

# Organic Chemistry II

## CHEM 234

*Dr. Xiaodong Michael Shi*

Section 002

MWF, 10:30 am--11:20 am

Clark 101



# Chapter 15 Problem Set

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**15.35, 15.36, 15.38, 15.42, 15.43, 15.45, 15.46, 15.48, 15.49, 15.50, 15.51,**

**15.54, 15.55, 15.57, 15.59, 15.61, 15.63, 15.69, 15.71**

# Chapter 15 Radical reactions

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## 15.1 Introduction: bond energy and homo dissociation

# Chapter 15 Radical reactions

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## 15.1 Introduction: bond energy and homo dissociation. [page 207](#)

Bond	BDE (kcal/mol)	Bond	BDE (kcal/mol)
H-F	136	H-H	104
H-Cl	103	F-F	38
H-Br	88	Cl-Cl	58
H-I	71	Br-Br	46
H-OH	119	I-I	36
		HO-OH	51
C-H	98	C-F	109
C-C	88	C-Cl	84
C-O	93	C-Br	70
		C-I	56

# Chapter 15 Radical reactions

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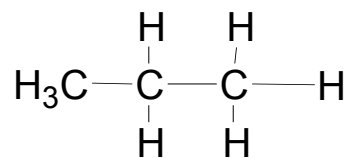
## 15.1 Introduction: radical stability

Hyperconjugation

# Chapter 15 Radical reactions

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## 15.1 Introduction: radical stability



# Chapter 15 Radical reactions

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## 15.2 Radical Reactions:

Initiation

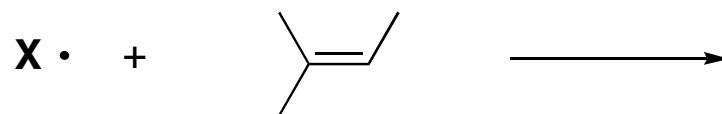
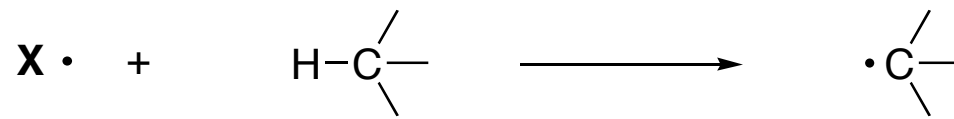
Propagation

Termination

# Chapter 15 Radical reactions

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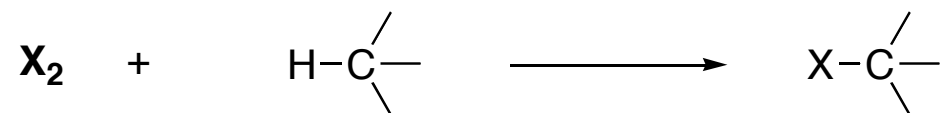
## 15.2 Radical Reactions: two common reaction of radicals



# Chapter 15 Radical reactions

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## 15.3 Halogenation of Alkanes



# Chapter 15 Radical reactions

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## 15.4 Halogenations Mechanisms

Initiation

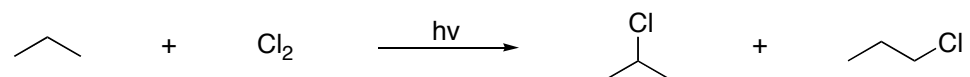
Propagation

Termination

# Chapter 15 Radical reactions

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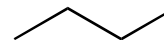
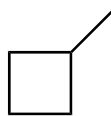
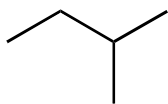
## 15.5 Halogenations: selectivity



# Chapter 15 Radical reactions

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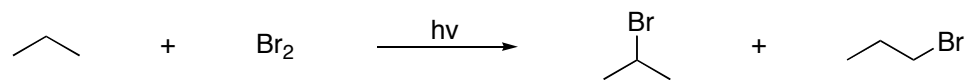
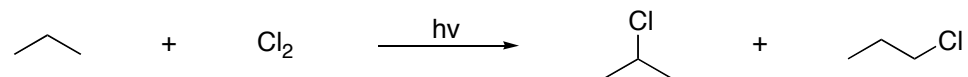
## 15.5 Halogenations: selectivity



# Chapter 15 Radical reactions

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## 15.6 Bromination: slower but better selectivity



# Chapter 15 Radical reactions

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## 15.6 Bromination: slower but better selectivity. **WHY?**



# Chapter 15 Radical reactions

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## 15.7 Applications

# Chapter 15 Radical reactions

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## 15.8 Stereochemistry: **no selectivity!**

# Chapter 15 Radical reactions

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## 15.8 Stereochemistry: **no selectivity!**

# Chapter 15 Radical reactions

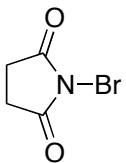
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15.10 Allylic radical: **stable!**

# Chapter 15 Radical reactions

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## 15.10 Allylic radical: selectivity

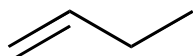


**NBS**

# Chapter 15 Radical reactions

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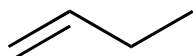
## 15.10 Allylic radical: resonance equilibrium



# Chapter 15 Radical reactions

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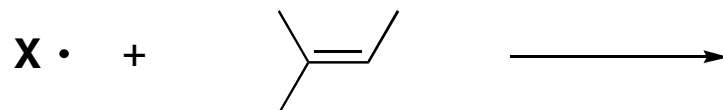
## 15.10 Allylic radical: resonance equilibrium



# Chapter 15 Radical reactions

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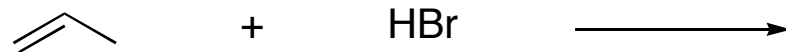
## 15.13 Radical reaction at double bonds: break the $\pi$ -bond



# Chapter 15 Radical reactions

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## 15.13 Addition of HBr & Markovnikov's rule



# Chapter 15 Radical reactions

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## 15.13 Addition of HBr, Markovnikov's rule and mechanism



# Chapter 15 Radical reactions

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## 15.14 Polymerization