# Chapter 19 WS

**Name:** _____

**A/B Models & Basic Calculations**

**Period:** _____  **Date:** _____

1) What are the basic properties of Acids?
- Sour Taste
- Turn Litmus Paper Red
- More [H+] than [OH-]
- React with metals
- pH < 7
- POH >7

2) What are the basic properties of Bases?
- Slippery & Bitter Taste
- Turn Litmus Paper Blue
- More [OH-] than [H+]
- React with organics
- pH > 7
- POH <7

3) Fill in the following table for the 3 different definitions of acids and bases:

| Model | Acid | Base | Examples |
|---|---|---|---|
| Arrhenius | Contain & Produce H+ Ions | Contain & Produce OH- Ions | $Acid = HX \rightarrow H^+ + X^-$ <br> $Base = XOH \rightarrow X^+ + OH^-$ |
| Bronsted-Lowry | H+ ion donor | H+ ion acceptor | $NH_3 + H_2O \rightarrow NH_4^+ + OH^-$ |
| Lewis | e- pair acceptor | e- pair donor |  |

4) Label each of the following as monoprotic, diprotic, or triprotic acids:
   a. $H_2SO_4$
      diprotic
   b. HF
      monoprotic
   c. $H_3PO_4$
      triprotic
   d. $CH_3COOH$
      monoprotic
   e. $HNO_3$
      monoprotic
   f. $H_2MnO_4$
      diprotic

5) What is a conjugate acid?
   Substance created when a Bronsted-Lowry base accepts a H+ ion from the Bronsted-Lowry acid. Is the acid for the reverse reaction

6) What is a conjugate base?
   Substance created when a Bronsted-Lowry acid donates an H+ ion from the Bronsted-Lowry base. Is the base for the reverse reaction

7) Identify the acid, base, conjugate acid, and conjugate base in the following equation:

$$CH_3COOH + H_2O \rightarrow CH_3COO^- + H_3O^+$$
Acid  Base  C. Base  C. Acid
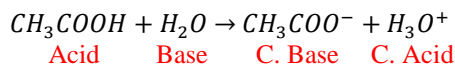
8) What does amphoteric mean and what chemical is THE example of it?
   Amphoteric means the substance can be both an acid and a base. Water is the best example of an amphoteric substance

9) What is the chemical equation for the self-ionization of water?
$$H_2O_{(l)} \leftrightarrow H^+_{(aq)} + OH^-_{(aq)}$$
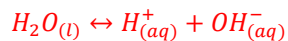
10) What is the formula for Kw, what is the value of it, and what do the two parts stand for?
$$K_w = [H^+][OH^-] = 1 \times 10^{-14}$$

11) How can you determine whether a solution is acidic/basic by just the concentrations?
Acidic = More [H+] than [OH-]          Basic = More [OH-] than [H+]

12) What is the formula for pH and the formula for pOH?
pH = -log[H+]
pOH = -log[OH-]

13) When you add the pH and pOH it must always equal what number? Write the equation.
pH + pOH = 14

14) Fill in the table with the missing information. Be sure to show work below.

| pH | [H₃O⁺] | pOH | [OH⁻] | ACID or BASE? |
|---|---|---|---|---|
| 3.78 | $1.66 \times 10^{-4}$ | 10.22 | $6.03 \times 10^{-11}$ | Acid |
| 3.41 | $3.89 \times 10^{-4}$ M | 10.59 | $2.57 \times 10^{-11}$ | Acid |
| 8.81 | $1.55 \times 10^{-9}$ | 5.19 | $6.46 \times 10^{-6}$ | Base |
| 8.69 | $2.04 \times 10$ | 5.31 | $4.88 \times 10^{-6}$ M | Base |
| 8.46 | $3.47 \times 10^{-9}$ | 5.54 | $2.88 \times 10^{-6}$ | Base |
| 12.08 | $8.45 \times 10^{-13}$ M | 1.92 | $1.19 \times 10^{-2}$ | Base |
| 11.86 | $1.38 \times 10^{-12}$ | 2.14 | $7.24 \times 10^{-3}$ | Base |
| 3.36 | $4.33 \times 10^{-4}$ | 10.64 | $2.31 \times 10^{-11}$ M | Acid |