

- Amino group: -NH_2 (amines) related to ammonia (-NH_3) and act as base accepting a proton to form -NH_3^+
 - Hydrophobic and reactive and hydrogens can be replaced by other groups
- Carbonyl group: -C=O one of the most important and reactive groups
 - Hydrophilic
 - Aldehydes -CHO
 - $\text{CH}_3\text{-C-H}$
 - $=\text{O}$
 - Ketones
 - $\text{CH}_3\text{-C-CH}_3$
 - $=\text{O}$
- Carboxylic acid group: -COOH
 - -OH can ionize making compounds containing this group weak acids
 - Krebs cycle (tricarboxylic acid cycle) is a cycle of cellular reactions involving a number of carboxylic acids
- Sulfhydryl groups: -SH
 - H atom can be removed easily
 - In proteins 2-SH groups may become oxidized to form a cross link structure -S-S-
- Several functional groups in 1 molecule:
 - Alpha- amino acids (building blocks of proteins)
 - Contains both -COOH and -NH_2 but at neutral pH an amino acid is best written $^+\text{H}_3\text{N-CHR-CO}_2^-$
 - Fatty acids contain both hydrophilic and hydrophobic groupings

Important reactions:

- Oxidation of alcohols
 - Alcohol groups may reversibly be oxidized to carbonyl group
 - An aldehyde is the oxidation product when the alcohol has at least 2 H atoms attached to the C bearing the -OH groups
 - Known as the primary alcohol
 - Primary alcohol $\rightarrow$ aldehyde $\rightarrow$ carboxylic acid
 - If alcohol only has one H atom it will produce a ketone
- Reactions between functional groups
 - When carboxylic acid reacts with an alcohol, water is eliminated and an ester is formed
 - Condensation reaction
 - Reverse = hydrolysis

Organic Compounds

Carbon:

- Facilitated by its versatile valency of 4
- Ability to form long chains
 - More than one bond per atom
 - Preference for single bonds over double
 - 2 single bonds is more stable than 1 double
- Oxide must not be too much more stable than the pure element
 - Would only bond to oxygen

Hydrocarbon – organic carbon compound composed of hydrogen and carbon only

- Aliphatic and aromatic

Aliphatic:

- Carbon atoms form open chains, branched chains, & non-aromatic rings

Aromatic:

- Any organic compound characterized by 1 or more planar rings each of which contains 3 conjugated double bonds and delocalized pi electrons
- Undergo substitution reactions more readily than addition reactions
- Benzene