PRINCIPLES OF GEOCHEMISTRY
GEOL 423
PROBLEM SET #3
FALL 2009

All the data necessary for these problems are given in Faure or Andrews et al. Assume all activity coefficients are equal to one unless stated otherwise. **Show all work.**

Problem 1: Calculate the pH of a solution containing 0.05 mole of acetic acid per liter of solution.

Problem 2: Calculate the concentrations of all ions and the pH of a solution containing 0.2 moles of As acid (H_3AsO_4) per liter of solution.

Problem 3: Assume that atmospheric p_{CO_2} has been increased to a value of 10^{-2} atm by fossil fuel burning. Calculate the pH of a rain droplet in equilibrium with this atmosphere.

Problem 4: Assuming that the atmosphere has $p_{SO_2} = 10^{-8}$ atm, and that SO_2 is not oxidized, calculate the pH of a rain droplet in equilibrium with the atmosphere. Neglect the effect of CO_2 on pH.

Problem 5: What would the pH of a rain droplet be if atmospheric $p_{SO_2} = 10^{-8}$ atm, the SO_2 is completely oxidized to form H_2SO_4(aq), the H_2SO_4(aq) is completely absorbed by water vapor and the total volume of water vapor per m^3 of air is 0.001 dm^3?