10/7/11

Functional Groups
More nomenclature
Priority Rules

Saturated – maximum amount of hydrogen attached possible (all single bonds)

Unsaturated – contains double or triple bonds (or rings)

Hydrocarbon functional groups

alkane

alkene

alkyne

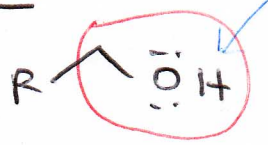
Saturated heteroatom groups

X = F, Cl, Br, I R = alkyl groups

alkyl halides
haloalkanes

must have H

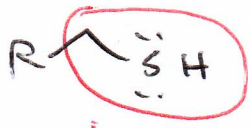
R = H or alkyl



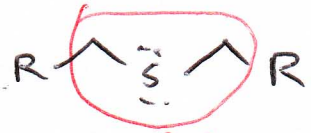
alcohol

ether

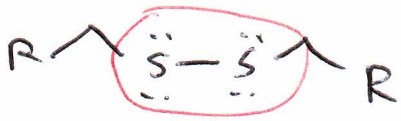
peroxide



thiol



sulfide

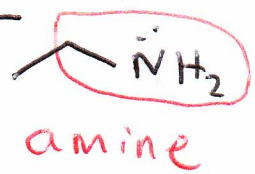


disulfide

2° alcohol

3° thiol

For amines, 1° 2° 3° 4° refer to # of carbons attached.



amine

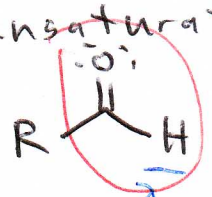
1° amine

2° amine

3° amine

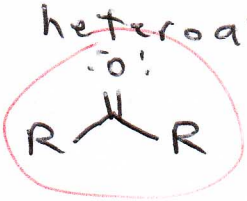
4° ammonium

Unsaturated heteroatom groups



Must have one H

aldehyde

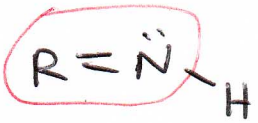


ketone

R = alkyl

C=O

↑ Carbonyl bond



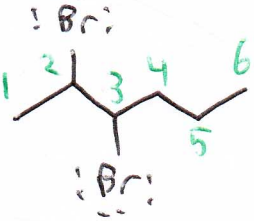
imine

Functional group priority order

↑ more important

carboxylic acid derivatives
unsaturated heteroatom groups
saturated heteroatom groups
hydrocarbons
halogens → always considered substituents

F	fluoro
Cl	chloro
Br	bromo
I	iodo

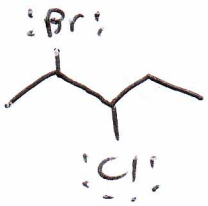


multiplicative prefixes

1	mono *	6	hexa
2	di	7	hepta
3	tri	8	octa
4	tetra	9	nona
5	penta	10	deca

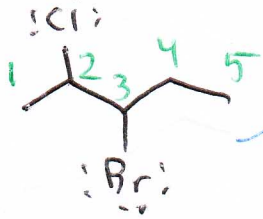
toluene 

2,3-dibromohexane



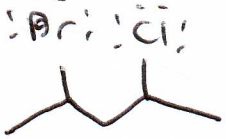
Rule #3: Substituents are listed in order of alphabetization

2-bromo-3-chloropentane

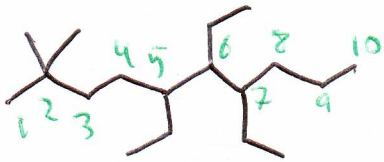


3-bromo-2-chloropentane

Rule #4: If numbering the chain from multiple directions yields the same set of locants, the priority is given to the substituent name first alphabetically,



2-bromo-4-chloropentane



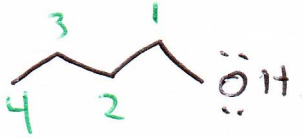
2,2-dimethyl 5,6,7-triethyl

Rule #5: Simple multiplicative prefixes are (normally) not used in alphabetization

5,6,7-triethyl-2,2-dimethyl decane

Naming alcohols

Rule #6: Numbering is established by the highest priority functional group.

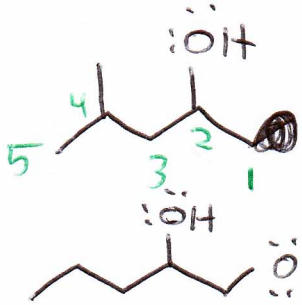


1-butanol (old) butan-1-ol (new)

ending for alcohols

preferred

"e" is not used since consonant is followed by a vowel

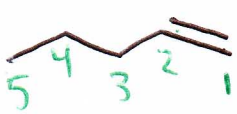


4-methyl pentan-2-ol

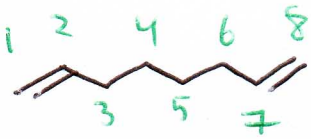
pentane-1,2-diol

p "e" is used to separate consonants

Alkenes



pent-1-ene

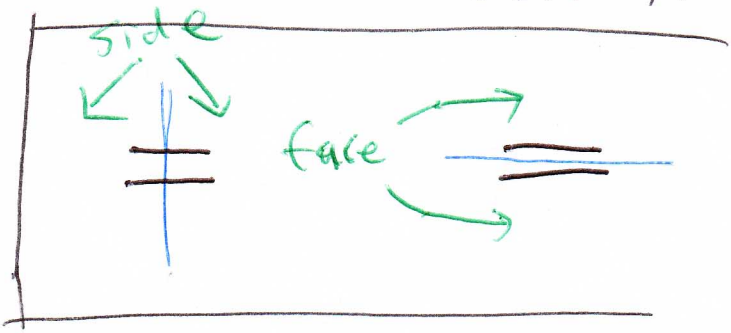


~~octa~~-1,7-diene

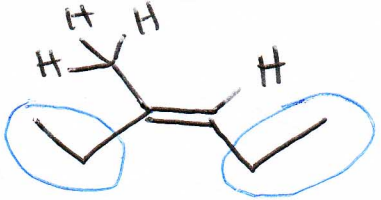
trans cis

opposite same

trans-pent-2-ene cis-pent-2-ene



* The terms cis + trans can only be used when comparing exactly 2 objects



E - "trans"

Z - "cis"

(Z)-3-methylhex-3-ene

CIP Priority Rules - (Cahn - Ingold - Prelog)

Rule #1: Higher priority is given to higher atomic number.

Rule #2: If priority cannot be established at the first point of attachment, the next position out is examined.