

Name _____ Date _____ Period _____

MAKING ORGANIC BIOMOLECULES

The **PURPOSE** of this lab is for students to...

- create 1 glucose, 1 amino acid, 1 glycerol, and 3 fatty acids using a molecule kit.
- combine 2 glucose molecules to create a disaccharide.
- combine 2 amino acids to create a dipeptide.
- combine 1 glycerol and 3 fatty acids to create 1 triglyceride.
- observe why “building up” reactions are considered “dehydration synthesis”.
- observe why “breaking down” reactions are considered “hydrolysis”.

Each lab team will need the following **MATERIALS**:

- 29 carbon atoms (black)
- 61 hydrogen atoms (white)
- 17 oxygen atoms (red)
- 1 nitrogen atom (blue)
- 1 “R” group (purple)
- 108 covalent bonds

DRAW orbital diagrams for each of these atoms:

C	H	O	N

Note that carbon has room for 4 covalent bonds. Can you see them on the black atoms?

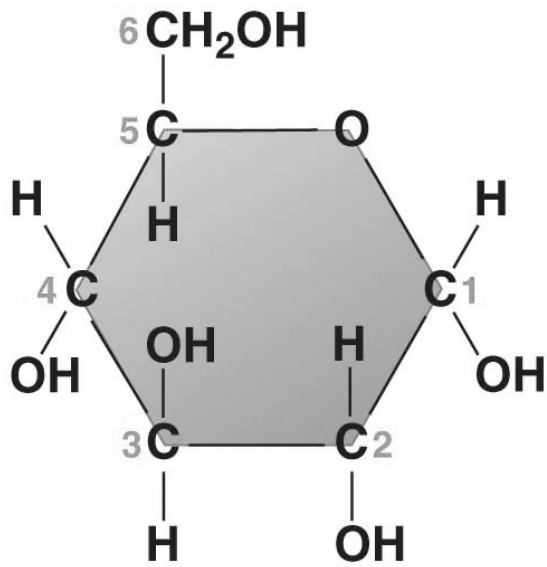
Note that hydrogen has room for 1 covalent bond. Can you see it on the white atoms?

Note that oxygen has room for 2 covalent bonds. Can you see them on the red atoms?

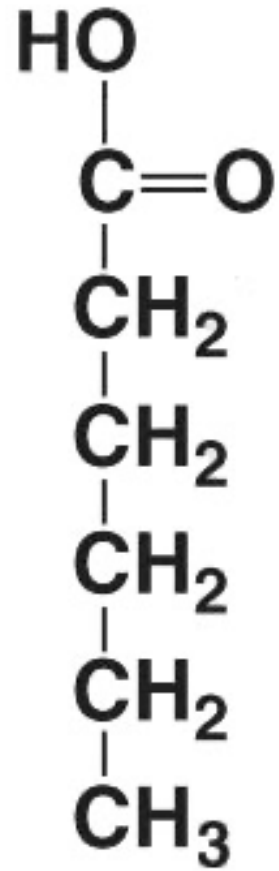
Note that nitrogen has room for 3 covalent bonds. Can you see them on the blue atoms?

PROCEDURE:

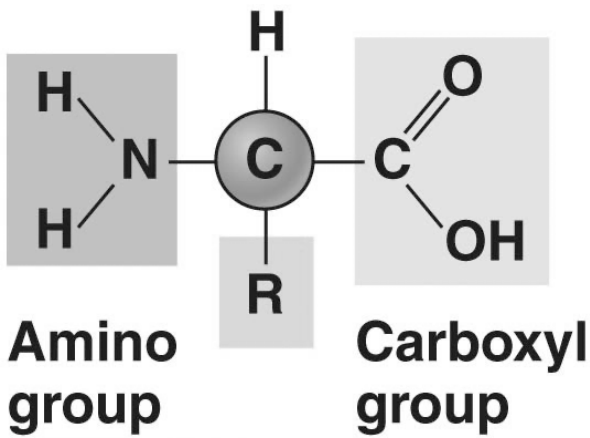
1. Make 1 glucose, 1 amino acid, 1 glycerol, and 3 fatty acids using the molecule kits.
2. Show your molecules to the teacher before proceeding to the next step.
3. **CREATE A TRIGLYCERIDE:** Link the 3 fatty acid molecules to the glycerol molecule. Remove an OH from each part of the glycerol and an H from each fatty acid. In essence, you will be removing a H₂O molecule. Repeat until you have attached all 3 fatty acids to the glycerol. You will have removed a total of 3 H₂O molecules. This is called a “dehydration synthesis reaction”. Why does it have that name?
4. **DISSASSEMBLE YOUR TRIGLYCERIDE:** Remove the 3 fatty acids from the glycerol. Add in the 3 H₂O molecules to separate them. This is called a “hydrolysis reaction”. Why does it have that name?
5. Join together with another group.
6. **CREATE A DISACCHARIDE:** Link 2 glucose molecules together. You will remove an H₂O in the process. Link carbon 1 of the first glucose molecule to carbon 4 of the second glucose. This is called a “dehydration synthesis reaction”. Why does it have that name?
7. **DISSASSEMBLE YOUR DISACCHARIDE:** Add in the H₂O molecule to separate the sugars. This is called a “hydrolysis reaction”. Why does it have that name?
8. **CREATE A DIPEPTIDE:** Link amino acid molecules together. You will remove an H₂O in the process. Link the carboxyl group of the first amino acid molecule to the amino group of the second amino acid. This is called a “dehydration synthesis reaction”. Why does it have that name?
9. **DISSASSEMBLE YOUR DIPEPTIDE:** Add in the H₂O molecule to separate the amino acids. This is called a “hydrolysis reaction”. Why does it have that name?
10. Completely disassemble all of your atoms and covalent bonds. Show the teacher that all of the pieces have been fully separated. Place the pieces back in the bag.



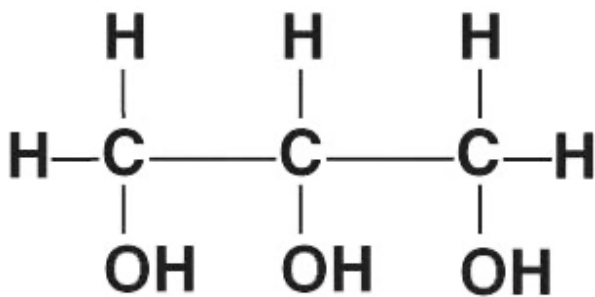
GLUCOSE



FATTY ACID (x3)



AMINO ACID



GLYCEROL