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Organic Chemistry

Class- T.Y.B.Sc.

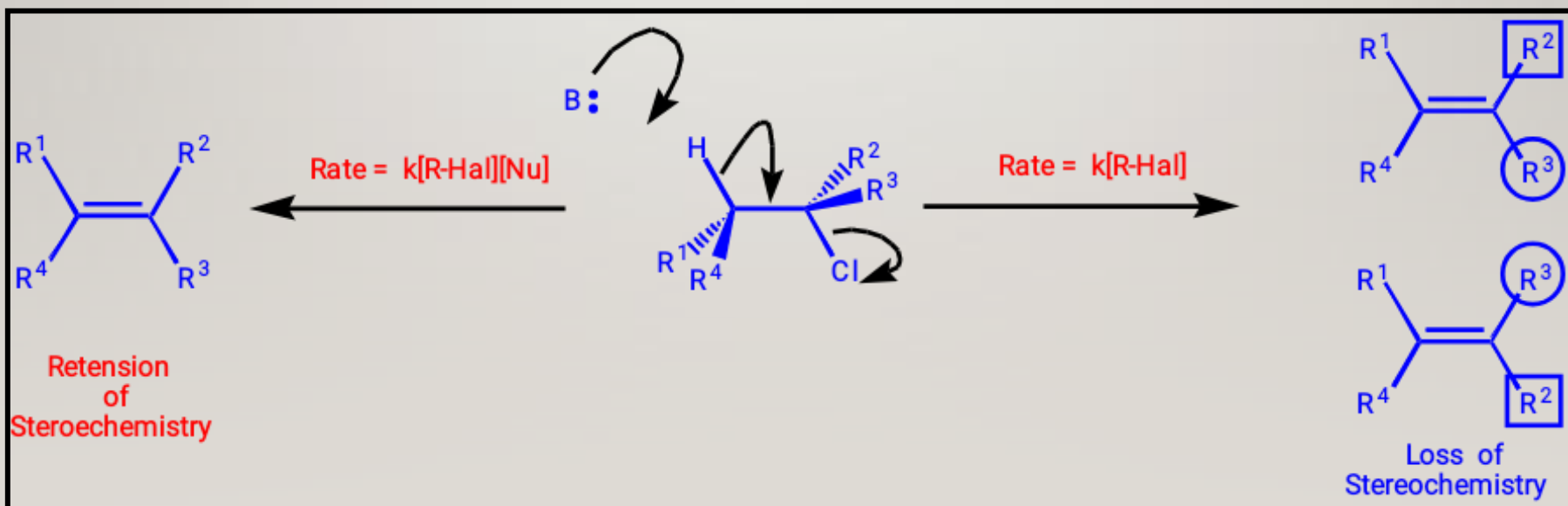
Elimination Reactions

Miss. Gaikwad Rani J.

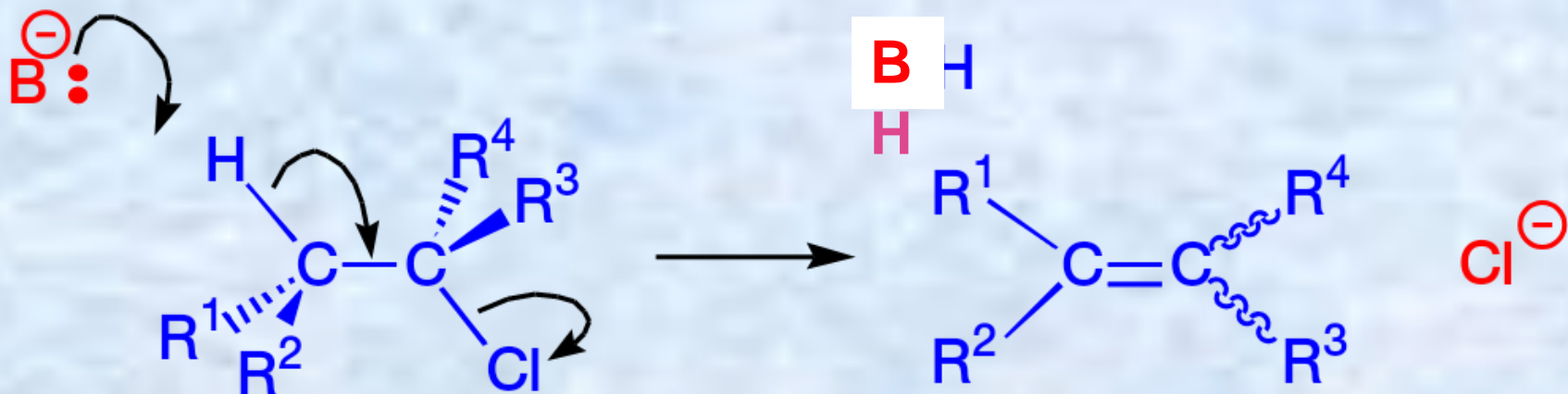
Asst. Professor Dept. of Chemistry

A. S. C College, Kolhar

Elimination Reactions



Elimination Reactions

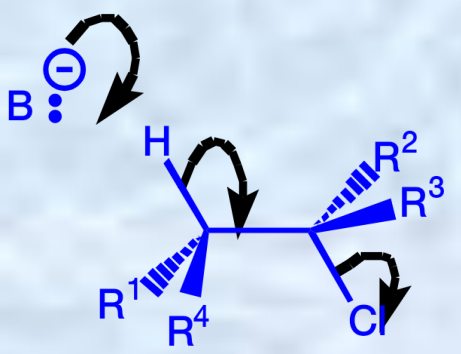


Descriptor	Rate Equation	
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E2	rate = $k[\text{R-Hal}][\text{Nu}]$	Retention
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E1	rate = $k[\text{R-Hal}]$	Loss of
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The E2 Reaction Mechanism

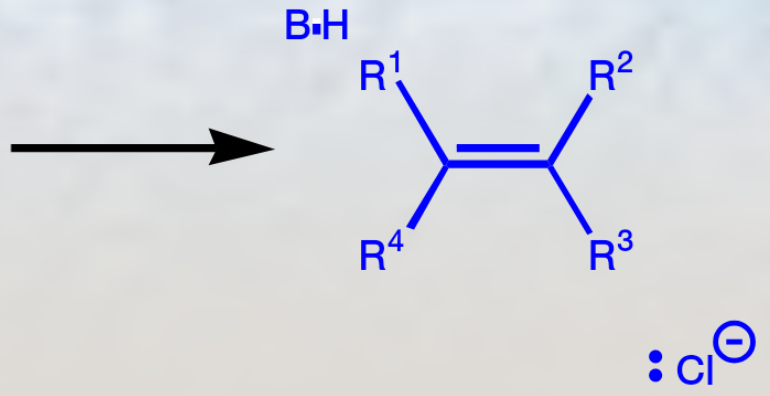
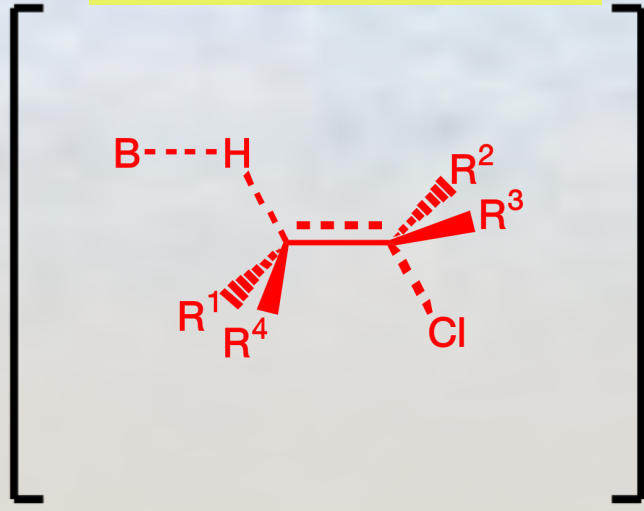


Bimolecular Process

$$\text{Rate} = k[\text{R-Hal}][\text{B}]$$

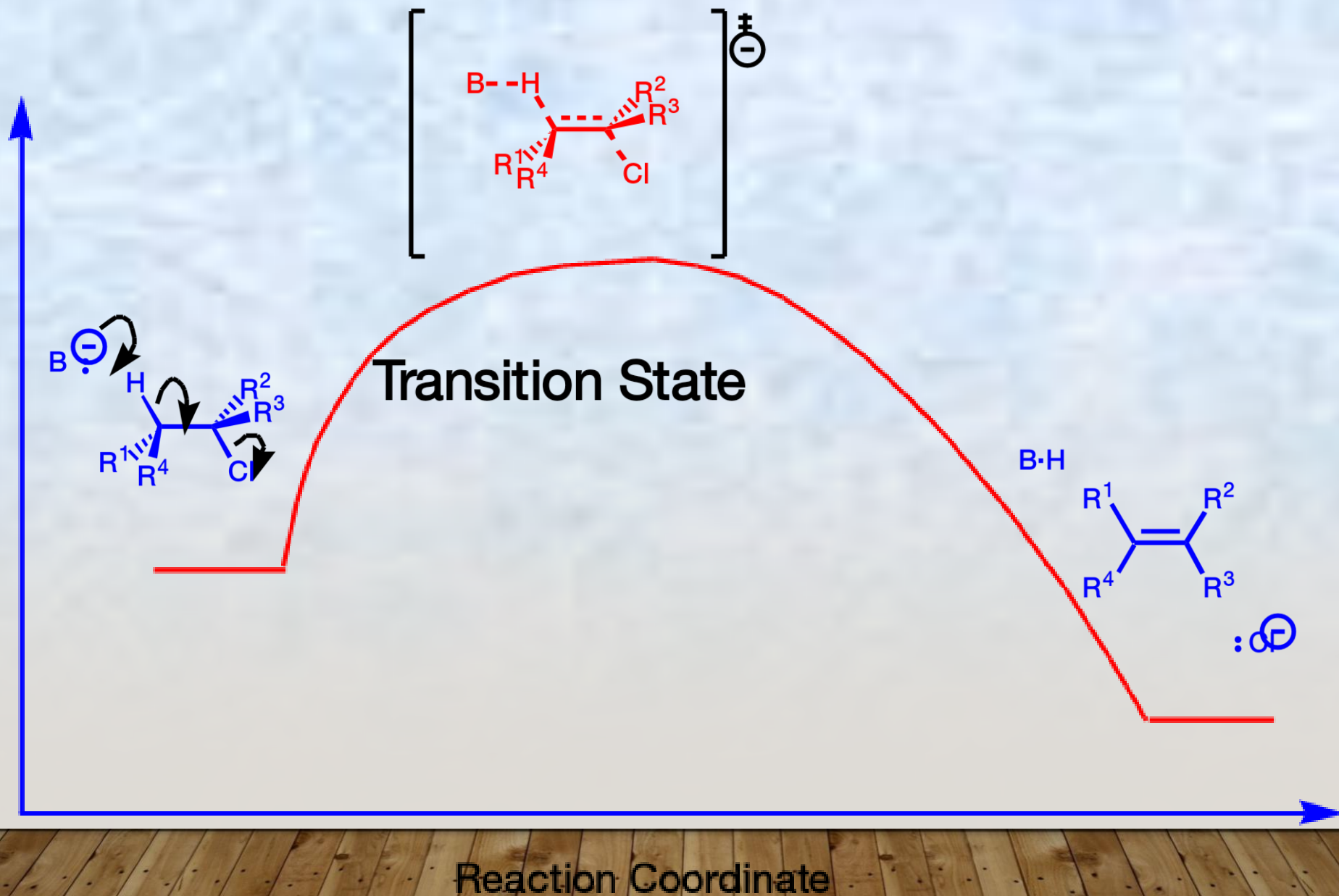
H and Cl must be antiperiplanar

Compare to S_N2

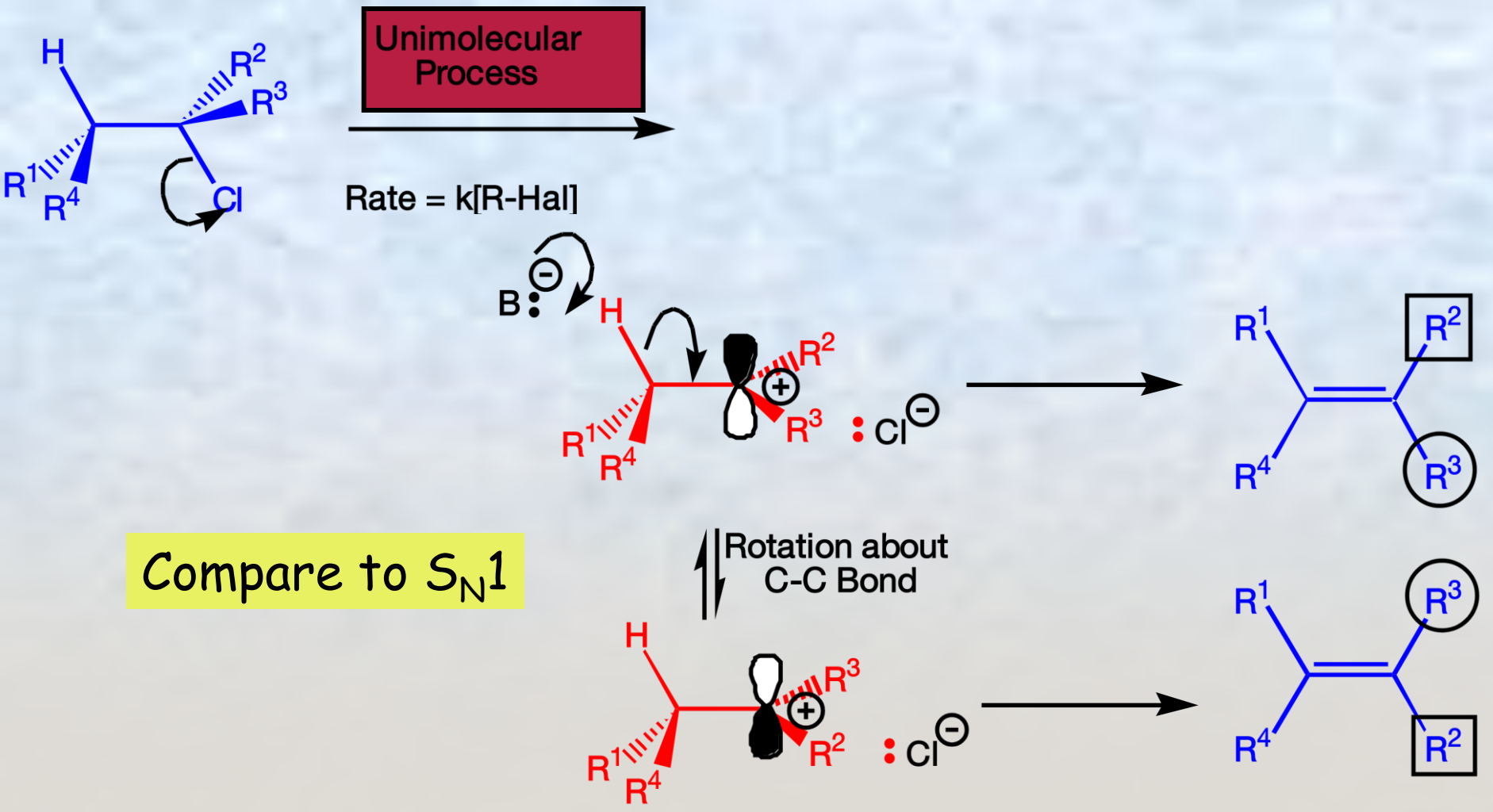


Transition State – Energy Maxima

Retention of Stereochemistry



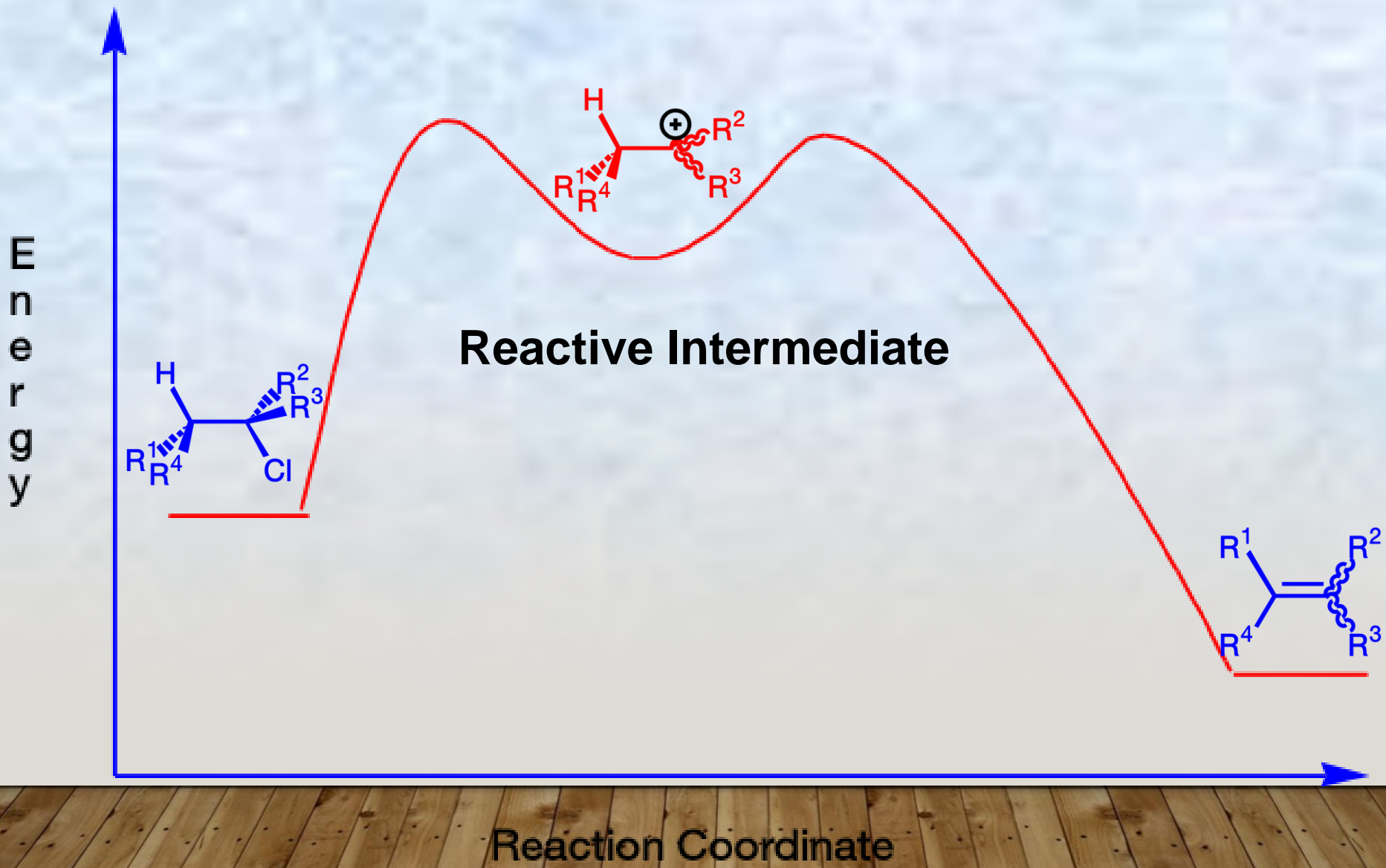
The E1 Reaction Mechanism



Compare to S_N1

Reactive Intermediate – Energy Minima

Loss of Stereochemistry



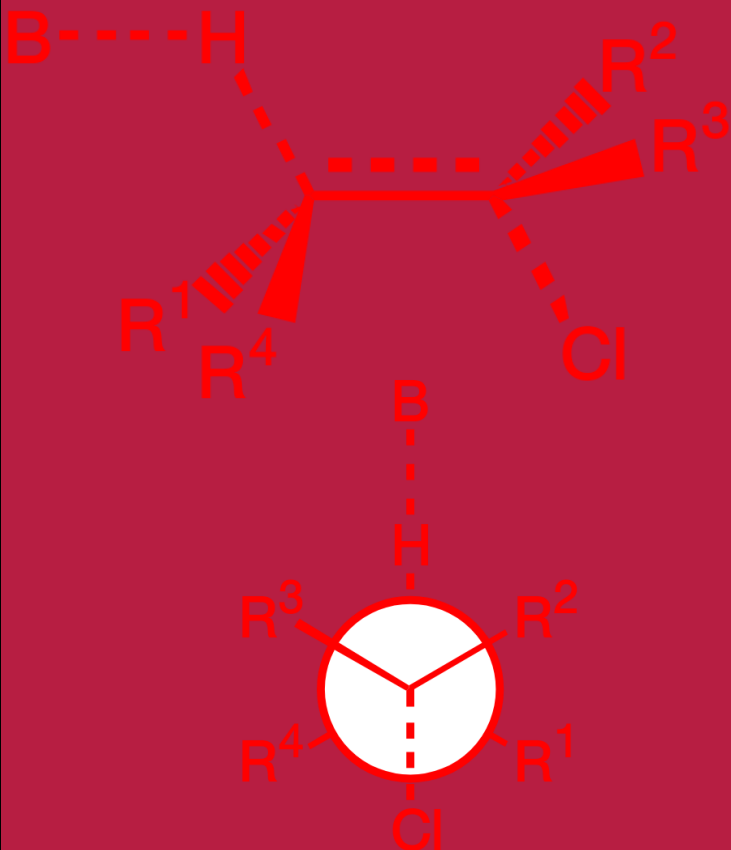
E
n
e
r
g
y

Reactive Intermediate

Reaction Coordinate

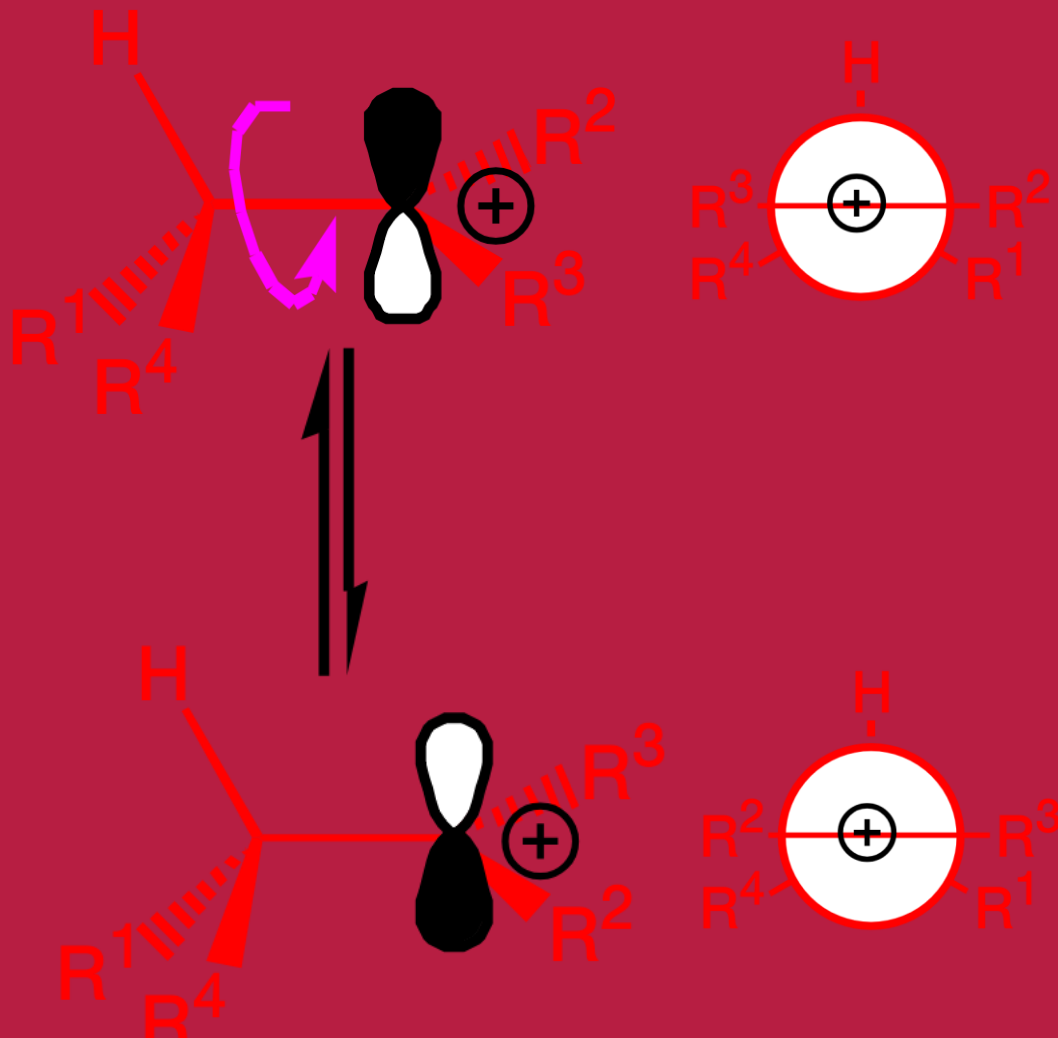
Stereochemistry Compared

E2

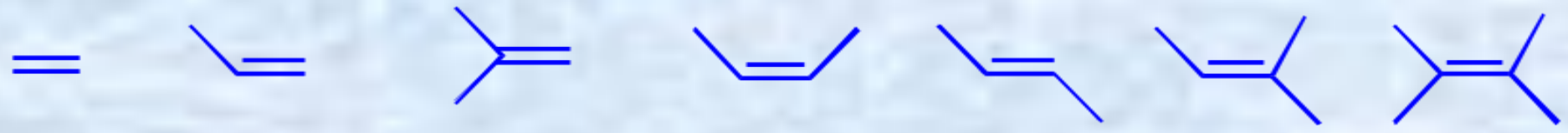


H, C, C and Cl are antiperiplanar

E1



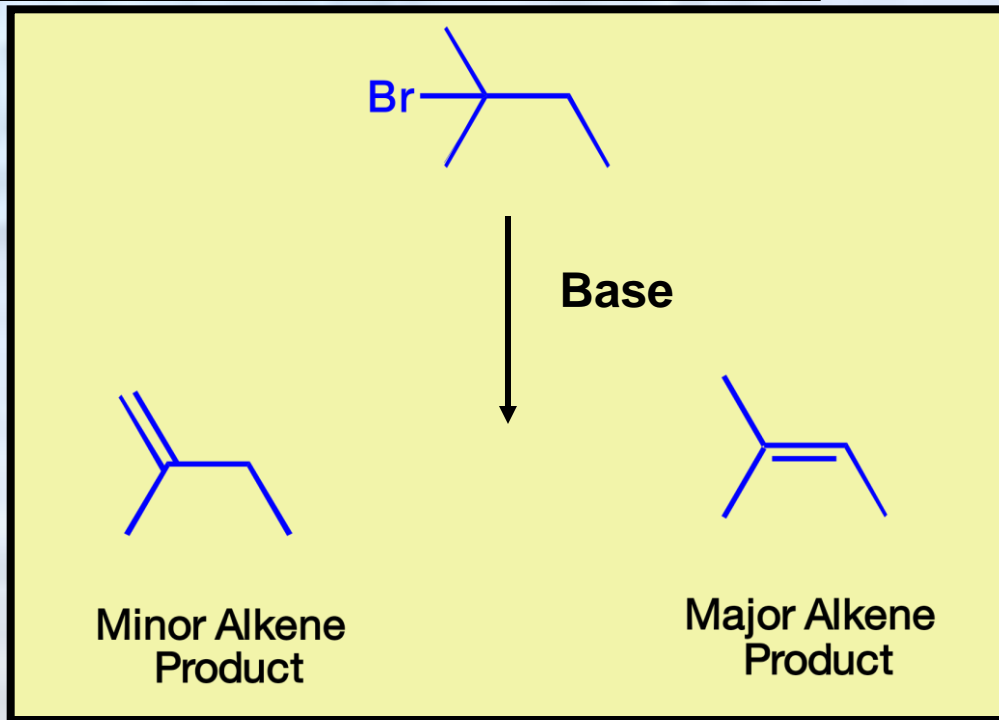
Alkene Stability



Stability Increases



Constitutionally Different Eliminations



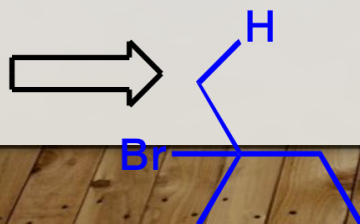
Statistically favoured!

Minor Alkene Product

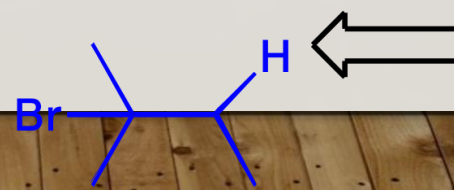
Major Alkene Product

Constitutional Isomers

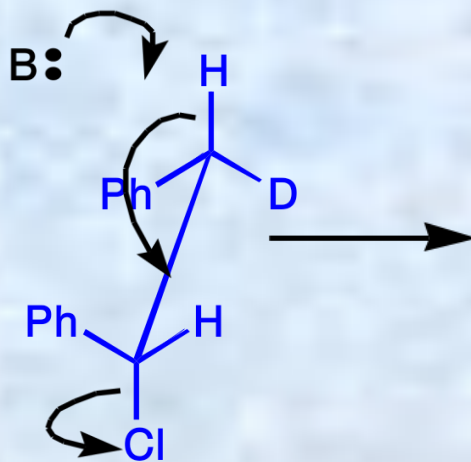
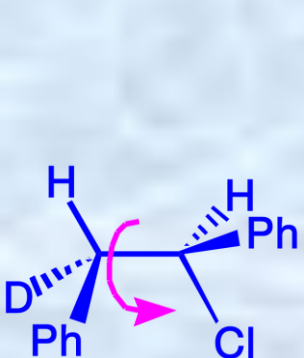
6 Equivalent Hydrogen atoms



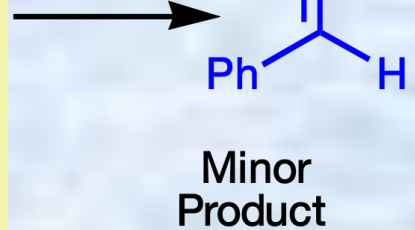
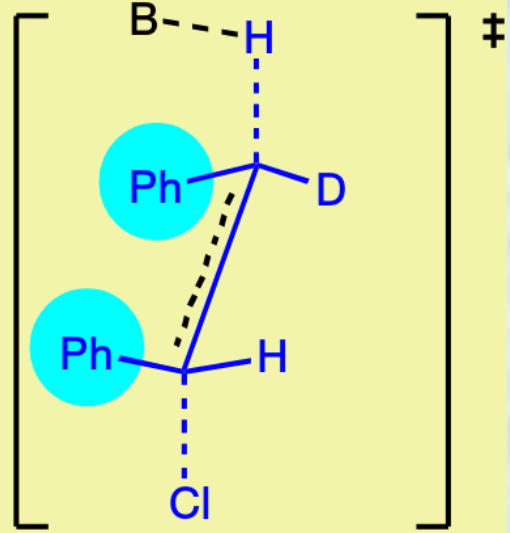
2 Equivalent Hydrogen atoms



Conformational Equilibria



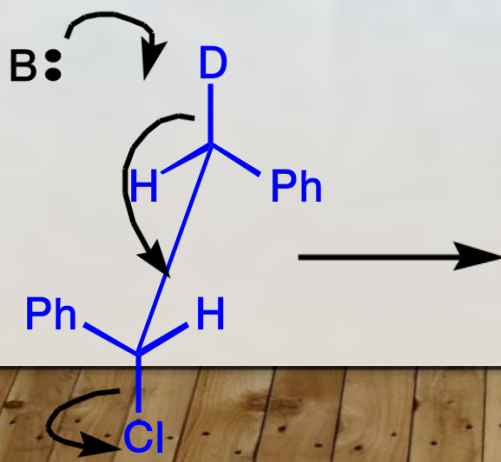
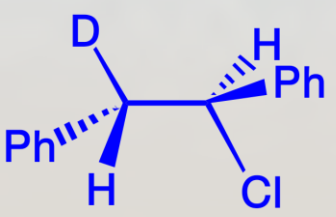
High Energy Transition State



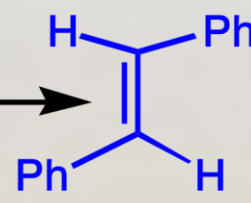
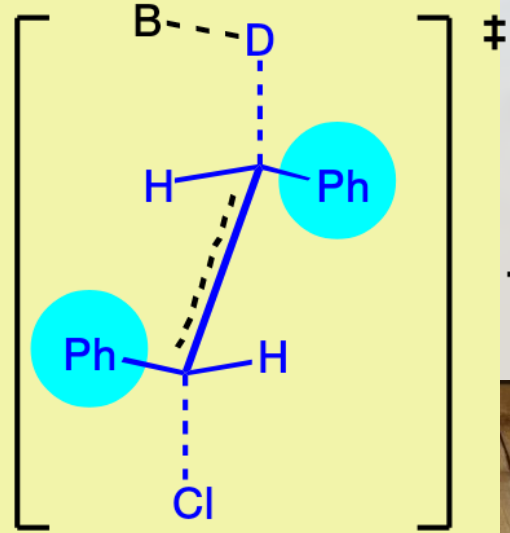
Minor Product

↕
Rotation
about C-C
bond

Conformers



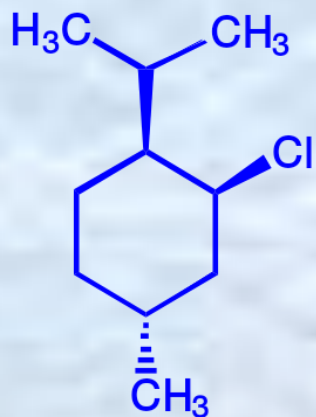
Low Energy Transition State



Major Product

Diastereoisomers

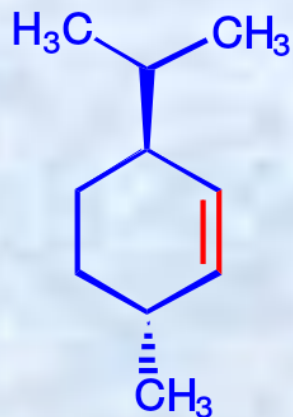
Cyclohexane Rings – E2



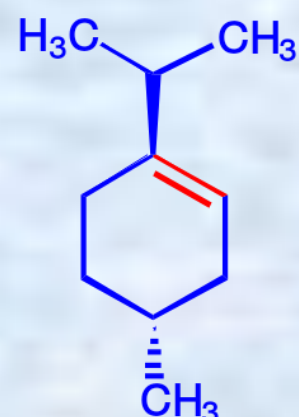
NaOEt

EtOH

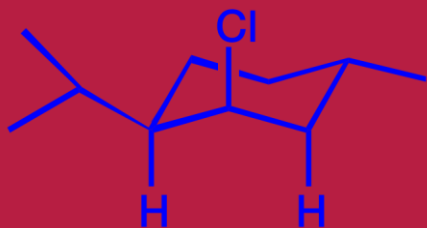
Rate = $k[\text{R-Cl}][\text{NaOEt}]$



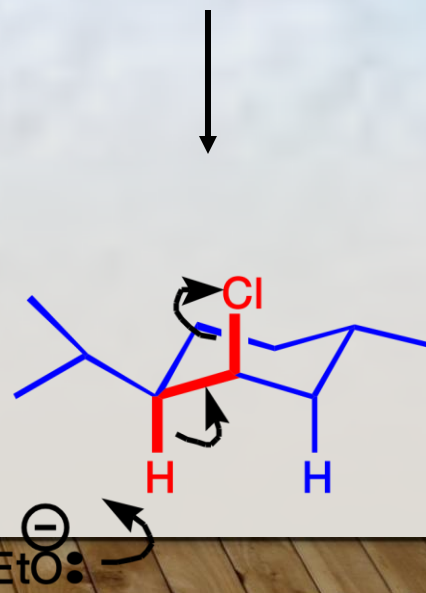
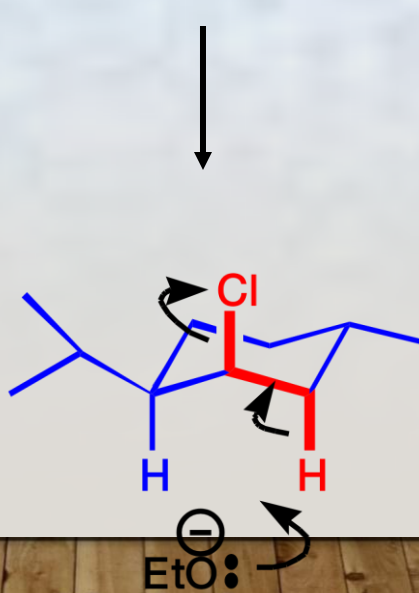
25%



75%



Two C-H bonds are *antiperiplanar* to the C-Cl bond



Cyclohexane Rings – E1

