Engy-5140: Chemical and Nuclear Waste Processing 2019 UMass Lowell; Prof. V. F. de Almeida **03Oct19**

Midterm Exam 1: 03 Oct 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.

Problem 1 (50 pts)

An aerated waste tank with raffinate from a chemical operation contains 100 L of aqueous solution as follows:

1. 15 g/L of ^{133}Cs
2. 20 g/L of ^{88}Sr
3. 12 g/L of ^{140}Ce
4. 6 M HNO_3

Classify this waste as best as you can using resources covered in the course and make recommendations for disposal.

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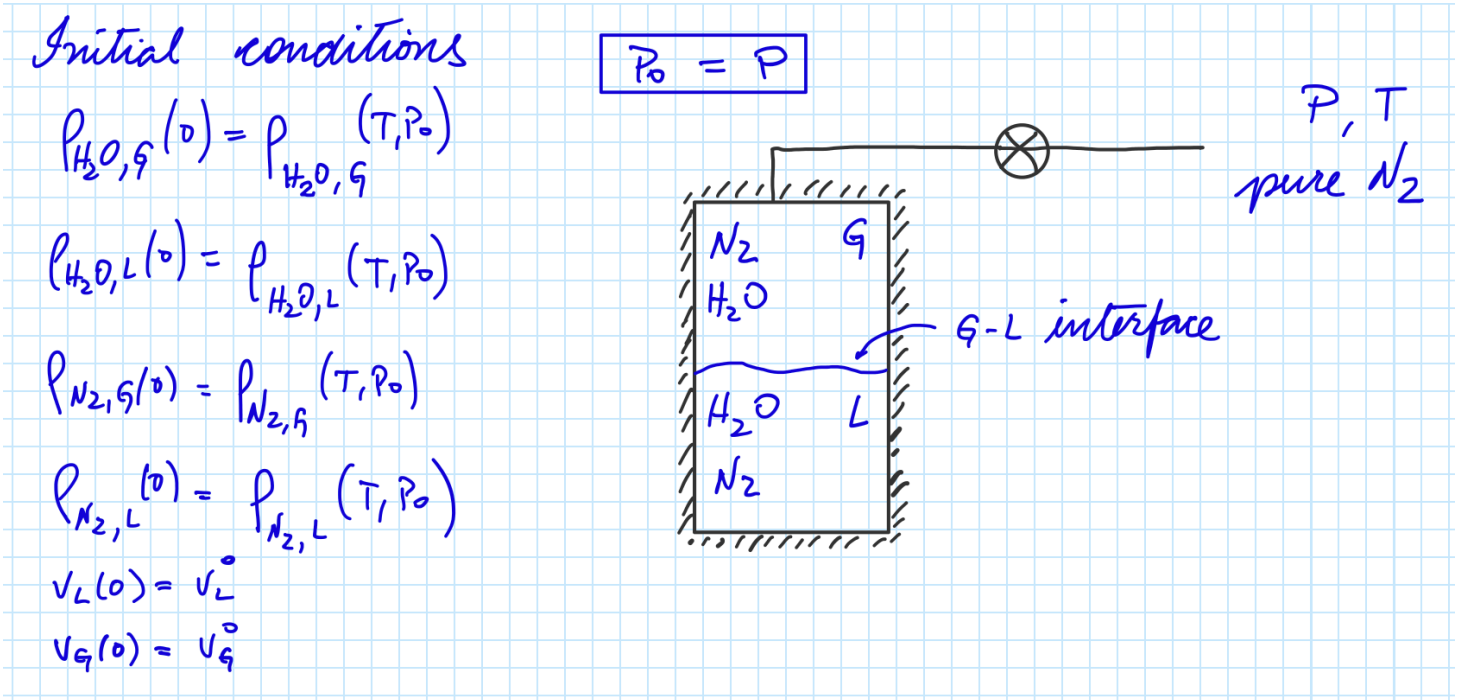
Problem 2 (50 pts)

The evaporation problem covered in class is shown below with the condition of *equal pressure and temperature*.

1. Develop a network-based set of governing equations to model the evolution of the mass concentration of the species involved. Explain your assumptions.
2. How many parameters does your problem have?
3. What physical condition must be used to help choose values for the parameters? Apply the condition to your model and comment on the results.



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