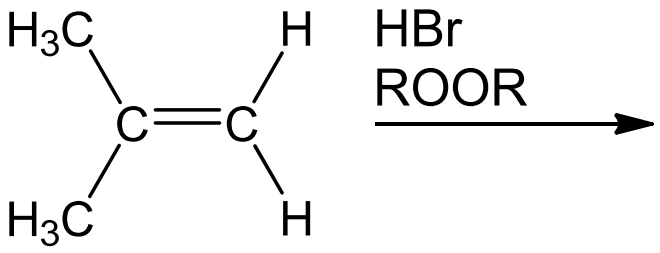
# Chapter 10: Alkyl Halides Part 2: Radical Reactions

Today and Friday – 10.5-10.7, 10.10,10.11, 10.13, and 10.9

We will not cover 10.8 or 10.12 in class, but they are interesting applications.

# Radical Reactions

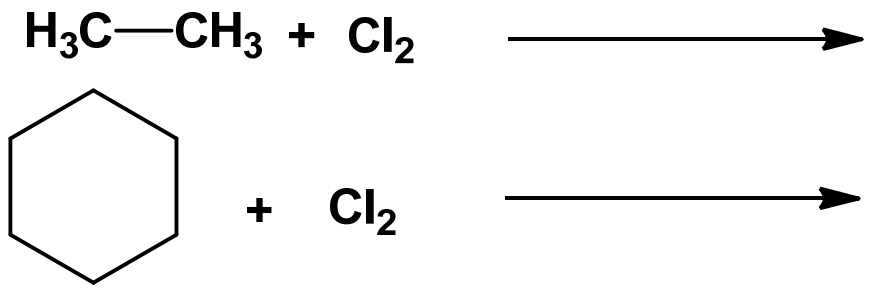



Free radicals form when bonds break HOMOLYTICALLY

# Addition of Radicals to Alkene

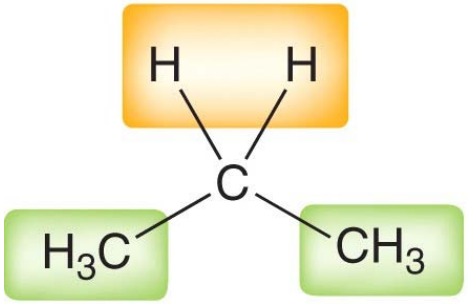
# Preparing Alkyl Halides from Alkanes: Radical Halogenation

# Chlorination of Higher Alkanes



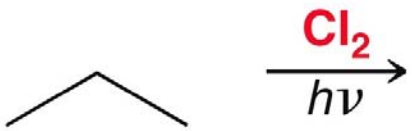
# Halogenation Regioselectivity

- With substrates more complex than ethane, multiple monohalogenation products are possible




Two hydrogen atoms

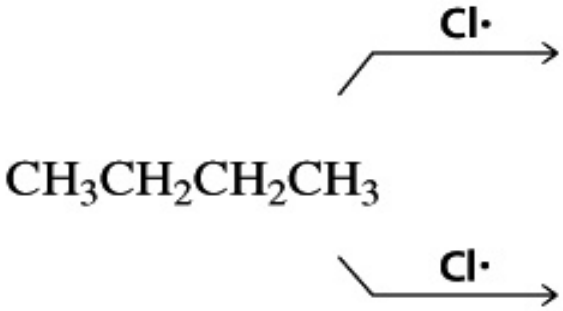
Six hydrogen atoms



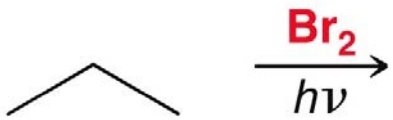
In determining the relative amounts of products obtained, both probability and reactivity should be considered

probability:

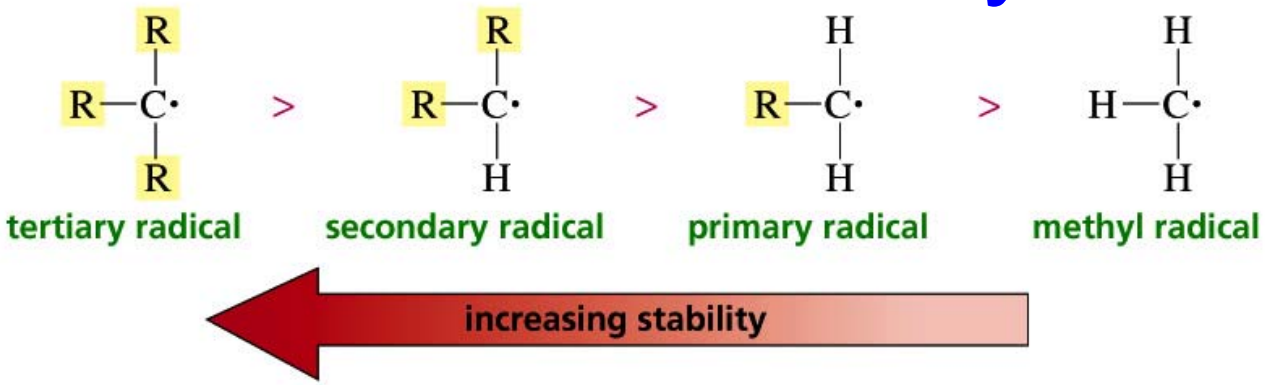
reactivity:



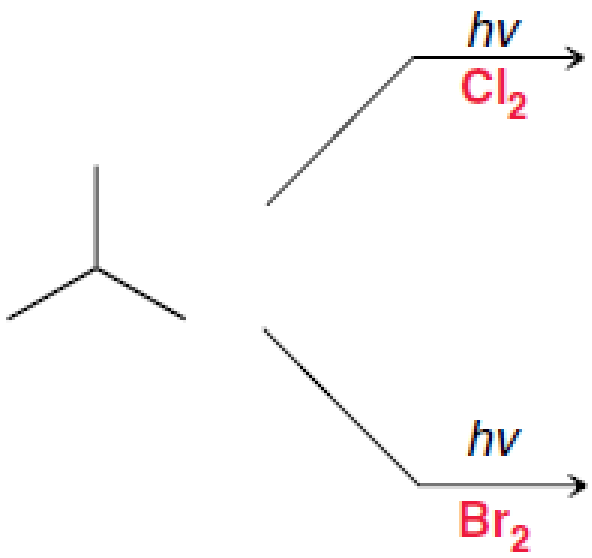
# Halogenation Regioselectivity



# Relative Stabilities of Alkyl Radicals

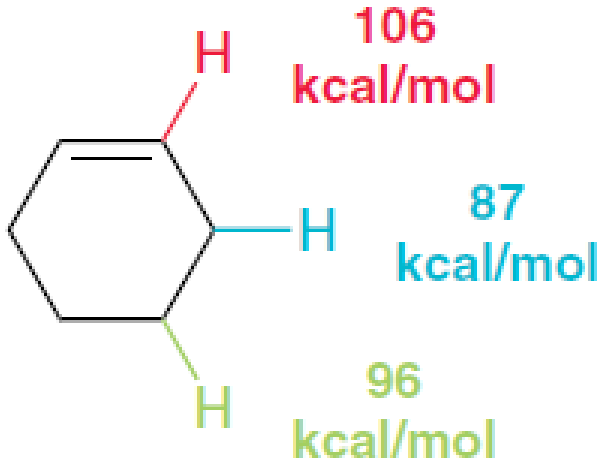


# Halogenation Regioselectivity



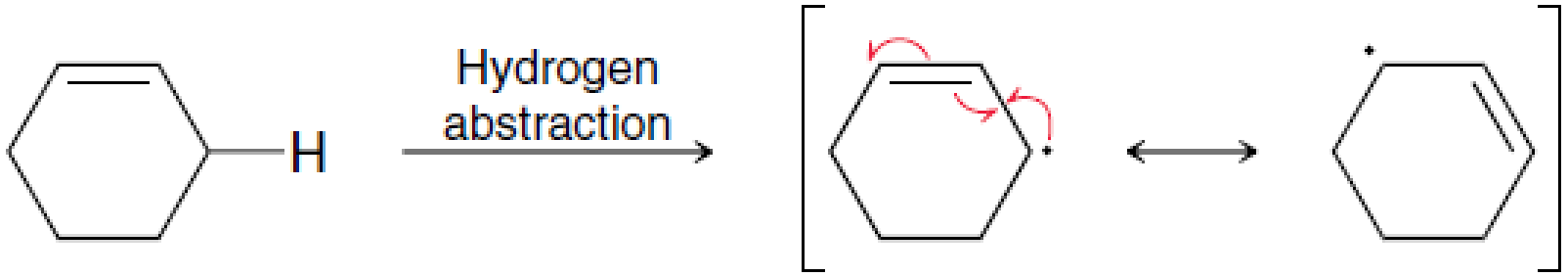
# Allylic Halogenation

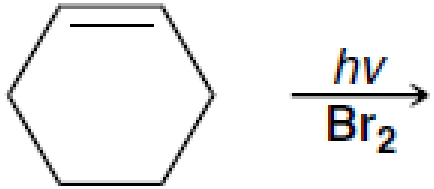
- When an C=C double bond is present, it affects the regioselectivity of the halogenation reaction.
- Given the bond dissociation energies below, which position of cyclohexene will be most reactive toward halogenation?



# Allylic Halogenation

- When an allylic hydrogen is abstracted,

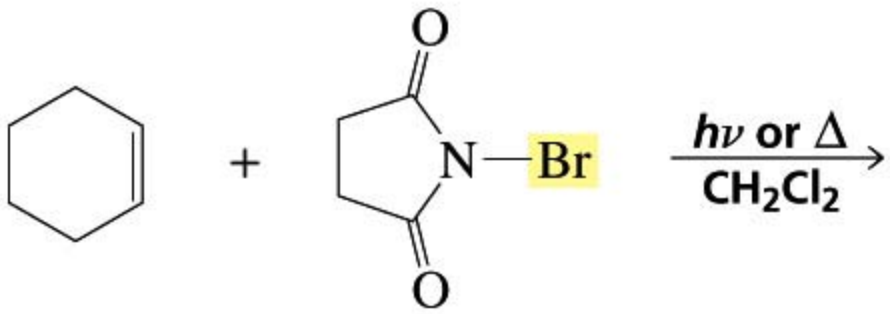



- What other set of side-products is likely to form in this reaction?

# Allylic Halogenation with NBS

Because of the reactivity of allylic hydrogens, a milder brominating reagent can be used




*N*-bromosuccinimide
NBS

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# For Next Time….

Suggested Homework Problems Chapter 9

# 1,7,9,13,18,20,32-37, 41,44,52,57

Suggested Homework Problems Chapter 10

# 1, 2, 12, 16, 23,24, 33, 42

Next Up Chapter 12 on Monday!