**Predicting the Direction of Acid-Base Reactions Using Ka Values**

**https://www.chem.fsu.edu/editors/rlight/2200s05/Predicting\_Acid\_Base\_Reactions.htm**

A Bronsted-Lowry acid-base reaction is simply the transfer of a proton from an acid to a base, forming the **conjugate base** of the acid and the **conjugate acid** of the base.  
  
For Example:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
| CH3COOH | + | HCO3- | https://www.chem.fsu.edu/editors/rlight/2200s05/images/eqarrow.gif | CH3COO- | + | H2CO3 |

There is actually an equilibrium between reactants and products, and the equilibrium position can be determined quantitatively from the acid dissociation constants of each acid/conjugate base pair.

If the Keq for the above reaction is greater than 1 then\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

If the Keq for the above reaction is less than 1 then\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1) Write the Keq expression for the above reaction:

Problem?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

So how are you going to calculate the above Keq value?

3) What does Ka mean? What information does Ka give you?

Write the Ka expression for **HA(aq)**

**Ka =**

3) Use the table to find the Ka of each acid in the reaction:

4) What do these 2 numbers about the 2 acids with respect to each other?

5) Show how each acid ionizes:

6) Write the Ka expressions for each of the acids:

7) Mathematically, how are all 3 related i.e. the Keq and the 2 Ka expressions?

8) The Keq value is\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

9) The equilibrium lies to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ because\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

10) Why should you have known this without calculating the Keq?

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**Problems:**

1. Predict the products of the following acid-base reactions.
2. Predict whether the equilibrium lies to the left or right of the equation.

3) Calculate the Keq for the acid base reactions.

a) **HSO4-(aq) + CO32-(aq) ↔ SO42-(aq) + HCO3-(aq)**

b) **HPO42-(aq) + H2O(aq) ↔ H2PO4-(aq) + OH-(aq)**