

Lipids

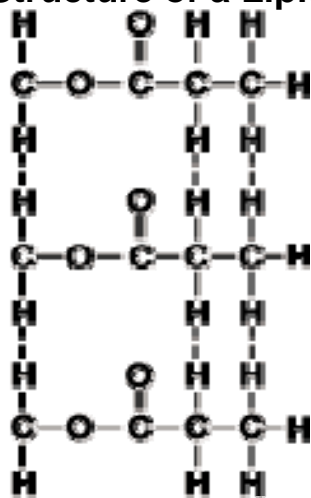
Basic Information

- ✓ The organic group of lipids is made up of **fats, oils and waxes**.
- ✓ All lipids contain the elements hydrogen, carbon, and oxygen.
- ✓ The ratio of **H:O is always GREATER than 2:1** but varies from lipid to lipid.
- ✓ The biological uses for lipids include:
 - **RESERVE ENERGY SOURCE:** a *gram of fat can provide up to 6 times* the amount of energy as one gram of carbohydrates.
 - **Lipids make up cell structures** such as cell membranes.
 - In animal cells, **lipids are used for insulation and cushioning**.

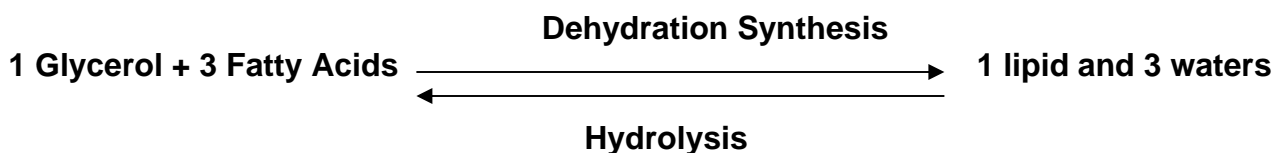
Building Blocks of Lipids

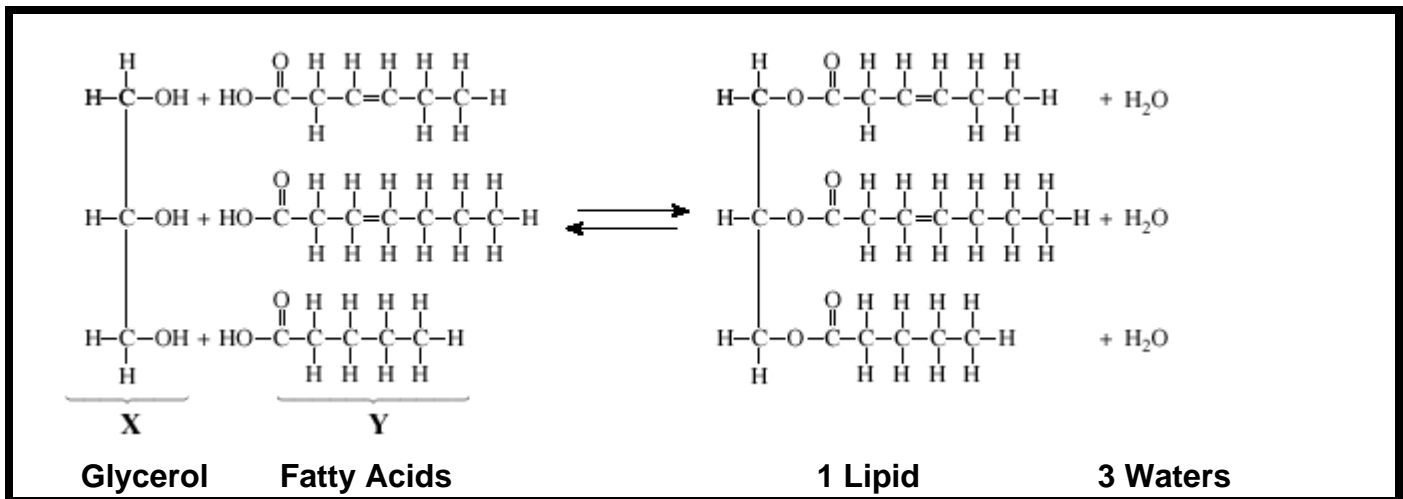
- ✓ Lipids are made up of **3 fatty acids and 1 glycerol**
- ✓ Lipids are structurally shaped like the **capital letter E** as pictured below.
- ✓ At each end of a fatty acid is a **CARBOXYL group (-COOH)**.
- ✓ **The spine of the lipid is made up of a GLYCEROL molecule** (a type of alcohol molecule)
- ✓ **Each fatty acid attaches to a hydroxyl group (-OH) on the glycerol by the process of dehydration synthesis** (bonds are formed by the removal of a water molecule).
- ✓ **One water molecule is removed for each fatty acid** attached to the glycerol.
- ✓ The bonds of the fatty acids to the glycerol molecule forms the three horizontal lines of the E.
- ✓ Since the lipid is in the shape of an E, it is **NOT** a polymer.

Structure of a Lipid



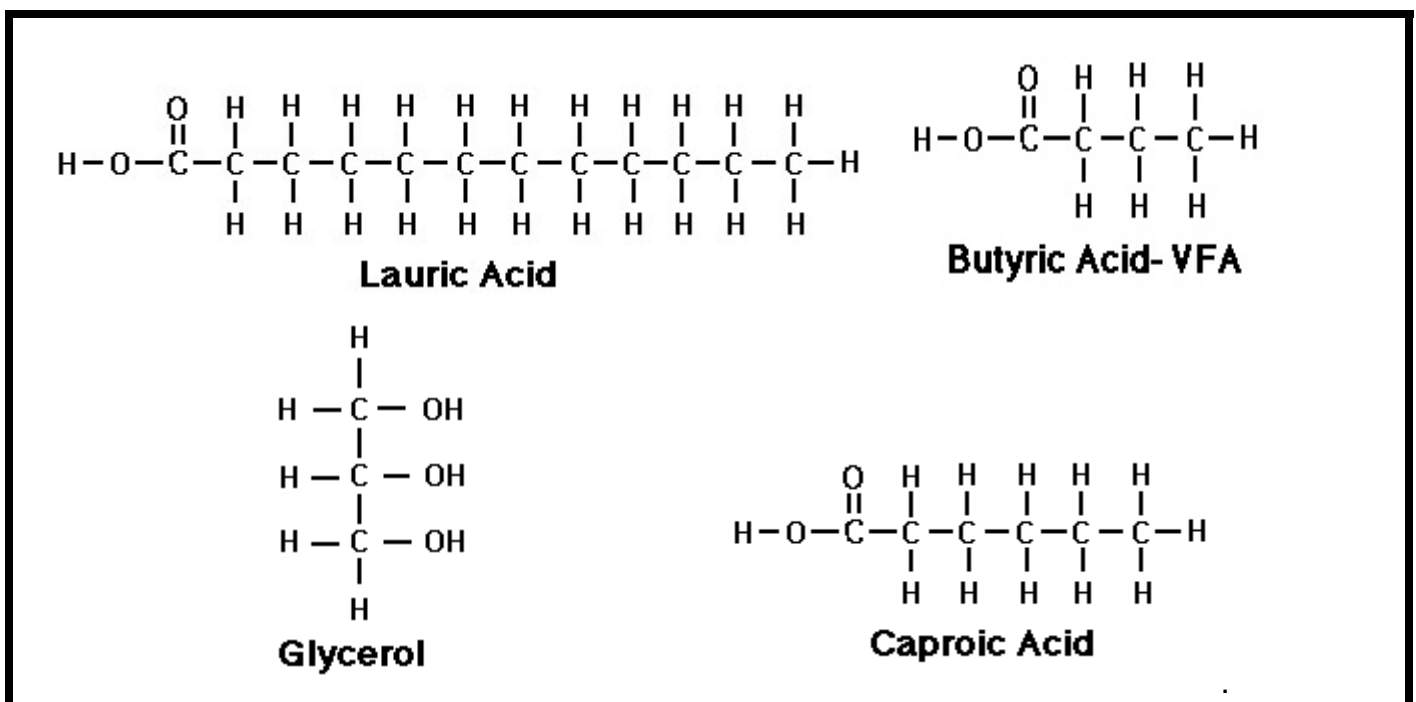
Chemical Reaction to Make a Lipid





- ✓ Glycerol and Fatty Acids are the raw materials or **REACTANTS**
- ✓ The Lipid is the **Product**
- ✓ The three waters are the **METABOLIC WASTES**

Questions:



1. Compare the number of hydrogen to the number of oxygen atoms in the three fatty acids.
2. Circle the carboxyl group in each fatty acid.
3. Describe the process by which lips are formed.
4. What are the metabolic wastes that are formed as a result of synthesizing lipids?
5. Explain the process by which lipids are broken down into their building blocks.
6. Are enzymes needed for the processes discussed in # 4 & # 6? Explain your answer.
7. Discuss the biological uses of lipids.
8. Compare carbohydrates and lipids.
9. Is a lipid an example of a polymer? Explain.