Engy-5140: Chemical and Nuclear Waste Processing 2019 UMass Lowell; Prof. V. F. de Almeida **07Nov19**

Midterm Exam 2: 07 Nov 2019

Name:

Guidance:

- This is an open-book, open-note, **individual** exam.
- No discussion with anyone is allowed.
- You may use online documents and course notes.
- Make sure to answer the questions asked.
- Show your **invidual** work and be crystal clear.

Ground water at volumetric flow rate of 1,500 gpm, containing a volatile organic compound (VOC), is to be treated by countercurrent air stripping in a trayed column to produce drinking water that meets EPA standards (see data below).

Component	K-value	Groundwater (ppm)	EPA drinking water tolerance (ppm)
1,2-Dichloroethane (DCA)	60	85	0.005

ppm is parts per million by mass (assume 1 ppm in water = 1 mg/L).

Using the network modeling approach covered in this course, provide answers to the problems below (based on Seader, Henly, and Roper textbook Separation Process Principles Chap. 6, 2016) .

Problem (100 pts)

1. Compute the minimum air flow rate in scfm (60˚F, 1 atm).
2. Compute the number of equilibrium stages (or nodes) if the air flow rate is twice the minimum required and the tower operates at 25˚C and 1 atm.
3. Compute the composition of DCA in the air.
4. Is the air exiting the column safe to breathe? Present enough evidence to defend your response.

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