

# OCR (B) Chemistry A-Level

## PAG 02 - Acid Base Titration

Determination of the concentration of hydrochloric acid

Flashcards

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What apparatus is used in a titration to accurately measure volumes?



What apparatus is used in a titration to accurately measure volumes?

- Burette to measure the volume of solution added
- Pipette and pipette filler to measure a specific volume of solution into the conical flask



Describe the 'weighing-by-difference'  
method



## Describe the 'weighing-by-difference' method

- Add roughly the desired mass of a substance to a weighing bottle and weigh
- Transfer the substance to a beaker / conical flask
- Reweigh the weighing bottle
- The difference between the masses is the mass of solid



# Describe how to carry out an acid-base titration



# Describe how to carry out an acid-base titration

1. Use a pipette to add  $25 \text{ cm}^3$  of acid to a conical flask. Add a few drops of indicator.
2. Pour alkali into the burette. Record the initial burette volume.
3. Complete a trial titre. The conical flask should be swirled constantly above a white tile. Stop adding the alkali as soon as the end point is reached. Record the final burette volume.
4. Repeat the titration until two concordant results are obtained. Add alkali drop by drop near the end point.

( $25 \text{ cm}^3$  of alkali may initially be put into the conical flask if the burette is filled with acid)



When transferring a solution from one beaker to another, how can you ensure as much of the dissolved substance has been transferred as possible?





When transferring a solution from one beaker to another, how can you ensure as much of the dissolved substance has been transferred as possible?

Use distilled water to wash any leftover solution from the old apparatus into the new beaker



How do you accurately fill a volumetric flask to the graduated mark?



How do you accurately fill a volumetric flask to the graduated mark?

Fill so the *bottom of the meniscus* rests on the graduated mark.

The meniscus is the curve of the liquid.



# What is a standard solution?



# What is a standard solution?

## A solution of a known concentration



Describe how to make a standard solution of  $\text{NaHCO}_3$



# Describe how to make a standard solution of $\text{NaHCO}_3$

1. Weigh out a specified amount of  $\text{NaHCO}_3$
2. Add a small volume of distilled water to the beaker containing the  $\text{NaHCO}_3$  to dissolve it
3. Use a funnel to add the solution to a  $250\text{cm}^3$  volumetric flask
4. Rinse the beaker with distilled water and add the washings to the flask
5. Make the flask up to the graduation mark with distilled water
6. Stopper and shake the flask



Suggest 2 indicators that could be used  
in an acid-base titration





Suggest 2 indicators that could be used in an acid-base titration

1. Phenolphthalein
2. Methyl orange



State the colour of phenolphthalein in:

- Acidic conditions
- Basic conditions



State the colour of phenolphthalein in:

- a) Acidic conditions
- b) Basic conditions

- a) Pink
- b) Colourless



State the colour of methyl orange in:

- a) Acidic conditions
- b) Basic conditions



State the colour of methyl orange in:

- a) Acidic conditions
- b) Basic conditions

- a) Red
- b) Yellow

(Orange at the end point of a titration)



# What are concordant results in a titration?



What are concordant results in a titration?

Titres that are within  $0.1 \text{ cm}^3$  of each other



What degree of precision should burette readings be recorded to?





What degree of precision should burette readings be recorded to?

To the nearest  $0.05 \text{ cm}^3$



Which results are used when calculating a mean titre?



Which results are used when calculating a mean titre?

2 concordant results (within  $0.10 \text{ cm}^3$  of each other)



When completing a titration, what piece of apparatus is used to make the colour change easier to observe?



When completing a titration, what piece of apparatus is used to make the colour change easier to observe?

A white tile

This is placed underneath the conical flask.



What 3 things are required to take an accurate burette reading?



What 3 things are required to take an accurate burette reading?

1. Read from the bottom of the meniscus
2. Allow any liquid on the walls of the burette to settle before taking a reading
3. Ensure there are no air bubbles



# What is the end point of a titration?





What is the end point of a titration?

The first point at which the indicator changes colour (permanently)



# Why is the conical flask swirled during a titration?



Why is the conical flask swirled during a titration?

To ensure all the reactants are combined so that the reaction is complete



Why is it better to have a titre volume of  $25 \text{ cm}^3$  than  $10 \text{ cm}^3$ ?



Why is it better to have a titre volume of  $25 \text{ cm}^3$  than  $10 \text{ cm}^3$ ?

The larger the titre volume, the smaller the percentage error



What equation links number of moles  
and concentration?



What equation links number of moles and concentration?

Number of moles = concentration x volume

$$n = C \times V$$



If you know the volume of acid required to neutralise an alkali, how could you calculate the concentration of the acid, given the alkali concentration and volume?





If you know the volume of acid required to neutralise an alkali, how could you calculate the concentration of the acid, given the alkali concentration and volume?

- Calculate the number of moles of the alkali using the known volume and concentration ( $n = C \times V$ )
- Use the chemical equation to work out the ratio of acid and alkali that react and hence work out how many mole of acid have reacted
- Divide the moles of acid by the volume used in neutralisation

