

# Functional Groups

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Things attached to  
carbon chains

# Functional Groups

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- Atoms other than hydrogen or carbon covalently bonded to a carbon atom in an organic molecule.
- Most commonly oxygen, nitrogen, or the halogens.
- The presence of a functional group drastically changes the chemical properties of a molecule.

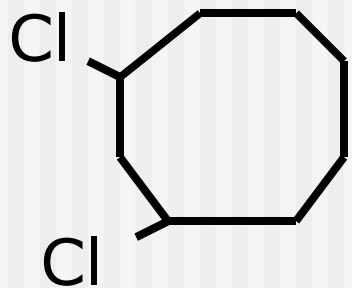
# Different Functional groups with a 2 carbon chain

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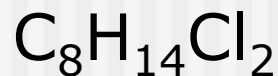
- Ethane- gas (found in natural gas)
- Ethanol- grain alcohol (drinkable)
- Ethanoic acid- vinegar
- Diethyl ether- starting fluid
- Chloro fluoro ethane (CFC's used as refrigerants)
- Ethanal- foul smelling liquid (similar to formaldehyde)

# Halogenated Hydrocarbons

- Hydrocarbons with halogens attached
- Before the main chain name the halogen as either fluoro, chloro, bromo or iodo and give its number
- For each halogen subtract 1 H

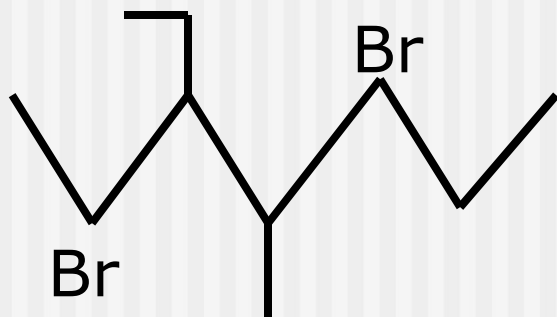


1,3-dichloro cyclooctane



# Practice

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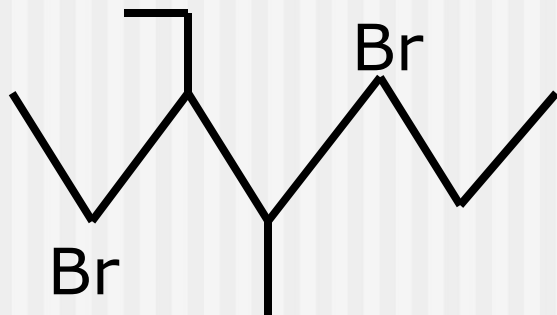
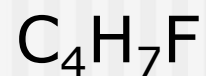


# Practice

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2 fluoro 1 butene



2,5-dibromo 3-ethyl  
4-methyl heptane



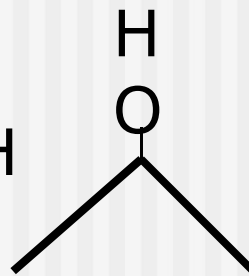
# Alcohols

- Hydrocarbons with an -OH attached
- To name it, give it the suffix -(an)ol and the number the OH is attached to
- Normally you subtract one H from the main group and put an OH on the end (to signify it is an alcohol)

Ethanol     $C_2H_5OH$



$C_3H_7OH$



2 propanol

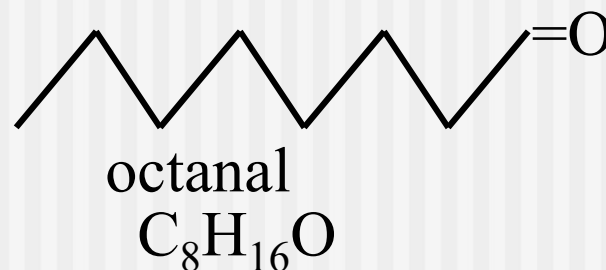
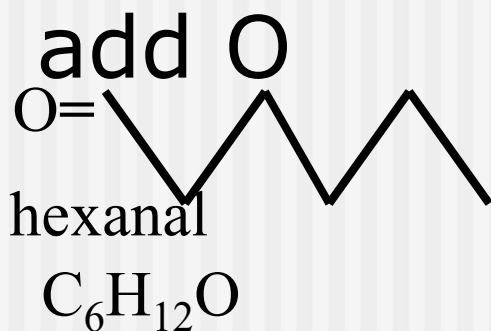
Commonly

Isopropanol or

Rubbing alcohol

# Aldehydes

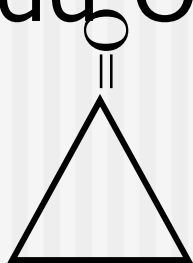
- Hydrocarbons with a =O **on the outer edge of the chain**
- (most have a foul stench, like formaldehyde or methanal)
- To name it add the suffix “-al”
- For the formula subtract 2 H and



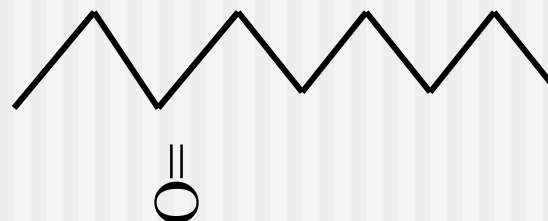


# Ketones

- Hydrocarbons with a =O **not on the edge** of the compound
- To name it add the suffix “-one”
- For the formula subtract 2 H and add O



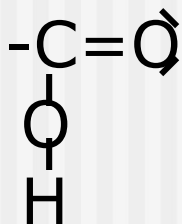
cyclopropanone  
 $C_3H_4O$



3-nonanone  $C_9H_{18}O$

# Carboxylic Acid

- Hydrocarbons with a  $-\text{COOH}$  group attached
- To name it give it the suffix “-oic acid”, the C in the group does count
- Subtract one C one H and add  $\text{COOH}$
- This group looks like...



Pentanoic acid

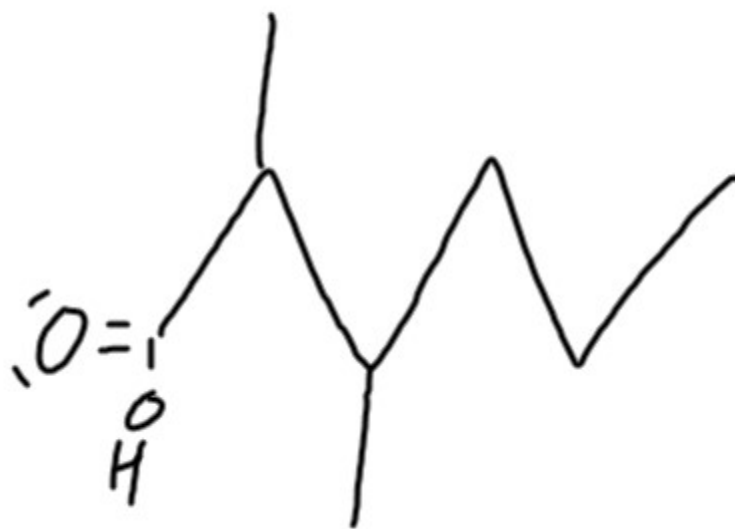
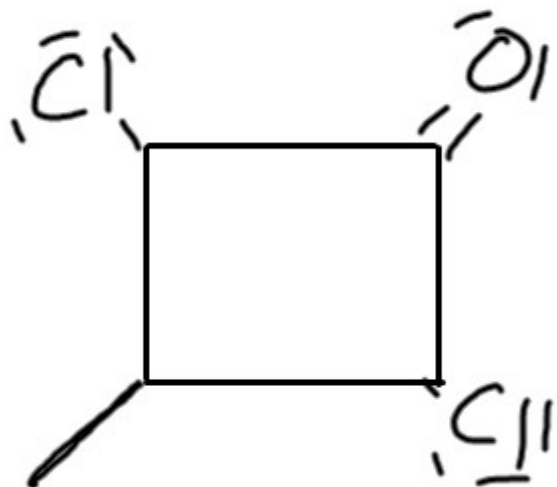


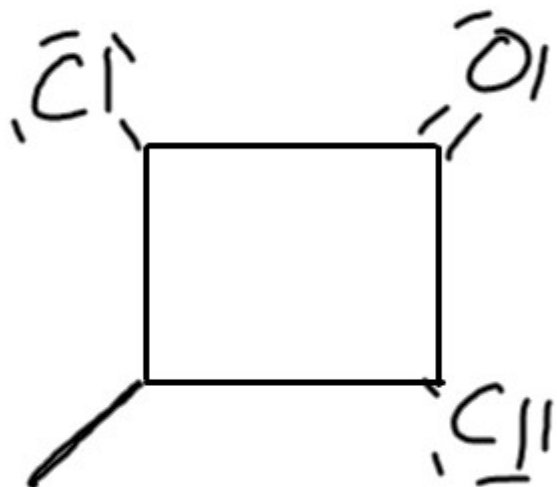
# Everything so far...

- Alkanes, alkenes, and alkynes
  - Isomers, halogenated and cyclic
- \*R means any carbon chain

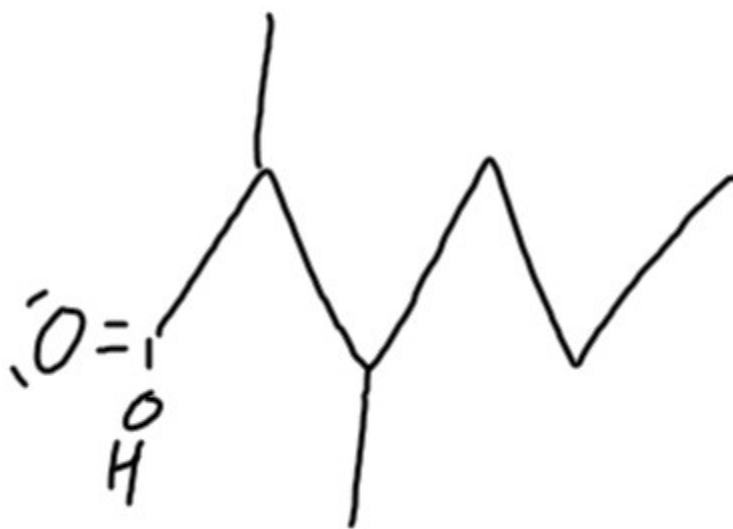
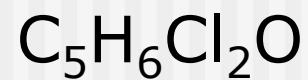
Alcohols R-OH -ol	Carboxylic Acids $\begin{array}{c} \text{R}-\text{C}=\text{O} \\   \\ \text{HO} \end{array}$ -oic acid
Aldehydes on the end R=O -al	Ketones $\begin{array}{c} \text{R}-\text{C}-\text{R} \\    \\ \text{O} \end{array}$ -one

Name these molecules and give the formula





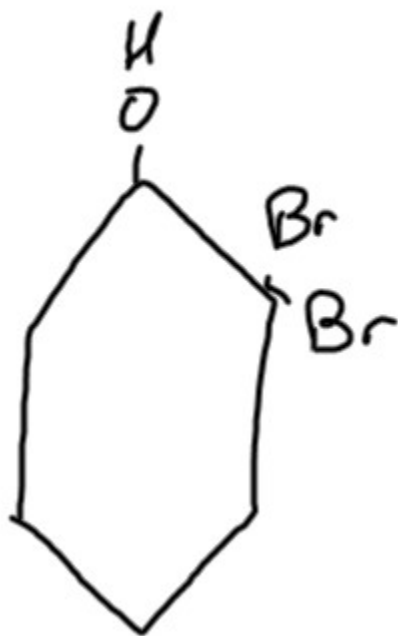
2,4 dichloro 3 methyl  
1 cyclobutanone



2, 3 dimethyl  
hexanoic acid

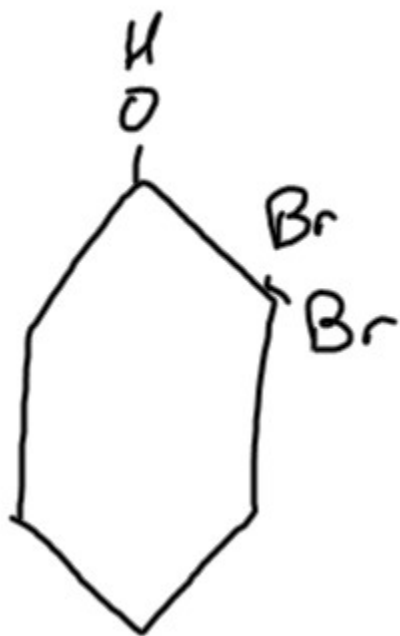
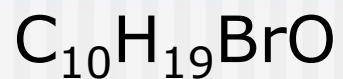


Name these molecules and give the formula

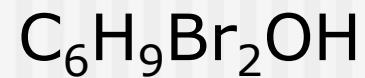




3 bromo 4, 4 diethyl 1 hexanal



2, 2 dibromo 1 cyclohexanol



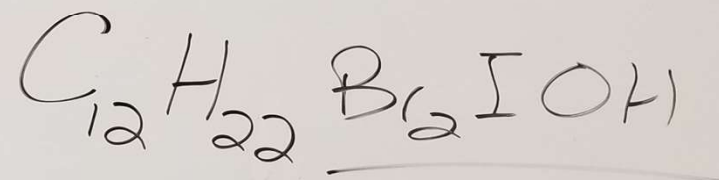
Draw the structural formula and give the molecular formula for the following

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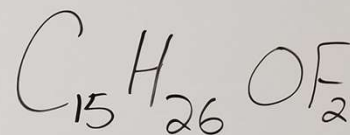
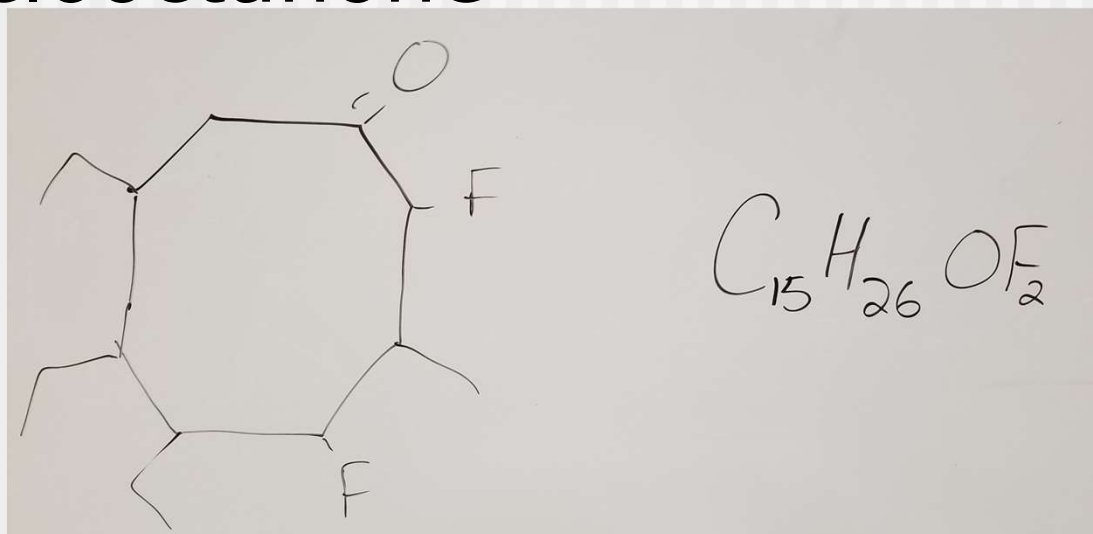
- 5, 6 dibromo 1 iodo, 3,4,5 trimethyl 2 nonanol
- 2,4 difluoro 3 methyl 5, 6, 7 triethyl 1 cyclooctanone



- 5, 6 dibromo 1iodo, 3,4,5 trimethyl 2 nonanol



- 2,4 difluoro 3 methyl 5, 6, 7 triethyl 1 cyclooctanone



# Large Molecule (ATP)

Deoxy-ATP  
(deoxyadenosine  
triphosphate)

Phosphate groups

