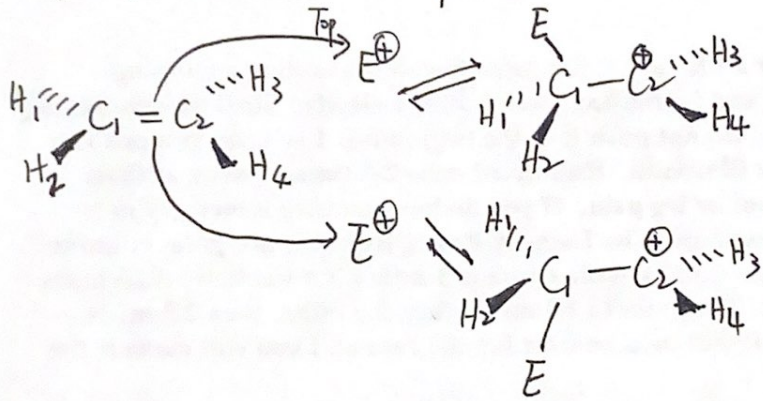
MTW 10.17.24

- Alkenes: structure and arrow pushing
- Regiochemistry: Markovnikov, Non-markovnikov, etc.
- Stereochemistry (anti, syn, etc)

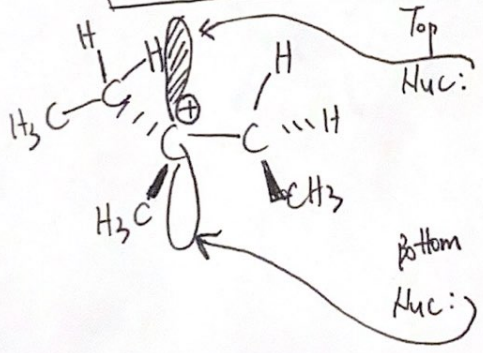
Recall Alkene geometry: Flat

$E^{\oplus}$ = Generic electrophile ($\overset{\delta+}{Br}-\overset{\delta-}{Br}$, $H-Br$, $\overset{\oplus}{C}H_3$)

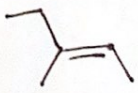
$E^{\oplus}$ can add to the top or bottom face of alkenes



side notes: drawing wedge and dash.



- Nucleophiles can add to empty $2p$ orbital
- Can add to top or bottom



+ HCl.

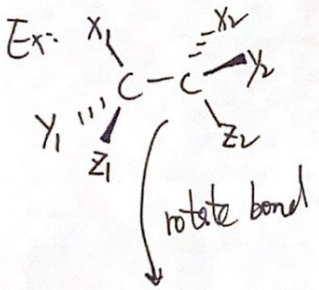
If Nuc = $:\ddot{\underset{\cdot\cdot}{\underset{\cdot\cdot}{Cl}}}:^{\ominus}$, then $:\ddot{Cl}:^{\ominus}$ can add to the top or bottom faces.

Since $H^{\oplus}$ and $Cl^{\ominus}$ can add to the same face (both add to top, or both add to bottom)
($E^{\oplus}$) (Nuc)
↓
"syn"

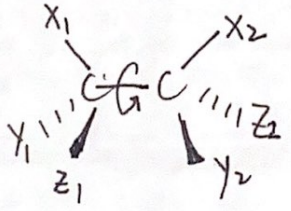
or opposite faces ("Anti"),

the stereochemistry of addition is mixed.
(Both syn and anti are equally likely)

Stereochemistry: cares about 3D space.
tell us: how atoms will be "put on"
chiral consequences.
the direction of two groups relative to each other

Ex: 

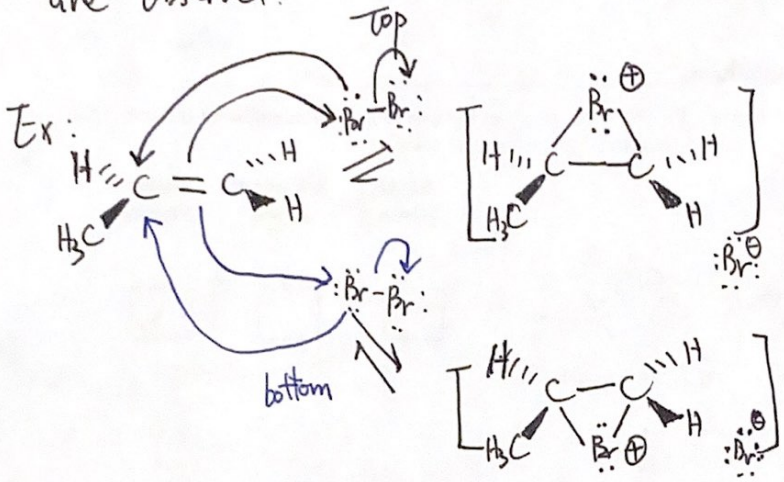
what groups are "anti" to one another?
As drawn:
anti: X_1 and Z_1; Y_1 and Y_2; Z_1 and X_2.



what groups are "syn" relative to each other
As drawn
syn: X_1 and X_2; y_1 and Z_2; Z_1 and Y_2.

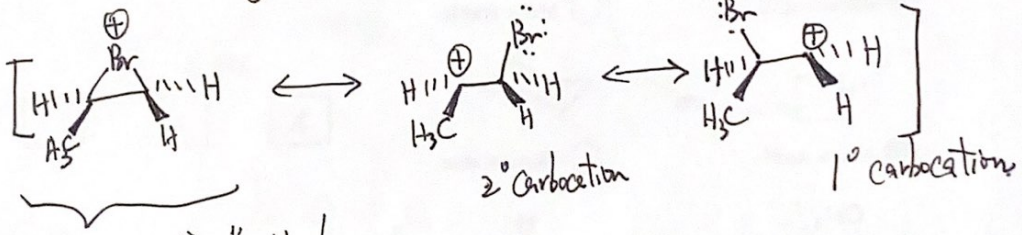
But in other reactions, only syn or only anti additions are observed.

Ex:

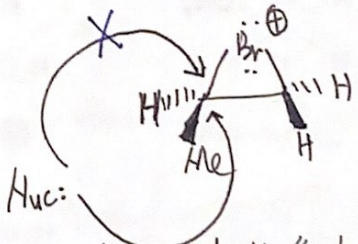


The bromonium ion intermediate has a bridging bromine (3-membered ring)

3 membered ring delocalizes charge ⇒ stablizing

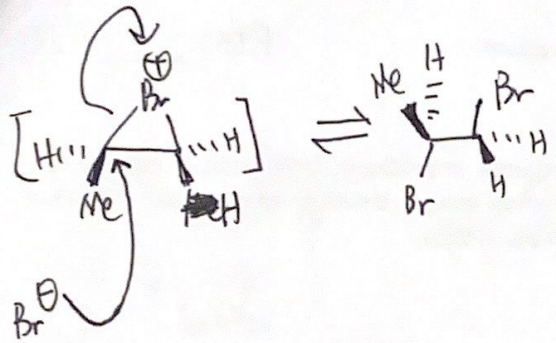


Bridging "Br" blocks Nuc: attack on the top face.

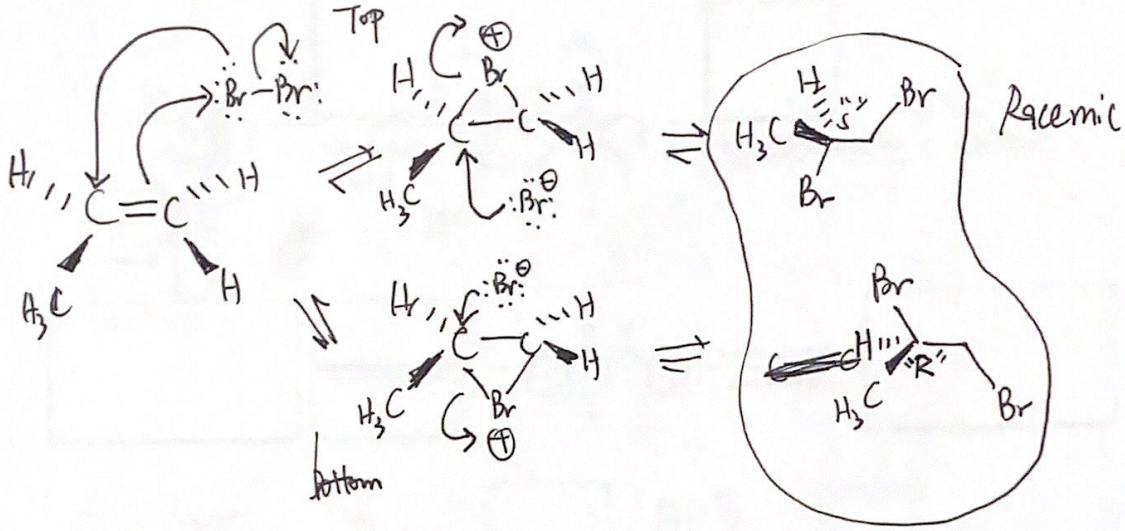


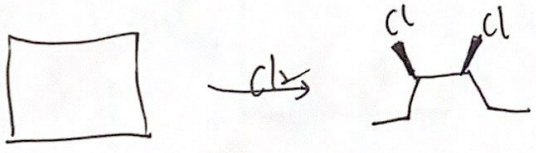
Nucleophile will add to the more substituted "c" because it has a greater partial ⊕

Now, the Nuc can only add to the more substituted "c" from the back side!



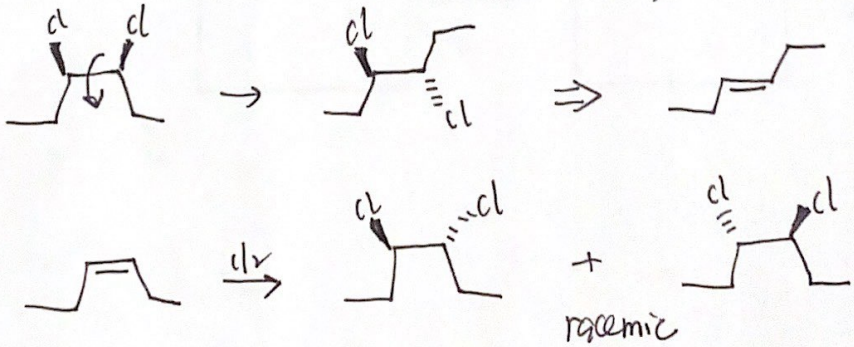
Anti stereochemistry only

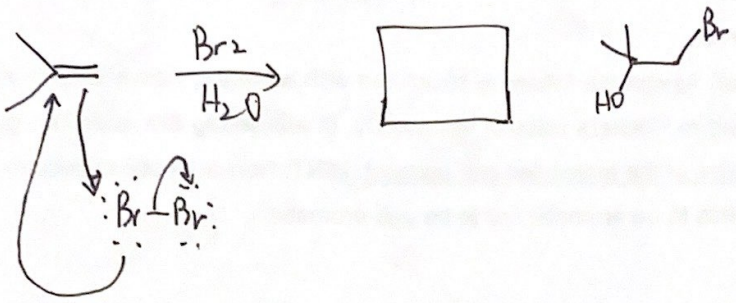


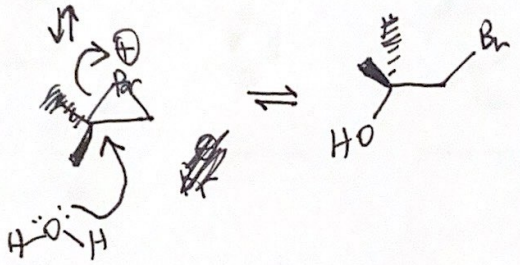


→ As drawn, Cl atoms are syn.

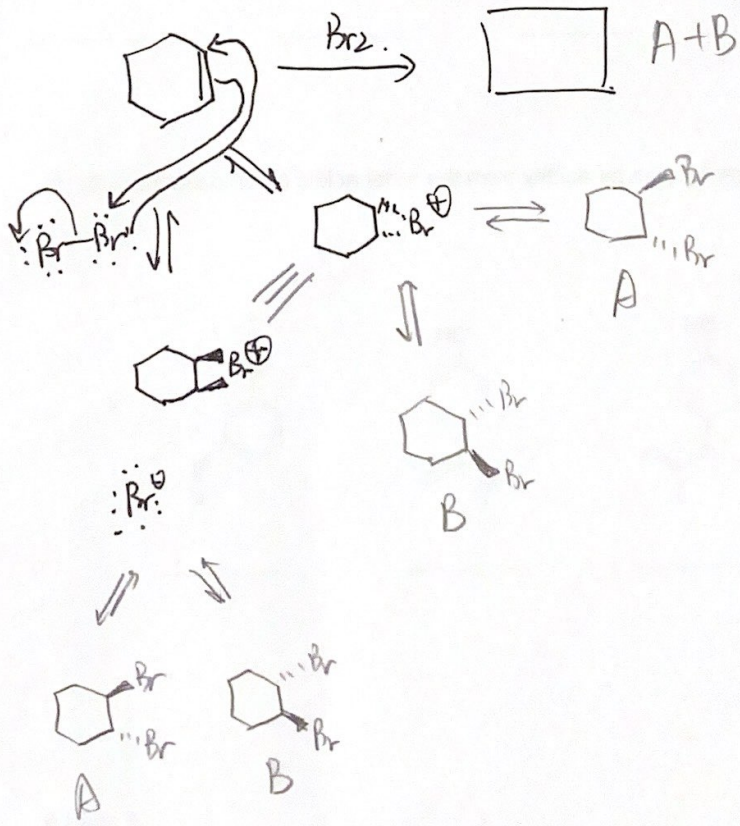
→ X_2 + alkene, stereochemistry of addition : anti

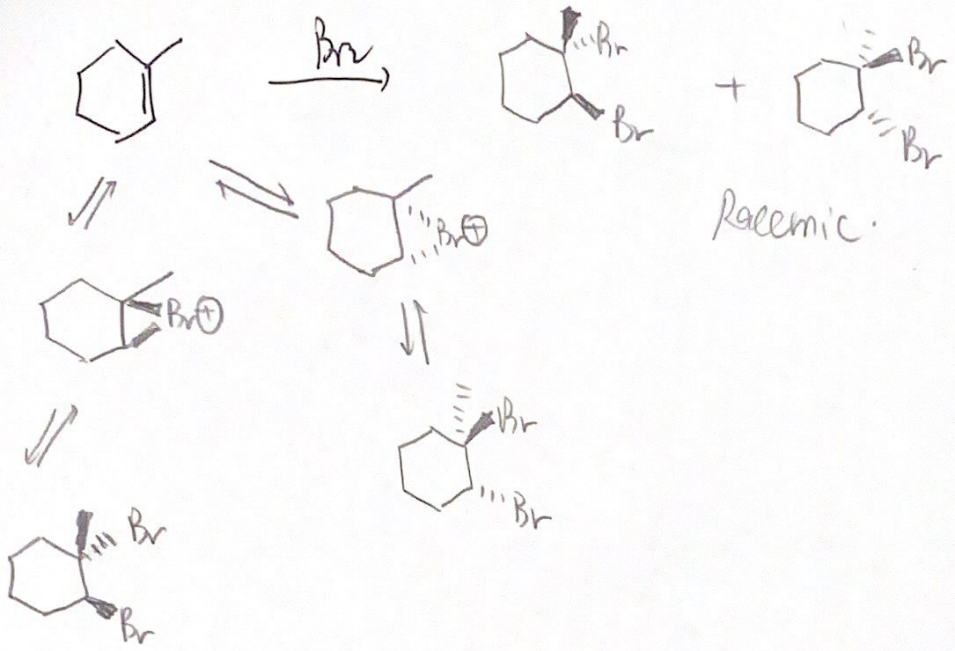






stereochemistry : anti





Racemic.