

ORGANIC CHEMISTRY 1 LECTURE GUIDE 2019

BY RHETT C. SMITH

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# Organic Chemistry 1

## Lecture Guide 2019

By Rhett C. Smith, Ph.D.

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Companion Books from the Proton Guru:

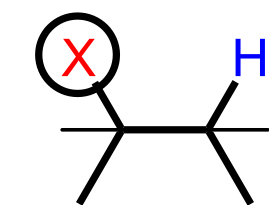
*Organic Chemistry 1 Reactions and Practice Problems 2019*

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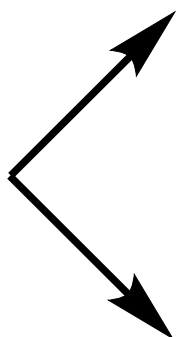
*Organic Chemistry 1 Primer 2019,*

by Rhett C. Smith, Andrew G. Tennyson, and Tania Houjeiry

Lecture Topic II.10: Competition Among  $S_N1$ ,  $S_N2$ , E1 and E2 Reactions  
Predicting Major Products



X = Cl, Br, I



A

In a given context:

1. Elimination or Substitution?
2. E1,  $S_N1$ , E2, or  $S_N2$ ?

Notes

## Lecture Topic II.10: Competition Among $S_N1$ , $S_N2$ , E1 and E2 Reactions

### Predicting Major Products

Bimolecular reaction ( $S_N2$ , E2) are favored by high concentration of good Nu or strong B

**good Nu, weak B** (i.e.,  $I^-$ ,  $Br^-$ ,  $HS^-$ ,  $NH_3$ ):

(A)

**good Nu, strong B** (i.e.,  $HO^-$ ,  $EtO^-$ ,  $H_2N^-$ ):

(B)

**poor Nu, strong B** (i.e.,  $^tBuO^-$ , bulky):

(C)

Substrate can also help determine E2 versus  $S_N2$

**1° RX** no bulky base:

(D)

**BULKY base** (i.e.,  $^-O^tBu$ ):

(E)

**2° RX**  $S_N2$  and E2;

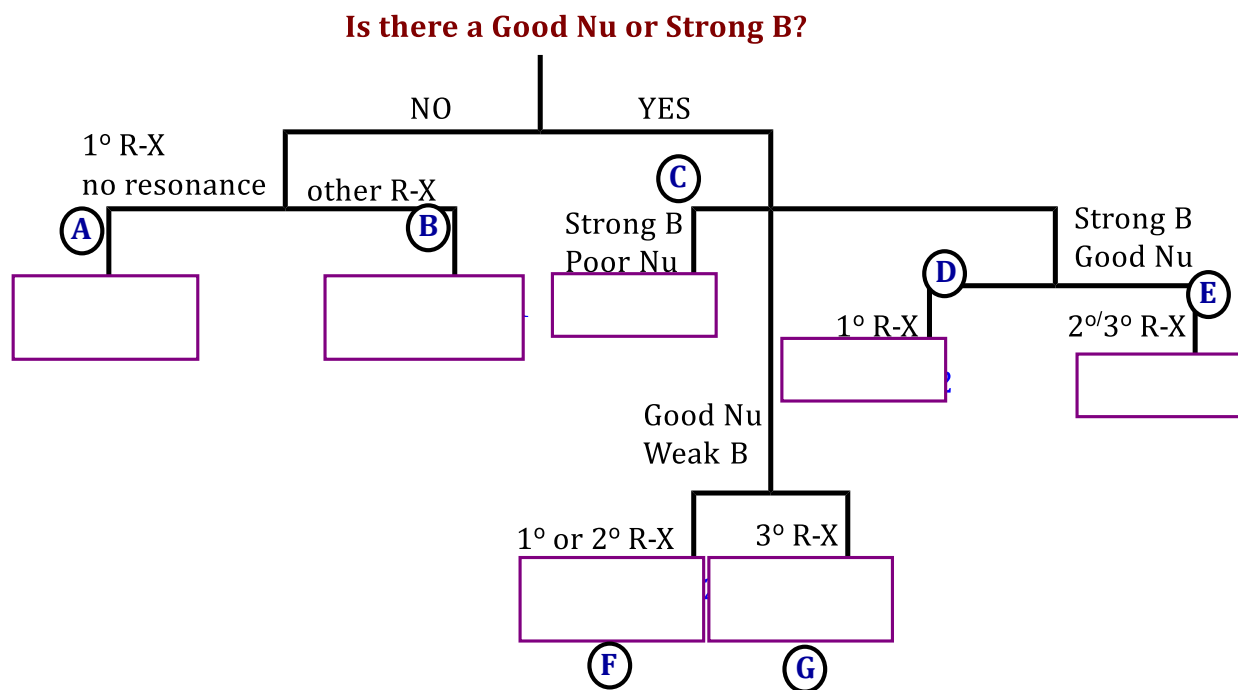
the stronger/bulkier the base, the more E2

**3° RX** E2 only

Unimolecular reactions ( $S_N1$ , E1) are favored when neither a good nucleophile nor a strong base

Notes

Lecture Topic II.10: Competition Among  $S_N1$ ,  $S_N2$ , E1 and E2 Reactions  
 Predicting Major Products



Notes

Lecture Topic II.10: Competition Among S<sub>N</sub>1, S<sub>N</sub>2, E1 and E2 Reactions

## Predicting Major Products

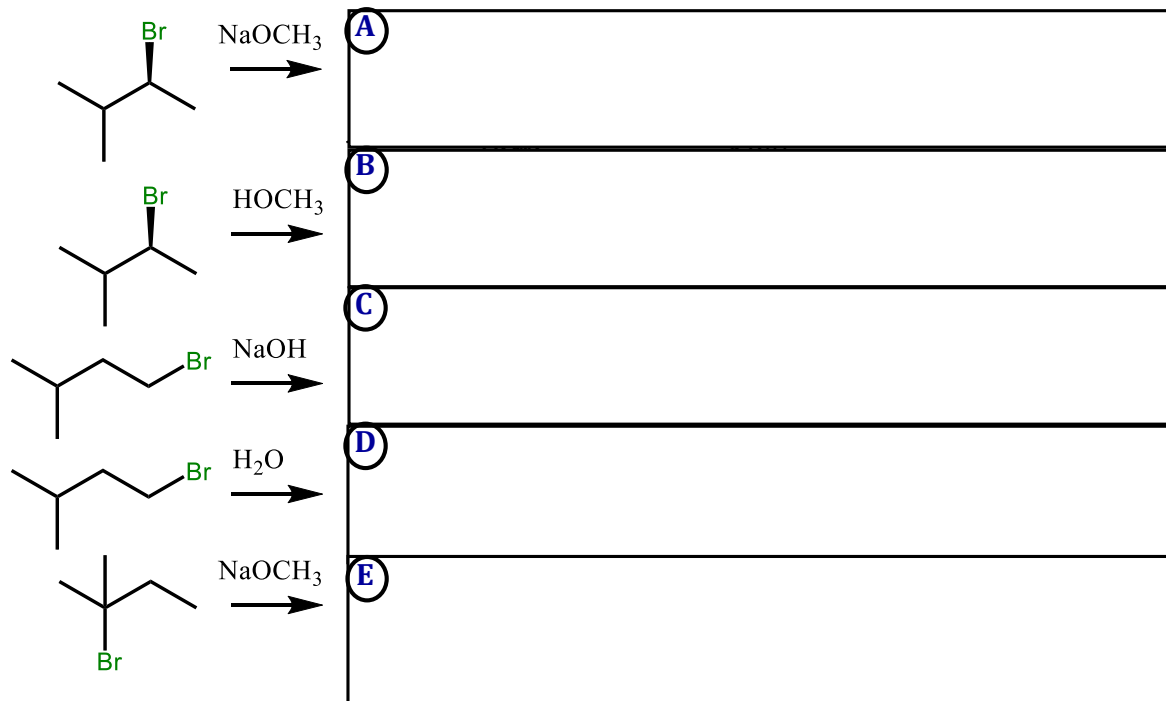
	<b>Reagent</b>			
<b>Substrate</b>	Poor Nu/Weak Base	Good Nu/Weak B	Good Nu/Strong B	Poor Nu/Strong B
<b>CH<sub>3</sub>-X</b>				
<b>1° R-X</b>				
<b>2° R-X</b>				
<b>3° R-X</b>				

Notes

Lecture Topic II.10: Competition Among  $S_N1$ ,  $S_N2$ , E1 and E2 Reactions

Predicting Major Products

**Example.** Determine whether each reaction will proceed predominantly via  $S_N1$ ,  $S_N2$ , E1, E2, or some combination thereof, and show the product(s)

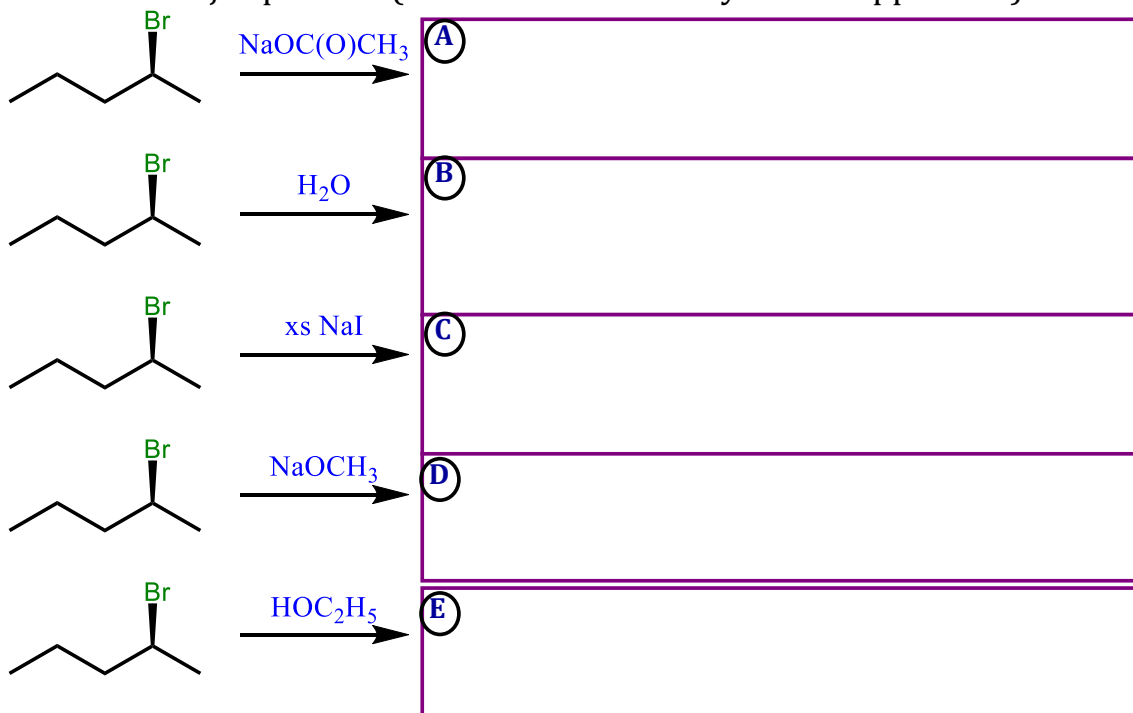


Notes

## Lecture Topic II.10: Competition Among $S_N1$ , $S_N2$ , E1 and E2 Reactions

### Predicting Major Products

**Example.** Predict whether each proceeds via  $S_N1$ ,  $S_N2$ , E1, or E2, and draw the major product (show stereochemistry where applicable).



Notes