

Unit 5: Organic Compounds

I. Organic Chemistry – The Study of Carbon and Carbon Compounds

_____ is the basis of all living things.

Major sources of raw materials from which organic compounds are obtained include petroleum, coal, wood, plant products, and animals.

Carbon forms 4 covalent bonds with other carbons as well as several other elements.

- There are 3 elements carbon likes to bond with in living organisms:

- The number and variety of carbon (_____) compounds is far greater than the number and variety of _____ compounds.

- Carbon compounds can occur in 3 different arrangements:

- _____

- _____

- _____

- Compounds with the same formula but different 3-dimensional structures are called _____.

- _____ and _____ molecules are both sugars and have the same simple formula ($C_6H_{12}O_6$) but different structural arrangements.

fructose

glucose

II. Macromolecules – large molecules, could have more than 200,000 atoms in one molecule

A. _____ – all composed of C, H, and O and used by cells to store and release energy.

□ _____ – also called saccharides

- _____ – single sugars
- Test for single sugars using _____ – turns orange/red when positive for single sugars

• Example:

Glucose - _____

Fructose - _____

Galactose - _____

- _____ – double sugars (contains 2 single sugars)

• Example:

Sucrose - _____

Maltose - _____

Lactose - _____

- Digestion of double sugar – enzyme breaks molecule into 2 single sugars

□ _____ – polysaccharide – largest carbohydrate molecules

- Made up of thousands of glucose-like units connected in a chain
- Used by plants as food storage
- When digested in the intestine, starch is broken down into _____
- Test for starch using _____ – turns blue or black when starch is present

□ _____ – also a polysaccharide

- Common component of wood and paper
- Made up of long chains of glucose-like units
- Differs from starch by the way the glucose units branch

B. _____ – large complex polymer composed of C, H, O, N and sometimes S, P

- provide structure for tissues and organs and carry out metabolism

• _____ – basic building block of all proteins

- 20 common amino acids in various combinations make thousands of proteins
- The covalent bond formed between 2 amino acids in the protein chain is called a _____

• Test for proteins using _____ – turns blue or violet when protein is present

• protein molecules are digested by enzymes in our stomachs to produce _____

• _____ – proteins that change the rate of a chemical reaction

- digestion of food, storage and release of energy

- C. _____ – Fats – made up of C, H, and O just like carbohydrates, but with a smaller proportion of O
- Not as large as proteins and starches
 - Made of 3 fatty acids and 1 glycerol unit
 - Fats are insoluble in water
 - Cells use fats for energy, insulation, protection, and membrane production
 - When digested, fat is broken down into _____
 - Test for lipids using _____ – a translucent spot will appear if fats are present
- D. _____ - composed of C, H, O, N, and P, stores cell information in form of a genetic code
- 2 types
 - _____ – deoxyribonucleic acid contains the sugar _____
 - _____ – ribonucleic acid contains the sugar _____
 - made of _____ which are composed of
 - 5 carbon sugar
 - phosphate group
 - a nitrogenous base

Homework Questions:

*****Answer the homework questions in your science journal.**

1. When starch is digested in the intestine, starch molecules are broken down into smaller units. What smaller units do you predict will be produced? Explain.
2. Protein molecules are digested by enzymes in our stomachs. When enzymes break proteins into smaller units, what units do you suppose are produced? Explain.
3. When fat molecules are digested by enzymes, what do you predict the products to be? Explain.
4. Based on the name, where in the cell would you expect to find most nucleic acid molecules? Explain.
5. Why can molecules have the same chemical formula but look different structurally? Explain.
6. How do you know if a substance tests positive for lipids? Protein? Sugar? Starch?