Course 343 Lecturer Hackenberger

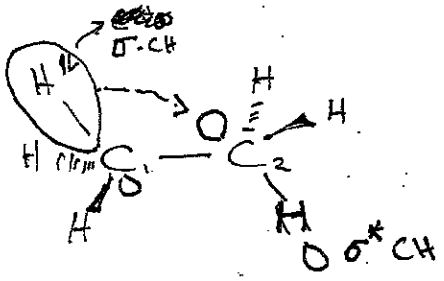
Day Friday Date 09/13/13

Notes Taken By Guenette Total # of Pages 3

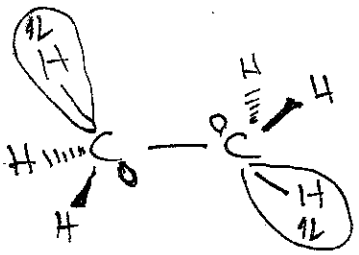
Submit a *Single-sided Copy* to the Office
DO NOT STAPLE

Last time: - Polarity Bond vs. Molecule
- Drawing Conventions
- Conformational Analysis staggered vs. eclipsed - Ethane

Why is staggered more stable: 2 main arguments
1) repulsion of C-H σ bonds
2) staggered conformation is stabilized by $\sigma \rightarrow \sigma^*$ interaction

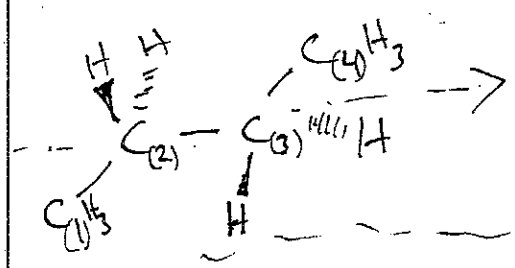


$\sigma \rightarrow \sigma^*$
- need to be perfectly aligned for this to occur (parallel orientation)
leakage from $\sigma \rightarrow \sigma^*$ orbital
C_1 C_2

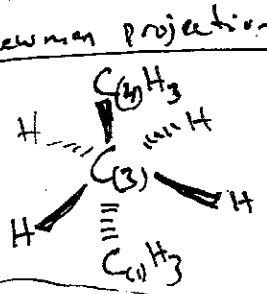


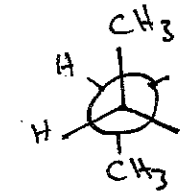
no $\sigma \rightarrow \sigma$ C_1H C_2H since both are filled
- σ^* always present in molecule + unoccupied σ bonds are "crowded" so will try to populate some unfilled (σ^*) orbitals that they are aligned w/

Butane



Newman projection

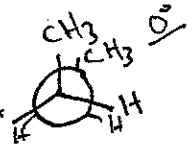




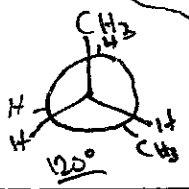
two staggered conformers

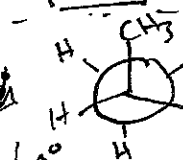
most stable
Anti conformation

two eclipsed conformation



least stable conformation





staggered
Gauche

Course 343 Lecturer Hackenberger

Day Friday Date 09/13/13

Notes Taken By Guenette Total # of Pages 3

Submit a *Single-sided Copy* to the Office
DO NOT STAPLE

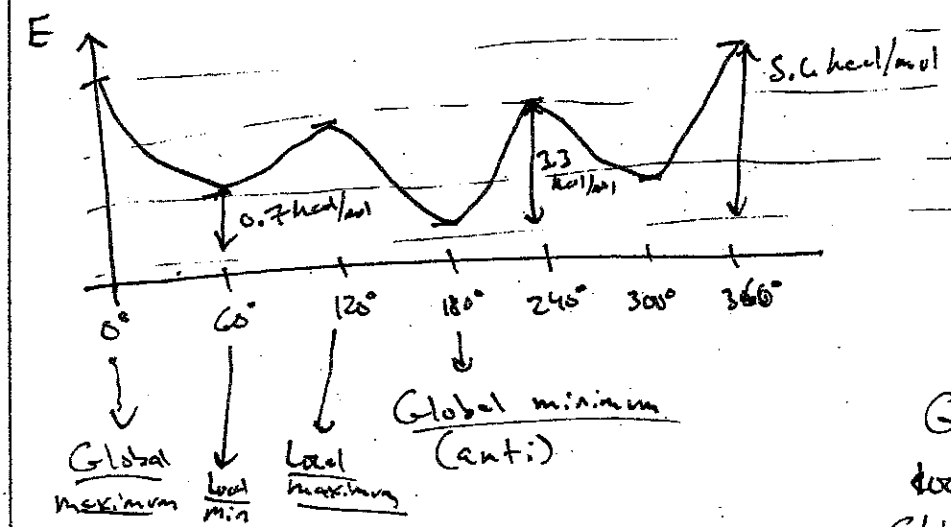


Fig 2.5 p. 57

Know energy values from the table

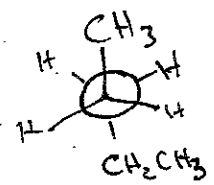
	energy diff
Gauche – anti	0.7 kcal/mol
local max – anti	3.3 kcal/mol
Global max – anti	5.6 kcal/mol

Why is Gauche more unstable than anti?

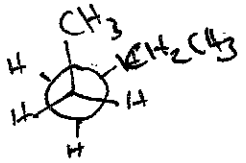
- repulsion between CH_3 groups

Applying this to other cases:

Pentane (C5)



anti



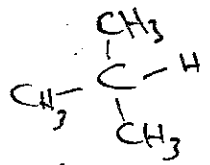
Gauche

all at the same E diff

alkanes ≥ 4 carbons can be branched or linear

C_4H_{10}: $CH_3CH_2CH_2CH_3$

n-butane



iso-butane
(an isomer of n-butane)

isomers → same molecular form, but different molecule

Course 343 Lecturer Hackenberger

Day Fri Date 09/13/13

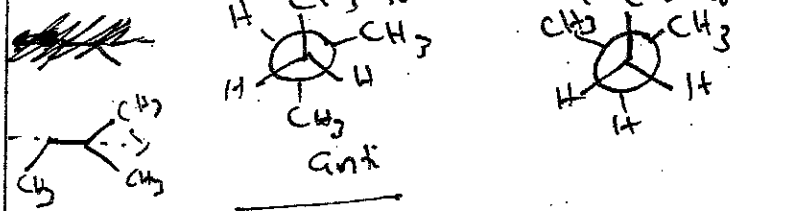
Notes Taken By Grieve Tice Total # of Pages 3

Submit a *Single-sided Copy* to the Office

DO NOT STAPLE

C_5H_{12} :

↳ Conformational analysis (contrast to n-pentane)



- only looking at staggered conformation assuming eclipsed less stable

1 gauche + 1 anti → most favorable

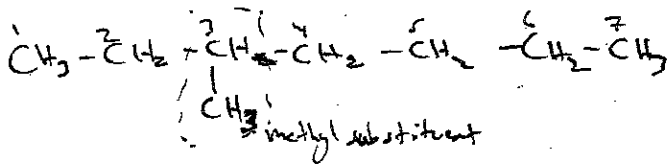
2 gauche → energy diff of 0.7 kcal/mol

Can add up known values.

~~Branched alkyl substituents~~

Alkane nomenclature

Aim → Name to Structure (also vice versa)



3-methyl heptane

- rules
  - identify longest chain
  - always use as low of numbers as possible (~~5-methyl heptane~~)
  - The drawing might change but the name won't