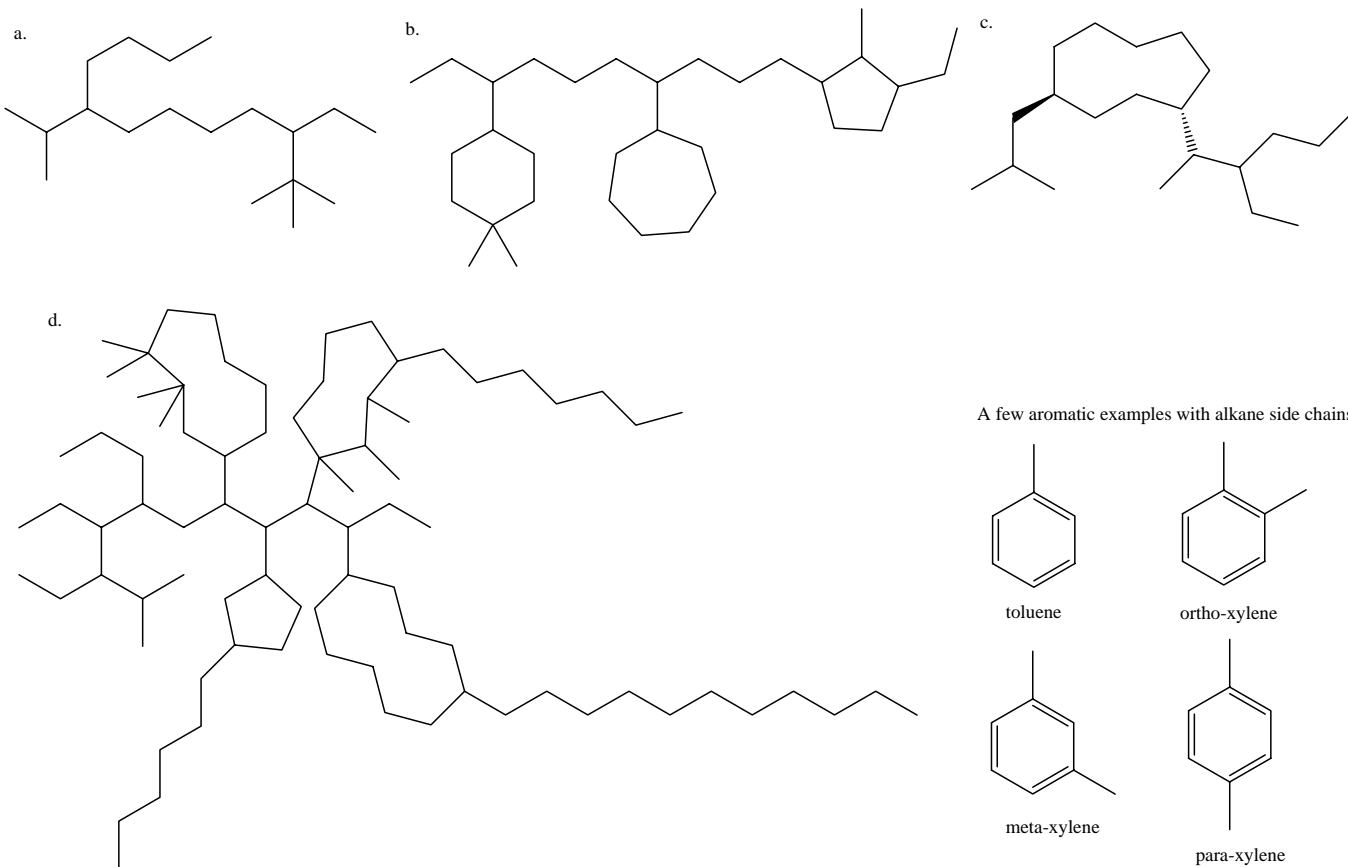
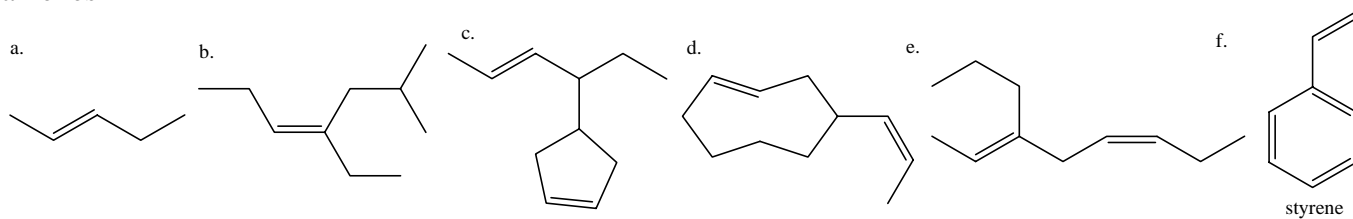


On a separate piece of paper, provide acceptable names for the following structures. Redraw each structure by your name and clearly number your longest chain in your drawing. The "strict" rule say to use prefixes in alphabetical order, but I don't try to follow that rule, nor do I enforce it.

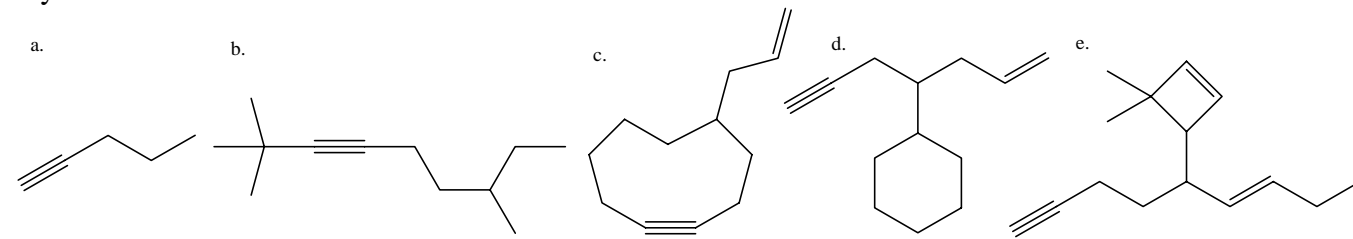
1. alkanes



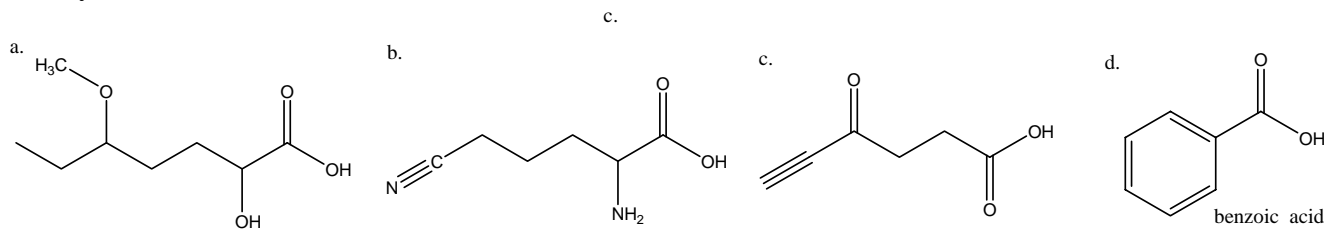
2. alkenes



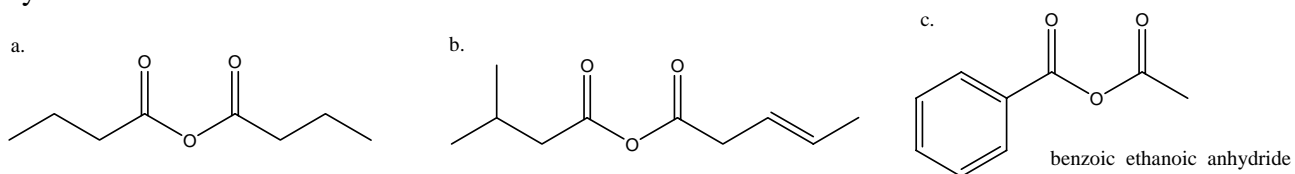
3. alkynes



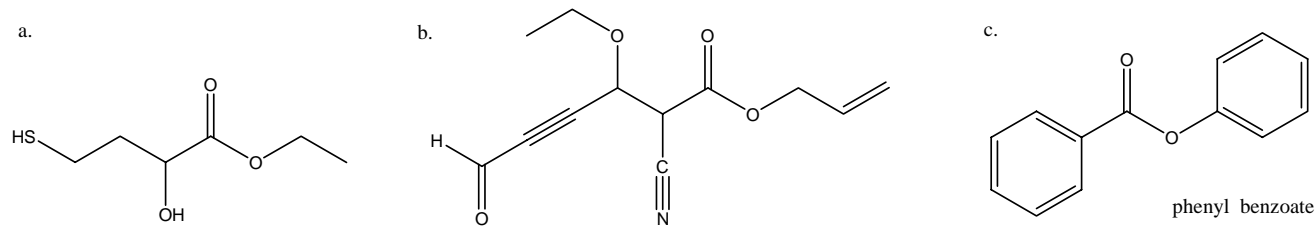
4. carboxylic acids



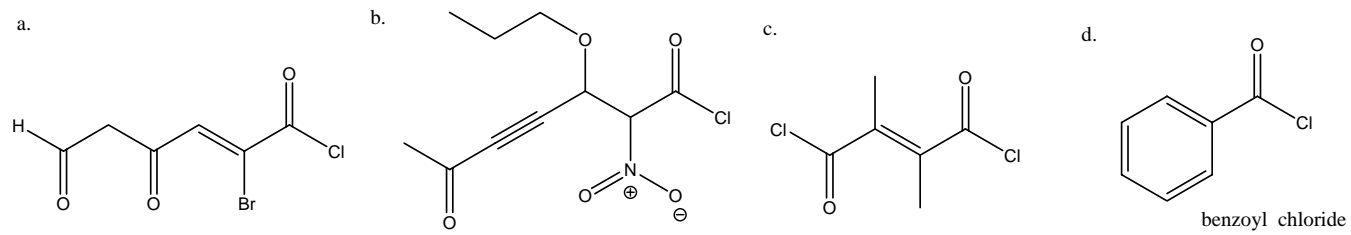
5. anhydrides



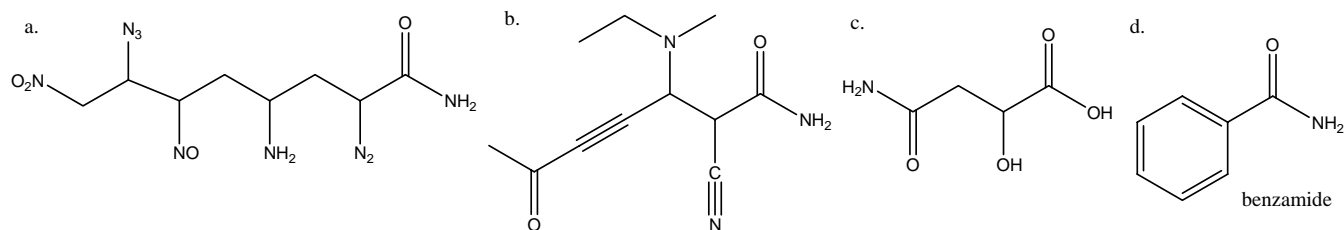
6. esters



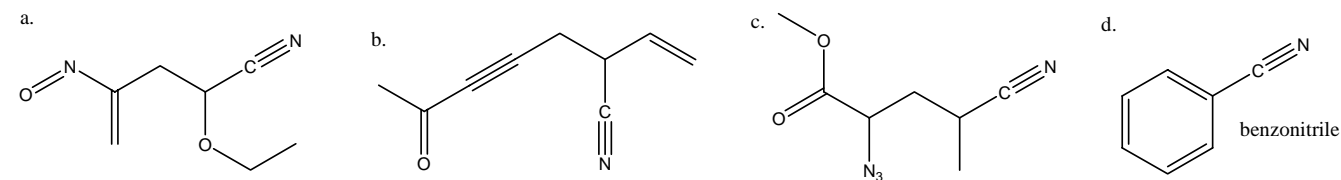
7. acid chlorides



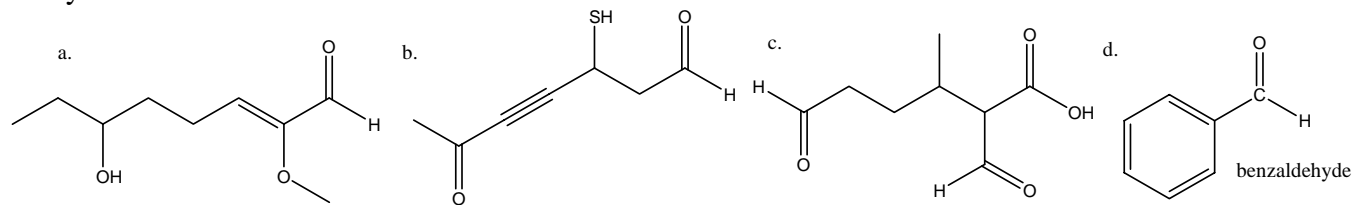
8. amides



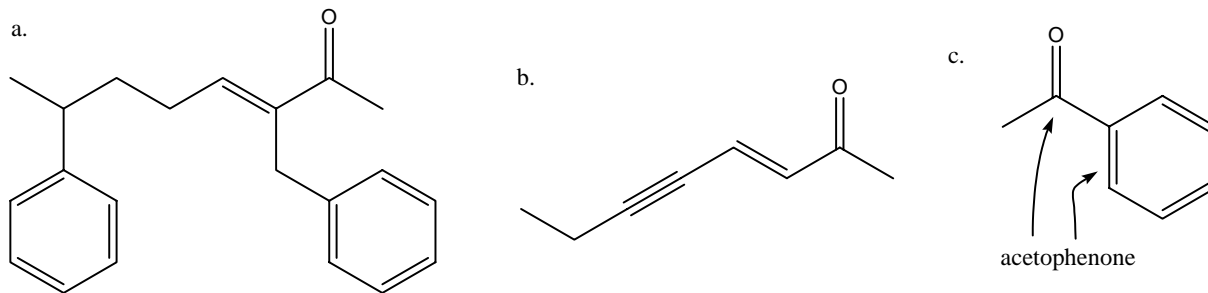
9. nitriles



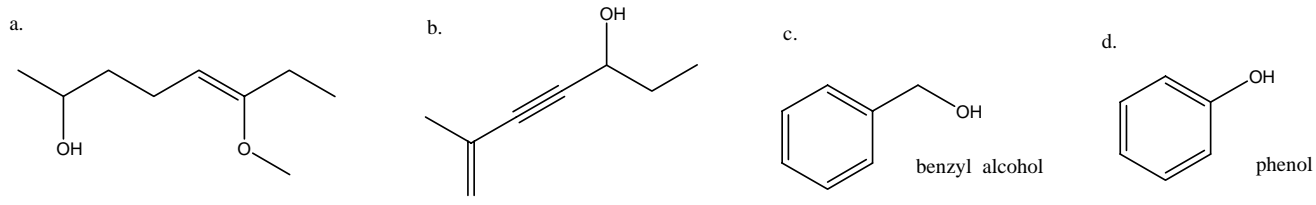
10. aldehydes



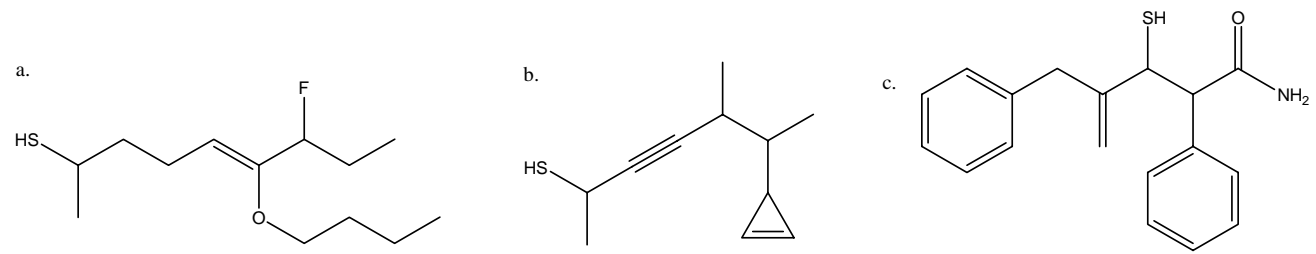
11. ketones



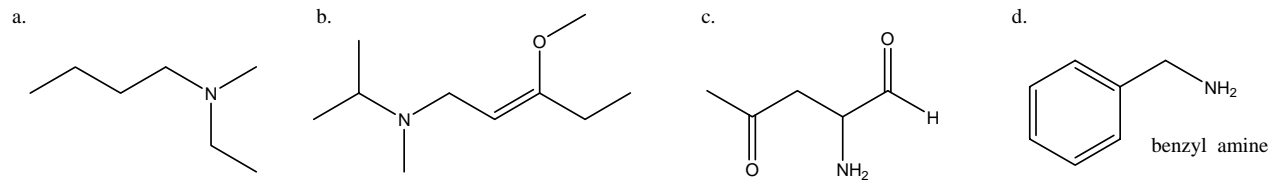
12. alcohols



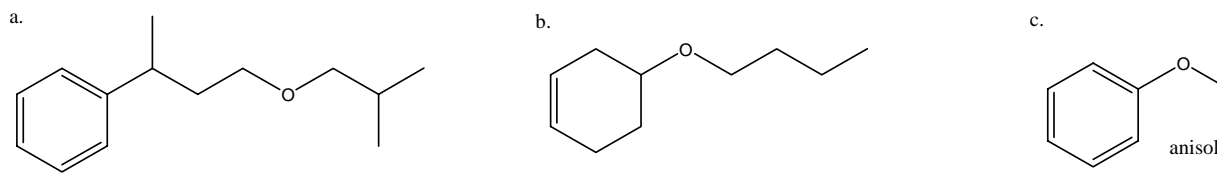
13. thiols



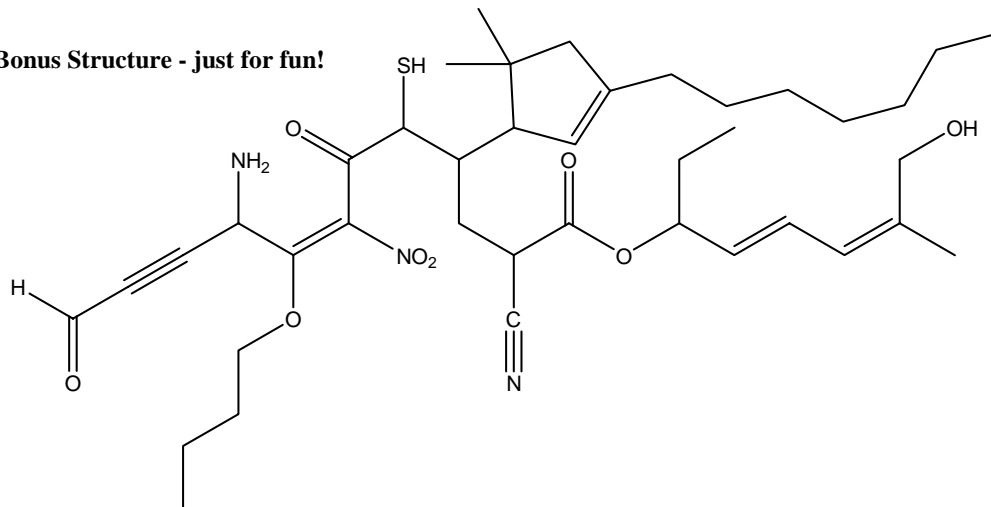
14. amines



15. ethers

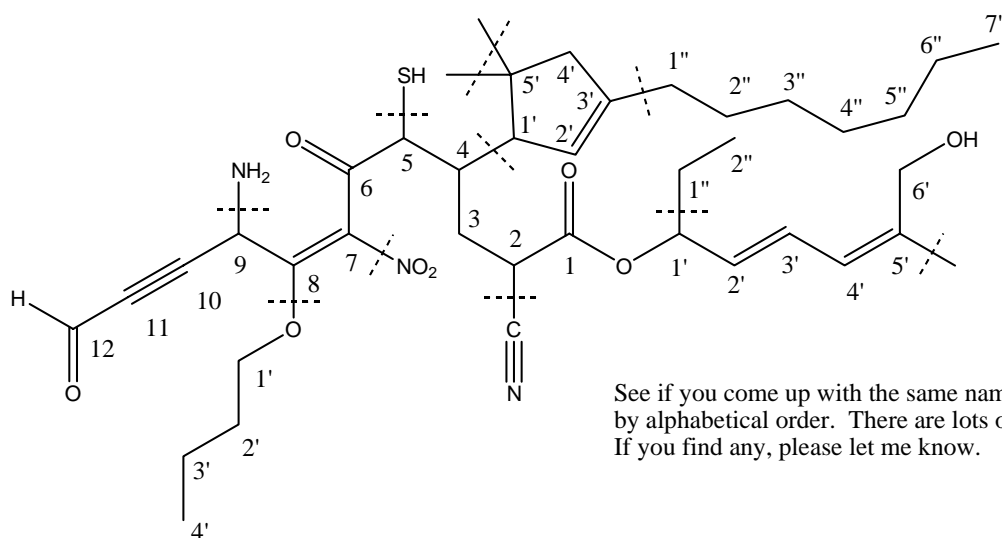


16.

Bonus Structure - just for fun!Points to Consider

1. What is the highest priority group present?
2. What is the longest chain with that group?
3. Number that chain (ring) so that the high priority group gets the lowest number.
4. Identify branches and other functionality with their numbers. (Usually named as prefixes.)
5. Combine everything into one name with proper use of hyphens (between numbers and letters) and commas (between numbers and numbers).

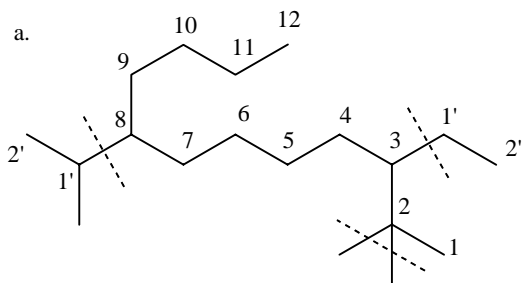
Possible answer.



See if you come up with the same name as I did. I tried to do it by alphabetical order. There are lots of opportunities for mistakes. If you find any, please let me know.

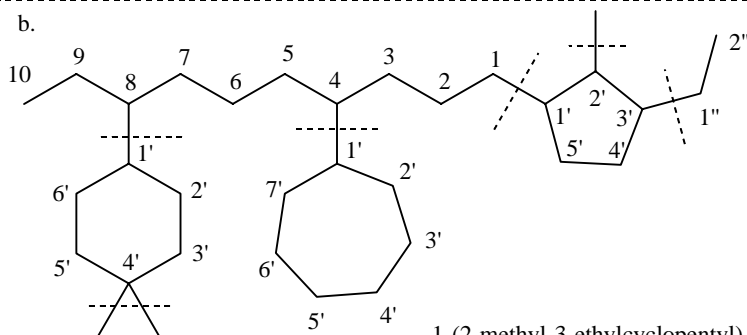
(2E,4Z)-1-ethyl-6-hydroxy-5-methylhexa-2,4-dienyl (7Z)-9-amino-8-butoxy-2-cyano-4-(5,5-dimethyl-3-heptylcyclopent-2-enyl)-5-mercapto-7-nitro-6,12-dioxododec-7-en-10-ynoate

alkanes prefix = none suffix = -ane

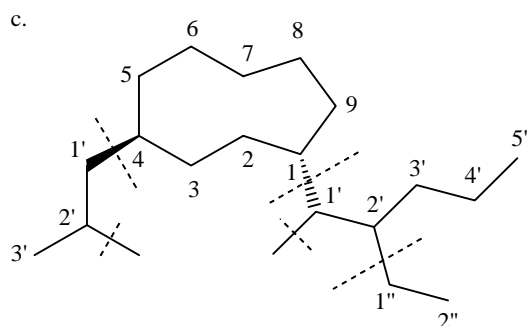


----- = a branch point

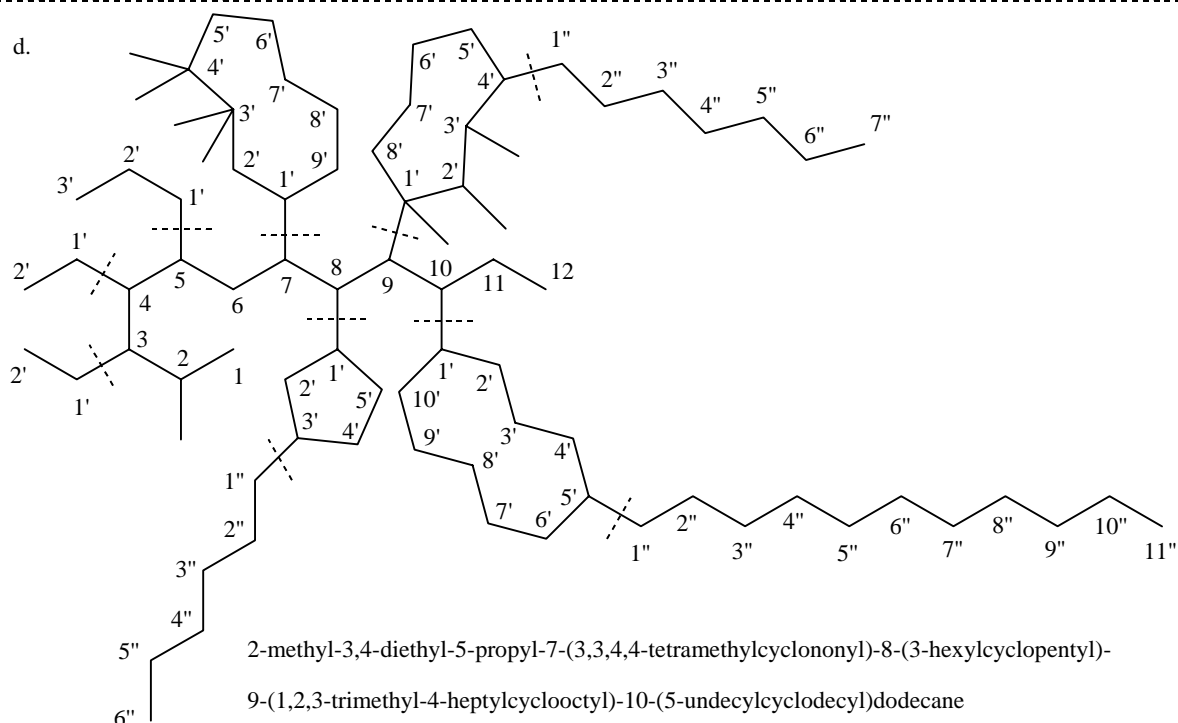
2,2-dimethyl-3-ethyl-8-(1-methylethyl)dodecane



1-(2-methyl-3-ethylcyclopentyl)-4-cycloheptyl-8-(4,4-dimethylcyclohexyl)decane



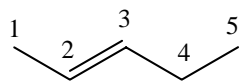
trans-1-(1-methyl-2-ethylpentyl)-4-(2-methylpropyl)cyclononane



2-methyl-3,4-diethyl-5-propyl-7-(3,3,4,4-tetramethylcyclononyl)-8-(3-hexylcyclopentyl)-
9-(1,2,3-trimethyl-4-heptylcyclooctyl)-10-(5-undecylcyclodecyl)dodecane

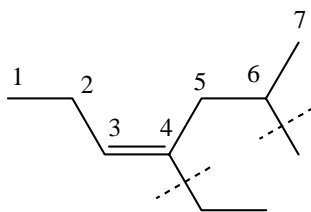
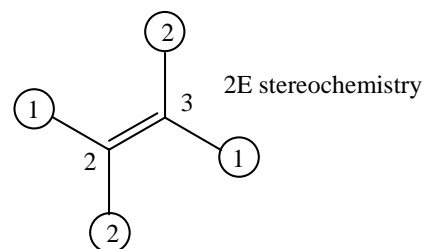
alkenes **prefix = none** **suffix = -ene**

a.



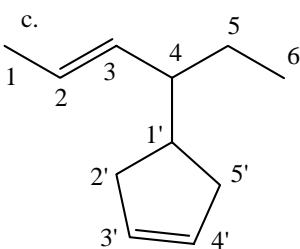
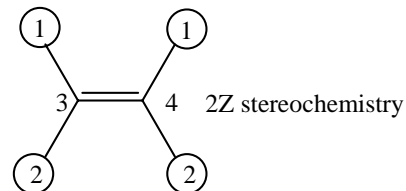
(2E)-pent-2-ene or (2E)-2-pentene

(newer way) (older way)
European American

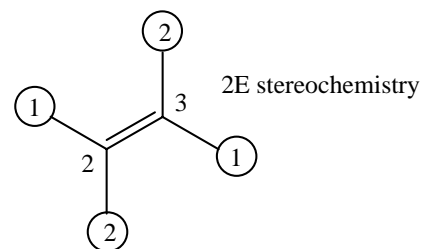


(3Z)-4-ethyl-6-methylhept-3-ene (newer way)

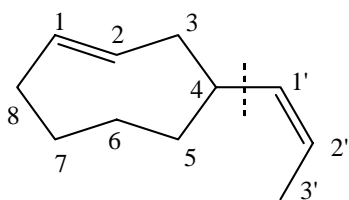
(3Z)-4-ethyl-6-methyl-3-heptene (older way)



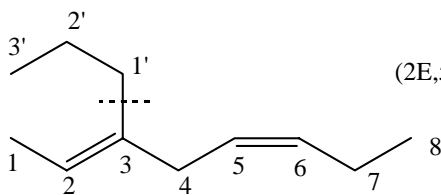
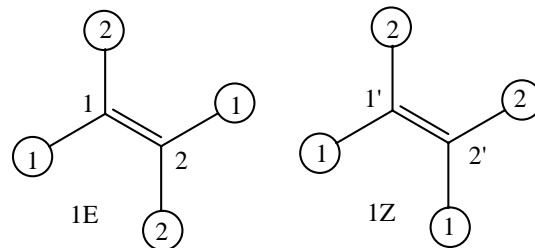
(2E)-4-(cyclopent-3-enyl)hex-2-ene



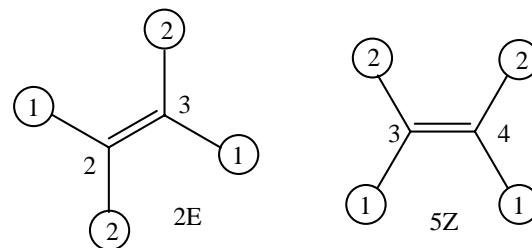
d.



(1E)-4-(prop-1Z-enyl)cyclooct-1-ene

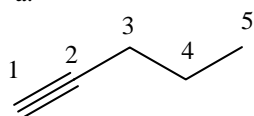


(2E,5Z)-3-propylocta-2,5-diene



alkynes **prefix = none** **suffix = -yne**

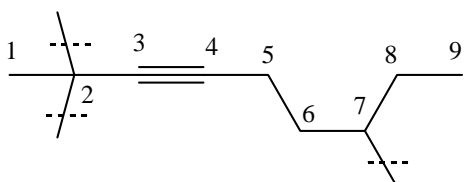
a.



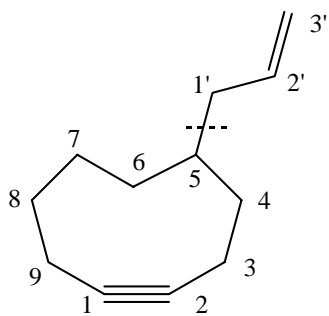
pent-1-yne (newer way)

1-pentyne (older way)

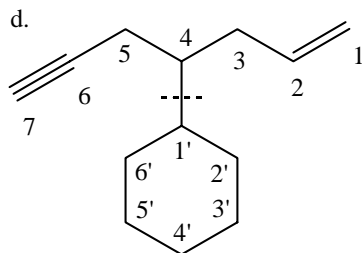
b.



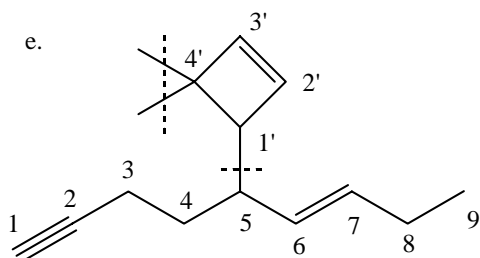
2,2,7-trimethylnon-3-yne



5-(prop-2-enyl)cyclonon-1-yne



1-cyclohexylhept-1-en-6-yne

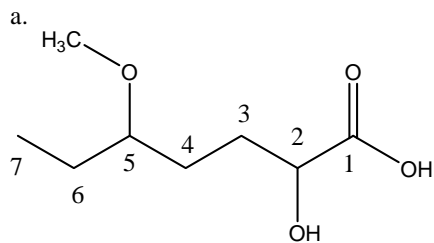


5-(4,4-dimethylcyclobut-2-enyl)non-6E-en-1-yne

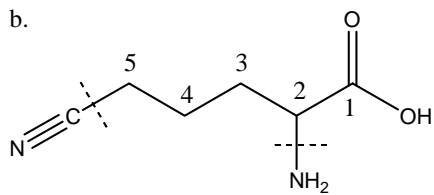
carboxylic acids

prefix = none for our course

suffix = -oic acid

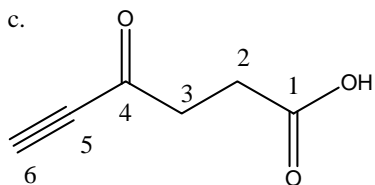


2-hydroxy-5-methoxyheptanoic acid



2-amino-5-cyanopentanoic acid

Do not number the longest chain into the nitrile group when it is a lower priority group.

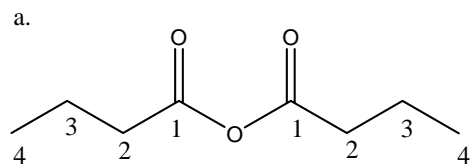


4-oxohex-5-ynoic acid

anhydrides

prefix = none for our course

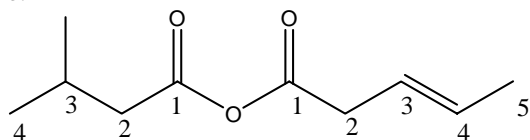
suffix = -oic anhydride



butanoic anhydride

Since both carbon chains are identical, you only have to write the name once. The "anhydride" part of the name tells you there's two of them.

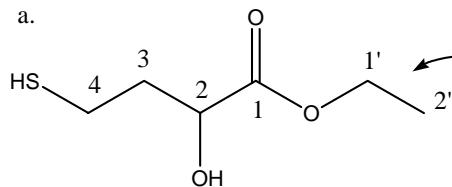
b.



3-methylbutanoic pent-3E-enoic anhydride

esters**prefix = none for our course****suffix = -oic anhydride**

a.

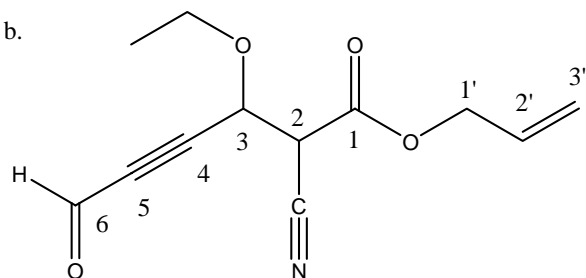


ethyl 2-hydroxy-4-mercaptoputanoate

ethyl 2-hydroxy-4-sulfanylbutanoate

This part of the ester name is always named as a separate "branch" name in front of the parent name.

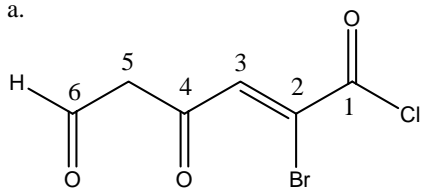
b.



prop-2-enyl 2-cyano-3-ethoxy-6-oxohex-4-ynoate

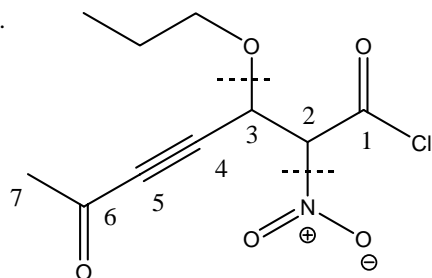
acid chlorides**prefix = chlorocarbonyl****suffix = -oyl chloride**

a.



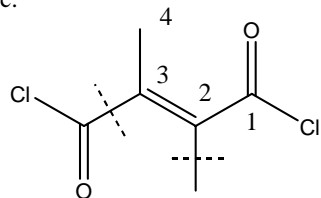
2-bromo-4,6-dioxohex-2Z-enoyl chloride

b.



2-nitro-3-propoxy-6-oxohept-4-ynoyl chloride

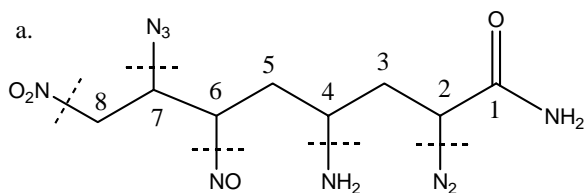
c.



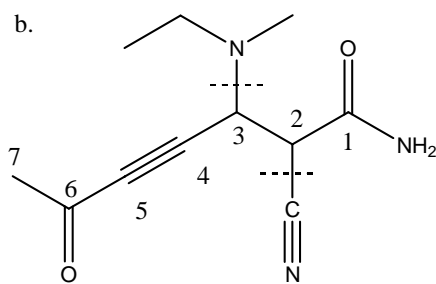
2-methyl-3-chlorocarbonylbut-2E-enoyl chloride

amides**prefix = carbamoyl (or amido)****suffix = -amide**

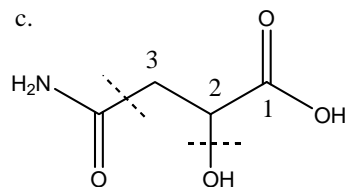
a.



2-diazo-4-amino-6-nitroso-7-azido-8-nitrooctanamide



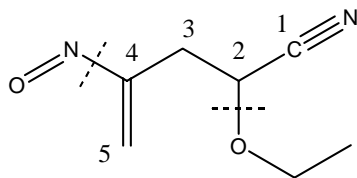
2-cyano-3-(N-ethyl-N-methylamino)-6-oxohept-4-enamide



2-hydroxy-3-carbamoylpropanoic acid }
 2-hydroxy-3-amidopropanoic acid } Either is OK.

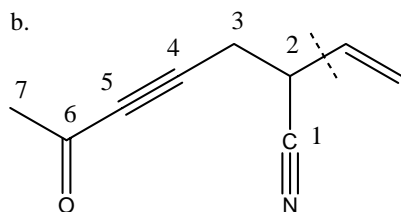
nitriles**prefix = cyano****suffix = -nitrile**

a.

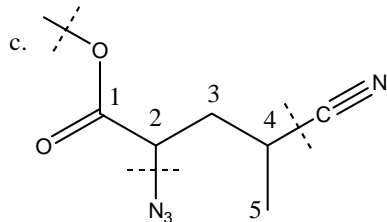


2-ethoxy-4-nitrosopent-4-enenitrile

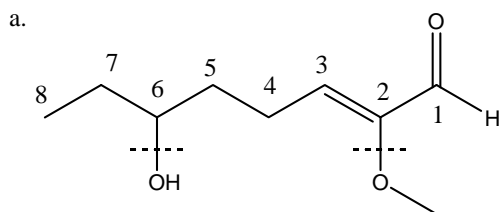
Don't drop the "e" of the stem when using nitrile as a suffix.



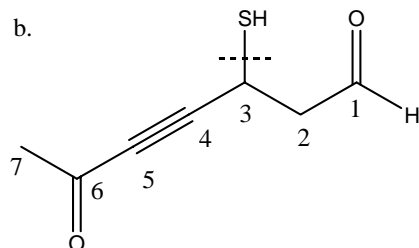
2-ethenyl-6-oxohept-4-enenitrile



methyl 2-azido-4-cyanopentanoate

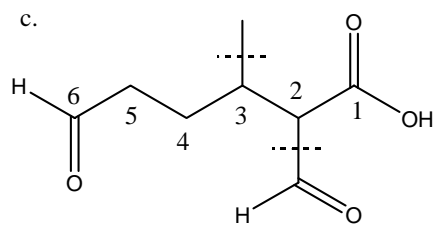
aldehydes**prefix = oxo (when part of the longest chain)****suffix = -al****prefix = formyl (when branched off of the longest chain)**

2-methoxy-6-hydroxyoct-2Z-enal



3-mercapto-6-oxohept-4-ynal

3-sulfanyl-6-oxohept-4-ynal

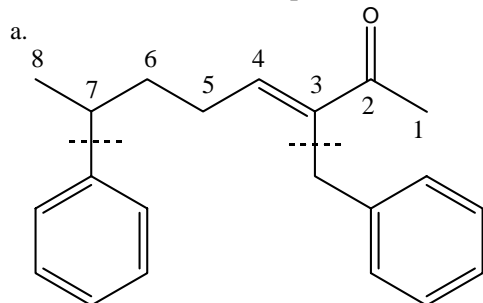


2-formyl-3-methyl-6-oxohexanoic acid

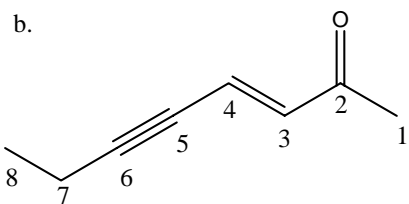
ketones

prefix = oxo

suffix = -one (rhymes with "cone")



3-benzyl-7-phenyloct-3E-en-2-one

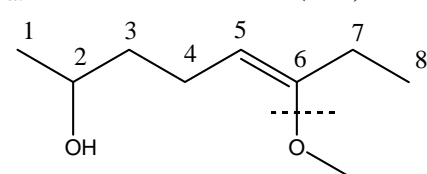


oct-3E-en-5-yn-2-one

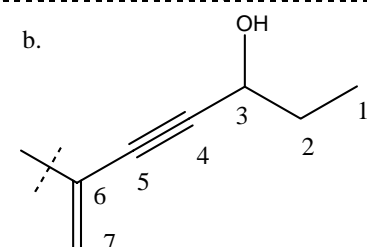
alcohols

prefix = hydroxy

suffix = -ol

(note, an alcohol is not "hydroxide")

6-methoxyoct-5Z-en-2-ol



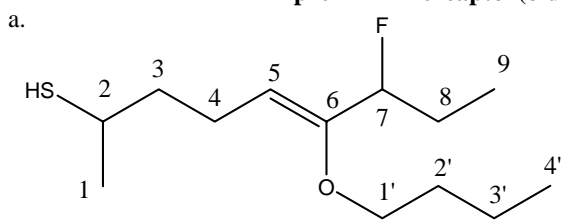
6-methylhept-6-en-4-yn-3-ol

thiols

prefix = sulfanyl (newer)
prefix = mercapto (older)

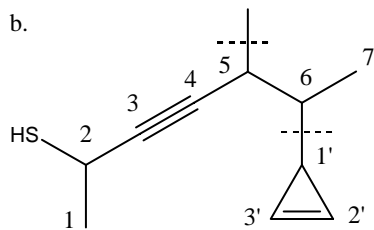
Both are OK.

suffix = -thiol

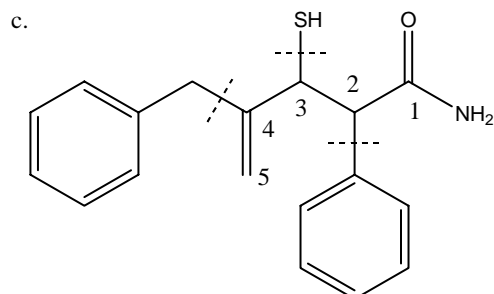


6-butoxy-7-fluoronon-5Z-ene-2-thiol

Don't drop the "e"
of the stem when
thiol is used as
the suffix.

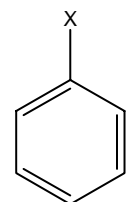
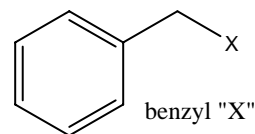


5-methyl-6-cycloprop-2-enylhept-3-yne-2-thiol

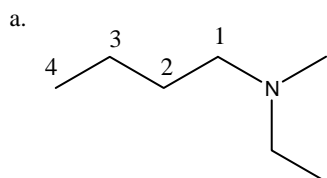


2-phenyl-3-mercapto-4-benzylpent-4-enamide

2-phenyl-3-sulfanyl-4-benzylpent-4-enamide

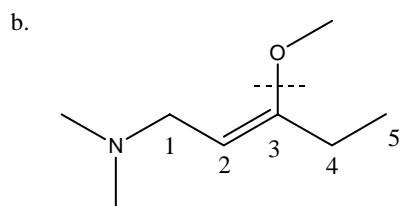
**amines**

prefix = amino

suffix = -amine
can name 2 ways, see below

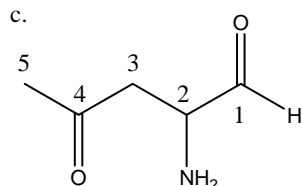
N-ethyl-N-methylbutanamine (substituents on a parent name)

butylethylmethylamine (all named as branches on the nitrogen)



N,N-dimethyl-3-methoxypent-2Z-en-1-amine

dimethyl-3-methoxypent-2Z-enylamine

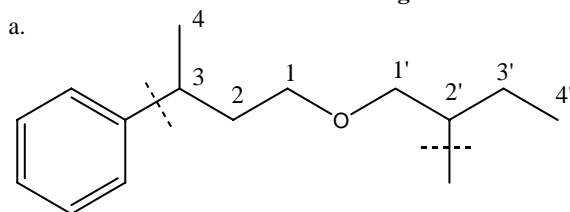


2-amino-4-oxopentanal

ethersprefix = alkoxy (four carbons or less)
alkyloxy (five carbons or more)

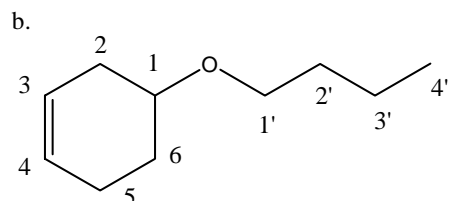
suffix = none

common nomenclature allows naming each branch as "alkyl" followed by "ether", all separate words



1-(2-methylbutyloxy)-3-phenylbutane

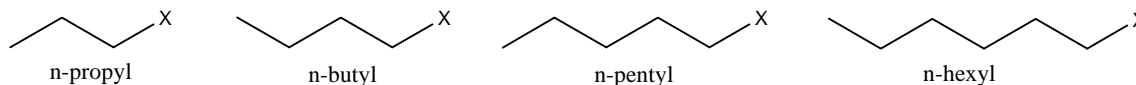
2-methylbutyl 3-phenylbutyl ether



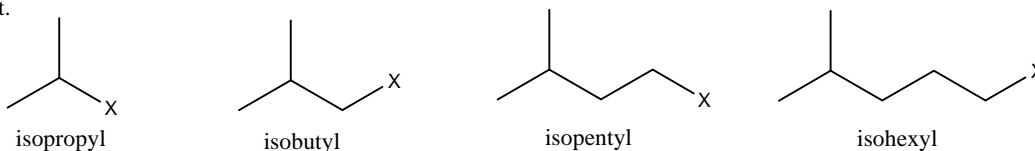
1-butoxycyclohex-3-ene

1-butyl 1-cyclohex-3-enyl ether

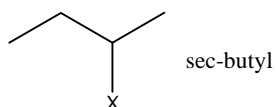
n-alkanes, n = normal (Straight chain name based on the total number of carbon atoms present.)



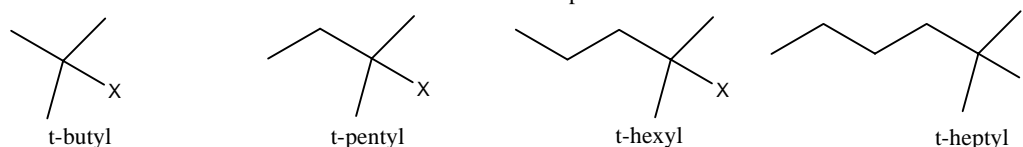
Isoalkanes, iso = 3 carbons with branch off middle carbon. The stem name is based on the total number of carbon atoms present.



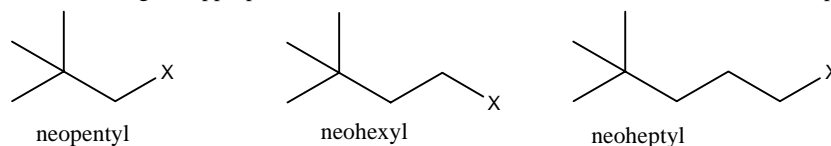
This is a unique term applied to only secondary substitution on a straight 4C chain.



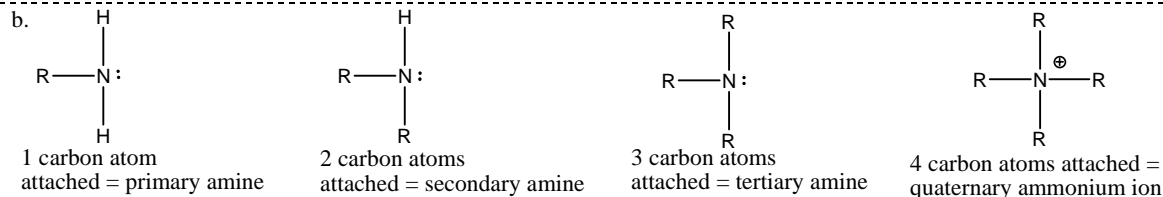
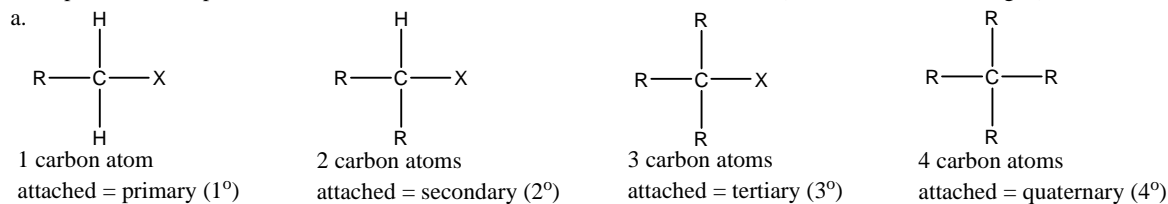
t-alkanes, t = tert = tertiary carbon, having the first pattern and at least 2 methyl groups and a side branch (1C or longer). The stem name is based on the total number of carbon atoms present.



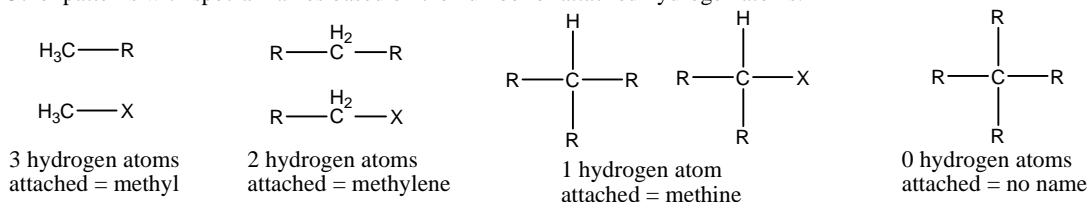
Neoalkanes have the 5 carbon pattern shown in the first structure (4° carbon in the middle, with 3 methyl groups and a side branch) using the appropriate stem name based on the total number of carbon atoms present.



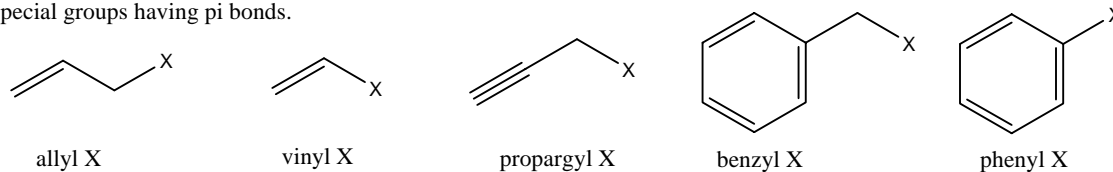
Other patterns with special names based on the number of attached carbon atoms (a. to carbon, b. to nitrogen).



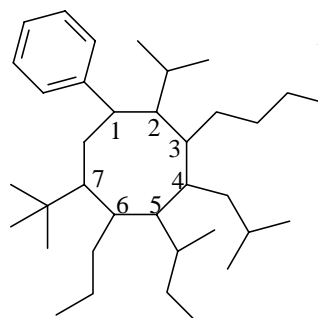
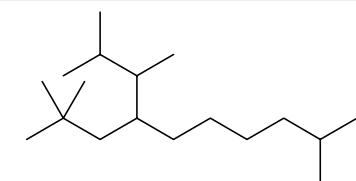
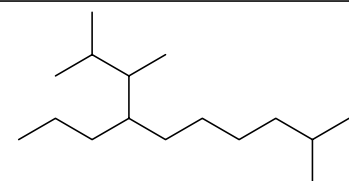
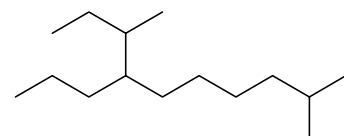
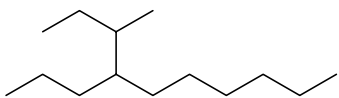
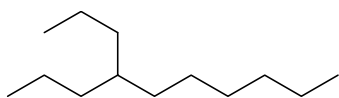
Other patterns with special names based on the number of attached hydrogen atoms.



Special groups having pi bonds.

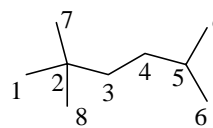


Some typical alkane examples

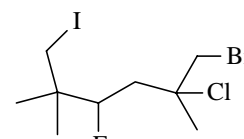


What are the common names?

- 1-
- 2-
- 3-
- 4-
- 5-
- 6-
- 7-



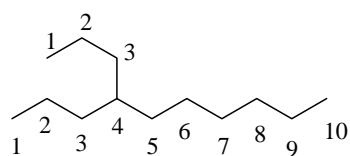
structure A



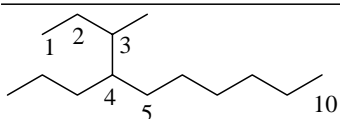
structure B

Which carbons are primary, secondary, tertiary or quaternary in structure A, structure B?

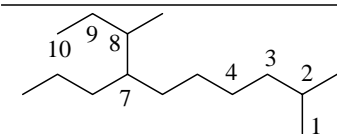
- primary carbon = 1° =
- secondary carbon = 2° =
- tertiary carbon = 3° =
- quaternary carbon = 4° =



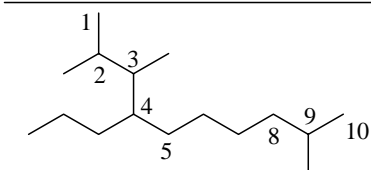
4-propyldecane



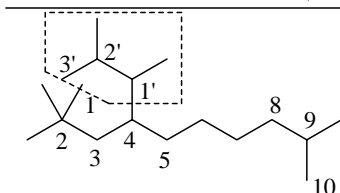
3-methyl-4-propyldecane



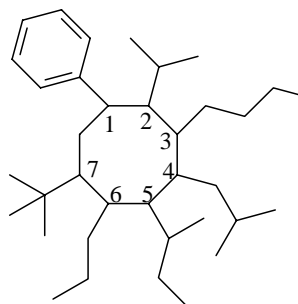
2,8-dimethyl-7-propyldecane



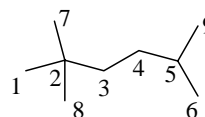
2,3,9-trimethyl-4-propyldecane



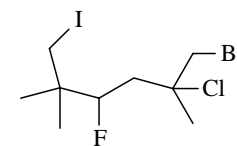
2,2-dimethyl-4-(1,2-dimethylpropyl)decane



- 1-phenyl
- 2-isopropyl
- 3-butyl
- 4-isobutyl
- 5-sec-butyl
- 6-propyl
- 7-t-butyl or 7-tert-butyl



structure A



structure B

- primary carbon = 1° = 1, 6, 7, 8, 9
- secondary carbon = 2° = 3, 4
- tertiary carbon = 3° = 5
- quaternary carbon = 4° = 2

Same answers for either structure A or B.

Name _____

Provide an acceptable structure for each of the following names.

- a. 2,4-dimethylhexane
- b. 1,3,5,5-tetramethylcyclohept-1-ene
- c. hept-5E-en-1-yne
- d. 5-(4-methylcyclobut-2-enyl)non-1-ene
- e. trans-3-ethyl-1-isopropylcyclopentane
- f. cis-1-t-butyl-4-isobutylcyclohexane
- g. deca-2E,4Z-dien-6,8-diyne
- h. 1-allyl-3-propargyl-6-vinylcyclodecane or 1-(prop-2-enyl)-3-(prop-2-ynyl)-6-ethenylcyclodecane
- i. hept-1-en-6-yne
- j. 3-allyl-1-sec-butylcycloprop-1-ene or 3-(prop-2-enyl)-1-(1-methylpropyl)cycloprop-1-ene
- k. 3-propylocta-1,6E-diene
- l. 7-(1,1-dimethylethyl)-4-(1-methylpropyl)cycloundec-1-yne
- m. 2,9,10-trimethyl-6-butyl-dodecane
- n. 1-(1,3-dimethylbutyl)-4-methylcycloocta-1,3,5,7-tetraene
- o. 2,9,10-trimethyl-6-butyl-dodecane
- p. trans-(3,3-dimethylbutyl)-3-methylcyclooctane
- q. 7-(1,1-dimethylethyl)-4-(1-methylpropyl)cycloundec-1-yne
- r. hept-1-en-6-yne
- s. cycloundeca-1E,3Z,7Z-triene
- t. 3-benzyl-6-ethyl-7-phenyloct-2Z-ene

Nomenclature Worksheet for lecture

Points to Consider

1. What is the highest priority group present?
2. What is the longest chain with that group?
3. Number that chain (ring) so that the high priority group gets the lowest number.
4. Identify branches and other functionality with their numbers. (Usually named as prefixes.)
5. Combine everything into one name with proper use of hyphens (between numbers and letters) and commas (between numbers and numbers).