Engy-5140: Chemical and Nuclear Waste Processing Fall 2019 UMass Lowell; Prof. V. F. de Almeida **06Dec2019**

Final Project 04 18Dec2019

Name: `your name`

Guidance:

- Work within your team only. Be clear and complete in your answers.
- Save your work frequently to a file locally to your computer.
- During your work and before submitting the final version do: `Kernel` -> `Restart & Run All`, to verify your notebook runs correctly.
- Save your file again.

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Problem Statement

A SO_2 -air mixture is scrubbed with water in a trayed tower at 20˚C and 1 atm. Solute-free water enters the top at 1,000 lb/h. The liquid phase leaving the bottom contains 0.6 lb SO_2 /100 lb of solute-free water. The partial pressure of SO_2 in the gas leaving is 23 torr. The mole ratio of water to air is 25. Equilibrium data for solubility of SO_2 in H_2O at 20 ˚C is tabulated below.

lb SO_2 / 100 lb H_2O	Partial Pressure of SO_2 in Air, torr
0.02	0.5
0.05	1.2
0.10	3.2
0.15	5.8
0.20	8.5
0.30	14.1
0.50	26.0
0.70	39.0
1.0	59.0

Using the network modeling approach covered in this course, address the items to follow (based on Seader, Henly, and Roper textbook Separation Process Principles Chap. 6, 2016).

Problem 1 (100 pts)

1. Design a trayed column and provide construction/operation parameters.
2. What are the efficiencies of your absorber?
3. What percent of SO_2 in the entering gas is absorbed in the tower?
4. What is the mass of SO_2 per day leaving the tower in the gas phase?
5. Describe the hazards to humans if the exiting air is inhaled.

Answers: