WKS
K_w, pH and pOH

Name _____
Period ____ Date _____

Use the Acids and Bases equations from Chart B of your reference packet to answer the following questions and calculations.

1) How does the water dissociation constant for water relate to the concentrations of H^+ and OH^- in aqueous solutions?

2) pH is a **[linear / logarithmic]** function which means that for every change in pH of 1 the concentration of $[H^+]$ changes by **[one / a factor of 10]**.

3) If the pH of one solution is 5 and another has a pH of 2, which solution has a higher $[H^+]$? By what *factor* is this solution stronger than the other solution? Explain or use a calculation to show why.

4) If you know the $[OH^-]$ of a solution, how would you determine the pH?

5) Why can one assume that the hydrogen ion concentration in an aqueous solution of a strong monoprotic acid equals the molarity of the acid or that the concentration of hydroxide ion for a strong base equals the molarity of the base? [Hint: what is true for a strong acid or base?]

6) Calculate the pH and pOH of the following solutions of strong acids and bases. Remember question 4 when answering (c) and (d). Be careful with letter (d)—the subscript is important.
   a) 1.0 M HI
   b) 0.050 M HNO_3
   c) 1.0 M KOH
   d) 2.4×10^{-5} M $Mg(OH)_2$

All of the following solutions are at a temperature of 25°C or 298 K:

7) What is the pH of a solution with $[H^+] = 1.00\times10^{-13}$ M? What is the pOH? What is $[OH^-]$? Is it acidic, basic or neutral?

8) What is the pOH of a solution with $[OH^-] = 3.50\times10^{-2}$ M? What is the pH? What is $[H^+]$? Is it acidic, basic or neutral?

9) What are the $[H^+]$, $[OH^-]$, and pOH of a solution whose pH = 2.38? Is it acidic, basic, or neutral?

10) What are the $[H^+]$, $[OH^-]$, and pH of a solution whose pOH = 9.00? Is it acidic, basic, or neutral?

Answers: 6)a) pH = 0.00, pOH = 14.00; b) pH = 1.30, pOH = 12.70; c) pOH =0.00, pH = 14.00; d) pOH = 4.32, pH = 9.68; 7) pH = 13.00, pOH = 1.00, $[OH^-] = 0.10$ M; 8) pOH = 1.46, pH = 12.54, $[H^+] = 2.88\times10^{-13}$ M; 9) $[H^+] = 4.17\times10^{-3}$ M, pOH = 11.62, $[OH^-] = 2.40\times10^{-12}$ M; 10) $[OH^-] = 1.00\times10^{-9}$ M, pH = 5.00, $[H^+] = 1.00\times10^{-5}$ M