**ENGR 121 Homework 11**

**NOTE:** Use engineering format for problems 1 through 3, and use non-engineering format for problem 4-5. This is an individual assignment.

1. Assume you have 8 Liters of water to which you add salt to create a mixture with 0.5wt% NaCl. Determine:

**Given: Vol=8L, NACL%=0.5%**

* 1. the mass of the water mwater=8kg

**Request: m**

**Solution: 1L=1kg**

**8L \* 1kg/1L =8kg**

* 1. the mass of the salt msalt=0.0402kg

**Request: msalt**

**Solution: x/(x+8kg)=0.005**

**x-0.005x=0.004**

**x=0.004/0.995**

**msalt=0.0402kg**

* 1. the number of moles of NaCl 0.687 mol NaCl

**Request: molNaCl**

**Molar Mass Nacl: 54.88 g/mol = 0.017 mol/g**

**Solution: 0.0402kg \* 1000g / kg = 40.2g**

**molNaCl = 40.2g \* 0.017 mol/g = 0.687mol**

* 1. the number of Cl- ions 4.14 x 1023 ions Clˉ

**Request: # ions Cl-**

**1 mol = 6.022\*1023**

**1 ion Cl-/ 1 NaCl**

**0.687 mol Nacl \* 1 ion Cl-/ 1 NaCl = 0.687 mol Cl-**

**0.687 mol Cl- \* (6.022\*1023) = 4.14\*1023**

1. If a constant current of 0.25mA passes through the probes of the conductivity sensor, how many OHˉ molecules would be formed over a 3.5-minute period? 3.276 x 1017 molecules of OHˉ

2 𝐻2𝑂(𝑙) + 2𝑒− → 𝐻2(𝑔) + 2𝑂𝐻−(𝑎𝑞)

**Given: I=0.25mA, t=3.5m**

**Request: Molecules**

**Solution: 1A=1C/s**

**1mA=1C/s\*1/1000**

**0.25mA=1C/s\*1/1000\*1/4 = C/(4000 \* s)**

**=6.2\*10^18e- / (4000 \* s)**

**=1.560375\*10^15 e- / s**

**3.5 min = 210 s**

**1.560375\*10^15 e- / s \* 210s = 3.2767\*10^17e-**

**In the chemical equation: 2e-/2OH- = 1 e-/1 OH-**

**3.2767\*1017 e- \* 1 e-/ 1 OH- = 3.2767\*1017 OH-**

1. A 10-gallon aquarium contains 3.5% salt by weight. How much 9% salt by weight water would you need to add to bring the salt concentration to 5% salt by weight? 31.2lb 9% salt water

**Given: Vol=10gal, Salt%=3.5%, Salt1%=9%, Salt**

1. Fill out the self/peer evaluation form found in the downloads page under Class 11. This is to serve a mid-project check on team and self-participation; please be honest with your answers. **Turn in the form in the next class in a separate stack from your homework.** Only your instructor will see the results of the form.

1. Prepare with your group for the temperature evaluation. Download the evaluation document (found under Class 8 on the downloads page). Have the first page filled out and all required components ready to be turned in during your team’s evaluation.