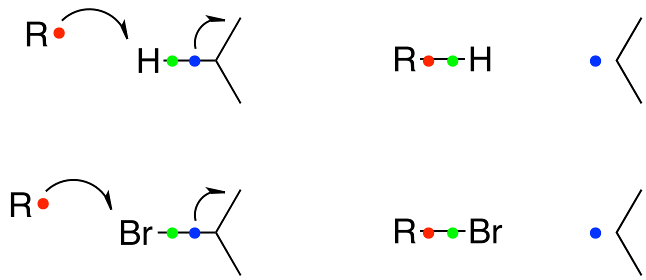
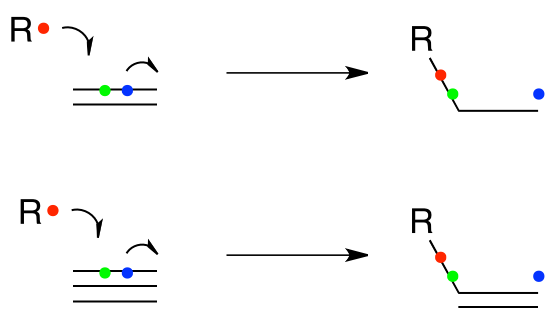
Although some of the reactions that we have studied in class may seem complicated, they really boil down to three types of processes, summarized below. Each step involves the movement of 3 electrons

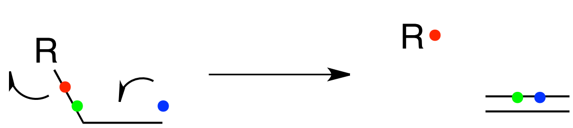
Atom Extraction



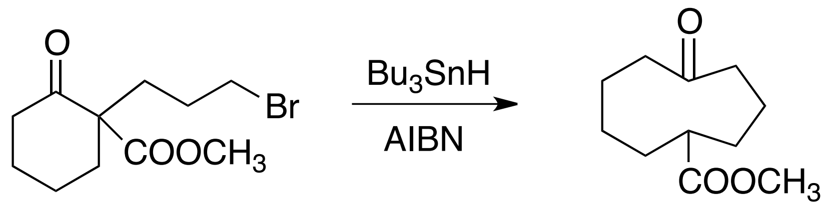
Multiple Bond Addition



Fragmentation: the reverse of the above reaction

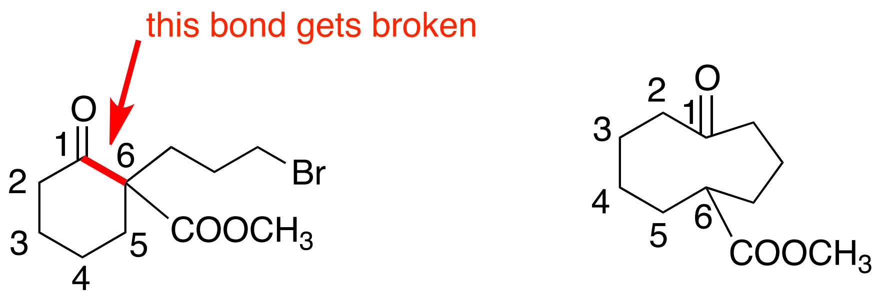


Note that each of the 'fishhook' arrows indicate the movement of 3 electrons.

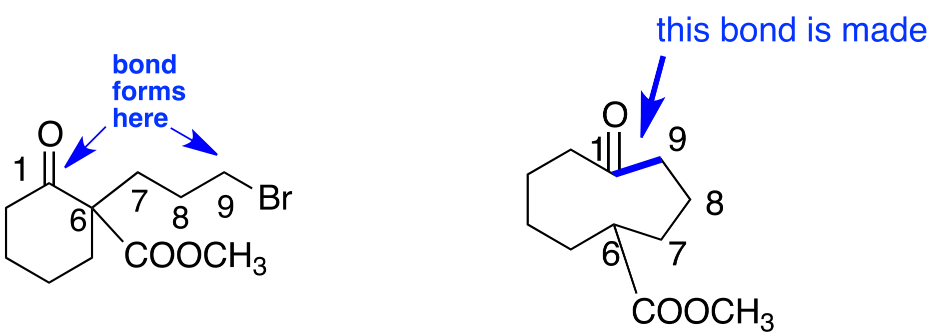


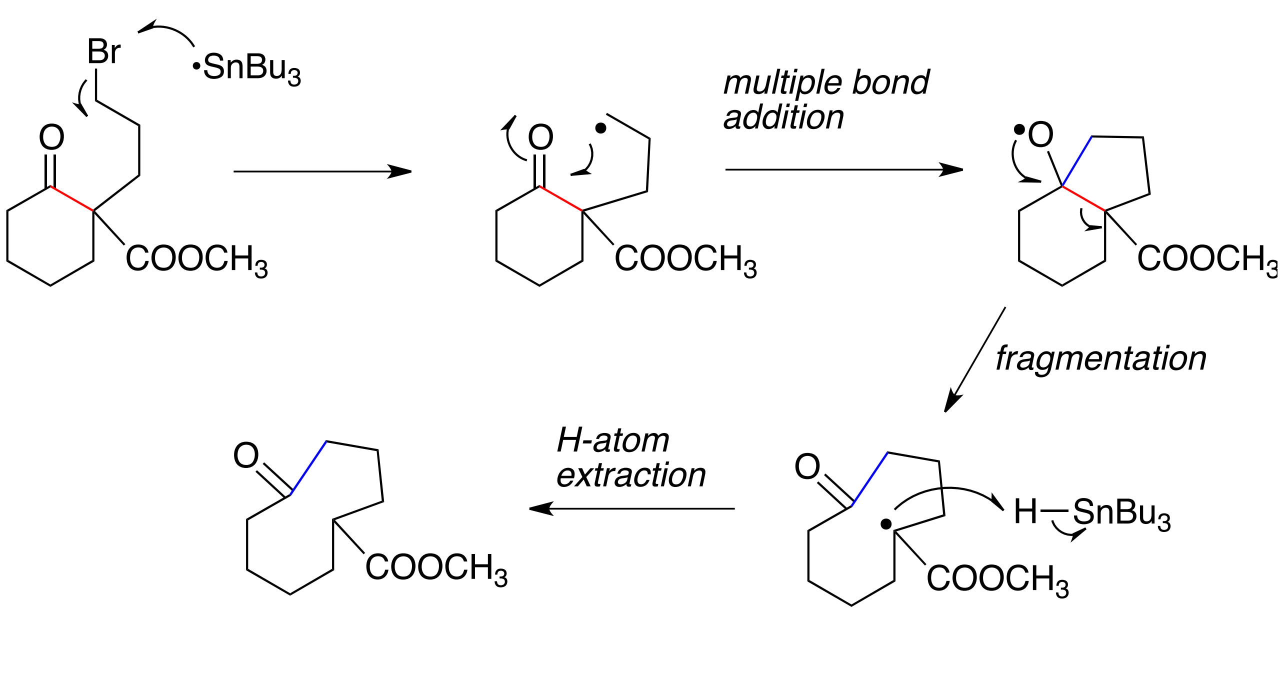
First thing: Map it out. We know that there are 6 carbons between C=O and CO_2CH_3

In the starting material. Can we find a similar trend for the product? Yes. By mapping those carbons, we can realize that the C1-C6 bond gets broken

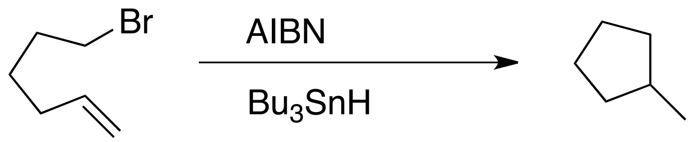


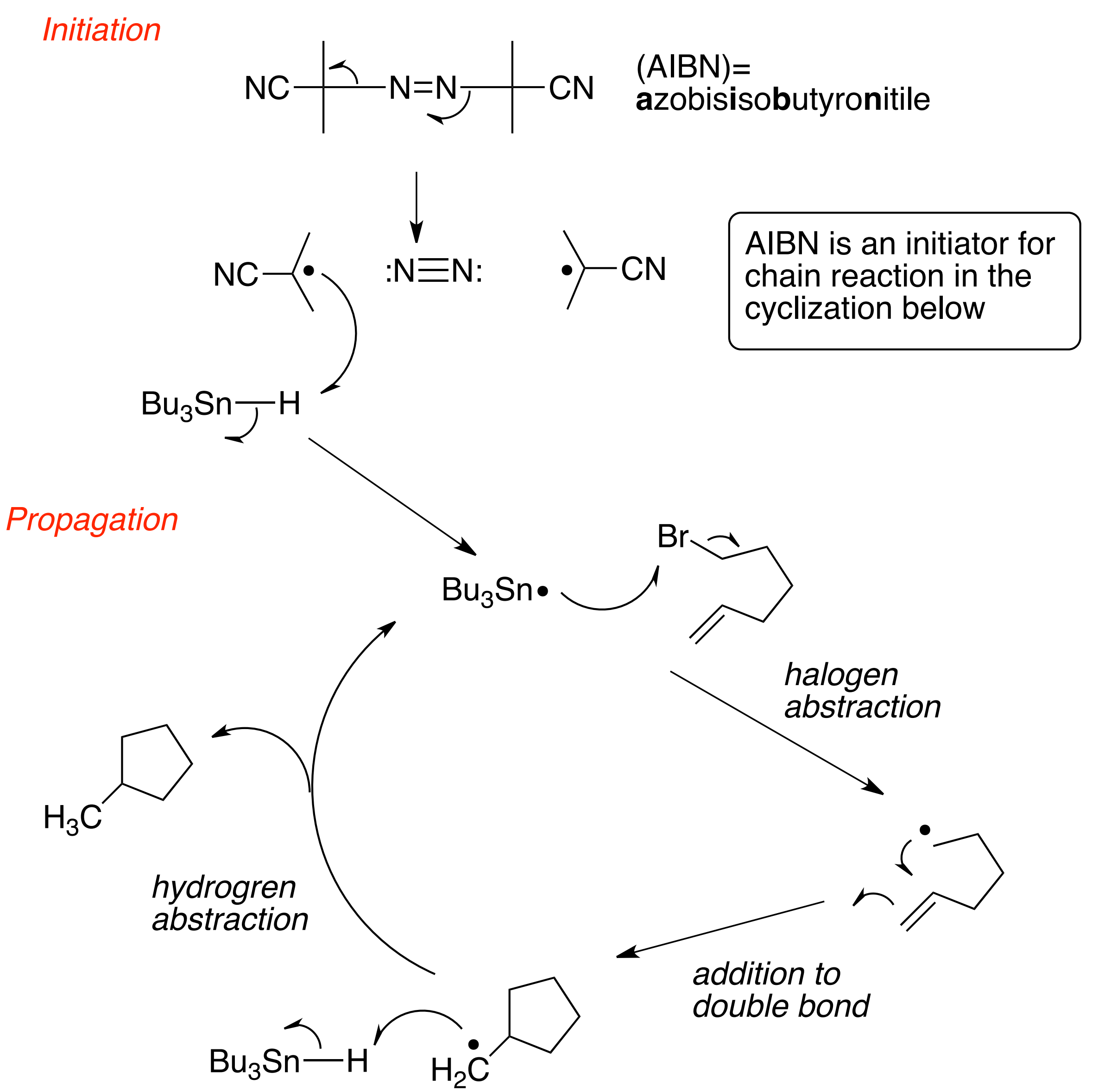
We have 3 carbons left. Plug them in and see if we can tell where the bond will form. We can see that it will be between carbons 1 and 9.

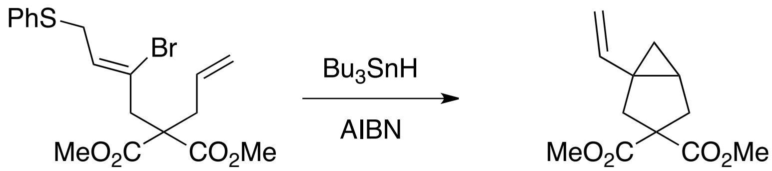




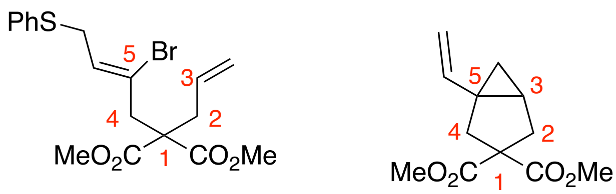
This example illustrates two of these processes: atom abstraction and double bond addition (in this case, an intramolecular version)



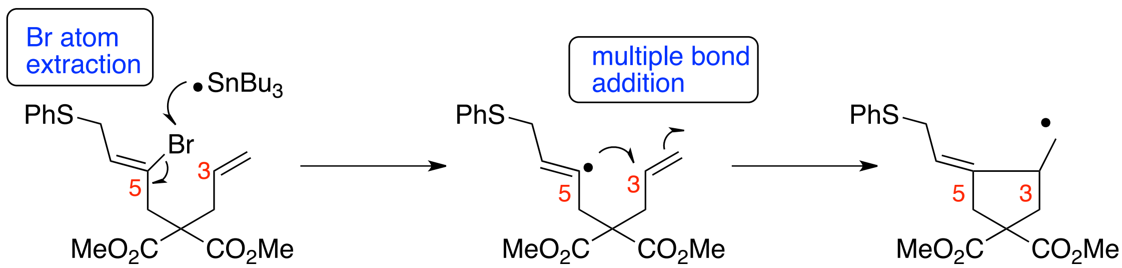




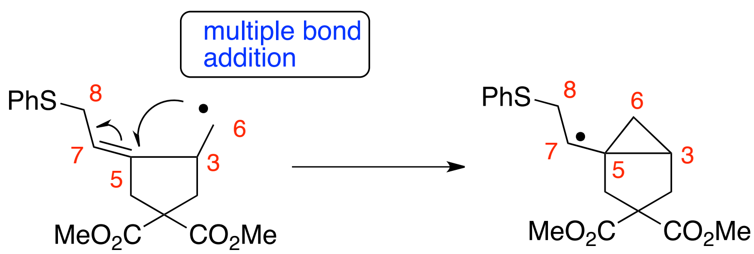
Map it out. Use the ester bound carbon as the starting point. We can see that there is a bond that will be formed between C-5 and C-3



Start the problem. Use AIBN to generate a tin radical (see radical handout 1), then form the bond using a multiple bond addition reaction.



Map out the carbon atoms that you have not yet connected. It becomes apparent that C-6 needs to be connected to C-5. Use a multiple bond addition to accomplish it.



Finish the problem with a fragmentation reaction (the reverse of multiple bond addition). Then abstract a hydrogen to regenerate Bu_3Sn•