QUIZ #5

1. (2 points) Which one of the following is not a strong acid?
   a. HBr  
   b. HClO₄  
   c. H₂SO₄  
   d. H₃PO₄

2. (2 points) What is the conjugate acid of ClO⁻?
   \[ \text{HClO} \]

3. (3 points) Write a net ionic equation for the reaction of nitrous acid, HNO₂, with water, showing that nitrous acid behaves as a Brønsted-Lowry acid.
   \[ \text{HNO}_2 + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{NO}_2^- \]

4. (4 points) Calculate the pH of a 4.2 × 10⁻³ M HCl solution.
   \[ [\text{H}^+] = 4.2 \times 10^{-3} \text{ M} \]
   \[ \text{pH} = -\log (4.2 \times 10^{-3}) = 2.38 \]

5. (4 points) Calculate the H₃O⁺ and OH⁻ concentrations in a solution in which pOH = 5.75. \( [\text{K}_w = 1.0 \times 10^{-14}] \)
   \[ [\text{OH}^-] = 10^{-5.75} = 1.8 \times 10^{-6} \]
   \[ \text{pH} = 14.00 - 5.75 = 8.25 \]
   \[ [\text{H}^+] = 10^{-8.25} = 5.6 \times 10^{-9} \]

6. (5 points) Calculate the pH of a 0.065 M nitrous acid solution. The acid dissociation constant \( K_a \) for HNO₂ is 4.5 × 10⁻⁴.
   \[ \text{HNO}_2 \rightleftharpoons \text{H}^+ + \text{NO}_2^- \]
   \[ 0.065 - x \quad x \quad x \]
   \[ K_a = 4.5 \times 10^{-4} = \frac{x^2}{0.065 - x} \]
   \[ x = [\text{H}^+] = 0.0052 \text{ M} \]
   \[ \text{pH} = 2.28 \]