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| Titration  CλeMis+ry: http://genest.weebly.com  Stop in for help every day at lunch and Tues, Weds., &Thurs after school!  After-hours question? Email me at home: [eagenest@madison.k12.wi.us](mailto:eagenest@madison.k12.wi.us) |  | Name\_\_\_\_\_\_\_\_\_  Period\_\_\_\_\_\_\_\_ |

**Titration problems:**

1. A 100.0 mL sample of 0.50 M HCl is titrated with 0.10 M NaOH. The indicator used was phenolphthalein.
   1. Write the reaction.
   2. Write what color phenolphthalein would be in the beginning\_\_\_\_\_\_\_ At the end\_\_\_\_\_\_\_\_
   3. What volume of the NaOH solution is required to reach the endpoint of the titration?
2. If 26.5 mL of a 0.20 M solution of NaOH is required to titrate 50.0 mL of sulfuric acid (H2SO4)), what is the concentration of the sulfuric acid solution? The indicator used was bromothymol blue.
   1. Write the reaction.
   2. Write what color bromothymol blue would be in the beginning\_\_\_\_\_\_\_ At the end\_\_\_\_\_\_\_\_
   3. What volume of the H2SO4 solution is required to reach the endpoint of the titration?
3. If 26.5 mL of a 0.20 M solution of NaOH is required to titrate 50.0 mL of phosphoric acid (H3PO4), what is the concentration of the phosphoric acid solution?

**Review:**

1. Calculate the hydrogen ion concentration and the hydroxide ion concentration for the following pH values.

[H+] [OH-]

* 1. pH = 1.04
  2. pH = 13.1

1. What volume of 0.200 M hydrochloric acid solution is needed to neutralize 25.0 mL of 0.150 M sodium hydroxide solution?

15. Write a balanced chemical equation for each reaction

Mg + H2SO4 🡪

H3PO4 + NaOH 🡪

22. What would be the **pH** of each of the following:

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| a) 0.0010 M HCl |  |
| b) 0.0010 M HNO3 |  |
| c) 0.010 M NaOH |  |
| d)pure water |  |
| f) 0.000000000001M HCl |  |

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| Metal with Acid  Remembering that Acid + Metal → hydrogen gas + salt, fill in the missing substances for each reaction below |

1. HBr + Na → \_\_\_\_\_ + \_\_\_\_\_
2. HNO3 + Mg →\_\_\_\_\_ + \_\_\_\_\_
3. H3PO4 + Ca →\_\_\_\_\_ + \_\_\_\_\_
4. We have three equations which we have been using in this chapter. :

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| Write the equation you have memorized that describes what number you get when you multiply the molarity of H+ by the molarity of OH- | Write the equation you have memorized that describes how H+ molarity is related to p H | Write the equation that you have been using since March to relate moles of solute, volume of solution, and molarity of a solution. |

1. If a solution contains 4.115 moles of HNO3 dissolved to make 788 mL of solution, what is the molarity?
2. ~~If 335 mL of a 0.20 M solution of Ca(OH)~~~~2~~ ~~is required to titrate 450.0 mL of HBr, what is the concentration of the acid solution?~~
3. ~~If 3.59 mL of a 0.040 M solution of Ca(OH)~~~~2~~ ~~is required to titrate 840.0 mL of HBr, what is the concentration of the acid solution?~~