NEXT SECTION: Lecture Outline 2: ALKANES

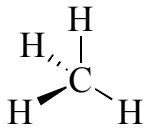
Hydrocarbons – Compounds that contain only C and H

- Alkanes contain only single bonds (C-H, C-C)
- Alkenes = Olefins (C=C)
- Alkynes =Acetylenes (C≡C)

Alkanes

- All carbons are sp^3 hybridized (optimal bond angle of 109^o)
- Single bonds (σ bonds).
- Tetrahedral geometry at every carbon
- Held together by London (dispersion) forces

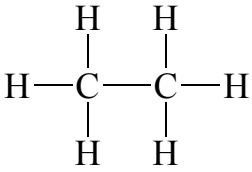
Ex #1) CH_4, methane



Bp = -161°C

CH_4 H_4C CH_3-H

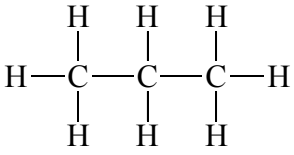
Ex #2) C_2H_6, ethane



Bp = -88°C

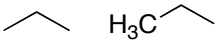
C_2H_6 CH_3-CH_3 H_3C-CH_3

Ex #3) C_3H_8, propane

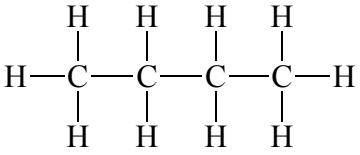


Bp = -42°C

C_3H_8 $CH_3CH_2CH_3$



Ex #4) C_4H_{10}, butane

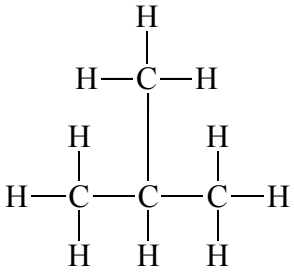


C_4H_{10}, $CH_3CH_2CH_2CH_3$

n-Butane: normal straight chain butane

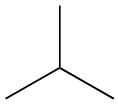
NOTE: Propane has a boiling point of -42°C, which is higher than methane because it's chain-like structure allows for more surface area for London dispersion forces to take effect.

Ex #5) C_4H_{10} , isobutene or i-Butane

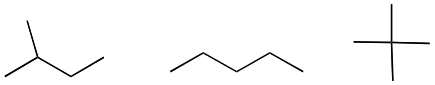


- Isomers are different compounds that have the same molecular formula and different structure. They have different physical properties (e.g. mp, bp, odour, biological effects)
- iso - meros
  same - parts

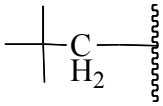
one type: structural (same as constitutional)



structural isomer = constitutional isomer



isopentane n - pentane Neopentane

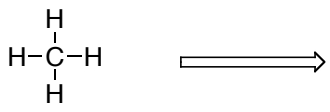


Neo Group

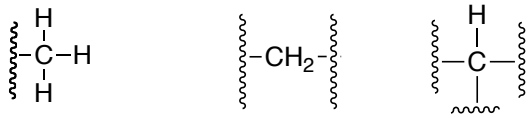
Groups (part of an alkane structure)

- In naming the particular group, drop the "ane" part and add "yl" to the name
- For example, methane → methyl

(i) Methyl group – CH_3

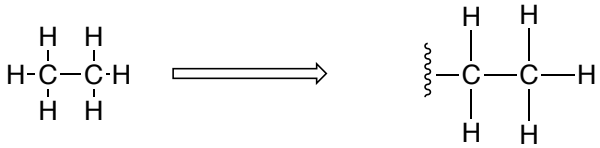


methane



methyl group methylene methine

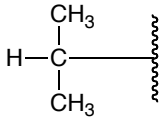
(ii) Ethyl group – CH_2CH_3



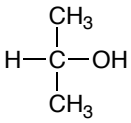
ethane

ethyl

(iii) Isopropyl group

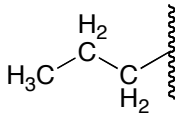


iso-propyl group

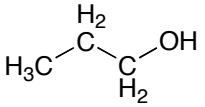


iso-propyl alcohol

(iv) *n*-Propyl group

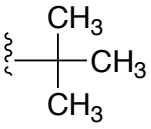


n-propyl chain

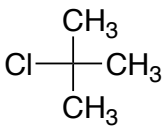


n-propyl alcohol

(v) *tert*-Butyl group



tert-Butyl chain



tert-Butyl chloride