

ORGANIC CHEMISTRY 1 LECTURE GUIDE 2019

BY RHETT C. SMITH

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By Rhett C. Smith, Ph.D.

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Organic Chemistry 1 Reactions and Practice Problems 2019

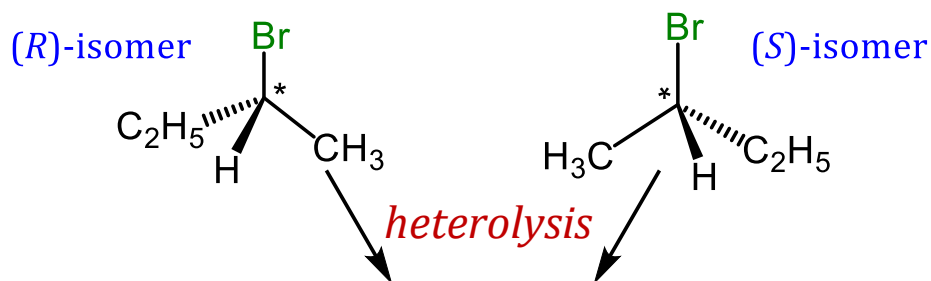
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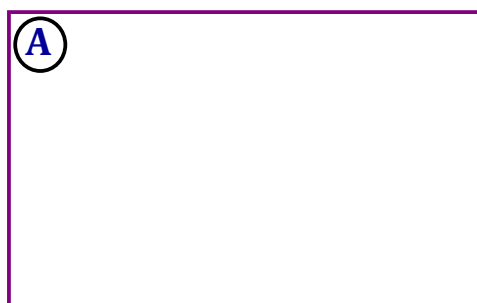
by Rhett C. Smith, Andrew G. Tennyson, and Tania Houjeiry

Lecture Topic II.5: Stereochemistry of Substitution Reactions
Stereochemistry of S_N1 Reactions

Recall from **Lecture Topic II.1** that a single chiral product cannot be obtained from achiral starting materials for **any** step of a reaction sequence. Consider the reaction of a chiral alkyl halide by an S_N1 pathway:



After heterolysis,
Chirality is lost. We
cannot even tell
from which of the
two isomers the
cation was formed!



An Achiral Carbocation

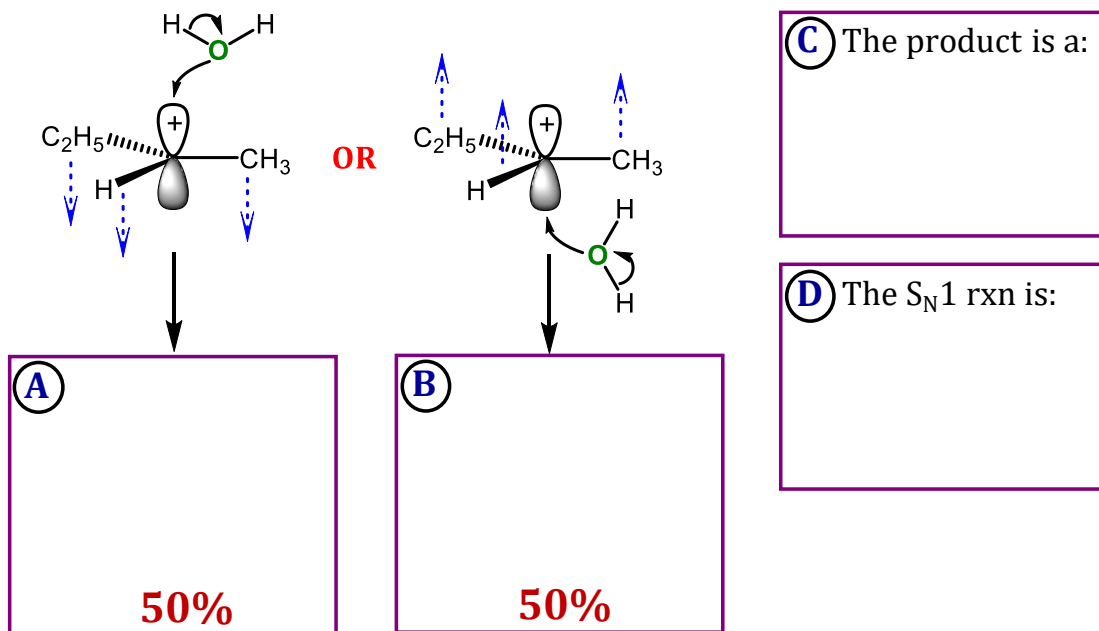
Notes

This type of heterolysis is sometimes casually referred to as “leaving group leaves”

Lecture Topic II.5: Stereochemistry of Substitution Reactions

Stereochemistry of S_N1 Reactions

The carbocation formed by heterolysis has a trigonal planar geometry; it is achiral and symmetric. The nucleophile may attack from either face of the plane with equal probability:

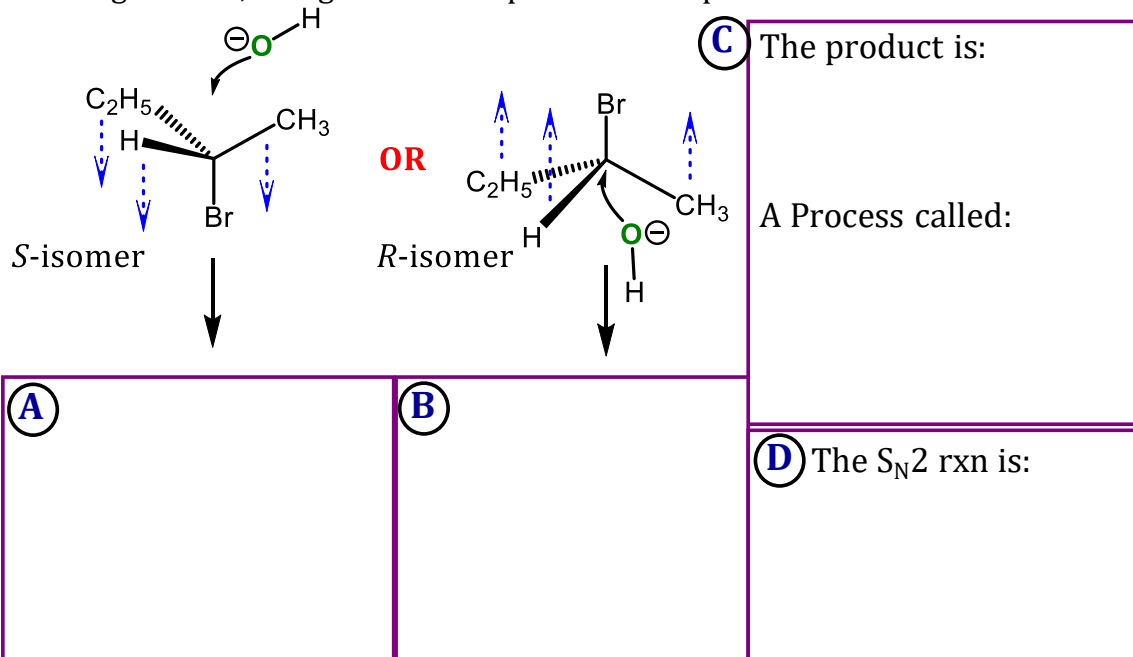


Notes

Lecture Topic II.5: Stereochemistry of Substitution Reactions

Stereochemistry of S_N2 Reactions

The S_N2 reaction is concerted, so if the nucleophile substitutes at a stereogenic site, a single chiral compound will be produced:



Notes