

Organic Functional Groups

Functional Groups

- A functional group is a specific group of atoms which exist in a molecule and gives a molecule an ability to react in a specific way or gives it special properties.

Alkyl Halides

- Alkyl Halides are halogens (F, Cl, Br, I) that are attached to the parent chain as branching substituents.
- Rules for naming:
 - 1.) The naming of Alkyl halides is the same as naming alkyl groups, using the words "fluoro", "chloro", "bromo" and iodo.
 - 2.) Use a number to indicate the position of attachment.
 - 3.) If more than one halogen is present, use di, tri etc. To denote how many there are.
 - 4.) If a compound contains both alkyl and halo groups, list the attached groups alphabetically **with numbering starting from the end which gives the lowest number.**

Ex. 1 -

Ex. 2 -

Ex. 3 -

Ex. 4 -

Ex. 5 -

Alcohols

- Alcohols are organic compounds containing an OH group.
- Rules for naming alcohols:

- 1.) Number the parent chain to give the alcohol the lowest possible number.
- 2.) Place the number immediately before the parent chain name, separated by a dash (alkyl groups are listed in front of the number for alcohol groups).
- 3.) Indicate the alcohol group by changing the "e" ending to "ol". The "ol" represents alcohol.

Ex. 1 -

Ex. 2 -

Ex. 3 -

Ex. 4 -

- Properties of alcohols
- Alcohols with short parent chains (C_4 or less) are soluble in water while larger alcohols are not soluble. This is due to the polar OH bonding to the water and "winning" over the short hydrocarbon parent chain. Once the hydrocarbon chain becomes C_5 or larger it "wins" over the polar OH and no longer is soluble in water.
- ALL ALCOHOLS ARE POISONOUS AND WILL KILL YOU!! Ethanol just does it slower.

Esters

- An ester is a compound in which a COO joins two hydrocarbon chains.
- Rules for esters:
 - 1.) The hydrocarbon chain that has the C of the COO group is considered the parent chain which has the "e" ending changed to "oate".
 - 2.) The hydrocarbon chain attached to the O of the COO group is named like and alkyl group.

Ex. 1 -

Ex. 2 -

Ex. 3 -

- Esters are made by reacting an organic acid and an alcohol in the presence of an inorganic acid such as HCl or H₂SO₄.

Ex. -

- **The rest of this chapters functional groups need to be learned for identifying but NOT NAMING.**

Aldehydes

- Aldehydes are organic compounds containing a C=O group at the end of a hydrocarbon chain. The aldehyde group actually looks like this



Ex. -

Ketones

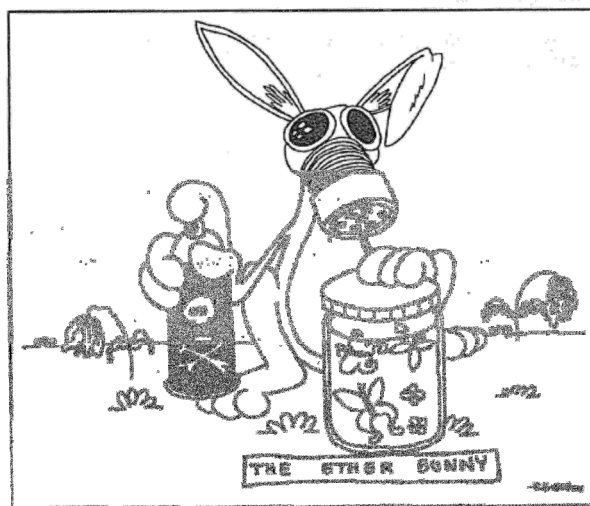
- A ketone is an organic compound containing a C=O group OTHER THAN AT THE END OF A HYDROCARBON CHAIN.

Ex. -

Ethers

- An ether is a compound in which an oxygen joins two hydrocarbon groups.

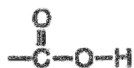
Ex. -



- Ethers often have anaesthetics properties.
- Many used to be used to put people to sleep before surgeries.

Carboxylic Acids

- A carboxylic acid is an organic compound containing a COOH group. This group is often shown as



Ex. -

Amines

- An amine is an organic compound containing an NH_2 group. Amino acids are a carboxylic acid with an amine at the 2 position.


Ex. -

Amides

- An amide is an organic compound containing a CONH_2 group. The CONH_2 group is also shown as

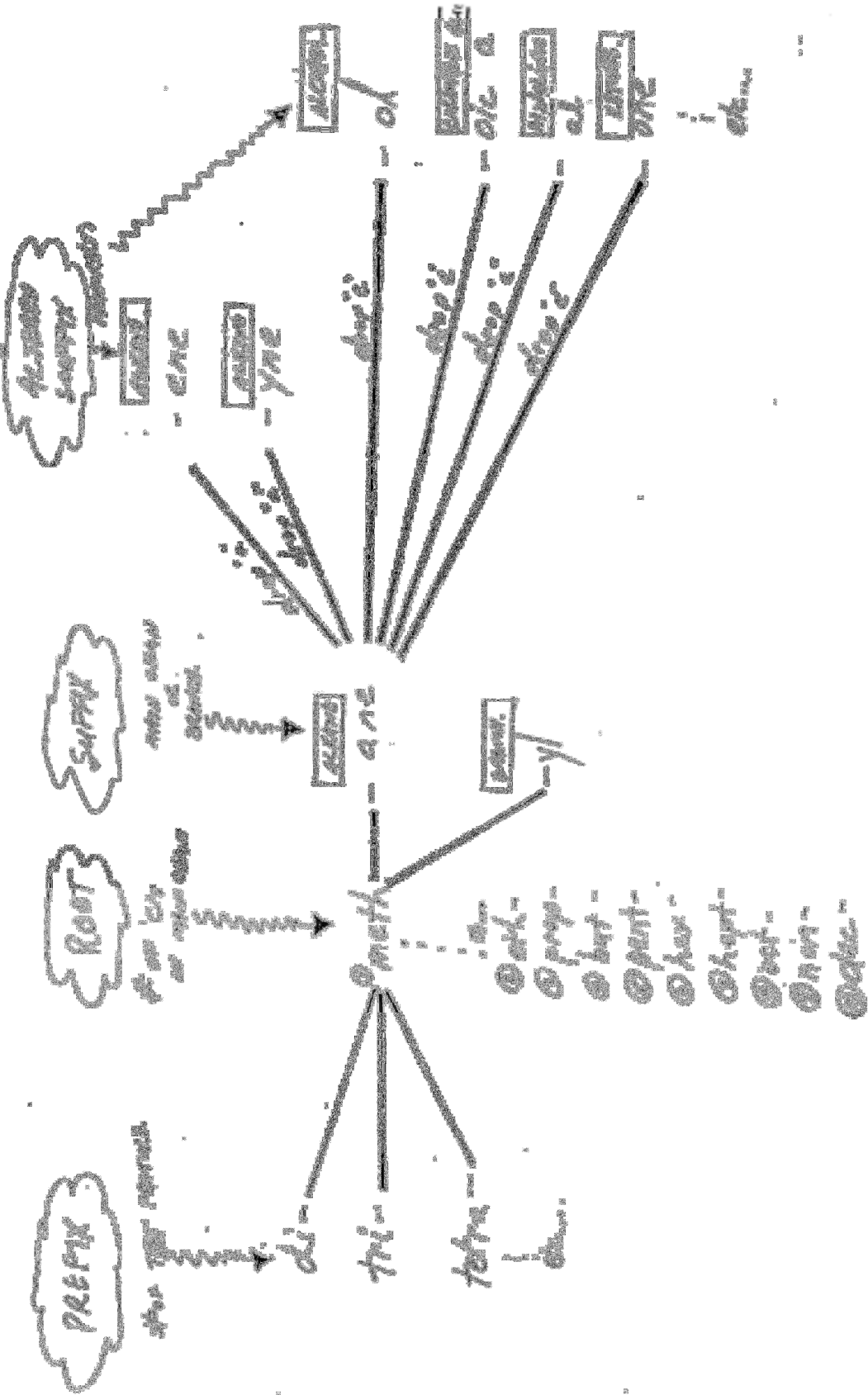


Ex. -

Name	Functional Group	Name	Functional Group
alkene	$\text{C}=\text{C}$	ether	$-\text{O}-$
alkyne	$\text{C}\equiv\text{C}$	amine	$-\text{NH}_2$
halide	$-\text{F}, -\text{Cl}, -\text{Br}$ or $-\text{I}$	amide	$-\text{CONH}_2$
alcohol	$-\text{OH}$	carboxylic acid	$-\text{COOH}$
aldehyde	$-\text{CHO}$	ester	$-\text{COO}-$
ketone	$-\text{CO}-$	aromatic ring	

An Illustration of the Code of Organic Nomenclature

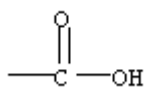
- note this does not illustrate the detailed rules - see your notes!



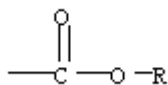
Functional Group Priorities in Organic Nomenclature

Group - from highest to lowest priority:

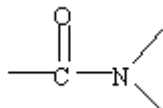
carboxylic acid



ester



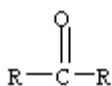
amide



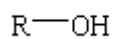
aldehyde



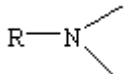
ketone



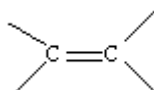
alcohol



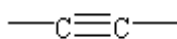
amine



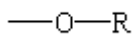
alkene



alkyne



ether



halogen

