ACID-BASE TITRATIONS
STRONG ACID & BASE

CHEM 251 SDSU

STRONG TITRANT, STRONG ANALYTE

- The simplest acid-base titration involves a strong analyte (e.g. HNO_3) and a strong titrant (e.g. KOH).
- The fact that the acid/base dissociate completely makes the calculation simpler - we do not need to involve the K_a values.
- Assume that the reaction goes to completion at all concentrations.

SAMPLE PROBLEM

Plot the titration curve for the titration of 15.0 mL of 25.0 mM KOH with 10.0 mM HNO_3.

Determine the pH after the following volumes of titrant have been added:

A) 0.00 mL of titrant
B) 25.00 mL of titrant
C) 37.50 mL of titrant
D) 42.00 mL of titrant

PH BEFORE V_{EQ}

- Before the V_{eq} the analyte will be the dominant species in solution.
- Any titrant added will react immediately and not directly contribute to the pH.
- The pH of the solution is only due to the remaining analyte - need to account for dilution and loss of moles.

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B) 25.00 mL of titrant

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PH AT THE EQUIVALENCE POINT

- Equal moles of acid and base are present in solution.
- The acid and base dissociate fully and the H^+ and OH^- react completely.
- The pH is determined by the dissociation of water $H_2O \rightleftharpoons H^+ + OH^-$ pH = 7.00.

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PH AFTER V_{EQ}

- Once the titration is past the V_{eq} the titrant dominates the pH of the solution.
- As the titrant is strong there is no back reaction - the concentration of the excess titrant directly determines the pH.
- Solution pH will approach but never equal the pH of the titrant.

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TITRATION CURVE

Plot the titration curve for the titration of 15.0 mL of 25.0 mM KOH with 10.0 mM HNO_3.