Announcements

To join clicker to class today (Clickers with LCD display joins automatically):
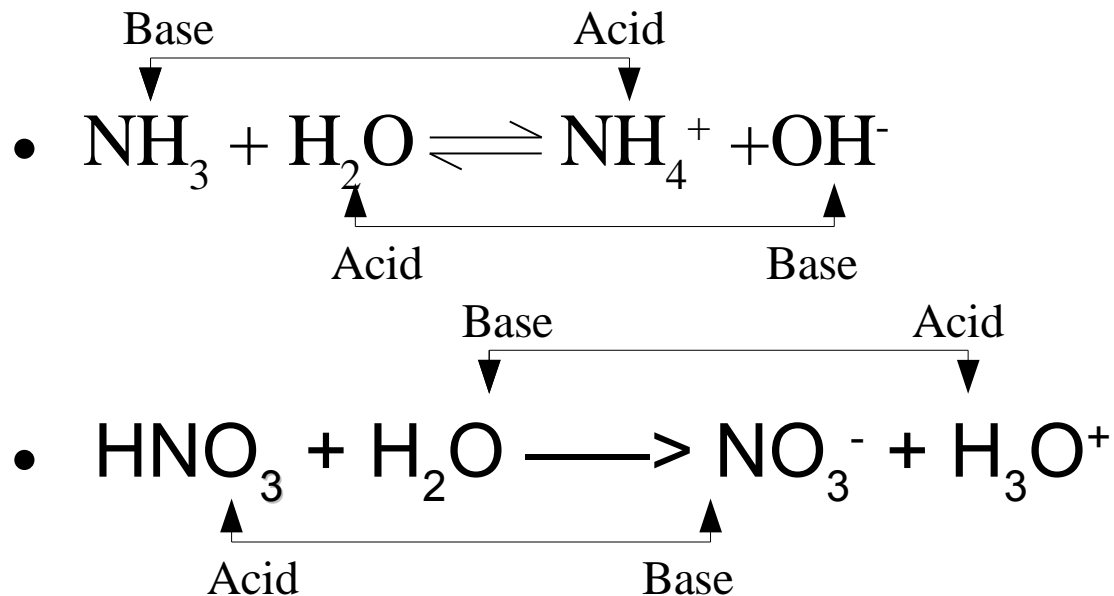
- Turn on the Clicker (the red LED comes on).

- Push "Join" button followed by "20" followed by the "Send" button (switches to flashing green LED if successful).

- Now hiring students to prep for general chemistry next Fall. See Ms. Hauer in HS-449

- Last quiz in discussion tomorrow on end of kinetics and beginning of equilibria.

Review

- Finding what the equilibrium concentrations will be when starting with a mixture that is not at equilibrium.
    - Makes use of fact that matter is conserved.
    - Make ICE (initial, change, equilibrium) Table
    - Solve by assuming the change is small.
- Catalysts do not change equilibrium point.
- Acids and Bases.
    - Bønsted-Lowry
        - acid = a proton donor
        - base = a proton acceptor
    - Lewis Models
        - acid = electron pair acceptor
        - base = electron pair donor
    - Conjugate Acid-Base Pairs.

Conjugate Acid-Base Pairs

- Acids and bases which interconvert during an acid base reaction.

Base   Acid

- $NH_3 + H_2O \rightleftharpoons NH_4^+ + OH^-$

Acid   Base

Base   Acid

- $HNO_3 + H_2O \longrightarrow NO_3^- + H_3O^+$

Acid   Base

pH, pOH, pK$_w$

- $H_2O \rightleftharpoons H^+ + OH^-$
  - K_w (25 °C)= $[H^+][OH^-] = 1.0 \times 10^{-14}$
  - in pure water $[H^+] = [OH^-] = x$
    - $x^2 = 1.0 \times 10^{-14}$
    - $x = 1.0 \times 10^{-7} = [H^+] = [OH^-]$
- $pK_w = -\log(1.0 \times 10^{-14}) = 14.00$
  - $pk_w = -\log[H^+][OH^-] = -\log[H^+] + -\log[OH^-]$
  - $= pH + pOH = 14.00$

Acid/Base "Strength"

- "Strong" are strong electrolytes (100% dissociated)

$$HCl(aq) \longrightarrow H^+(aq) + Cl^-(aq)$$

- "Weak" do not dissociate completely (establish equilibrium)

$$HF(aq) \rightleftharpoons H^+(aq) + F^-(aq)$$

Chang Table 16.2