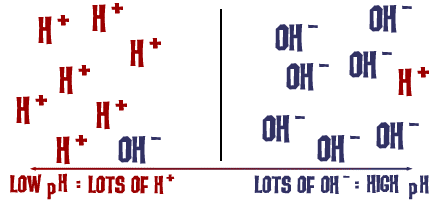
**Titration Calculations**

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| **YOYO:** Using Table K and L, write the complete neutralization reaction for the following reactants  1. Carbonic acid and potassium hydroxide.  2. Phosphoric acid and sodium hydroxide |

Types of Acids and Bases

* HCl produces \_\_\_\_\_ hydrogen and is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* H2SO4 produces\_\_\_\_\_ hydrogens and is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* H3PO4 produces \_\_\_\_\_ hydrogens and is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* NaOH has \_\_\_\_\_\_ hydroxide group and is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



Concentration: Molarity (Table T)

* 1 M of HCl gives off \_\_\_\_ mole H+/ liter
* 2 M of HCl gives off \_\_\_\_\_ moles H+/ liter
* 1 M of H2SO4 gives off \_\_\_\_ moles of H+/liter
* 2 M of H2SO4 gives off \_\_\_\_ moles of H+/ liter

You try

* 1 M NaOH gives off \_\_\_\_ mole of OH-/ liter
* 2 M NaOH gives off \_\_\_\_\_ mole of OH-/ liter
* 2 M Ca(OH)2 gives off \_\_\_\_\_mole OH- liter

Titration

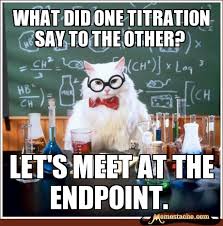
* Titration is used to find the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of an unknown acid or base.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* This is done by \_\_\_\_\_\_\_\_\_ measured volumes of an acid or base of known molarity to a base or acid of unknown molarity until neutralization occurs
* Neutralization is when the number of \_\_\_\_\_\_\_ and \_\_\_\_\_\_ are equal and the pH is \_\_\_\_\_\_, this is also known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ point.
* An acid-base indicator is used to show when \_\_\_\_\_\_\_\_\_\_\_\_\_ has occurred.
* The point of \_\_\_\_\_\_\_\_\_\_ is the endpoint of the titration.

Sample Titration Problems

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| **Sample #1:** What is the concentration of a 30 ml sample of HCl if it can be neutralized by 50 ml of 1.2 M of NaOH? | **Sample #2:** How many milliliters of 3.0 M of H2SO4 are needed to neutralize 50 ml of 1.2 M Al(OH)3? |

Practice

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| 1. Determine the concentration of H3PO4 if a 90. ml sample is neutralized by 30. ml of 0.9 M Ca(OH)2. | 1. How much 6.0 M HNO3 is needed to neutralize 39 ml of 2.0 M KOH? |
| 1. How much 3.0 M NaOH is needed to neutralize 30 ml of .75 M H2SO4? | 1. What is the concentration of 20 ml of LiOH if it is neutralized by 60 ml of 4 M HCl? |
| 1. What is the concentration of 60 ml of H3PO4 if it is neutralized by 225 ml of 2 M Ba(OH)2? | 1. How much 2 M HBr is needed to neutralize 380 ml of 0.1 M NH4OH? |
| 1. You have 50 mL of 1.0 M H2SO4(aq). What volume of 0.5 M NaOH would be required to neutralize the acid? | 1. A acid has an H+ concentration of 0.1 M and a volume of 100 mL. What volume of a base with a 0.5 M [OH-] will be required to neutralize the reaction? |

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