Course 343 Lecturer Gellman

Day Monday Date 9/14/15

Notes Taken By Kirandeep Deol Total # of Pages 4

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Dr. MacDonald

- For alkanes larger than propane, branched isomers are possible.

C_4H_{10} : $CH_3CH_2CH_2CH_3$ "butane" or "n-butane"

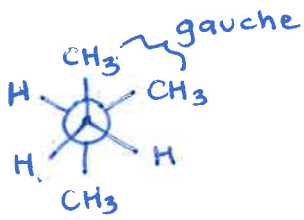
$CH_3CH(CH_3)CH_3$ "isobutane"

C_5H_{10} $CH_3CH_2CH_2CH_2CH_3$ "pentane"

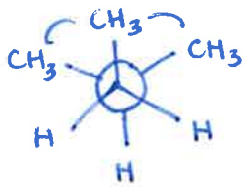
$CH_3CH(CH_3)CH_2CH_3$ "isopentane"

$C(CH_3)_4$ "neopentane"

Consider...



- one gauche "more stable"



- two gauche interactions

⇒ concepts of staggered & eclipsed vs. anti are general!

Alkane Nomenclature

- left largely to text
- need to master name → drawing (NOT drawing → name)

ie.

$CH_3CH_2CH(CH_3)CH_2CH_2CH_2CH_3$

"3-methyl heptane"

- In general, identify parent alkane by finding largest line of C's (in ex. heptane)

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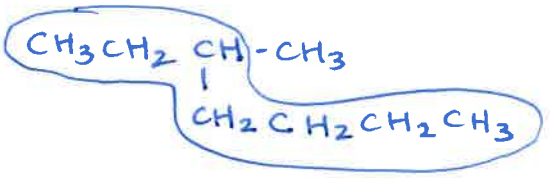
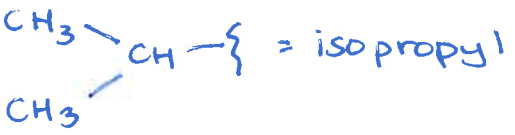
- Don't be misled by the way molecule is drawn

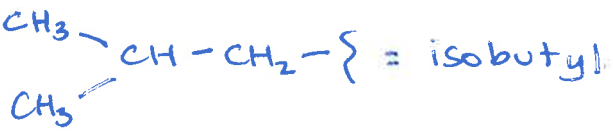
ie.

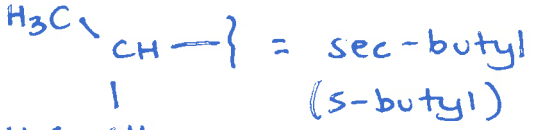


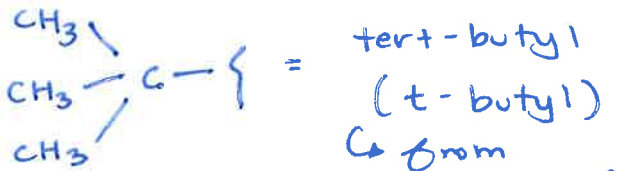
- once parent chain is identified, other parts are substituent(s); numerals indicate locations.

Common Names (NEED TO KNOW)

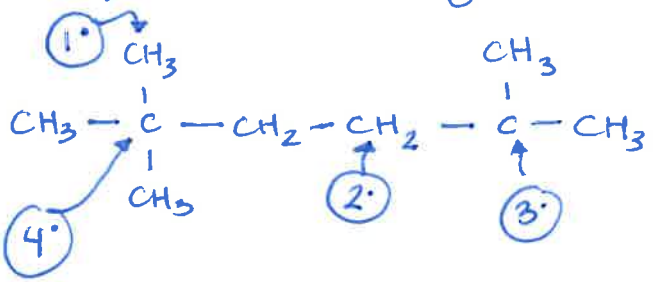








Last two names arise in part from a way of classifying carbons, based on # of carbons to which they are bonded.



1° = primary

2° = secondary

3° = tertiary

4° = quaternary

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 = t-butyl cyclohexane

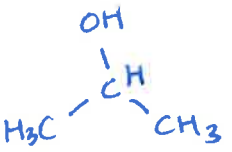
↳ for ring

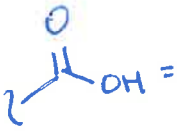
Note: rings are drawn in skeletal format

Functional Groups:

- certain groups of atoms commonly encountered, & often these groups have characteristic chemical properties

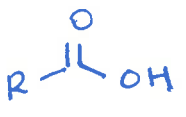
ie. ?–OH = alcohol or hydroxyl

ie 

 = carboxylic acid

" $CH_3CH_2CH_2$–C(=O)–OH " "butanoic acid" "butyric acid"

ie. sometimes designate an entire family of compounds to generate nomenclature

ie  "carboxylic acids"

R = any alkyl groups (Me, Et, isopropyl)

overview: carbon cycle

CO_2 (O=C=O) = fully oxidized carbon

alkanes = fully reduced carbon

petroleum = mostly alkanes ⊕ aromatics 

modern human society — petroleum $\xrightarrow{\Delta, O_2}$ CO_2 + H_2O + ENERGY ("combustion")

Plants: CO_2 $\xrightarrow{\text{sun-light}}$ carbohydrates [$(CH_2O)_n$]

vs. vs.

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animals

carbohydrates $\xrightarrow{O_2}$ CO_2 + ENERGY

vs.

earth

carb $\xrightarrow{\text{"geology"}}$ coal & petroleum

} circle of life... and it moves us all.

Chapter 3: Acids & Bases

Recall: Acid-base rxn = proton ("Bronsted") transfer [proton = H^+]

General: $A-H + :B \rightleftharpoons A^{\ominus} + HB$

$A^{\ominus}$: conjugate base of A-H

HB: conjugate acid of :B

Problems: 1-5, 7-12, 16, 19, 27, 29, 32-36, 37a, 40-44, 47, 52-55

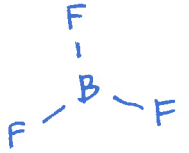
Acid/Base rxns provide simple starting point from which to consider rxn. mechanisms.

Lewis acid/Base (focus on e^- lone pairs rather than $H^{\oplus}$)

Lewis acid: e^- deficient species (e^- acceptor)

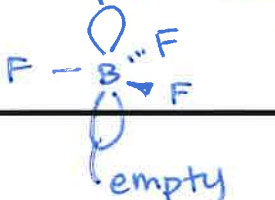
Lewis base: e^- rich species (e^- donor)

ie



- BF_3 and other trivalent boron compounds have six e^- around B - capacity to accept a lone pair to complete octet

↳ sp^2 hybridized ↳ empty p orbital $\Rightarrow$



empty p orbital

Thus $BF_3 + F^{\ominus} = BF_4^{\ominus}$