

# Physical Chemistry CUME

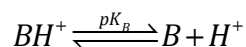
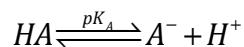
---

March 2016

LORIEAU

1. Consider the following 2 acids:

$$\mathbf{\text{Log}_b x = \text{Log}_a x / \text{Log}_a b}$$



- Derive the Henderson-Hasselbalch equation for each. (pH as a function of pK and the concentrations of each component.)
- Derive the standard free energy ( $\Delta G^\circ$ ) with respect to the pK.
- How would the standard free energies ( $\Delta G^\circ$ ) and the pKs be influenced for these two reactions in a low dielectric environment (like oil, or the center of a membrane,  $\epsilon=2$ ) versus a high dielectric environment (like water,  $\epsilon=80$ )?
  - Write  $\Delta pK$  in terms of changes of standard free energy.
  - How would the different dielectric constants influence the  $\Delta G^\circ$  of the reactants and products of each type of acid?
  - How would this influence the sign of pK for each case?