

Edexcel Chemistry A-Level

Core Practical 09 - Finding K_a

Flashcards

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What is a weak acid?



What is a weak acid?

An acid that only partially dissociates in solution.



What is K_a ?



What is K_a ?

An acid dissociation constant, K_a , measures quantitatively the strength of acid in solution.

$$K_a = \frac{[H^+][A^-]}{[HA]}$$



Why are acid-base indicators used?



Why are acid-base indicators used?

To detect when a reaction reaches its equivalence point. The indicator should be chosen so that its end point (point of colour change) matches the equivalence point of the reaction.



Why does a pH probe need to be calibrated?



Why does a pH probe need to be calibrated?

So that for each pH reading, the pH value is accurate.



How do you calibrate a pH probe?



How do you calibrate a pH probe?

Submerge pH probe in buffer solutions of three different pHs including pH 7 and usually pHs around 4 and 10. Each time pressing the calibrate button.



What is accuracy?



What is accuracy?

The more accurate the data, the closer it is to the actual value.



What equipment is used to carry out a titration?



What equipment is used to carry out a titration?

- A pipette and pipette filler are used to accurately measure out the volume of a reactant before transferring it to a conical flask.
- A burette is a controlled way to add small volumes of one reactant to the other reactant (until the reaction has reached completion).



How do you carry out a titration?



How do you carry out a titration?

- Once the pipette has been used to place one reactant into the conical flask, fill the burette with the other reactant. Record initial volume.
- Add a few drops of indicator to the conical flask.
- Open the burette tap and allow the reactant to flow into the conical flask, swirling it to mix the contents.
- Close the burette tap once the expected colour change occurs. Use a white tile so the colour change is easy to identify.
- Record final burette volume.
- Repeat until you get concordant results, then calculate a mean titre.



How do you carry out a titration to calculate pH?



How do you carry out a titration to calculate pH?

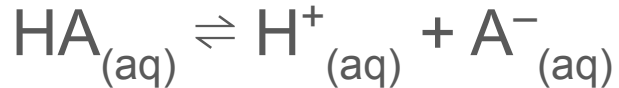
- Into a conical flask, add 25 cm^3 of 0.1 mol dm^{-3} ethanoic acid solution with a few drops of phenolphthalein.
- The sodium hydroxide solution goes in the burette.
- Titrate the solutions together until the mixture just turns pink.
- Add another 25 cm^3 of 0.1 mol dm^{-3} ethanoic acid solution into the conical flask, using a pipette
- Record the pH of the resulting solution.



How do you calculate K_a from this?



How do you calculate K_a from this?



- In the solution, only half the acid has been titrated, therefore:
 $[\text{HA}] = [\text{A}^-]$
- You can then cancel $[\text{A}^-]$ and $[\text{HA}]$ in the K_a equation as they equal the same thing- Therefore $K_a = [\text{H}^+]$
- Convert the resulting solution's pH to $[\text{H}^+]$ to give a value for the acid dissociation constant, K_a . ($[\text{H}^+] = 10^{-\text{pH}}$)

