Learning Log

Learning Log Chapter 2  
1. Review the discussion of emergent properties in Chapter 1. Explain how table salt and water have emergent properties.   
2. If you were a pharmaceutical researcher, why would you want to learn the three dimensional shapes of naturally occurring signal molecules? Be thorough. *(CUES: receptors, function, binding, structure)*  
3. Provide 3 common trace elements important to human beings. Is a trace element an essential element?   
4. In humans, iron is a trace element required for the proper functioning of hemoglobin, the molecule that carries oxygen in red blood cells. What might be the effects of iron deficiency? *(CUES: function, protein, structure)*  
5. Why does the structure H-C=C-H fail to make sense chemically? *(CUES: valence electrons, bonds, stable)*  
6. Describe 2 biological applications that use radioactive isotopes.  
7. Write an equation that uses the products of photosynthesis as reactants, and the reactants of photosynthesis as products. Add energy as another product. This new equation describes a process that occurs in your cells. Describe this equation in words. How does this equation relate to breathing? *(CUES: food, oxygen, metabolism)*

Learning Log Chapter 3  
1. Describe how the properties of water contribute to the upward movement of water in a tree. *(CUES: adhesion, cohesion, polar, hydrogen bonds)*  
2. What is electronegativity? What would be the effect on the properties of the water molecule if oxygen and hydrogen had equal electronegativity? Why? *(CUES: attraction, polar, non-polar)*  
3. Water striders have legs that are coated with a hydrophobic substance. What might be the benefit? What would happen if the substance were hydrophilic?  
4. Explain the saying “It’s not the heat, it’s the humidity.” *(CUES: evaporative cooling)*  
5. How can the freezing of water crack boulders? *(CUES: hydrogen bonds, density)*6. Compared with a basic solution at pH 10, the same volume of an acidic solution at pH 2 has \_\_\_ times  
as many protons (H+)? Show your work.  
7. Acetic acid (CH3COOH) can act as a buffer, similar to carbonic acid. Write the dissociation,   
identifying the acid, base, H+ acceptor, & H+ donor.

Learning Log Chapter 4  
1. How do the properties of carbon allow it to be the basis of most life forms on Earth? Explain in detail. *(CUES: bonds, valence electrons, variation, isomers)*  
2. Review cell membrane structure on p. 125 & p. 127. How are fatty substances & cell membranes chemically similar? How do these properties allow fatty substances to pass readily through most cellular membranes? *(CUES: polarity, hydrocarbon)*  
3. In what ways does a methyl group differ chemically from the other 6 functional groups?  
4. Draw the 6 functional groups and state the common name for each. Also, indicate whether each is polar or non-polar & list at least one biological compound (found in living things!) that contains each functional group. *(CUES: cysteine, ATP, cholesterol, histamine, lactic acid, ribose)*   
5. Suppose you had an organic molecule such as glycine (see figure 4.10) and you chemically removed the   
–NH2 group and replaced it with the –COOH group. How would this change the chemical properties of the molecule? *(CUES: proton, acceptor, donor, acid, base)*  
6. What chemical change occurs to ATP when it reacts with water & releases energy? *(CUES: phosphate group, hydrolysis, exergonic)*