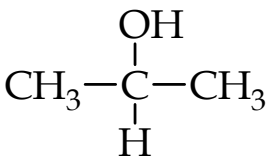
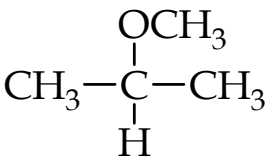
These Functional Groups must be memorized

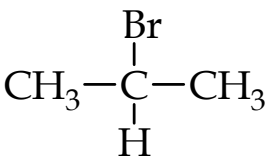
Alcohol



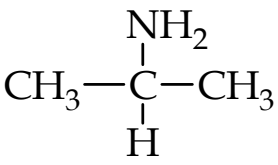
Ether



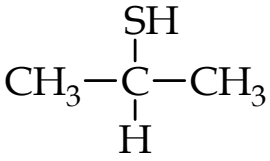
Halide



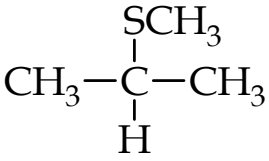
Amine



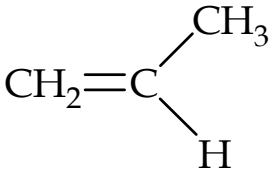
Thio alcohol



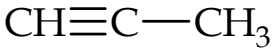
Thio ether



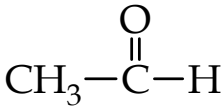
Alkene



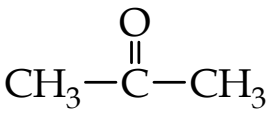
Alkyne



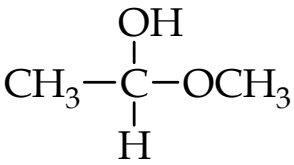
Aldehyde



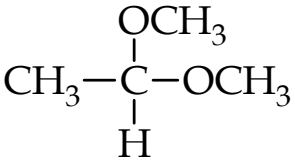
Ketone

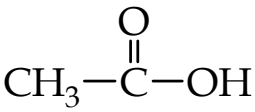


Hemiacetal

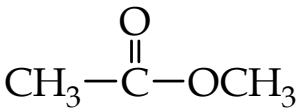


Acetal

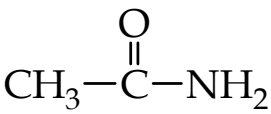




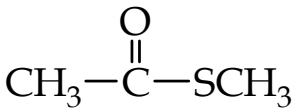
Carboxylic Acid



Carboxylic Ester



Amide



Thio Ester

On the next page, see how the symbol R is used to abbreviate alkyl groups when drawing condensed structures.

Alcohols and Phenols

- Alcohols can be primary, secondary, or tertiary.
- A phenol is an aromatic alcohol.
- The general form for an alcohol is R-OH

Amines

- Amines can be primary (1°), secondary (2°), tertiary (3°), or quaternary (4°). 1°, 2°, and 3° amines can be protonated.
- Protonated amines have 4 bonds to N, one of those bonds is to a H.
- A protonated amine has a positive charge on the N and has *one less* spare pair of electrons than it would have if it was neutral (still follows the octet rule).
- The general form for a primary amine is RNH_2, secondary is R_2NH, tertiary is R_3N, and quaternary is R_4N^+.

Carbonyl containing compounds

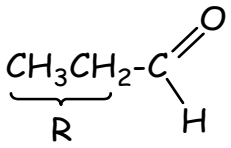
- A *carbonyl* is a carbon double bonded to an oxygen (C=O).
- The carboxylate form of carboxylic acid is ionic. The single bonded oxygen atom holds the negative charge and has *one more* spare pair of electrons than it would have if neutral (still follows the octet rule).

Sulfur containing compounds

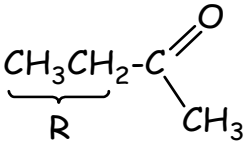
- thio- is a prefix that commonly refers to the presence of sulfur in organic molecules.
- The general form for a thiol is R-SH

Carbonyl Functional Groups

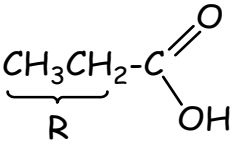
aldehyde



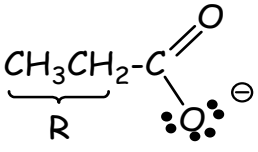
ketone



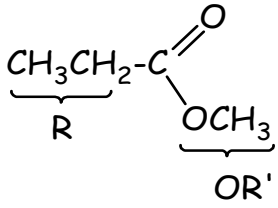
carboxylic acid



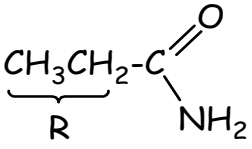
carboxylate



carboxylic ester



amide



amide