

18 • Acid-Base Reactions

Titration Curve

Consider a 10. mL sample of 0.10 M HCl.

- _____ a) What is the pH of the solution?
- _____ b) How many mL of 0.10 M NaOH would be required to neutralize it?
- _____ c) What is the pH of the neutralized solution?
- _____ d) What would the pH of the solution be if you added 20. mL of NaOH?

volume of 0.10 M HCl	volume of 0.10 M NaOH	moles of H ⁺	moles of OH ⁻	moles of XS H ⁺ or OH ⁻	total volume	[H ⁺] or [OH ⁻]	pH
10.	20.						

Let's do this more carefully:

volume of 0.10 M HCl	volume of 0.10 M NaOH	moles of H ⁺	moles of OH ⁻	moles of XS H ⁺ or OH ⁻	total volume	[H ⁺] or [OH ⁻]	pH
10.	0.0						
10.	1.0						
10.	2.0						
10.	3.0						
10.	4.0						
10.	5.0						
10.	6.0						
10.	7.0						
10.	8.0						
10.	9.0						
10.	10.						
10.	11						
10.	12						
10.	13						
10.	14						
10.	15						
10.	16						
10.	17						
10.	18						
10.	19						
10.	20.						

Graph this data: x = **Volume of NaOH added** and y = **pH**. This is called a “**titration curve.**”

Questions:

- At what point on this curve is the acid neutralized?
- What would a graph of the slope of this curve vs. **Volume of NaOH added** look like?
Sketch it over your titration curve.
- Identify the “equivalence point” on your titration curve and on the sketch of the slope vs. NaOH.
- Phenolphthalein is an acid-base indicator that changes color at pH of 9. It is commonly used for this titration. Indicate on your graph when the phenolphthalein will change color.