Announcements

- 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).
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- Exam 3 on chapters 15 and 16 is one week from today.

Review

- Brønsted-Lowry
  - acid = a proton donor – base = a proton acceptor
- Lewis
  - acid=electron pair acceptor –base = electron pair donor
- Conjugate pairs
  - Acids and bases which interconvert during an acid-base reaction.
  - Conjugate bases of weak acids are strong bases.
  - Conjugate acids of weak bases are strong acids.
- Acid dissociation equilibria just like any other.
  - $HA(aq) \leftrightarrow H^+(aq) + A^-(aq)$ – $K_a = [H+][A-]/[HA]$
  - Given numerical value for K_a and initial [HA] can find final equilibrium concentrations.
- Likewise for bases
  - $BOH(aq) \leftrightarrow B^+(aq) + OH^-(aq)$ – $K_b = [B^+][OH^-]/[BOH]$

Review Con't

- Acid Rain (pH < 5.3)
  - Multiple coupled acid dissociation equilibria
    - Large K_{a1}, assume first dissociation goes to completion and then equilibrate second step (K_{a2}).
    - Small K_{a1}, equilibrate first dissociation, use result to as start to equilibrate second dissociation, then iterate. You are not expected to iterate, but must show that second step change is small enough that you do not need to.
    - Acids causing acid rain H_2SO_4, HNO_3, HNO_2.Equilibria and Bases
  - Natural rain slightly acidic from carbonic acid (H_2CO_3) equilibria. The carbonic acid comes from dissolved CO_2.
- $pH = -\log_{10}[H^+] = -\log_{10}[H_3O^+]$ (pH < 7 = acid, pH > 7 = base)
- pH of salt solutions are not necessarily neutral. This effect is how Midwest lakes are basic despite acid rain.

Buffers

- Buffer = a solution that resists a change in its pH when either an acid or base is added.
- Buffers consist of a weak acid + the salt of its conjugate base. (alternately weak base + salt of its conjugate acid)
- Can calculate pH using standard equilibrium calculations
- If [salt] and [acid] reasonably high easier to use Henderson-Hasselbach: $pH = pK_W + \log([base]/[acid])$