Chem 6A/6B; practice final exam

1. Show, using specific structures and reagents, how one could accomplish the following transformations.

• [6B] The conversion of a carboxylic acid to an ester
• [6B] The formation of a Grignard reagent from bromobenzene
• [6B] The conversion of a terminal alkene to a primary alcohol
• [6A & 6B] The conversion of the alcohol ‘just formed’ to the corresponding methyl ether
• [6A & 6B] The conversion of the same alcohol to a primary alkyl bromide
• [6B] The oxidation of a secondary alcohol to a ketone
• [6B] The reaction of the ketone ‘just formed’ with methylmagnesium bromide
• [6A & 6B] The reaction of the same ketone with sodium borohydride in methanol
• [6B] The formation of an α,β-unsaturated ester starting with an aldehyde
• [6A & 6B] The reaction of 2-pentanol with catalytic sulfuric acid
• [6A & 6B] The product of dilute sodium bicarbonate, phenol, and methyl bromide.
• [6B] The in situ generation of 2-methyl-1,3-butadiene
• [6B] The reaction of that diene with an activated dienophile

2. [6A & 6B] What is the overall yield for a three step sequence where the yields for the individual steps are 80%, 90%, and 50%?

3. [6A & 6B] Indicate the specific spectral changes one would see in the IR, the proton NMR, and the C-13 NMR spectrum for each of the specific transformations indicated in problem 1.

4. [6B & 6A (as applicable)] Formulate a mechanism for each of the transformations of problem 1.

5. [6A & 6B] Provide a mechanism that illustrates the conversion of trans-2-butene to meso-2,3-dibromobutane.

6. [6A & 6B] Show how the Karplus relationship allows one to differentiate between the spectra shown on pages B 34 and B 35 of the lab manual.

7. [6A & 6B] Why does one not see an absorption corresponding to the C-C triple bond stretch in diphenylacetylene? [See B 51 of the lab manual].