

Chem 151. R. Corn

Alpha Fractions:

I. Monoprotic Acid



$$C_{\text{tot}} = [\text{HA}] + [\text{A}^-]$$

$$C_{\text{tot}} = [\text{HA}] (1 + K_a/[\text{H}^+])$$

$$\alpha_{\text{HA}} = [\text{HA}]/C_{\text{tot}} = (1 + K_a/[\text{H}^+])^{-1}$$

$$\alpha_{\text{A}^-} = 1 - \alpha_{\text{HA}} = (1 + [\text{H}^+]/K_a)^{-1}$$

II. Diprotic Acid



$$C_{\text{tot}} = [\text{H}_2\text{A}] + [\text{HA}^-] + [\text{A}^{2-}]$$

$$C_{\text{tot}} = [\text{H}_2\text{A}] (1 + K_1/[\text{H}^+] + K_1K_2/[\text{H}^+]^2)$$

$$\alpha_{\text{H}_2\text{A}} = [\text{H}_2\text{A}]/C_{\text{tot}} = (1 + K_1/[\text{H}^+] + K_1K_2/[\text{H}^+]^2)^{-1}$$

$$C_{\text{tot}} = [\text{HA}^-] ([\text{H}^+]/K_1 + 1 + K_2/[\text{H}^+])$$

$$\alpha_{\text{HA}^-} = [\text{HA}^-]/C_{\text{tot}} = ([\text{H}^+]/K_1 + 1 + K_2/[\text{H}^+])^{-1}$$

$$\alpha_{\text{A}^{2-}} = 1 - \alpha_{\text{H}_2\text{A}} - \alpha_{\text{HA}^-} = (1 + [\text{H}^+]/K_2 + [\text{H}^+]^2/K_1K_2)^{-1}$$