4.10 Relative Strengths of Weak Acids and Weak Bases
## Predicting Whether Reactants or Products will be Favoured
in a Brönsted-Lowery Equilibrium

Name: _____

1. Are reactants or products favoured in each of the following?
(Find the "acid" on each side, and compare their Ka).

    a. HIO_3 + NO_2^- ← → HNO_2 + IO_3

    b. HCO_3^- + HS^- ← → CO_3^{2-} + H_2S

    c. NH_4^+ + OH^- ← → NH_3 + H_20

    d. H_2CO_3 + HPO_4^{2-} ← → $H_2PO_4^-$ + HCO_3^-

2. Write the equilibrium reactions which occur for each of the following. Do the resulting equilibria favour reactants or products?

    a. HSO_4^- + NO_2^- ← →
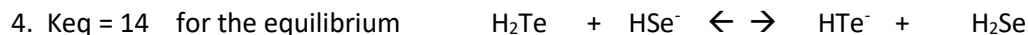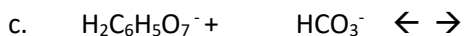
    b. H_3PO_4 + HPO_4^{2-} ← →
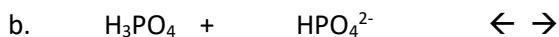
3. Write the equilibrium reactions, and determine the side favoured for each of the following.
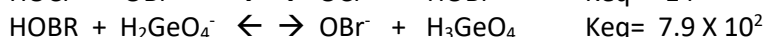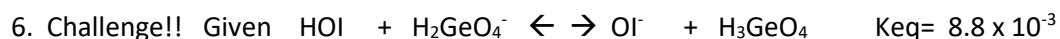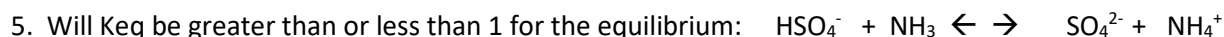   **3 Steps :** Unlike #2 above, both reactants are amphiprotic
        1. Check table to see which amphiprotic reactant acts as the "acid".
        2. Write the products.
        3.   Identify the acid on each side of the equation and go back to the Ka table to see
        which acid is stronger.

    a. HCO_3^- + HSO_3^- ← →

    b. HSO_3^- + $HC_2O_4^-$ ← →

    c. $H_2C_6H_5O_7^-$ + HCO_3^- ← →

4. Keq = 14   for the equilibrium H_2Te + HSe^- ← → HTe^- + H_2Se

    Which acid is stronger: H_2Te or H_2Se?
    Which base is stronger?

5. Will Keq be greater than or less than 1 for the equilibrium: HSO_4^- + NH_3 ← → SO_4^{2-} + NH_4^+

6. Challenge!! Given HOI + $H_2GeO_4^-$ ← → OI^- + H_3GeO_4 Keq= 8.8×10^{-3}
                      $HOCl$ + OBr^- ← → OCl^- + $HOBr$ Keq = 14
                      $HOBR$ + $H_2GeO_4^-$ ← → OBr^- + H_3GeO_4 Keq= 7.9×10^2
Arrange the 4 acids in order from strongest to weakest.