

More Organic

Today

Review hydrocarbons  
Functional Groups  
Condensation Reaction  
Biopolymers

How many carbons and hydrogens in the following?



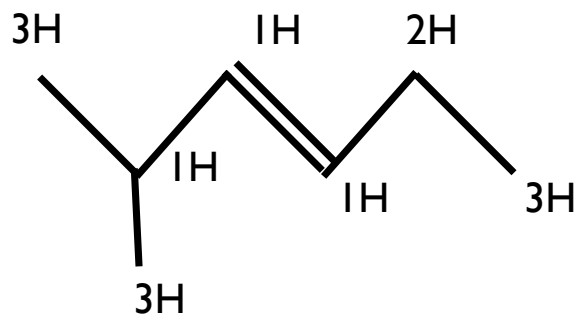
A. 6 C, 14 H

B. 6 C, 15 H

C. 6 C, 16 H

D. 7 C, 15 H

E. 7 C, 14 H



## Other side-chains

Halogens

F Fluoro

Cl Chloro

Br Bromo

I Iodo

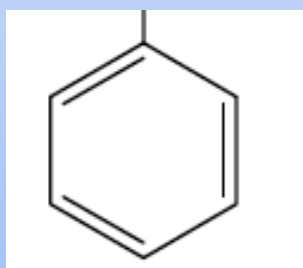
OH group

hydroxy

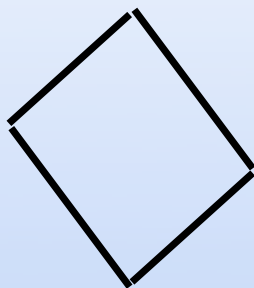
NH<sub>2</sub> group

amino

Benzene Ring  
phenyl



**Cyclic Hydrocarbons**  
the carbon chain connects back to itself



cyclobutane

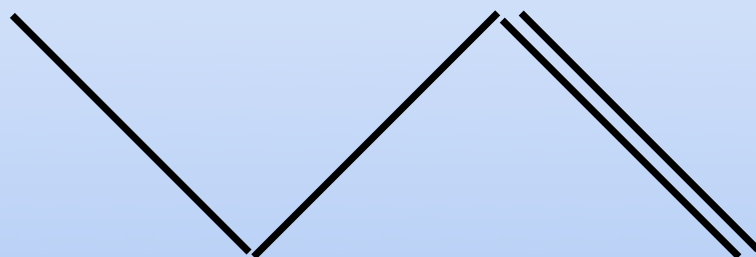
# Structural Isomers

hexane ( $C_6H_{14}$ )

doc cam

## Nomenclature with functional group

Put the number by before the functional group suffix



you'll be tested on this one

you'll be  
understood

I butene

IUPAC  
name

but-1-ene

Name this compound



- A. 2-methyl pent-5-ene
- B. 2-methyl hex-3-ene
- C. 1,1-dimethyl pent-2-ene
- D. 5-methyl hex-3-ene
- E. 5-methyl hex-4-ene

## Dienes

Two double bonds



5 carbon chain, parent  
penta

no side chains

two double bonds diene  
position 1 and 3

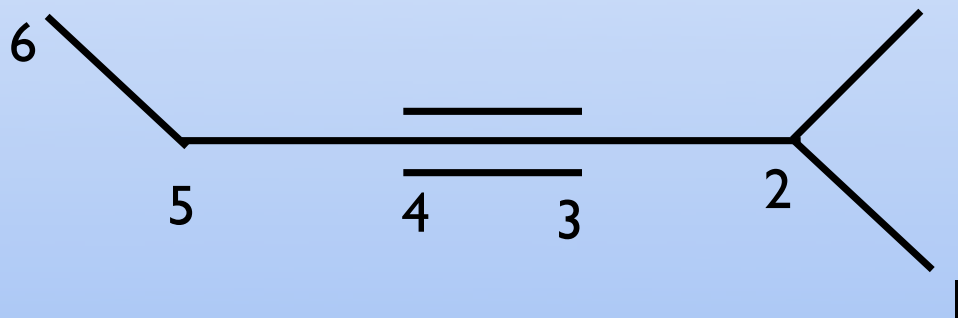
penta-1,3-diene



# Alkyne

Carbon Carbon Triple Bond

Suffix **-yne**



2 methyl hex-3-yne

## Other functional groups

Common  
Ethanol

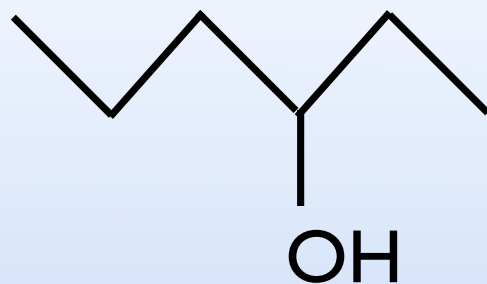


R = Generic representation  
of the rest of the molecule

functional group

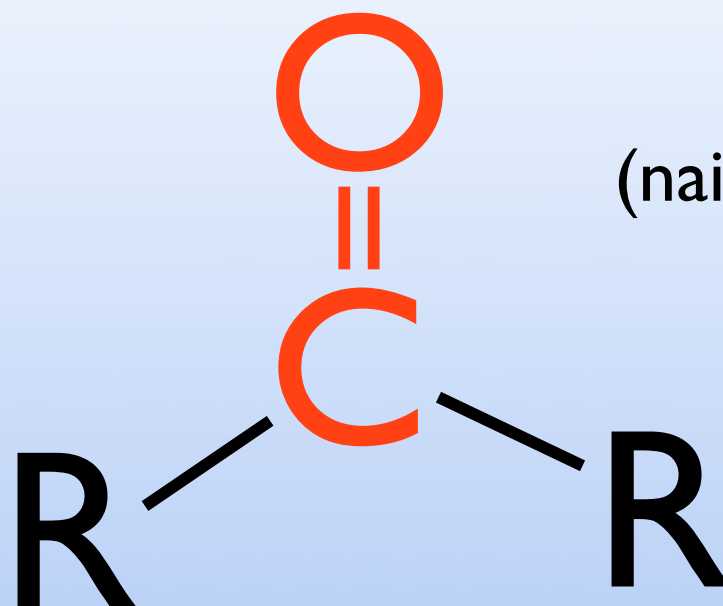
**-OH** group is an alcohol  
suffix is **-ol**

Name this compound



- A. heptan-2-ol
- B. hexan-4-ol
- C. 2-ethylbutan-1-ol
- D. 2-ethylpentan-1-ol
- E. hexan-3-ol

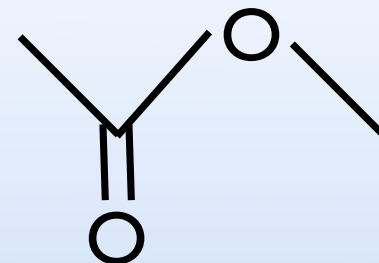
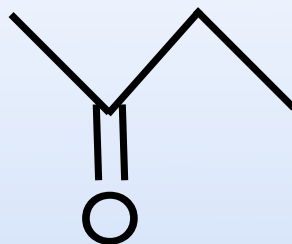
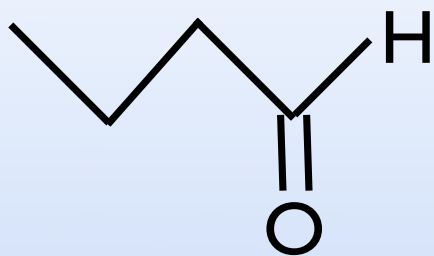
Ketone



Common  
Acetone  
(nail polish remover)

carbon double bonded to an oxygen  
bonded to carbons on either side  
suffix is -one

Which of the following is a ketone?



A. A

B. B

C. C

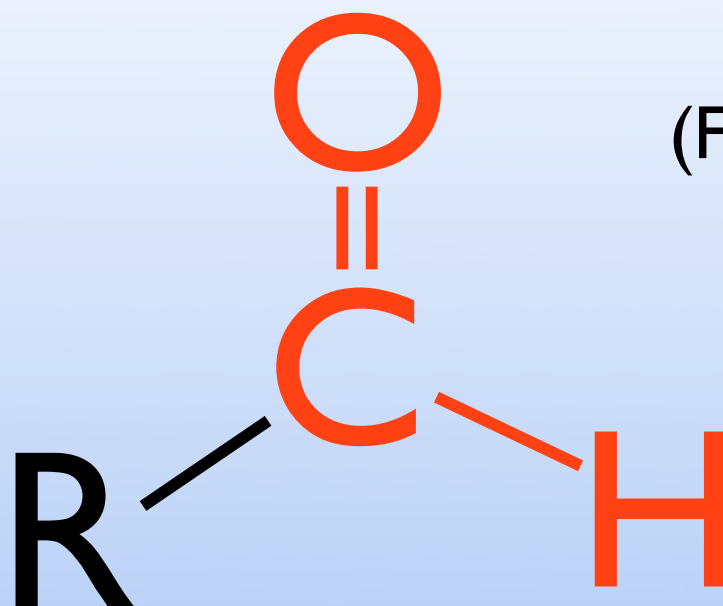
D. A & B

E. all three

butan-3-one

## Aldehyde

Common  
Formaldehyde  
(Fetal Pig Storage)



carbon double bonded to an oxygen  
bonded to carbon on one side  
(like a ketone at the end of a chain)  
suffix is -al

Name this compound



A. hex-3-enal

B. hex-3-en-1-al

C. hex-3-en-6-al

D. hex-6-al-3-ene

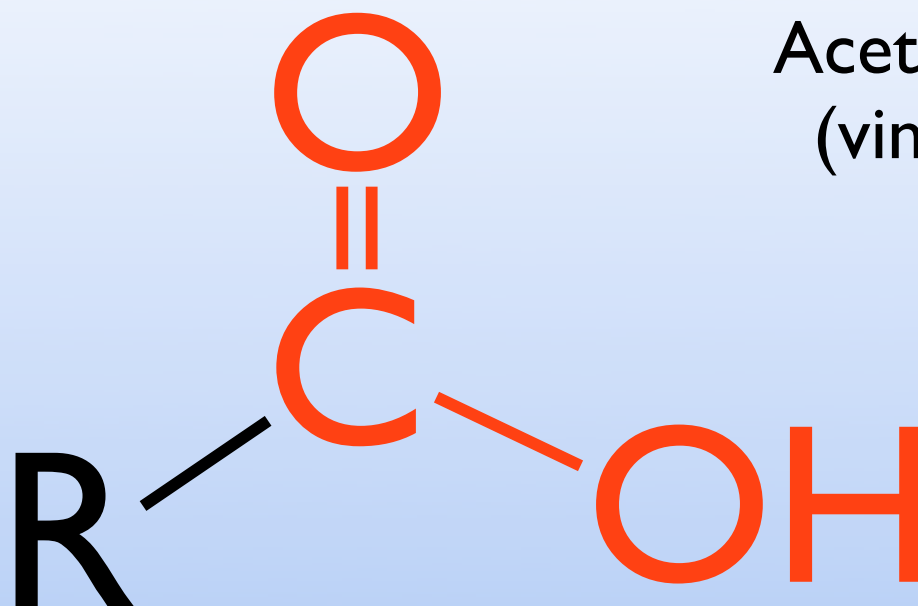
E. hexene6-3-al

No need to number aldehyde  
its always at the end

H shown to emphasize the  
functional group

## Carboxylic Acid

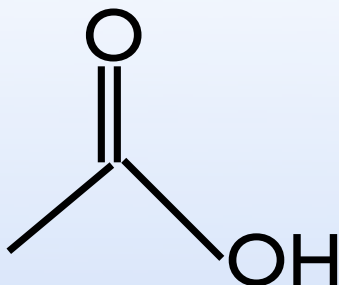
Common  
Acetic Acid  
(vinegar)



carbon double bonded to an oxygen  
bonded to carbon on one side  
OH on the other side  
suffix is -oic acid



Name this compound



A. methanoic acid

B. ethanoic acid

C. propanoic acid

D. 3 hydroxy propan-2-one

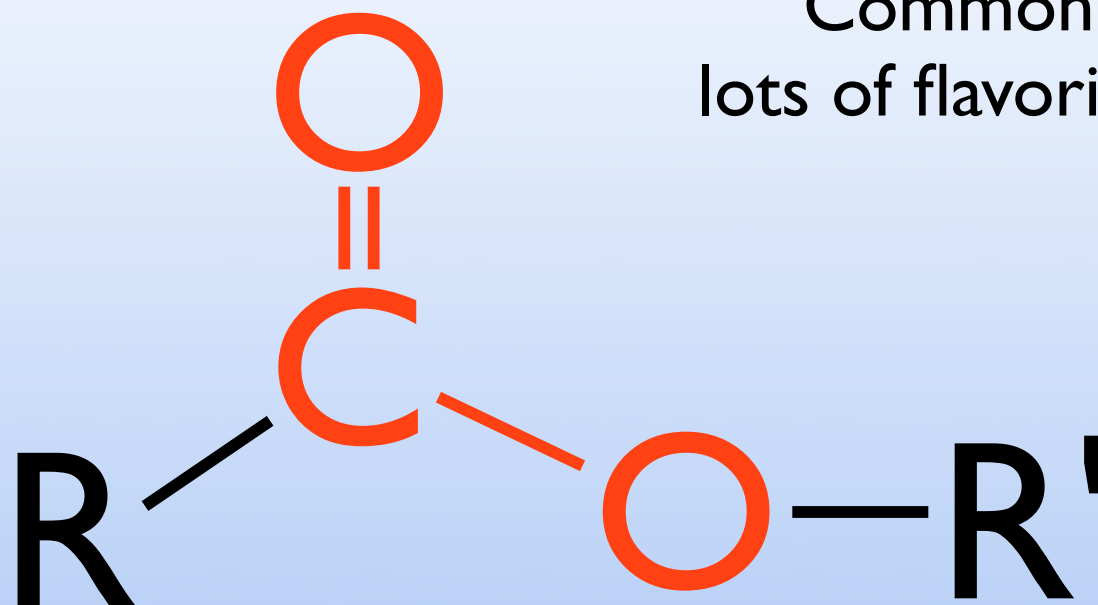
E. propanol

No need to number carboxylic acid  
its always at the end

this compound is also  
commonly known as acetic acid

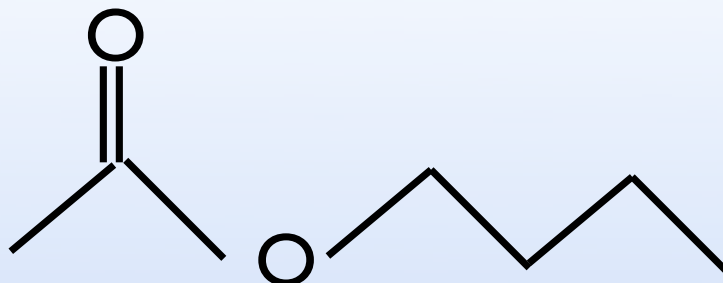
## Ester

Common  
lots of flavorings



carbon double bonded to an oxygen  
bonded to carbon on one side  
OR on the other side  
suffix is -oic acid

Name this compound



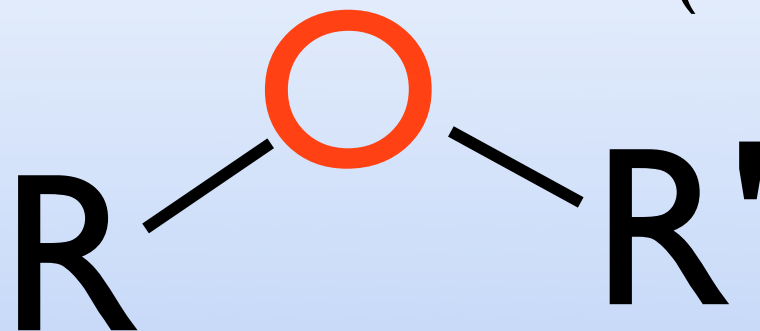
- A. ethyl butanoate
- B. butyl methanoate
- C. methyl heptanoate
- D. butyl ethanoate**
- E. pentyl ethanoate

No need to number ester  
name the two sides

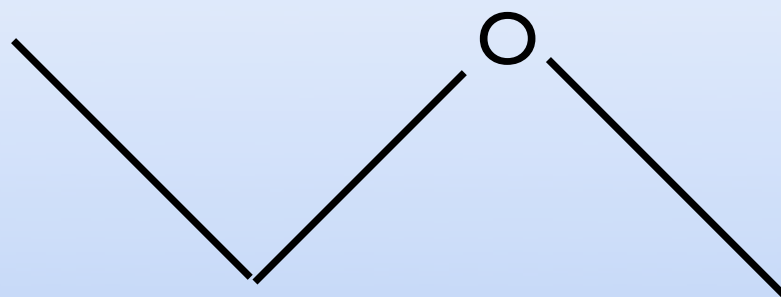
part with the carboxyl (C=O)  
is the parent  
other part is like the side chain

Ether

Diethyl Ether  
(knocks you out)



carbon oxygen in the middle of the chain  
suffix is -ether



Treat as two "side chains"

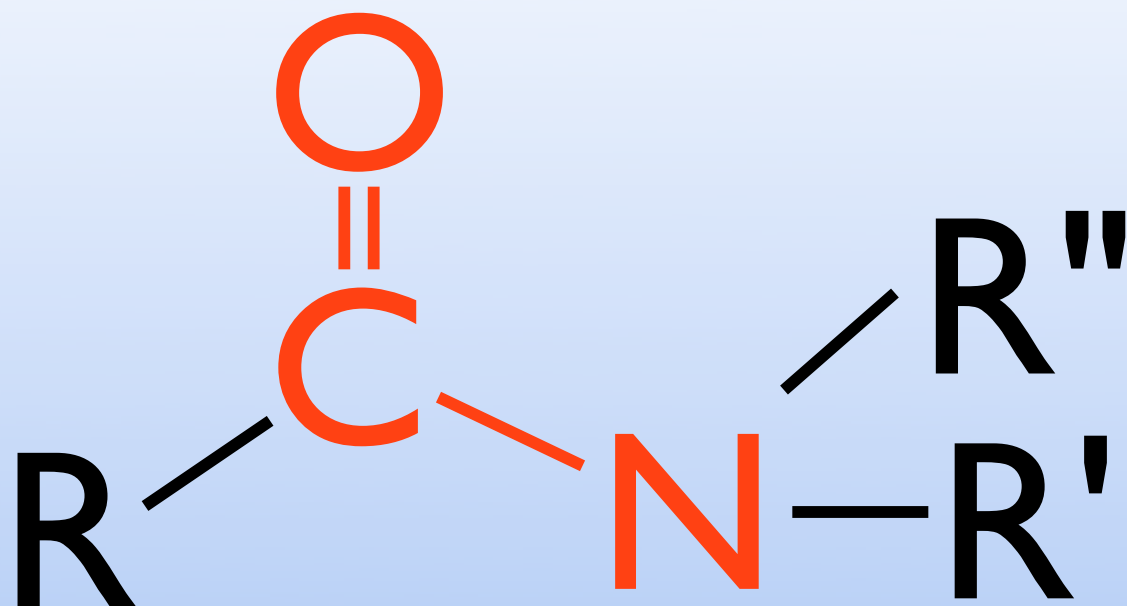
methyl ethyl ether

## Primary Amine



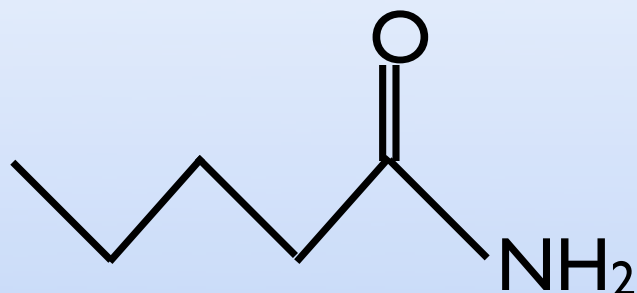
$-\text{NH}_2$  group is an amine  
suffix is **-amine**

## Amide

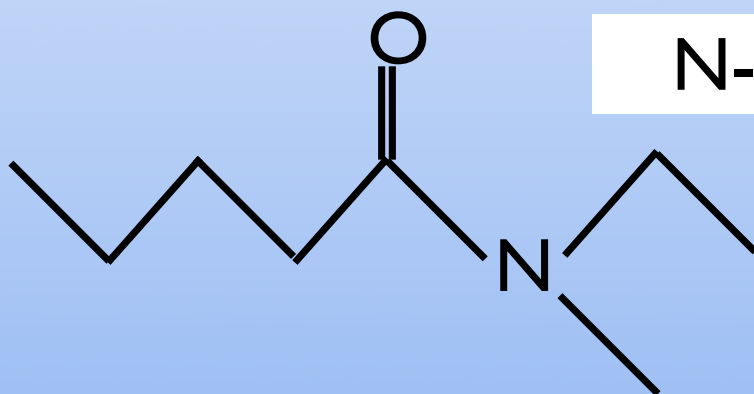


carbon double bonded to an oxygen  
bonded to carbon on one side  
N on the other side  
suffix is -amide

Naming amide  
Treat part with C=O as parent  
parts on the N as sidechains



pentanamide

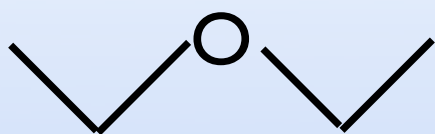


N-ethyl-N-methylpentanamide

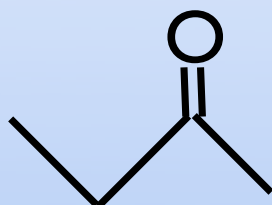




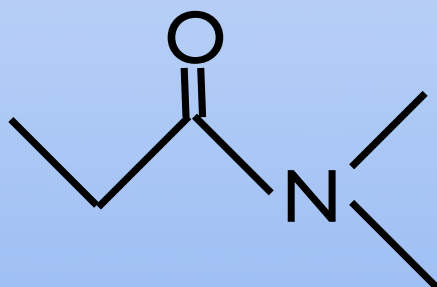
Amine



Ether



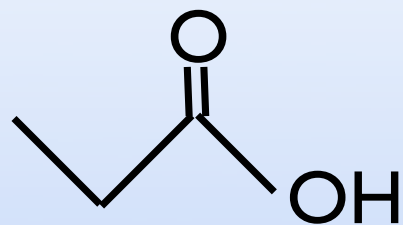
Ketone



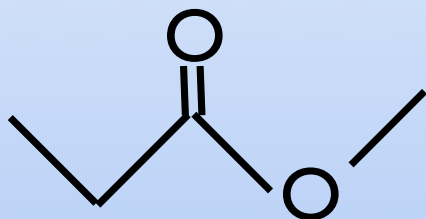
Amide



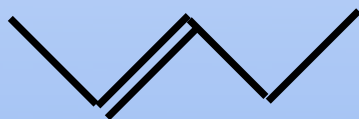
Alcohol



Carboxylic Acid



Ester



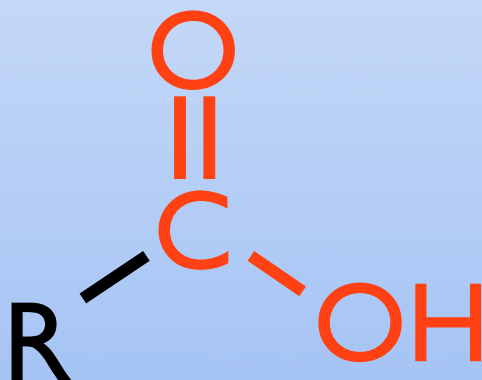
Alkene

# Important Reaction for Biochemistry

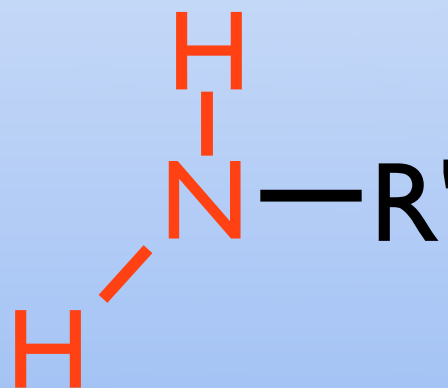
## Formation of an Amide

The don't call them functional groups for nothing

Carboxylic Acid

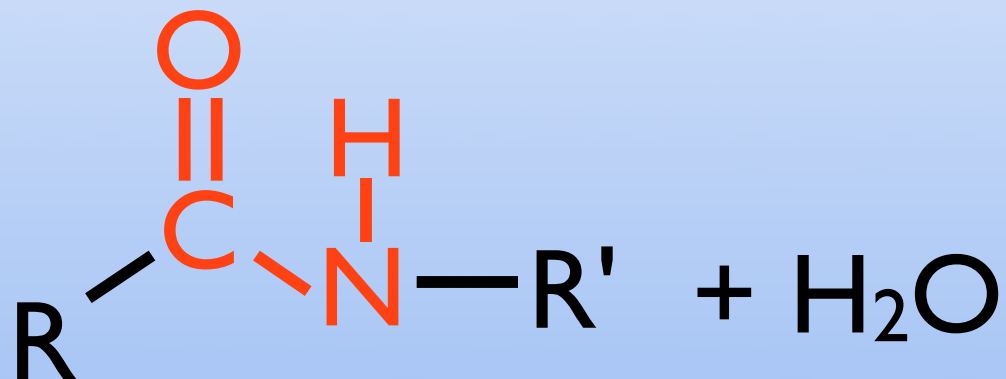
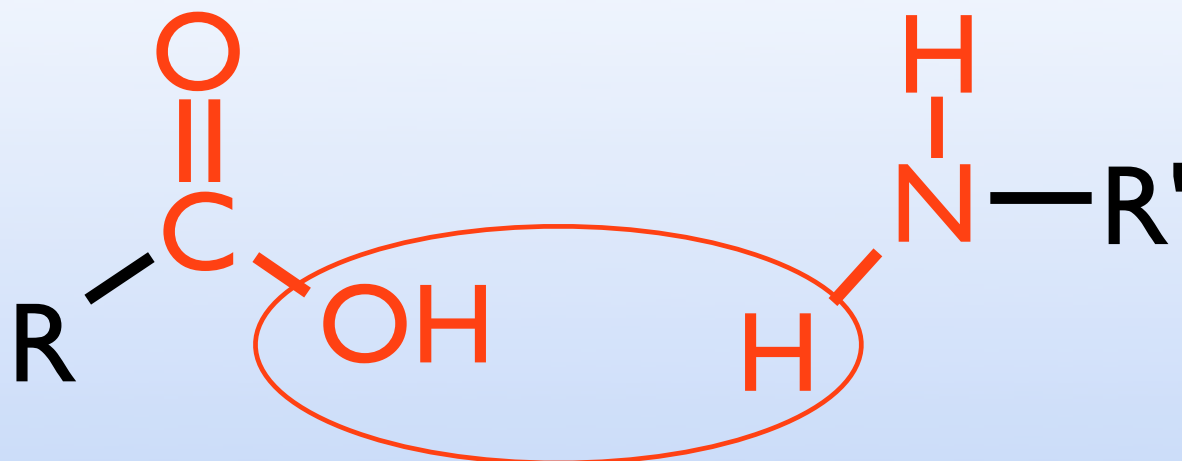


Primary Amine



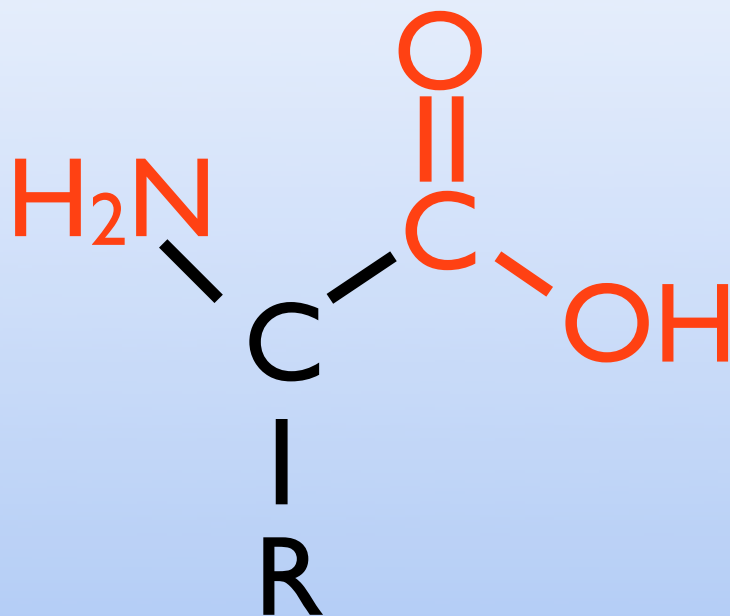
Carboxylic Acid

Primary Amine



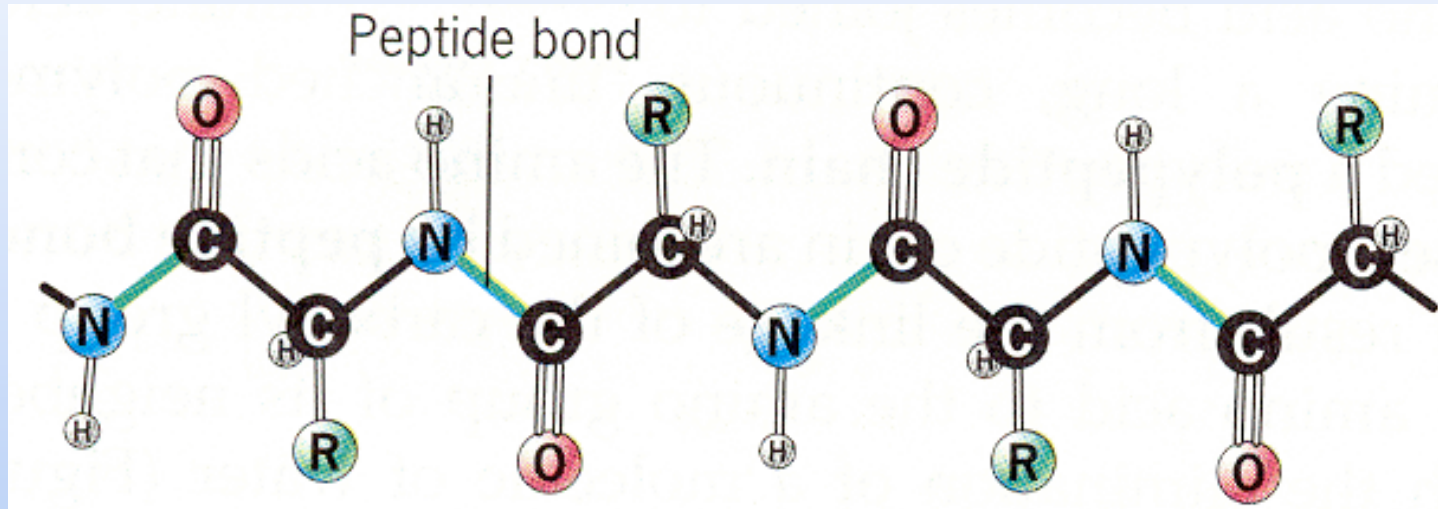
Amide + Water

## Amino Acid



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

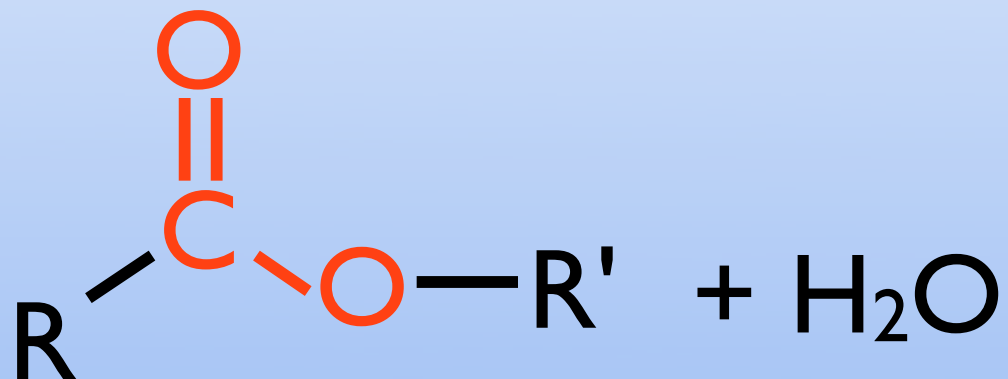
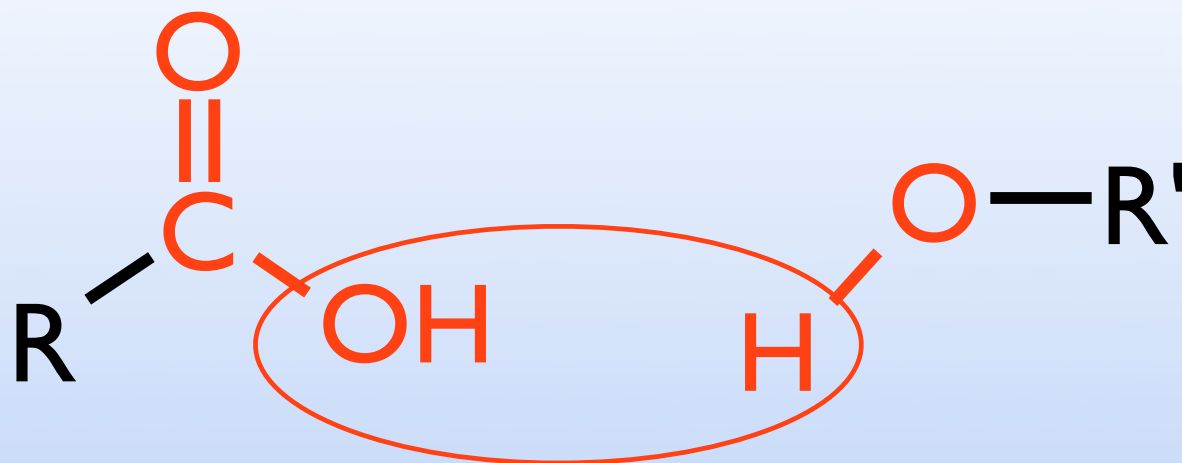
# Polypeptide



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

Carboxylic Acid

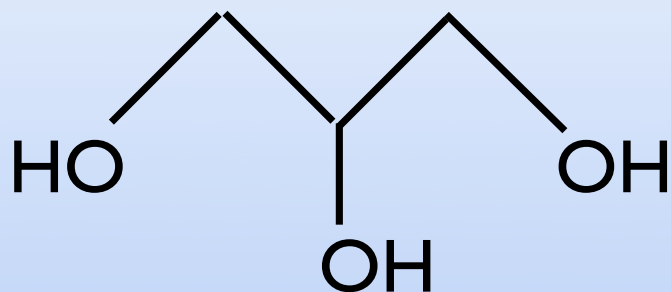
Alcohol



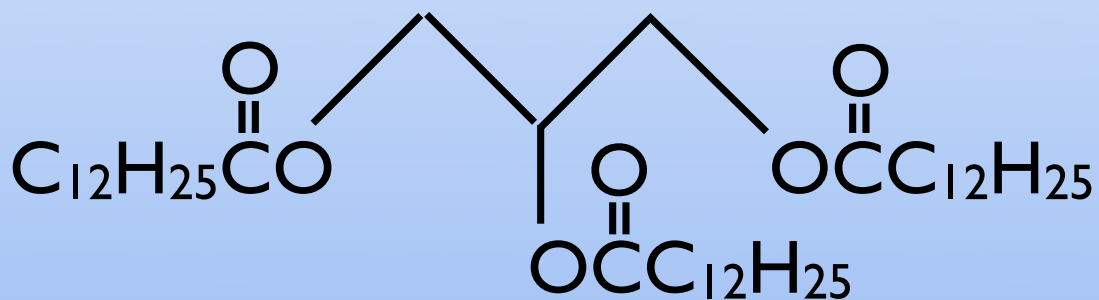
Ester + Water

## Triglycerides

Glycerol



Fatty Acid  
(carboxylic acid with long chain)



Makes Triglyceride

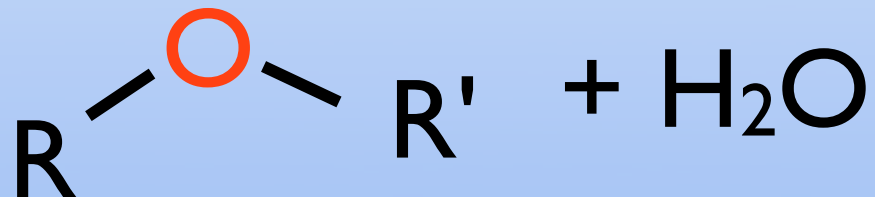
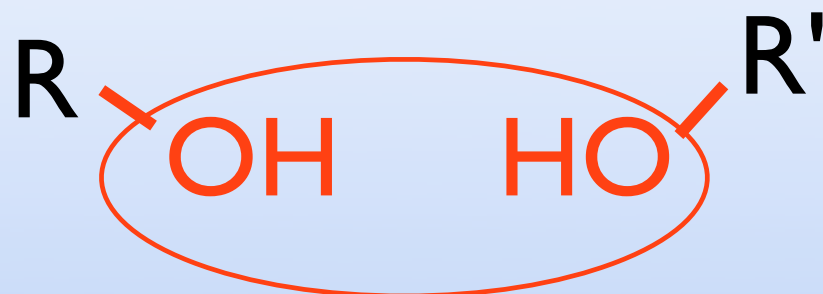


The three fatty acids can  
all be the same or different

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

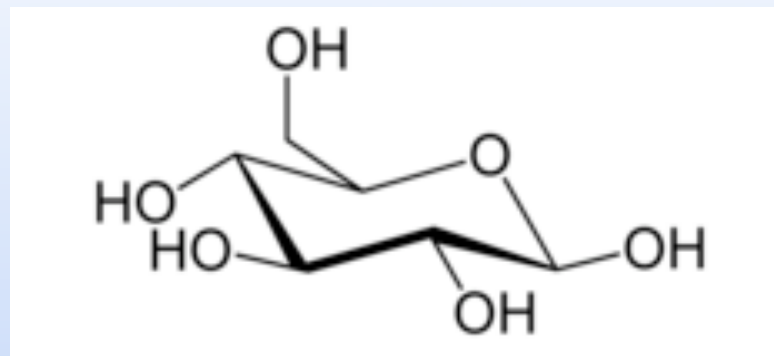
Alcohol

Alcohol



Ether + Water

# Sugars

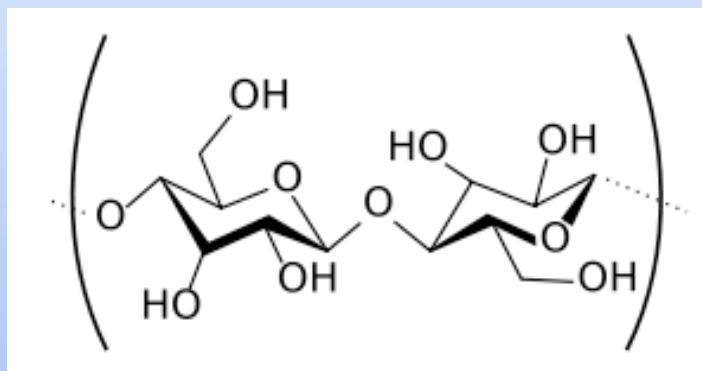
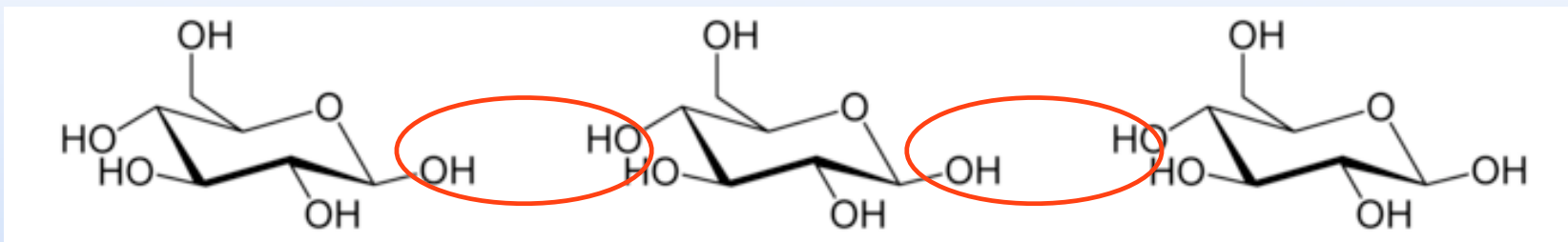


## Glucose

(key factor for sugars lots of hydroxyls)

They can react to form chains of sugars  
polysaccharide

# Cellulose



Very long ether chain  
(pretty much all plant material)

## Condensation Reactions (two molecules make one + water)

Carboxylic Acid + Amine = Amide + water

Carboxylic Acid + Alcohol = Ester + water

Alcohol + Alcohol = Ether + water