

# Chem 321L: Lab Exam Review

## Exam Format: Multiple Choice and True/False

### Techniques to Review from *Mohring* and your labs:

- **Laboratory Glassware** Technique 4 (3<sup>rd</sup> Edition: pages 31-36; 4<sup>th</sup> Edition: pages 44-50)
  - You should know the names and use for every piece of equipment you used in lab this semester.
  - You should know how to identify, assemble and work the parts of a simple distillation apparatus.
- **Laboratory Notebook** Technique 3 (3<sup>rd</sup> Edition: pages 21-28; 4<sup>th</sup> Edition: pages 32-36)
- **Heating and Cooling Methods** Technique 6 (3<sup>rd</sup> Edition: pages 49-58; 4<sup>th</sup> Edition: pages 73-86)
  - Be able to define bumping and superheating.
  - Know when and how to use boiling stones and boiling sticks.
- **Refluxing a Mixture** Technique 7 (Section 7.1; 3<sup>rd</sup> Edition: page 59; 4<sup>th</sup> Edition: page 87)
  - Be able to define refluxing.
- **Extraction** Technique 11 (3<sup>rd</sup> Edition: pages 113-132); Technique 10 (4<sup>th</sup> Edition: pages 142-163)
  - Be able to define extraction, refluxing, aqueous layer, organic layer, miscible, immiscible, density, salting out (brine), and emulsion.
  - Know the relative densities of common solvents we have used in lab relative to water.
  - Understand extraction efficiency and how to increase the efficiency of an extraction process.
- **Drying Organic Liquids and Recovering Products** Technique 12 (3<sup>rd</sup> Edition: pages 132-141); Technique 11 (4<sup>th</sup> Edition: pages 163-173)
  - Be able to define drying, anhydrous, and hydrate.
  - Know how to use a drying agent.
  - Know the main factors that need to be considered when selecting a drying agent.
  - Know common drying agents, how they work, and how to tell when a sample is dry.
- **Recrystallization** Technique 15 (3<sup>rd</sup> Edition: pages 183-197; 4<sup>th</sup> Edition: pages 221-235)
  - Be able to define recrystallization and know the 7 steps to follow.
  - Know how to choose a solvent for recrystallization.
  - Know what to do if crystals don't form as expected and common sources of loss of product.
  - Know what a solvent pair is and how to choose a good solvent pair.
- **Melting-Point Theory** Technique 14 (3<sup>rd</sup> Edition: pages 174-182; 4<sup>th</sup> Edition: pages 211-220)
  - Know what a melting point range is and how we determine it in lab.
  - Know what happens to the melting point if the sample is wet or has an impurity.
- **Boiling Points and Distillation** Technique 13 (3<sup>rd</sup> Edition: pages 141-174); Technique 12 (4<sup>th</sup> Edition: pages 173-206)
  - Know the definition of distillation, how distillation is performed, and the types of distillation that exist and when each is used (simple, fractional, steam, vacuum).
  - Be able to define boiling point, partial pressure, azeotrope, and codistillation.

### Calculations to Review: Be prepared to show your work!

- Percent Yield (pages 24-25)
- Theoretical Yield
- Limiting Reactant
- Partition Coefficient
- Weight of water per gram organic material
- How to calculate mmoles
- Understand Molarity ( $M$ )
- Unsaturation Number
- Calculate the Molecular Weight of a molecule

### Other information to review:

1. Review the vocabulary given at the beginning of each lab and throughout the background information in each lab.
2. Know the tests (chemical and other) that we used in lab, why we performed them, and when each is appropriate for determining if you have a certain product (IR, melting point, Beilstein test, solubility, melting point, Iodine, pH paper,  $\text{KMnO}_4$ ).
3. Know and be able to identify the IR frequency regions for OH stretch, aromatic =C-H stretching region, C=C stretch, C=O stretch, and C-O stretch.
4. Be able to determine stereogenic centers in molecules and to determine R and S.
5. Review your Experimental write-up for Lab 8 and make sure you understand the process and rules for writing it.