DISTILLATION OF A BINARY MIXTURE

In this experiment, you will be conducting both a simple distillation and a fractional distillation of a mixture of cyclohexane (bp=79^{o}) and methylcyclohexane (bp=101^{o}) to compare the two techniques.
The initial mixture will be approx. 1:1 cyclohexane/methylcyclohexane (v/v), your instructor will give you the actual amounts the day of the experiment.

To maximize the efficiency of the fractional distilling column you will want to control the rate at which the material distills. To assess the efficiency of the column you will analyze the distillate using gas chromatography. You will compare these results with those from the simple distillation.

For this experiment you will work with a partner. Each student pair will be responsible for collecting a total of 6 ml of distillate in 2 ml increments from both simple and fractional distillation setups--3 samples from each. You will be required to record the following data for each fraction in your notebook and on the blackboard:
1. Distillation rate measured for each fraction (ml collected/minute)
2. Temperature range during distillation of each fraction
3. Composition of the distillate (based on gc results).

After collecting your fractions, you will analyze them by gc. In your notebook, record the chromatography conditions used for the analyses. You will record the data of the other students (which will be provided) and with this data you will construct two graphs for each type of distillation. The first graph will be a determination of temperature vs fraction number(or volume); the second graph will be an analysis of composition of each component versus fraction number (a total of four graphs).

You will be required to discuss your data in writing, especially any discontinuities in the graphs. What parameters affected the efficiency of your distillation? How might it have been improved?

Students will sign up at the blackboard to take fractions in the following order:

Fraction #	Technician	
1-3	Smith, Jones	(*You will be taking fractions from both setups simultaneously*;
4-6	.....	*be certain to **label** the fractions **immediately** so they are not confused;*
7-9		*eg, SD1, SD2, SD3, FD1, FD2, FD3*)
10-12		
13-15		
16-18		
19-21		
22-24		

Observe the activity of the student technicians ahead of you to become familiar with conditions, behaviour of the column, etc. Record your data on the sheet provided in the lab. Tightly cap your samples and, if you need to keep them until next week, wrap the vial with parafilm and place the vials in the refrigerator/freezer (ask the TA).