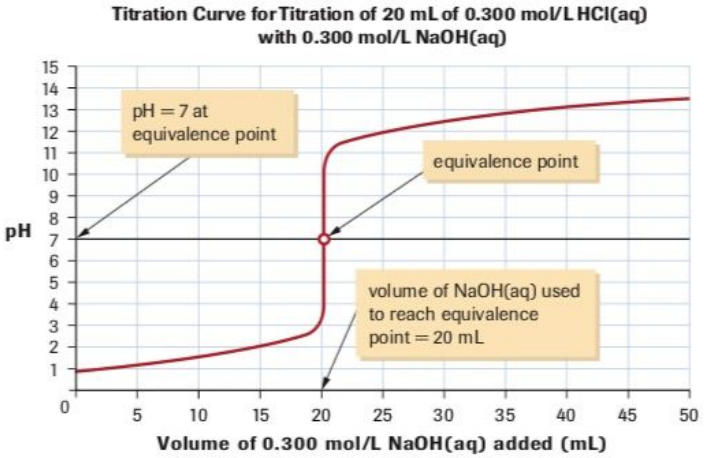
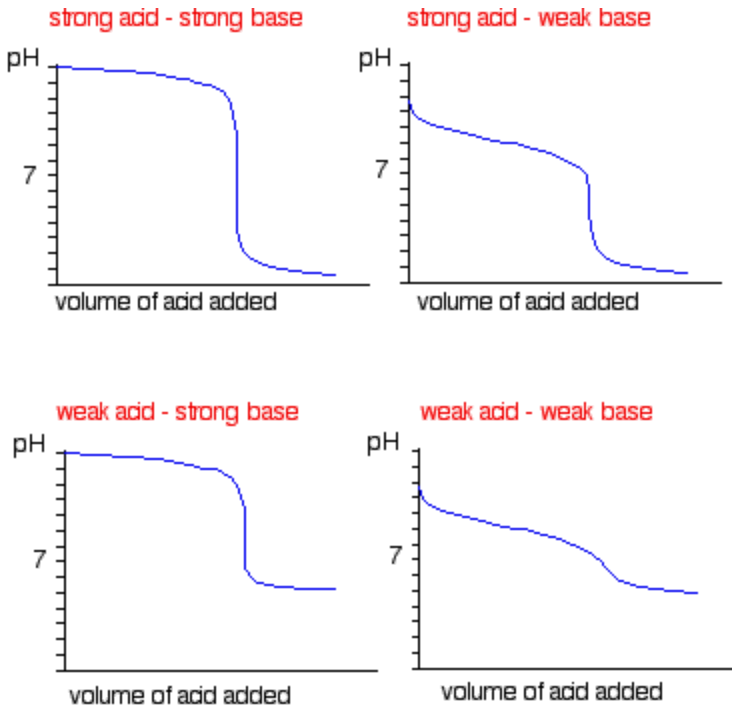
Chemistry 20	Unit 4
Lesson 10 - Acid–Base Titration Curves and Indicators	84 mins

pH Curves (Demonstration)

- When titrating a acidic sample with an basic titrant, you would expect the pH to be low initially, then to increase as base is progressively added, and finally to be low when a large excess of base has been added. This expectation turns out to be correct. However, what is interesting and important is the way that the pH increase. A titration pH curve is very useful evidence, providing valuable information about any acid–base reaction. - Equivalence point will be when both sets of ions are equal.	Diagram 

Titration pH Curves

- When a titration is done to create a pH curve, the addition of titrant is not stopped at the endpoint, but is continued until a large excess has been added. - Depending on what is titrating what the curve will be different… but some basic curves for added different acids to bases are shown to the right.	

Choosing Acid–Base Indicators for Titration

- An indicator used should show the exact point in which ALL the ions of base have been reacted with ALL the ions of acid. The equalization point. - The compound is made will determine the end pH. - If the endpoint is 3.6 then bromothymol blue (working range 6.0 – 7.6) would be useless… a better choice would be methyl orange (working range 3.2 – 4.4)	Using Net Ionic Equations can help with figuring out the end-point $HCl_{(aq)} + NaOH_{(aq)} \rightarrow NaCl_{(aq)} + HOH_{(l)}$ Becomes $H^+_{(aq)} + OH^-_{(aq)} \rightarrow H_2O_{(l)}$ $Na_2CO_{3(aq)} + 2\ HCl_{(aq)} \rightarrow 2\ NaCl_{(aq)} + H_2CO_{3(aq)}$ Becomes $CO_{3(aq)}^{2-} + 2\ H^+_{(aq)} \rightarrow H_2CO_{3(aq)}$ (which will have a endpoint of about 3.6 pH because HCl is so much stronger than $H_2CO_{3(aq)}$)

Chemistry 20 - Unit D - Acid–Base Titration Curves and Indicators

Name: _____

1) In the titration of dilute ammonia with dilute hydrochloric acid, a trial pH curve titration found the equivalence point pH of the solution to be 4.8. Explain why bromocresol green is a better indicator choice than alizarin yellow for this titration.

2) Why must only a very small amount of indicator be used in a titration analysis?

3) If congo red indicator is used in the titration of dilute nitric acid, $HNO_{3(aq)}$, with dilute sodium hydroxide, $NaOH_{(aq)}$, will the indicator endpoint of the titration correspond to the equivalence point? Explain, using a sketch of the pH titration curve to illustrate your reasoning.

4) For a titration analysis to determine the concentration of an oxalic acid solution, complete the following:

a) What information must you have in order to select an indicator for this reaction?

b) What equipment and procedure would be required to get this information?

5) Why is it necessary to start a titration analysis with at least one standard solution?