Biology
Year 9

Organic Molecules

Name: _____

Form: _____

Prepared by William Green
DBGS 2010

Introduction

1. What is the basic element of all organic material?

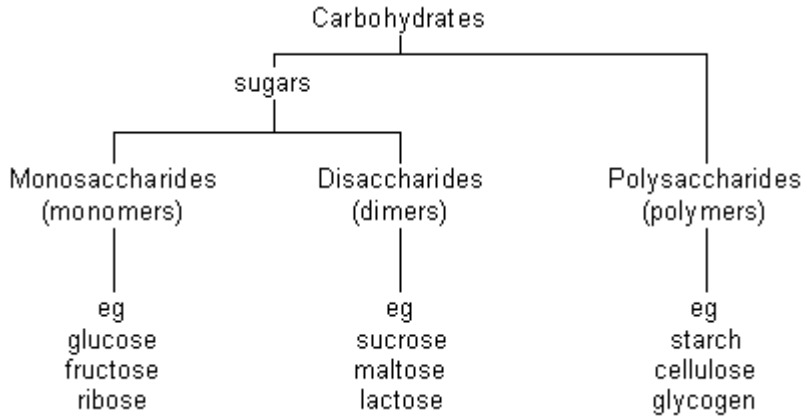
2. The basic structure of an organic molecule consists of _____ elements with _____ electrons available to form _____

3. Draw a diagram of the organic molecule

4. List the four classes of organic macromolecules.

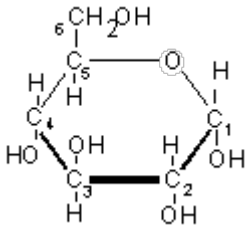
5. A polymers is a _____ molecule consisting of _____ sub units called _____ bonded together

Carbohydrates

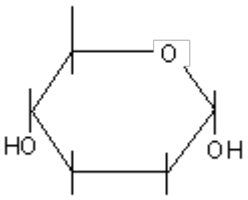


1. The basic structure of a carbohydrate is a _____ molecule combined with a _____ molecule to form the molecular formula of _____. The two common types of carbohydrates are _____ and _____. The function of carbohydrates are to store _____ energy for cellular use and give _____ _____ in plants.

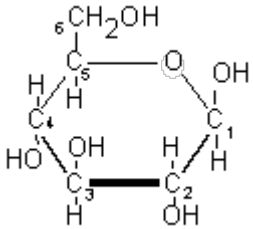
2. **Monosaccharides (simple sugar)** have the formula _____where n can be ___ _____. The most common and important monosaccharide is _____, which is a six-carbon, so has the formula $C_6H_{12}O_6$. Its structure is:



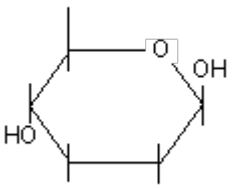
a-glucose (used to make starch and glycogen)



or more simply

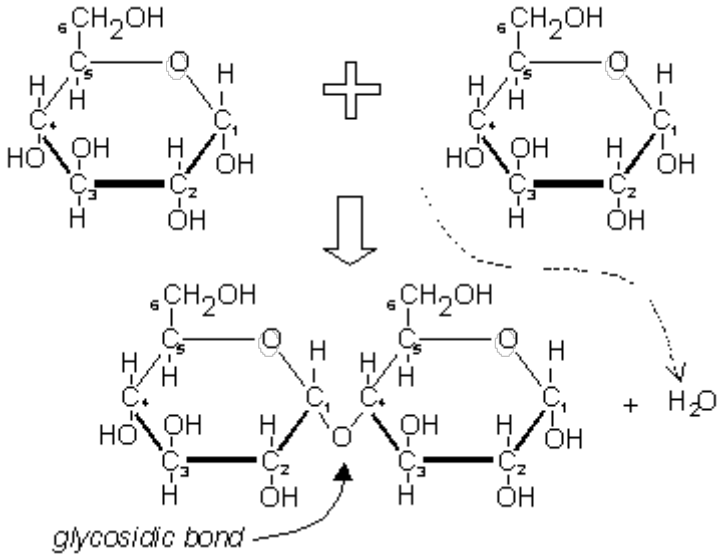


b-glucose (used to make cellulose)



The other two monosaccharide's are _____ and _____.

3. **Disaccharides (double sugars)** are formed when _____ are joined together by a glycosidic bond. The reaction involves the formation of a molecule of water



There are three common disaccharides:

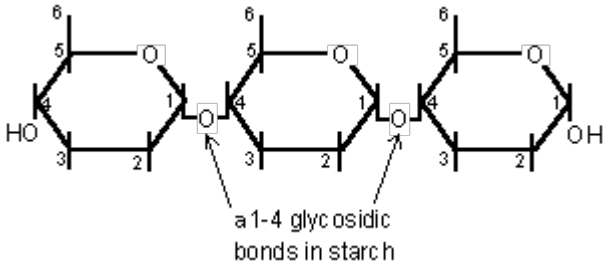
- _____ (or malt sugar) is_____. It is formed on digestion of starch by amylase, because this enzyme breaks starch down into two-glucose units. Brewing beer starts with malt, which is a maltose solution made from germinated barley.
- _____ (or cane sugar) is _____. It is common in plants because it is less reactive than glucose, and it is their main transport sugar. It is the common table sugar that you put in your tea.
- _____ (or milk sugar) is _____. It is found only in mammalian milk, and is the main source of energy for infant mammals.

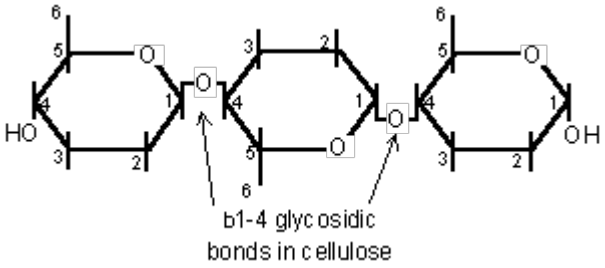
4. **Polysaccharides**

Polysaccharides are long chains of _____.

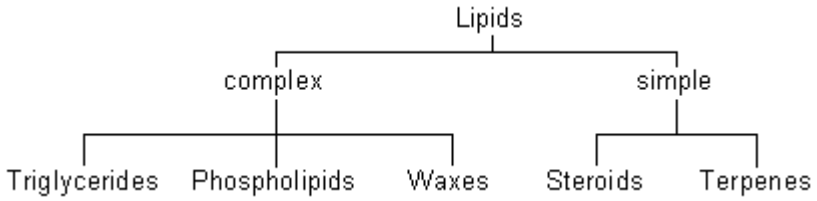
There are three important polysaccharides:

- _____ is the plant storage polysaccharide. It is insoluble and forms starch granules inside many plant cells. Being insoluble means starch does not change the water potential of cells, so does not cause the cells to take up water by osmosis.
- _____is only found in plants, where it is the main component of cell walls.
- _____ is the storage molecule of sugar that is stored in the liver





Lipids



1. The basic characteristics of a lipid contains _____ oxygen's than a carbohydrate

2. Give examples of the various lipids.

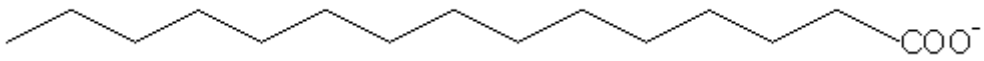
3. The function of lipids are _____ long term, _____ structure, _____, _____, _____ and _____.

4. Lipids are made up of _____ and _____.

_____ are long molecules with a polar, _____ end and a non-polar, _____ "tail".

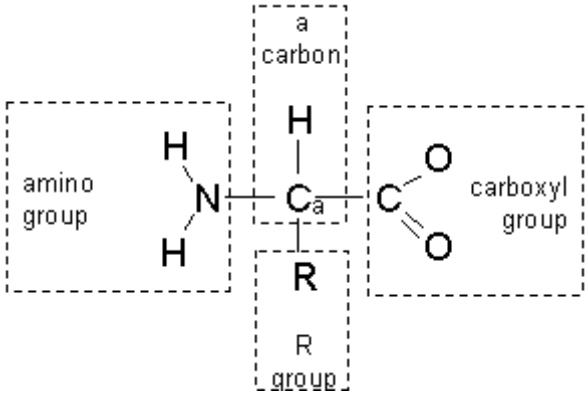
Hydrophilic means the molecule is _____ while hydrophobic means the molecule is _____

- If there are no C=C double bonds in the hydrocarbon chain, then it is a _____ . These fatty acids form _____ chains, and have a _____ melting point. Most of these are _____ fats



- If there are C=C double bonds in the hydrocarbon chain, then it is an _ _____. These fatty acids form _____ chains, and have a _____ melting point. Fatty acids with more than one double bond are called _____. Most of these are _____ fats

Proteins



1. _____ are basic polymer of a protein. They are made of _____, _____, _____ and _____. These polymers are held together with a _____ bond. This is why proteins are called _____.

Basic Function of Proteins

structure	e.g. collagen (bone, cartilage, tendon), keratin (hair), actin (muscle)
enzymes	e.g. amylase, pepsin, catalase, etc (>10,000 others)
transport	e.g. haemoglobin (oxygen), transferrin (iron)
pumps	e.g. Na^+K^+ pump in cell membranes
motors	e.g. myosin (muscle), kinesin (cilia)
hormones	e.g. insulin, glucagon
receptors	e.g. rhodopsin (light receptor in retina)
antibodies	e.g. immunoglobulins
storage	e.g. albumins in eggs and blood, caesin in milk
blood clotting	e.g. thrombin, fibrin
lubrication	e.g. glycoproteins in synovial fluid
toxins	e.g. diphtheria toxin

antifreeze e.g. glycoproteins in arctic flea

and many more!

How many amino acids are there? ____(they are determined by the R group)

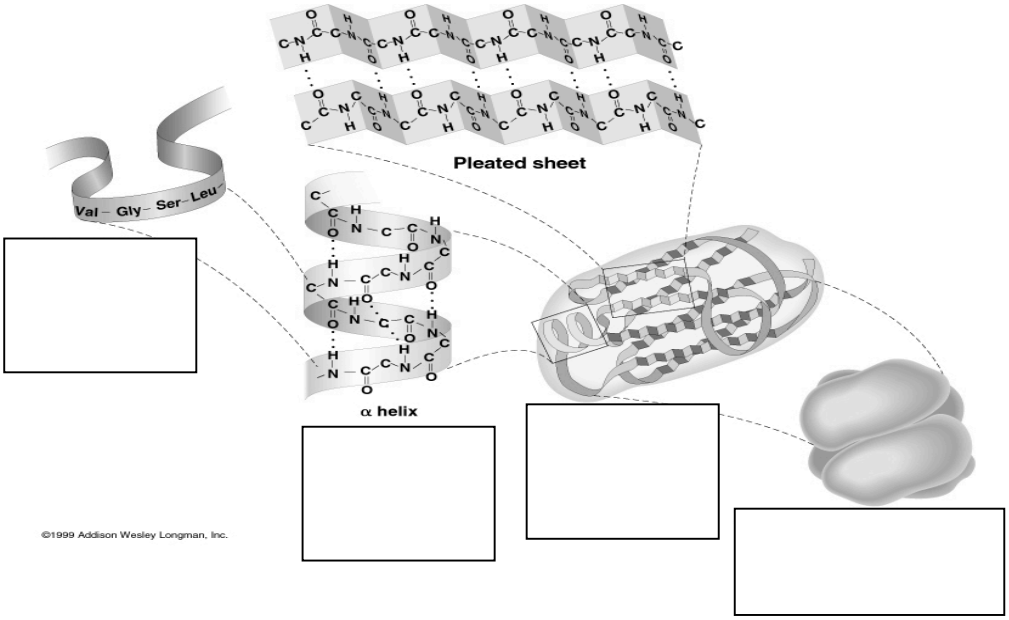
EXAMPLE OF AN AMINO ACID SEQUENCE

$^{+}NH_3$-Gly — Pro — His — Leu — Tyr — Ser — Trp — Asp — Lys — Cys-COO^{-}

Protein Structure

Polypeptides are just a string of amino acids, but they fold up to form the complex and well-defined three-dimensional structure of working proteins.:

1. Label the four shapes of protein?



2. _____, _____, _____ and _____ will determine protein conformation?

3. When proteins change their shape they are considered to be _____ proteins. These proteins are _____ inactive