Edexcel Chemistry A-Level

Core Practical 09 - Finding K_a

Flashcards

What is a weak acid?

What is a weak acid?

An acid that only partially dissociates in solution.

What is K_a?

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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?

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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?

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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?

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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 Ka from this?

$HA_{(aq)} \rightleftharpoons H^+_{(aq)} + A^-_{(aq)}$

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