Earthlabs Lab 1-B Elements in Plant Biomolecules: **C**HNOPS + Mg and Fe (The Ingredients of Life)

**BACKGROUND INFORMATION**:

Biomolecules are the carbon-based molecules that make up living things. Living things continually build and take apart biomolecules. This process drives life.

Most biomolecules consist of six basic ingredients (or chemical elements) : Carbon(C), Hydrogen (H), Nitrogen(N) Oxygen(O), Phosphorus (P) Sulfur(S) (sometimes referred to as “CH-NOPS” ). Carbon is the most important of these elements because carbon atoms provide the core structure of the biomolecule. This is why carbon is sometimes referred to as the “structural backbone” of life.



Many other elements, such as magnesium(Mg), iron (FE) and calcium (Ca) are found in small amounts in living organisms but can be of HUGE importance.

Most biomolecules fall into 4 main categories and “other:”

1. Carbohydrates (examples are sugars, starches, cellulose)

2. Proteins (made of amino acids),

3. Nucleic acids (DNA and RNA)

4. Lipids (fats, oils and waxes).

5. “OTHER” - This category includes the many types of biomolecules that do not fall into the first four categories.

Animals, like ourselves, are consumers. When consumers eat food, they are eating biomolecules in that food and using the atoms in those biomolecules to make their own biomolecules and so on, and so on…… up the food chain.

Plants, on the other hand, are producers. They can’t eat other organisms, go the supermarket or order take-out! They must produce all of their biomolecules from what they take in from air (CO2) and soil (H2O, O, N, P, S, Mg, Fe)

**Directions: CHNOPS CHART**

As you analyze the J-Mol biomolecules in LAB 1B, write down the elements you see in each J-Mol in the chart below: Then answer the questions at the end.

|  |  |  |
| --- | --- | --- |
| **Name of Element** | **Symbol** | **Color in J-Mol** |
| Carbon | C | gray |
| Hydrogen | H | white |
| Nitrogen | N | blue |
| Oxygen | O | red |
| Phosphorus | P | orange |
| Magnesium | Mg | green |
| Sulfur | S | yellow |
| Iron | Fe | Brown/bronze |

|  |  |
| --- | --- |
| **Names of Plant Bio-molecules and hydrocarbons** | **Types of elements found in Bio-molecules \* Use symbols** for the Elements:  C, H, N, O,P,S + Mg, Fe. Write them in CHNOPS order. |
| Carbon Dioxide (a gas) |  |
| Glucose (a carbohydrate sugar) |  |
| Fructose sugar (a carbohydrate fruit sugar) |  |
| Cellulose (a carbohydrate) |  |
| Chlorophyll-a (other) |  |
| DNA (a nucleic acid) |  |
| Cytochrome – (a plant protein) |  |
| Propane – a hydrocarbon |  |
| Methane -a hydrocarbon |  |

Questions.

What two CHNOPS elements make up all of these bio-molecules and hydrocarbons.

Which CHNOPS element forms the structural foundation of all of these bio-molecules?

Where do plants get the carbon atoms to make its glucose?

Where do plants get the carbon atoms to make its millions of bio-molecules such as fructose, cellulose, DNA, and cytochrome?