Learning Objectives
Chapter 13 – Unsaturated Hydrocarbons

- What is the difference between alkanes, alkenes, and alkynes?
- What are the basic properties of alkenes and alkynes?
- You should be able to draw the complete formulas for alkenes and alkynes (with the appropriate number of hydrogens on each carbon atom).
- What is the relationship between the number of hydrogens and the number of carbons in alkenes and alkynes? Knowing this information, you should be able to come up with the formula for any alkene or alkyne. You should also be able to look at a formula and determine if it corresponds to an alkane, an alkene, or an alkyne.
- You should be able to identify the geometry around all the carbons in alkanes, alkenes, and alkynes.
- You should be able to name alkenes, alkynes, and cycloalkenes.
- You should be able to draw the structures corresponding to the names of alkenes, alkynes, and cycloalkenes.
- What is the difference between cis- and trans-isomers? You should be able to draw these two isomers. You should also be able to name compounds that exhibit cis-trans isomerism (you must be able to recognize which compounds have cis-trans isomerism).
- Why are cis-trans isomers possible in alkenes but not in alkanes?
- What are the different types of reactions that alkenes undergo?
- What is the difference between symmetrical and unsymmetrical addition reactions?
- What does Markovnikov’s rule tell you about addition reactions?
- You should be able to predict the products of alkene addition reactions if I give you the starting reactants.
- You should be able to identify the missing reactants in an addition reaction if I give you the starting material and the product of the reaction.
- What does hydrogenation do to the physical state of a hydrocarbon?
- What is bromination used to check for? What colors would you see if there are double bonds in a compound? If there are no double bonds?
- What are polymers? What are monomers? You should be able to look at a polymer structures and determine the structure of the monomer components.
- What are aromatic compounds?
- What is the structure of benzene? You should know different ways of representing benzene.
- What does the circle in the benzene structure represent?
- You should be able to name aromatic compounds
  - You should know the names and structures of aniline, toluene, and phenol.
  - You should be able to name aromatic compounds with a numbering system or with o, m, p designations.
- What is the difference between addition reactions and substitution reactions?
- What are the different types of substitution reactions that aromatic compounds undergo?
- You should be able to predict the products of aromatic substitution reactions if I give you the starting reactants.
- You should be able to identify the missing reactants in an aromatic substitution reaction if I give you the starting material and the product of the reaction.