

S_N2 Displacement At sp^3 Centers

from chapter(s) _____ in the recommended text

A. Introduction

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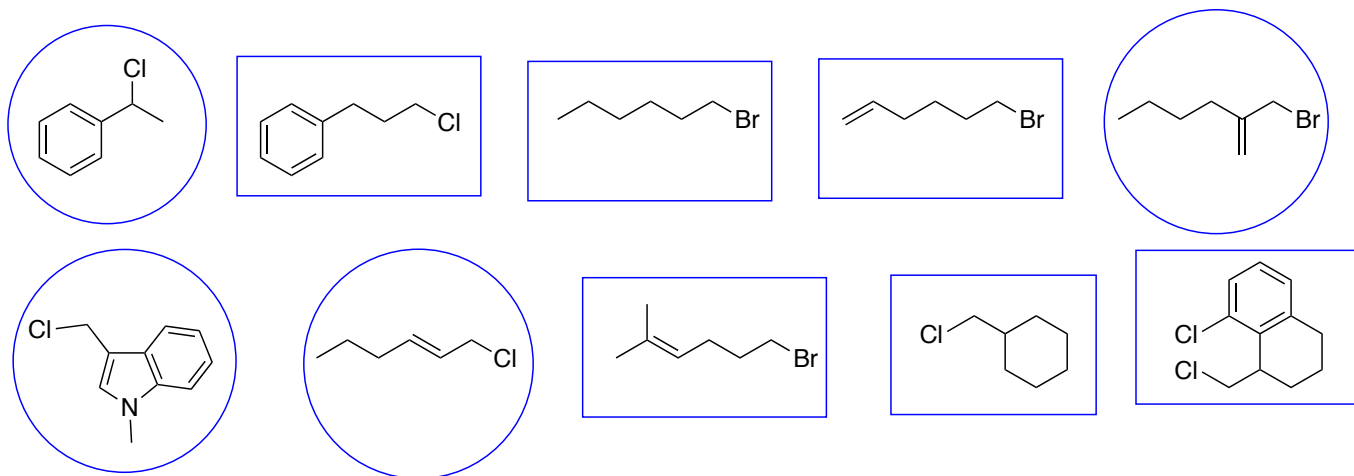
B. Differentiating S_N1 and S_N2

replaces another and *with second order kinetics*.

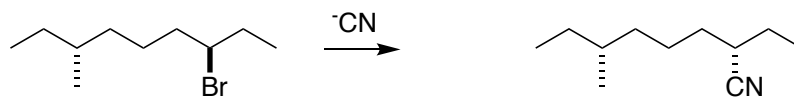
S_N2 processes whereas S_N1

S_N2 pathways.

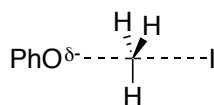
feature S_N1 mechanisms.



Stereochemical Inversion In S_N2 Reactions



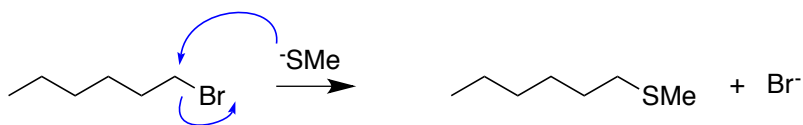
Transition states in S_N2 displacement processes have geometries that resemble trigonal bipyramidal shapes.



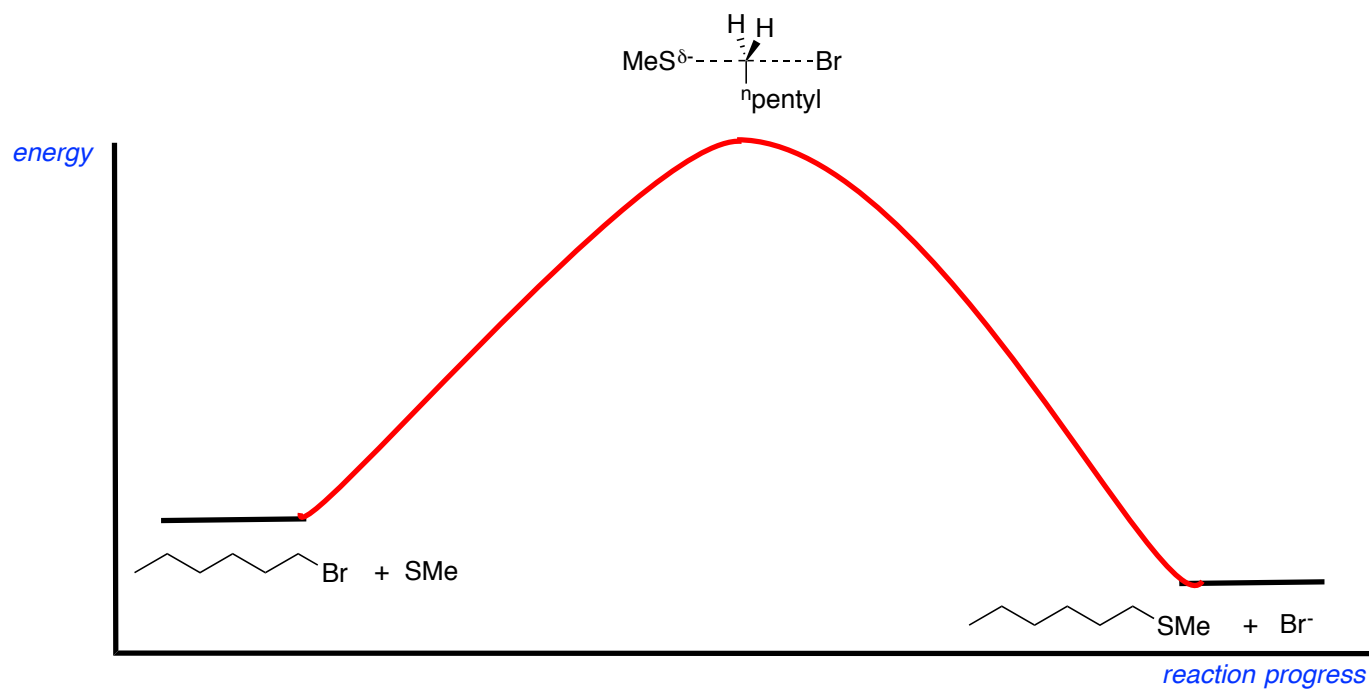
S_N2 .

S_N1

Kinetics And S_N2 Pathways



product plus by-product



doubles

accelerated

more

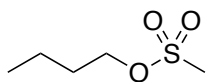
less.

C. Interconversion Of Enantiomers And Diastereomers

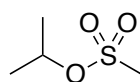
Conversion Of Alcohols Into Leaving Groups

Hydroxyl groups are not

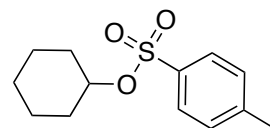
better



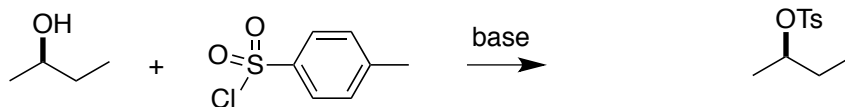
*n*butyl mesylate



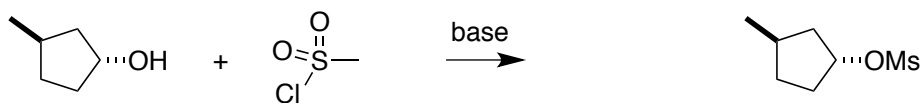
*i*propyl mesylate

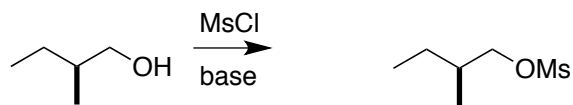
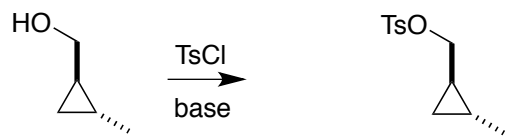


cyclohexyl tosylate



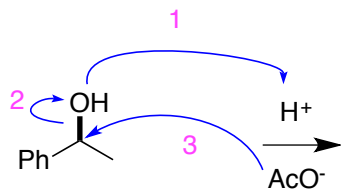
*s*butyl tosylate



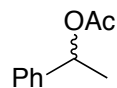


Mesylates and tosylates are better retention of configuration inversion stereochemistry.

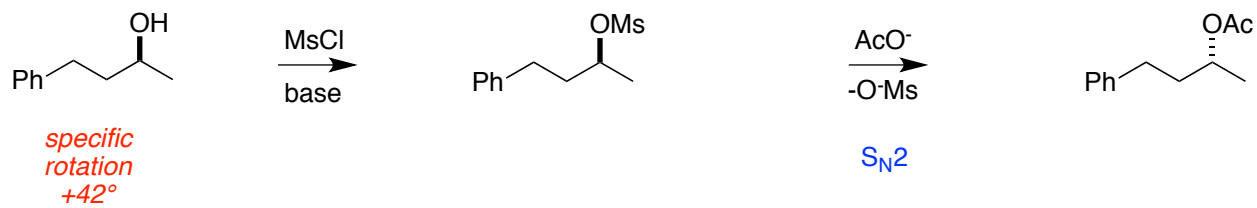
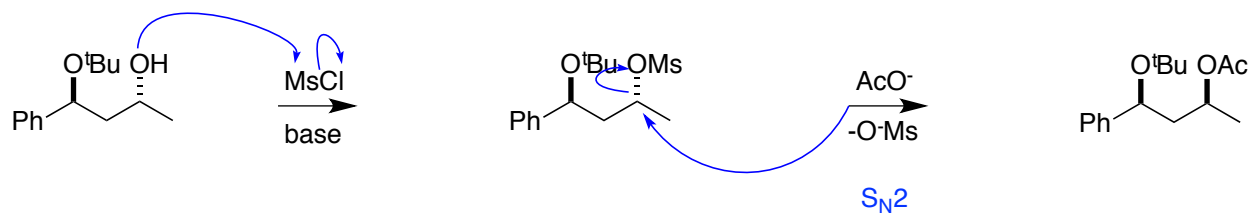
S_N1 .



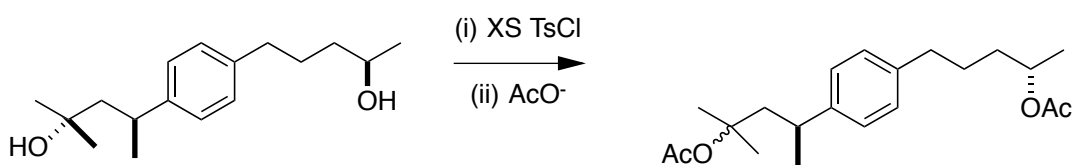
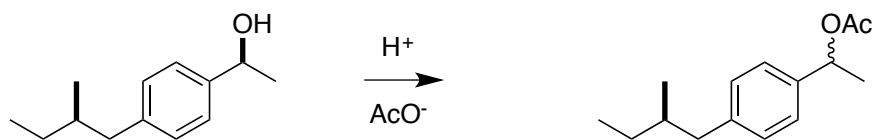
specific rotation
 $+13^\circ$



specific rotation = 0°



specific rotation = -42°

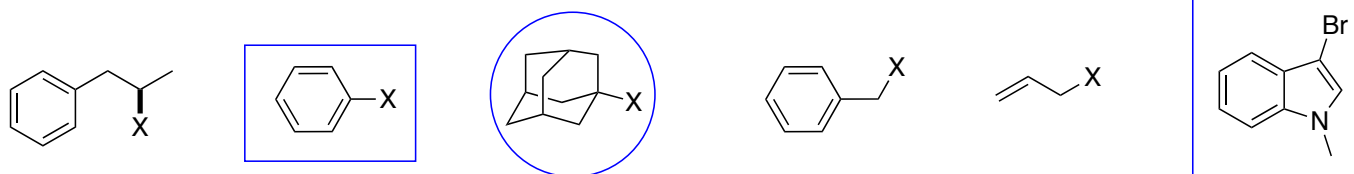


product of one $\text{S}_{\text{N}}1$ and one $\text{S}_{\text{N}}2$ reaction

Stereoelectronic Effects

S_N2 reactions

transition state



LUMO on

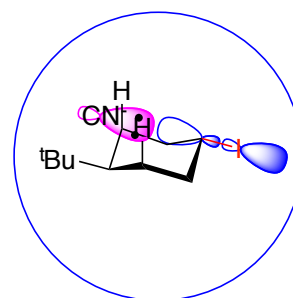
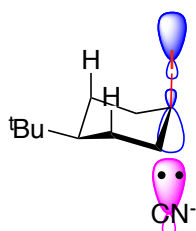
HOMO.

the empty p-orbital of the carbocation.

LUMO

HOMO.

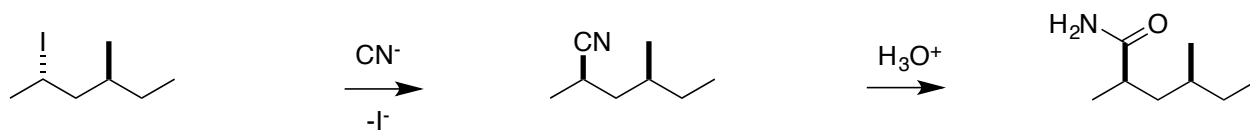
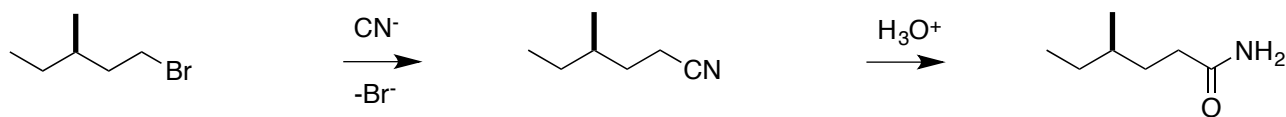
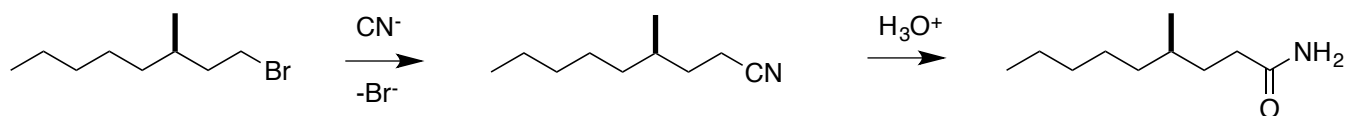
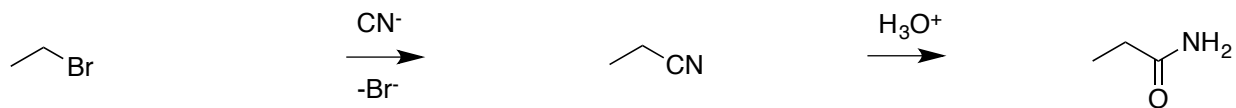
σ^* orbital.

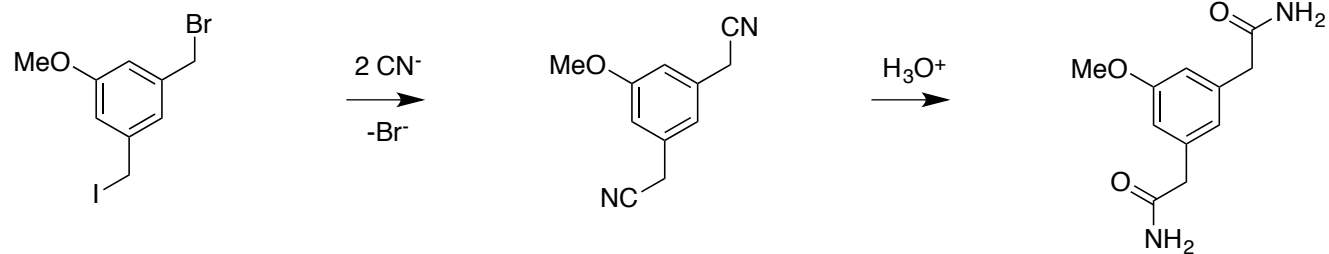


draw C - I σ^ -orbitals and orientation of S_N2 displacement by CN^-*

D. A Little Synthetic Chemistry For Chemistry Majors

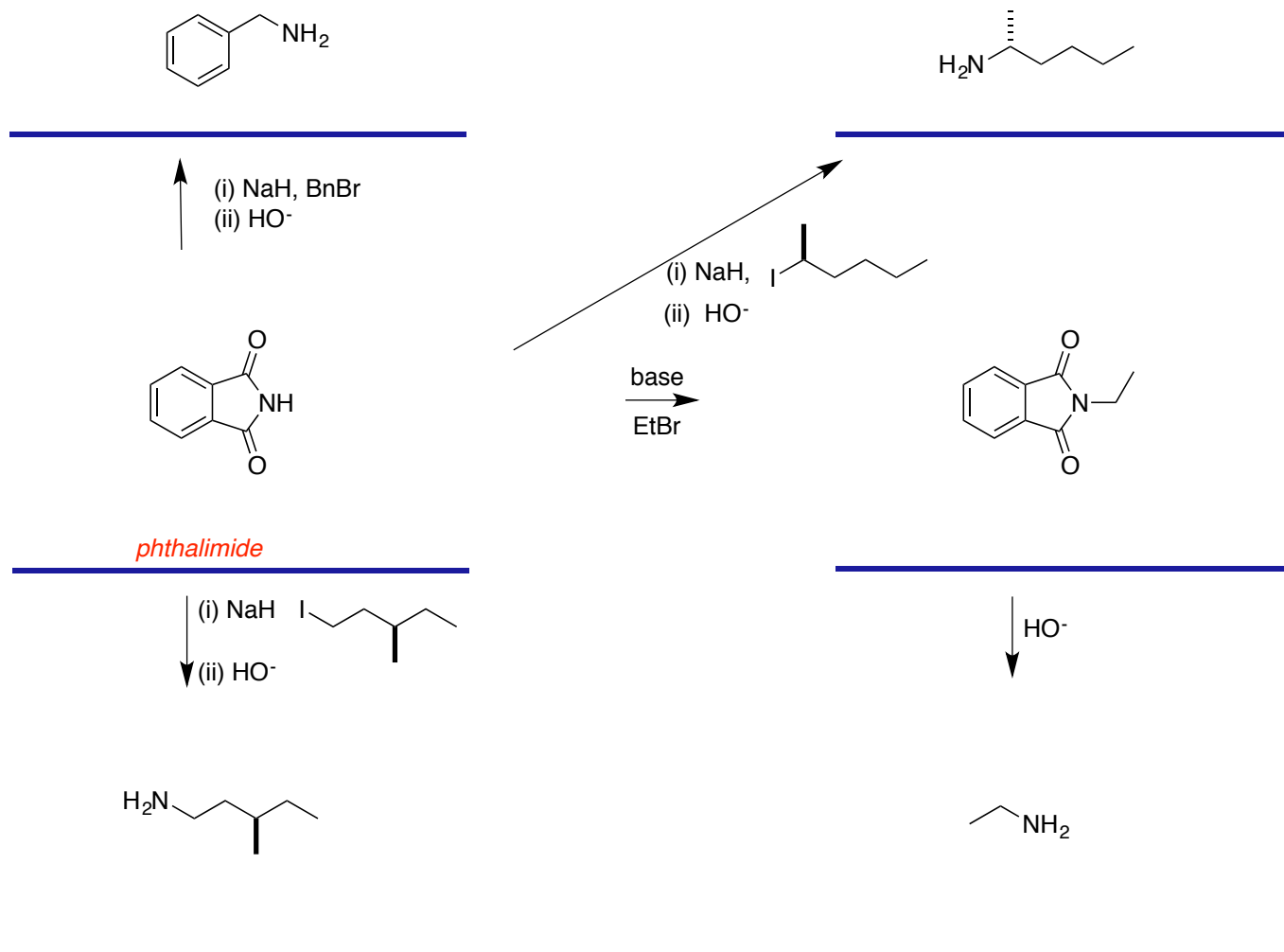
Cyanide: A Useful C-Nucleophile





This type of transformation (nitrile displacement then hydrolysis) works for 4-MeOC₆H₄I / MeI / BnI / allyl bromide / vinyl iodide

Phthalimide: Useful *N*-Nucleophile For Syntheses Of Primary Amines



phthalimide

primary amines

Gabriel synthesis is a better