Date Assigned\_\_\_\_\_ Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date In \_\_\_\_\_ Period \_\_\_\_\_\_

**Chemistry of Lipids**

Introduction:

All living things are composed of many different kinds of chemical molecules. One important chemical molecule is a **lipid**. Lipids, another name for **fats** and **oils**, make up parts of living cells. They compose the **cell membrane** and other **membranes** in the cell. They are also **stored** in the vacuole and used later as a source of **energy**. To better understand the chemistry of lipids, it is helpful to study the smaller molecules which bond together to make up a common lipid known as a **triglyceride**. Triglycerides are made up of two smaller molecules. These are **glycerol** and **fatty acids**.

**Standard**: H1L1 Compare and contrast the four types of organic macromolecules. Explain how they comes the cellular structure of the organisms and are involved in critical cellular processes.

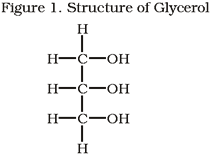
**Objectives**:

1. Identify the structure of gycerol and fatty acids.
2. Identify the structure of amino acids.
3. Demonstrate the bonding of molecules forms an organic macromolecule.
4. Compare and contrast lipids and proteins.

**Materials**: Scirrors, Colored Pencils, Cut Out Sheet

***Glycerol:***

Examine the structure of glycerol. See figure 1.

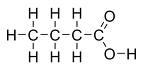


1. What elements are present in glycerol?
2. Write the chemical formula for glycerol: C\_\_ H\_\_ O\_\_
3. Compare and contrast glycerol with carbohydrates. Do carbohydrates and glycerol have the same ratio of hydrogen and oxygen?

***Fatty Acids:***

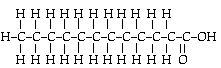
The second kind of molecule which is part of a lipid is a fatty acid. There are **many different types** of fatty acids, but all are similar. Some examples of fatty acids are butyric acid, caproic acid, and lauric acid.

[See full size image](http://www.theexoticblends.com/images/research/fat1.gif)Examine these structural formulas of these 3 molecules.

[](http://upload.wikimedia.org/wikipedia/commons/thumb/c/c8/Butyric_acid_flat_structure.png/800px-Butyric_acid_flat_structure.png)

Butyric Acid

Caproic Acid



Lauric Acid

1. What elements are present in all fatty acids?
2. Write the formula for each of the 3 fatty acids.
3. How many hydrogen atoms are there?
4. How many oxygen atoms are there?
5. Look at the end of butyric acid. It has a special arrangement of carbon, hydrogen, and oxygen atoms called a carboxyl group. Circle the carboxyl group in each fatty acid.



1. Does glycerol contain a carboxyl group?

***Forming Lipids***

A lipid molecule consists of one glyerol molecule and 3 fatty acids joined together. There are many different types of lipids. The different types are formed when different combinations of fatty acids link up with glycerol. The production of a lipid molecule is a chemical reaction.

***Glycerol + Fatty Acids Lipids + H2O***

Cut out one glycerol molecule and 3 fatty acid molecules. Cut along **solid** lines only.

1. What do you have to do to each molecule to make them interlock together like pieces of a puzzle?

Cut out the OH from glycerol, and an H from each fatty acid. Connect the pieces together to form a lipid. Glue and label your lipid into your lab notebook.

Join the leftover H and OH together and glue and label them into your notebook.

1. What is the name of the compound HOH?

***Summary Questions:***

1. What molecules make up a triglyceride?
2. What has to be removed when a triglyceride is formed?
3. What is another common word for lipids? Give some examples of lipids.
4. Describe the function of lipids (from class notes!)

Enrichment Questions: Saturated fats and Unsaturated fats, melting points of each. Steroids and wax also as enrichment.

Saturated fats only have single bonds between carbon atoms. Unsaturated fats have double bonds

<http://www.karentimberlake.com/lipids.htm>

