



Key

## Review Sheet – Acids and Bases CP/Honors Chemistry

### Terms:

Properties of acids  
Properties of bases  
Electrolytes  
Arrhenius Acid  
Arrhenius Base  
Strong acid  
Weak acid  
Hydroxide ion

Hydrogen ion  $H^+$   
Hydronium ion  $H_3O^+$   
Acid/base Indicator  
Neutralization reaction  
Bronsted-Lowry Theory  
Proton donor  
Proton acceptor  
Conjugate acid/base pairs

Amphoteric substances  
Titration  
Standard solution  
Endpoint  
 $K_w$   
pH  
pOH



- Are the following properties of acids, bases, or both?
  - Turns phenolphthalein pink. *B*
  - Turns litmus red. *A*
  - Reacts with metals to make hydrogen gas. *A*
  - Feels slippery. *B*
  - Tastes sour. *A*
- Explain the difference between a strong acid and a weak acid. *ionizes completely*
- Explain the difference between a concentrated solution and a dilute solution. *ionizes partially*
- Name the following acids:
  - HBr *hydrobromic acid*
  - $H_2CO_3$  *carbonic acid*
  - $HClO_2$  *chlorous acid*
- Write the formula for each of the following acids
  - Oxalic acid  $H_2C_2O_4$
  - Nitrous acid  $HNO_2$
  - Hydroiodic acid  $HI$
- Calculate the pH of the following solutions:
  - $pOH = 4.7$   *$9.3 = pH$*
  - $[OH^-] = 1.0 \times 10^{-3} M$   *$pOH = 3$   $pH = 11$*
  - $[H^+] = 4.5 \times 10^{-4} M$   *$pH = 3.35$*
  - $2.6 \times 10^{-5} M HCl$   *$pH = 4.59$*
  - $0.040 M LiOH$   *$pOH = 1.40$   $pH = 12.60$*
- A solution has a  $[H_3O^+] = 1.7 \times 10^{-3}$ . Calculate the pH, pOH and  $[OH^-]$   *$pH = 2.77$   $pOH = 11.23$   $[OH^-] = 5.9 \times 10^{-12} M$*
- Predict the products of each of the following reactions. Balance the equations if needed:
  - $HBr + LiOH \rightarrow H_2O + LiBr$
  - $Al(OH)_3 + 3HNO_2 \rightarrow 3H_2O + Al(NO_2)_3$
  - $2HI + Ca(OH)_2 \rightarrow 2H_2O + CaI_2$

9. To completely neutralize 5.00 mL of a solution of KOH of unknown concentration, exactly 30.0 mL of 0.100 M HCl is added. What is the molarity of the KOH solution?  $(5.00\text{ mL})x = (30.0\text{ mL})(0.100\text{ M})$   $x = 0.600\text{ M}$
10. How many mL of 0.15 M HCl needs to be titrated into 10.0 mL of 0.500 M NaOH to reach the endpoint?  $(0.15\text{ M})(x) = (0.500\text{ M})(10.0\text{ mL})$   $x = 33\text{ mL}$
11. Name two strong acids.  $\text{HCl}, \text{HBr}, \text{HI}, \text{HClO}_4, \text{H}_2\text{SO}_4, \text{HNO}_3$
12. Name two weak acids.  $\text{CH}_3\text{COOH}, \text{HNO}_2, \text{etc}$
13. Name two strong bases.  $\text{Group 1 + Group 2 Metal hydroxides}$
14. For each of the following Bronsted bases, write the formula for its conjugate acid.
- $\text{NH}_3$   $\text{NH}_4^+$
  - $\text{HPO}_4^{2-}$   $\text{H}_2\text{PO}_4^-$
  - $\text{HSO}_3^-$   $\text{H}_2\text{SO}_3$
15. For each of the following Bronsted acids, write the formula for its conjugate base.
- $\text{H}_2\text{O}$   $\text{OH}^-$
  - $\text{HBr}$   $\text{Br}^-$
  - $\text{HSO}_4^-$   $\text{SO}_4^{2-}$
16. Label each substance as either a Bronsted acid or Bronsted base. Then identify conjugate acid-base pairs.
- $\text{H}_2\text{SO}_3 + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{HSO}_3^-$
  - $\text{NH}_3 + \text{HCl} \rightleftharpoons \text{NH}_4^+ + \text{Cl}^-$
  - $\text{OH}^- + \text{HNO}_2 \rightleftharpoons \text{NO}_2^- + \text{H}_2\text{O}$
17. Given the following two equations, identify the substance that is amphoteric.
- $$\text{H}_2\text{O} + \text{HCl} \rightleftharpoons \text{H}_3\text{O}^+ + \text{Cl}^-$$
- $$\text{H}_2\text{O} + \text{NH}_2^- \rightleftharpoons \text{OH}^- + \text{NH}_3$$
18. Using the chart provided, determine the color of each indicator at the given the pH.

	pH = 2	pH = 5	pH = 7	pH = 9	pH = 11
Bromthymol blue	Yellow	Yellow	Green	Blue	Blue
Methyl Orange	Red	Yellow	Yellow	Yellow	Yellow
Phenolphthalein	Colorless	Colorless	Colorless	lt Pink	Pink

19. Write a balanced chemical equation for the reaction between sodium hydroxide and hydrofluoric acid.  $\text{NaOH} + \text{HF} \rightarrow \text{NaF} + \text{H}_2\text{O}$
20. Write a balanced chemical equation for the reaction between magnesium metal and hydrochloric acid.  $\text{Mg} + 2\text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2$