Today

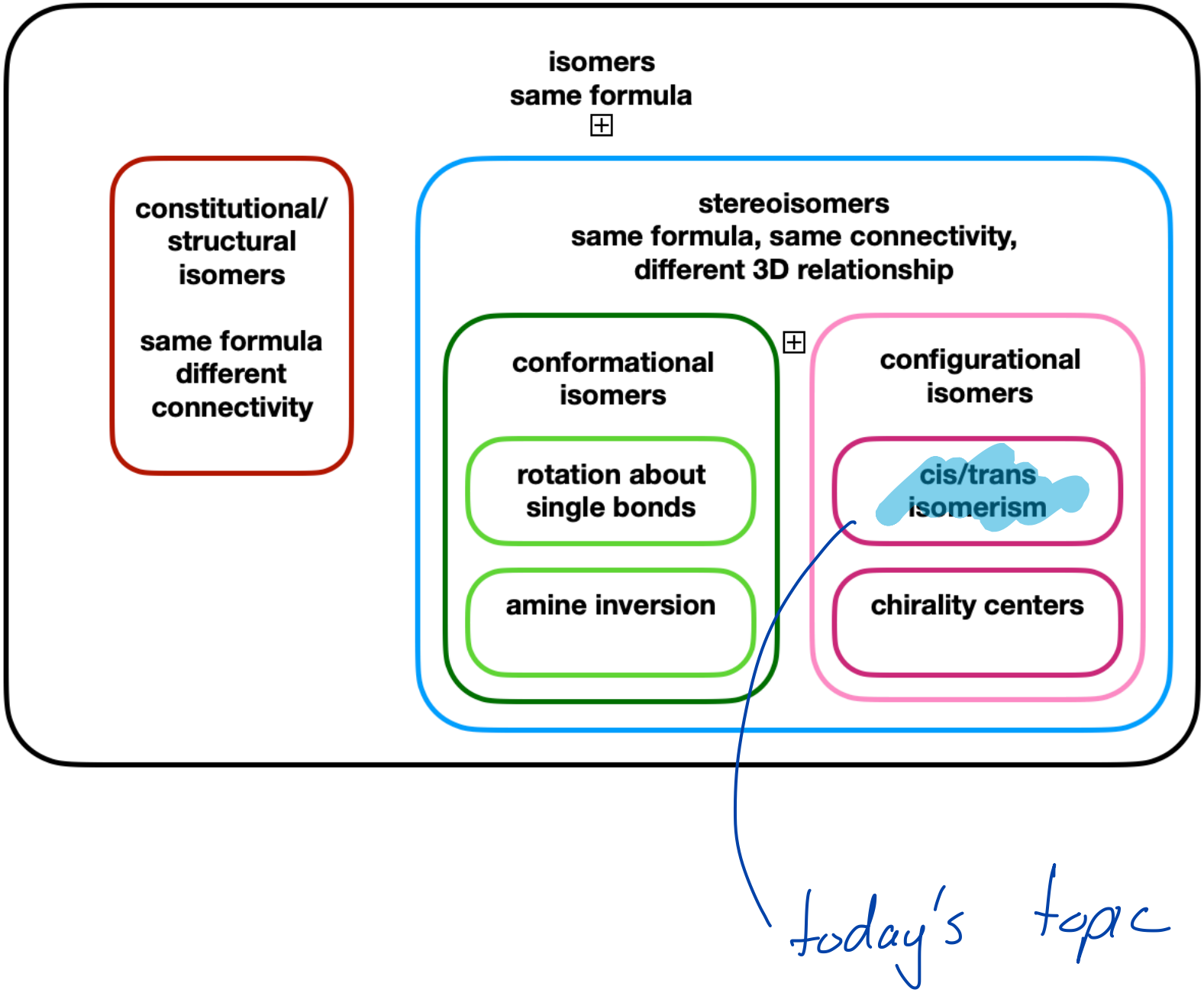
Sections 4.1 and 4.2
Isomers and the stereoisomers of alkenes

Sections 4.3 - 4.8
Chirality

Next Class

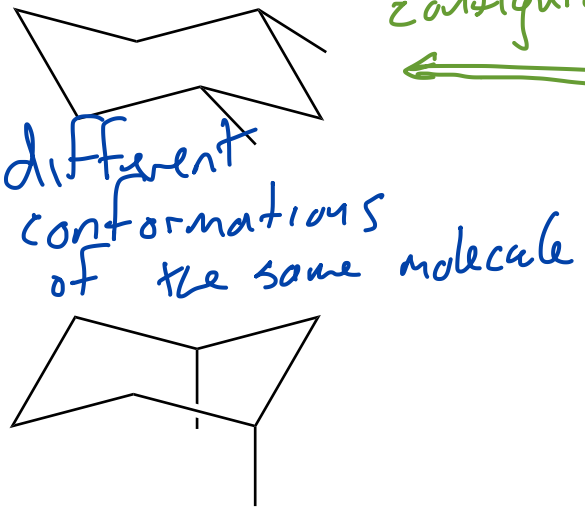
Sections 4.9-4.14
Optical activity and compounds with more than one center of chirality

Isomers

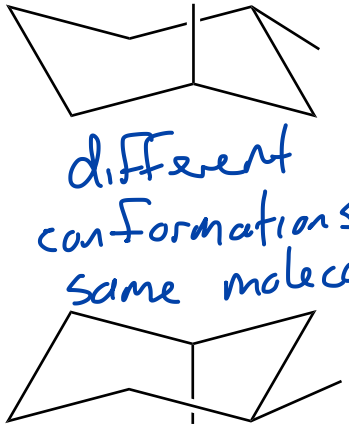

isomers
same formula
⊞
constitutional/
structural
isomers
same formula
different
connectivity
stereoisomers
same formula, same connectivity,
different 3D relationship
conformational
isomers
⊞
configurational
isomers
rotation about
single bonds
cis/trans
isomerism
amine inversion
chirality centers
today's topic

these are different configurations

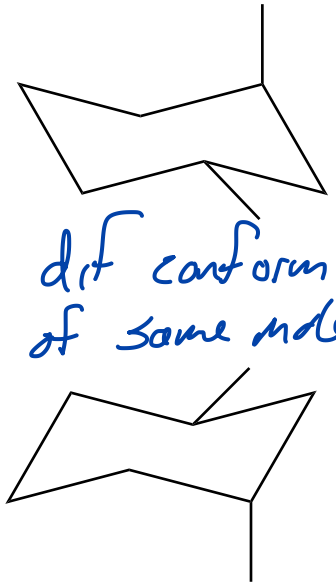
different configurations



different conformations of the same molecule



different conformations of same molecule



dif conformations of same molecule

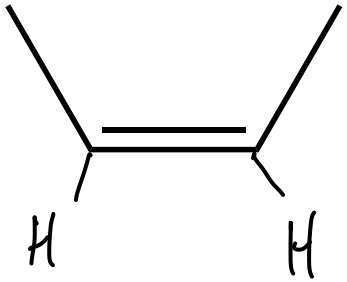
cis methyl groups

trans relationship between methyl groups

also a trans relationship between methyl groups

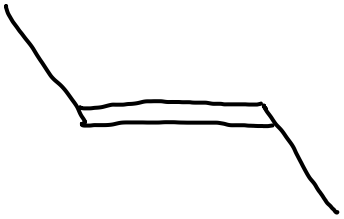
Convert $CH_3–CH=CH–CH_3$ to a skeletal structure

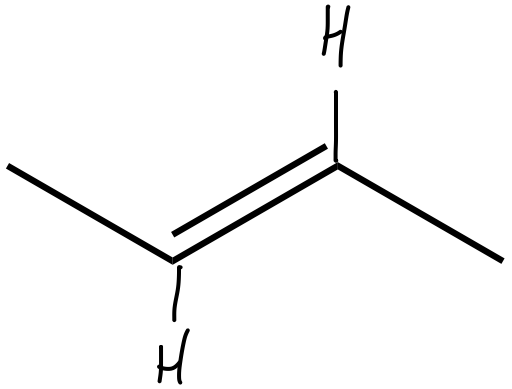
Convert $CH_3–CH=CH–CH_3$ to a skeletal structure



BP 3.7 °C
MP -139.0 °C

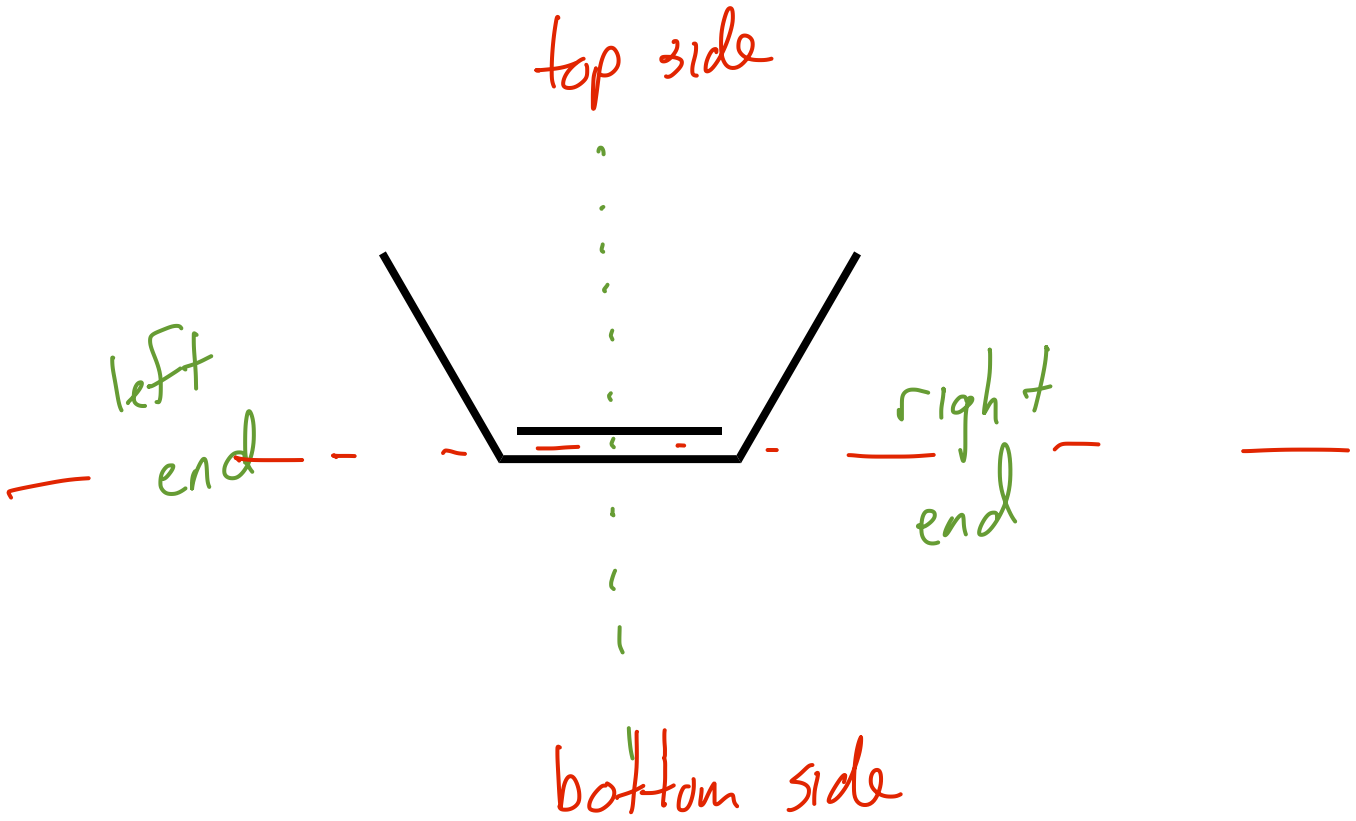
cis

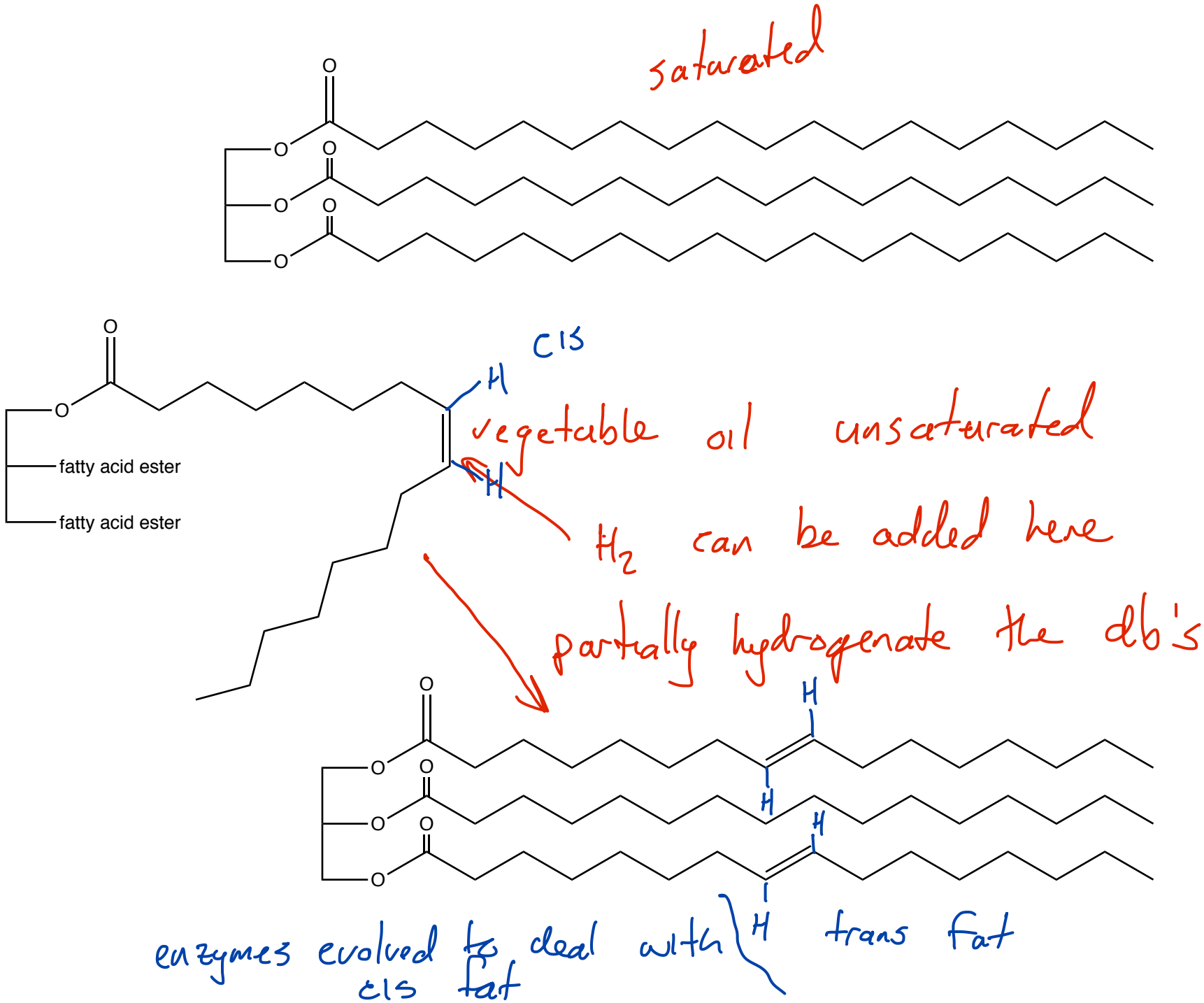


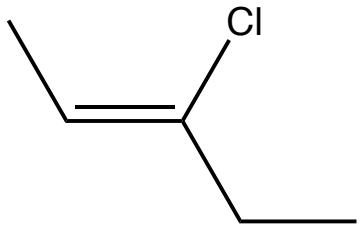


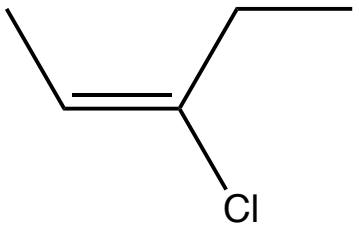
BP 1.0 °C
MP -105.0 °C

trans


top side
left end
right end
bottom side


saturated
fatty acid ester
fatty acid ester
cis
vegetable oil
unsaturated
H_2 can be added here
partially hydrogenate the db's
enzymes evolved to deal with cis fat
trans fat





cis + trans nomenclature only works when there a # atom at both ends of the double bond

First: One end at a time, **assign priority** to groups at each end of double bond

higher priority is given to the group with the higher atomic number for the atom directly bonded to the sp^2 carbon

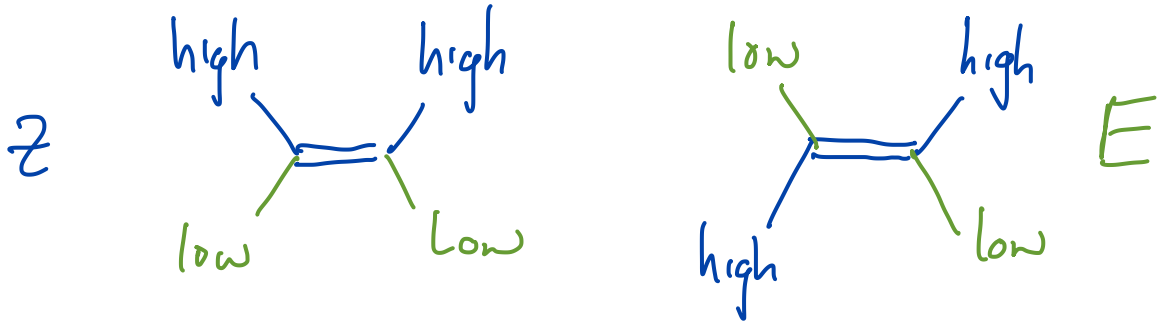
in a tie, consider the atomic numbers of the elements attached to the element that is attached to the sp^2 carbon (move one bond further out from the sp^2 hybridized C atom)

if the element that is attached to the sp^2 carbon has a doubly bonded or triply bonded atom attached to it the element is treated like there are two or three elements singly bonded to the element that is bonded to the sp^2 carbon

^2H vs ^1H

when comparing isotopes, the mass number is used (D vs H, ^{12}C vs ^{13}C)

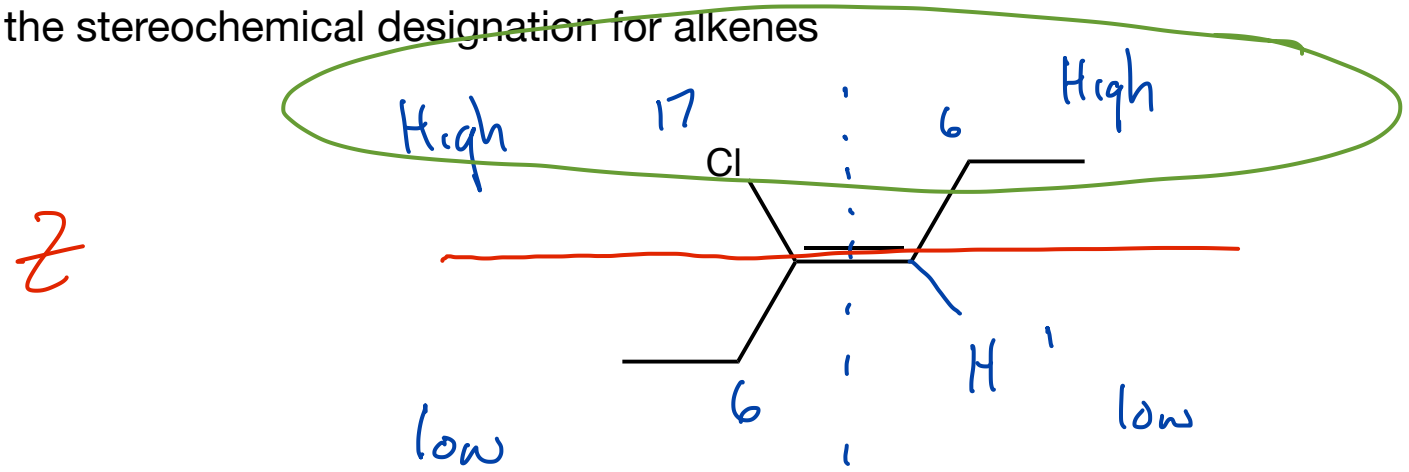
Second: If the high priority groups at each end of the double bond are on the **Zame Zide**, the proper designation is **Z**, if they are on **opposite** sides, then **E**.



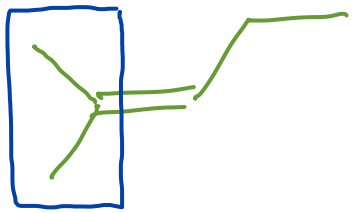
confirm ends of db are different

Assigning the stereochemical designation for alkenes

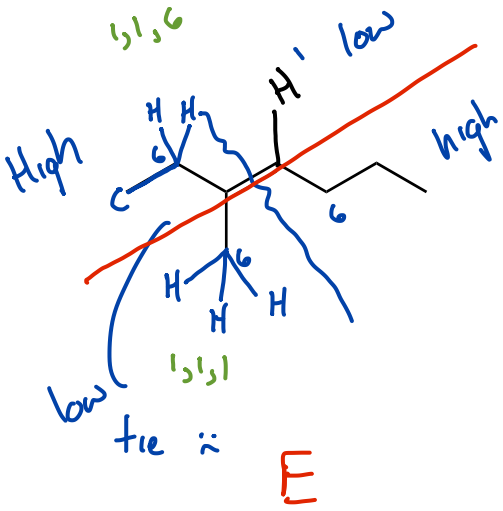
Section 4.2

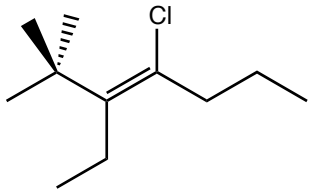


CH_3's not different, no Z or E

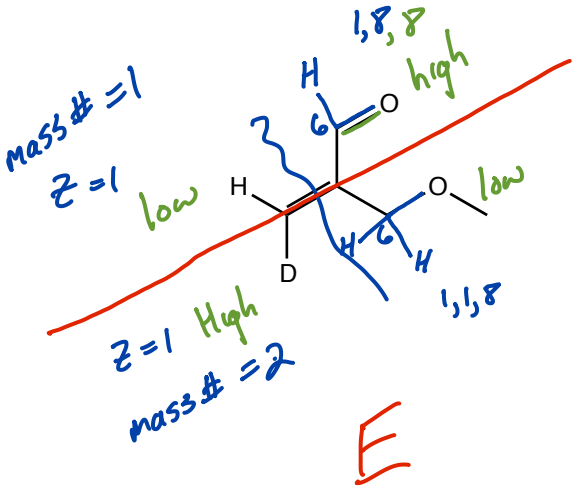


https://www.westfield.ma.edu/PersonalPages/cmasi/Z,E_priority_worksheet.pdf





Z



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