**Ka and Kb Calculations Worksheet**

1. Write chemical equations which represent the dissociation of each of these acids or bases in aqueous solution. Use a single arrow in the case of a strong acid or base, and a double arrow to represent the equilibrium condition that exists in the solution of a weak acid or base.

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| a. HCl |
| b. NaOH |
| c. H2SO4 |
| d. KOH |
| e. HC2H3O2 |
| f. HCN |
| g. Cu(OH)2 |
| h. NH4OH |

1. Calculate the [H+], [OH‐], pH, and pOH of a 1.0 x 10‐3 M solution of HCl, a strong acid.
2. Calculate the [H+], [OH‐], pH, and pOH of a 0.0020 M solution of NaOH, a strong base.
3. Benzoic acid, HC6H5CO2, is an organic acid whose sodium salt, NaC6H5CO2, has long been used as a safe food additive to protect beverages and many foods against harmful yeasts and bacteria. The acid is monoprotic. Write the formula for calculating its Ka.
4. The [H+] of a 0.10 M solution of cyanic acid (HCNO) is found to be 0.0010 M. Calculate the Ka for cyanic acid. HCNO ↔ H+ + CNO‐
5. If 1.22 grams of benzoic acid, HC6H5CO2, is dissolved in 1.0 L of water, the [H+] is found to be 8.0 x 10‐4 M. Calculate the Ka for benzoic acid. HC6H5CO2 ↔ H+ + C6H5CO2‐
6. A 0.0050 M solution of butyric acid, HC4H7, has a pH =4.0, calculate Ka. HC4H7O ↔ H+ + C4H7O2‐
7. Determine the [OH‐] and [H+] of a 0.20 M solution of formic acid. The Ka = 1.8 x 10‐4 HCOOH ↔ H+ + HCOO‐
8. HCN has an initial molarity of 0.50 M, with a Ka value of 3.7 x 10‐8. Calculate its pH at equilibrium.
9. Ethylamine (C2H5NH3) is a weak Bonsted‐Lowry base. If it has an initial molarity of 0.024

M and a Kb of 5.6 x 10‐4, calculate its pH at equilibrium.

1. A chemist adds 0.75 moles of NH3 to enough water to make 0.50 liters of solution. Kb of ammonia is 1.8 x 10‐5. Determine the pH of this solution at equilibrium.

# Hydrazine, N2H4, has been used as a rocket fuel. Like ammonia, it is a Bronsted base. A 0.15 M solution has a pH of 10.70. What is the Kb for hydrazine?