CHE 171
Fall, 2005
Specific Objectives for Lab Final Exam

1. Be able to calculate the density of a liquid given its mass at different volumes, by measuring the slope of the line that results when mass is plotted as a function of volume.

2. Know how a chemical preparation (product) is dried to constant mass.

3. With regard to liquid-liquid extraction, be able to predict which layer (organic phase or aqueous phase) a given compound will be in based on its relative polarity; be able to predict which layer will be on the top or bottom given the densities of the two liquids.

4. Know what the purpose of a drying agent (like sodium sulfate or magnesium sulfate) is and how to dry an organic solution.

5. Know the relationship between temperature and pressure with regard to boiling points.

6. Be able to predict how melting points and boiling points are affected by impurities.

7. Be able to calculate the theoretical yield of a given reaction and percent yield based on actual product obtained; know the difference between percent *yield* and percent *recovery*.

8. Be able to explain and differentiate between simple, fractional, and vacuum and distillation.

9. Be able to explain the process of recrystallization and describe what constitutes a good solvent to use for this process.

10. Be able to read and understand phase diagrams for mixtures of solid compounds (see Figure F1, Lehman OP 30, page 714).

11. Be able to explain what chromatography is and how it works in a general sense (stationary phase, mobile phase, eluting solvent, retention time, R_f); be able to describe at least two specific types of chromatography and how they work.

12. Be able to estimate the reduced pressure boiling point of a liquid at a given pressure and given its BP at atmospheric pressure using a nomograph (see Figure E16, Lehman OP 28, page 696).

13. Be able to use the Fenske equation to calculate the total number of theoretical plates provided by a fractional distillation apparatus and the HETP, given the column's length, the volatility factor of the mixture, and GC data for the first few drops of distillate collected (see Lehman pages 703-707). Also, given a temperature-composition diagram like the one shown in Figure E21 (Lehman page 704), be able to estimate the number of theoretical plates that would be required to separate the components of a given mixture.

14. Be able to calculate the specific rotation of an optically active compound given its observed rotation, concentration and the path-length of the sample tube.

The exam will consist of 10-20 short answer questions or problems and is worth a total of 40 points towards your overall grade for the course (~7%). The best way to prepare is to use the above specific objectives to review the various Operating Procedures (Lehman's OPs) we have learned throughout the fall quarter. It would also be helpful to review your lab reports, specifically the assigned exercises.