

The exam will cover Chapters 13, 14 and 15. Exam questions are based largely on Workshops, in class Quiz Questions and the posed Problems of the Day.

### Chapter 13. Conjugation

1. Allylic radicals. Know the basic mechanism of halogen substitution and the relative stabilities of the different types of radicals. (Much of this is a repeat of CHE 321 material.)
2. Nomenclature. Know how to name dienes. Review the E and Z nomenclature.
3. MO's Know how to draw the pi molecular orbitals of pi systems up to six carbons. Use nodal patterns as your guide.
4. Know how to use hydrogenation data to evaluate the relative stability of dienes. (
5. Know about conjugation and UV-visible absorption. Which compounds will absorb at higher wavelengths?
6. Be able to distinguish between 1,2 and 1,4 addition to dienes. Know which is under kinetic control, which is under thermodynamic control.
7. Know how to synthesize a diene using CHE 321 chemistry. Review Study Guide 1.
8. Know all about the Diels Alder reaction. Review Study Guide 2.
  - a. Know how to construct a Molecular Orbital interaction diagram for the Diels Alder reaction or a similar reaction. See Study Guide 2 and Workshop 2.
  - b. Know the basic stereochemistry of the diene and the dienophile. (Put basic scheme on your card.)
  - c. Know how EDG and EWG are used.
  - d. Know the stereochemistry of the reaction. (*endo vs exo*)
  - e. Know the regiochemistry of the reaction. (Not in book, review lecture notes and study guide.)
  - f. Practice Diels Alder synthesis. See workshop 2 and review Problems of the Day.

### Chapter 14. Aromaticity

1. Know the pi molecular orbitals of cyclic systems up to six atoms. (Benzene)
2. Know the Huckel  $4n + 2$  rule and how to apply it to neutral molecules, cations and anions.\
3. Know the difference between aromatic, antiaromatic and non aromatic.
4. Know how to count electrons in a heterocyclic molecule.
5. Know how to use hydrogenation data to evaluate the relative stability of aromatics.
6. Know how to draw Kekule resonance forms.
7. Don't worry about NMR.

### Chapter 15. Reactions of Aromatic Compounds

Know the basic nomenclature of substituted aromatics.

1. Know the basic mechanisms of addition for all the common electrophiles covered in lecture.
2. Know which groups activate and which groups deactivate the ring.
3. Know which groups direct ortho and para or meta. (And why)
4. Know the secondary reactions, including Clemmensen reduction and side group oxidation.
5. Know about benzyl radicals
6. Know about acidity of benzene derivatives.
7. Practice aromatic syntheses

### Final Notes.

Synthesis is very important on this exam. Know how to apply the Diels Alder and aromatic substitution reactions to make a complex molecule. Study your basic MOs as covered in class. Pay a lot of attention to the nature and function of EDG and EWG. Don't panic. If you can understand all the workshop problems you should do well.