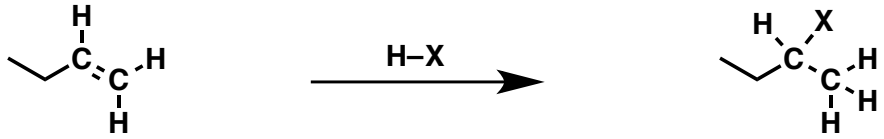
Addition of Hydrogen Halides To Alkenes

General Reaction:



X = halide

Typical acids: HCl, HBr, HI

Major product

"Markovnikov" selectivity

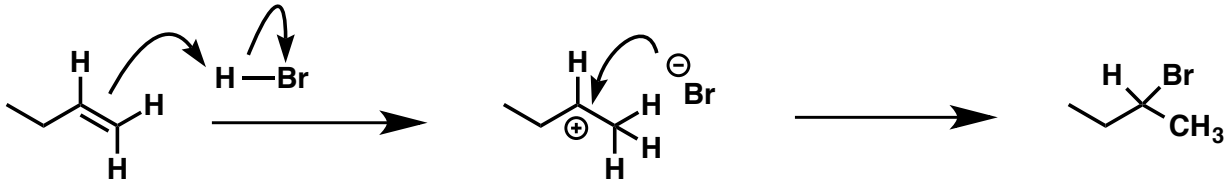
Minor product

"anti-Markovnikov"

Mechanism Basics Box:

- Acids (HX) include HCl, HBr, and HI
- First step is protonation of alkene to give a carbocation, with the pi bond acting as a base
- Rearrangements may occur to give a more stable carbocation intermediate
- The final step is addition of X^- to carbocation, which may occur from either face of the cation
- Net effect is addition of HX across double bond with X at the "most substituted" position ("Markovnikov" selectivity)
- The rate-determining step is formation of the carbocation

General Mechanism:

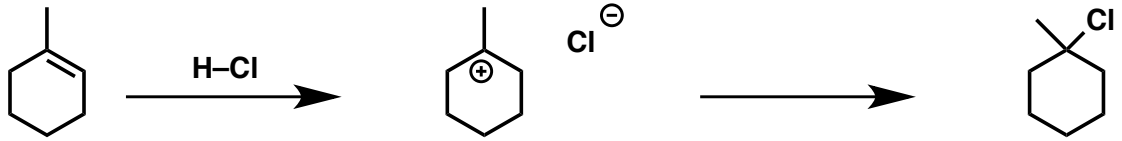


Addition

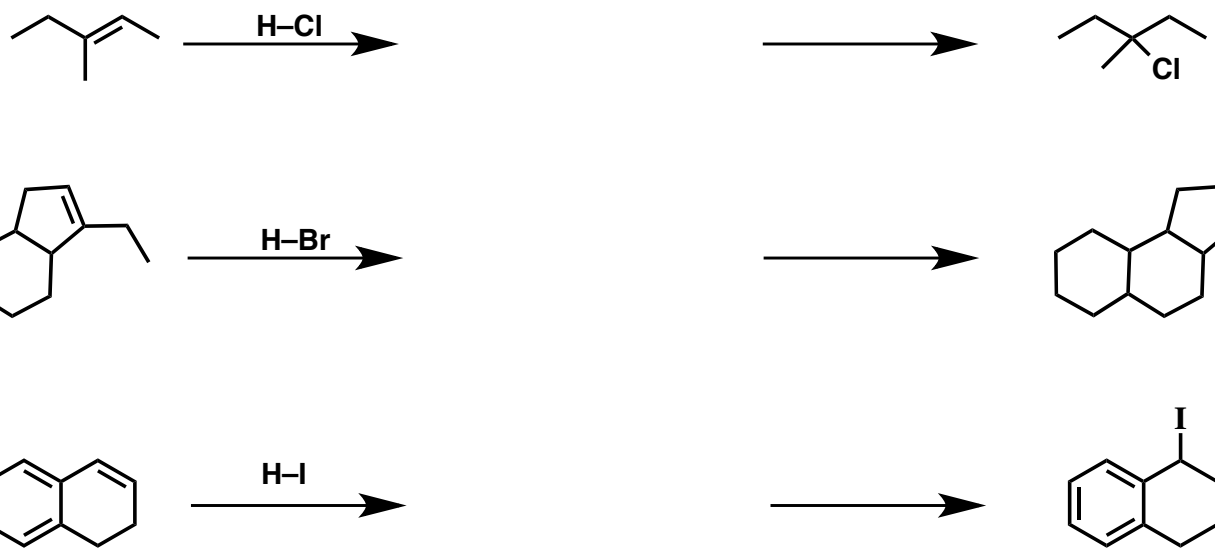
Carbocation intermediate

sigma bond formation

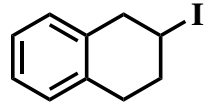
Fill in the missing arrows.



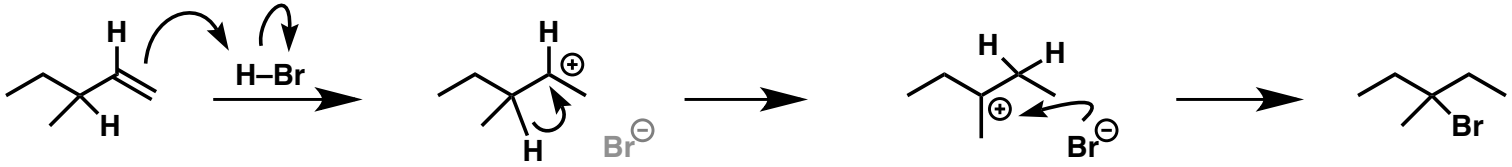
Complete the mechanism by following the pattern (draw arrows and intermediates).



Why not this?



Advanced Examples - Addition With Rearrangement



Addition *Rearrangement* *sigma bond formation*

Complete the mechanism by following the pattern (draw arrows and intermediates).