Organic

You know more than you think already

What you will need
Lewis dot, VSEPR
VB, hybrid orbitals, MO
electronegativity
intermolecular forces

Step 1

Nomenclature

prefix parent suffix

parent is the name of the longest carbon chain. Each length has a given name

1 carbon methane
2 carbons ethane
5 carbons pentane

Step 1

Nomenclature

prefix parent suffix

prefix is the name of any substituent groups (sidechains)

1 carbon methyl
2 carbons ehtyl
5 carbons pentyl

Step 1

Nomenclature

prefix parent suffix

suffix is the name of the "functional group"

-ol alcohol
-one ketone
-ane alkane

Problem number 1

Lots of carbon and hydrogen atoms
Pain to draw them all

implicit hydrogens
(on the chalk board)

Names for parent groups

First lets look at alkanes
(essentially no functional group)

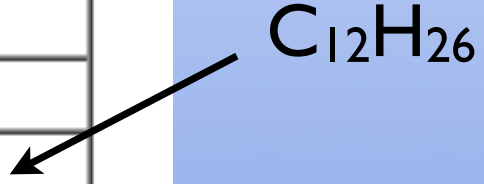
All single bonds

suffix is ane

methane butane 5-methyloctane

Name those carbon chains

Number of Carbons	Prefix	Structure
1	*Meth*ane	CH_4
2	*Eth*ane	CH_3CH_3
3	*Prop*ane	$CH_3CH_2CH_3$
4	*But*ane	$CH_3(CH_2)_2CH_3$
5	*Pent*ane	$CH_3(CH_2)_3CH_3$
6	*Hex*ane	$CH_3(CH_2)_4CH_3$
7	*Hept*ane	$CH_3(CH_2)_5CH_3$
8	*Oct*ane	$CH_3(CH_2)_6CH_3$
9	*Non*ane	$CH_3(CH_2)_7CH_3$
10	*Dec*ane	$CH_3(CH_2)_8CH_3$
11	*Undec*ane	$CH_3(CH_2)_9CH_3$
12	*Dodec*ane	$CH_3(CH_2)_{10}CH_3$



Name those sidechains

Number of carbon atoms	Formula	Name of alkane	Name of alkyl group	Formula
1	CH_4	methane	methyl	CH_3-
2	CH_3CH_3	ethane	ethyl	CH_3CH_2-
3	$CH_3CH_2CH_3$	propane	propyl	$CH_3CH_2CH_2-$
4	$CH_3(CH_2)_2CH_3$	butane	butyl	$CH_3(CH_2)_2CH_2-$
5	$CH_3(CH_2)_3CH_3$	pentane	pentyl	$CH_3(CH_2)_3CH_2-$
6	$CH_3(CH_2)_4CH_3$	hexane	hexyl	$CH_3(CH_2)_4CH_2-$
7	$CH_3(CH_2)_5CH_3$	heptane	heptyl	$CH_3(CH_2)_5CH_2-$
8	$CH_3(CH_2)_6CH_3$	octane	octyl	$CH_3(CH_2)_6CH_2-$
9	$CH_3(CH_2)_7CH_3$	nonane	nonyl	$CH_3(CH_2)_7CH_2-$
10	$CH_3(CH_2)_8CH_3$	decane	decyl	$CH_3(CH_2)_8CH_2-$
11	$CH_3(CH_2)_9CH_3$	undecane	undecyl	$CH_3(CH_2)_9CH_2-$
12	$CH_3(CH_2)_{10}CH_3$	dodecane	dodecyl	$CH_3(CH_2)_{10}CH_2-$

What about sidechains?

Main the main chain (the longest)
Then name the side chain
Number the sidechain numbering from the functional group
Always use the smallest possible number

The next simplest
add a functional group

C=C Double bond

suffix -ene

C≡C Triple bond

suffix -yne

The following compound is

2-hexene

or hex-2-ene

Why?
Double bond so it is an alkene
The longest chain is six carbons - hex
the double bond is in position 2
(note it is not 4 as that is larger)

The following compound is

What is this?

Double bond --- Alkene
Longest chain is six - hex
Sidechain is methyl

Number functional group first
so -ene is at position 2
-methyl group is at position 5

5-methyl hex-2-ene

5 methyl 2-hexene

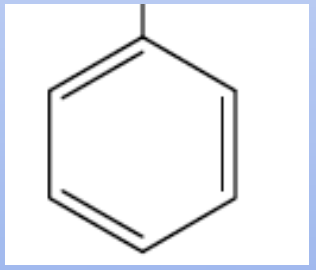
Other side-chains

Halogens
- F Fluoro
- Cl Chloro
- Br Bromo
- I Iodo

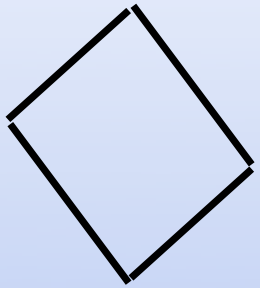
OH group
hydroxy

NH_2 group
amino

Benzene Ring
phenyl



Cyclic Hydrocarbons
the carbon chain connects back to itself

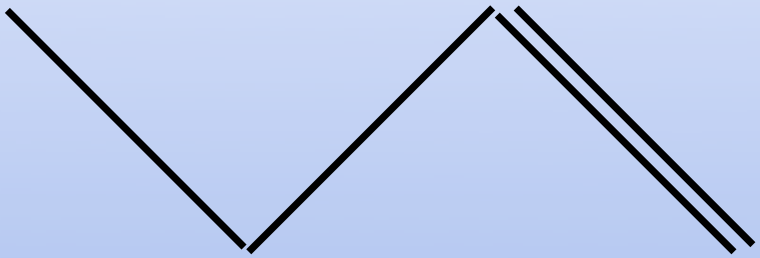


add a cyclo to the front

cyclobutane

Nomenclature with functional group

Put the number by before the functional group suffix



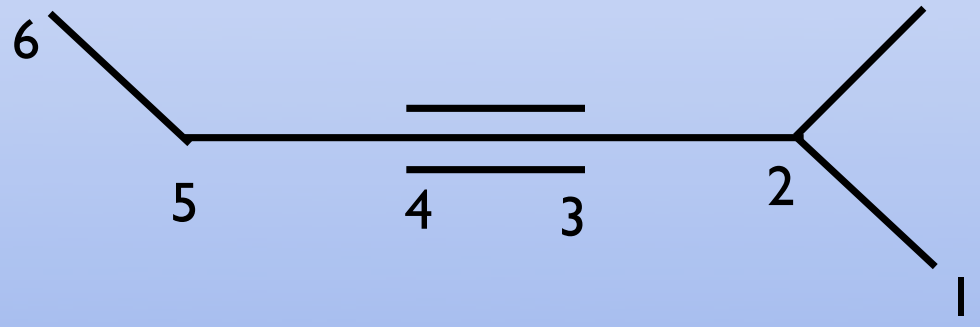
you'll be tested on this one

you'll be understood	IUPAC name
1 butene	but-1-ene

Alkyne

Carbon Carbon Triple Bond

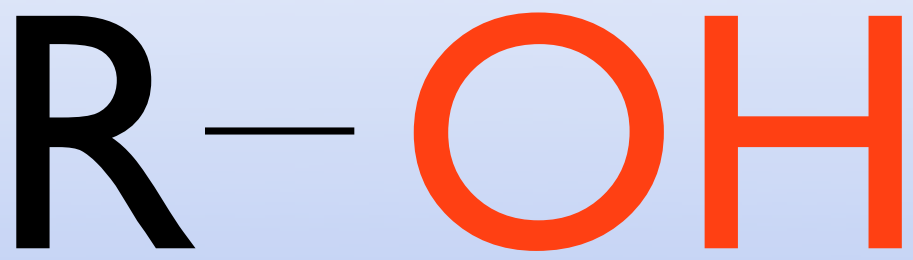
Suffix -yne



2 methyl hex-3-yne

Other functional groups

Common Ethanol

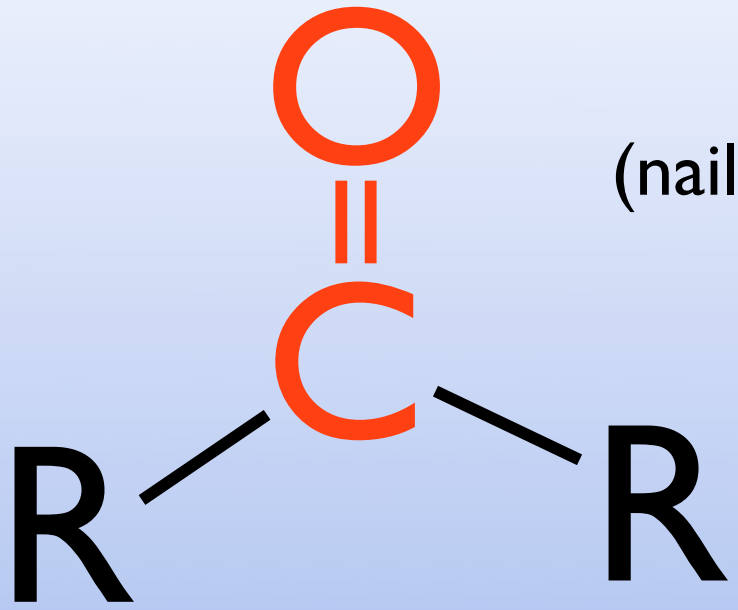


R = Generic representation of the rest of the molecule

functional group

-OH group is an alcohol
suffix is -ol

Ketone

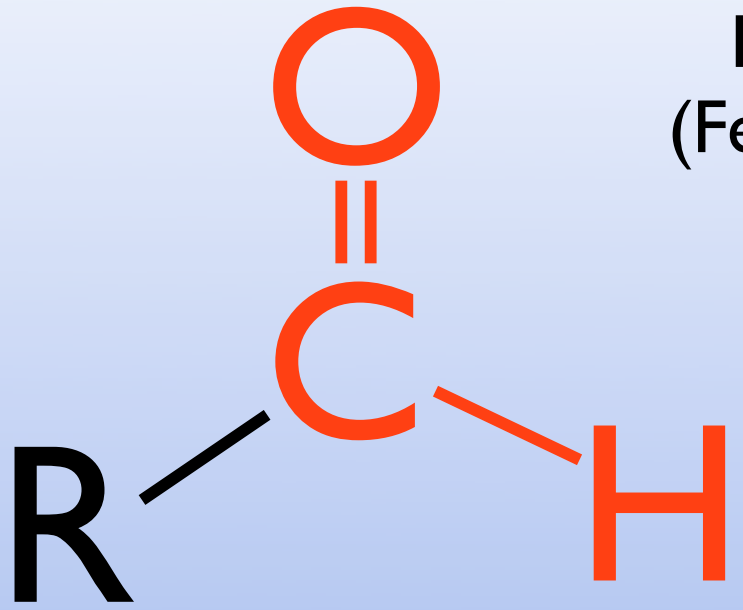


Common
Acetone
(nail polish remover)

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

Aldehyde

Common
Formaldehyde
(Fetal Pig Storage)

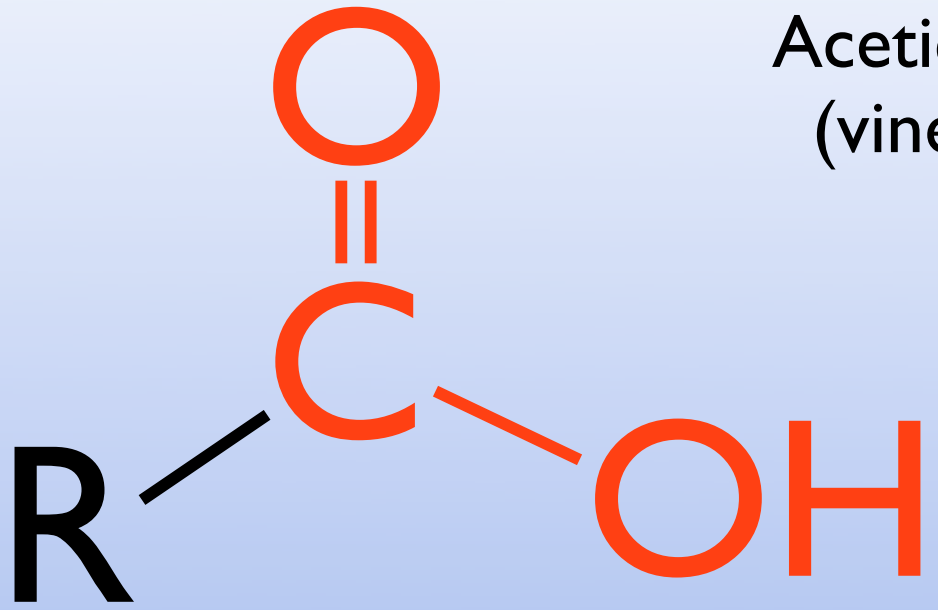


carbon double bonded to an oxygen
bonded to carbon on one side
(like a ketone at the end of a chain)

suffix is -al

Carboxylic Acid

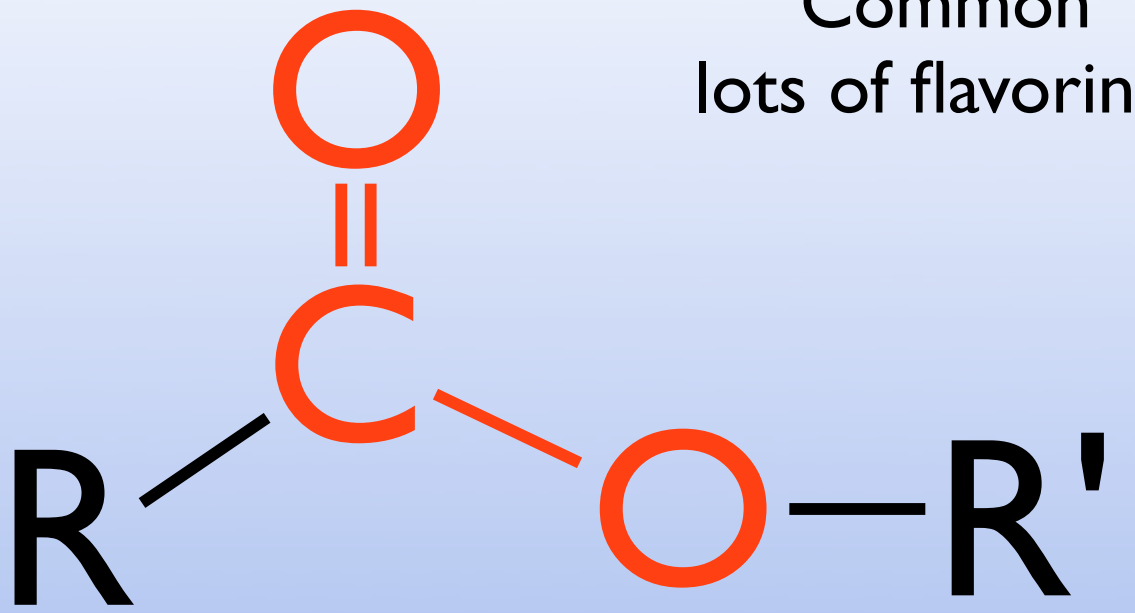
Common
Acetic Acid
(vinegar)



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

Ester

Common
lots of flavorings

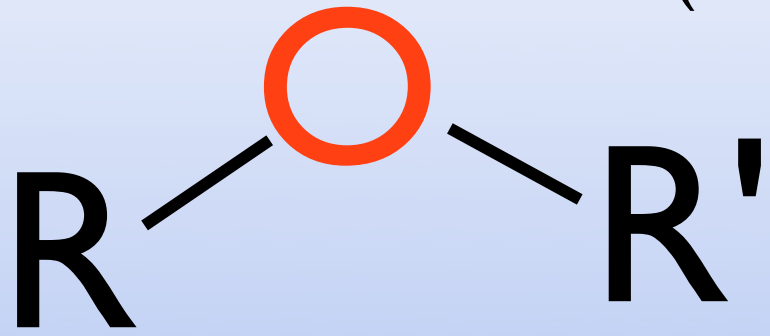


carbon double bonded to an oxygen
bonded to carbon on one side
OR on the other side

suffix is -oic acid

Ether

Diethyl Ether
(knocks you out)



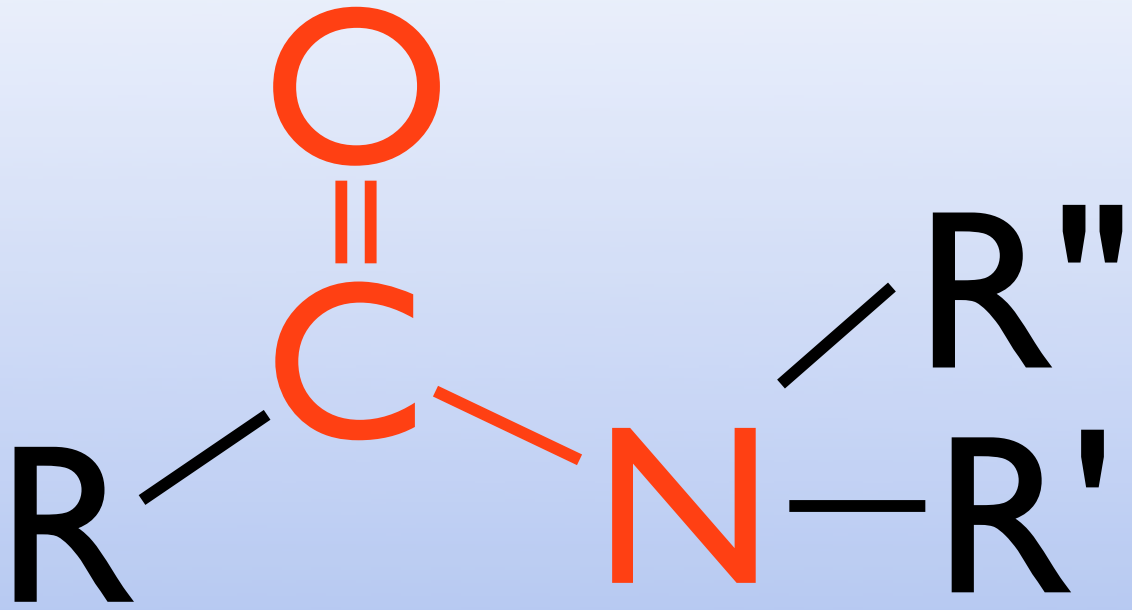
carbon oxygen in the middle of the chain

suffix is -ether

Primary Amine

-NH_2 group is an amine
suffix is -amine

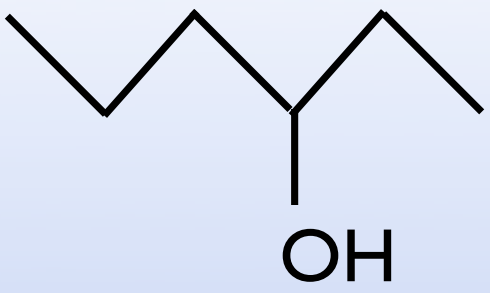
Amide



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

suffix is -amide

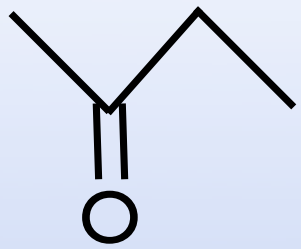
Name this compound



functional group - alcohol
longest chain 6 - hex
no side chains

3 hexanol
or
hexan-3-ol

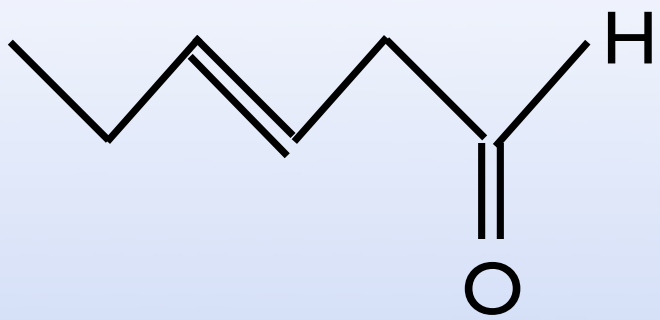
Name this compound



functional group - ketone
longest chain 4 - butan
functional group at position 2

butan-2-one
or
2 butanone

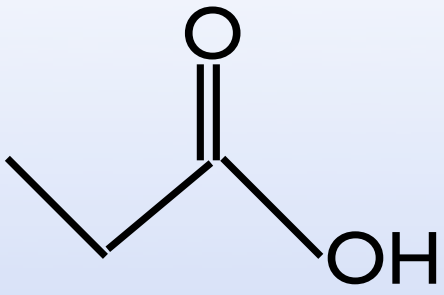
Name this compound



two functional groups
there is a rank order (alkene, alkyne are last)

aldehyde and alkene
aldehyde always at the end (position 1)
longest chain 6
hex-3-enal
or
3 hexenal

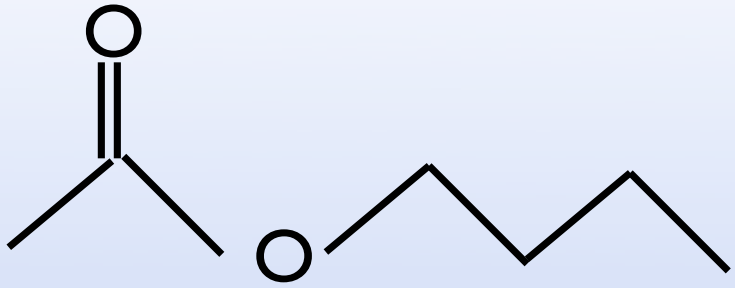
Name this compound



functional group - carboxylic acid
longest chain 4 - butan

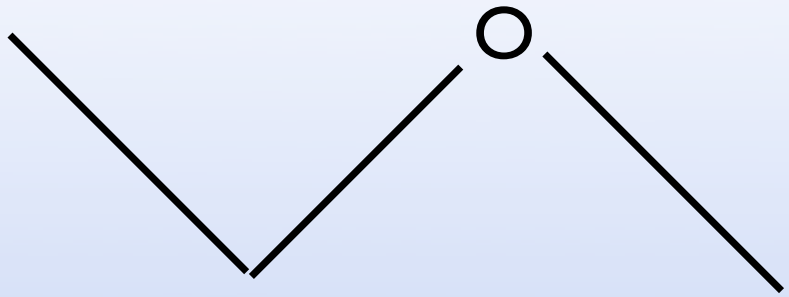
butanoic acid

Name this compound



functional group - ester
treat part on "attached" to the oxygen as sidechain
longest chain with functional group is 2 - ethan
sidechain is 4 - butyl

butyl ethanoate



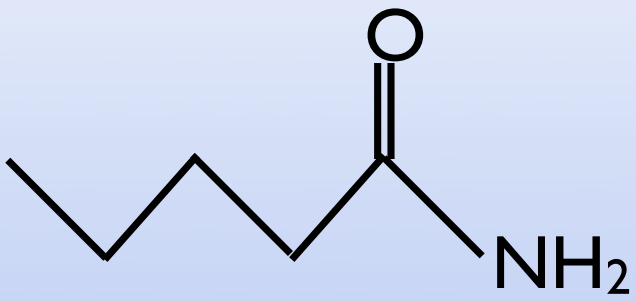
Functional group - ether
treat as two side chains
one is ethyl
the other is methyl

methyl ethyl ether

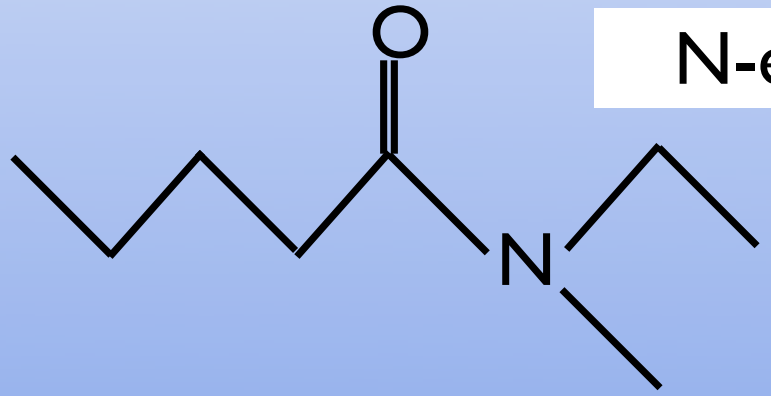
Naming amide

Treat part with C=O as parent

parts on the N as sidechains

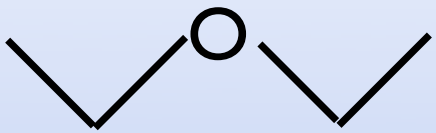


pentanamide

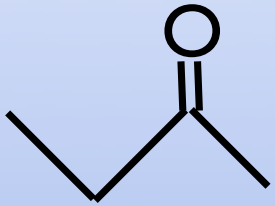


N-ethyl-N-methylpentanamide

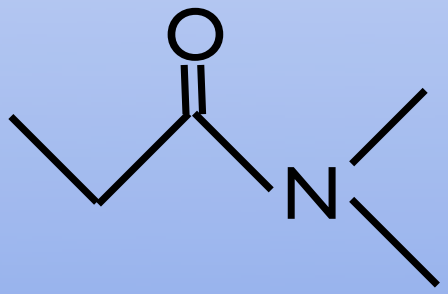
Amine



Ether

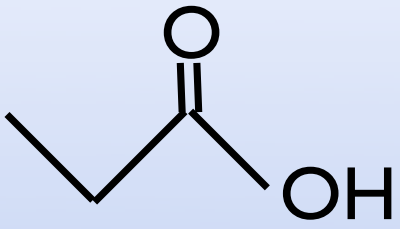


Ketone

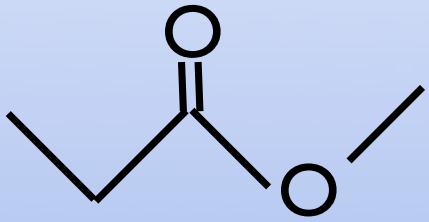


Amide

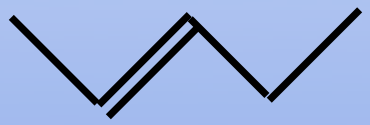
Alcohol



Carboxylic Acid



Ester



Alkene