CHE 173
Winter, 2005
Specific Objectives for Quiz 8

1. Understand what constitutes a formal oxidation reaction in organic chemistry.
2. Understand what constitutes a formal reduction reaction in organic chemistry.
3. Be able to determine whether a given substrate has undergone oxidation or reduction; know how to determine the oxidation number (or oxidation state) of a carbon atom in a molecule.
4. Know the following methods for preparing alcohols (see Table 15.1):
   (a) acid-catalyzed hydration of alkenes (Markovnikov)
   (b) hydroboration/oxidation of alkenes (anti-Markovnikov)
   (c) hydrolysis of alkyl halides
   (d) reaction of organometallic reagents with carbonyl compounds
5. Know several ways to prepare alcohols from the reduction of carbonyl carbons:
   (a) catalytic hydrogenation
   (b) treatment of aldehydes or ketones with $NaBH_4$
   (c) treatment of aldehydes or ketones with LAH
   (d) be able to show a mechanism for (b) and (c) above
6. Understand that alcohols can also be prepared by any of the following methods:
   (a) reduction of carboxylic acids and esters with LAH
   (b) treatment of epoxides with organometallic reagents (Grignards or organolithium reagents)
7. Know what a diol is and how to prepare one from the corresponding alkene; know that diols undergo oxidative cleavage to give two carbonyl compounds (15.12).
8. Know/understand the following reactions that alcohols undergo (Table 15. & 15.4):
   (a) reaction with HX
   (b) reaction with $SOCl_2$ (thionyl chloride)
   (c) reaction with PX_3
   (d) acid-catalyzed dehydration
   (e) conversion to Tosylates
   (f) conversion of alcohols to ethers
   (g) esterification
   (h) oxidation of alcohols
9. Know what a thiol is and have a general sense of the chemistry that thiols undergo (oxidation, reduction).
10. Understand how to analyze alcohol compounds by IR and NMR spectroscopy.
11. Be able to apply all of the above in the synthesis of a given target compound.