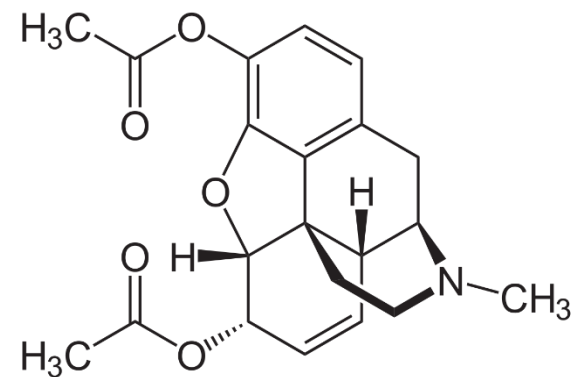
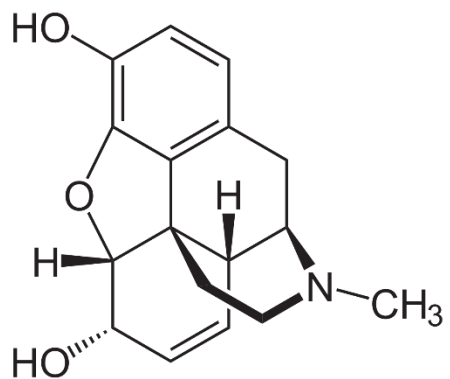
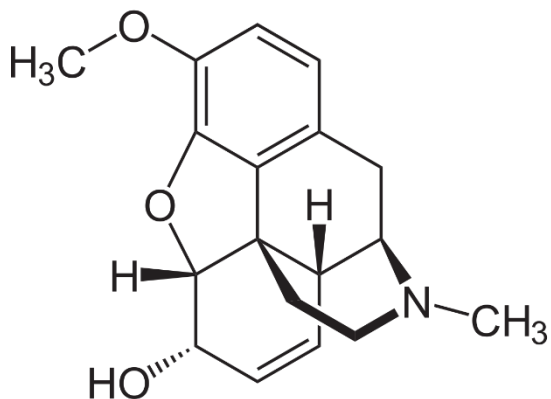


Functional Groups

Components of organic molecules



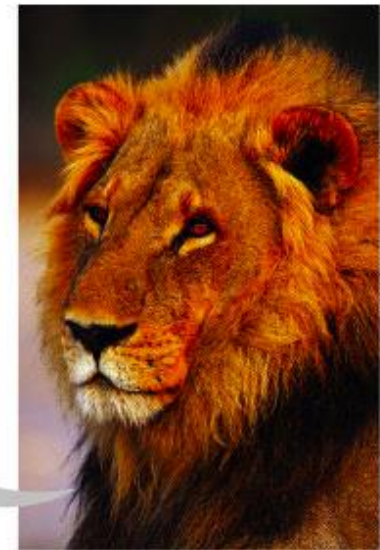
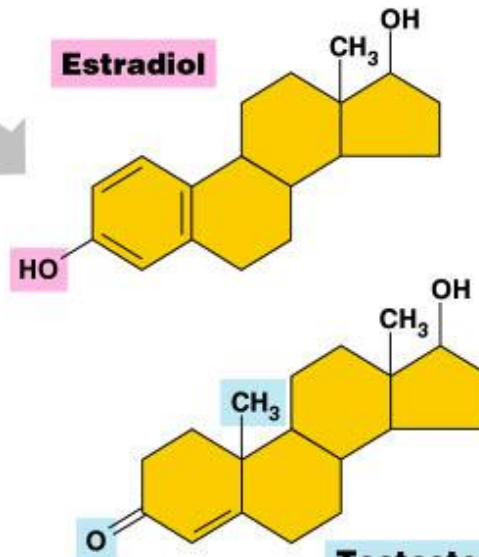
Viva la difference!

Basic structure of male & female hormones is identical

- identical C skeleton
- attachment of different functional groups
- interact with different targets in the body



Female lion

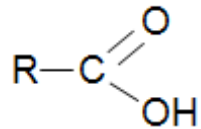


Male lion

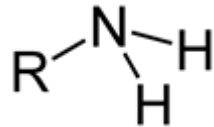
Functional groups

Each functional group has its own properties.

Carboxyl

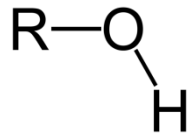


Amino

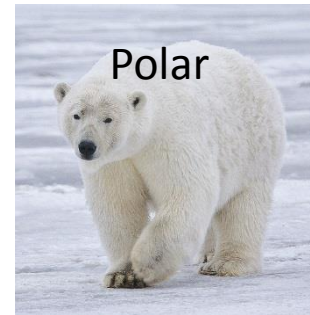
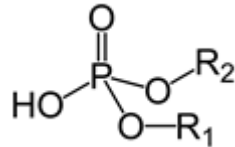


All of these functional groups are...

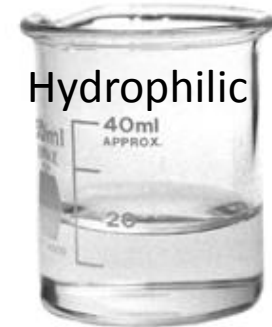
Hydroxyl



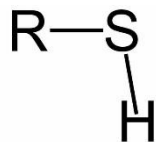
Phosphate



AND

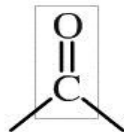


Sulfhydryl



AKA Thiol

Carbonyl



Molecules that have these functional groups will get their properties
(To some degree)

e.g. Increased solubility in water

Hydroxyl

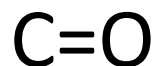
—OH

- organic compounds with OH = alcohols
- names typically end in **-ol**
 - ethanol

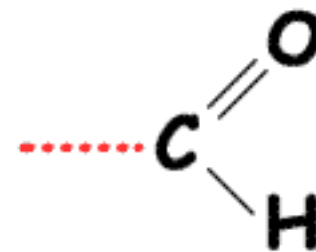


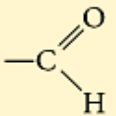
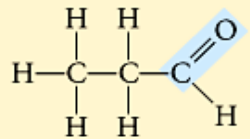
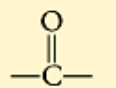
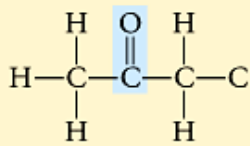
Functional Group	Formula	Name of Compounds	Example
Hydroxyl	—OH	Alcohols	$\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{OH} \\ \quad \\ \text{H} \quad \text{H} \end{array}$ <p>Ethanol (the drug of alcoholic beverages)</p>

Carbonyl



- O double bonded to C
 - if C=O at end molecule = aldehyde
 - if C=O in middle of molecule = ketone



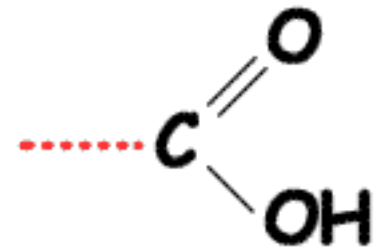
Functional Group	Formula	Name of Compounds	Example
Carbonyl		Aldehydes	 Propanal
		Ketones	 Acetone

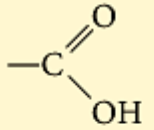
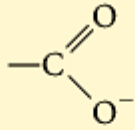
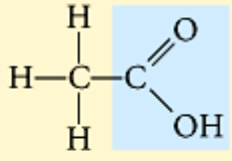


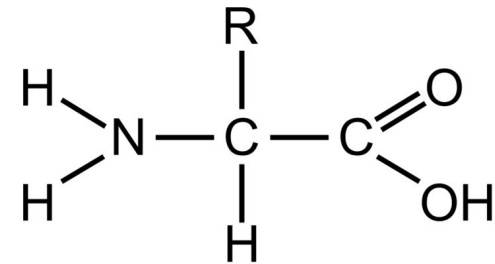
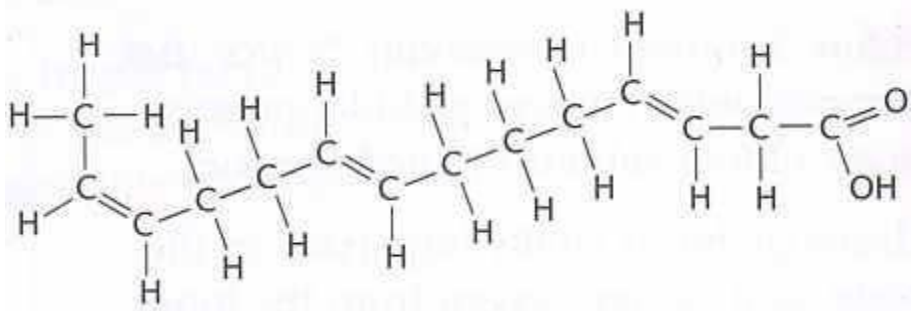
Carboxyl

-COOH

- C double bonded to O & single bonded to OH group
 - compounds with COOH = acids
 - fatty acids
 - amino acids



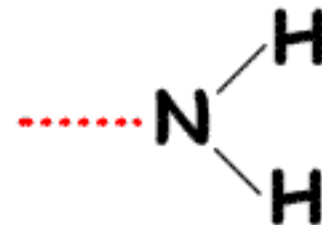
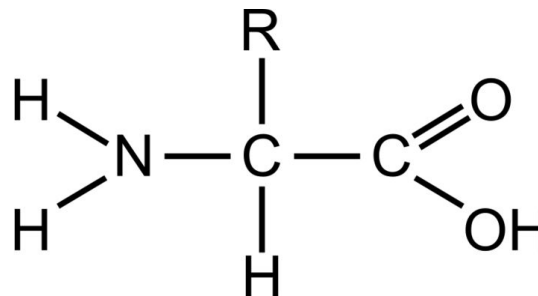
Functional Group	Formula	Name of Compounds	Example
Carboxyl	 (non-ionized)	 (ionized)	Carboxylic acids  Acetic acid* (the acid of vinegar)



Amino



- N attached to 2 H
 - compounds with NH_2 = amines
 - amino acids
 - NH_2 acts as base
 - ammonia picks up H^+ from solution



Functional Group	Formula	Name of Compounds	Example
Amino	 (non-ionized)	 (ionized)	Amines
			 Glycine*

Sulfhydryl



- S bonded to H
 - compounds with SH = thiols
 - SH groups stabilize the structure of proteins

Functional Group	Formula	Name of Compounds	Example
Sulfhydryl	$-\text{SH}$	Thiols	$\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{SH} \\ \quad \\ \text{H} \quad \text{H} \end{array}$ <p>Ethanethiol</p>

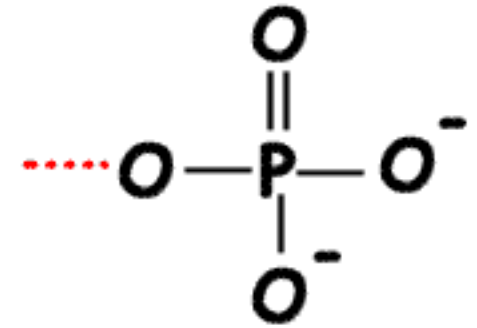


Phosphate



- P bound to 4 O

- connects to C through an O
- PO_4^{3-} are anions with 3 negative charges
- function of PO_4 is to transfer energy between organic molecules (ATP)



Functional Group	Formula	Name of Compounds	Example
Phosphate		Organic phosphates	

