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 \((n→\pi^*; \pi→\pi^*)\)
- Be able to interpret basic UV-vis spectra (understand the effects of conjugation on \(\lambda_{\text{max}}\))
- 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 \(^1\text{H} \) 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 \(^{13}\text{C} \) 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.