Review Sheet – CH 254, Exam #1

The exam will cover Chapter 12, Chapter 13, and sections 1-7 of Chapter 14.

Chapter 12 Topics

Basic Spectroscopy

- Understand the concept of the electromagnetic spectrum
- Be able to match types of spectroscopy with the appropriate region of the electromagnetic spectrum
- Be able to do a SODAR calculation

Infrared Spectroscopy

- Understand that IR absorptions are caused by molecular vibrations (bending, stretching)
- Identify functional groups by IR

UV-Vis Spectroscopy

- Understand that UV-vis absorptions are caused by electronic transitions (HOMO→LUMO) and what the most common transitions are ($n \rightarrow \pi^*$; $\pi \rightarrow \pi^*$)
- Be able to interpret basic UV-vis spectra (understand the effects of conjugation on λ_{max})
- Know the color wheel
- Know the Beer-Lambert Law and be able to perform the associated math

Mass Spectrometry

- Understand the basics of what is going on inside a mass spec
- Understand what types of fragments are detected (those with positive charges)
- Be able to identify the base peak and the molecular ion peak
- Be able to identify the presence of major isotopes (Br and Cl)
- Know basic fragmentation patterns

Chapter 13 Topics

Understand the basics of NMR spectroscopy. (Why do we need a magnet?)

Be able to interpret a ^{1}H NMR spectrum and come up with a reasonable structure; show your work!

Understand the differences between proton and carbon NMR.

Be able to interpret a ^{13}C NMR spectrum and come up with a reasonable structure; show your work!

Know the purpose of DEPT spectroscopy.

Combined Spectroscopy

Given a combination of various sorts of spectral data, be able to come up with a reasonable structure; show your work!

Also, be able to come up with a molecular formula given combustion analysis and molecular weight.

Chapter 14 Topics

Understand the concept of aromaticity.

Know Hückel's Rule.

Be able to classify compounds as aromatic, antiaromatic, or nonaromatic, and explain why.