**Activity: Chemistry of Life Exploration**

**Objectives:** I will be able to

1. Recognize 4 basic molecules
2. Understand how atoms bond together to form molecules, and how to read molecular formulas.
3. Model and draw 4 basic molecular structures depicting the bonds in a molecule.

Use dehydration synthesis and hydrolysis to bond and break apart mono-, di- and polysaccharides.

**Directions:** *Carefully read through this handout and answer all questions in complete sentences.*

**Introduction:**

*In chemistry, bonding is determined by the number of electrons and how strongly an atom holds on to their electrons. By themselves, an atom has equal numbers of protons and electrons. When with other atoms, atoms will want to attain their most stable state. The 3 most common elements (atoms) in organic molecules are oxygen (65%), carbon (18%), hydrogen (10%),*

**Materials:**

Hydrogen atoms – white or green

Oxygen atoms – red

Carbon atoms – black

Bonds – white tubes

**Part 1: Building molecules**

**Water:** The chemical formula of water is H2O.

Answer the following questions, before building water:

1. What **elements** make up water?
2. What does the **subscript “2”** following the H represent?
3. Why **doesn’t** O have a subscript?
4. How many **molecules** of water are represented by H2O?

Now, using the molecule kit provided, build a structural model of water with the parts provided.

|  |  |
| --- | --- |
| 1. **Draw a picture** of your model. Use colors and labels in your drawing! | 1. Convert your drawing into a **structural formula** for water, using letters to represent each atom. |
|  | Get both of your drawings stamped off by your teacher! |

Answer the following questions, using your model.

1. What do the **lines between O and H** represent?
2. How many **bonds** does **H** form?
3. How many **bonds** does **O** form?

**Carbon Dioxide:** The chemical formula of carbon dioxide is CO2.

Answer the following questions, before building carbon dioxide:

1. What **elements** make up carbon dioxide?
2. What does the **subscript “2”** following the O represent?
3. Why **doesn’t** C have a subscript?
4. How many **molecules** of water are represented by CO2?

Now, using the molecule kit provided, build a structural model of carbon dioxide with the parts provided.

|  |  |
| --- | --- |
| 1. **Draw a picture** of your model. Use colors and labels in your drawing! | 1. Convert your drawing into a **structural formula** for carbon dioxide, using letters to represent each atom. |
|  | Get both of your drawings stamped off by your teacher! |

Answer the following questions, using your model.

1. How many **bonds** does **C** form?
2. How many **bonds** does **O** form?
3. How do the **number of bonds formed** by oxygen compare in H2O and CO2?

**Oxygen Molecule:** The chemical formula of the water molecule is O2.

Answer the following questions, before building the oxygen molecule

1. What **element(s)** make up O?
2. What does the **subscript “2”** following the O represent?
3. How many **molecules** of **O2** are represented by **2O2**?

Now, using the molecule kit provided, build 2 structural models of oxygen with the parts provided.

|  |  |
| --- | --- |
| 1. **Draw a picture** of your models. Use colors and labels in your drawing! | 1. Convert your drawing into a **structural formula** for oxygen, using letters to represent each atom. |
|  | Get both of your drawings stamped off by your teacher! |

Answer the following questions, using your model.

1. How many **bonds does each O** atom form?
2. How many bonds are **in the O2 molecule**?

**METHANE:**

1. What **element(s)** make up CH4?
2. What does the **subscript “4”** following the H represent?
3. How many **molecules of CH4**are represented by CH4?

Now, using the molecule kit provided, build a structural model of methane with the parts provided.

|  |  |
| --- | --- |
| 1. **Draw a picture** of your model. Use colors and labels in your drawing! | 1. Convert your drawing into a **structural formula** for methane, using letters to represent each atom. |
|  | Get both of your drawings stamped off by your teacher! |

Answer the following questions, using your model.

1. How many **bonds does each C** atom form?
2. How many **bonds does each H** atom form?
3. How many **bonds are between each C and H**?

Answer the following general questions:

1. What is a chemical formula?
2. What is a structural formula?