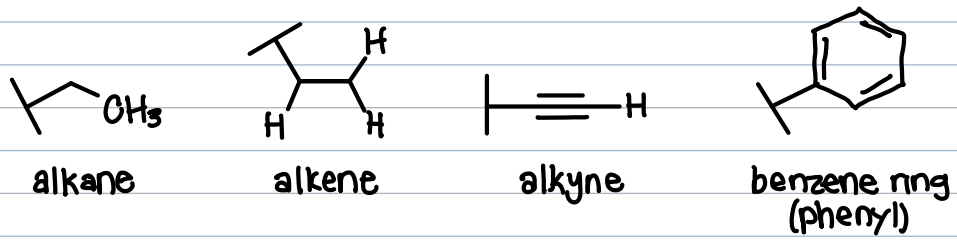
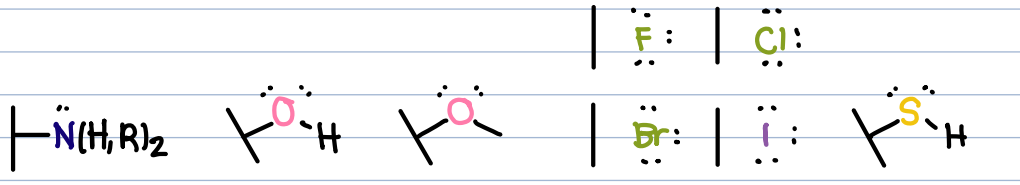
Functional Groups

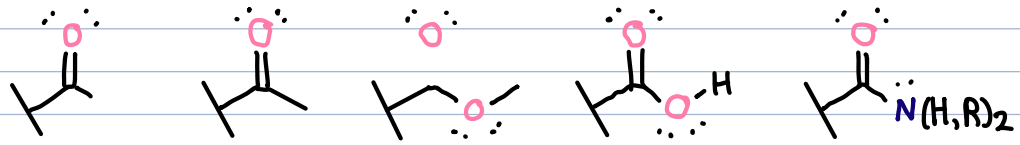
The Main Players



alkane alkene alkyne benzene ring (phenyl)

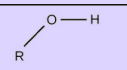
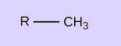
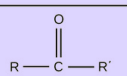
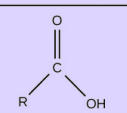
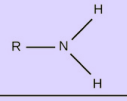
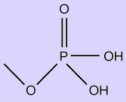
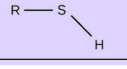


amine alcohol ether alkyl halide thiol



aldehyde ketone

The characteristics of an organic molecule depend not only on its carbon skeleton, but also on groups of atoms attached to the skeleton that are in involved in chemical reactions. These groups of atoms are called functional groups.

Functional Group	Structure	Properties
Hydroxyl		Polar
Methyl		Nonpolar
Carbonyl		Polar
Carboxyl		Charged, ionizes to release H^+. Since carboxyl groups can release H^+ ions into solution, they are considered acidic.
Amino		Charged, accepts H^+ to form NH_3^+. Since amino groups can remove H^+ from solution, they are considered basic.
Phosphate		Charged, ionizes to release H^+. Since phosphate groups can release H^+ ions into solution, they are considered acidic.
Sulfhydryl		Polar

Organic molecule tripeptide functional group:

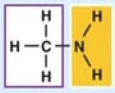
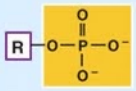
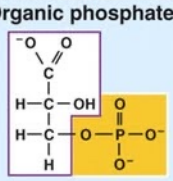
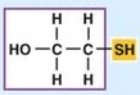
- phosphate group - the electronegative oxygens of the phosphate group attract electrons to themselves, and as a result the phosphate group acts as an acid losing hydrogen ions to the surrounding solution. This dissociation leaves the phosphate group w/ 2 negative charges. This group is important b/c they transfer of energy between organic molecules.

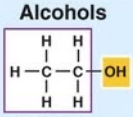
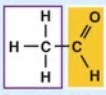
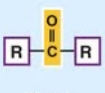
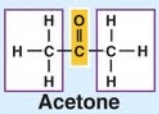
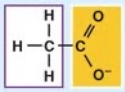
- There are 2 carbonyl groups, C double bond O, in this tripeptide. This group is polar b/c oxygen has a strong attraction for elections. If a carbonyl group is at the end of a carbon skeleton, the molecule = aldehyde; if a carbo-

nyl is within a carbon skeleton, the molecule = ketone

The sulfhydryl group (-SH) [molecules termed thiols have a sulfhydryl group. 2 SH groups can react, forming a cross-link helps stabilize the structure of many proteins The 2 electronegative O2 of the carboxyl group (-COOH) pull electrons away from the hydrogen atom. This weakens the bond between O2 & H and the hydrogen atom tends to dissassociate from the molecule as a H+ Bic the carbonoxyl group donates H+; this group is acidic & molecules that contain these groups are known as carboxylic acids.

- The hydroxyl group (-OH) is polar bic the electronegative oxygen has a strong attraction for elections.

Functional group	Class of compounds and an example	Properties
 Amino	Amines  Methylamine	Basic. Accepts H^+ in living tissues to form $—NH_3^+$. Enters into condensation reactions by giving up H^+.
 Phosphate	Organic phosphates  3-Phosphoglycerate	Negatively charged. Enters into condensation reactions by giving up —OH. When bonded to another phosphate, hydrolysis releases much energy.
 Sulfhydryl	Thiols  Mercaptoethanol	By giving up H, two —SH groups can react to form a disulfide bridge (S—S), thus stabilizing protein structure.

Functional group	Class of compounds and an example	Properties
 Hydroxyl	Alcohols  Ethanol	Polar. Hydrogen bonds with water to help dissolve molecules. Enables linkage to other molecules by condensation.
 Aldehyde	Aldehydes  Acetaldehyde	C=O group is very reactive. Important in building molecules and in energy-releasing reactions.
 Keto	Ketones  Acetone	C=O group is important in carbohydrates and in energy reactions.
 Carboxyl	Carboxylic acids  Acetate	Acidic. Ionizes in living tissues to form $—COO^-$ and H^+. Enters into condensation reactions by giving up —OH. Some carboxylic acids important in energy-releasing reactions.