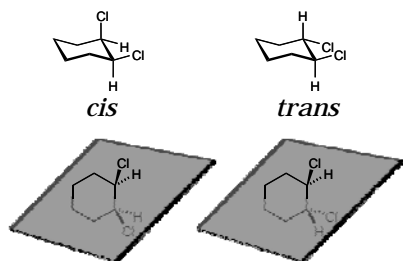
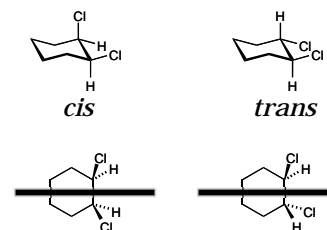


Can we use the mirror plane method to demonstrate that the *trans* isomer is chiral whereas the *cis* isomer is achiral?



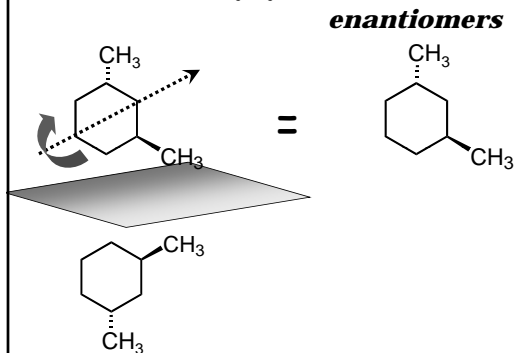
internal mirror plane **no internal mirror plane** ¹¹⁶

Can we use the mirror plane method to demonstrate that the *trans* isomer is **chiral** whereas the *cis* isomer is **achiral**?



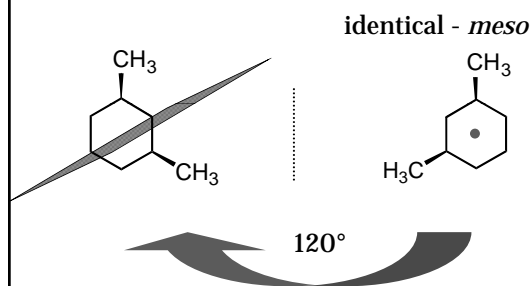
internal mirror plane **no internal mirror plane** ¹¹⁷

1,3-Disubstituted Cyclohexanes
trans-1,3-dimethylcyclohexane



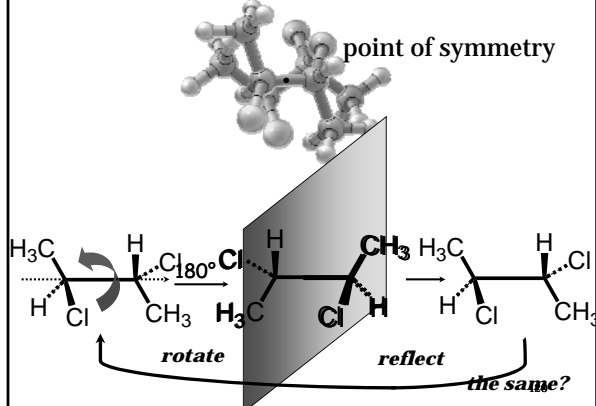
¹¹⁸

1,3-Disubstituted Cyclohexanes
cis-1,3-dimethylcyclohexane



¹¹⁹

Molecules with more than one stereocenter



Review:

chiral – having a non-identical mirror image

enantiomers - two structures that are mirror images but are not identical

diastereomers - structures that are stereoisomers but are not enantiomers

meso - a structure that has diastereomers but is not chiral

¹²¹

End of Chapter 5

Stereochemistry

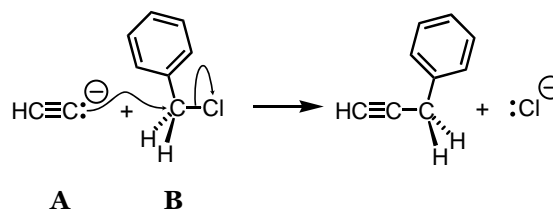
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Nucleophilic Substitution Reactions

Chapter 6

1

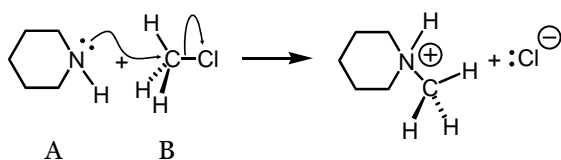
Some Examples of Substitution Reactions



Which reactant is the acid?

2

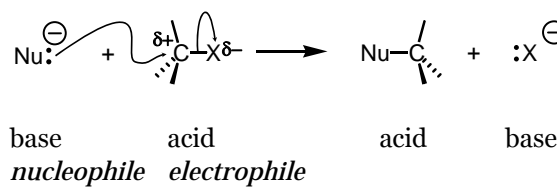
Some Examples of Substitution Reactions



Which reactant is the base?

3

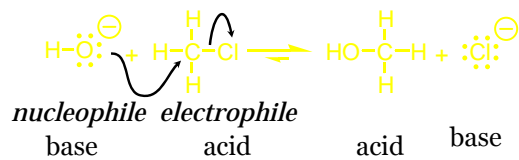
Substitution Reactions



substitution of a C-Nu bond for a C-X bond

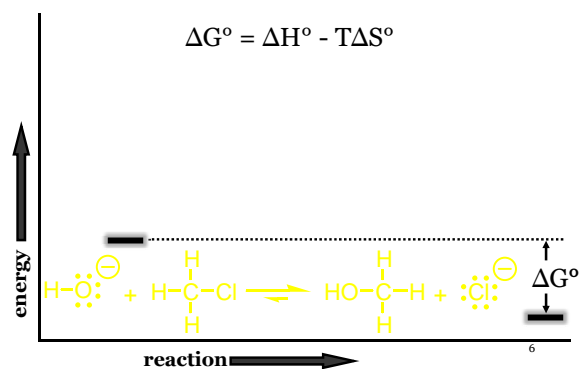
4

Thermodynamics vs Kinetics

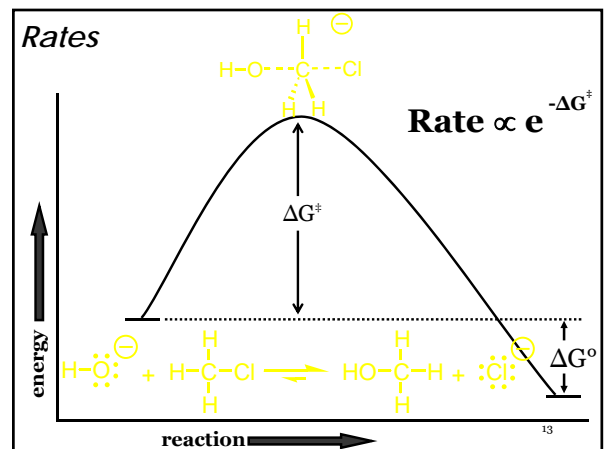
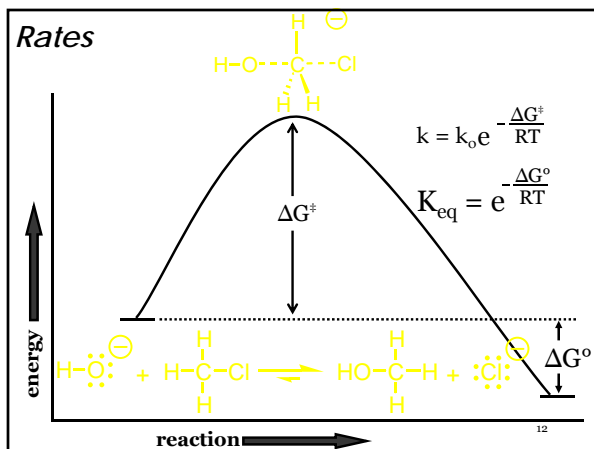
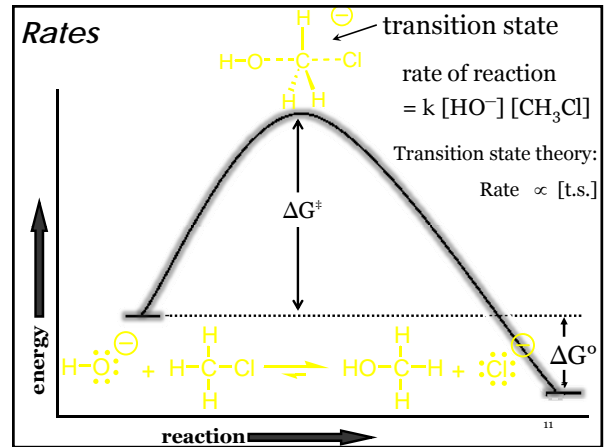
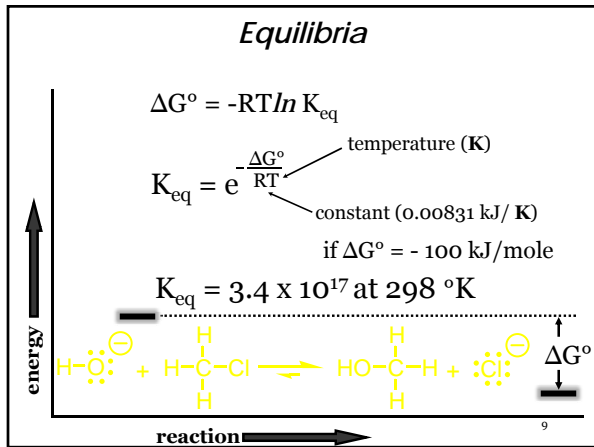
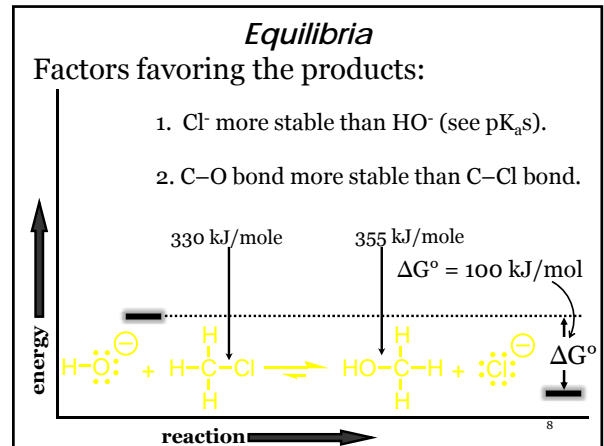
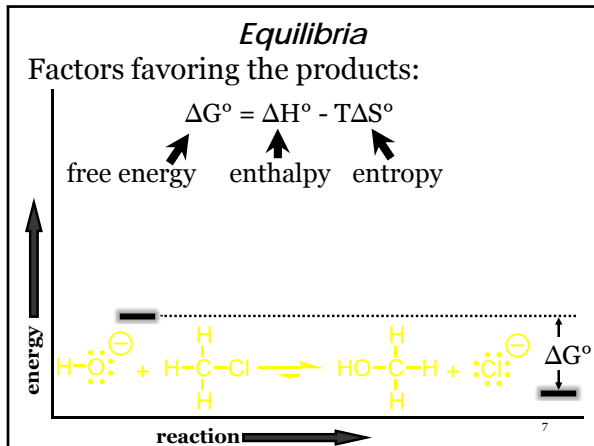


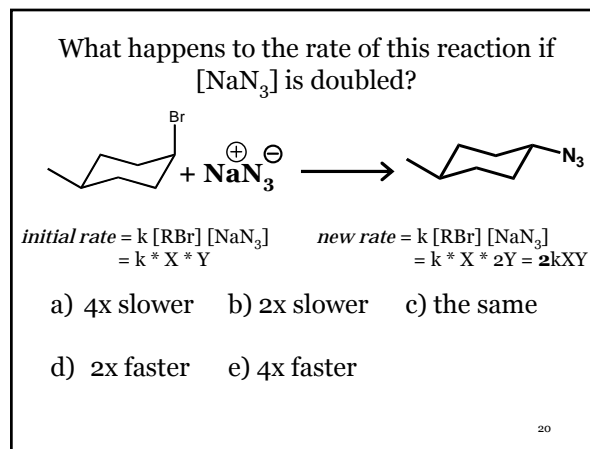
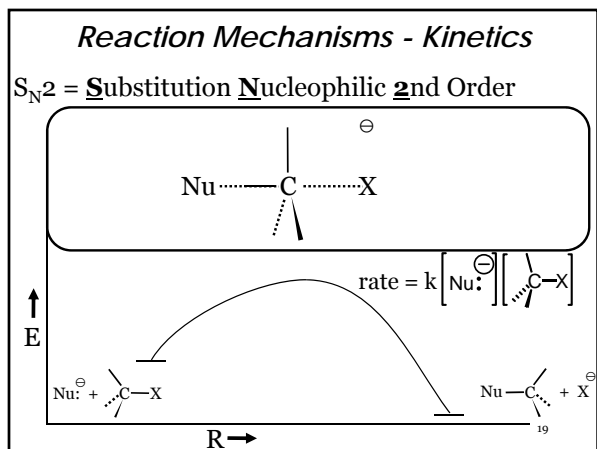
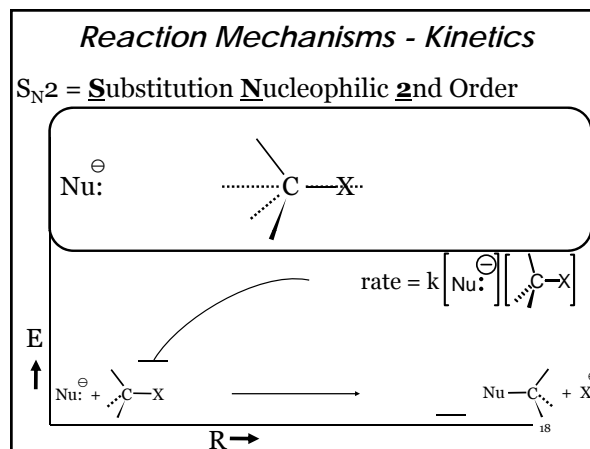
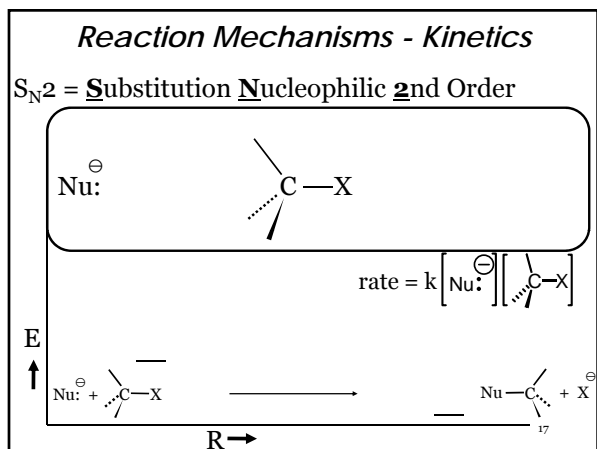
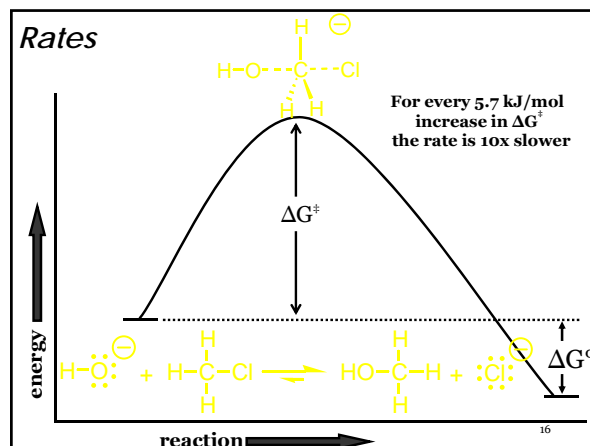
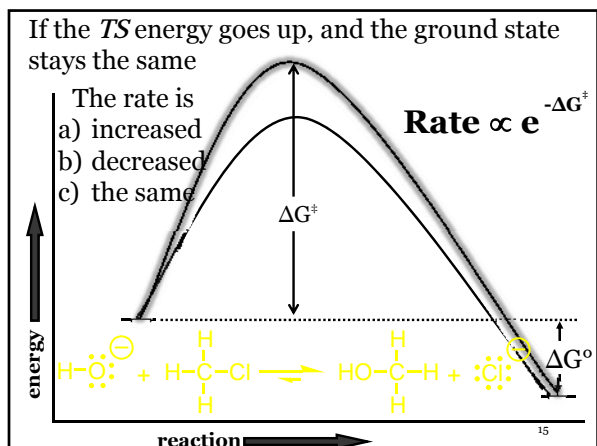
5

Equilibria

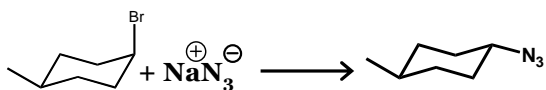


6





What happens to the rate of this reaction if both $[\text{NaN}_3]$ and $[\text{RBr}]$ are doubled?



$$\text{initial rate} = k [\text{RBr}] [\text{NaN}_3] = k * X * Y$$

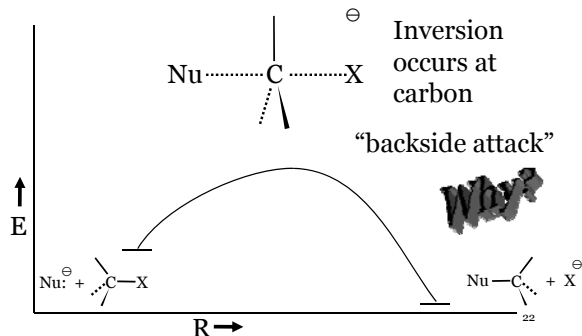
$$\text{new rate} = k [\text{RBr}] [\text{NaN}_3] = k * 2X * 2Y = 4kXY$$

- a) 4x slower b) 2x slower c) the same
d) 2x faster e) 4x faster

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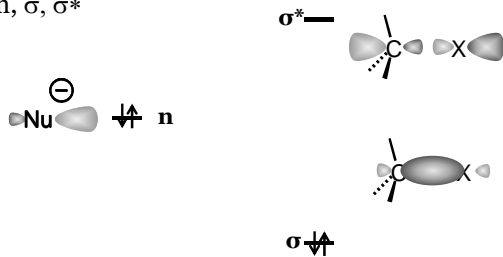
Stereochemistry

$S_N2 = \text{Substitution Nucleophilic 2nd Order}$



Identify the Highest Occupied Molecular Orbital (s)

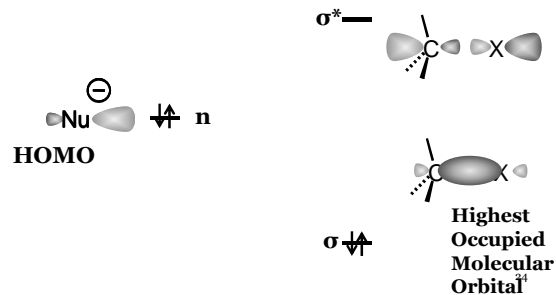
- a) n b) σ c) σ^*
d) n, σ e) σ, σ^* f) n, σ^*
g) n, σ, σ^*



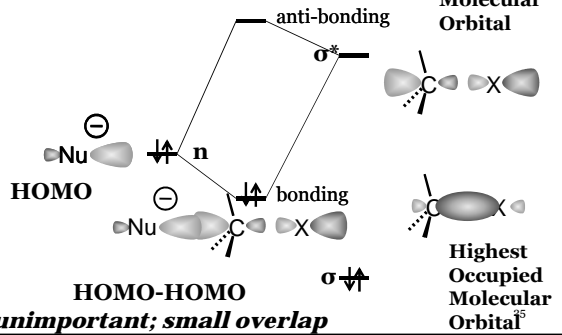
23

Identify the Highest Occupied Molecular Orbital

Lowest Unoccupied Molecular Orbital



HOMO-LUMO most important interaction

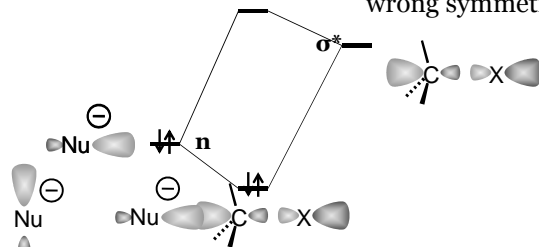


Stereochemistry

Why don't we see retention of configuration?

Why isn't "frontside" attack important?

wrong symmetry



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