

More Organic

Today

Review hydrocarbons
Functional Groups
Condensation Reaction
Biopolymers

How many carbons and hydrogens in the following?



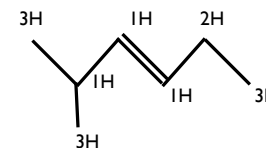
A. 6 C, 14 H

B. 6 C, 15 H

C. 6 C, 16 H

D. 7 C, 15 H

E. 7 C, 14 H



Other side-chains

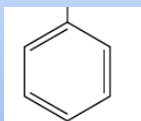
Halogens

F Fluoro
Cl Chloro
Br Bromo
I Iodo

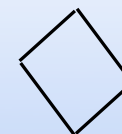
OH group
hydroxy

NH₂ group
amino

Benzene Ring
phenyl



Cyclic Hydrocarbons
the carbon chain connects back to itself



cyclobutane

Structural Isomers

hexane (C₆H₁₄)

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

1 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

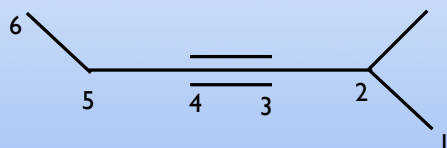
two double bonds diene position 1 and 3

penta-1,3-diene

Alkyne

Carbon Carbon Triple Bond

Suffix **-yne**



2 methyl hex-3-yne

Other functional groups

Common
Ethanol

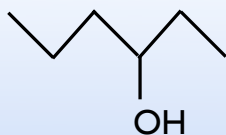


R = Generic representation
of the rest of the molecule

functional group

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

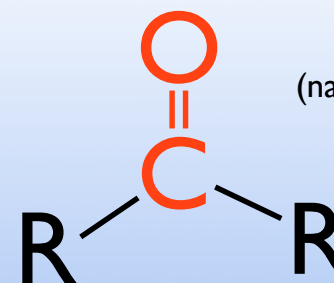
Name this compound



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

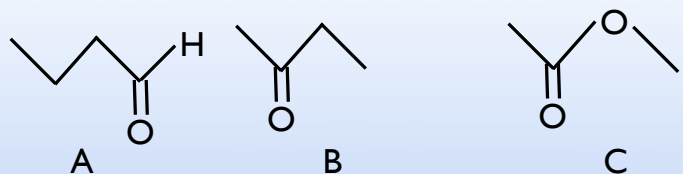
Ketone

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?

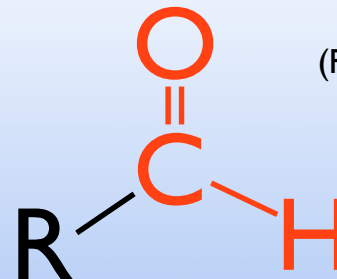


- A. A
- B. B**
- C. C
- D. A & B
- E. all three

butan-3-one

Aldehyde

Common
Formaldehyde
(Fetal Pig Storage)

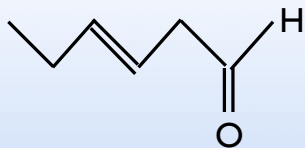


carbon double bonded to an oxygen
bonded to carbon on one side
(like a ketone at the end of a chain)
suffix is -al

Principles of Chemistry II

© Vanden Bout

Name this compound



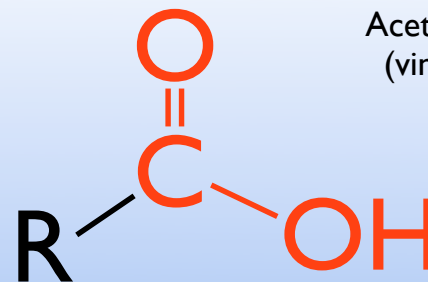
- A. hex-3-enal**
- B. hex-3-en-1-al
- C. hex-3-en-6-al
- D. hex-6-al-3-ene
- E. hexene6-3-al

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

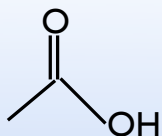
Principles of Chemistry II

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Principles of Chemistry II

© Vanden Bout

Name this compound



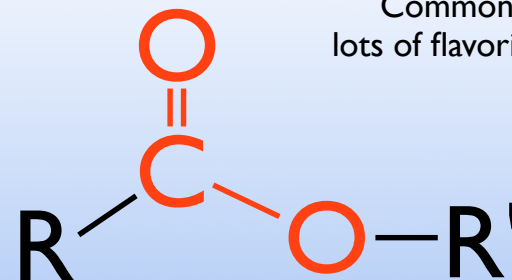
- A. methanoic acid
- B. ethanoic acid**
- C. propanoic acid
- D. 3 hydroxy propan-2-one
- E. propanol

No need to number carboxylic acid
its always at the end

this compound is also
commonly known as acetic acid

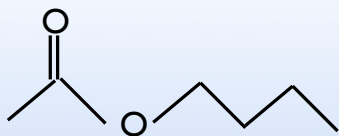
Ester

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

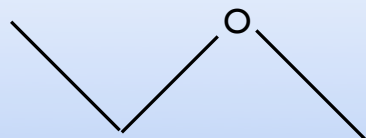
part with the carboxyl (C=O)
is the parent
other part is like the side chain

Ether

Diethyl Ether
(knocks you out)



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



Treat as two "side chains"

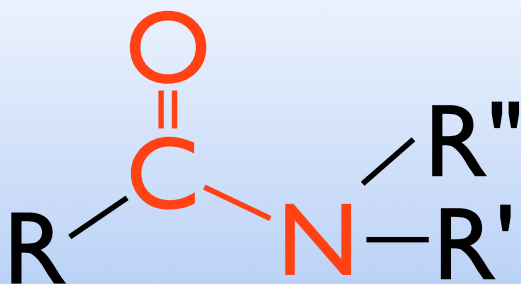
methyl ethyl ether

Primary Amine



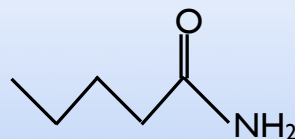
$-NH_2$ group is an amine
suffix is **-amine**

Amide

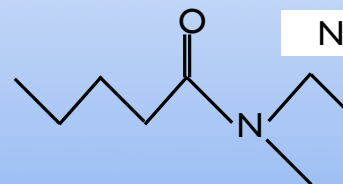


carbon double bonded to an oxygen
bonded to carbon on one side
N on the other side
suffix is **-amide**

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



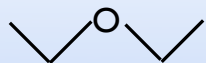
pentanamide



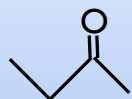
N-ethyl-N-methylpentanamide



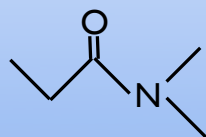
Amine



Ether



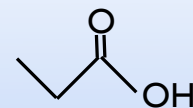
Ketone



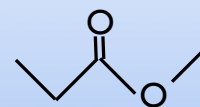
Amide



Alcohol



Carboxylic Acid



Ester



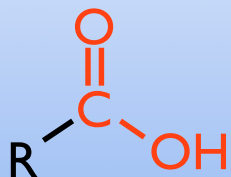
Alkene

Important Reaction for Biochemistry

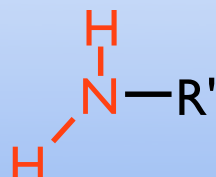
Formation of an Amide

The don't call them functional groups for nothing

Carboxylic Acid

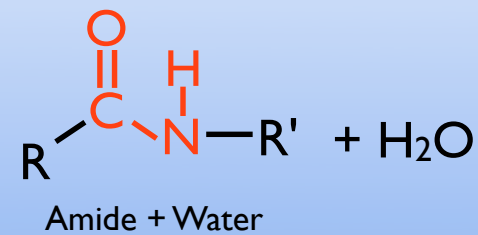
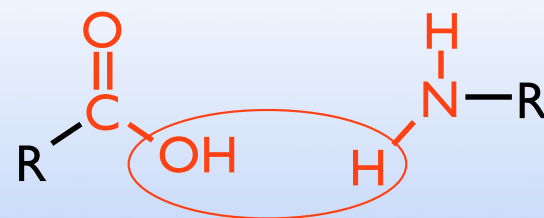


Primary Amine

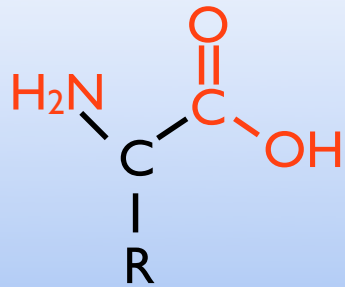


Carboxylic Acid

Primary Amine

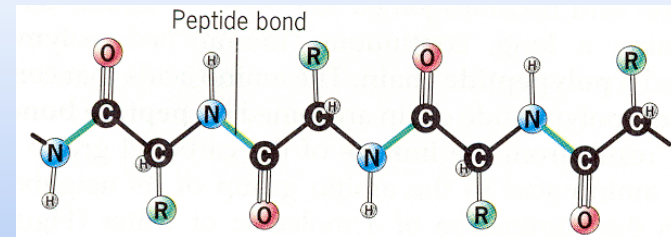


Amino Acid



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

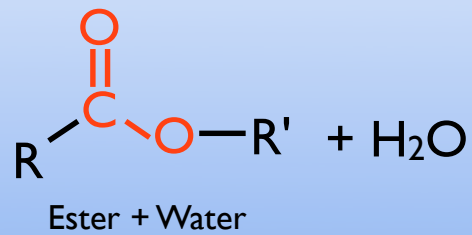
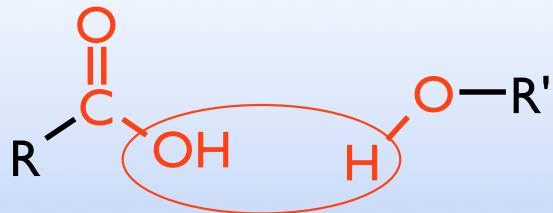
Polypeptide



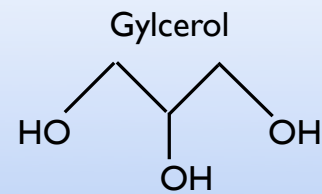
Two distinct ends
N-terminus is an amine
C-terminus is a carboxylic acid

Carboxylic Acid

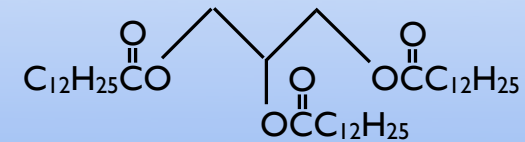
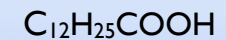
Alcohol



Triglycerides



Fatty Acid
(carboxylic acid with long chain)



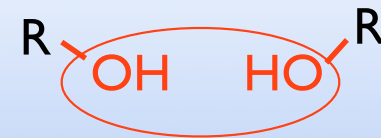
Makes Triglyceride

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

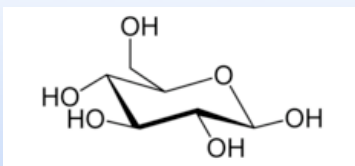
Alcohol

Alcohol



Ether + Water

Sugars

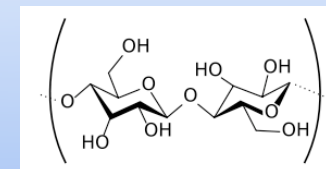
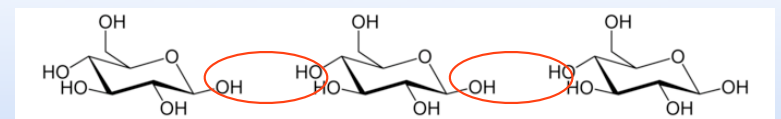


Glucose

(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