



the zen of
chemistry

Compounds of Carbon

Naming and Drawing Basic Hydrocarbons

Presented by

Amelia McCutcheon

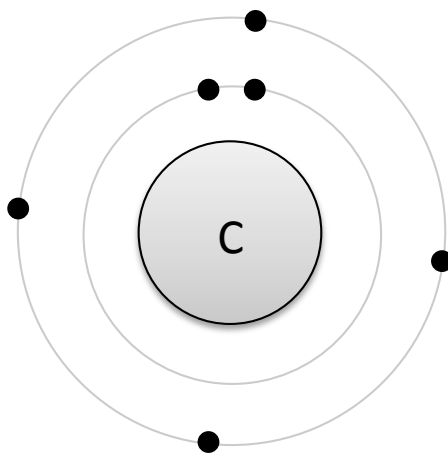
Hydrocarbons

- Hydro = hydrogen
- Carbon = Carbon

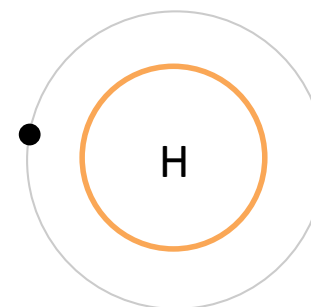
- Hydrocarbons: Molecules formed predominantly from hydrogen & carbon



Revision: Covalent Bonding

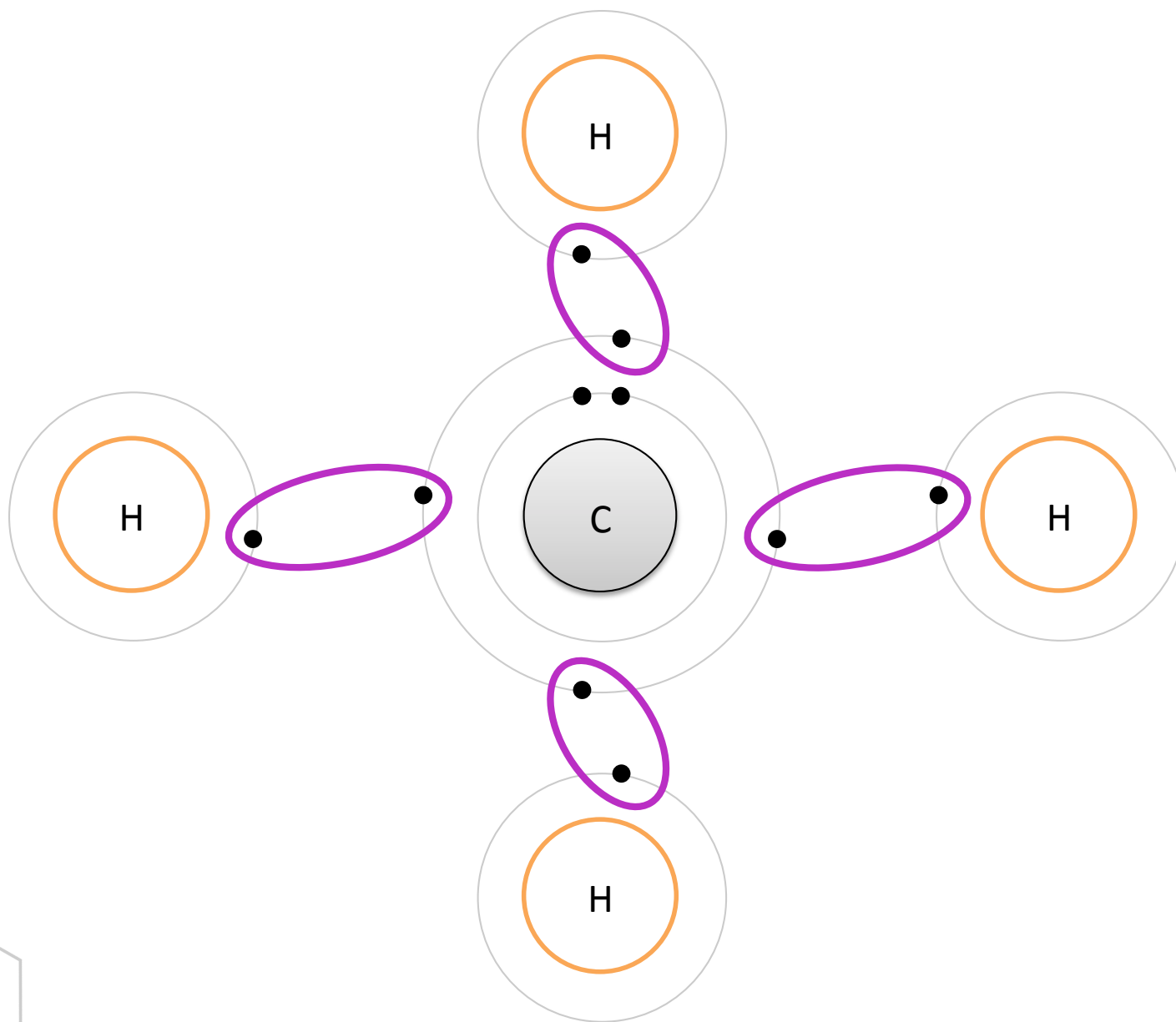


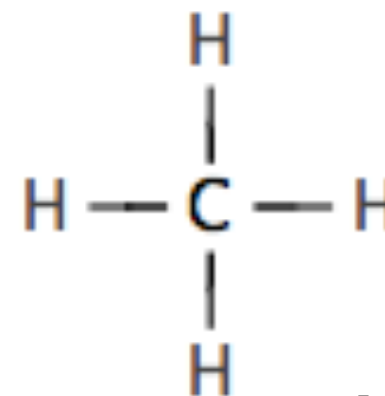
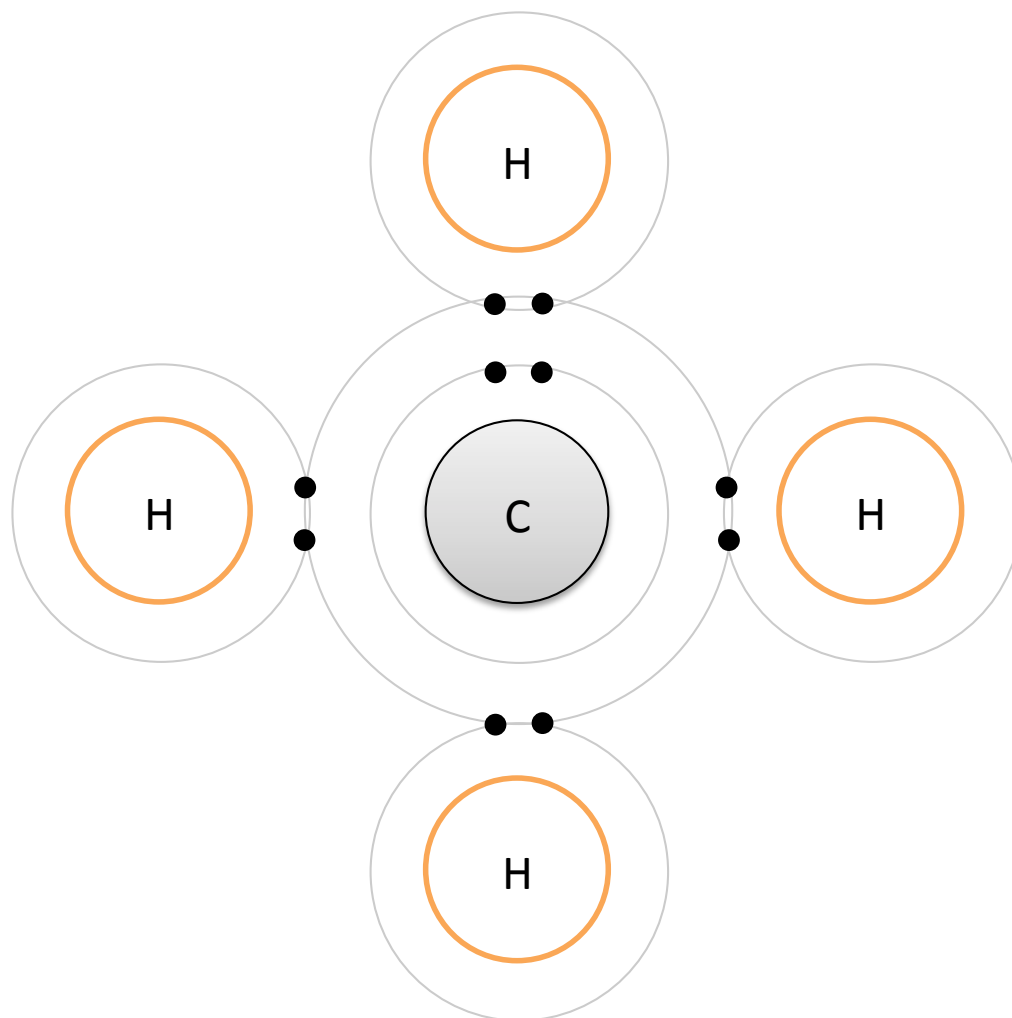
Carbon atom
Atomic Number: 6
Number of protons: 6
Number of electrons: 6

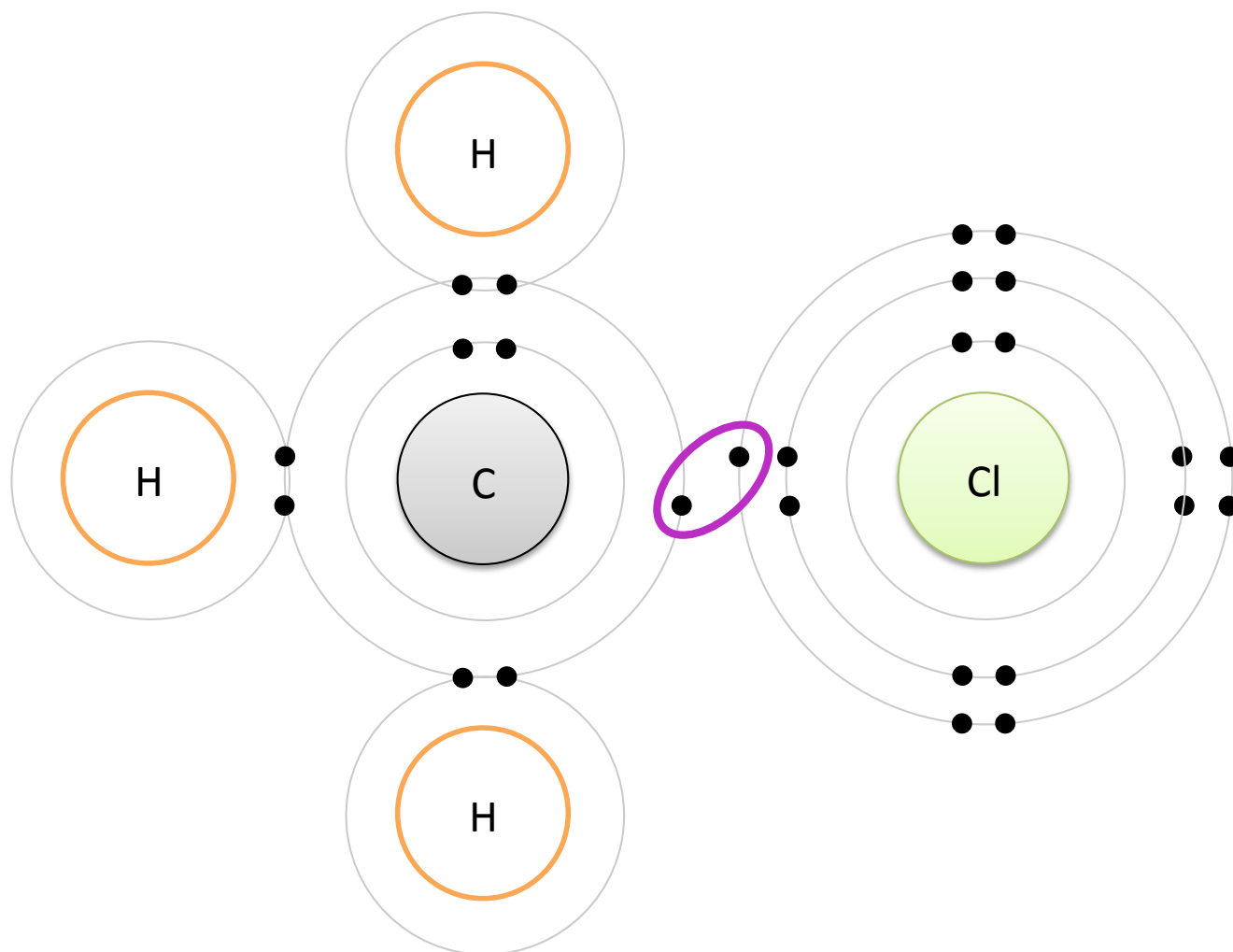


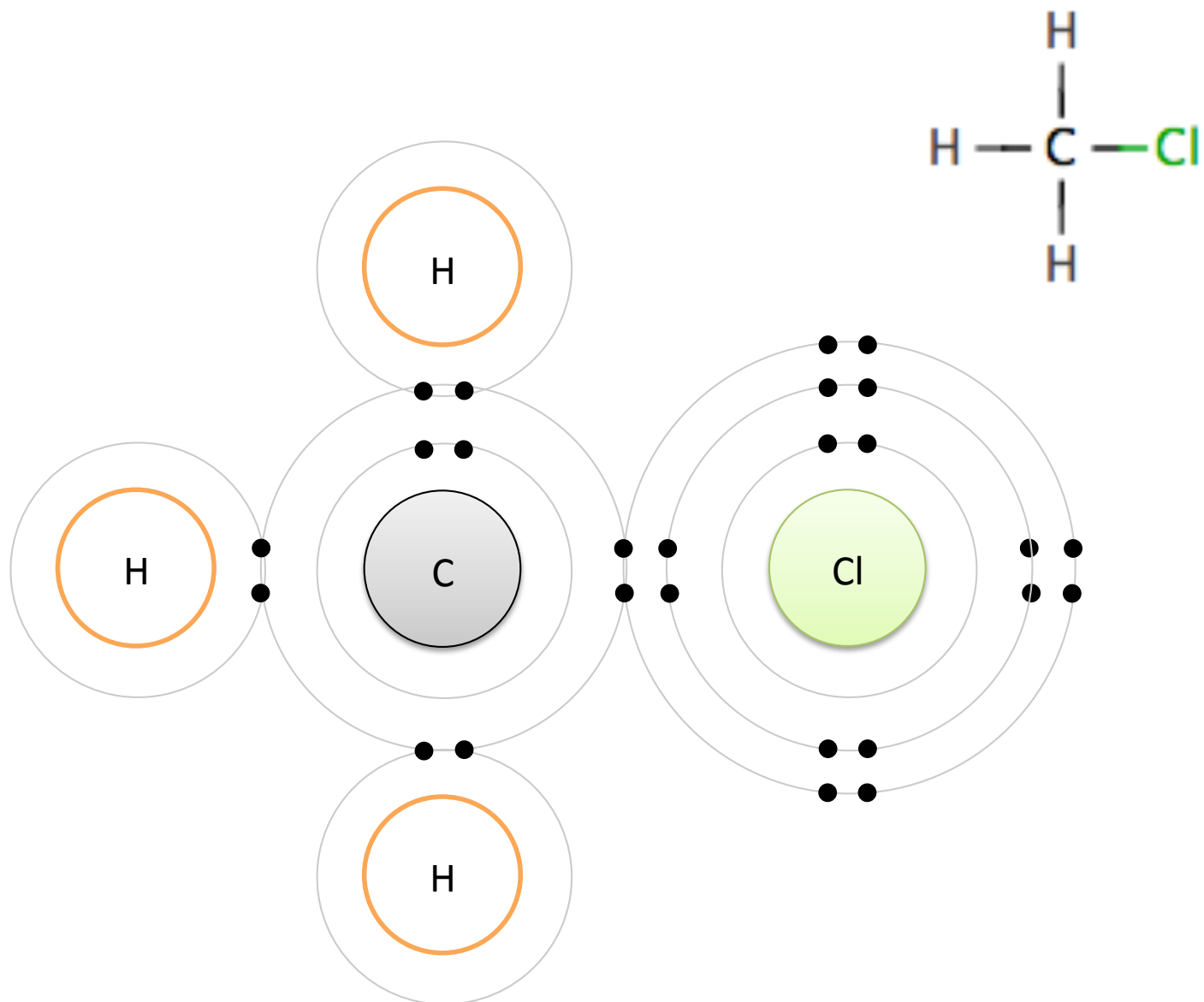
Hydrogen atom
Atomic Number: 1
Number of protons: 1
Number of electrons: 1

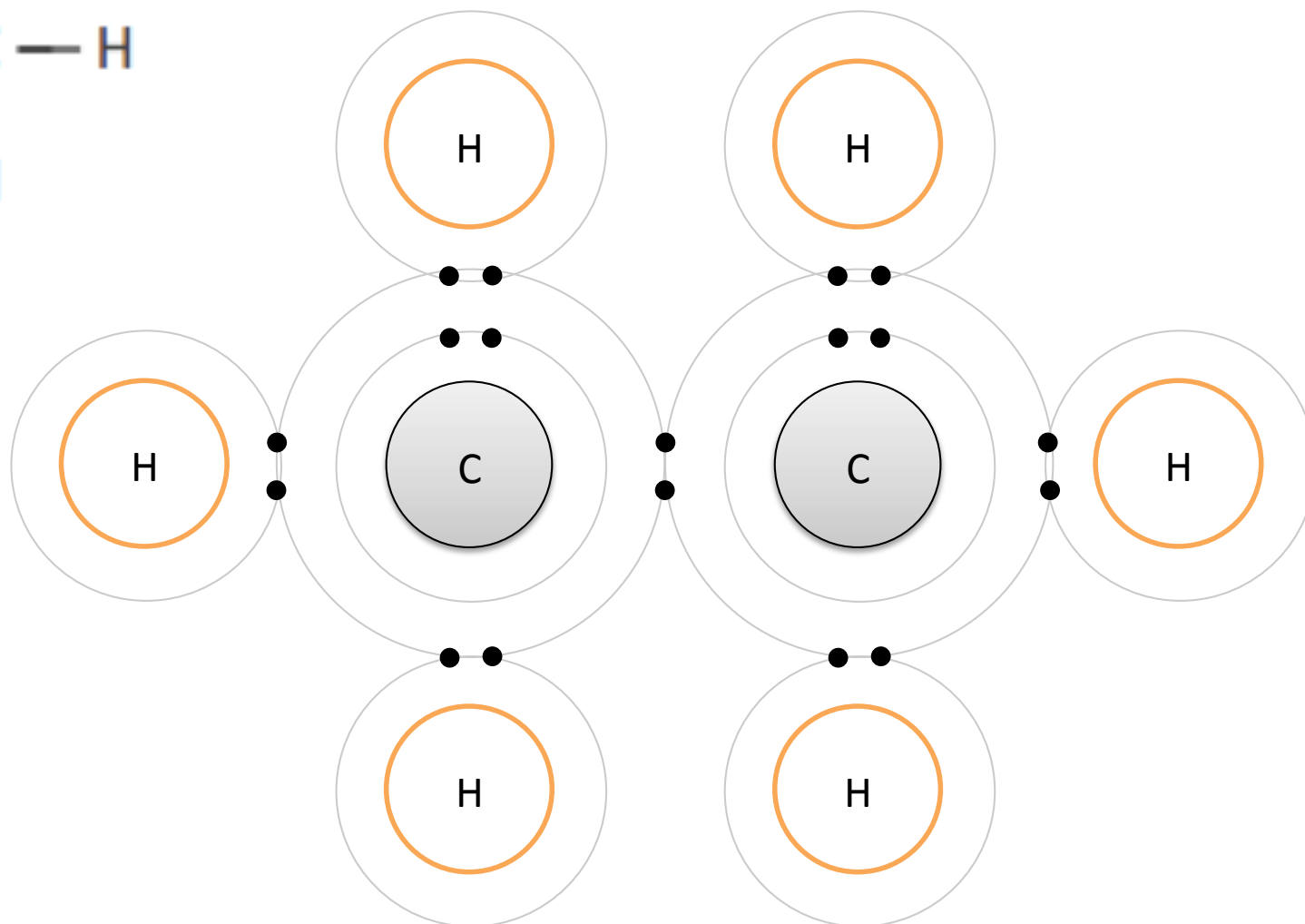
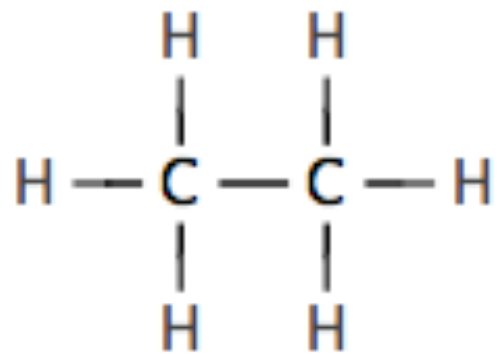


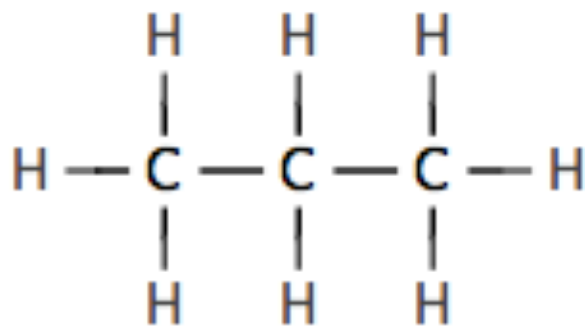
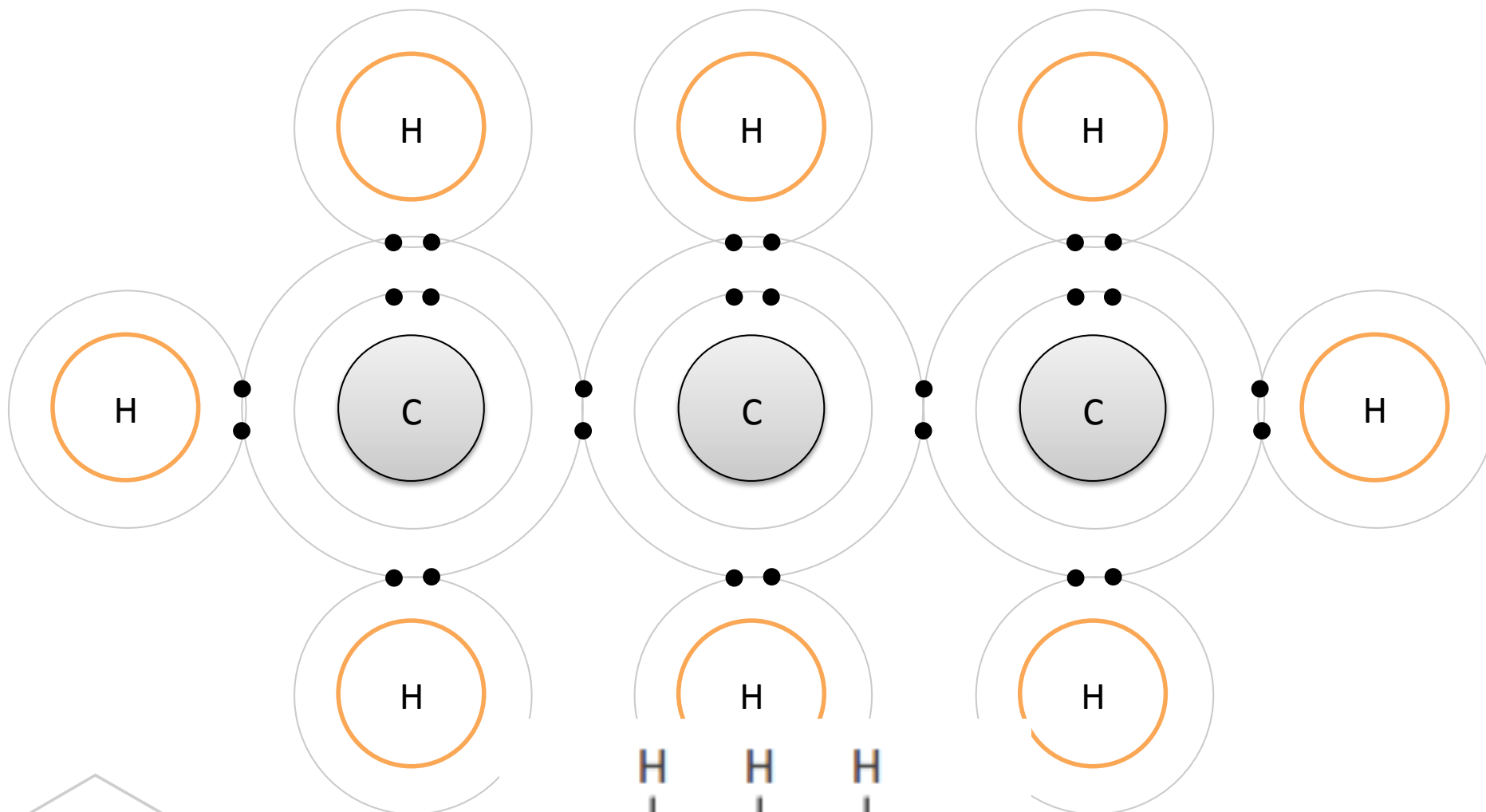










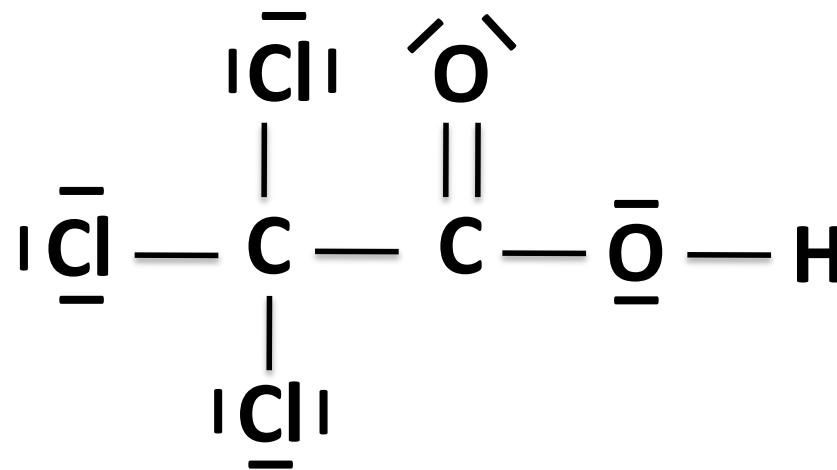
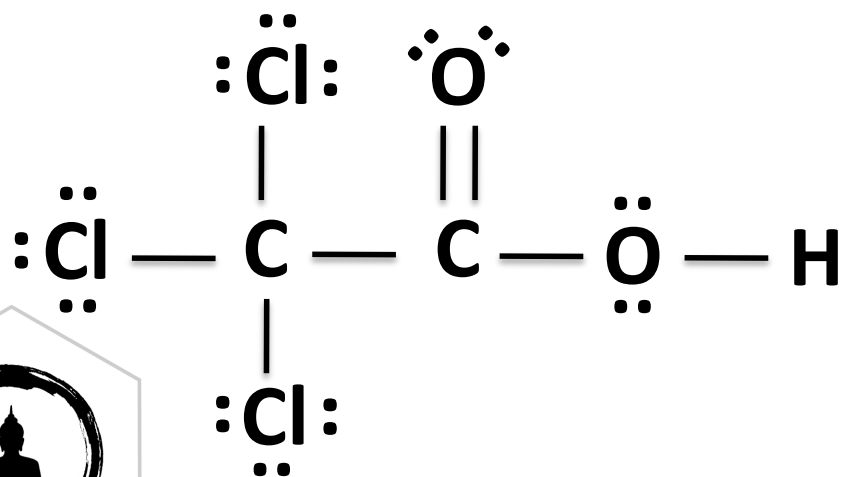
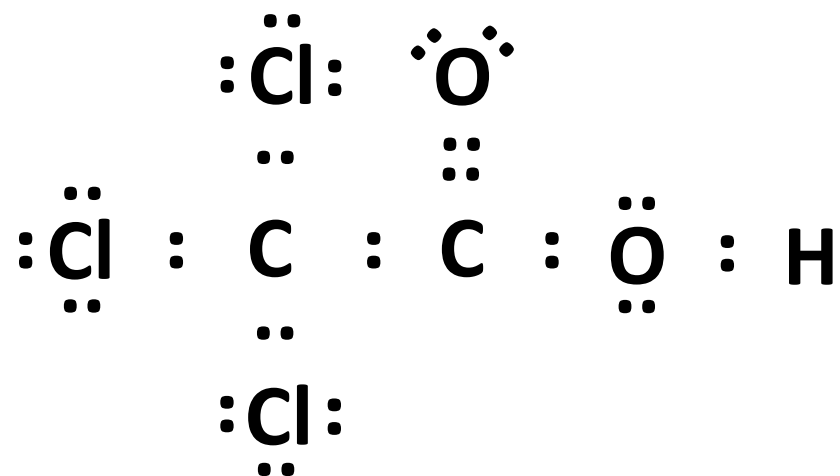


Hydrocarbon Drawing & Representations

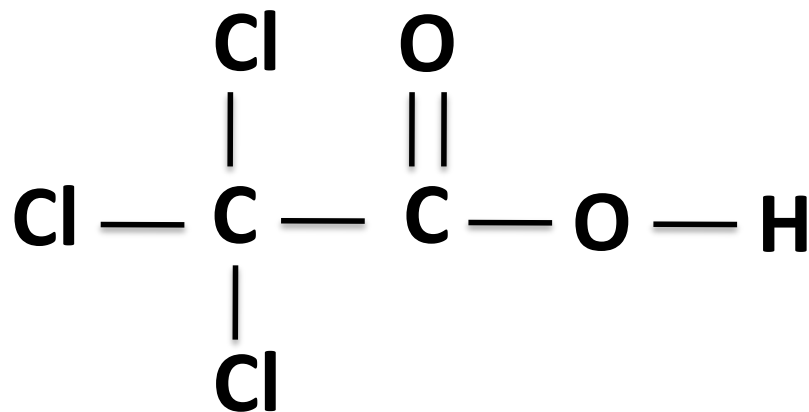
- Electron Dot or Lewis Structures
- Molecular Structure or Structural Formula
- Semi-structural formula or Condensed Structural Formula
- Skeletal structure
- Molecular Formula



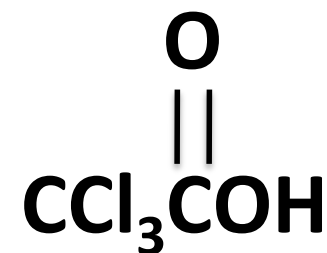
Electron dot/ Lewis Structures



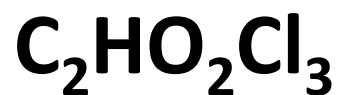
Other Structures



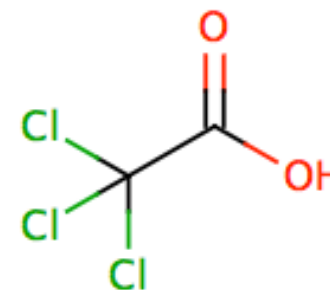
Molecular Structure
or Structural Formula



Semi-structural formula or
Condensed Structural Formula



Molecular Formula

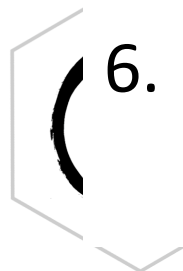


Skeletal Structure

Hydrocarbon Naming

IUPAC systematic nomenclature

1. Identify the parent chain
 - longest chain
 - contains the parent functional group & most number of multiple (double & triple) bonds
2. Identify the parent functional group
 - according to order of precedence
3. Identify any side-chains
4. Identify all other functional groups
5. Identify all multiple bonds
6. Number the parent chain and assign locants to all functional groups, side chains and multiple bonds



Hydrocarbon Naming

Carbon chain length prefix

1 = meth

2 = eth

3 = prop

4 = but

5 = pent

6 = hex

7 = hept

8 = oct

9 = non

10 = dec

Side chain alkyl groups

1 = methyl

2 = ethyl

3 = propyl

4 = butyl

5 = pentyl

6 = hexyl

7 = heptyl

8 = octyl

9 = nonyl

10 = decyl



Hydrocarbon Naming

Carbon chain length prefix

1 = meth

2 = eth

3 = prop

4 = but

5 = pent

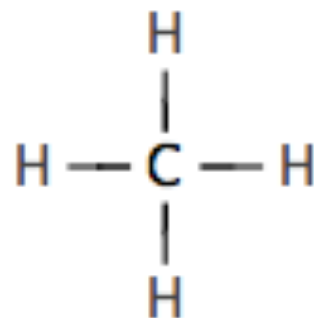
6 = hex

7 = hept

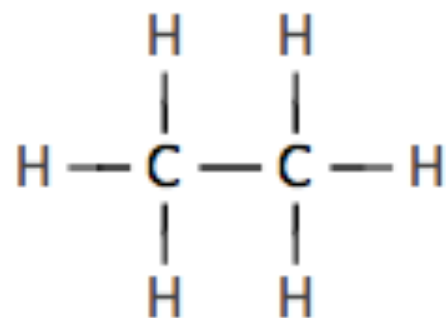
8 = oct

9 = non

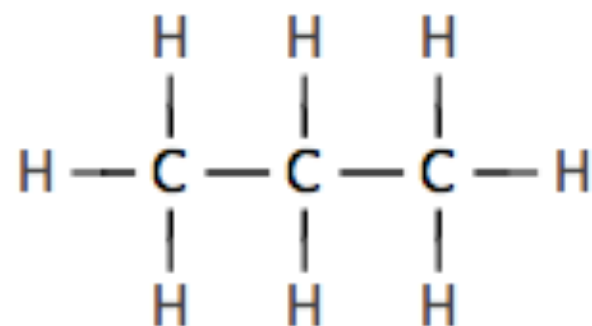
10 = dec



methane



ethane

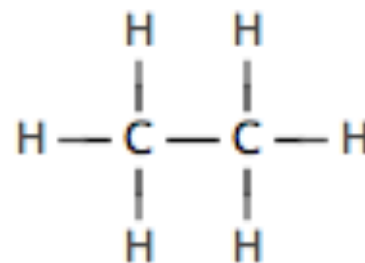


propane



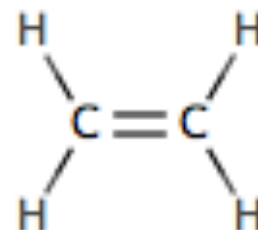
Hydrocarbon Naming

- Alkanes: Compounds containing ONLY C-C single bonds



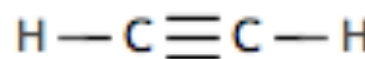
ethane

- Alkenes: Compounds containing one or more C=C double bond(s)



ethene

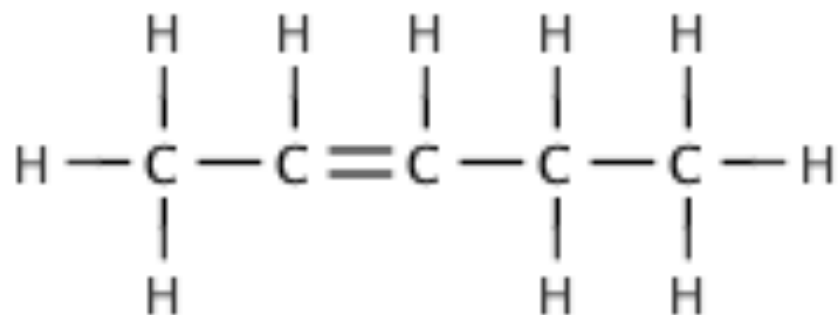
- Alkynes: Compounds containing one or more C≡C triple bond(s)



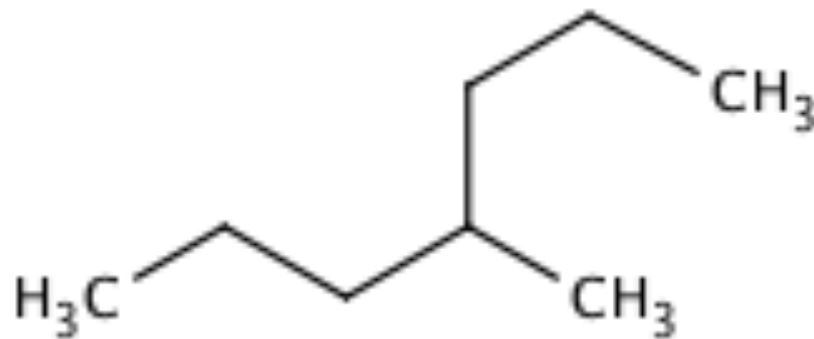
ethyne



Hydrocarbon Naming



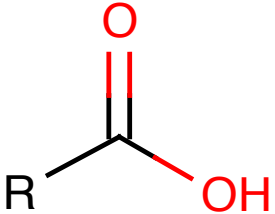
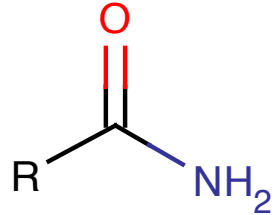
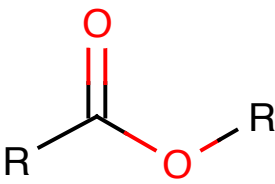
pent-2-ene



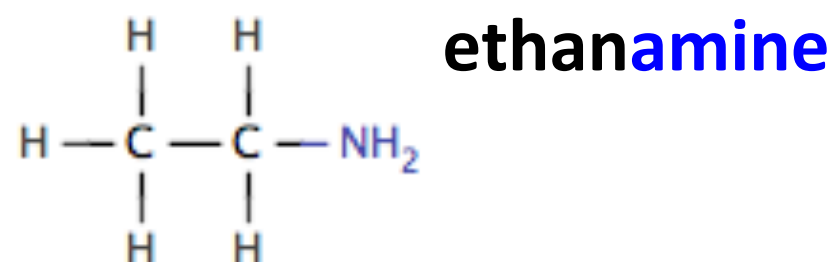
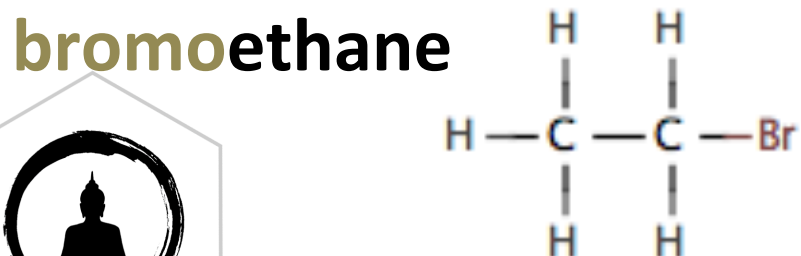
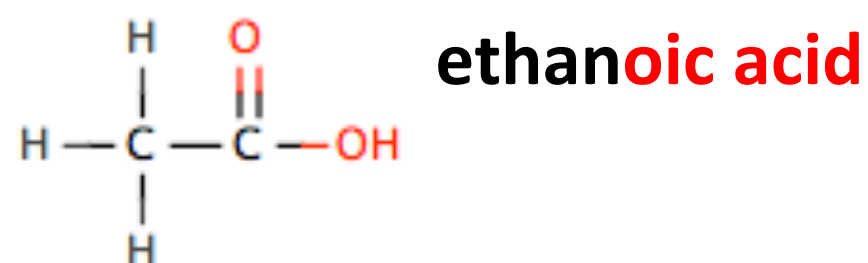
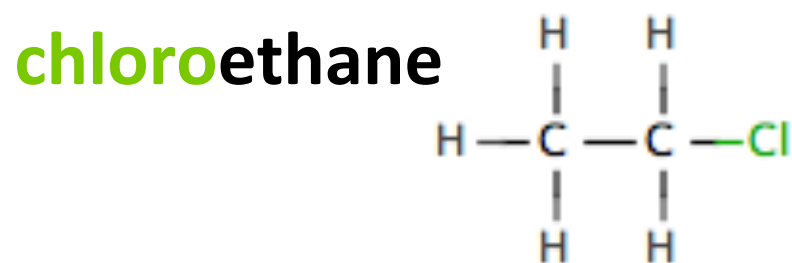
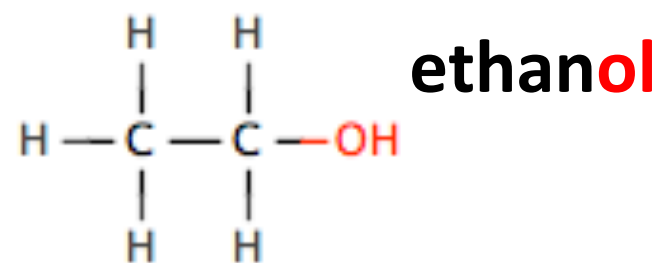
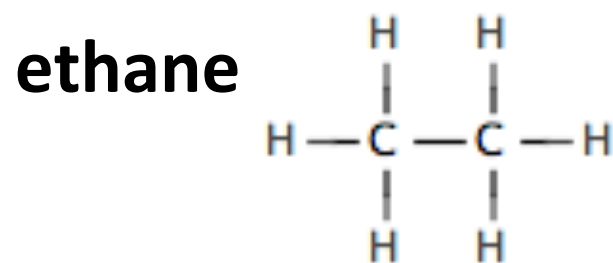
4 - methylheptane



Functional Groups

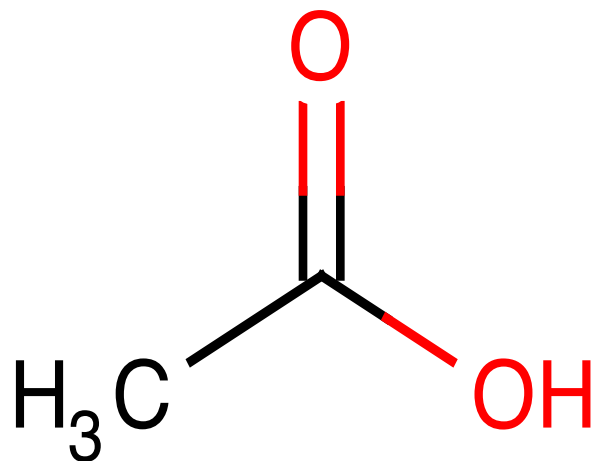
Group	Group name	Prefix (P) / suffix (S)
R-F	Fluoro	fluoro- (P)
R-Cl	Chloro	chloro- (P)
R-Br	Bromo	bromo- (P)
R-I	Iodo	iodo- (P)
R-OH	Alcohol/Hydroxyl	hydroxy- (P) or -ol (S)
	Carboxylic acid	-oic acid (S)
R-NH ₂	Amine	amino- (P) or -amine (S)
	Amide	amido- (P) or -amide (S)
	Ester	Ester (S) Or ____yl ____oate

Ethane with different functional groups

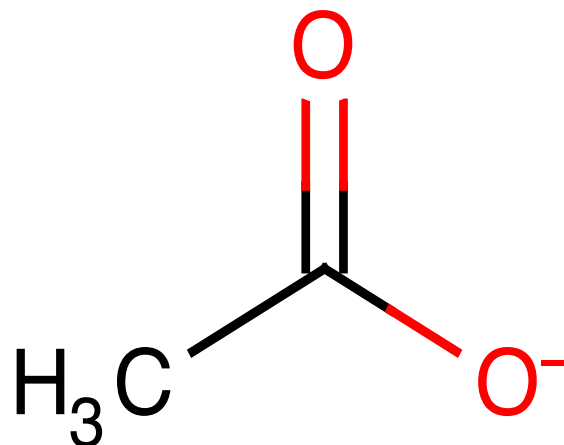


Naming esters

Ethanoic acid



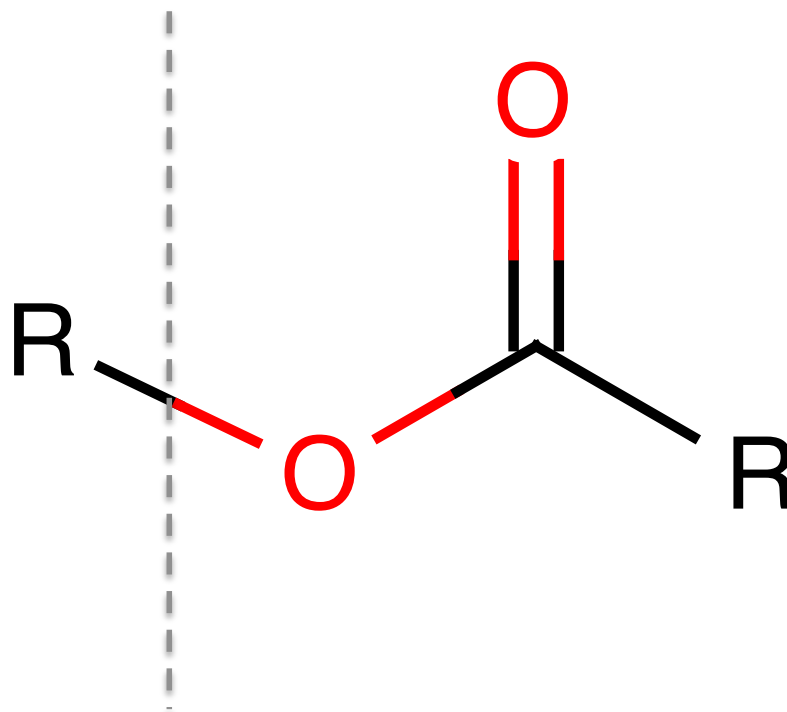
Ethanoate



Naming esters

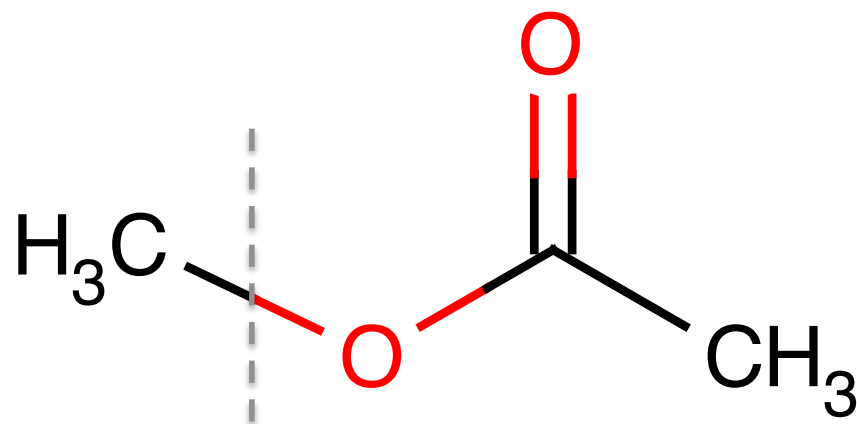
-yl

-oate

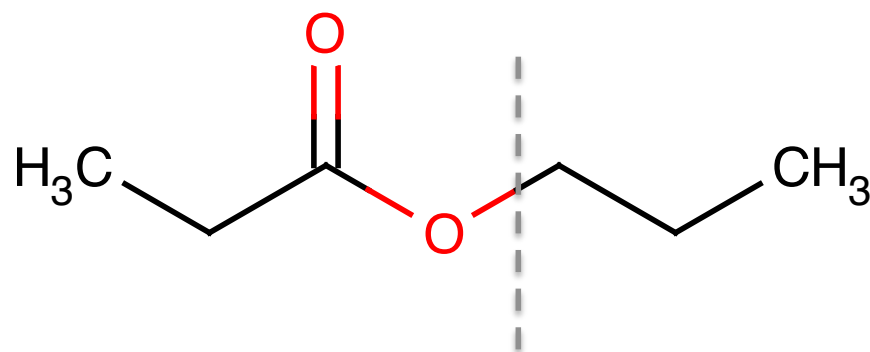


Examples

Methyl ethanoate



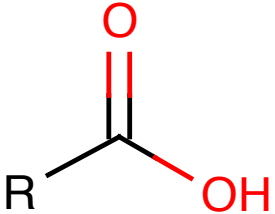
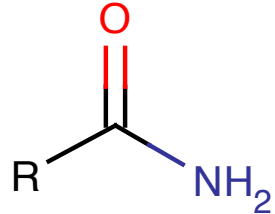
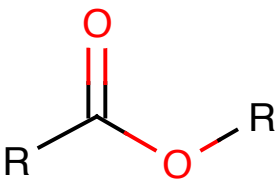
Propyl propanoate



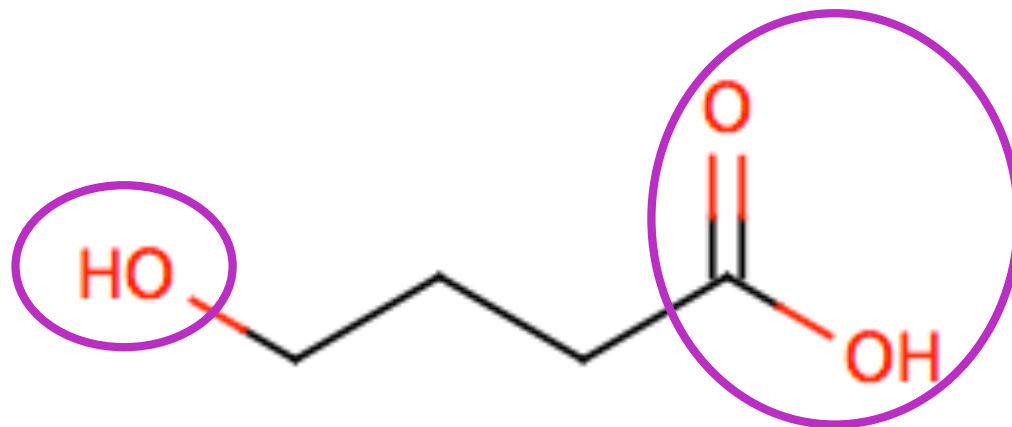
**Beware of the directionality
of the ester group!**



Order of Precedence

	Group	Group name	Prefix (P) / suffix (S)
5	R-F	Fluoro	fluoro- (P)
	R-Cl	Chloro	chloro- (P)
	R-Br	Bromo	bromo- (P)
	R-I	Iodo	iodo- (P)
3	R-OH	Alcohol/Hydroxyl	hydroxy- (P) or -ol (S)
1		Carboxylic acid	-oic acid (S)
4	R-NH ₂	Amine	amino- (P) or -amine (S)
2		Amide	amido- (P) or -amide (S)
2		Ester	Ester (S) Or ____yl ____oate

Example



4- hydroxybutanoic acid





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