Course CH 343 Sec 003 Lecturer Sam Gellman

Day Monday 1:20 Date 9/26/11

Notes Taken By Alicia Phelps Total # of Pages 4

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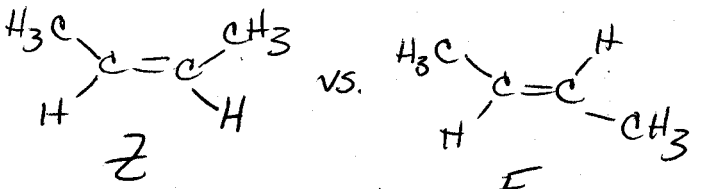
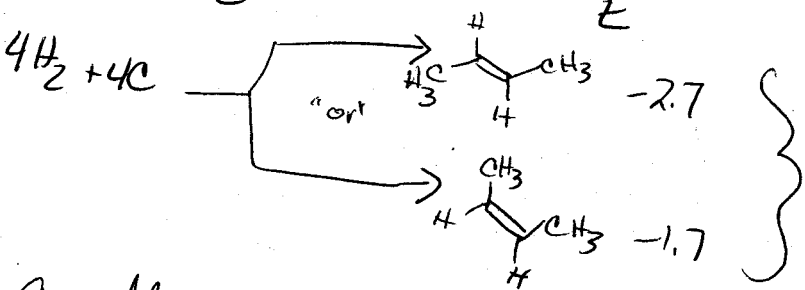
Office Hour: TODAY 5-6pm (None on Friday)

Recall: Difference in stability between alkene stereoisomers?

Ex:

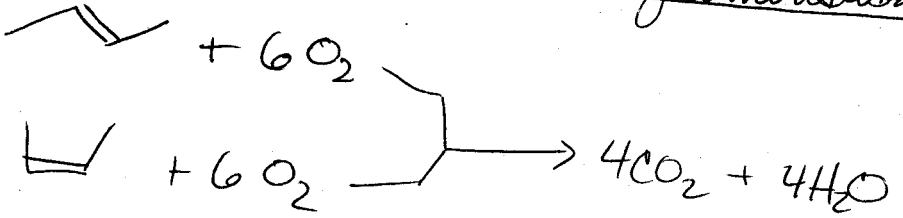


Approach: Compare heats of rxn, e.g., heats of formation (ΔH_f)



⟩ is more stable by 1 kcal/mol

Another comparison: heats of combustion ("burn" to $CO_2 + H_2O$)



ΔH_c° (kcal/mol)

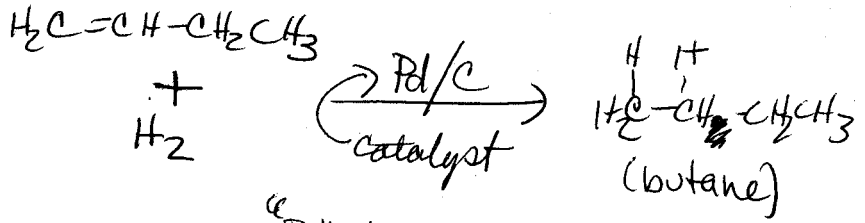
−646.8
−647.8

again, conclude that ⟩ is more stable by 1 kcal/mol

- Make sure you understand where these #'s came from.

One more comparison: Heats of hydrogenation ΔH_h°

Ex: Hydrogenation of alkenes



"Palladium on carbon"

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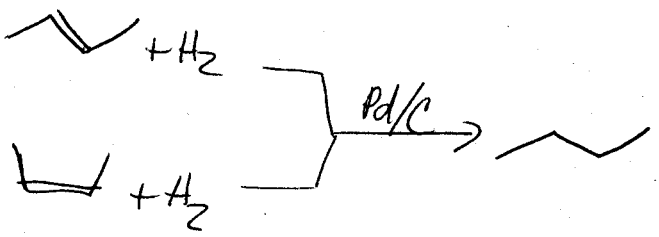


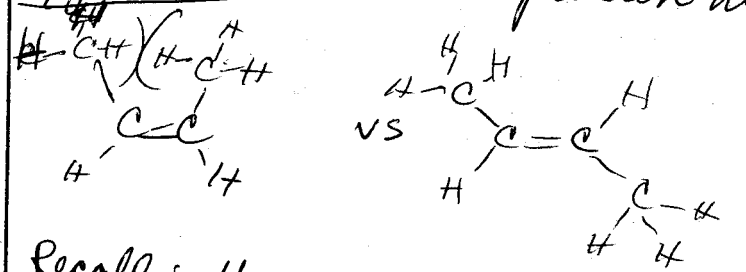
ΔH_h°

-27.6
-28.6

Again, ⌒ is more stable by 1 kcal/mol

- In general, more stable if larger substituents are trans rather than cis → Why?

Explanation: Steric repulsion in cis case, but not trans



Recall: Gauche vs. anti butane

pp. 145-147 (esp. Table 4.1)

Another trend: adding more alkyl substituents to alkene C's (sp² carbons) increases stability

Ex:

~2.5 kcal/mol less stable

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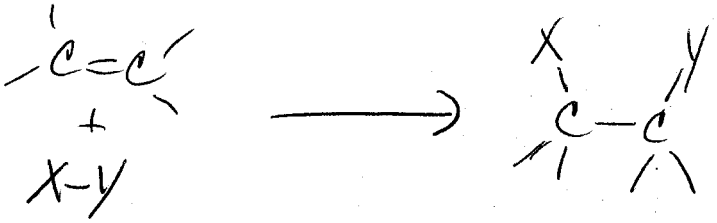
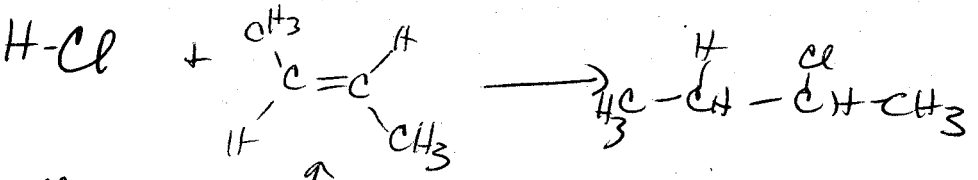
Addition Rxns of Alkenes

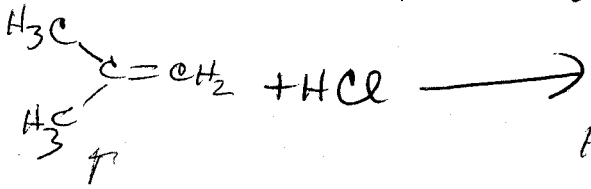


1) Hydrogen halide additions ("HX" additions)

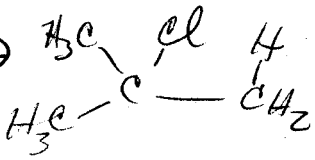
Ex:



another:

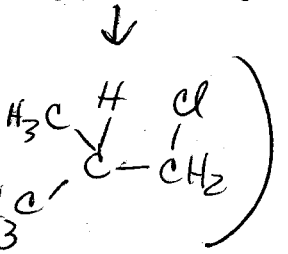


Both sp^2C are equivalent



Markovnikov product

does not form!



anti-Markovnikov product

Both sp^2C are not equivalent

"Markovnikov's rule"

→ X ends up on the more substituted Carbon

"Regioselectivity" - X ends up on one region over another

Note: Comparable rxns w/ HBr + HI (HF often thought about separately b/c it's so reactive

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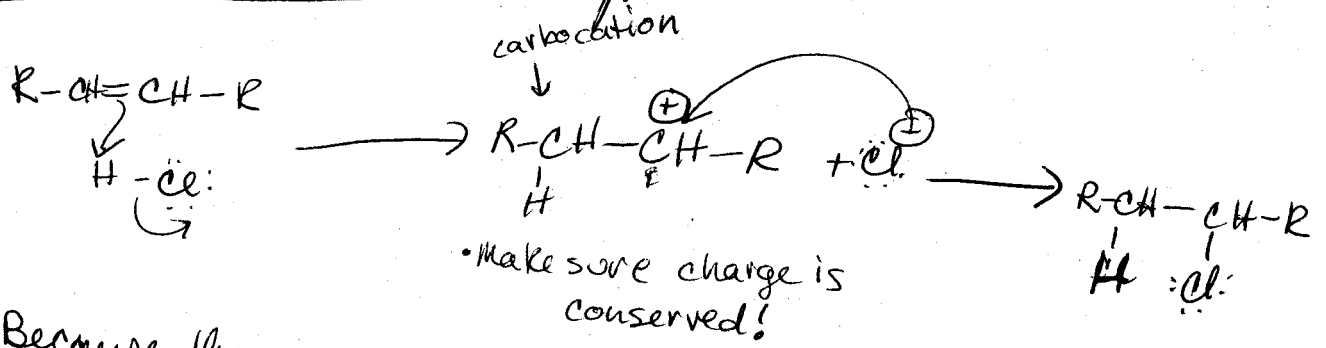
Mechanism (mechanistic hypothesis)



- Make sure charge is conserved!

- Because there are 2 steps, there is an intermediate in the mechanism
- In this case, "carbocation" or "carbon-centered cation"
- Intermediates often reactive species

1st Step: Brønsted Acid-Base Rxn (alkene π bond is the base)

2nd Step: Lewis acid-Lewis base