Lab 3 - Organic Molecules of Biological Importance

[13] The acid or carboxyl group is found in lipids and proteins. The term “acid” often appears in the name of molecules wi

at the subscripts telling you about the number of each atom. Can you see a relationship? For instance for every one carbon atom, how many hydrogen atoms are there? For every one carbon atom, how many oxygen atoms are there?

[37] I hope you came up with this relationship. All monosaccharides have this relationship. Write this relationship in your lab manual and then build your glucose molecule. If you have any problems, just remember how you used your molecular model kits last week. When you have completed your glucose molecule, return to the program.

[38] All done building your glucose molecule? That wasn't so bad, was it? If your molecule doesn't look quite right, now is the time to fix it because you will need it later. You will also need the correct number of parts to construct another molecule.

[39] Glucose, as a monosaccharide, is a building block of larger carbohydrates. If we, through dehydration, attach our glucose molecule to another monosaccharide we will have produced a disaccharide. If you are thinking "di" means two you are absolutely correct. Disaccharides are also considered sugars.

[40] If we keep bonding more monosaccharides together, we get a polysaccharide. The larger complex polysaccharides can be what we call starches.

[41] Write the definition of these terms and then continue Section 4 by building your fructose molecule and then come back to see if the fructose you build looks OK.

[42] Well, how does your fructose look? If it looks OK, you are ready to continue. If not, take a minute to fix it and then continue.

[43] Using the information in your lab manual answer the questions and combine your glucose and fructose molecules. Return once you have had your giant molecule checked and signed off by the instructor.

[44] Hopefully you are beginning to understand the process of dehydration! Before we leave the carbohydrates, I might mention if you haven't noticed it already, many of the names of sugars and starches end in "ose".

Section 5 – Lipids

[45] The next category of organic compounds we will examine is the lipids. This group is not as cohesive as the carbohydrates. As you can see by the definition shown here they all have this common quality. Take a minute to start section 5 by writing the definition and listing examples of lipids.

[46] To demonstrate a lipid's insolubility in water, think about oil and vinegar dressing. When you shake the bottle of dressing, the oil is distributed throughout the vinegar, but as soon as you stop shaking, the two separate.

[58] Remember in describing lipids, we said that they were insoluble in water. It turns out that phospholipids are only partially insoluble. One end of the molecule is insoluble while the other end can interact with water molecules. We say that the molecule has a hydrophilic or water loving end and a hydrophobic or water fearing end.

[59] Knowing what you do about the interaction of water with polar molecules, is the hydrophilic or hydrophobic end of a phospholipid polar?

[60] When you eat food, your digestive system breaks down the food you eat into organic components. The fats in food will be used by your cells, but must be transported to them through your bloodstream. Since blood is mostly water, the lipids won't dissolve and must be transported by emulsifying agents.

[61] The hydrophilic and hydrophobic portions of phospholipids make them useful as emulsifying agents. Look at the arrangements of emulsifying agents and fat droplets shown here. Based on what you know about phospholipids, which is the correct arrangement? Be sure you understand this relationship before you continue. Remember emulsifying agents are critical for transporting lipids throughout your bloodstream.

[62] You should have selected this arrangement between the emulsifying agent and lipid droplet. It is the only arrangement that accounts for the interaction of hydrophilic and hydrophobic portions of the molecules. Now finish up section 5 by describing the role of and drawing a diagram of an emulsifying agent and

carboxyl or acid group, and the “R” group. Draw this building block in the space provided in your lab book and label the requested portions of the molecule.

[68] While all amino acids have the same basic parts, it is the “R” group that allows for their variation. The “R” stands for a variable side group. Study the few amino acids shown here and you can see that the side group can be very simple, or very complex.

[69] Just like the other compounds, amino acids are joined during a dehydration reaction to form the larger molecules we call proteins. The covalent bond that holds amino acids together is given a special name. It is called a peptide bond and hence proteins are sometimes called

[78] Finally some proteins are made of two or more polypeptide chains. This combination of polypeptide chains is the quaternary structure. And once again the quaternary structure is held together with hydrogen bonds.

[79] Now find the display on “protein complexity” and finish section 7 by filling in the table on the “levels of protein complexity”.

[80] Take a look at the complex shapes of these proteins. Their shape is very important to their

[91] What happened to the egg white in the last frame is that it became denatured. A protein's