

Chemistry 30

Unit 5: Acids & Bases

Practice Set 2: 2-1 to 2-4 K_a , K_b , K_w and pH

1. Calculate $[H^+]$ in a 2.00 L solution of hydrogen chloride in which 3.65 g of HCl is dissolved. K_a for HCl is very large.
2. Calculate $[H^+]$ in a solution containing 3.20 g of HNO_3 in 250 mL of solution. Nitric acid is a very strong acid.
3. An acetic acid ($HC_2H_3O_2$) solution is 0.25 M. Given that K_a for acetic acid is 1.8×10^{-5} , find $[H^+]$.
4. A solution of acetic acid contains 12.0 g of $HC_2H_3O_2$ in 500 mL of solution. Calculate $[H^+]$.
5. Calculate $[H^+]$ and $[OH^-]$ at 25° C in:
 - a. a 5.0 M NaOH solution. NaOH is a strong base.
 - b. a 0.025 M $Ca(OH)_2$ solution. $Ca(OH)_2$ is a strong base.
 - c. a 0.10 M HCl solution. HCl is a strong acid
 - d. a 0.01 M $HC_2H_3O_2$ solution. $HC_2H_3O_2$ is a weak acid with $K_a = 1.8 \times 10^{-5}$.
6. A mass of 1.4 g of KOH is dissolved in water to form 500 mL of solution. What is the concentration of H^+ ions in this solution if the temperature of the solution is 25° C?
7. A mass of 4.0 g of NaOH is dissolved in water to form 500 mL of solution with a temperature of 25° C. Calculate the hydronium ion concentration in this solution.
8. Calculate the pH of a solution of nitric acid that is:
 - a. 1.0×10^{-4} M
 - b. consists of 6.3 g of solute dissolved in 1.00 L of solution?
9. Calculate the pH of a solution that consists of 5.0 g of HCl in 250 mL of solution?
10. What is the $[H^+]$ of a solution with a pH of 10.00 at 25°C?
11. What is the pH of an aqueous solution containing 0.0020 M barium hydroxide, $Ba(OH)_2$?
12. Calculate the hydronium ion concentration of:
 - a. 100.0 mL of an aqueous solution containing 0.60 g of sodium hydroxide, NaOH.
 - b. a blood sample with a pH of 7.40