Functional Groups
More nomenclature
Priority rules
Phantom atoms

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

Unsaturated - contains double or triple bonds (or rings)

Hydrocarbon functional groups

alkane

alkene

alkyne

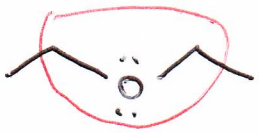
Saturated heteroatom groups

X = F, Cl, Br, I

R = alkyl group

alkyl halides

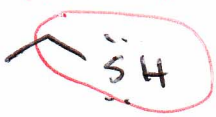
alcohol



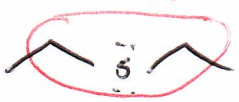
ether

peroxide

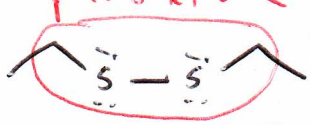
2° alcohol



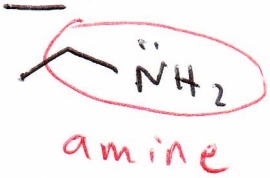
thiol



sulfide

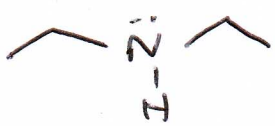


disulfide



amine

1° amine — 1 C on N

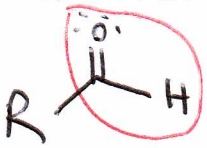


2° amine

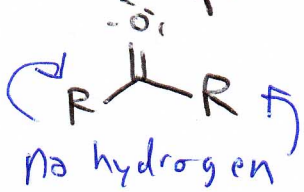
3° amine

4° ammonium

Unsaturated heteroatom groups

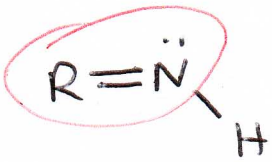


aldehyde



ketone

no hydrogen



imine

C=O

carbonyl bond

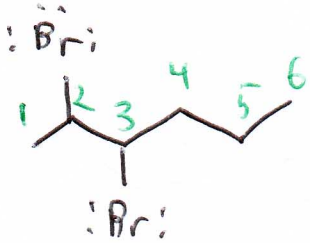
Functional group priority order

more important ↑

1. carboxylic acid derivatives
2. unsaturated heteroatom groups
3. saturated heteroatom groups
4. hydrocarbons
5. halogens

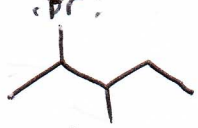
→ halogens are always considered substituents

F fluoro Cl chloro Br bromo I iodo



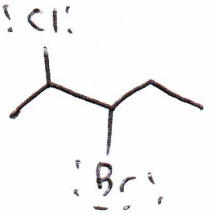
multiplicative prefixes			
1	mono *	6	hexa
2	di	7	hepta
3	tri	8	octa
4	tetra	9	nona
5	penta	10	deca

2,3-dibromohexane

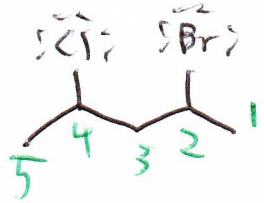


Rule #3: Substituents are listed in order of alphabetization

2-bromo-3-chloropentane



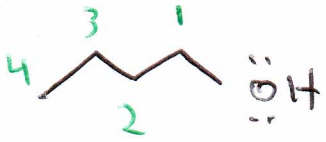
~~3-ch~~ 3-bromo-2-chloropentane



Rule #4! If numbering the chain from multiple directs gives the same locants, priority is given to the group that appears first in alphabetical order

2-bromo-4-chloropentane

Naming alcohols



old style: 1-butanol

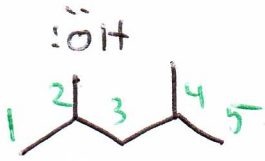
new style: butan-1-ol

preferred

ending for alcohols

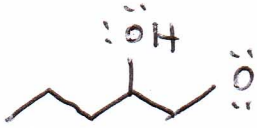
no "e"

emphasizes 1 refers to the alcohol



Rule #5: Higher order functional groups are given lower numbers than lower order groups if numbering multiple ways generates equivalent sets of locants,

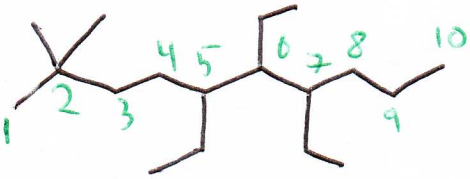
4-methylpentan-2-ol (new) 4-methyl-2-pentanol (old)



→ ~~hexane-1,2-diol~~

pentane-1,2-diol

"e" is present since it is followed by a consonant



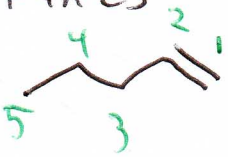
2,2-dimethyl

5,6,7-triethyl

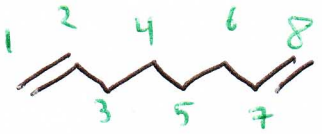
Rule #6: Simple multiplicative prefixes are ignored for purposes of alphabetization

3. 5,6,7-triethyl-2,2-dimethyldecane

Alkenes



pent-1-ene



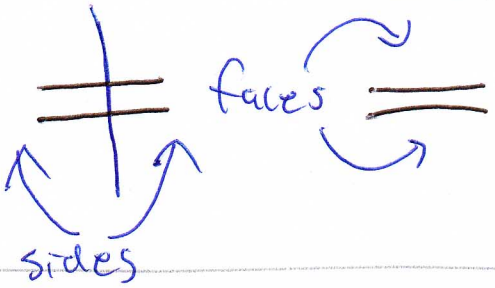
octa-1,7-diene

Trans

opposite

cis

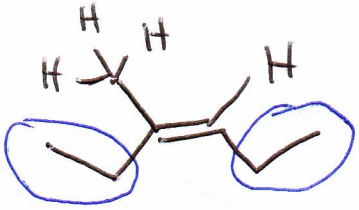
same



trans-pent-2-ene

cis-pent-2-ene

* The terms cis + trans can only be used when only two groups are being compared.



E- "trans"

Z- "cis"

(Z)-3-methylhex-3-ene

To name this alkene, the most important group on each side must be identified.

CIP priority rules (Cahn-Ingold-Prelog)

Rule #1: Higher atomic # is given priority

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