**Quiz 2**

# Directions: Answer each of the following questions. Be sure to use complete sentences where appropriate. For full credit be sure to show all of your work. Where appropriate answers should be boxed for clarity, written to the correct number of significant figures, and, include the proper units.

1. What is the approximate pH of each type of titration at the equivalence point (4 points):
   1. weak base, strong acid \_\_\_\_\_\_\_\_\_\_pH < 7\_\_\_\_\_\_\_\_
   2. weak acid, strong base \_\_\_\_\_\_\_\_\_pH > 7\_\_\_\_\_\_\_\_\_
   3. strong acid, strong base \_\_\_\_\_\_\_\_pH = 7\_\_\_\_\_\_\_\_\_\_
   4. weak acid, weak base \_\_\_\_\_\_\_\_\_pH = ?, need to know Ka and Kb
2. Predict the stronger acid and explain your answer (6 points):
   1. H2S or HCl

HCl is the stronger acid because it has a higher bond polarity.

* 1. HNO2 or HNO

HNO2 is the strong acid because it has more oxygen atoms, which will draw electron density towards them and further weaken the O-H bond.

* 1. H2SO3 or HClO3

HClO3 is the strong acid because Cl has a greater electronegativity (3.0) than S (2.5).

1. Calculate the pH of a solution that contains 5.00 M nitrous acid (Ka = 4.0 × 10-4) (10 points).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | HNO2 (aq) + | H2O (l) | H3O+ (aq) + | NO2- (aq) |
| I | 5.00 M |  | ~ 0 M | 0 M |
| C | -x |  | +x | +x |
| E | 5.00 M –x =  5.00 M – 4.5 × 10-4 M ≈ 5.00 M |  | x = 4.5 × 10-4 M | x = 4.5 × 10-4 M |

Use the quadratic equation or the x is small approximation:

Check your x value and equilibrium values by plugging them into Ka:

Check complete, now calculate the pH: