

Radical-based mechanisms contain two basic types of reactions: atom abstractions and pi-bond insertions. Using these steps, many different radical-based transformations can be understood.

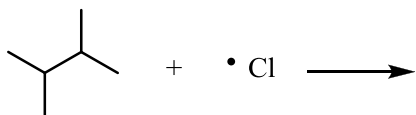
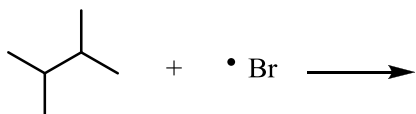
1. What type of bond breaking occurs during a radical process?
2. How will you know that you are drawing the correct electron-pushing arrows for a radical transformation? i.e how will these arrows be different from the arrows you used in chapter 8?
3. Draw the outcome of the following atom abstraction step. Be sure to include any necessary curved arrows.



4. Draw the outcome of the following pi-bond insertion step. Be sure to include any necessary curved arrows.



5. a) What is the difference in reactivity between a bromine radical (Br •) and a chlorine radical (Cl •)?
- b) How does this affect the regioselectivity of the atom abstraction process?
- c) With this in mind, give the major product(s) of the reactions below?



6. a) Which radical below is more stable? Why?

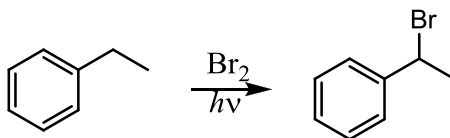


- b) With this in mind, give the major product(s) of the reaction below? Be sure to address stereochemistry in your answer.

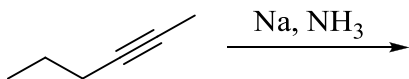
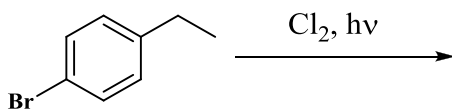
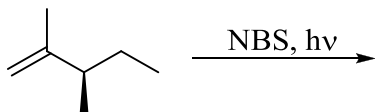
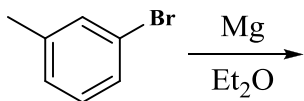


7. a) Radical mechanisms are often called “chain reaction” mechanisms because they involve a sequence of three different steps, which often are occurring at the same times. What are the three steps in a radical chain reaction mechanism?

b) Keeping this in mind, draw out a step-by-step reaction mechanism for the transformation shown below. Include all intermediates, charges, and electron-pushing arrows needed for the transformation. You need to show at least one example of each of the three types of steps (listed above) in your answer.



7. Give the major product(s) of each reaction below:



Putting it all together. Give the reagents necessary to accomplish the following syntheses. Makes sure to separate reagents into numbered step where needed. These are good summaries or reactions from the whole semester.

