Acids and Bases Worksheet

1. Define Acid. Define Base.

   Acid: A substance that releases H^+ ions in solution.

   Base: A substance that releases OH^- ions in solution.

2. As the concentration of H_3O^+ increases, does pH increase or decrease? As the concentration of OH^- increases, does pH increase or decrease? Explain.

   As H_3O^+ increases, it increases the number of H+ ions, and pH decreases (more acidic). As the concentration of OH^- increases, the pH increases (more basic).

3. Calculate the pH of antacid, given that the $[H^+]$ concentration=0.000 000 001 M?

   - $pH = -\log[H^+]$
   - $= -\log 0.000\ 000\ 001 = -\log 10^{-9}$
   - $= -(-9) = 9$

4. Calculate the pH of blood, given that the $[H^+]$ concentration=0.000 000 048 M?

   - $pH = -\log[H^+]$
   - $= -\log 0.000\ 000\ 048 = -\log 4.8 \times 10^{-8}$
   - $= -(-7.32) = 7.32$

5. What is the [H+] concentration of tomato juice (pH=5)?

   - $[H^+] = 10^{-pH}$
   - $= 10^{-5}$
   - $= 0.00001$ M

6. What is the [H+] concentration of seawater (pH=7.85)?

   - $[H^+] = 10^{-pH}$
   - $= 10^{-7.85} = 1.4 \times 10^{-8}$
   - $= 0.000\ 000\ 014$ M

7. If it takes 25.30 mL of 0.277 M HCl to titrate 10.0 mL of aqueous ammonia to a methyl red endpoint, what is the molarity of the ammonia?

   $HCl(aq) + NH_4OH(aq) \longrightarrow NH_4Cl(aq) + H_2O(l)$

25.30 mL x 0.277 mol HCl/1000 mL solution x 1mol NH_4OH/1mol HCl = 0.00701 NH_4OH

0.00701 mol NH_4OH/10.0mL solution x 1000mL solution/1L solution =0.701 mol NH_4OH/1L solution = 0.701 M NH_4OH