

\* While I prefer you turn in a hard copy of the worksheet, I will accept scanned copies sent to my email address, joensj@fiu.edu

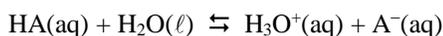
Section: (circle one)      M,W,F                      Tu,Tr

Exam 2 is Friday, October 21 (for the M,W,F class) and Thursday, October 20 (for the T,R class) in class. It will cover material from Chapters 15 and 16 of Burdge.

For problems involving calculations you must show your work for credit. Unless otherwise stated, you may assume  $T = 25.0\text{ }^{\circ}\text{C}$ .

1) The pH of a  $2.4 \times 10^{-3}\text{ M}$  solution of a weak monoprotic acid HA is  $\text{pH} = 5.38$ . Based on this, find the percent dissociation for the weak acid.

The reaction of a weak monoprotic acid in water may be written as



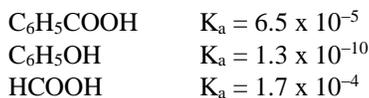
By definition, the percent dissociation is      % dissociation =  $\frac{\text{concentration of dissociated acid}}{\text{initial concentration of acid}} \times 100\%$

The initial concentration of acid is  $2.4 \times 10^{-3}\text{ M}$ . By looking at the balanced reaction, we can see that the concentration of dissociated acid will be equal to  $[\text{H}_3\text{O}^+]$  (since when an HA molecule dissociates it forms an  $\text{H}_3\text{O}^+$  and an  $\text{A}^-$ ).

$$[\text{H}_3\text{O}^+] = 10^{-\text{pH}} = 10^{-5.38} = 4.17 \times 10^{-6}\text{ M}$$

$$\text{So } \quad \% \text{ dissociation} = \frac{4.17 \times 10^{-6}}{2.4 \times 10^{-3}} \times 100\% = 0.17\%$$

2) Consider the following list of weak acids



For each of the following questions circle the correct answer.

a) The strongest acid



b) The strongest base



The strongest acid will be the one with the largest value for  $K_a$ . Since the weaker the acid the stronger the conjugate base, the strongest conjugate base will correspond to the weakest acid.



$$\text{So } [\text{OH}^-] = x = 6.37 \times 10^{-6} \text{ M}$$

$$\text{pOH} = -\log_{10}[\text{OH}^-] = -\log_{10}(6.37 \times 10^{-6}) = 5.20$$

$$\text{pH} + \text{pOH} = 14.00, \text{ and so } \text{pH} = 14.00 - \text{pOH} = 14.00 - 5.20 = 8.80$$

This is not an easy problem, mainly because it requires you to pull together a lot of different ideas. Having said that, people sometimes need to know how to find the value for pH for salts that contain conjugate acids or conjugate bases.