THERMODYNAMICS AND TRANSPORT LABORATORY

TA INSTRUCTIONS FOR THE CONDUCTIVE HEAT TRANSFER LAB

Ch En 385 – Knotts

Overview

- Students should spend about 1 hour in the lab. Part of this will be doing experiments, but make sure they are answering the analysis questions during waiting periods.
- The apparatus will require about 1.5 hours to approach the desired equilibrium. Coordinate with the lab manager if you are unable to come in that far ahead of time to start the apparatus.
- Before operating the equipment alone, you should have passed it off with either Dr. Knotts, Will Davis, or Mike Beliveau.

General Instructions

1. Do the following to prepare for students.
    a. Learn how to run the equipment and pass off your understanding with either Dr. Knotts, Mike Beliveau, or Will Davis.
    b. Perform the experiments that the students will do.
2. You should have set up specific times (5 hours a week) for students to perform the experiments. You will be in the lab during these times.
3. You will setup the apparatus before each lab hour following the instructions below.
4. After students are finished with the lab, you will shut down the apparatus following the procedures below.
5. You can grade assignments when in the lab and not answering student questions; however, you should be closely monitoring the students.
    a. Keep them on task.
    b. Ask questions to deepen understanding.

Apparatus

Figure 1 is a picture of the apparatus. Notice the following.

- The main power switch
- Heater On button
- Heater Off button
- Liquid fill cap
- Default valve position
- Temperature and Pressure displays

Figure 2 is a picture of the refractometer. This will be used to measure sample composition.

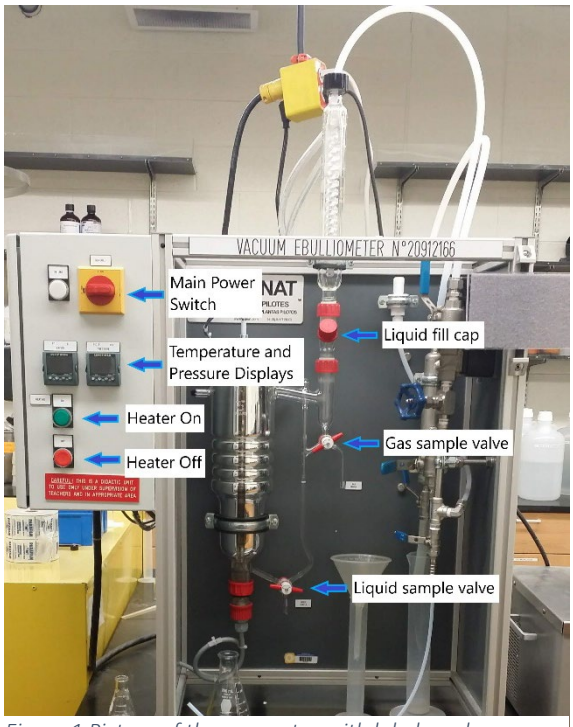

Figure 1 Picture of the apparatus with labels on key components

Set Up of the Starting Configuration

Do the following, **before students arrive**, if not already done.

- Turn on the cooling water refrigeration bath about 1 hour before turning on the heater.
- Check the fluid level in the ebulliometer. If the fluid level is below the white mark on the distillate return line, refill the ebulliometer through opening the red liquid fill cap. The liquid level must stay below the Y junction below the gas sample valve.
- Turn on the Main Power switch
- Make sure the valves are in the operating positions, shown in Figures 3 and 4. The black lines on the front of the valve indicate the flow path through the valve.
- Once the temperature and pressure displays show digits, turn on the heater using the green button.
- The students will wait for equilibrium before taking samples.

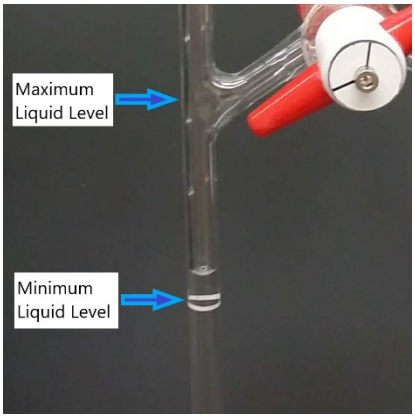

Figure 2 Ebulliometer liquid level reading

Lab Operation Procedures

During the lab time, students will have only enough time to run one set point, so they will be provided with a set of data points from students in UO lab to complete their analysis.

- Taking samples
  - Sample valves
- Reading samples
  - Refractometer

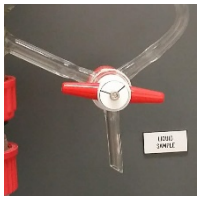

Figure 4 Liquid Sample Valve

Figure 3 Gas Sample Valve

Shutdown Procedures

1. Turn off the heater by pressing the red “Stop” button.
2. Wait 30 minutes for the liquid to cool.
3. Turn off main power and shut off cooling water.