Today

More Organic

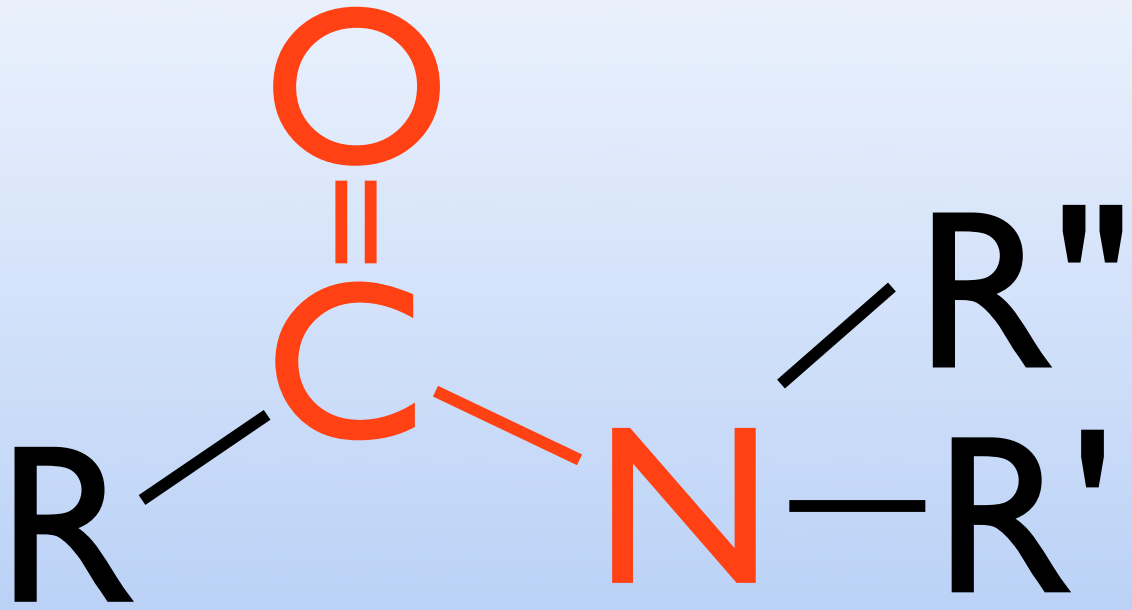
Polymer

Biopolymers

Primary Amine

-NH_2 group is an amine
suffix is -amine

Amide



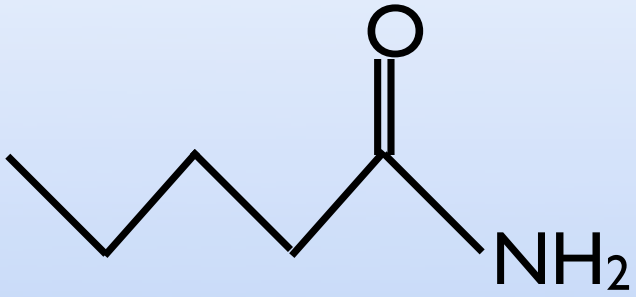
carbon double bonded to an oxygen
bonded to carbon on one side
N on the other side

suffix is -amide

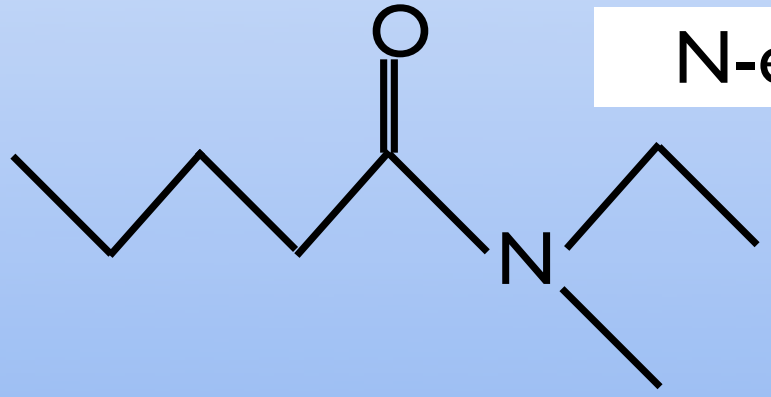
Naming amide

Treat part with C=O as parent

parts on the N as sidechains

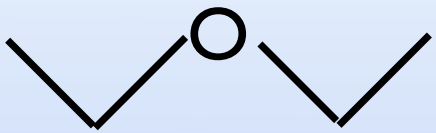


pentanamide

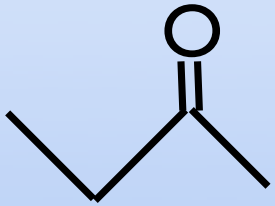


N-ethyl-N-methylpentanamide

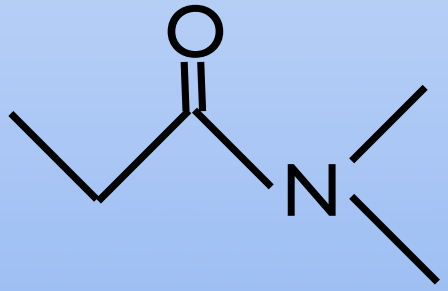
Amine



Ether

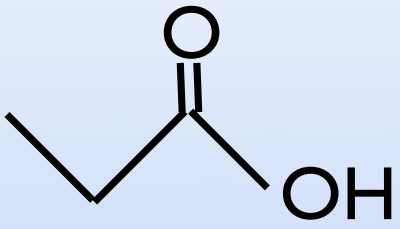


Ketone

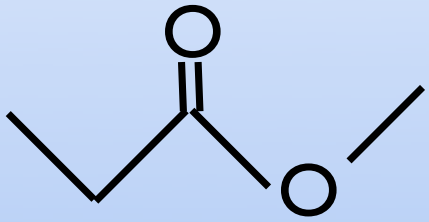


Amide

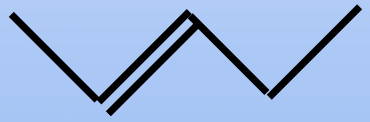
Alcohol



Carboxylic Acid



Ester



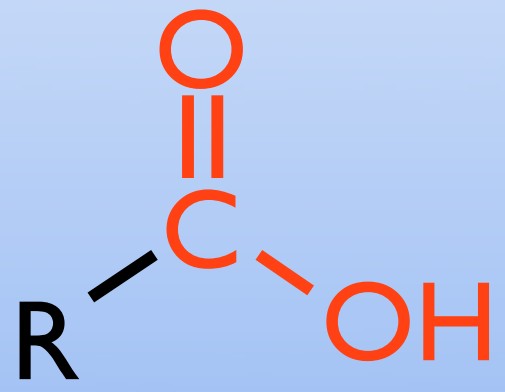
Alkene

Important Reaction for Biochemistry

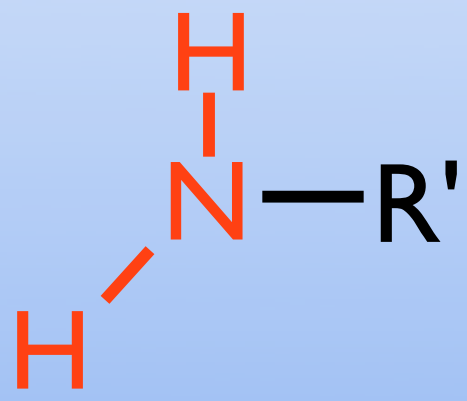
Formation of an Amide

The don't call them functional groups for nothing

Carboxylic Acid

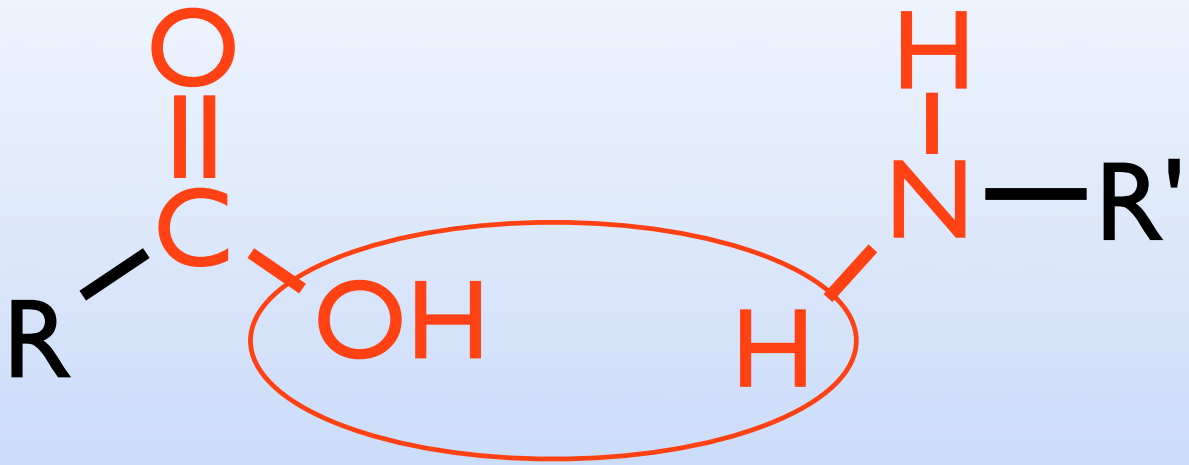


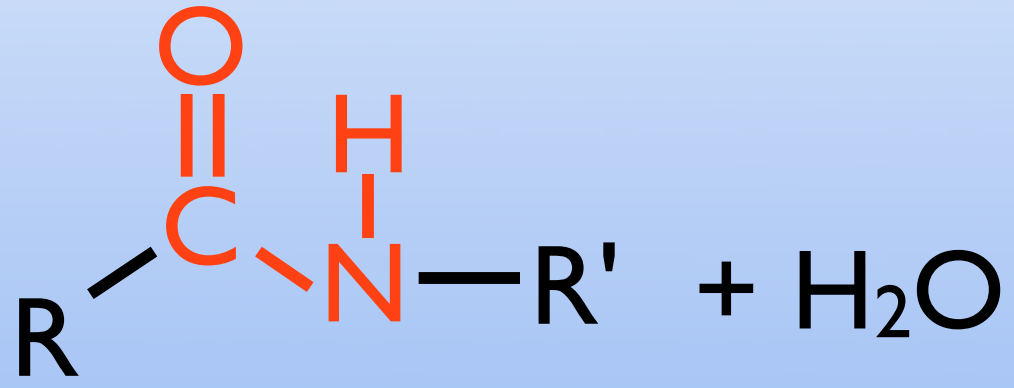
Primary Amine



Carboxylic Acid

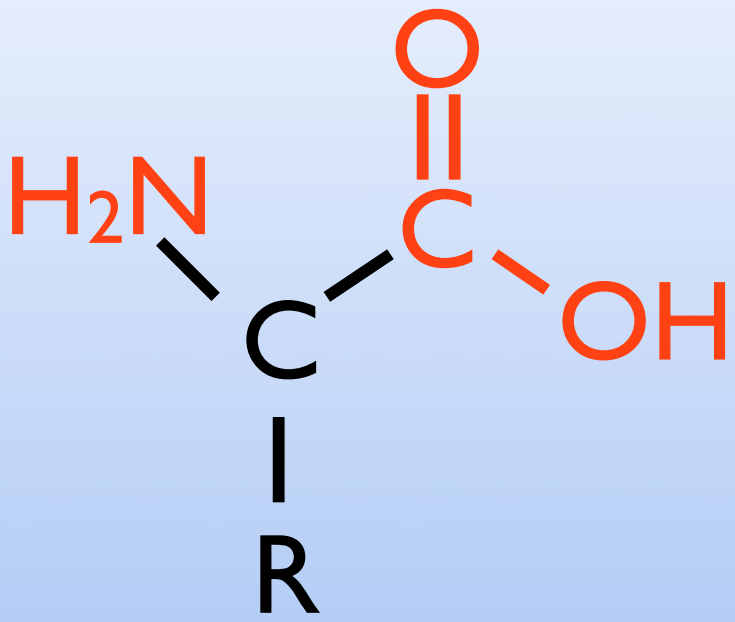
Primary Amine





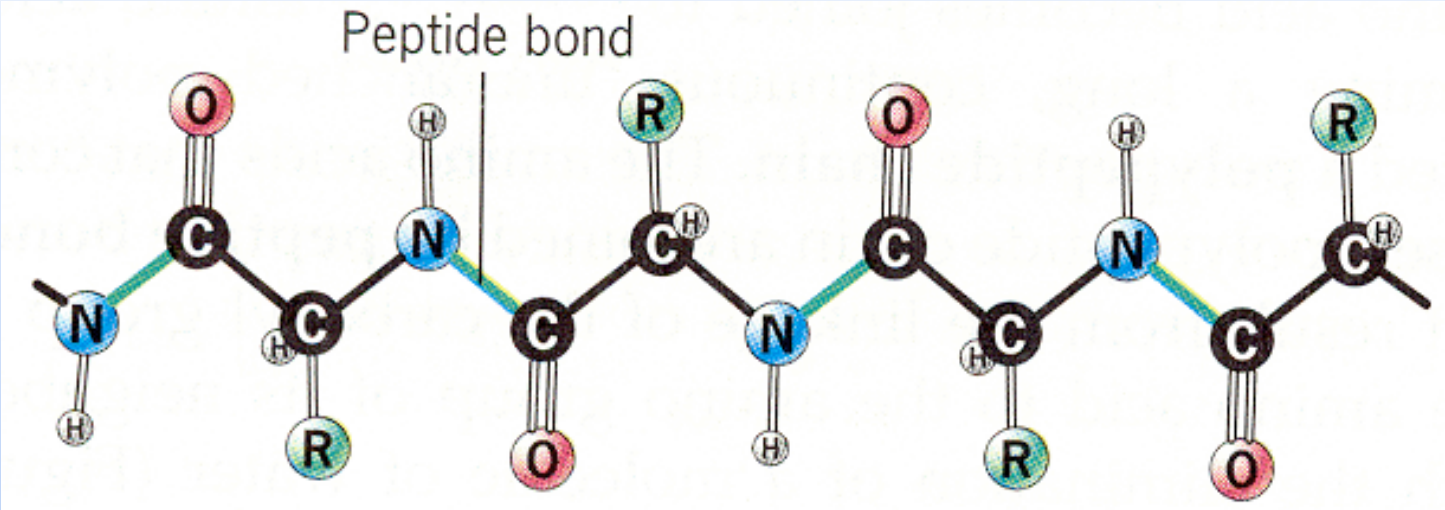
Amide + Water

Amino Acid



Carboxylic End and Amine End
Can react with itself
(or similar molecules) in a chain

Polypeptide

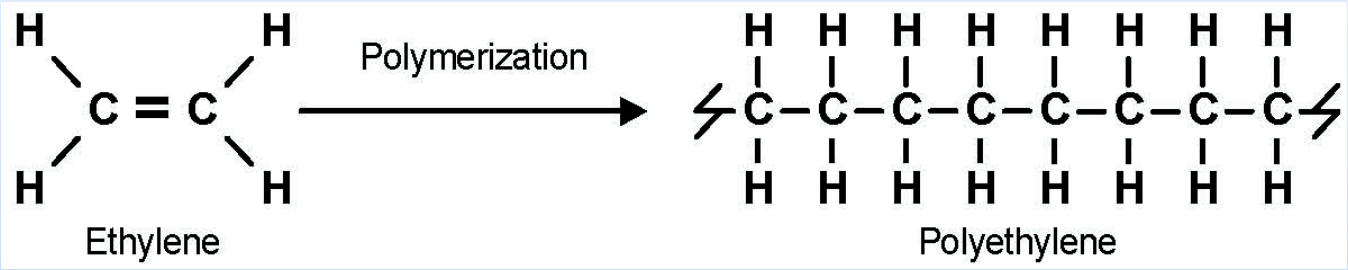


Two distinct ends
N-terminus is an amine
C-terminus is a carboxylic acid

Such a compound is called a polymer

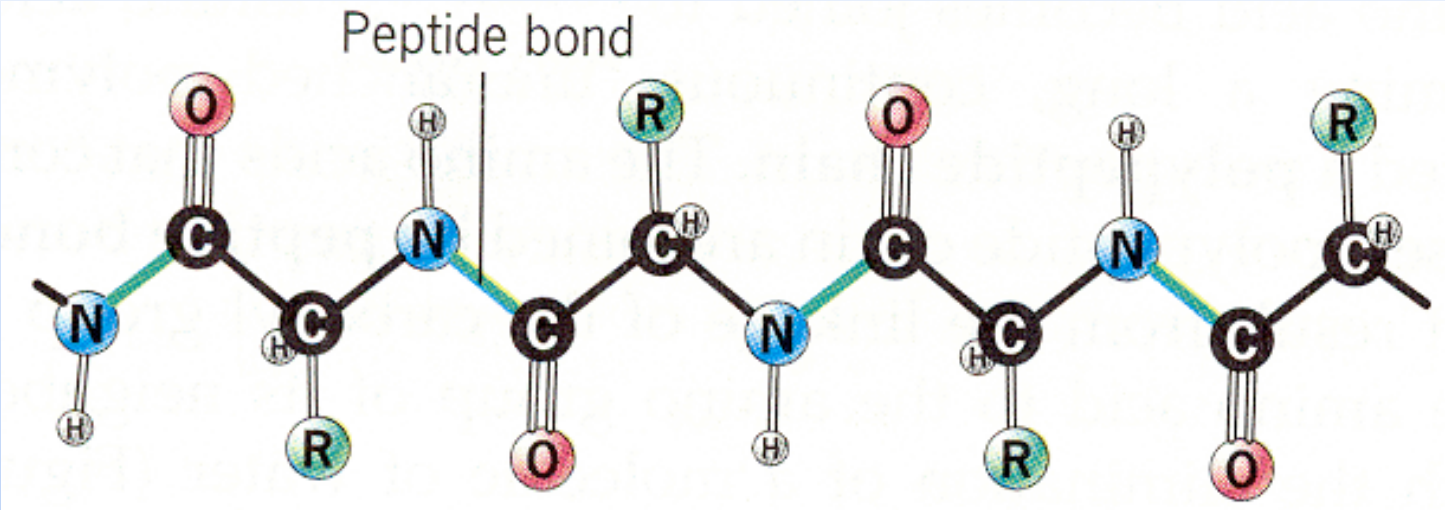
monomer

polymer



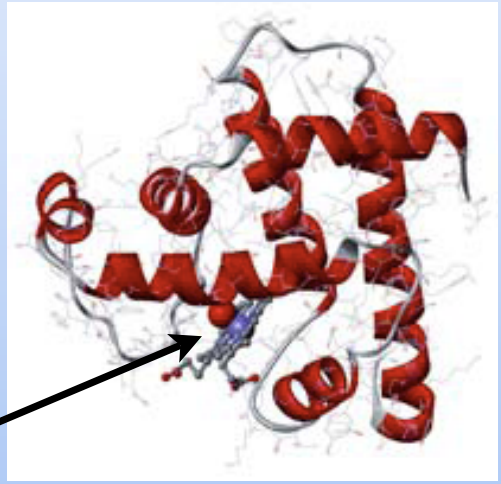
polyethylene = plastic shopping bag

Biopolymer (polymer that is biologically relavent)

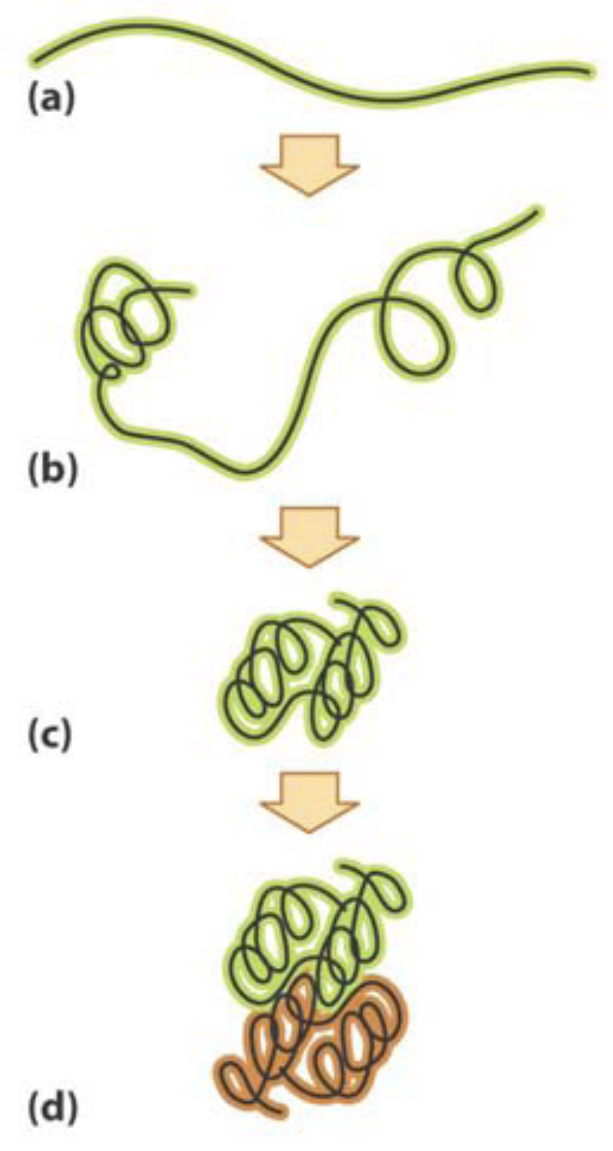


monomer = amino acid

Polypeptides have unique structures that give them function (proteins)



binding site
might be an enzyme
(catalyst)



primary structure = sequence

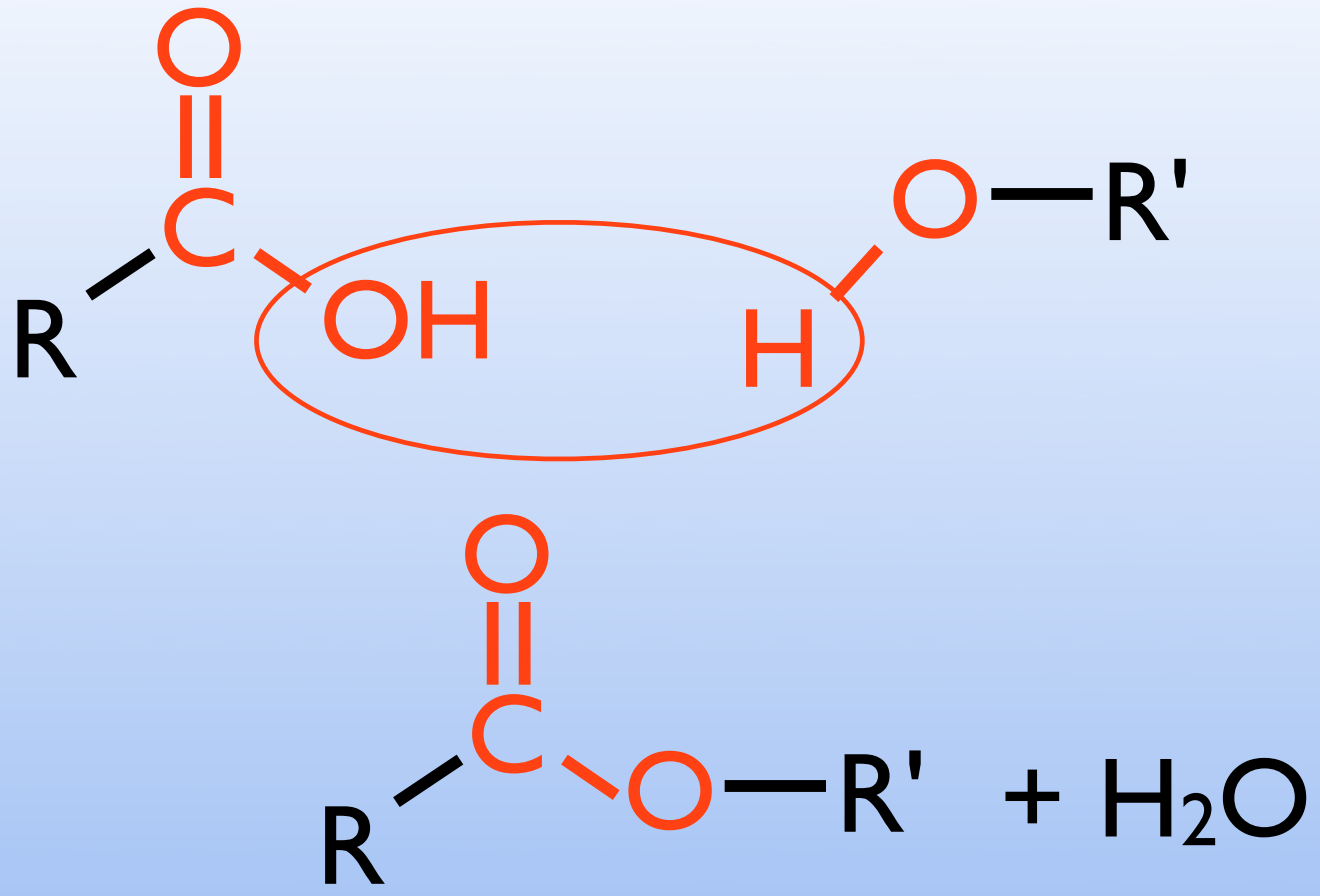
secondary structure = folds

tertiary structure = 3-D arrangment

quaternary structure = interactions with other proteins

Carboxylic Acid

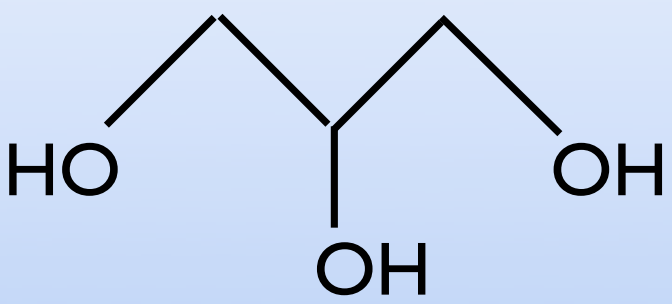
Alcohol



Ester + Water

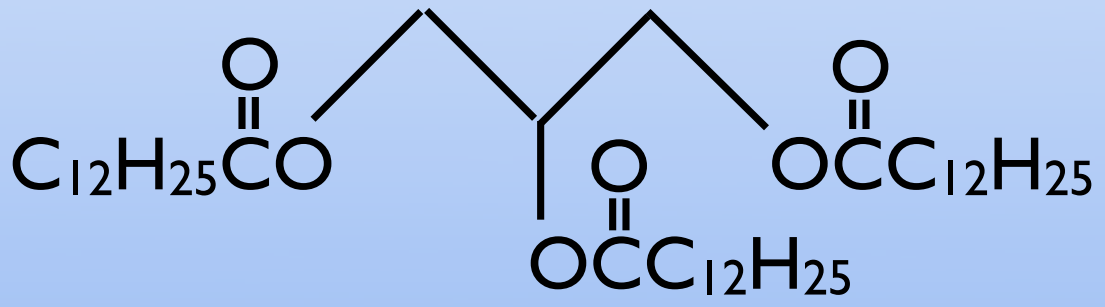
Triglycerides

Gylcerol



Fatty Acid
(carboxylic acid with long chain)

$C_{12}H_{25}COOH$



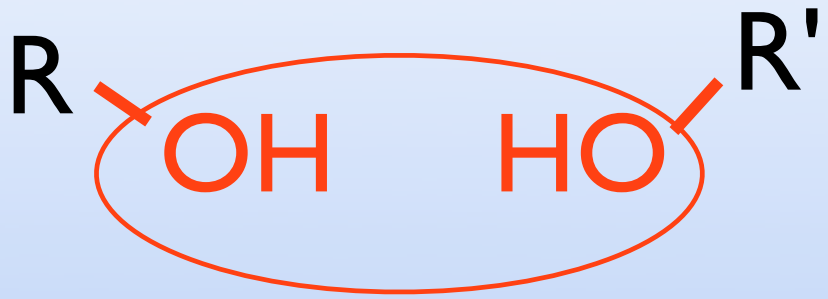
Makes Trigylceride

The three fatty acids can
all be the same or different

High levels of triglycerides is linked to
build up of plaque in the arteries
= heart disease

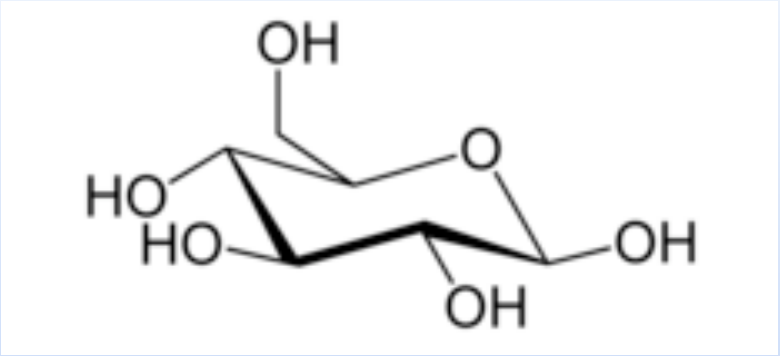
saturated fats	unsaturated fats
all sp^3 carbon	some sp^2 carbon
(no double bonds)	(some double bonds)
strong intermolecular forces	weaker intermolecular forces
solid	liquid
(lard, crisco, ...)	(canola oil, olive oil, ...)

Alcohol Alcohol



Ether + Water

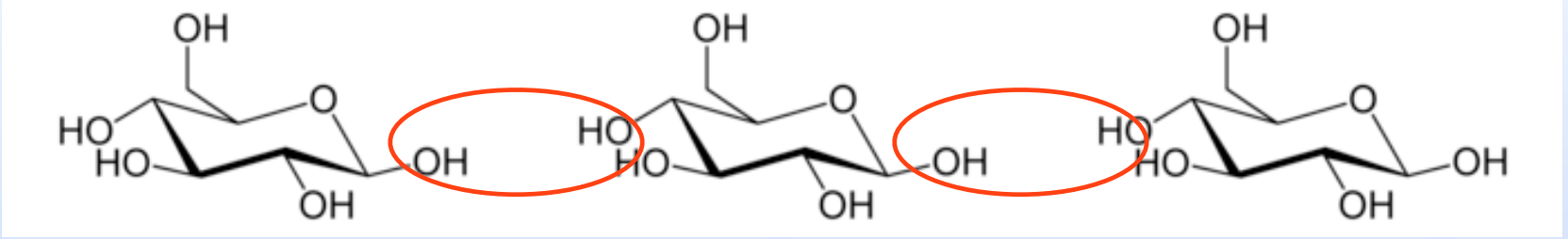
Sugars

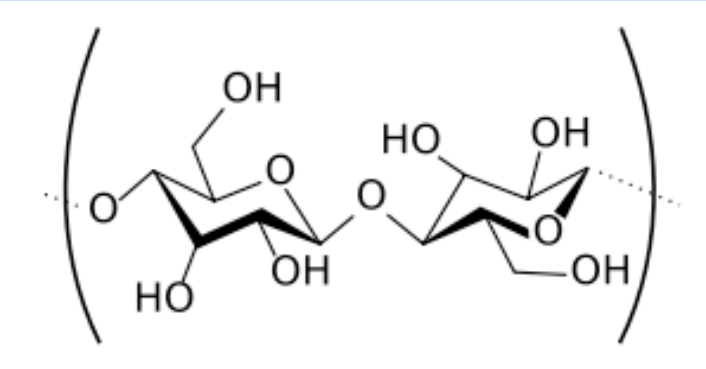


Glucose
(key factor for sugars lots of hydroxyls)

They can react to form chains of sugars
polysaccharide

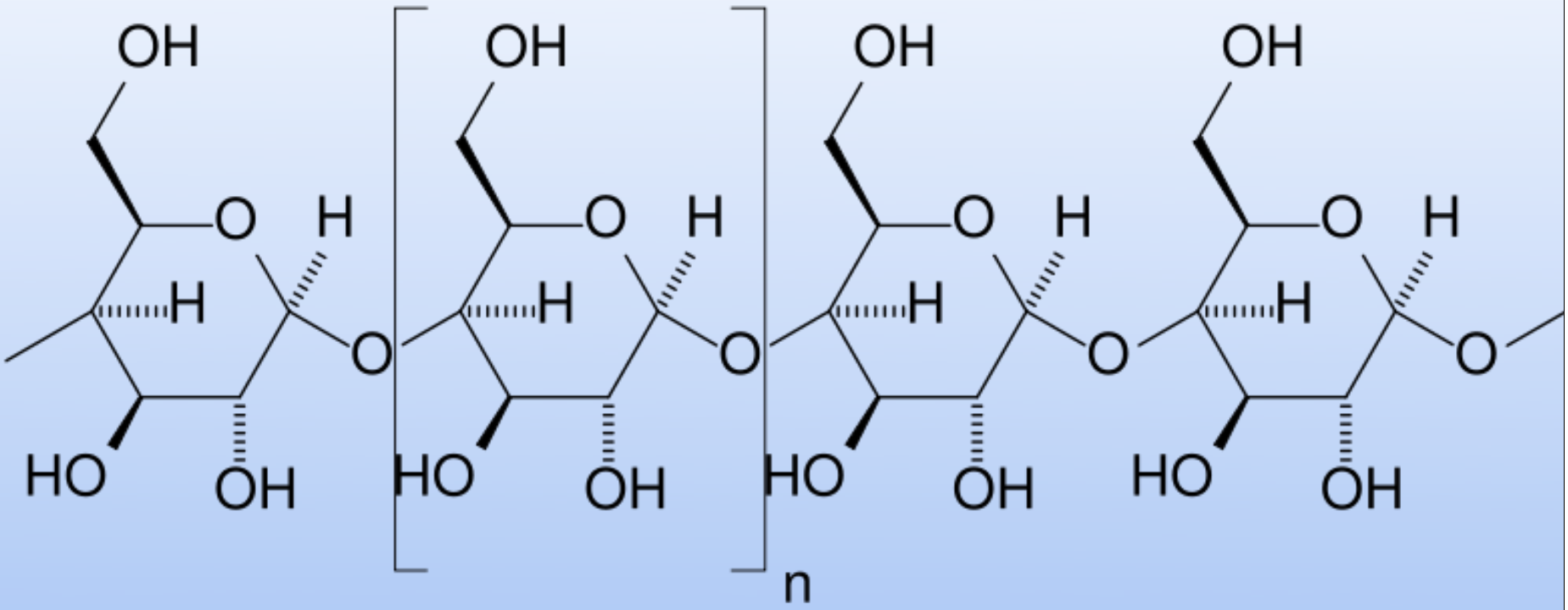
Celluose





Very long ether chain
(pretty much all plant material)

Polysaccharide (Starch)



Sugars, Carbohydrates
monosaccharides (one)
disaccharides (two)
polysaccharides (many)

Condensation Reactions
(two molecules make one + water)

Carboxylic Acid + Amine = Amide + water

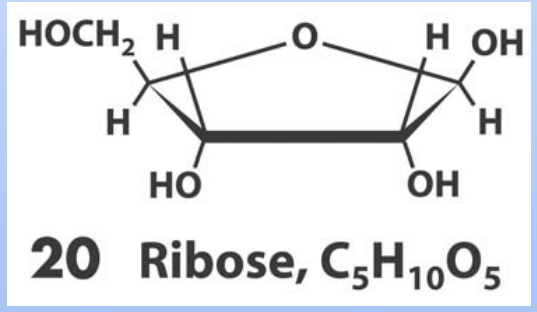
Carboxylic Acid + Alcohol = Ester + water

Alcohol + Alcohol = Ether + water

Other important biopolymers

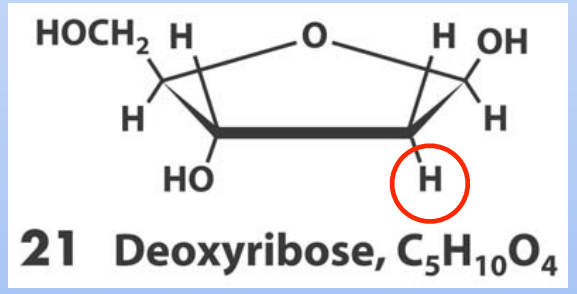
(RNA and DNA)

Three pieces Base, Sugar, Phosphate



20 Ribose, $C_5H_{10}O_5$

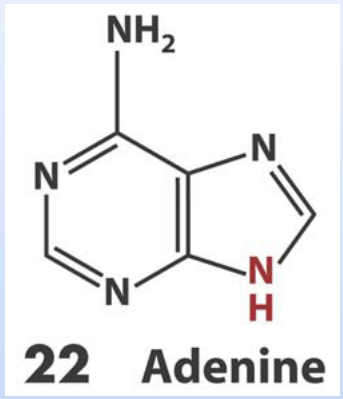
RNA sugar



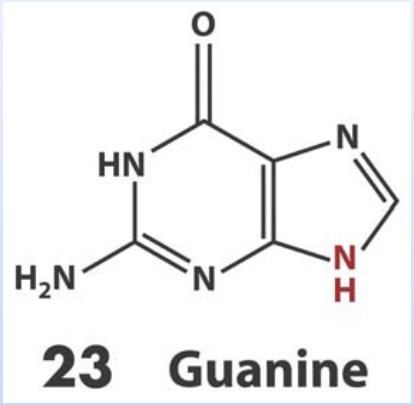
21 Deoxyribose, $C_5H_{10}O_4$

DNA sugar

Base units (4 DNA base units)

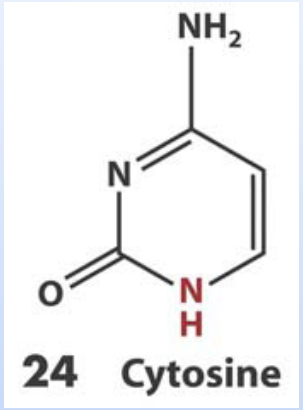


22 Adenine

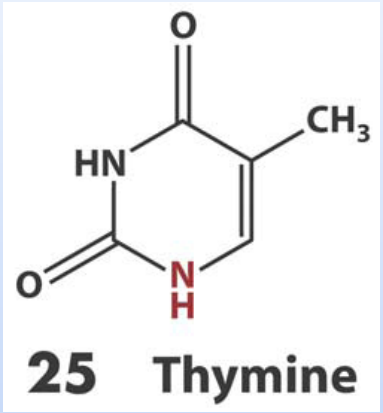


23 Guanine

guanidine

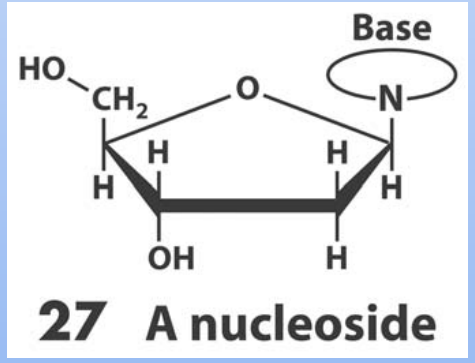


24 Cytosine

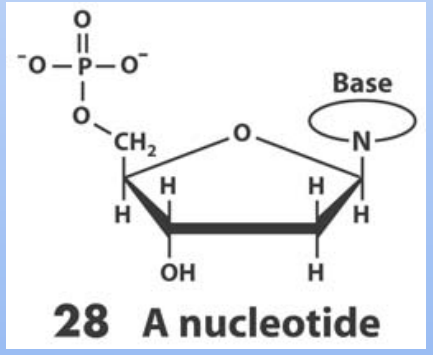


25 Thymine

pyrimidine

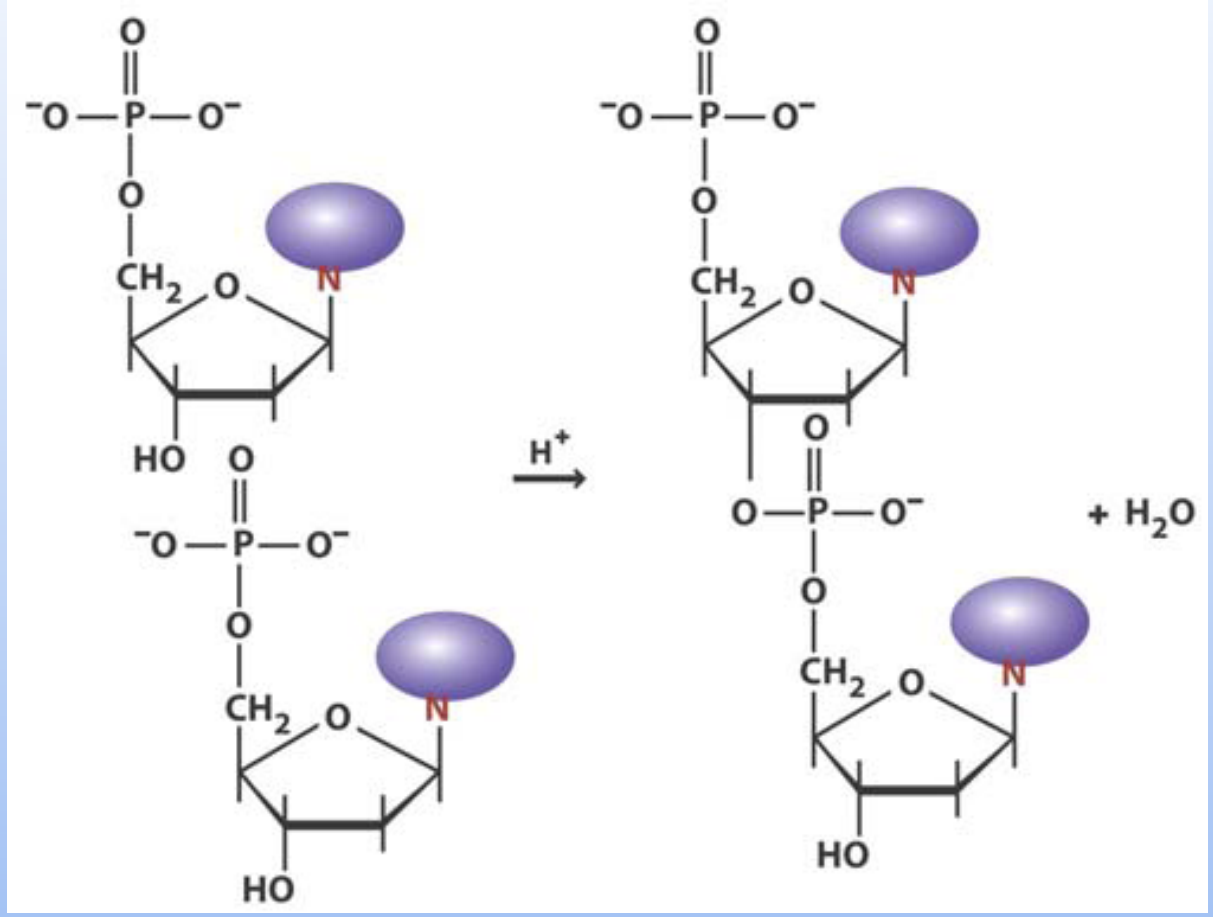


27 A nucleoside



28 A nucleotide

Put it all together and you get a polymer



opposite of this reaction is hydrolysis

what about tertiary structure?
double helix due to hydrogenbonds