Chapter 4: Carbon and the Molecular Diversity of Life

1. Make an electron distribution diagram of carbon. It is essential that you know the answers to these questions:

   a. How many valence electrons does carbon have?

   b. How many bonds can carbon form?

   c. What type of bonds does it form with other elements?

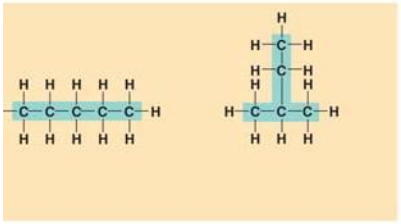
2. Carbon chains form skeletons. List here the types of skeletons that can be formed.

3. What is a *hydrocarbon*? Name two. Are hydrocarbons hydrophobic or hydrophilic?

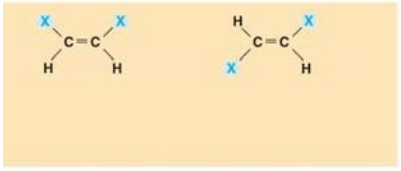
4. In Chapter 2 you learned what an *isotope* is. Since students often confuse this word with *isomer*, please define each term here and give an example.

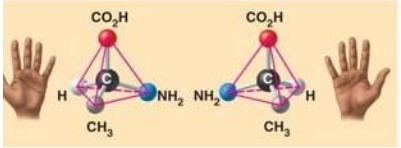
	Definition	Example
isotope		
isomer		

5. Use this figure to identify the three types of isomers. For each type, give a key character and an example.



6. Give one example of enantiomers that vary in their pharmacological effect.





7. Define *functional group*.

8. There are seven functional groups. Complete the following chart.

	Hydroxyl	**Carbonyl**	**Carboxyl**	**Amino**	**Sulfhydryl**	**Phosphate**	**Methyl**
Structure							
Example							
Functional Properties							

9. You will need to master the chart and the information in it. Using the functional groups above, see if you can answer the following prompts:

   a. $-NH_2$

   b. Can form cross-links that stabilize protein structure

   c. Key component of ATP

   d. Can affect gene expression

   e. CH_3

   f. Is always polar

   g. Determines the two groups of sugars

   h. Has acidic properties

   i. –COOH

   j. Acts as a base

   k. Circle and identify three functional groups in the molecule shown above.