

Structure and Reactivity of Alkenes
Learning Objectives

As you study the items in these topics, you should...

1) Understand the meaning of the following words and know when and how to use them:
   a) saturated
   b) unsaturated
   c) vinyl (vinylic)
   d) allyl (allylic)
   e) *cis*
   f) *trans*
   g) *E*
   h) *Z*
   i) electrophile
   j) nucleophile
2) Be able to calculate the degree(s) of unsaturation (a.k.a. index of hydrogen deficiency) for any given molecular formula and understand how this value can help you come up with structural possibilities.
3) Know how to name compounds containing one or more alkene functional groups
4) Know how to interpret a reaction coordinate diagram (a.k.a. reaction energy diagram) including:
   a) how to determine if a reaction is exergonic or endergonic and exothermic or endothermic
   b) how to determine the number of transition states and intermediates in a reaction
   c) how to label various parts of an energy diagram
   d) how to use an energy diagram to analyze a reaction or a set of reactions
5) Be able to construct and interpret reaction energy diagrams (this includes the ability to label all its parts).
6) Be able to recognize when carbocations are formed.
7) Be able to classify and determine the relative stability of carbocations (you should know the factors that affect carbocation stability).
8) Be able to recognize when a carbocation will rearrange and what product(s) will be formed thereafter.
9) Reactions of alkenes: for each of the reactions that your instructor holds you responsible for, be able to:
   a) provide a mechanism for the reactions (unless told that you do not need to know the mechanism)
   b) predict the product(s) of the reactions
   c) predict the regiochemistry and stereochemistry of the products
   d) use the reaction in a synthesis