Notes: 2-20

Tuesday, February 20, 2007
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Functional Groups

Functional group	Suffix	Example
Alkane	-ane	pentane c-c-c-c-c
Alkene	-ene	1-pentene: c=c-c-c-c
Alkyne	-yne	1-pentyne c≡c-c-c-c
Alcohols R-OH	-ol	methanol CH_3OH

≡

aryl Ar

Ethers R-O-R CH_3OCH_3 dimethylether

Ethanol CH_3CH_2OH

Aromatics

1-propanol $CH_3CH_2CH_2OH$

2-propanol (isopropanol) CH_3CHCH_3 (OH)

Ketones -one RCR (O)

Ex. acetone → CH_3CCH_3 (O)

Carbonyl carbon

Aldehydes $R-CH$ (O) -al suffix

Ex. Butyraldehyde butanal $CH_3CH_2CH_2CH$ (O)

Ester -ate $R-C(=O)-O-R$

Ex. Isoamyl acetate
Ex. Isopentyl acetate

IUPAC Naming

2-methyl-2-chloropropane

3 portions to name:

1. Substituents - what groups are off the main chain
2. Prefix - how many carbons in the main chain of the molecule
3. Suffix - what functional groups are present, if none or only halide using the ending "ane"

Parent

Memorize the parent names

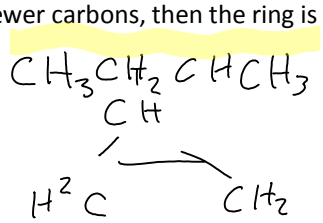
# carbons	Prefix
1	Meth
2	Eth
3	Prop
4	But
5	Pent
6	Hex
7	Hept
8	Oct
9	Non
10	Dec
11	Undec
12	dodec

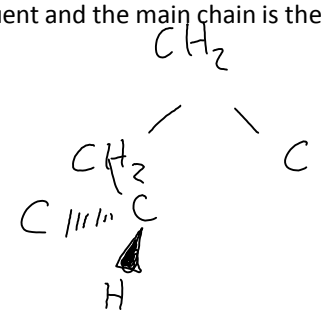
Identifying the Main Chain

- The longest chain of bonded carbon atoms
- If 2 chains have the same length, select the chain with the most substituents as the main chain

Main Chain with Rings

- If a ring has more carbons in it than in an attached carbon chain, the ring is the main chain.
- If the ring has fewer carbons, then the ring is a substituent and the main chain is the carbon chain.





Naming Substituents

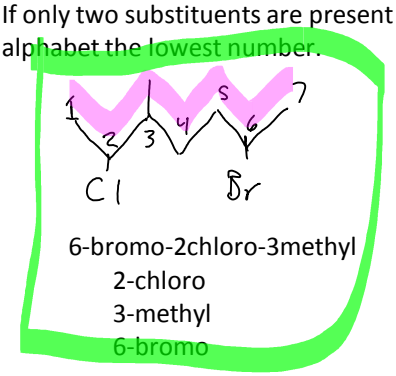
- Carbon-containing substituents are named alkyl groups.
- Halide groups are named as halo substituents
- Sec- and tert- are not alphabetized
  - sec=secondary, tert=tertiary
- See names of common substituents handout

Complex Substituents

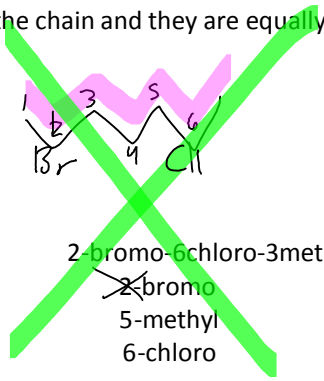
- If there is not a common name for a substituent, you may need to label the alkyl group as a complex substituent
- See names of common substituents handout

Numbering of the Chain

- Open chain compounds are numbers so that the first substiuent on either end receives the lowest number.
- If the substituents that are first from either end are the same distance, give the lowest number to the next substituent
- If only two substituents are present on the chain and they are equally distant, give the first in the alphabet the lowest number.



6-bromo-2chloro-3methyl
2-chloro
3-methyl
6-bromo



2-bromo-6chloro-3methyl
~~2~~-bromo
5-methyl
6-chloro

Numbering Cycloalkanes

- If there are only two substituents on the ring, the carbon in the ring that has the substituent first int the alphabet = position #1
- Ignore di, tri, tetra, sec-, and tert-

# of substituents	Substituent prefix
2	Di-
3	Tri-
4	Tetra-
5	Penta-
6	Hexa-

Put the Name Together #-substituent + Parent + Suffix

- List substituents in alphabetical order ,ignoring di, tri, tetra, sec-, and tert-
- Make sure tha tyour substituent prefix matches the numbers you place in front of it, for example, 2-trimethyl is incorrect.
- If the molecule is a cycloalkane, you may need to include cis and trans at the front of the name.