Pre-Health Post-Baccalaureate Program
CHM2210 Study Guide & Practice Problems

Topics Covered:

Constitutional Isomerism in Alkanes
Nomenclature of Alkanes

Created by Isaac Loy

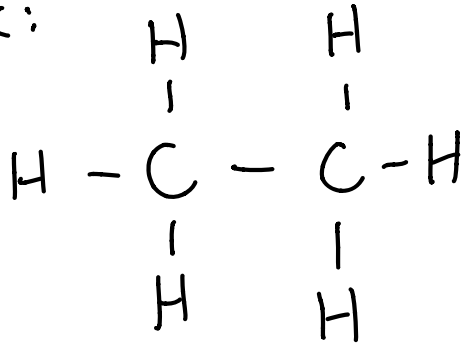
Alkanes: An Overview

→ Alkanes are part of a larger class of molecules called hydrocarbons

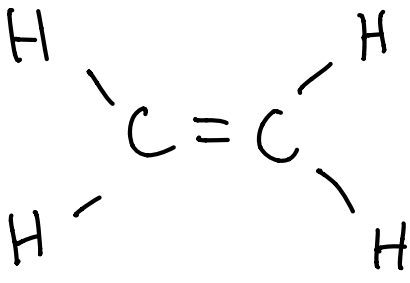
→ Hydrocarbons are organic molecules which contain only carbon and hydrogen

→ Alkanes are saturated hydrocarbons, meaning that they contain no pi bonds and the max. amount of hydrogens possible

Ex:



saturated (max. number of hydrogens)

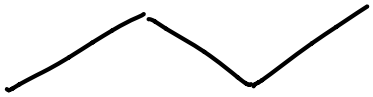


unsaturated

Constitutional Isomerism

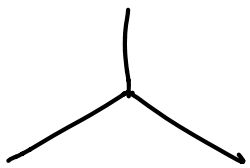
→ Constitutional isomers are molecules which have the same molecular formula but different structures

Ex:



C_4H_{10}

Butane



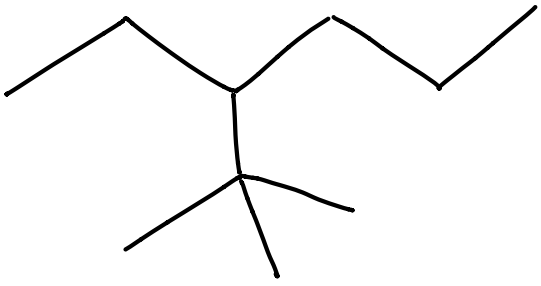
C_4H_{10}

2-methylpropane

Nomenclature and IUPAC

→ How to name a molecule

① Identify the highest priority functional group in the molecule

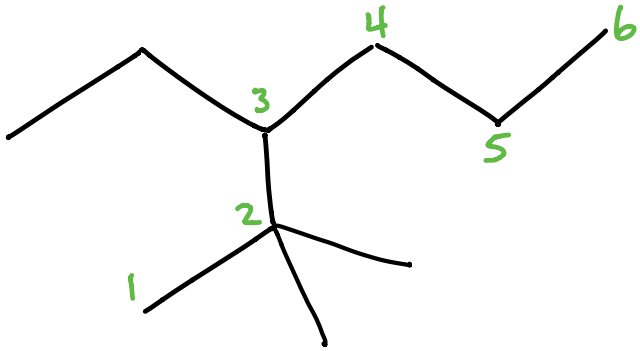


← alkane: ending is "-ane"

② Identify the longest carbon chain in the molecule. If there are multiple carbon chains of the same length, choose the chain with the greater number of substituents.

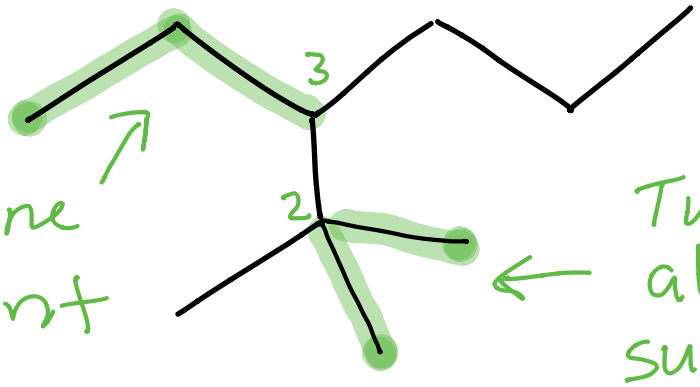
Count in such a way that the first encountered substituent has a lower number

Chain length	prefix
1	meth-
2	eth-
3	prop-
4	but-
5	pent-
6	hex-
7	hept-
8	oct-
9	non-
10	dec-



← six - C parent chain: prefix is "hex-"

③ Identify substituents and name them based on their functional group and position.



2-C alkane substituent on third carbon:
"3-ethyl"

Two 1-C alkane substituents on second carbon:
"2,2-dimethyl"

④ Put it all together by using the formula:

sub.-sub. prefix FG ending

If multiple substituents are present (such as in this example), use alphabetical order to determine which substituent comes first. Note: di-, tri- does not factor into alphabetizing!

3-Ethyl-2,2-dimethylhexane

Common Alkyl Substituents

→ Methyl — CH_3

→ Ethyl — CH_2CH_3

→ Propyl — $CH_2CH_2CH_3$

→ Isopropyl (1-methylethyl) — $CH(CH_3)_2$

→ Butyl — $CH_2CH_2CH_2CH_3$

→ Isobutyl (2-methylpropyl) — $CH_2CH(CH_3)_2$

→ Sec-butyl (1-methylpropyl) — $CH(CH_3)CH_2CH_3$

→ tert-butyl (1,1-dimethylethyl) — $C(CH_3)_3$