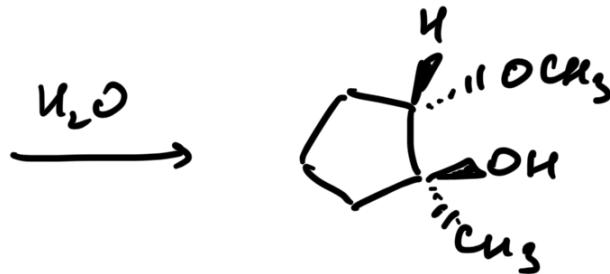
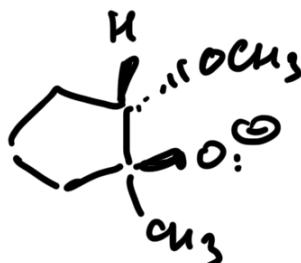
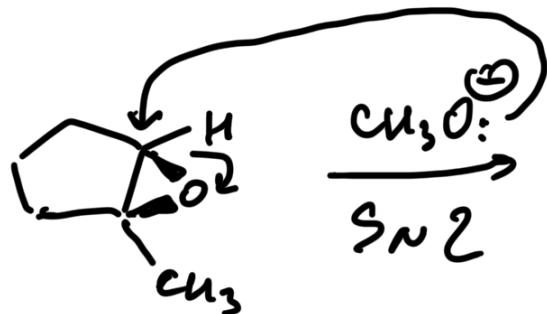
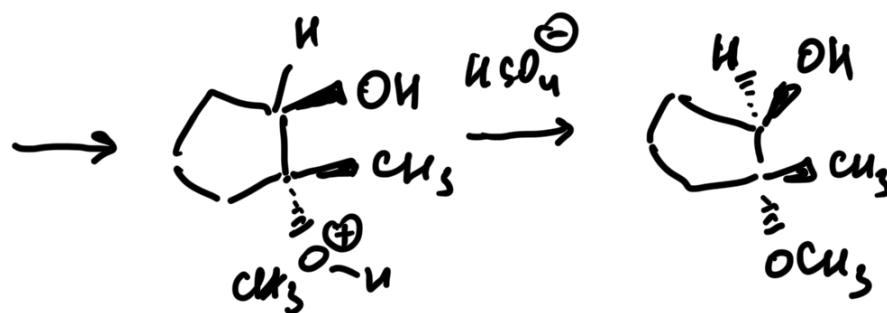
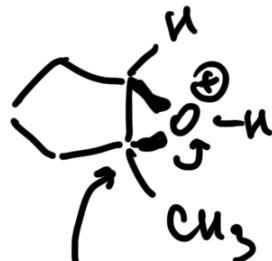
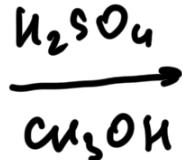
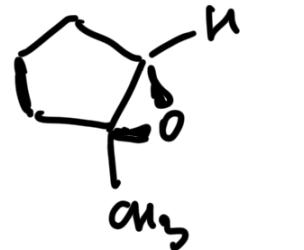


Reactions of epoxides

Complementarity of reactions with strong nucleophiles and acids



- at least subst. position
- inversion of stereochemistry

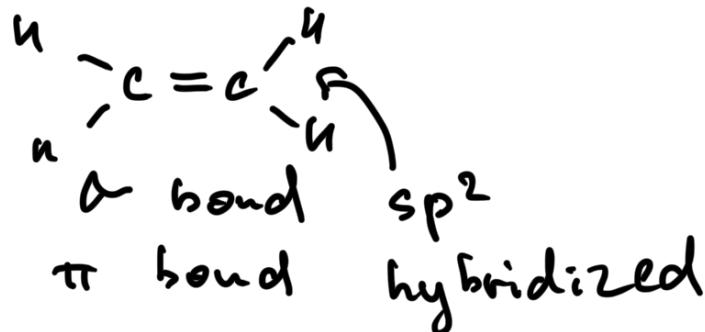


- between $\text{S}_{\text{N}}1$ and $\text{S}_{\text{N}}2$

- at most substituted side
- inversion of stereochemistry

Alkenes (again...)

The carbon-carbon double bond. (More) Types of alkenes



$$BDE_{\sigma_{C-C}} = 368 \text{ kJ/mol}$$

$$BDE_{\pi_{C-C}} = 264 \text{ kJ/mol} \rightarrow \text{involve } \pi\text{-bond}$$

electron-rich \rightarrow react w/ electrophiles less stable than cis!

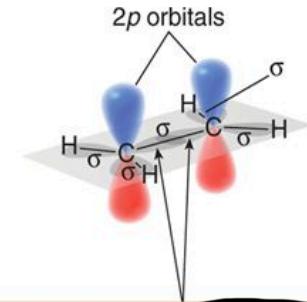


terminal alkenes

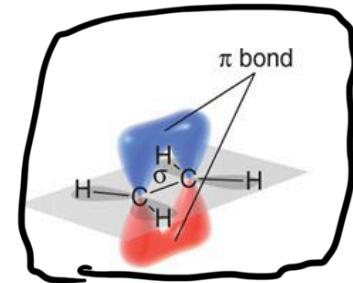


internal

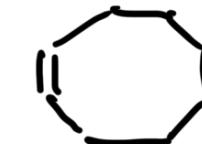
- trans more stable than cis



Overlap of the two sp^2 hybrid orbitals forms the C-C σ bond.



Overlap of the two 2p orbitals forms the C-C π bond.

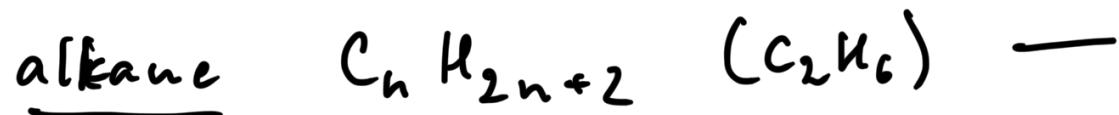
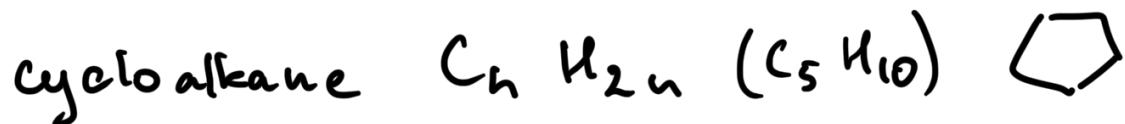
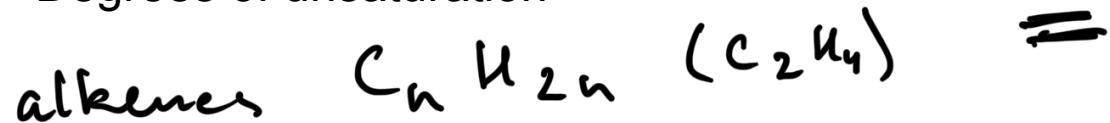


cycloalkene trans-cyclooctene



Alkenes

Degrees of unsaturation



degree of unsaturation - ring or double bond

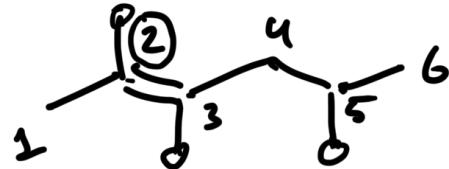


\uparrow
4 H less degrees of unsaturation = $\frac{4H}{2H} = 2$



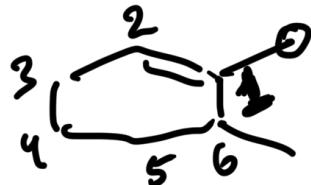
Alkenes

Nomenclature (IUPAC)



hexane (6 c)
↓
hexene → hex-2-ene

2,3,5 - trimethylhex-2-ene



1,6-dimethylcyclohexene

Alkenes

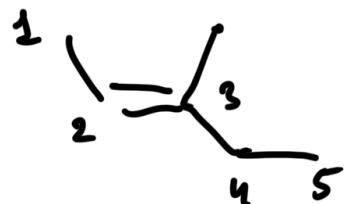
Nomenclature



cis - hex-3-ene
(same side)



trans - hex-3-ene
(opposite side)



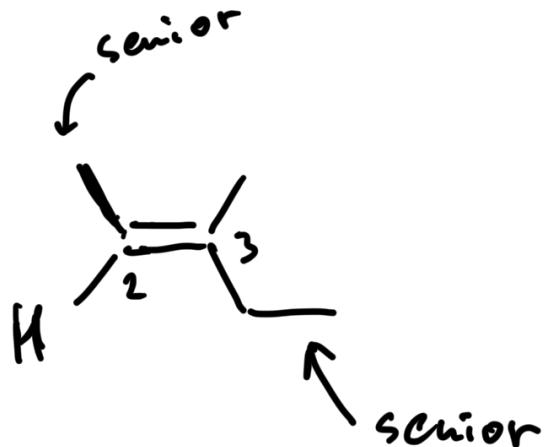
3 - methyl pent-2-ene



3 - methyl pent-2-ene

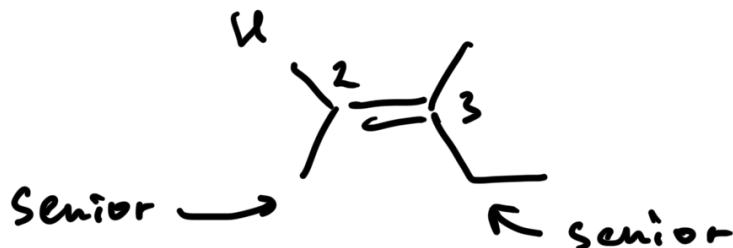
Alkenes

Naming stereoisomers



E - 3-methylpent-2-ene

(senior subst. on
opposite sides)



Z - 3-methylpent-2-ene

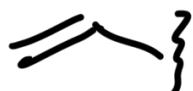
(senior subst. on
the same side)

Alkenes

Common names



methylene group



vinylic group



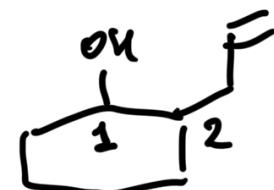
allyl group



methylene cyclohexane



1-vinylcyclopentene



2-allylcyclohexanol

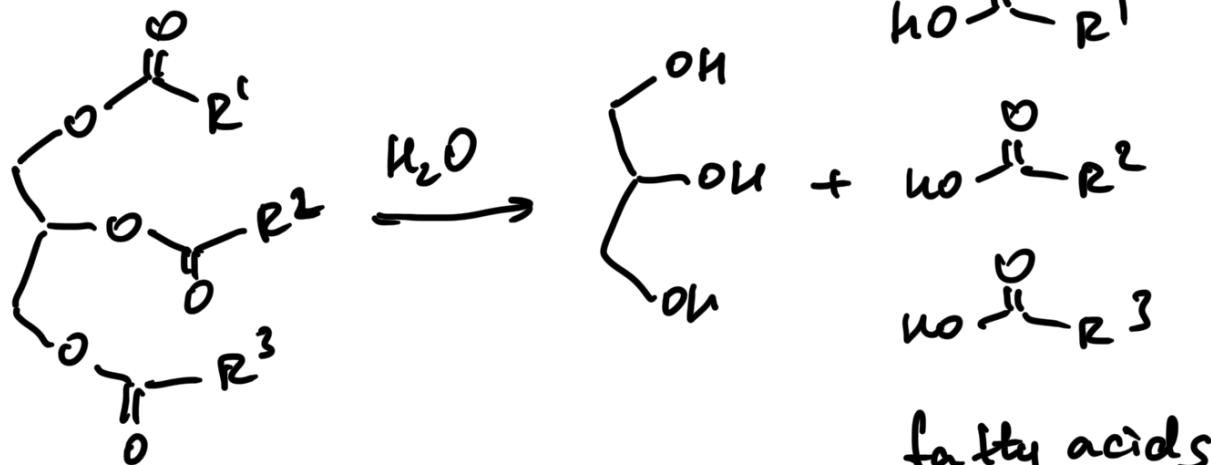
Alkenes

Fatty acids

fatty acids
↓

saturated or
unsaturated

(only 2 configured
double bonds)



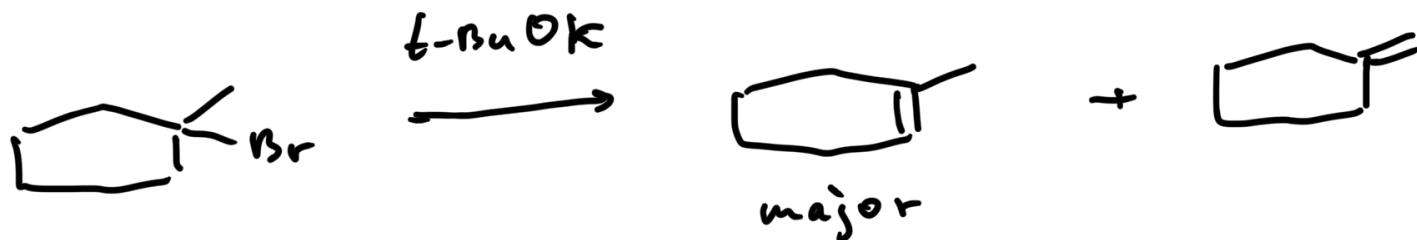
Name	Structure	Mp (°C)
Stearic acid (0 C=C)		69
Oleic acid (1 C=C)		4
Linoleic acid (2 C=C)		-5
Linolenic acid (3 C=C)		-11

Increasing number of double bonds

Alkenes

Synthesis. Elimination reactions.

E2 elimination of alkyl halides (or tosylates)



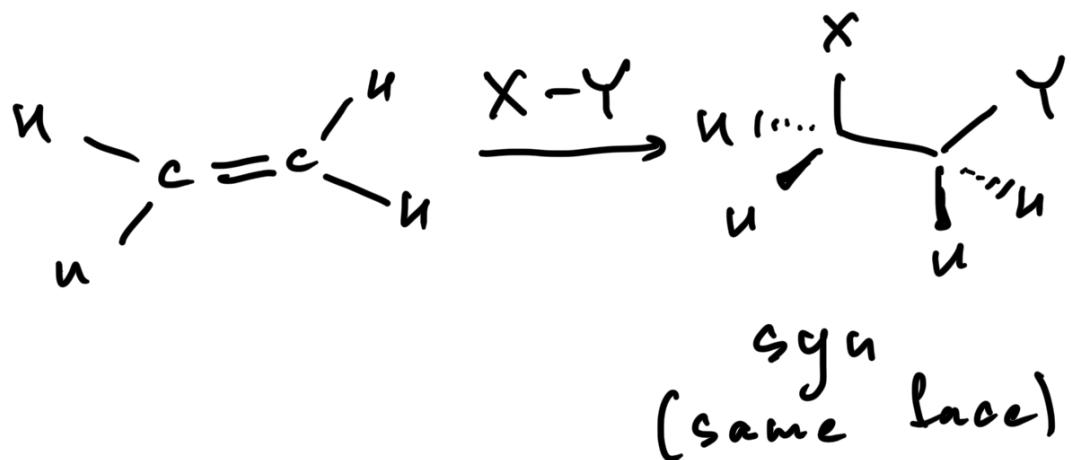
E1 & E2 elimination of alcohols



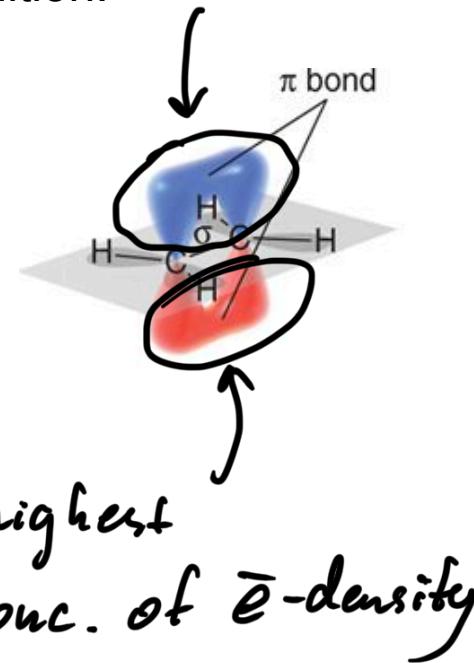
Reactions of alkenes: addition

Nucleophilicity of simple alkenes. Syn addition and anti addition.

↓
reactions w/electrophiles



or



Reactions of alkenes: addition

Typical addition reactions.

Reactions of alkenes: addition

Hydrohalogenation.

Reactions of alkenes: addition

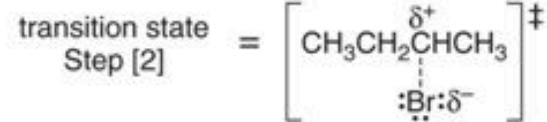
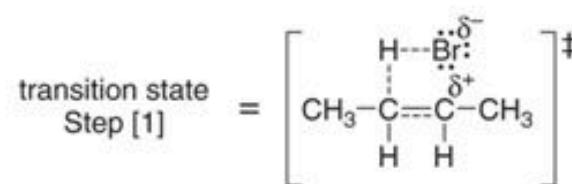
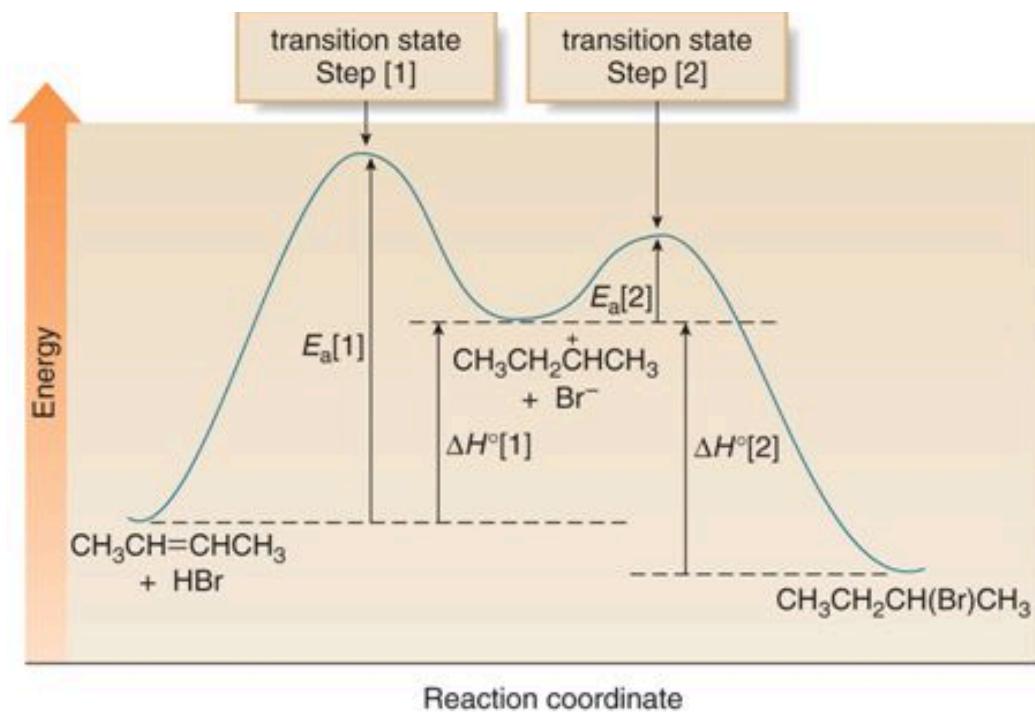
Hydrohalogenation.

Reactions of alkenes: addition

Hydrohalogenation.

Reactions of alkenes: addition

Hydrohalogenation.



Reactions of alkenes: addition

Markovnikov's rule.

Reactions of alkenes: addition

Markovnikov's rule.