Strong vs Weak Acid

- different from concentration (independant of concentration)
- strong acid → 100% (or close to) dissociation
  - → non-equilibrium
  - → stochiometric
  - → eg $HCl \longrightarrow H^+ + Cl^-$
    6.0M 6.0M

- weak acid → partial dissociation (less than 10% or even less than 0.001%)
  - → equilibrium
  - → not stochiometric (use variables etc)
  - → eg $HNO_2 \rightleftharpoons H^+ + NO_2^-$

eg Determine $[H^+]$ and pH and % dis for 1.0M HClO

$HClO \rightleftharpoons H^+ + ClO^-$ ($HOCl + H_2O_{(e)} \rightarrow H_3O^+ + OCl^-$)

$[ClO^-] = [H^+]$

$[HClO] = C_A^\circ - [H^+]$ (C_A° is the initial undissociated acid concentration)

$= 1.0 - [H^+]$

$$K_A = \frac{[H^+][ClO^-]}{[HClO]}$$

$$3 \times 10^{-8} = \frac{[H^+]^2}{1.0 - [H^+]}$$

* could use the quadratic eq^n at this point

$$[H^+] = \sqrt{3 \times 10^{-8}(1.0 - [H^+]}$$

guess a number less than 1.0

keep solving using answer until the # you plug in = the # you get out

eg guess 0.1

answer ① 0.00017391

② 0.00017390

③ 0.00017390

$[H^+] = 0.00017390M$.

$$pH = -\log [H^+]$$
$$= -\log 0.00017319$$
$$= 3.76$$

$$\%dis = \frac{[H^+]}{C_A^\circ} \times 100\%$$

$$= \frac{0.00017319}{1.0} \times 100\%$$
$$= 0.01732\%$$

Determine the initial concentration (C_A°) of acetic acid if the solution is found to have a pH of 4.06

monoprotic

$$CH_3COOH \rightleftharpoons CH_3COO^- + H^+ \quad (HC_2H_3O_2)$$

$$[H^+] = 10^{-pH}$$
$$= 10^{-4.06}$$
$$= 8.71 \times 10^{-5} M$$

$$[CH_3COO^-] = [H^+]$$
$$= 8.71 \times 10^{-5} M$$

$$[CH_3COOH] = C_A^\circ - [H^+]$$
$$\approx C_A^\circ - 8.71 \times 10^{-5} M$$

$$K_A = \frac{[CH_3COO^-][H^+]}{[CH_3COOH]}$$

$$1.8 \times 10^{-5} = \frac{(8.71 \times 10^{-5} M)^2}{C_A^\circ - 8.71 \times 10^{-5} M}$$

$$C_A^\circ = 5.085 \times 10^{-4} M.$$