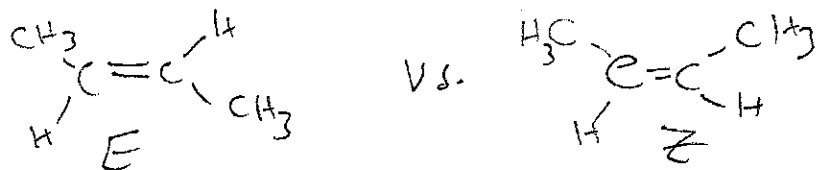


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Recall: Alkene Stereoisomers



Is there a difference in stability?

If so why? : Approach: Heats of rxns (Comparisons)

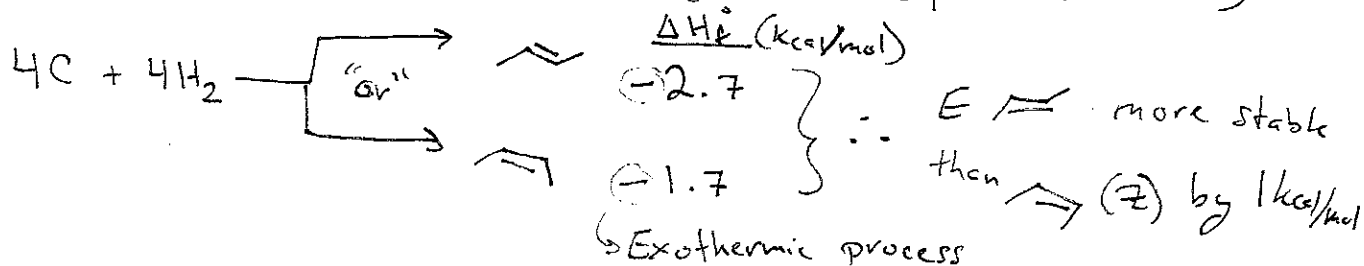
Recall:

Heat released \Leftrightarrow exothermic / Heat absorbed \Leftrightarrow endothermic

Analytical strategy \rightarrow rxns which either starting material (S.M.)
 or products are identical (\therefore Isomers)

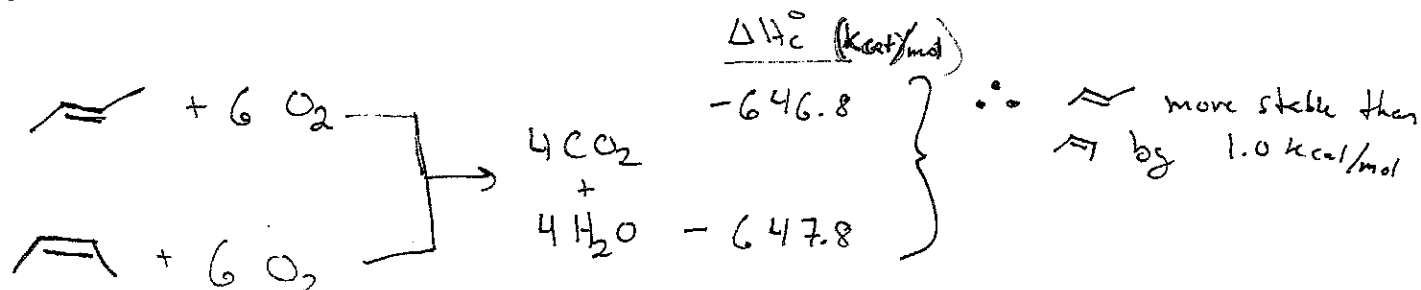
3 approaches:

1) Heats of formation (ΔH_f°) (from elements, 25°C, 1 atm)



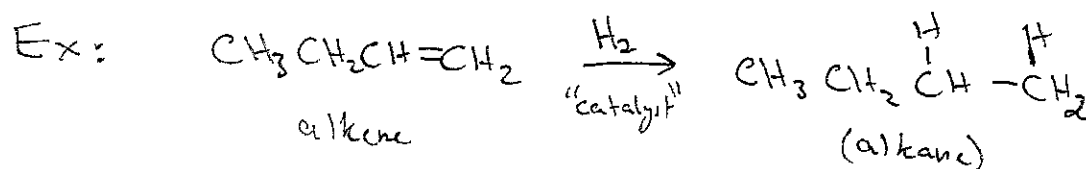
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2) Heats of Combustion (ΔH_c°)

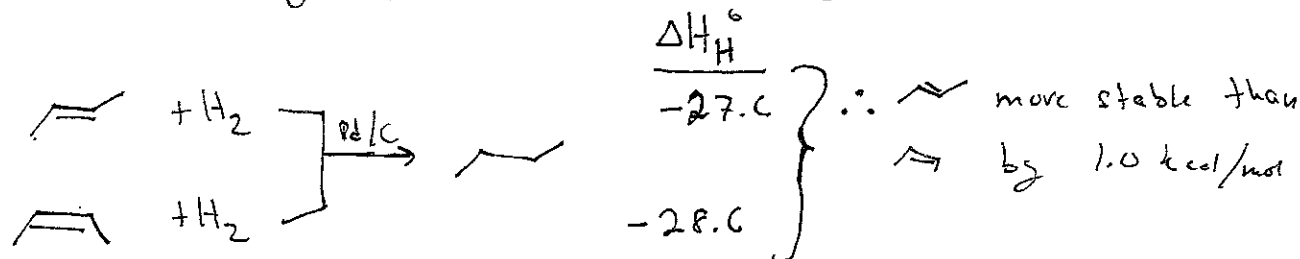


3) Heats of Hydrogenation (ΔH_H°)

"Hydrogenation" - addition of H₂ "across" a double bond

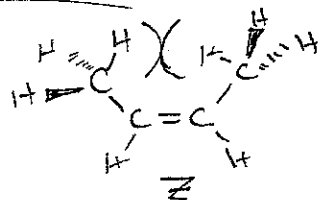


Catalyst = Pd/C → Pd coated on carbon (charcoal) → ↑ the surface area
 rxn only happen on the surface of Pd

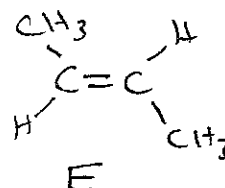


Origin of difference?

→ Steric effects



vs.



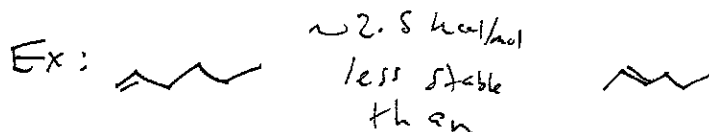
1 kcal/mol strain in 2 isomer

Recall gauche vs anti for butane

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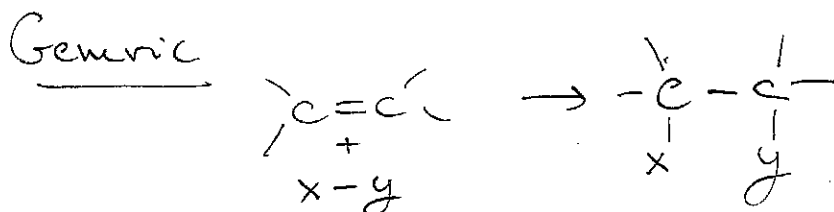
Alkene structure vs. stability

of alkyl substituents in sp^2 C's affects stability



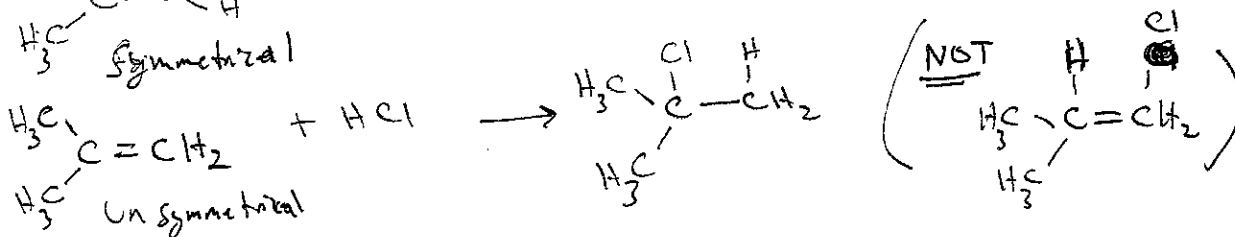
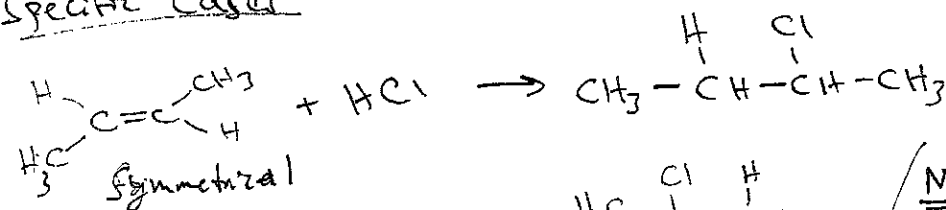
Conclusions gone through in the text

Addition reactions of alkenes



1) Hydrogen Halide addition (HX addition)
 $\rightarrow Br, I, Cl, F$

Specific cases



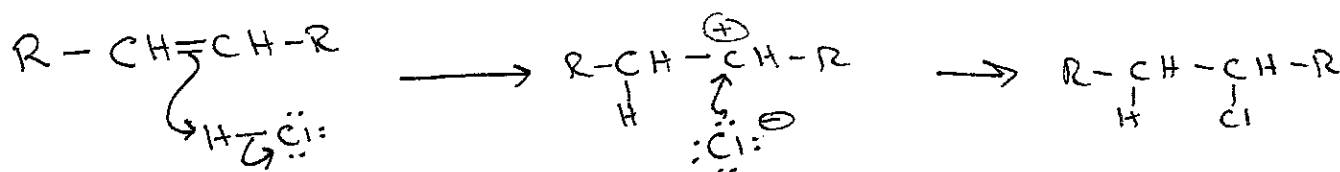
Unsymmetrical alkene - absolute selectivity in product formation
 ("Regioselectivity")

General trend for HX addition to unsymmetric alkenes
 ("Markovnikov's rule")

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Origin of this regioselectivity? → Mechanistic insight
 As a result of many such observations, mechanistic hypothesis for HX addition



Comments (proton transfer)

1) This mechanism has 2 steps. Thus, there is an intermediate ("reactive intermediate")

In this case, "carbocation"

Very reactive ⇒ very short life time

2) Analogies

1st step ⇒ Brønsted acid-base rxn

2nd step ⇒ Lewis acid-base rxn