*AP Chemistry*

*3 Acid-Base Theories & pH Problems*

Directions:

1. Complete the key definitions and compare the three main acid-base theories.

2. The older partner does the even problems. The younger partner does the odd problems. As you work, explain how you are doing the problem while your partner listens.

3. After each problem, discuss the answer with your partner. If both partners agree on the answer, the solver initials the answer. If an agreement can’t be reached, both partners raise their hands to get the teacher’s attention.

4. When all the problems have been solved, compare your answers with those of another group. If

both pairs agree on the answers, circle the answer.

5. Turn in the sheet when you have finished.

**Key definitions:**

pH =

pOH =

pH + = 14

3 Acid-base theories

Bronsted-Lowry Theory

Lewis Theory

Arrhenius Theory

**Solve the following problems: Write the correct equation. Show all your work.**

1. A solution of perchloric acid, a strong acid, has a hydronium ion concentration of 1.89 x 10-3M.

What is the hydroxide ion concentration? Recall that for strong acids, [H+] = the initial acid concentration

[H+][OH-] = \_ [H+] =

[OH-]=

2. Find the pOH of a 0.402 M solution of hydrobromic acid, a strong acid.

3. A window cleaning solution is found to have a [OH-] = 0.38 M. Calculate the pH, pOH and hydronium ion concentrations.

4. Barq’s root beer has a pH of 4.61. What is the [H3O+], [OH-] and pOH for this soft drink?

5. Find the hydronium ion concentration, pH, pOH and the hydroxide ion concentration of a 5.78 x 10-3 M solution of nitrous acid, a weak acid with 0.85% dissociation.

6. Find the hydronium ion concentration, pH, and hydroxide ion concentration, of a 0.057 M solution of acetic acid that is 9.3% ionized.

Complete the following reactions and identify conjugate pairs **Acid Base**

7. HCH3COO + H2O ⇌ H3O+ + CH3COO- Conjugate pair \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

Conjugate pair \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

8. \_\_\_\_\_\_\_ + \_\_\_\_\_\_\_ ⇌ HSO3- + Cl- Conjugate pair \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

Conjugate pair \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

9. NH3 + HNO2 ⇌ \_\_\_\_\_\_\_ + \_\_\_\_\_\_\_ Conjugate pair \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

Conjugate pair \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

10. HSO3- + HBr ⇌ \_\_\_\_\_\_\_ + \_\_\_\_\_\_\_ Conjugate pair \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

Conjugate pair \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

Identify any amphiprotic species from problems 7-10: