

Name: _____

Date: _____

pH Problems

Consider the following balanced chemical equation:



[This reaction is taking place in pure water all the time. The pH is 7 which means that the hydrogen ion concentration is 1×10^{-7} moles per liter. Since we get one hydroxyl ion (OH^-) for every hydrogen ion (H^+) the OH^- concentration is also 1×10^{-7} . The pH is defined as the negative logarithm of the Hydrogen ion concentration. If we add additional (OH^-) ions, the concentration of (H^+) will become smaller and the pH will approach 14 as a limit. If we add (H^+) ions the pH will approach 0 as a limit. If we know the pH we know the Hydrogen Ion concentration, we can calculate the Hydroxyl ion (OH^-) concentration. [$\text{pH} + \text{pOH} = 14$]

1. What is the pH of pure water (H_2O) ?
2. If a water solution has a pH of 1 it is said to be acid. What would the (OH^-) concentration be?
3. You measure the pH of some mineral water find it to be 12.
 - a. What is the hydrogen ion (H^+) concentration of the mineral water?
 - b. What is the hydroxyl ion (OH^-) concentration of the mineral water?
 - c. Is this solution acidic or basic?
4. You measure the pH of vinegar from your kitchen. It has a pH of 3.
 - a. What is the hydrogen ion (H^+) concentration of the vinegar?
 - b. What is the hydroxyl ion (OH^-) concentration of the vinegar?
 - c. Is this vinegar acidic or basic?
5. You dissolve a very small amount of baking soda from your kitchen in some tap water and measure the pH of the resulting solution. The pH value is 9.
 - a. What is the hydrogen ion (H^+) concentration of the baking soda solution?
 - b. What is the hydroxyl ion (OH^-) concentration of the baking soda solution?
 - c. Is this baking soda solution acidic or basic?