Basic Organic Chemistry Nomenclature
CHEM 104

Naming organic molecules reminds me a bit of looking at a big old oak tree in the dead of winter. You had a huge trunk with a bunch of different branches coming out of it. Naming organic molecules is kind of the same. You have one main chain (the trunk) and lots of different substituents (branches) coming off the main chain.

To get started with naming, the first things that you need to know are the basic names for carbon chains (See **Table 1**). This table also lists how you would describe these chains when they are substituents (coming off the main chain).

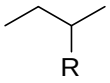
Additionally, there are a series of often used functional groups that are still referred to using their common names. These are groups that you should commit to memory (**Figure 1**).

Table 1. Names for Basic Carbon Chains and Substituents.

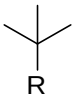
# of C	Name	Formula	Substituent	Formula
1	methane	CH_4	methyl	CH_3-
2	ethane	CH_3CH_3	ethyl	CH_3CH_2-
3	propane	$CH_3CH_2CH_3$	propyl	$CH_3CH_2CH_2$-
4	butane	$CH_3(CH_2)_2CH_3$	butyl	$CH_3(CH_2)_2CH_2$-
5	pentane	$CH_3(CH_2)_3CH_3$	pentyl	$CH_3(CH_2)_3CH_2$-
6	hexane	$CH_3(CH_2)_4CH_3$	hexyl	$CH_3(CH_2)_4CH_2$-
7	heptane	$CH_3(CH_2)_5CH_3$	heptyl	$CH_3(CH_2)_5CH_2$-
8	octane	$CH_3(CH_2)_6CH_3$	octyl	$CH_3(CH_2)_6CH_2$-
9	nonane	$CH_3(CH_2)_7CH_3$	nonyl	$CH_3(CH_2)_7CH_2$-
10	decane	$CH_3(CH_2)_8CH_3$	decyl	$CH_3(CH_2)_8CH_2$-

Figure 1. Common Substituents that You Should Commit to Memory

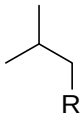
Isopropyl
(iso counts for alphabetizing)



secondary butyl
(sec-butyl)
(sec does not count for alphabetizing)



tertiary butyl
(tert-butyl)
(tert does not count for alphabetizing)



Isobutyl
(iso counts for alphabetizing)

vinyl

allyl

Naming Basic Alkane Molecules

Step 1. *Pick the longest continuous carbon chain in the molecule.*
-Make sure to evaluate all potential options. Don't just look "left to right," often the longest chain will have you looking all around the molecule. The highest priority functional group must be part of this longest chain.

-If there is more than one way to make the longest continuous carbon chain containing the highest priority functional group, choose the chain that gives the greater number of substituents.

Step 2. *Form the base name for the molecule.*
-Using the number of carbons in the longest chain that you chose in **Step 1** and the base names in **Table 1** you can determine the base name of the molecule.

Step 3. *Number the carbon chain.*
-Start numbering the molecule on the side closest to the first substituent. This will ensure that your numbers will be as low as possible. (If the distance to the first substituent is the same from each side, choose the side that is closest to the second substituent).

Step 4. *Describe all substituents that are attached to the main chain.*
Alkanes: name substituents as alkyl groups.
-If a substituent or functional group occurs more than once, use di-, tri-, tetra-, penta-, hexa-, etc.
-You still must tell what carbon each substituent or functional group is attached to (if you have 2 or something use "di" and two numbers to indicate where those 2 groups are)!
-Use dashes between numbers and letters
-Use a comma between numbers
Examples:
2,3-dichloroheptane, 1,3-heptadiene, 4,7-dihydroxyoctanoic acid

Step 6. *Put everything together and name it.*

Regardless of the order that the substituents are found on the molecule, list the substituents in alphabetical order before the base name. (Iso counts for alphabetical order. All others (di, tri, etc…tert, sec, etc.) do not)

Again, use dashes between numbers and letters and use a comma between numbers.