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Last Lecture: Ch. 14 alkynes - sp hybridization

- reactions of alkynes

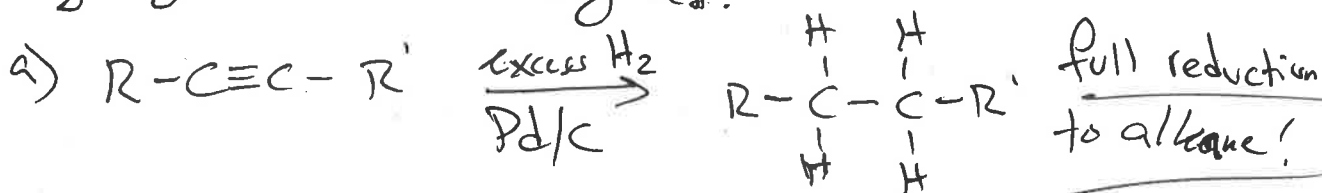
- 1) HX addition
- 2) ~~Hydrogenation~~ (H₂ pt mediated)
Hydration
- 3) Hydroboration

Exam Average → 51

- > 70 doing well
- > 50 solid
- > 30 concerned
- < 20 trouble

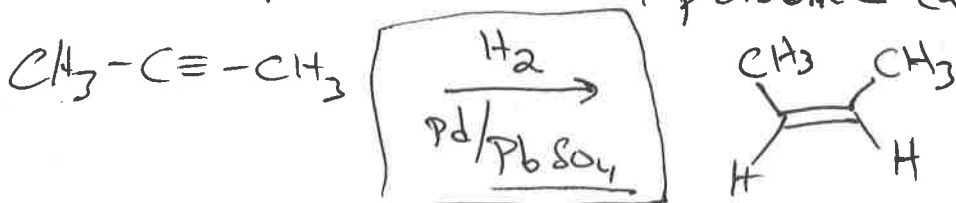
One more Alkyne rxn

4) Hydrogenation of alkynes:



b) Reduction to an alkene

↳ Stay at alkene w/ poisoned catalyst



only adds from one face

Lindlar Catalyst

(Z)-alkene
 syn-H₂-addition

Course 343

Lecturer Hackenberger

Day Friday

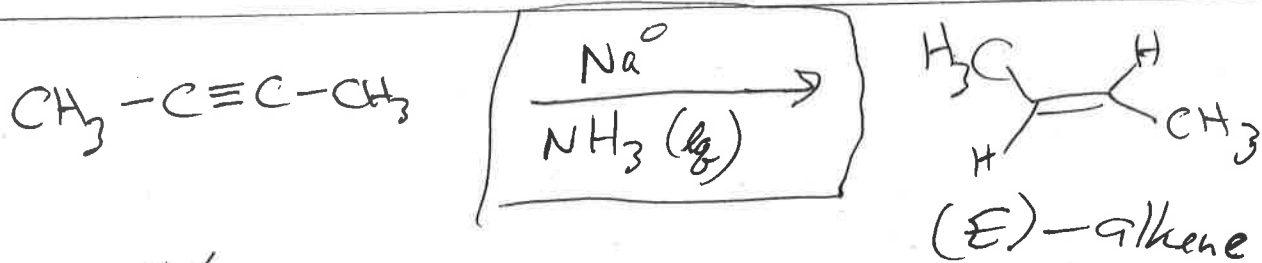
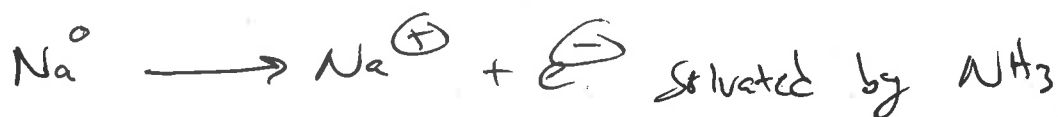
Date 12/6/13

Notes Taken By Greene tk

Total # of Pages 4

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liquid $\text{Na}/\text{NH}_3 \rightarrow$ bright blue solution"solvated electrons" \rightarrow how we should think of it

intermediate formed:



like a radical

picks up a Hydrogen to give (E)

More properties of Alkynes

Alkynes are more acidic than most other C-H

pKa's: $\text{sp}^3 \sim 50-60$ $\text{sp}^2 \sim 40-44$ $\text{sp} \sim 25$ \rightarrow alkynes can be deprotonated w/ strong base
(eg. NaNH_2 , NaH)Why? \rightarrow More s character in the sp orbital $\text{sp} \rightarrow 50\% \text{ s orbital } 50\% \text{ p orbital}$ $\text{sp}^2 \rightarrow 33\% \text{ s orbital } \text{sp}^3 \rightarrow 25\% \text{ s orbital}$ e^{\ominus} prefer to be in s-orbitals, they want to be closer to the nucleus \rightarrow electrostatic stabilization

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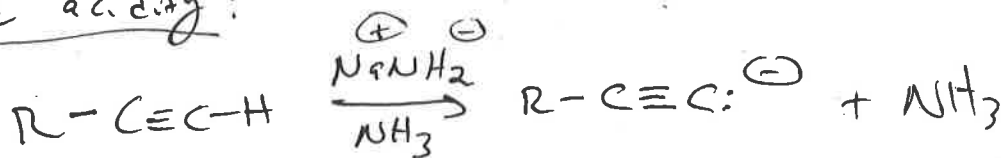
Stability of orbitals



Since in sp the e^- are closer to the nucleus than in sp^3
 when we form $R-C \equiv C:^-$

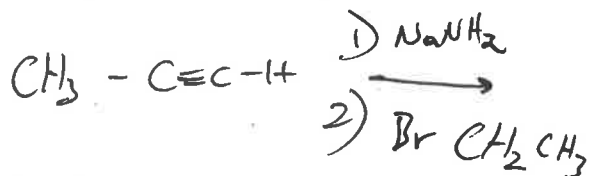
lone pair (of the deprot. carbon) is in a better orbital (sp)

\rightarrow if we have a more stable anion \rightarrow weaker base
 stronger acid!

Observed acidity:

very basic, but also a good nucleophile

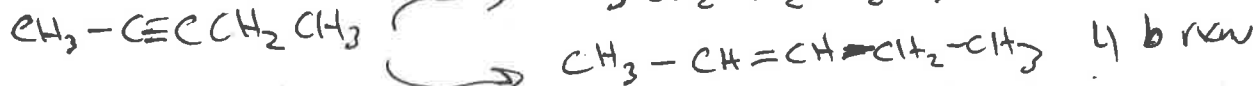
\rightarrow formation of C-C bonds possible via S_N2 rxns



new C-C bond!

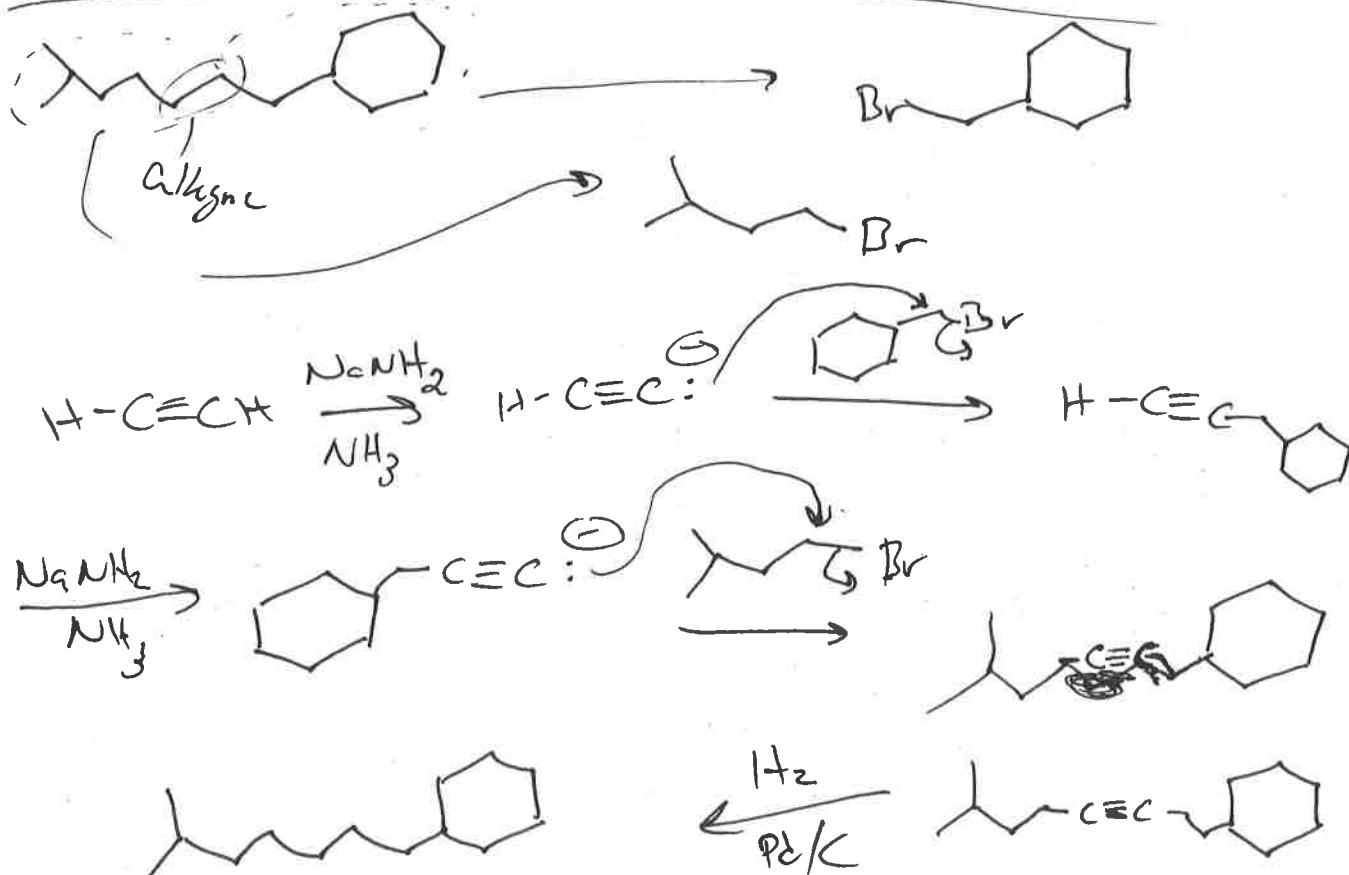
Mechanism

to convert afterwards to alkanes or (Z)/(E) alkenes we can use reduction



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Now we can synthesize complex alkanes



$\text{S}_{\text{N}}2$ rxns \rightarrow want to use very good $\text{S}_{\text{N}}2$ substrates

Alkyl halides $\rightarrow 1^\circ$

2° will give some elimination and reactions
since $\text{H}-\text{C}\equiv\text{C}^-$ is so basic!