Session 19 - Alkene Reactions Flowchart and Addition Reactions

1) Draw a flowchart of all the alkene reactions we have gone over so far.

Will be done on Test Prep 3 

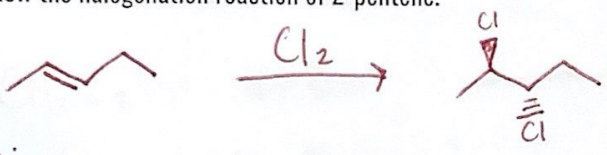
2) What are the 3 reactions that add a single OH group to an alkene, and how do they differ?

Hydration $\xrightarrow[H^{\oplus}\text{ catalyst}]{H_2O}$ Markovnikov w/ rearrangement

Oxymercuration – demercuration $\xrightarrow[2)\ NaBH_4]{1)\ Hg(OAc)_2,\ H_2O}$ Markovnikov, No Shift

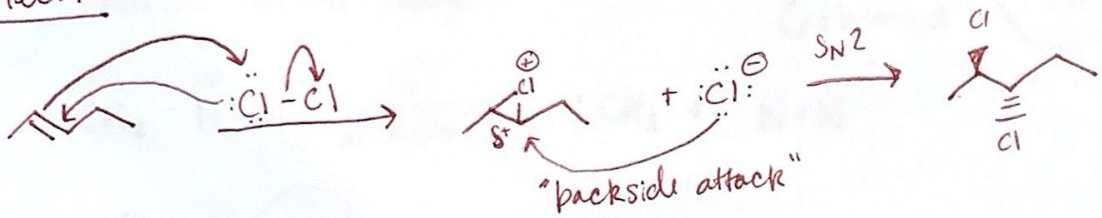
Hydroboration – oxidation $\xrightarrow[2)\ H_2O_2,\ OH^{\ominus}]{1)\ BH_3 \cdot THF}$ Anti-markovnikov

3) Show the halogenation reaction of 2-pentene.



Anti-addition

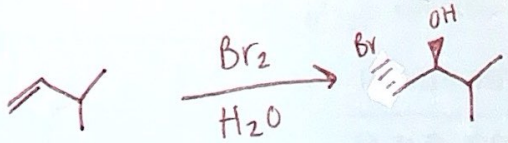
Mech:



4) What happens in a halohydrin reaction?

There is a competition b/w nucleophiles & H_2O (the stronger nucleophile) will add in a Markovnikov fashion, anti of the halogen.

5) Show the halohydrin reaction of 3-methylbutene.



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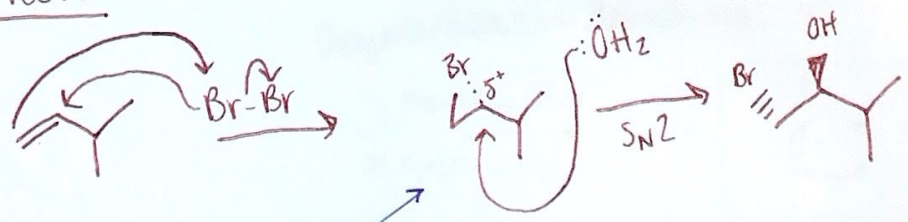
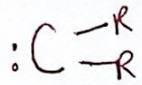


preference to this side to form more stable carbocation

6) What is a Carbene and what type of reaction is it involved in?

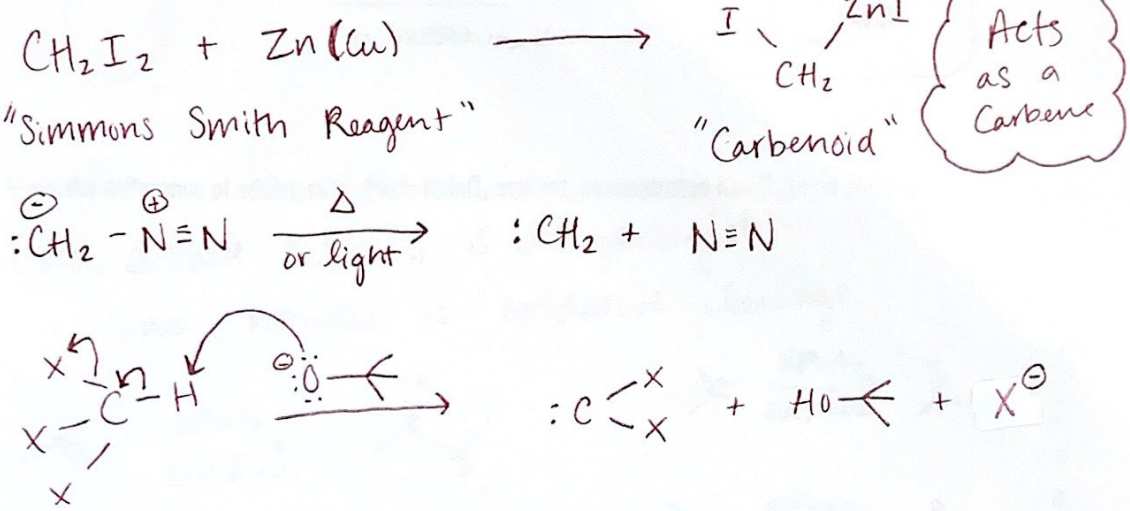
A carbene is an intermediate that is both neutral & highly reactive due to the lack of an octet. It can act as either a nucleophile or electrophile.



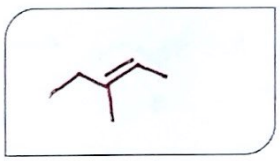
R = H, halogen, or a R group

* involved in cyclopropanation*

7) Show the 3 ways to make a Carbene.



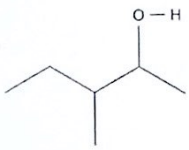
8) Complete the following reactions.



Hydroboration - oxidation

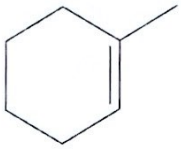
1) $BH_3 \bullet THF$

2) H_2O_2, OH^-



Anti-Markovnikov

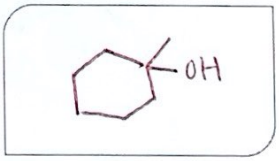
Markov. No Shift



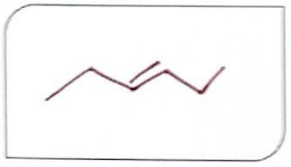
Oxymercuration - demercuration

1) $Hg(OAc)_2, H_2O$

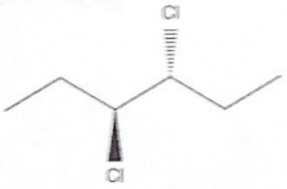
2) $NaBH_4$



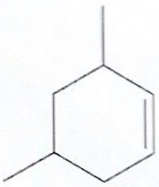
Halogenation



Cl_2

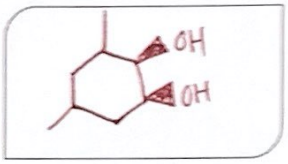


Dihydroxylation



1) OsO_4, pyridine

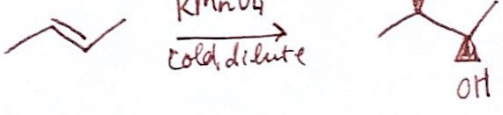
2) $NaHSO_{3\,(aq)}$, H_2O

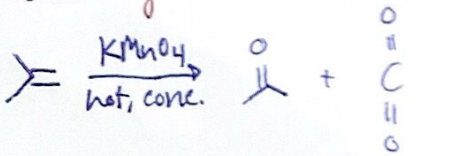


9) Show the difference of adding cold, dilute $KMnO_4$ and hot, concentrated $KMnO_4$ to an alkene.

Cold, dilute $KMnO_4$ is dihydroxylation & hot, conc. $KMnO_4$ is oxidative cleavage

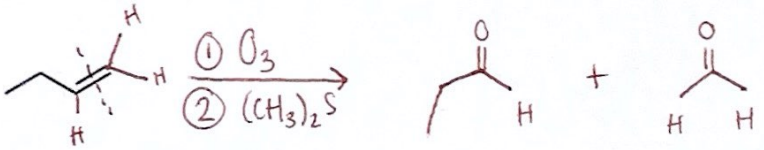
Syn addition of 2 OH groups





10) Show the ozonolysis reaction for the following reactants.

2 carbonyls →



4 carbonyls →