

The exam will cover Special Topics H, Chapter 16 and Chapter 17. Exam questions are based largely on Workshops, in class Quiz Questions and the posted Problems of the Day.

Special Topic H. Organometallics

1. Know how to count electrons.
2. Know the fundamental reaction types listed in the book section H.5.
3. Know the reactions covered in the text and lecture, the Heck, the Suzuki, the Stille, the Sonogashira and olefin metathesis.
4. Know the alkyne reactions we covered in class to make precursors for the organometallic reactions.
5. Know how to apply these reactions in an organic synthesis.

Chapter 16. Aldehydes and Ketones

6. Know the basic nomenclature.
7. Know the various ways of preparing aldehydes and ketones. Some are from last semester
8. Know all about nucleophilic addition to a carbonyl group.
9. Know all about *gem*-diols, hemiacetals, acetals, imines and enamines. Be able to draw a mechanism for the formation of each of these.
10. Know about HCN addition to a carbonyl
11. Know the Wittig reaction. Pay attention to the stereochemistry of the reaction. The normal Wittig gives Z alkenes, with excess base it give E alkenes, the normal HWE modification gives E alkenes, a special modification give Z.. The posted Wittig Study Guide discusses this and more.

Chapter 17. Aldehydes and Ketone II

1. Know about the acidity of carbonyl compounds. Know the approximate pK_a of a typical aldehyde or ketone.
2. Know all about the enol – keto equilibrium. Draw mechanisms for the acid and base catalyzed enolization.
3. Know about halogenations of aldehydes and ketones and the haloform reaction.
4. Know the aldol reaction. Be able to predict the products and draw the mechanism in both acid and base.
5. Know how about crossed aldol reactions and aldehyde-ketone couplings.
6. Know that nitro groups and cyano groups can also stabilize anions.
7. Know about cyclic aldol reactions.
8. Know the preparation and use of lithium enolates, both in aldol type reactions as well as direct alkylations.
9. Know about 1-4 conjugate addition to α,β -unsaturated aldehydes and ketones.
10. Know how copper reagents are used for 1-4 conjugate additions.
11. Know the Michael Addition
12. Know the Robinson Annulation.

Final Notes.

There are a lot of carbonyl reactions to know for this exam. Make sure that you can accurately predict the products and design a simple synthesis. Practice your mechanisms.

Can you recognize and draw mechanisms for the following?

Nucleophilic attack on a carbonyl, hemiacetal formation, acetal formation, imine formation, enamine formation, halogenation of a ketone, aldol reaction, dehydration of aldol to give enal, conjugate addition, Robinson annulation.

You will not be asked to draw the mechanisms for the Special Topics H reactions, but you should know the reaction types and how count the electrons so you can interpret an mechanism.