Analysis BIOLOGICAL PRINCIPLES I

Organic Molecules & Functional Groups

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1. Briefly describe the results of Stanley Miller's experiment, and why it is significant.
Stanley Miller identified several organic molecules that are present in living organisms. This is significant because it means that the presence of living organisms on Earth is attributed to the reactions of inorganic compounds.

2. What unique characteristics of carbon allows it to make 4 bonds with other atoms?
Carbon is tetravalent, meaning it has 4 electrons capable of forming a covalent chemical bond.

3. a.) What is an isomer?
An isomer is one of two or more compounds that have the same formula but a different arrangement of atoms in the molecule and different properties.

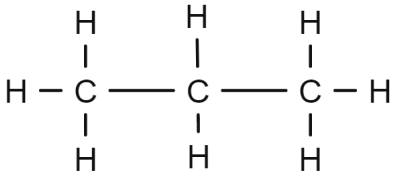
b.) List and describe 3 different isomer types:

Enantiomers :	Enantiomers are isomers that are mirror images of each other and that differ in shape due to the presence of an asymmetric carbon, one that is attached to four different atoms or groups of atoms.
Structural Isomers :	Structural isomers differ in the covalent arrangements of their atoms
Cis-trans Isomers :	Cis-trans isomers are pairs of molecules which have the same formula but whose functional groups are rotated into a different orientation in three-dimensional space.

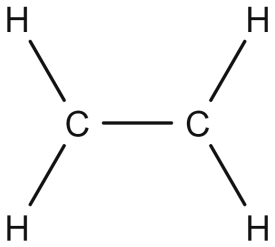
4. Why is it important to understand the isomeric difference between two molecules?
It is important to understand the isomeric difference between two molecules because molecules that possess a different structure can have different properties.

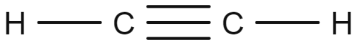
5. Draw structural formulas for the following compounds.

C_3H_8



C_2H_4



C_2H_2 

6. What is meant by a functional group?

Functional groups are specific groups of atoms withing molecules that have very characteristic properties regardless of other atoms present in a molecule.

7. Identify the functional group that tends to make an organic molecule that is:

Basic (alkaline): Amino group

Acidic: Carboxyl group

Alcoholic: Hydroxyl group

An Amino Acid: Amino group + Carboxyl group

8. How does an aldehyde differ from a ketone?

When a compound is a ketone, the carbonyl group is withing the carbon skeleton. When a compound is an aldehyde, the carbonyl group is at the end of the carbon skeleton.

9. There are 8 functional groups in these 3 molecules. Circle and name each one.

The first molecule contains 2 Aminos, a Carboxyl, and a Carbonyl; they are structured as such: NH_2, NH_2, COOH, and CO, respectively.
The second molecule contains a Phosphate and a Sulfhydryl; they are structured as such: OPO_3^{2-} and SH, respectively.
The third molecule contains Methyl and a Hydroxyl; they are structured as such: CH_3 and OH, respectively.