

### Understanding Chemical Terminology II

This Skillsheet explains how simple hydrocarbons and their related compounds are named.

Hydrocarbons, compounds containing only hydrogen and carbon, are named by the number of carbon atoms and the way they are bonded to each other. Hydrocarbon molecules can form a variety of patterns: chains, branched chains, or rings.

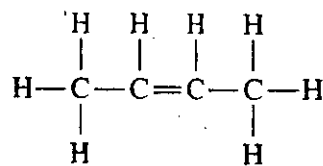
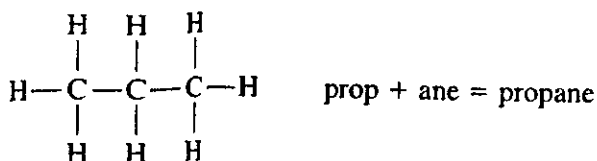
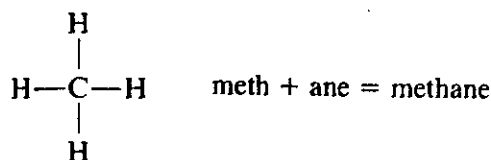
The first step in naming a straight-chain hydrocarbon is to count the number of carbon atoms. The prefix corresponding to this number is the first part of the name. The prefixes are as follows:

Number of carbons	Prefix
1	meth-
2	eth-
3	prop-
4	but-
5	pent-
6	hex-
7	hept-
8	oct-
9	non-
10	dec-

Next, determine how the carbons are bonded.

- If all bonds between the carbons are single, the name of the compound ends in *-ane*. The general name for these compounds is alkanes.
- If there is a double bond in the chain, the name ends in *-ene*. The general name for these compounds is alkenes. The location of the bond is shown with a number.
- If there is a triple bond in the chain, the name ends in *-yne*. The location of the bond is shown with a number. The general name for these compounds is alkynes.

#### Examples.



but + ene  
= butene  
= 2-butene  
(The number refers to the double bond on the second carbon.)

Figure 1

### Practice Problems

Name the following:

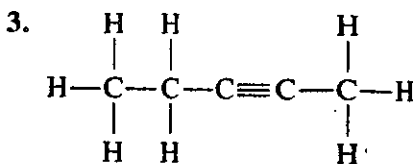
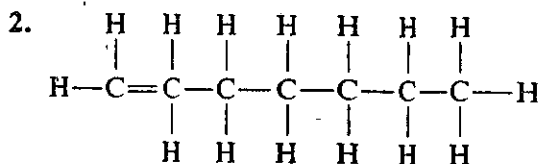
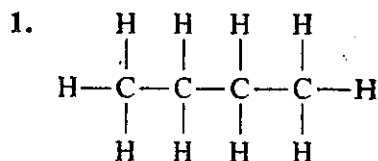


Figure 2

Figure 3 shows an example of a branched chain. Notice that there are seven carbon atoms in the compound. They are arranged in a straight chain of six carbons with the seventh on a branch. Number the carbons in the straight chain. If you start at the left, it is carbon #2 that has the branch attached. If you start at the right, the branch is on carbon #5. Now compare Figures 3, 4, and 5. These diagrams represent the same molecule as "seen" from different directions, or rotated into different positions.

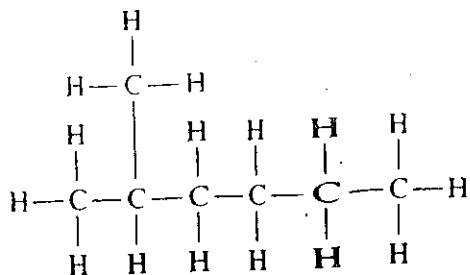


Figure 3

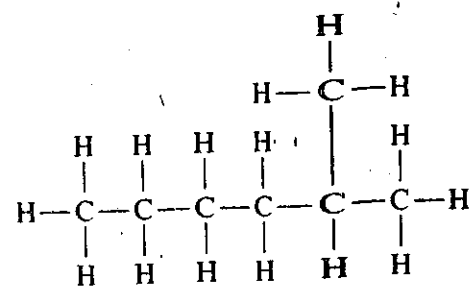


Figure 4

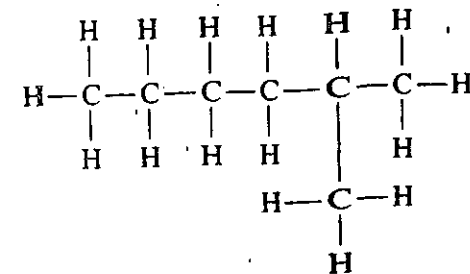


Figure 5

It is very important to be able to recognize the same molecule from different perspectives. One way to do so is to apply the following rules in naming a compound.

1. Count the carbons in the longest chain. Count from both directions. Choose the direction that results in the lower number for the carbon to which the branch is attached. (In Figures 3, 4, and 5 the number of the carbon with the branch is 2.)

2. Now count the carbons in the branch. In the example, there is one carbon in the branch. The prefix for one carbon is *meth-*. Add *-yl* to the prefix for the name of the branch. Thus, the one-carbon branch is named methyl.

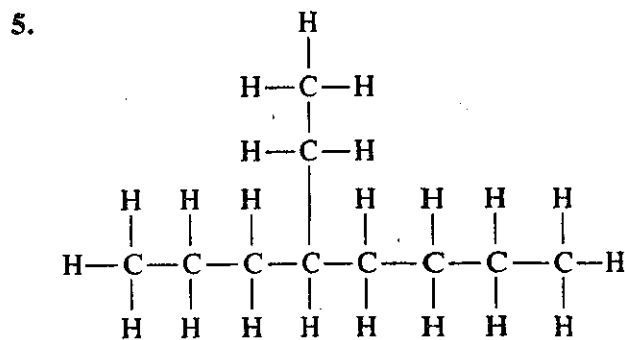
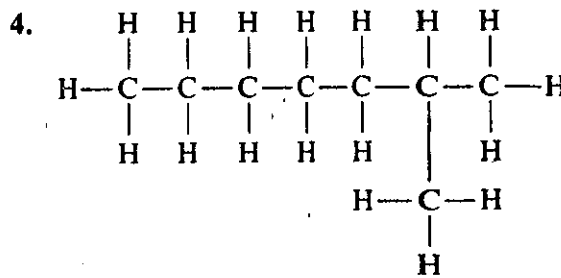
3. Select the prefix appropriate for the number of carbons in the straight chain. In the example there are six carbons in the chain, so the prefix is *hex-*.

4. Select the correct ending depending on the type of bonds between the carbon atoms. In the example, the ending should be *-ane* because all the bonds between carbon atoms are single. The name of the compound is 2-methylhexane.

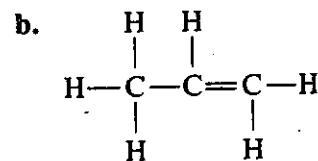
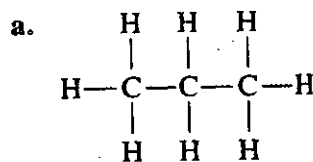
The 2 indicates to which carbon the methyl group is attached. The word hexane describes the longest straight chain.

### Practice Problems

Using the four-step procedure given above, name the following compounds.



6. Name the following molecules.



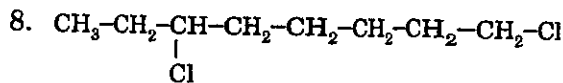
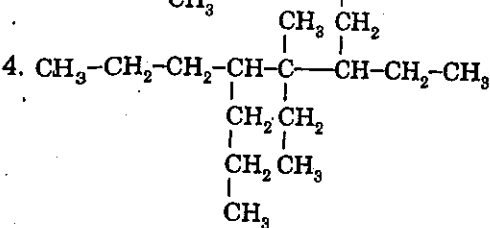
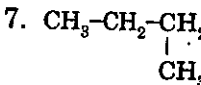
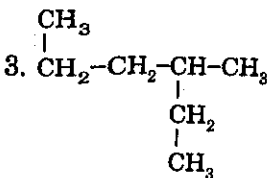
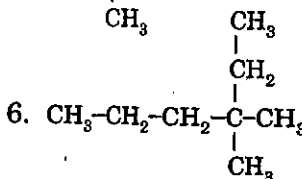
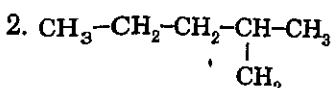
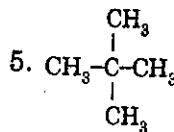
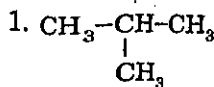
## CONCEPT REVIEW

Alkanes,  $C_nH_{2n+2}$ 

## Nomenclature Rules Summary:

1. Number the longest parent chain so the branches have the lowest position numbers.
2. A prefix is used to indicate two or more identical branches.
3. If there are several branches, name them in alphabetical order.

Name the following structures.



Write the condensed structural formulas for the following compounds.

9. 3,3,6-trimethylnonane

11. 2-methyl-3-ethylpentane

10. 3-ethyl-4-propylheptane