

Today

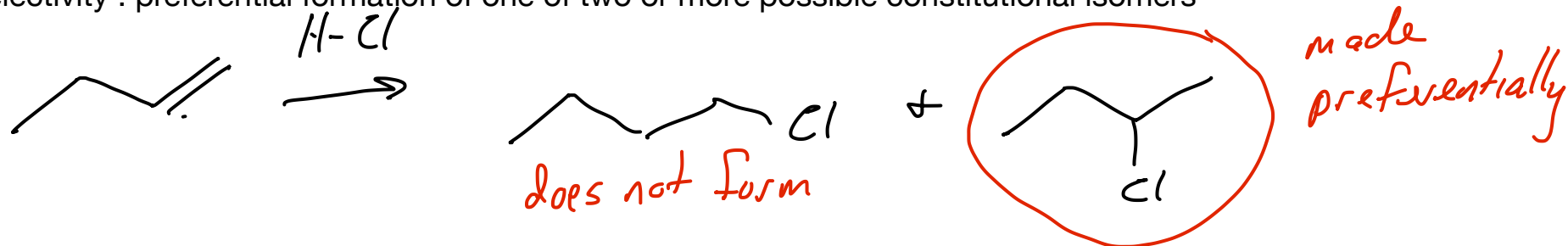
Next Class

Sections 6.12 and 6.13
Regioselectivity, stereoselectivity, and
stereospecificity

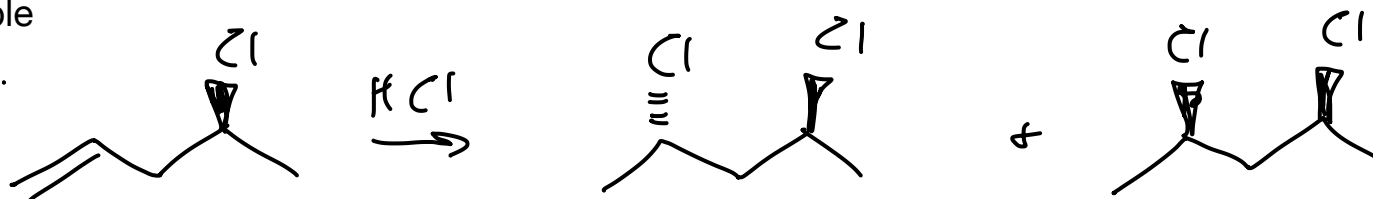
Sections 6.12 and 6.13
Regioselectivity, stereoselectivity, and
stereospecificity

Reworked Test originally due Wednesday. Due Monday instead since
Wednesday is a half day.

Regioselectivity: preferential formation of one of two or more possible constitutional isomers

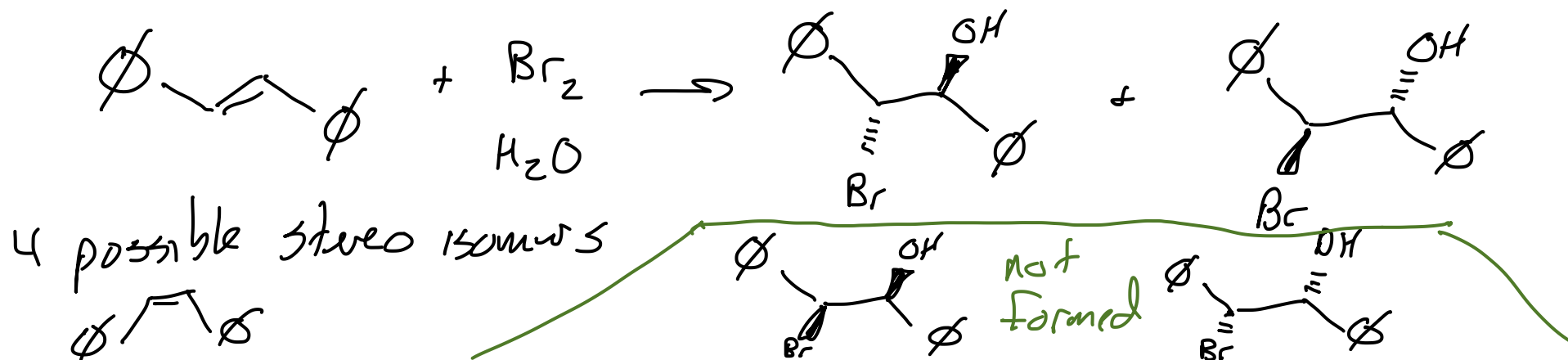


Stereoselectivity: the preferential formation of one stereoisomer over another when multiple stereoisomers are possible



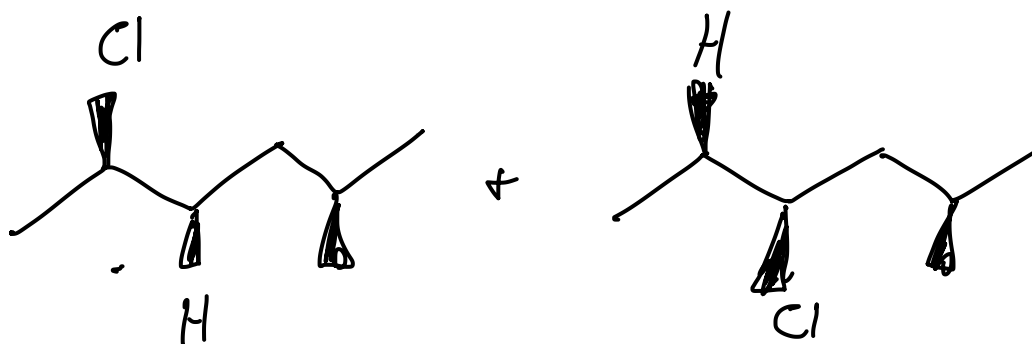
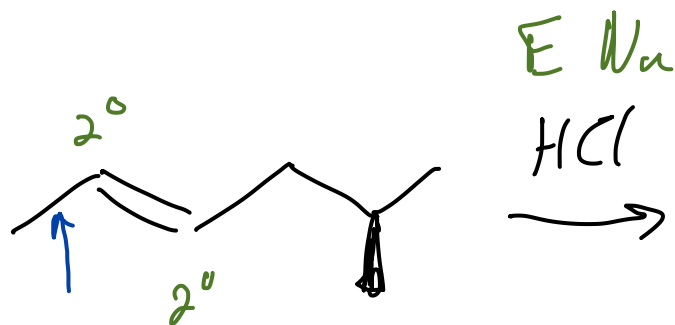
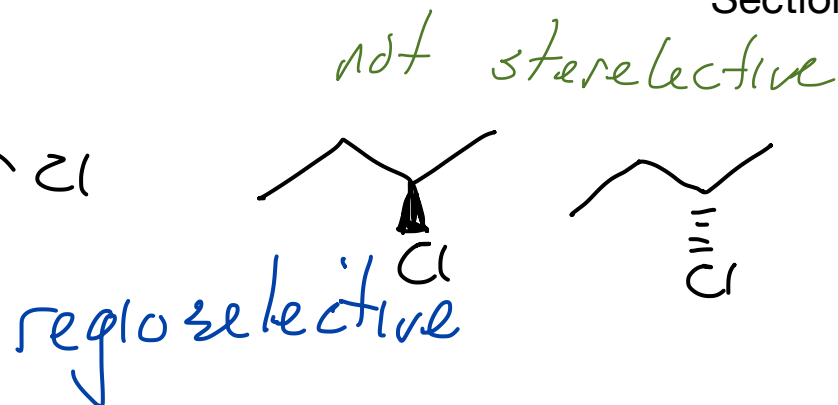
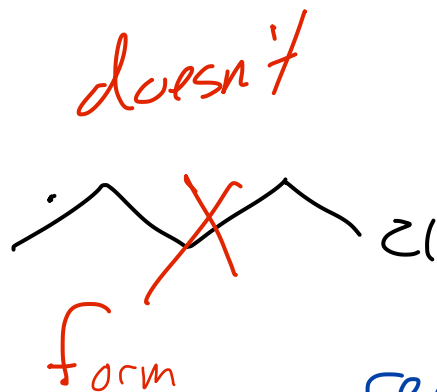
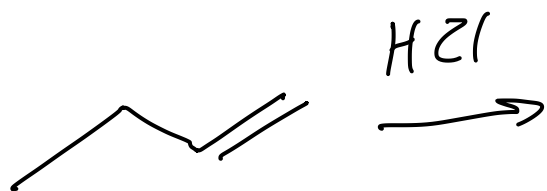
if we make more of one of these diastereomers then the rxn is stereoselective

Stereospecificity: a reaction that produces different sets of stereoisomeric products from different stereoisomeric reactants



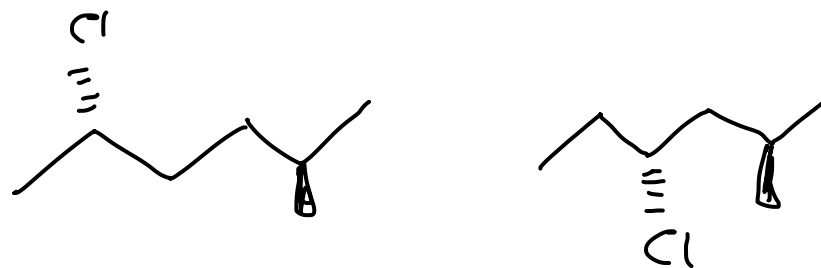
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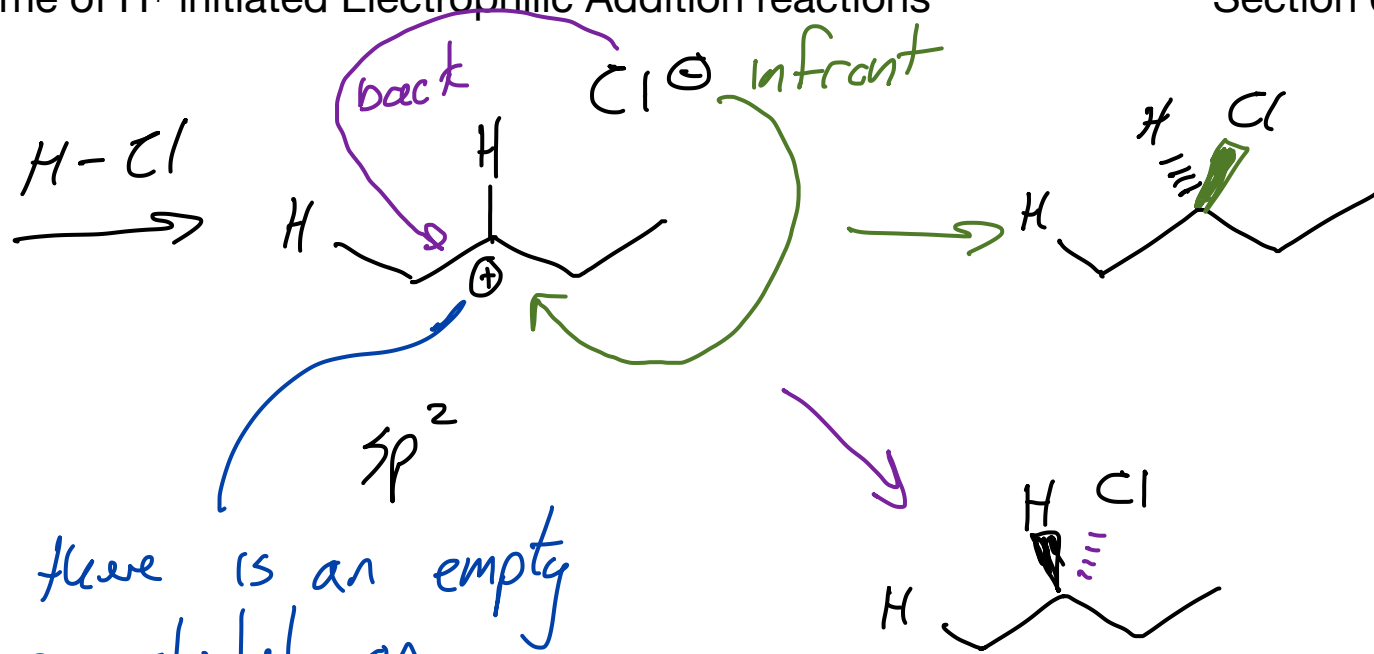
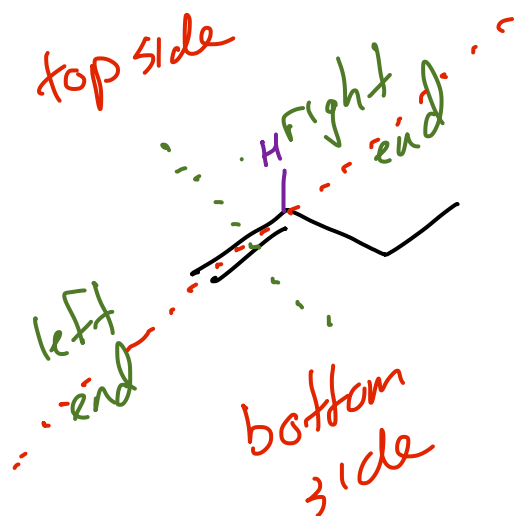
not regioselective

approximately 50/50
2-chloro vs 4-chloro



also not stereoselective

The stereochemical outcome of H⁺ initiated Electrophilic Addition reactions



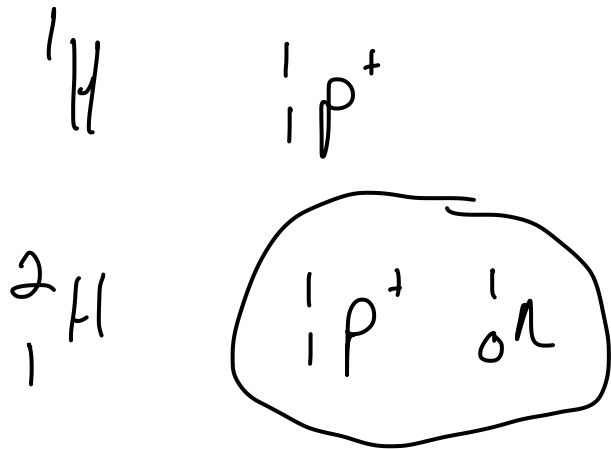
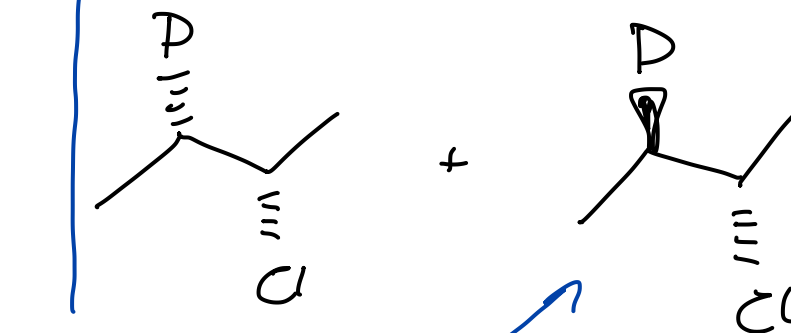
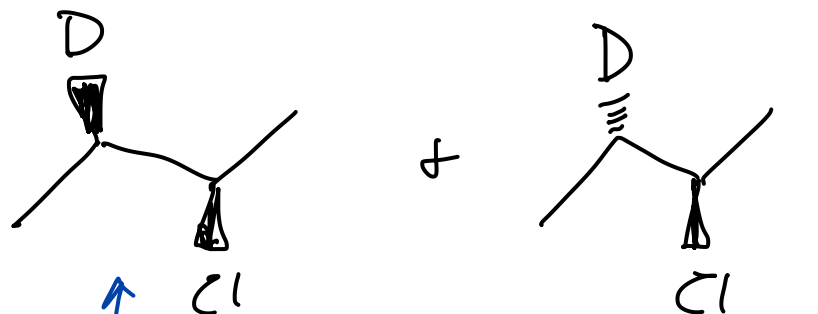
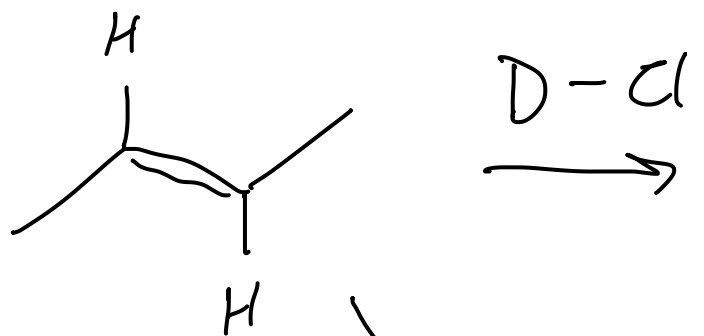
front face is in front of the screen
back face is behind the screen

there is an empty p orbital on this C⁺ which is perpendicular to the plane of the screen

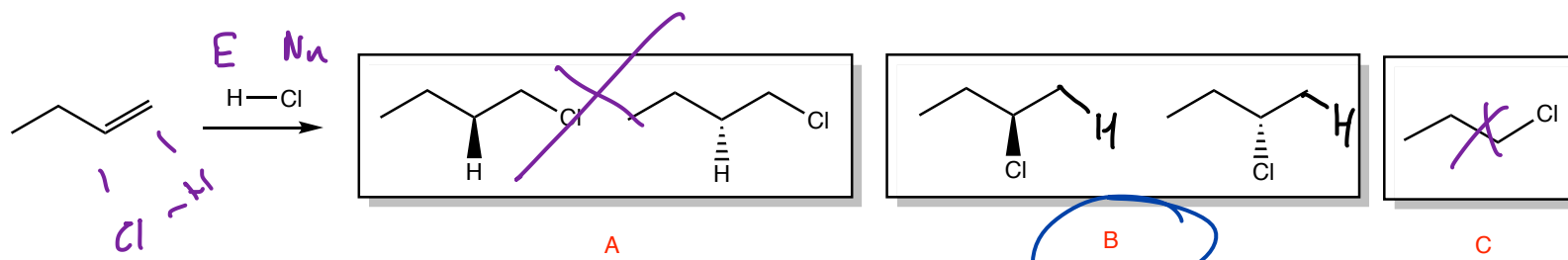
C⁺'s generated by H⁺ addition are planar and allow for both...

syn additions - E + Nu add to the same face of the db

anti addition - E + Nu add to opposite faces

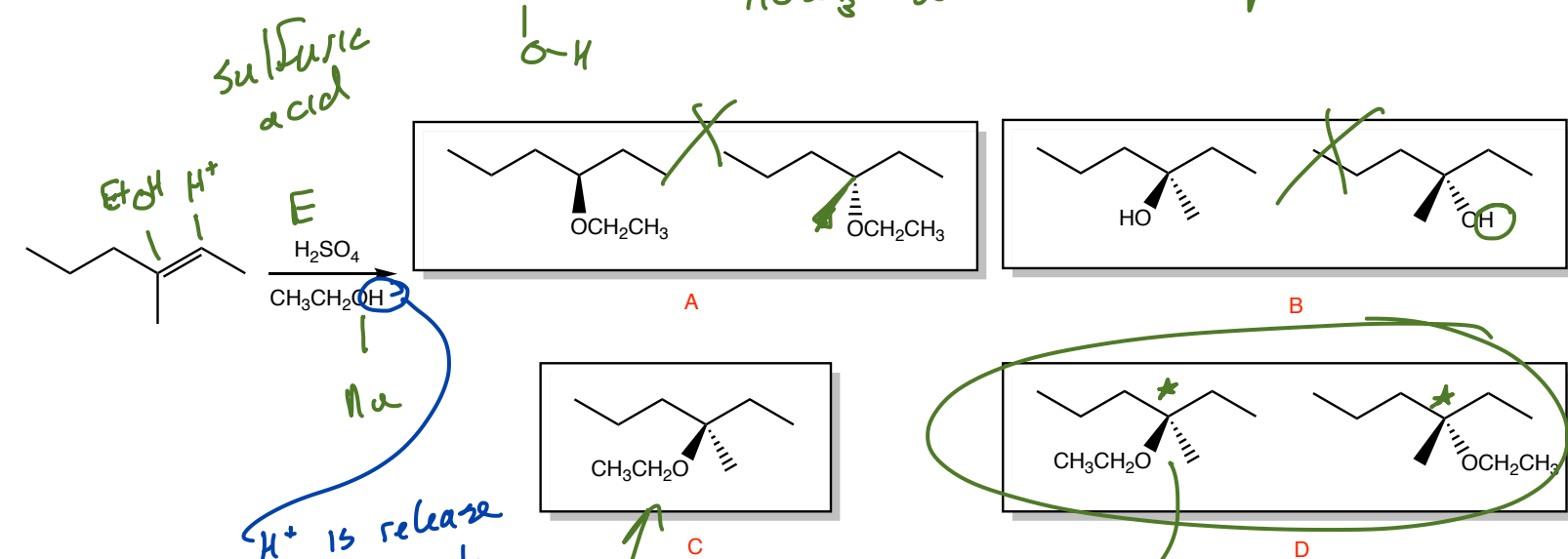


Reactions (predict major products)



$\text{O}_3\text{S(=O)}_2\text{OH}$ delocalized e^- in HOSO_3^- are not nucleophilic

lost a C



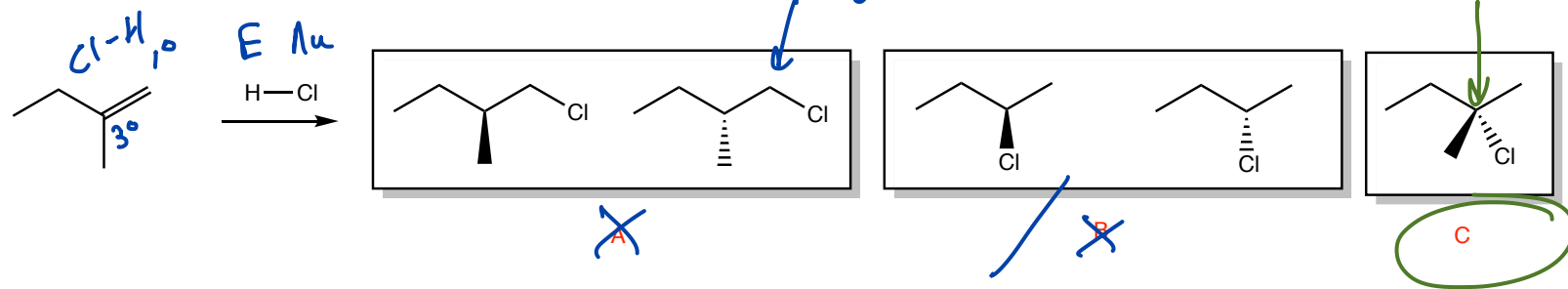
H^+ is release to regenerate catalyst

missing one stereoisomer

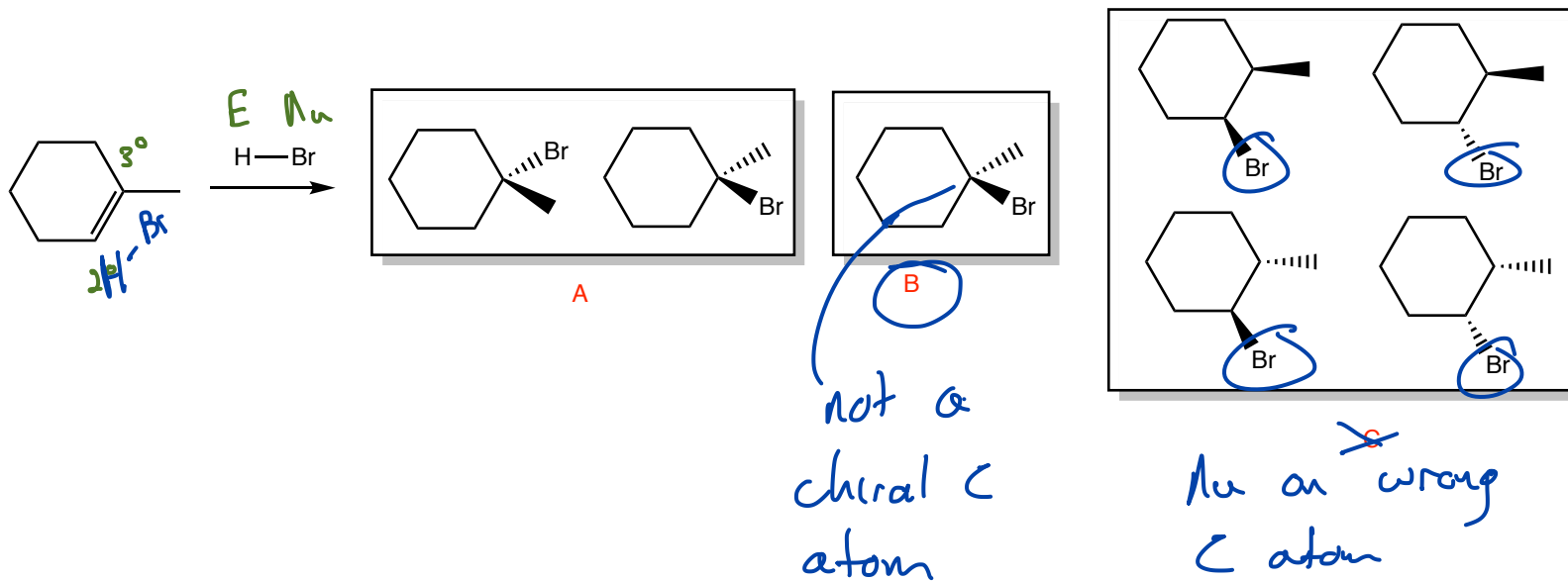
ether

neither enantiomer will be produced in excess

Reactions (predict major products)

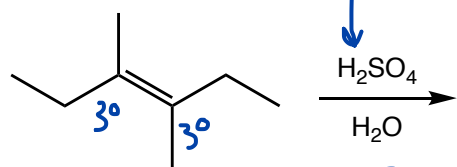


why not D?
 same molecule
 not a chiral C atom
 there is only 1 product

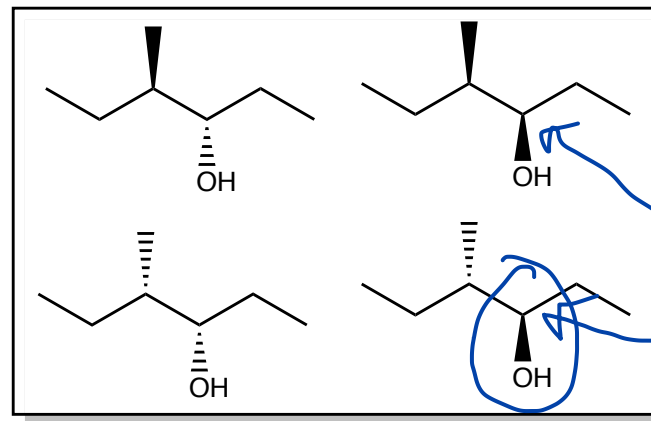
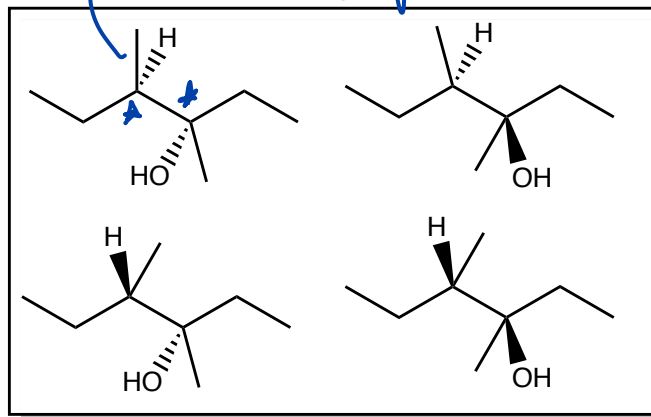


Reactions (predict major products)

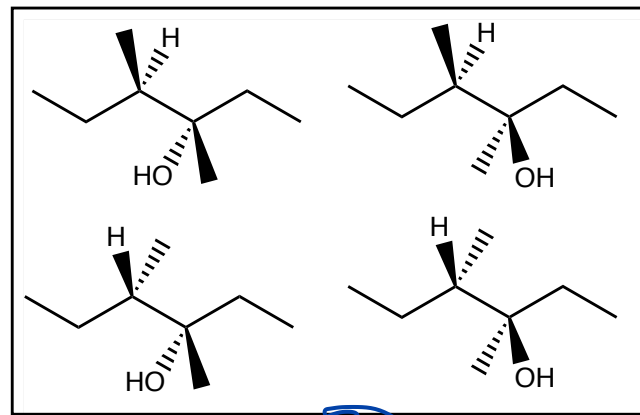
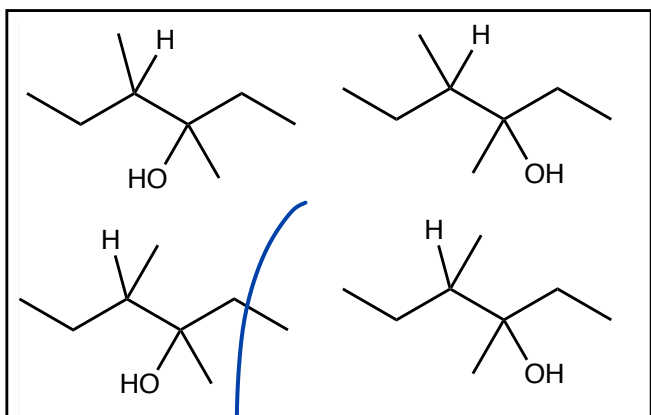
only partially representing the 3D structure



added
Ac



lost C atoms



$2^n = 2^2 = 4$

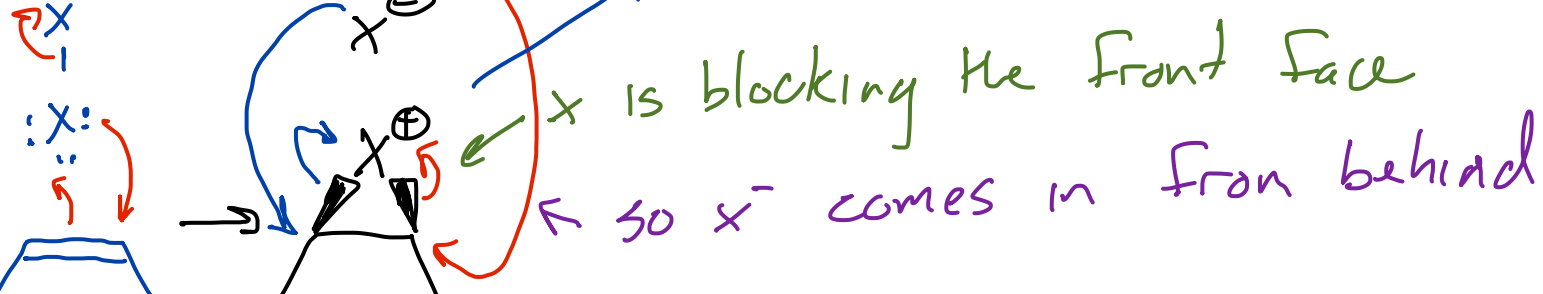
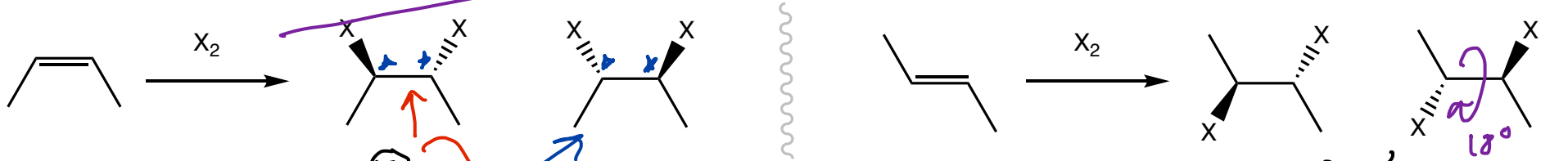
stereochem not specified

Br_2 Cl_2

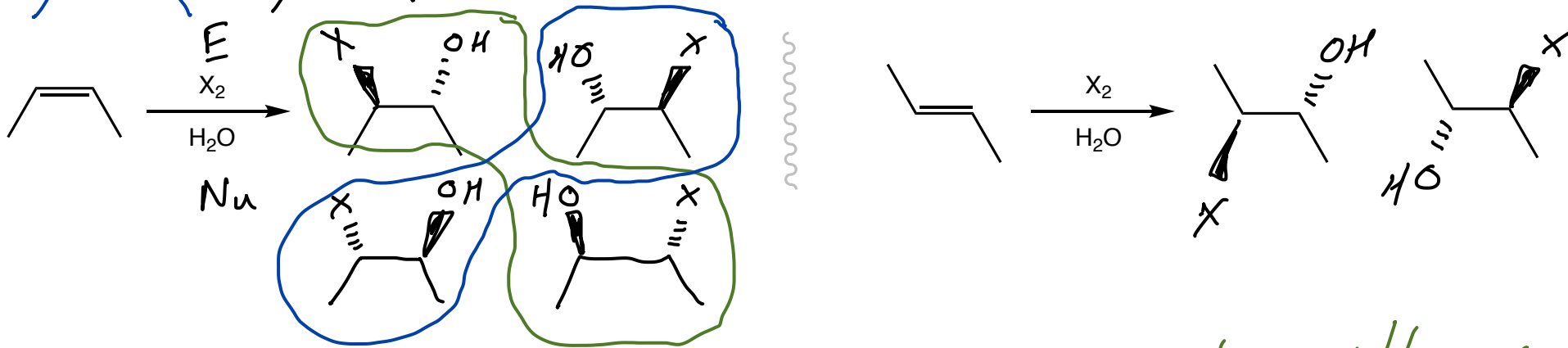
Addition of bromine and chlorine occur by an anti addition

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cannot form from 



X is blocking the front face
so X⁻ comes in from behind



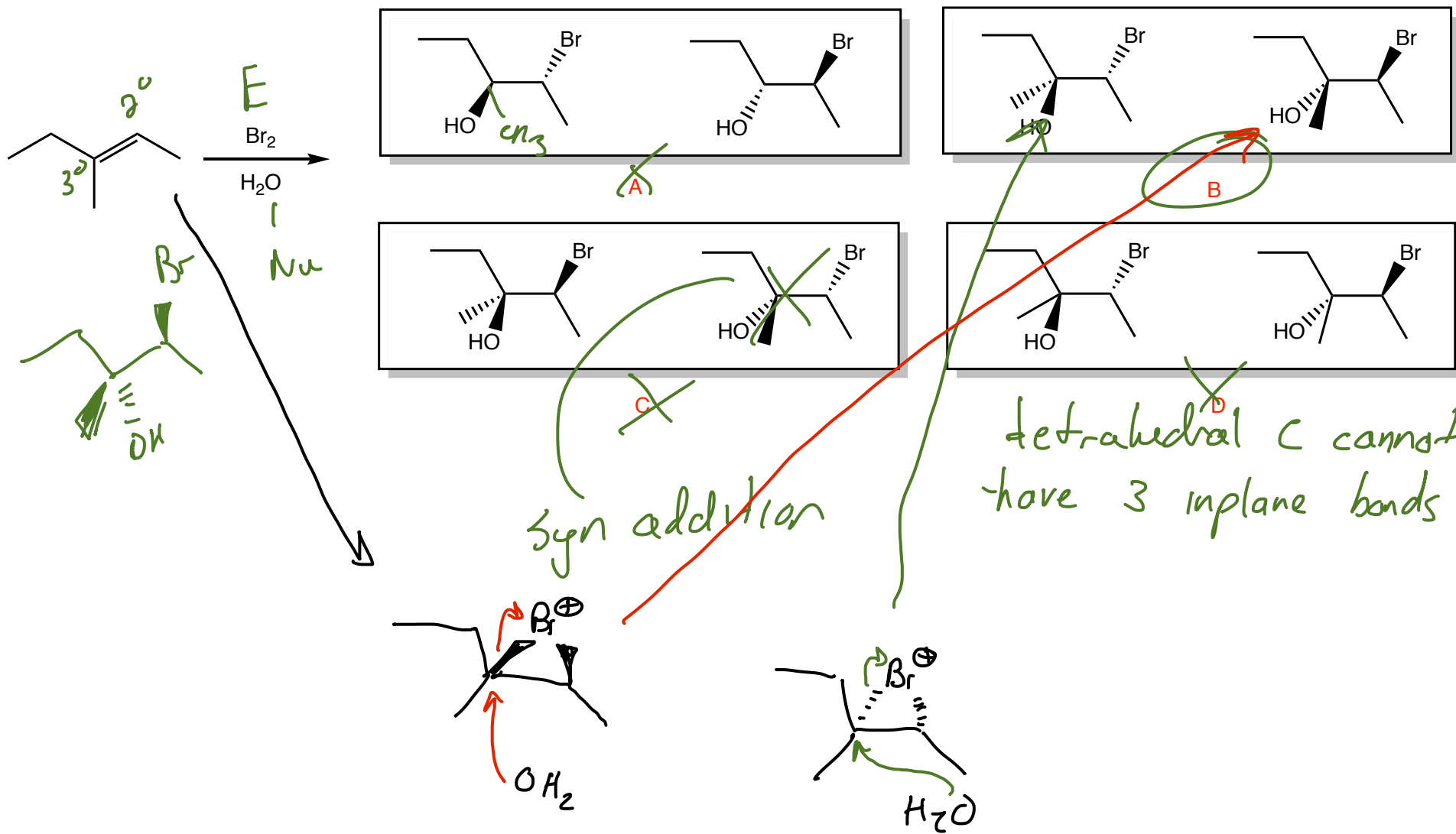
one set of stereoisomers

the other set

stereospecific - mechanism is that addition occurs in an anti fashion + the alkene has Z/E isomerism

Reactions (predict major products)

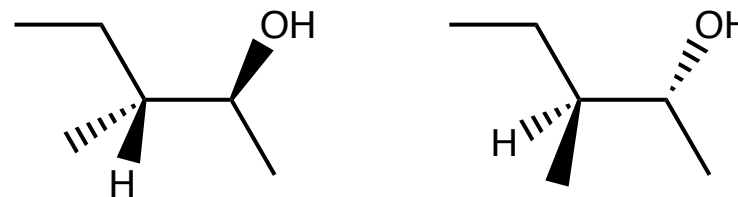
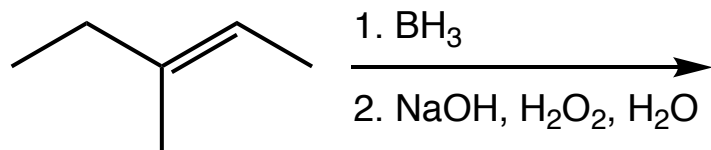
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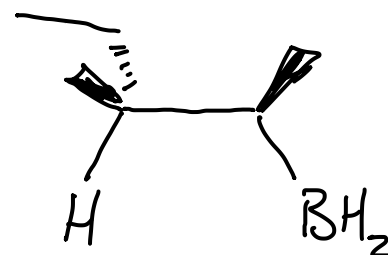
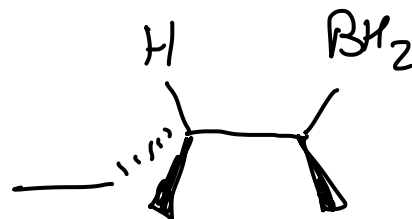
Hydroboration-oxidation occurs by a syn addition

means the OH + H are added to the

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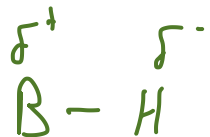
Same Face

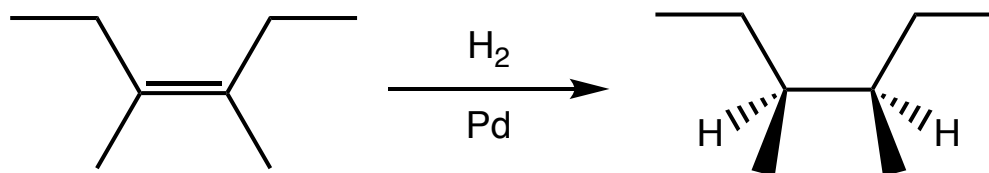


2. NaOH, H₂O, H₂O₂

H and B have to add to the same face because they are connected to each other & the rxn occurs in 1 step... no time for 1 of them to get to the opposite face.
B of BH₃ is electrophile (and a placeholder for the OH)

H of BH₃ is the nucleophile





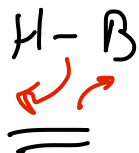
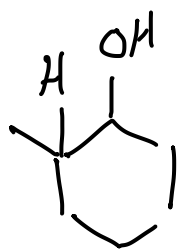
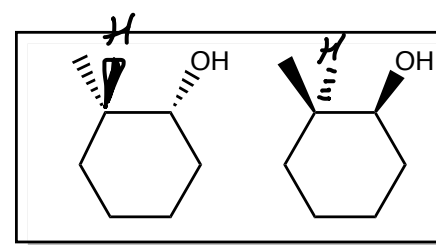
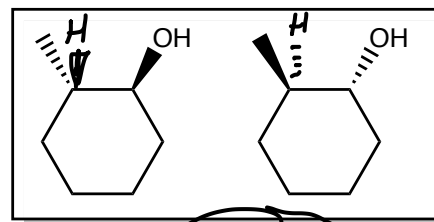
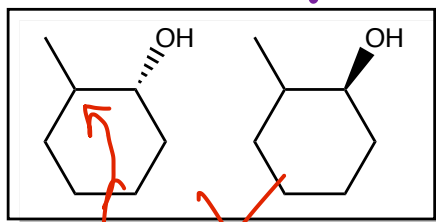
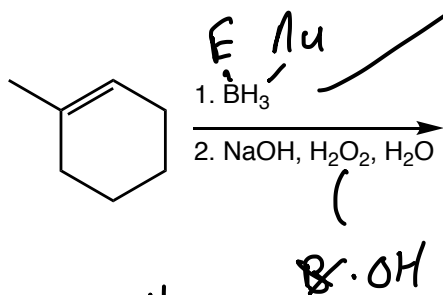
the alkene bonds to the Pd metal & the metal transfers the H atoms one transfer to the same ~~the~~ face

Reactions (predict major products)

syn addition

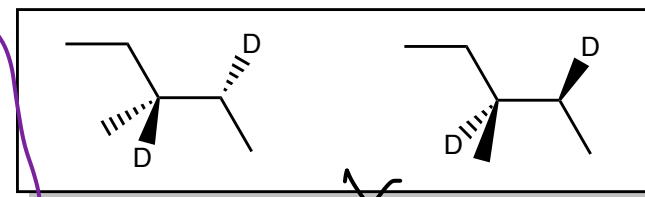
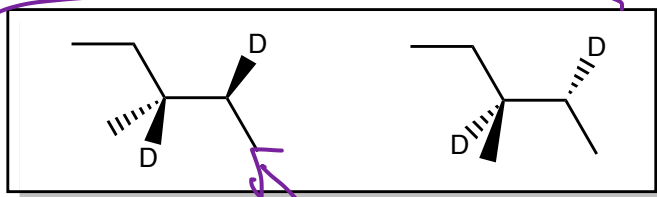
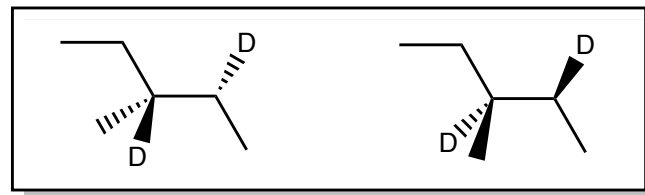
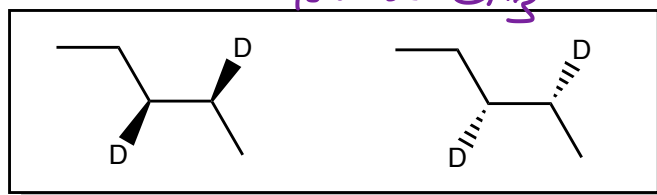
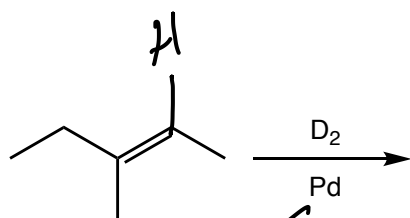
H^+ syn+anti X_2 anti

$BH_3 + H_2$ syn



stereochem not specified

the H + the OH need to be on the same face



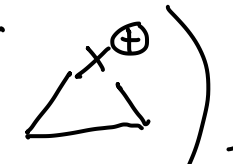
metal forces syn addition

same face



anti addition

H^+ initiated rxns syn + anti additions (C^+) cannot be stereospecific. If the rxn produces diastereomers then the rxn can be stereoselective, but we cannot predict which stereo isomer will predominate.

Br_2 Cl_2 initiated reactions can only occur via anti addition () so these rxns can be stereospecific.

H_2 + BH_3 rxns are syn additions (metal mediated + 1 step BH_3 rxn), so these can be stereospecific

1 stereoisomeric^{reactant} produces 1 set of stereoisomeric products

the other stereoisomeric^{reactant} produces the other set of products

