Problem Set 11

1. Read Chapter 8 Section 8: You are responsible for knowing electrophilic addition of halogens (X_2, where X = Cl, Br or I) to alkenes and that the mechanism proceeds through a cyclic halonium ion intermediate. How does the halonium ion intermediate affect the stereochemistry of addition? Why do the two halogen atoms add to the C=C bond from opposite sides via *anti* addition? Study Mechanism 8-7 Addition of Halogens to Alkenes.

   Work the following problems found in Section 7 of Chapter 8: **Problems 17 and 18.**

2. Read Chapter 8 Section 9: You should be familiar with formation of halohydrins. These reactions are similar to halogenation reactions (Section 8) in that they proceed via formation of a halonium ion intermediate. Why does addition of both a halogen and water result in a halohydrin instead of a dihalogenated product? Keep in mind that water is a more reactive nucleophile than $:Br^-$ (the conjugate base of a very strong acid). Similar to halogenation reactions, formation of halohydrins occurs via anti addition of a halogen and water. Why? Study Mechanism 8-8 Formation of Halohydrins. Be aware that attack of water on a halonium ion intermediate follows Markovnikov's rule where water reacts preferentially with the more substituted carbon in the halonium ion such that the halogen is on the less-substituted carbon in the product. Markovnikov addition occurs accordingly because the more-substituted carbon has a greater amount of positive charge due to greater stabilization of charge by alkyl substituents (i.e., the C-X bond is weaker at the more-substituted carbon).

   Work the following problems found in Section 9 of Chapter 8: **Problems 19-22.**

3. Read Chapter 8 Section 10: You are responsible for understanding addition of hydrogen to alkenes. What is the mechanism by which hydrogen adds to alkenes? Why do both hydrogen atoms add to the same side of alkenes via syn addition? What role does the transition metal catalyst (e.g., Ni, Pd, Pt) play in the reaction?

   Work the following problems found in Section 10 of Chapter 8: **Problems 23 and 24.**

Work the following problems found at the back of Chapter 8: **Problems 46m,q, 47g,k, 49c,d, 50c,g, 51h, 55a, 71, and 78.**