

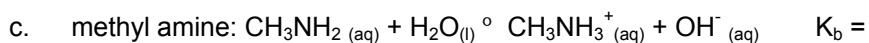
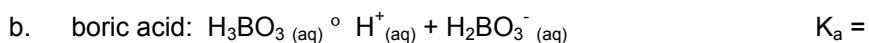
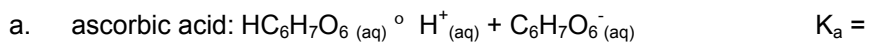
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Chemistry 30

Unit 5: Acids & Bases

Assignment 2 – K_a , K_b , K_w and pH

1. Given the following balanced ionization reactions for the following weak acids and bases, write the K_a or K_b expressions for each.

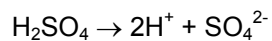


2. Calculate $[\text{OH}^-]$ in a solution containing 100.0 g of potassium hydroxide in 2.50 L solution. Potassium hydroxide is a strong base.

3. A solution is prepared in which 0.600 mole of hydrogen chloride is dissolved in enough water to make 5.80 L. Calculate the concentration of hydrogen ions in this solution.

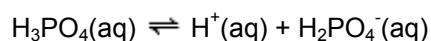
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4. A solution is prepared that contains 0.0445 mole of sulfuric acid in a total solution volume of 12.1 L. Sulfuric acid typically undergoes complete ionization according to the equation:



Calculate $[\text{H}^+]$. Sulfuric acid is a strong acid.

5. Phosphoric acid is a **weak** acid that undergoes the following ionization reaction:



If there are 1.32×10^{-2} mole of phosphoric acid present in 875 mL of solution, calculate the concentration of hydrogen ions, H^+ , in solution. K_a for phosphoric acid is 7.0×10^{-3} .

Begin by calculating $[\text{H}_3\text{PO}_4]$. Then use K_a to determine $[\text{H}^+]$.

6. Determine the pH of each of the following solutions, and tell whether the solution is acidic or basic.

		Acid or Base?
a) $[\text{H}^+] = 1.0 \times 10^{-3} \text{ M}$	pH = _____	_____
b) $[\text{H}^+] = 2.5 \times 10^{-5} \text{ M}$	pH = _____	_____
c) $[\text{OH}^-] = 0.01 \text{ M}$	pH = _____	_____

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7. Calculate both $[H^+]$ and $[OH^-]$ for the following solutions. All are either strong acids or strong bases. Be sure to clearly identify all answers.

a) 2.5 M NaOH

b) 0.045 M HCl

8 Calculate the pH of a 0.1 M solution of sodium hydroxide, NaOH, a strong base.

Hint: First find $[OH^-]$. Use this to find $[H^+]$ which you then convert to pH

9 a) Determine the concentration of hydrogen ions, $[H^+]$ in a solution whose pH is 5.17.

b) Calculate the hydroxide ion concentration, $[OH^-]$, for this solution.

10. Determine $[H_3O^+]$ in a solution whose pH = 9.22. (Hint: $[H_3O^+] = [H^+]$)

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11. A 2.67 g sample of hydrogen fluoride gas (HF) is dissolved in sufficient water to make 1.05 L of solution at 25°C to form an acidic solution. Hydrogen fluoride is a weak acid with $K_a = 6.6 \times 10^{-4}$.

Calculate the pH of this solution.

Begin by calculating [HF]. Then use K_a to determine $[H^+]$. Finally convert $[H^+]$ to pH.

12. The formula for ascorbic acid, better known as Vitamin C, is $HC_6H_7O_6$. K_a for ascorbic acid is 8.00×10^{-5} . Determine the pH of a solution prepared by dissolving a 500.0 mg vitamin C tablet in enough water to make 200.0 mL of solution.