CLB 321 Mass transfer practical

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# **Introduction**

There is an existing glass distillation column in the Process Modelling and Control group’s laboratory which separates ethanol and water. This column is a closed system, which means that the distillate and bottoms product are mixed and re-fed into the distillation column. Does this mean that the feed would be different from the initial set feed composition at steady state? During this practical, you will be investigating the operation of this column. The column has 10 plates, three heat exchangers, including a partial reboiler. The column will be controlled by the assigned demi’s. They will show you how to sample from the column and can give more information if necessary. The column will be set to operate with a feed containing a 50 vol% mixture unless otherwise stated. There should be enough time for the column to reach two different steady states, set, chosen and controlled by the demi’s. These steady states may differ from group to group.

# **Goals**

The operation of this unit involves many streams of differing compositions. Your goal is to present a complete mass and energy balance for the column itself as well as an indication of the concentration profile obtained over the column. You must design an experiment that will enable you to do these balances.

# **Preparation**

During the practical it is important to familiarize yourself with the different streams and unit operations. You will be expected to collect data during the experiment that will enable you to do a mass and energy balance around the column. You must make sure that you have strategies for measuring the relevant properties of the streams and the column itself. You will have access to thermometers, refractometers, scales and density measuring devices during the practical.

You will have to obtain VLE data for the system on your own. You can use Aspen to simulate the column to get an idea of what to expect, remember this is not an ideal system, with heat losses. At what pressure do you think the column operates? What efficiency do you expect the column to have? What effect would sampling have on the operation of the column?

# **What is expected in the feedback**

The feedback sessions will be to discuss the lab-session in a group presentation format. You as a group will prepare a presentation, where all members will contribute in the preparation and presenting thereof. The slides must be uploaded to ClickUP prior to the session for my perusal, in .pdf or .pptx format.

What needs to be included in the slides are all you have learned, your observations, your preparation, your results and how the simulation compares to the column. There is no guideline for the discussion, but the more you show understanding about the concepts and practice, the better. Just showing your preparation, observations and results during the feedback will result in a fail. Do not explain the workings behind the operation of a distillation column or heat exchanger, you have already been tested on that last semester.

At the end of the session I want you to rate each group member (anonymously) in order for me to see whether there are any students that did not contribute. I will explain the rating system in the feedback session.

**Good luck and enjoy!!**