The 5 - Step Method for Predicting Acid-Base Reactions

Example: Spilled oven cleaner containing aqueous sodium hydroxide is neutralized with vinegar. Predict the acid base equilibria. NaOH CH_3COOH

1. List all major entities present when the reactants are placed in water

Na^+ OH^- CH_3COOH H_2O (SB, SA, A, B)

2. Identify all possible acids and bases (using table) and cross out any metal ions. (They are spectators)

3. Identify the strongest acids and the strongest base. (Use table)

4. Write the strongest acid and strongest base as reactants. Transfer an H^+ from the acid to the base and predict products.

$$CH_3COOH_{(aq)} + OH^-_{(aq)} \rightleftharpoons CH_3COO^-_{(aq)} + H_2O_{(l)} \quad (>50\%)$$

(H^+ transfer)

5. Predict the position of the equilibria. Use table. If acid is above base then products are favoured

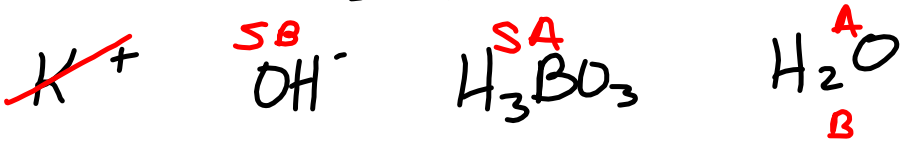
ACID IS ABOVE BASE >50%

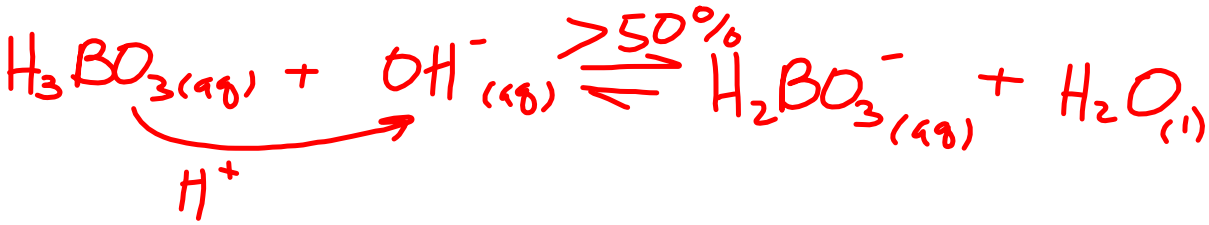
BASE IS ABOVE ACID <50%

* Remember to include states and charges!

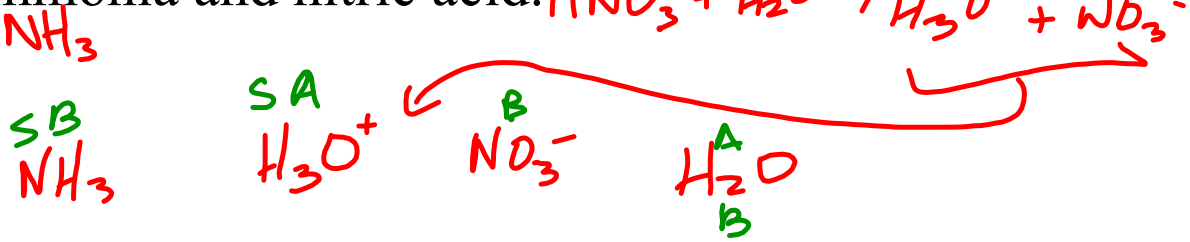
Examples

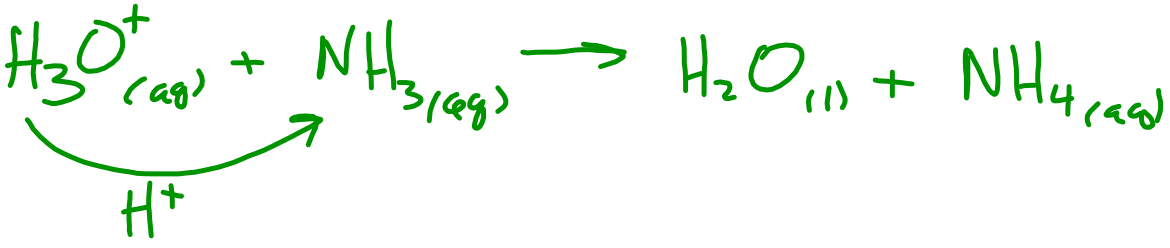
Predict the reaction of potassium hydroxide (KOH) and boric acid. H_3BO_3





Predict the quantitative reaction of ammonia and nitric acid. $HNO_3 + H_2O \rightarrow H_3O^+ + NO_3^-$





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