Your Name: _____

CEE 370	Fall 2019

Homework #3

1. Chemical Dosing

a. How many mg/L of chlorine (hypochlorous acid) are required to oxidize 0.8 mg/L ferrous iron to ferric iron? Express your answer in mg/L as Cl_2.

b. How many mg/L of potassium permanganate[1] are required to oxidize 2 mg/L of cyanide to nitrate and carbon dioxide?

2. Consider the following four solutions of acids or salts in water. In each case, list the chemical species or elemental groupings you would expect to exist in each of the 4 solutions; then list all of the equations that govern these systems (i.e., the equilibrium, mass balance, and electroneutrality equations). Consult slides for lecture #8.

a. 10^{-5} M sodium acetate and 10^{-6} M acetic acid

b. 10^{-5} M sodium dihydrogen phosphate and 10^{-6} M disodium hydrogen phosphate

c. 10^{-4} M hydrochloric acid

d. 10^{-4} M acetic acid

3. Determine the Percent composition (% acetate, % acetic acid) of a solution of Acetic Acid at the following pHs

a. pH 3.0

b. pH 4.5

c. pH 5.5

Assigned: 30 Sept 19
Due: 7 Oct 19

[1] Permanganate is a strong oxidant that is widely used in water treatment and for COD tests and some toxic waste treatment systems. Manganese is the oxidized species that does the "work" and its final reduced form after treatment is as manganese dioxide.

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Answer Page

Fill in the boxes with the correct answer.

You will only get credit for a problem if you (1) fill in the box with the correct answer, (2) your answer is legible, and (3) you include attach page(s) with calculations backing up your answer, when requested for the problem.

Problem #

1		mg/L as Cl_2
		mg/L as $KMnO_4$

2a	Species	
	Equilibria	
	Mass balances	
	Electro-neutrality	

2b	Species	
	Equilibria	
	Mass balances	
	Electro-neutrality	

2c	Species	
	Equilibria	
	Mass balances	
	Electro-neutrality	

2d	Species	
	Equilibria	
	Mass balances	
	Electro-neutrality	

3	a		% acetic acid		% acetate
	b		% acetic acid		% acetate
	c		% acetic acid		% acetate