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

Final Project 03 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 refinery gas stream of 800,000 scfm (32 ˚F, 1 atm) containing 72.5% H_2, 25% CH_4, and 2.5% C_2H_6 is to be used as a source of H_2. An absorber column is to be used to deliver a gas stream with 95% H_2 at no less than 375 psia. The absorber operates at 400 psia and 100 ˚F using n-octane as an absorbant. If at least 80% of the H_2 fed to the absorber is to leave in the exit gas, address the items below using the network modeling approach covered in this course, and thermodynamic and transport properties you found in the open literature.

(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. Using the O'Connell efficiency correlation (p. 49, Engy-5140-noneq-absorption), compare the results obtained to the previous item.
4. What is the mass of H_2 in the exiting gas stream produced per day?
5. What is the mass of each absorbed species in the exiting n-octane phase per day?
6. Describe the hazards in this operation.

Answers: