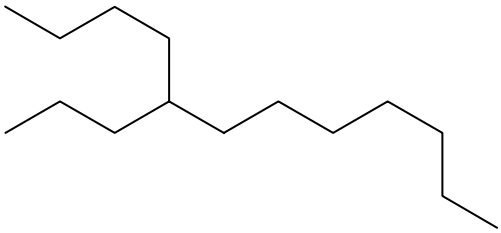
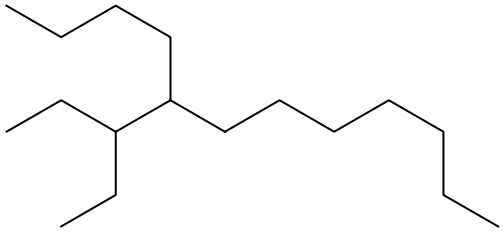
Nomenclature Problems – Guidelines and summary page on last two pages.

1.





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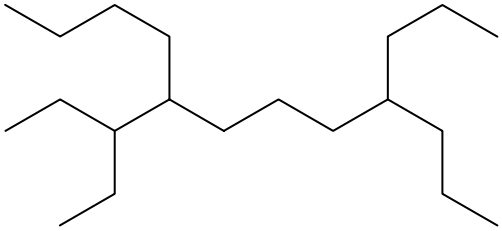

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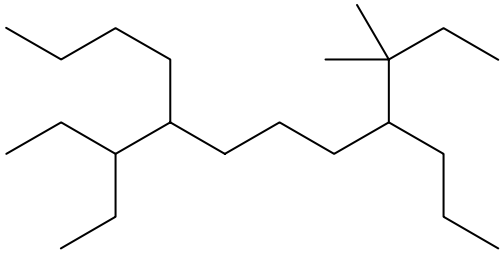

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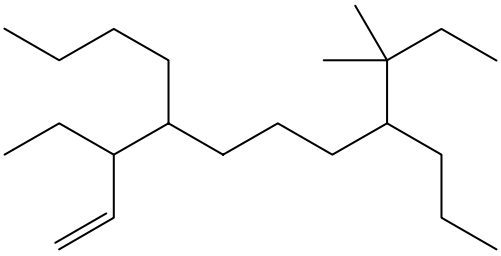

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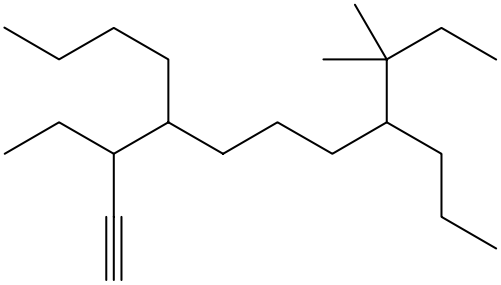

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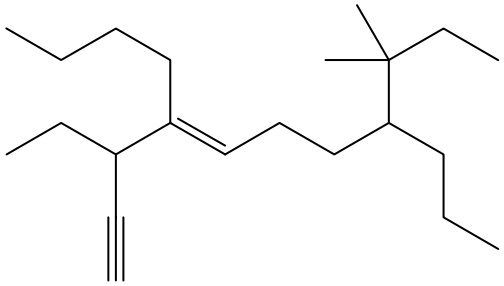

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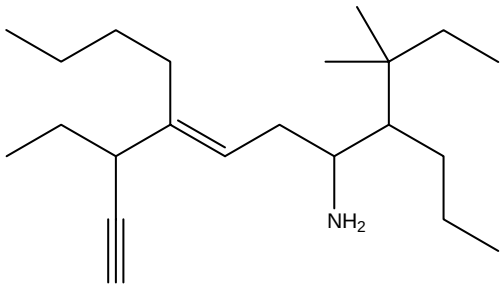

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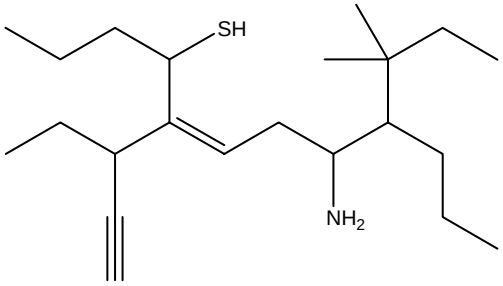

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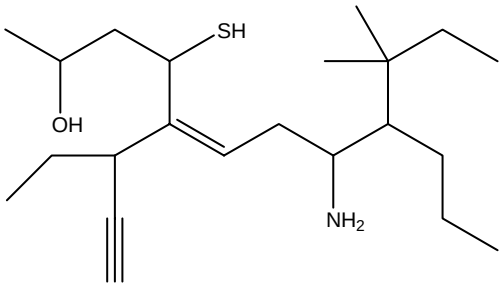

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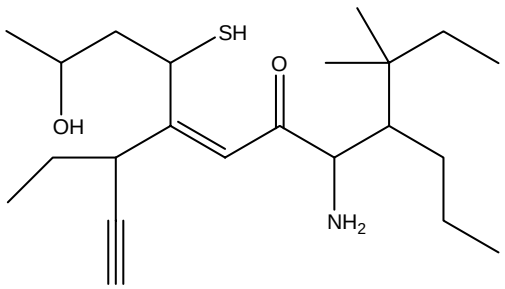

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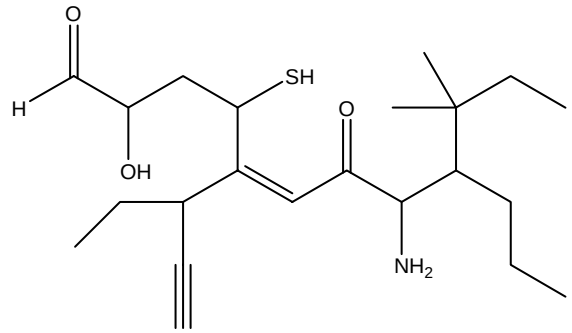

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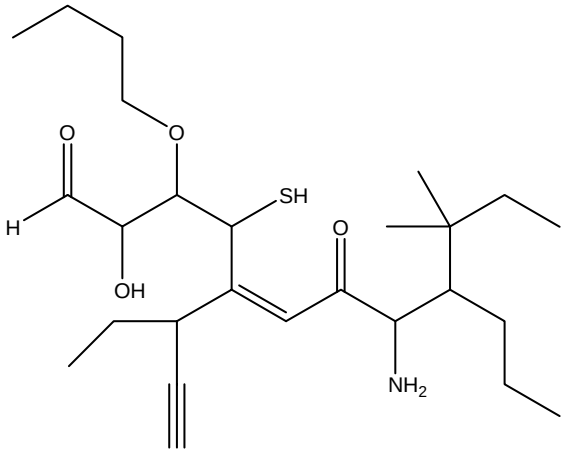

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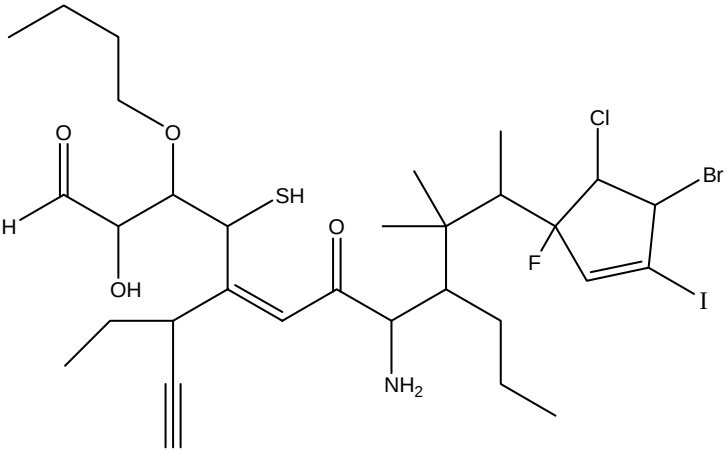

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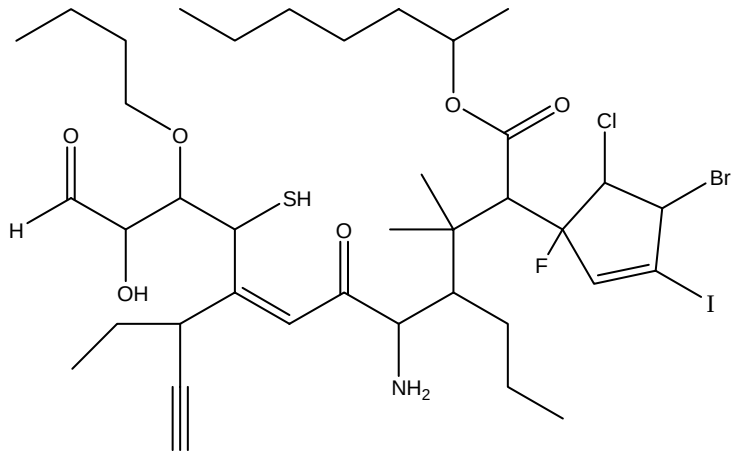
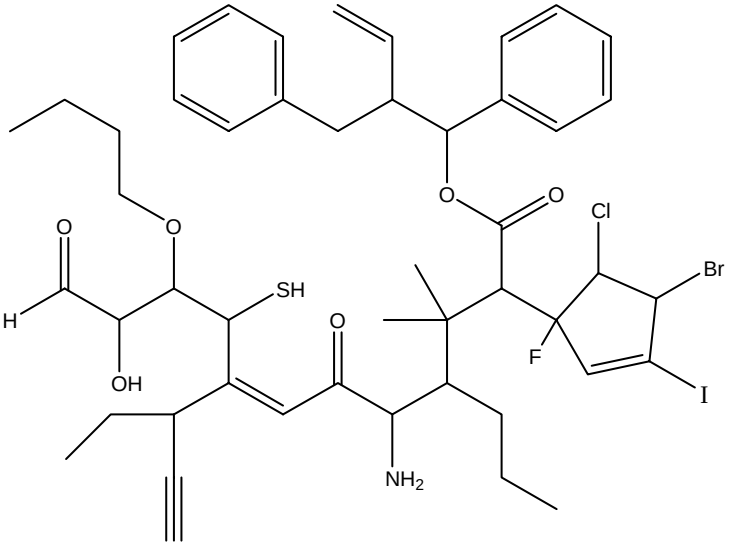
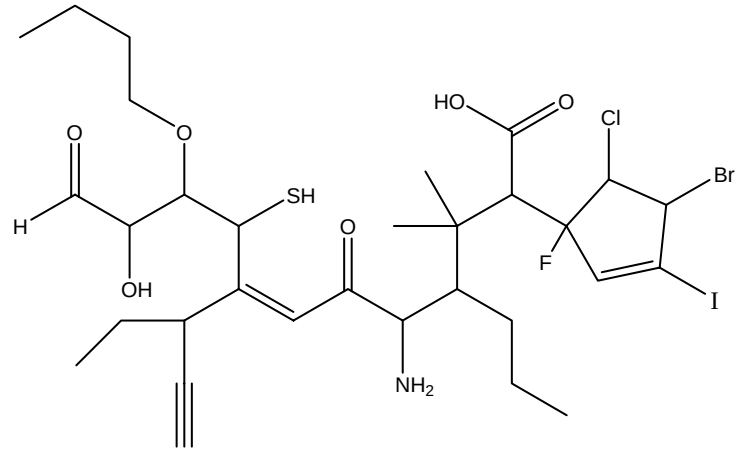

O
O
O
O
Cl
Br
SH
H
O
F
OH
I
NH2

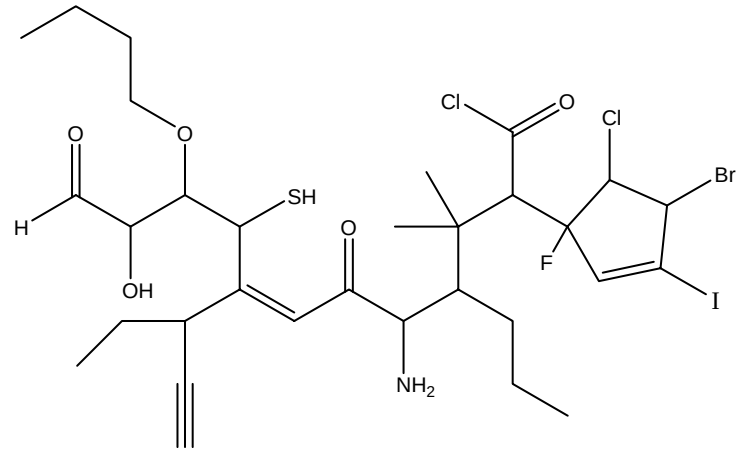
15.


O
O
O
O
Cl
Br
SH
H
O
F
OH
I
NH2

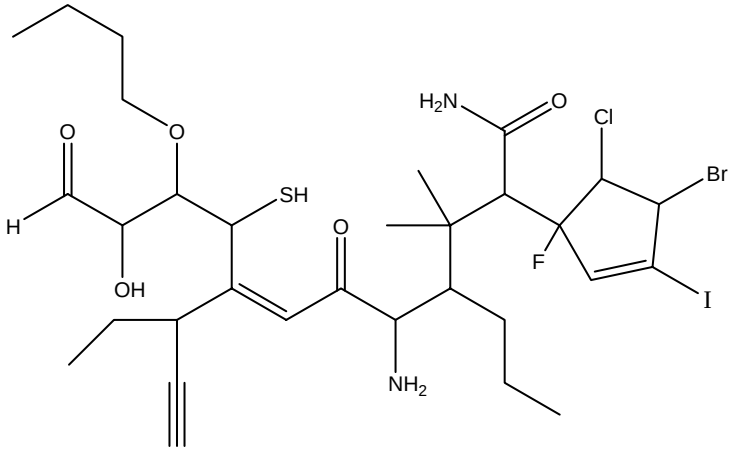
16.


HO
O
O
O
Cl
Br
SH
H
O
F
OH
I
NH2

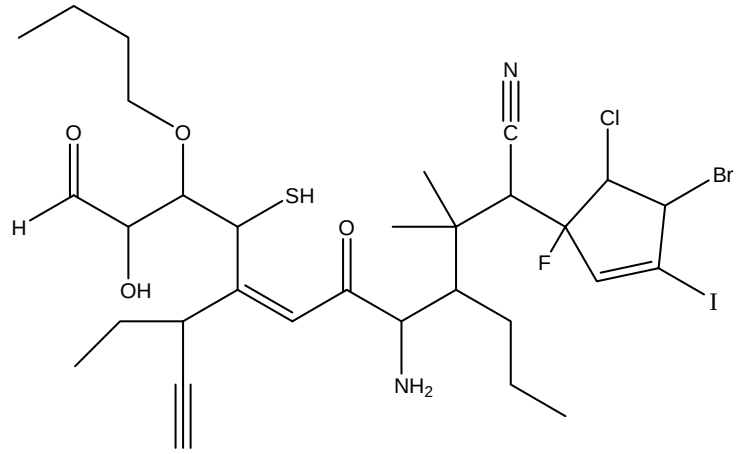
17.


Cl
O
Cl
Br
O
O
SH
H
O
F
OH
I
NH2

18.


H2N
O
Cl
Br
O
O
SH
H
O
F
OH
I
NH2

19.


N
C
Cl
Br
O
O
SH
H
O
F
OH
I
NH2

General Strategy For Naming Simple Organic Compounds (Bare bones summary sheets)

1. Find the highest priority group. These are listed in order of priority in the table of functional groups.

2. Find the longest chain containing the highest priority group. You should know carbon chains of length C_1-C_{12} (listed in the table).

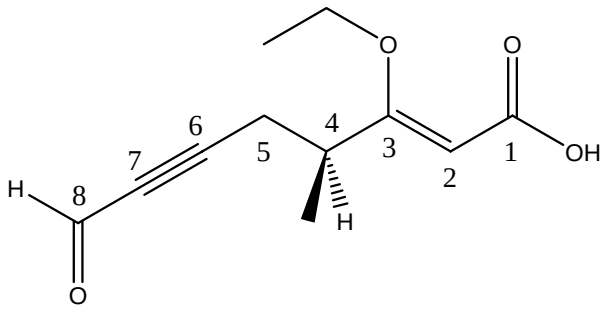
3. Number the longest chain containing the highest priority group to give the highest priority group the lowest number possible in numbering the longest chain. For the first seven groups, the functional group carbon will be number 1 (if it is the highest priority group) and the "1" can be omitted, since it is understood that it has to be this way.

4. Usually the highest priority group is named as a suffix at the end of alkane, alk-#-ene or alk-#-yne. The final e is dropped if the suffix begins with a vowel and it is retained if the suffix begins with a consonant. A number will be present in front of the suffix name unless its position is unambiguously clear (i.e. carboxyl groups aldehydes, nitriles, etc. always = 1, if highest in priority). If there is a C/C pi functional group to identify (alkene or alkyne), the number in front of its part of the name describes its position (see rule 6 below). If both a pi bond and a high priority substituent are present, then two numbers may be necessary, one for each functionality.

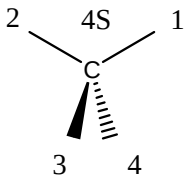
5. Lower priority groups are named with their prefix names and their location numbers based on the numbering of the parent chain (always true for substituents numbered 12 on the next page). The lower priority substituents should be listed in alphabetical order. Some parts of prefix names count in this regard and some don't. We will not emphasize this aspect in this course.

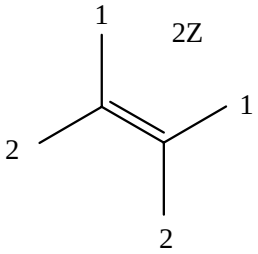
6. Double bonds and triple bonds are named as alk-#-ene or alk-#-yne, respectively. If both are present, name as alk-#-en-#-yne. Multiple pi bonds (or other substituents) use the prefixes di, tri, tetra, penta etc. with a number for each occurrence. In such cases, an "a" is added in front of the numerical prefix for better phonetics. (alka-#,#-diene or alka-#,#,#-triyne, alka-#,#-dien-#,#-diyne, etc.)

The essential functional groups to know (for our course) and their prefixes and suffixes are given in the attached table. In this table the term "alkan-#-suffix" is a generic term for any alkane with a functional group suffix, and it must be replaced with the correct parent stem name based on the number of carbons in the longest chain (C_1-C_{12} for us). If there is a double bond, the name will change to "alk-#-en-#-suffix and if there is a triple bond, the name will change to "alk-#-yn-#-suffix.

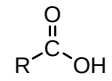
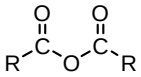
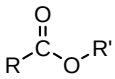
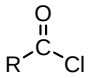
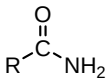


(2Z,4S)-3-ethoxy-4-methyl-8-oxooct-2-en-6-ynoic acid





Notice that no "1" is used for the carboxylic acid group, because it has to be "1" in this structure.

Functional Group		**prefix**	**suffix**
1. Carboxylic acid		#-carboxy not considered	alkan**oic acid**
2. Anhydride		#-acyloxyalkanecarbonyl not considered	alkan**oic anhydride** (if symmetrical)
3. Ester		**#-alkoxycarbonyl**	**alkyl** alkan**oate** (R') (RCO_2)
4. Acid halide		#-**chlorocarbonyl**	alkan**oyl chloride**
5. Amide		#-**carbamoyl** #-**amido**	alkan**amide**
6. Nitrile		#-**cyano**	alkane**nitrile**
7. Aldehyde		#-**oxo**	alkan**al**
8. Ketone		#-**oxo** (older = #-**keto**)	#-alkan**one**
9. Alcohol		#-**hydroxy**	#-alkan**ol**
10. Thiol		#-**mercapto**	#-alkane**thiol**
11. Amine		#-**amino**	#-alkyl**amine** / #-alkan**amine**
12. Ether		#-alk**oxy** (if more than 5C's, then #-alkoxyl) (can also use "#-oxa" prefix and count as carbon in longest chain)	
12. Thioether		#-alkyl**thio**	
12. Halogen		#-**fluoro**, #-**chloro**, #-**bromo**, #-**iodo**	
12. Azide*		#-**azido**	
12. Diazo*		#-**diazo**	
12. Nitro*		#-**nitro**	
12. Nitroso		#-**nitroso**	
12. Carbon branches		#-alkyl, #-(alk-#-enyl), #-(alk-#-ynyl)	

always prefixes (no suffix names)

The part of each name specific to the functional group is in **bold** and underlined to help you see those features.

"R" = carbon chains

# carbons	alkane chain name	alkyl branch name
1	methane	methyl
2	ethane	ethyl
3	propane	propyl
4	butane	butyl
5	pentane	pentyl
6	hexane	hexyl
7	heptane	heptyl
8	octane	octyl
9	nonane	nonyl
10	decane	decyl
11	undecane	undecyl
12	dodecane	dodecyl
13	tridecane	tridecyl
14	tetradecane	tetradecyl
15	pentadecane	pentadecyl
16	hexadecane	hexadecyl
17	heptadecane	heptadecyl
18	octadecane	octadecyl
19	nonadecane	nonadecyl
20	icosane	icocyl
	etc.	

* = formal charge is necessary in these Lewis structures and there are two reasonable resonance structures

stereoisomerism	prefixes	parent stem	C/C pi bonds	high priority suffix
R/S and E/Z	branches and low priority functional groups with location #	see box above	-ene -yne with location #	see list above drop preceeding "e" if suffix starts with a vowel