Chapter 2 Additional Problems

1. Explain why each of the following names is incorrect.
   a. methylheptane
   b. 4-methylhexane
   c. 3-propylhexane
   d. 3-isopropyl-5,5-dimethylloctane
   e. 3-methyl-4-chlorohexane
   f. 2,2-dimethyl-3-ethylpentane
   g. 3,5,6,7-tetramethylnonane
   h. 2-dimethylpropane

2. Give the IUPAC name for each of the following compounds.

   a. 
   b. 
   c. 
   d. 
   e. 
   f. 
   g. 
   h. 

3. (Only do part b)
   Calculate the elemental composition of each of the following compounds.
   a. ethyl acetate (fingernail polish remover), C₄H₈O₂
   b. trinitrotoluene (TNT), C₇H₅N₃O₆
4. (Only do part b)

From the analytical values for each compound, derive its empirical formula.

a. morphine: 71.6% C, 6.7% H, 4.9% N
b. DDT: 47.4% C, 2.6% H, 50.0% Cl

5. (Only do part b)

In each of the following examples, qualitative analysis shows the presence of no elements other than C, H, and O. Calculate the empirical formula for each case.

a. Combustion of 0.0132 g of camphor gave 0.0382 g of CO₂ and 0.0126 g of H₂O.
b. Combustion of 1.56 mg of the sex-attractant of the common honey bee (Apis mellifera) gave 3.73 mg of CO₂ and 1.22 mg of H₂O.

6.

Draw and name all of the isomers of C₆H₁₂ that contain a four-membered ring.

7.

With a set of molecular models find each of the four staggered conformations of pentane. Sketch each of these structures using dashed bonds and wedges as appropriate. Try to rank these conformations in order of increased energy (remember that a gauche conformation is less stable than an anti conformation).

8.

For each of the following compounds, construct a potential energy diagram for rotation about the C-2—C-3 bond. For each unique energy maximum or minimum, illustrate the structure with a Newman projection.

a. 2-methylbutane  
b. 2,2-dimethylbutane