reaction between hydrochloric acid and sodium thiosulfate. What must be kept the same in the observation of the black cross?



A black cross is observed until it disappears in the reaction between hydrochloric acid and sodium thiosulfate. What must be kept the same in the observation of the black cross?

- The same person should observe the cross as the point at which it disappears is subjective. This ensures that there is the same amount of error in each reading.
- Use the same black cross each time.



The temperature change of an acid-alkali neutralisation reaction is being measured in a beaker. How can this be improved?



The temperature change of an acid-alkali neutralisation reaction is being measured in a beaker. How can this be improved?

- Use a polystyrene cup instead of a glass beaker as it would be a better thermal insulator meaning more accurate temperature measurements
- Place a lid on the cup to minimise heat loss



How might the range of intervals used in an experiment be changed to give better results?



## How might the range of intervals used in an experiment be changed to give better results?

- If the trend was difficult to see at the intervals used, broader or narrower intervals can be used (depending on the results)
- If there didn't seem to be much change across the results, the intervals should be broadened to observe the changes over a larger range
- If there was lots of quick abrupt change across the intervals, the intervals should be narrowed to see the trend in more detail.



The mass of calcium carbonate powder is measured on a digital mass balance before being added to a solution. How can this mass measurement be improved?



The mass of calcium carbonate powder is measured on a digital mass balance before being added to a solution. How can this mass measurement be improved?

Using the weigh-by-difference method gives a more accurate result. The mass is weighed in a weighing boat. The calcium carbonate is then added to the solution and the empty weighing boat is reweighed. The mass of calcium carbonate is the difference between these measurements.



# What are control variables?



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Factors in the experiment which need to be kept constant throughout an experiment to make it a fair test.



Temperature is a control variable. How can temperature be kept constant throughout an experiment?



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Place the reaction vessel into a water bath. The temperature of the water changes much more slowly and is much more constant than the air temperature.



The rate of reaction between sodium and hydrochloric acid is being investigated at different temperatures. Which variables need to be controlled?



The rate of reaction between sodium and hydrochloric acid is being investigated at different temperatures. Which variables need to be controlled?

- Concentration of acid
- Volume of acid
- Surface area of sodium
- Mass of sodium



What can be used to limit pH changes during a reaction?



What can be used to limit pH changes during a reaction?

A pH buffer

