CEE 680 Spring 2020

Homework #6

1. Determine the pH and alkalinity for the following solutions. Assume the systems are closed to the atmosphere.
   a. $5x10^{-4}$F NaOH
   b. $5x10^{-5}$F Na_2CO_3
   c. $5x10^{-5}$F $KHCO_3$
   d. $1x10^{-3}$F HCl

2. What partial pressure of carbon dioxide are the solutions from question #1 in equilibrium with?

3. Repeat question #1, but assume the systems are open to the atmosphere.

4. A groundwater was found to have the following composition:
   ANC = $3x10^{-2}$ equ/L, pH = 7.5
   What is the partial pressure of CO_2 that is in equilibrium with this water?

5. A surface water and a groundwater are to be used as a raw water supply for the town of Springfield, FL. They will be mixed as follows:

	Surface Water	Groundwater
Flow Rate	3.5 MGD	0.8 MGD
Alkalinity	10 mg/L as $CaCO_3$	250 mg/L as $CaCO_3$
pH	6.9	8.3

   What will the pH of the combined waters be?

6. You are treating an alkaline groundwater by alum coagulation followed by base addition for corrosion control. Your target pH for the water in the distribution system is 8.5. Analysis of the finished water prior to base addition shows a pH of 7.2, and an alkalinity of 250 mg/L as $CaCO_3$. How much of either one of the following two bases would you have to add (in mg/L) to reach your target pH.
   a. Caustic Soda (NaOH)
   b. Soda Ash (Na_2CO_3)

Assigned: 25 Mar 20
Due: 1 Apr 20