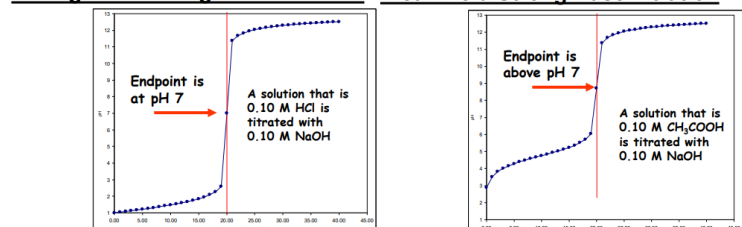
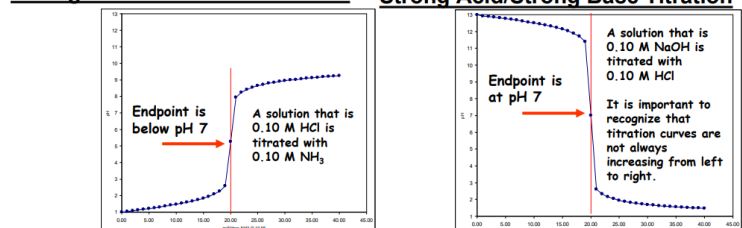


## N41 - Titration

### Strong Acid/Strong Base Titration Weak Acid/Strong Base Titration

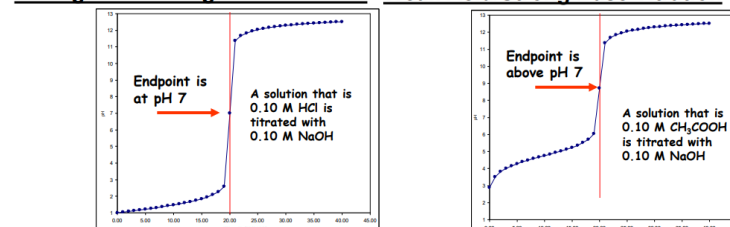


### Strong Acid/Weak Base Titration Strong Acid/Strong Base Titration

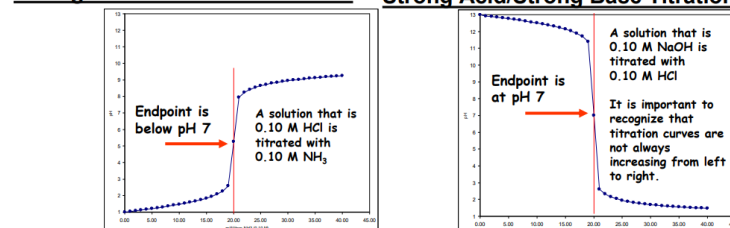


## N41 - Titration

### Strong Acid/Strong Base Titration Weak Acid/Strong Base Titration



### Strong Acid/Weak Base Titration Strong Acid/Strong Base Titration

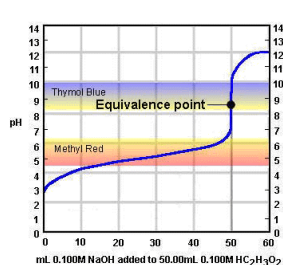
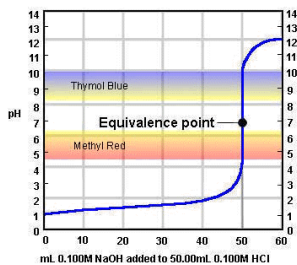
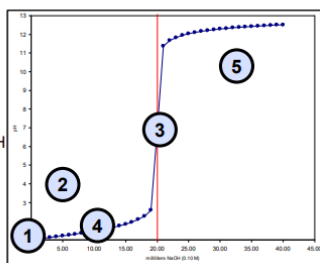


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### Calculations to Plot a Titration Curve

- Starting pH
  - ICE table then pH
- Early on during titration
  - Stoich then He-Ha
- Equivalence Point
  - mol acid = mol base
  - No more buffer! Reverse rxn
  - Calc new K value - ICE then pH
- 1/2 Way Point
  - 1/2 moles @ eq.pt
  - pH = pKa
- Towards end of titration
  - Extra titrant left over
  - Stoich then simple pH



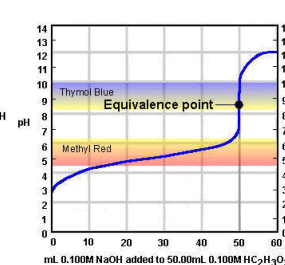
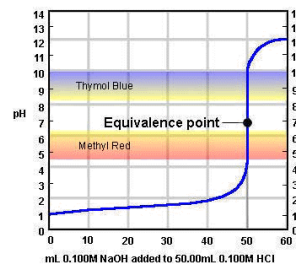
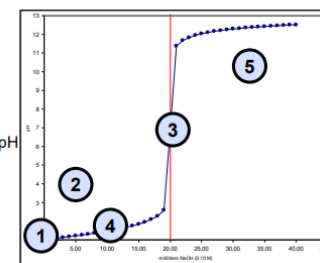
Indicator	pH Range in which Color Change Occurs	Color Change as pH Increases
Crystal violet	0.0 - 1.6	yellow to blue
Thymol blue	1.2 - 2.8	red to yellow
Orange IV	1.4 - 2.8	red to yellow
Methyl orange	3.2 - 4.4	red to yellow
Bromocresol green	3.8 - 5.4	yellow to blue
Methyl red	4.8 - 6.2	red to yellow
Chlorophenol red	5.2 - 6.8	yellow to blue
Bromthymol blue	6.0 - 7.6	yellow to blue
Phenol red	6.6 - 8.0	yellow to red
Neutral red	6.8 - 8.0	red to blue
Thymol blue	8.0 - 9.6	yellow to blue
Phenolphthalein	8.2 - 10.0	colourless to pink
Thymolphthalein	9.4 - 10.6	colourless to blue
Alizarin yellow	10.1 - 12.0	yellow to blue
Indigo carmine	11.4 - 13.0	blue to yellow

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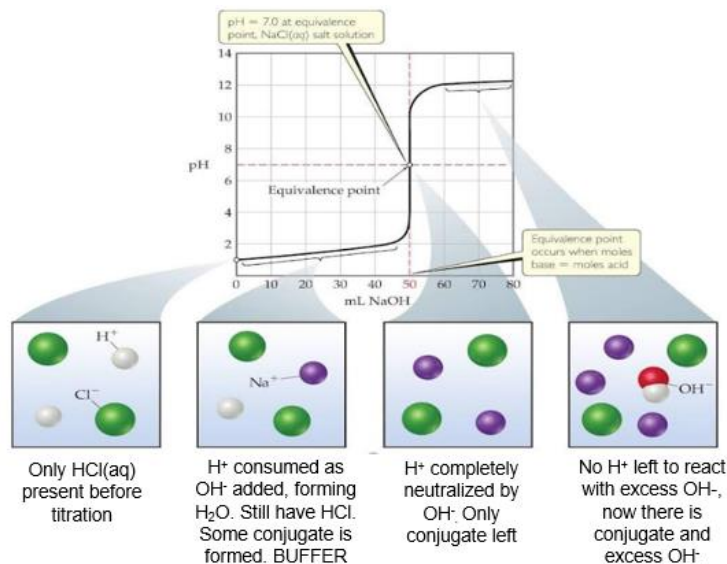
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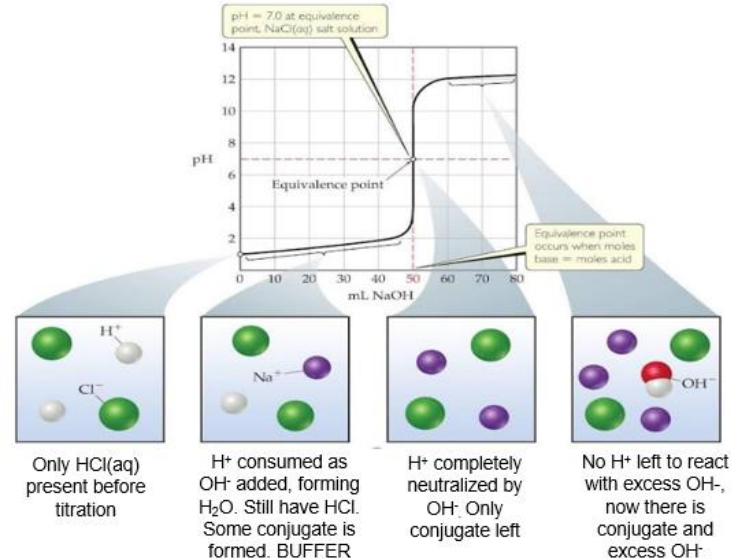


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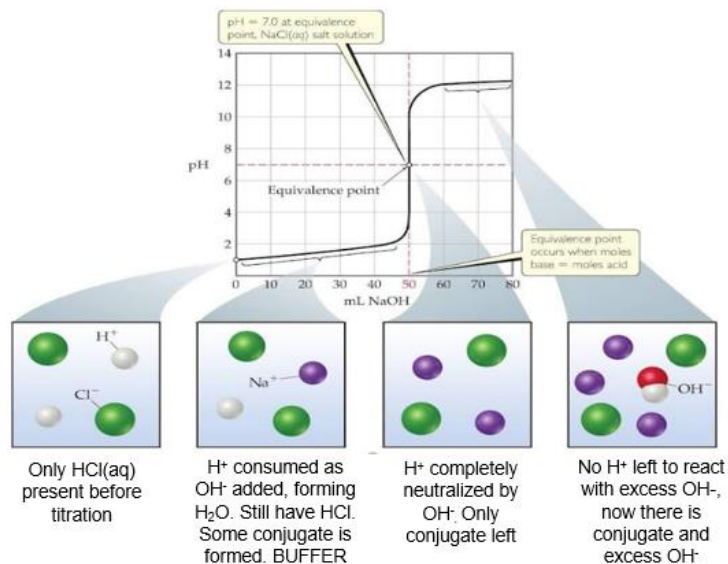
## N41 - Titration



## N41 - Titration



## N41 - Titration



## N41 - Titration

