Acid-Base Chemistry Review

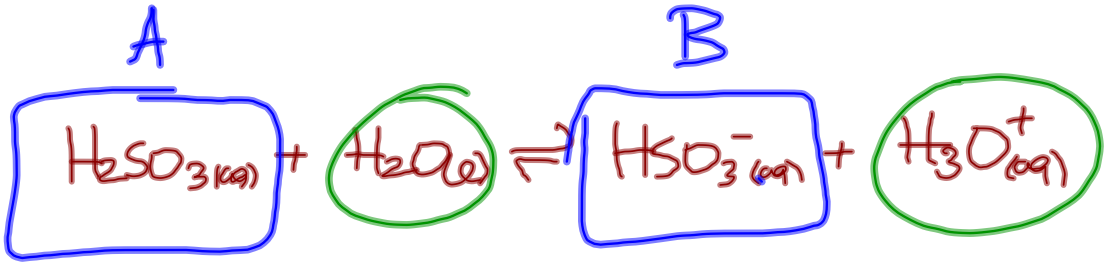
- Arrenhius Concept of Acid and Bases (Old and Revised)
- Bronsted-Lowry Acid-Base Concept H^+ donors H^+ acceptors

(Identify acids/bases, amphiprotic)

- Conjugate Acids and Bases

(the stronger an acid, the weaker its conjugate base)

- Polyprotic Acids
- Strong/Weak Acids
- Strong/Weak Bases
- Water Equilibrium
- Predicting Acid-Base Equilibria


A
B
$H_2SO_{3(aq)} + H_2O_{(l)} \rightleftharpoons HSO_{3(aq)}^- + H_3O_{(aq)}^+$

Calculate the pH and hydronium ion concentration if a 0.227 mol/L solution of benzoic acid is added to water.

$$C_6H_5COOH_{(aq)} + H_2O_{(l)} \rightleftharpoons C_6H_5COO^-_{(aq)} + H_3O^+_{(aq)}$$

0.227 M

$$K_a = \frac{[C_6H_5COO^-_{(aq)}][H_3O^+_{(aq)}]}{[C_6H_5COOH_{(aq)}]}, \quad [C_6H_5COO^-] = [H_3O^+]$$

$$K_a = \frac{[H_3O^+_{(aq)}]^2}{[C_6H_5COOH_{(aq)}]} \qquad pH = -\log[H_3O^+]$$

Calculate the pOH and hydroxide ion concentration if a 0.350 mol/L solution of ~~sodium~~ nitrite ions, acting as a base, is added to water.

$NO_{2(aq)}^- + H_2O_{(l)} \rightleftharpoons HNO_{2(aq)} + OH_{(aq)}^-$

0.350M

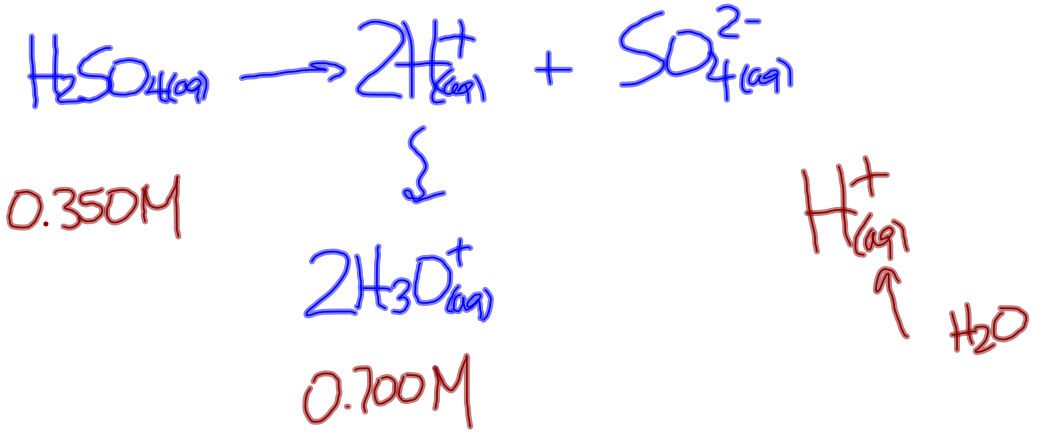
$K_b = \frac{[HNO_{2(aq)}][OH_{(aq)}^-]}{[NO_{2(aq)}^-]}$

$K_aK_b = K_w$

$K_b = \frac{K_w}{K_a}$

$K_b =$

Calculate the pH and hydronium ion concentration of a 0.350 mol/L solution of sulfuric acid.



Calculate the pH and hydronium ion concentration of a 0.350 mol/L solution of sodium hydroxide.

$$NaOH_{(aq)} \longrightarrow Na^{+}_{(aq)} + OH^{-}_{(aq)}$$

0.350M 0.350M

Predicting Acid-Base Reactions

1. List all entities (ions, atoms, or molecules) initially present.

2. Identify all possible acids and bases, using Bronsted-Lowry definition.

3. Identify the strongest acid and strongest base, using table of acids and bases.

4. Transfer one proton from the acid to the base and predict the conjugate acid and conjugate base as products.

5. Predict the position of the equilibrium.

Use the five-step method to predict the following acid-base equilibria:

- Ammonium chloride is added to a nitric acid solution.

- Methanoic acid is added to a sodium hydrogen carbonate solution.

Worksheet