


**Biology: Unit II- Chemistry of Life**  
**Biological Chemistry**

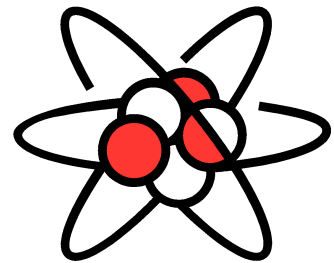
**Name:** \_\_\_\_\_  
**Date:** \_\_\_\_\_ **Period:** \_\_\_\_\_

**Levels of Organization**

Largest  Smallest	Cells	Smallest unit of life...made up of _____ (may contain organelles)
	Organelle	Part of a cell... Made up of several macromolecules
	Macromolecule	Large organic molecules...organic means found in living things
	Compound	2 or more _____ elements chemically combined (molecule)
	Element	Substance made of only _____ type of atom that cannot be broken down chemically ... (_____)
	Atom	Smallest part of an element that still has the _____ _____.

**Structure of an Atom**

- ☐ Nucleus (\_\_\_\_\_ of an atom)
  - Made up of \_\_\_\_\_ (+) + \_\_\_\_\_ (0)
  - $P + N =$  \_\_\_\_\_
  
- ☐ Electron Rings (found outside of the nucleus)
  - Contains \_\_\_\_\_ (-)
    - 1<sup>st</sup> ring can hold \_\_\_\_ v.e.
    - 2<sup>nd</sup> ring can hold \_\_\_\_ v.e.
    - 3<sup>rd</sup> ring can hold \_\_\_\_ or \_\_\_\_ v.e.
      - V.e. = valance electrons which are found in the outermost ring



**If mass is how much matter is in an object, why is atomic mass defined as:**

**Protons + Neutrons**

**In other words...why aren't electrons included?**

☐ Types of Atoms

- o \_\_\_\_\_ - atoms that have given away or taken electrons and therefore have a charge
  - **Cations**- positively charged ions because they have given away 1 or more electrons
    - Example: \_\_\_\_\_
  - **Anions**- negatively charged ions because they have accepted 1 or more electrons
    - Example: \_\_\_\_\_
- o \_\_\_\_\_ - atoms that contain different number of \_\_\_\_\_, but the same number of \_\_\_\_\_
  - Radioactive isotopes have an unstable \_\_\_\_\_ that breaks apart giving off energy in the form of \_\_\_\_\_.
  - Used to: age fossils, preserve food, and treat cancer

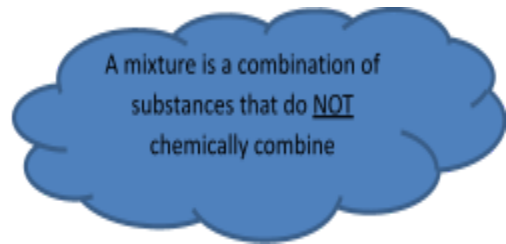
**Chemical Bonding**

☐ Covalent and Ionic Bonding

Covalent Bonds	Ionic Bonds
<b>Define:</b>	<b>Define:</b>
<b>Example:</b> H <sub>2</sub> O	<b>Example:</b> NaCl
<b>Explain how outer energy rings become "full":</b>	<b>Explain how outer energy rings become "full":</b>

☐ Chemical Reactions

- o Occur when \_\_\_\_\_ are formed or broken
  - The elements recombine into different molecules (they are **NOT** \_\_\_\_\_ or \_\_\_\_\_ during a chemical reaction)
  - In organisms, most reactions take place inside of the \_\_\_\_\_
    - All of the chemical reactions that take place within an organism is the \_\_\_\_\_
  - Reactants...what you \_\_\_\_\_ with
  - Products...what you \_\_\_\_\_ with



☐ Parts of a Solution

- o A mixture in which one or more substances are distributed evenly in another substance
  - \_\_\_\_\_ dissolves the \_\_\_\_\_.
  - Example: Kool-Aid
- o Concentration is the amount of solute dissolved in the solvent
  - Organisms cannot \_\_\_\_\_ unless concentrations stay within a specific range

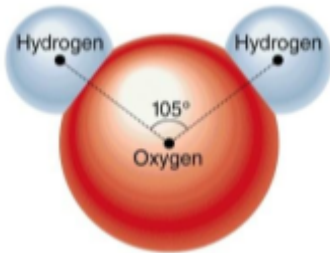
☐ Solutions and pH

- o Chemical reactions that take place in an organism depend on the \_\_\_\_\_ of the environment
- o pH is the measure of how \_\_\_\_\_ or \_\_\_\_\_ a solution is
  - Scale of 0-14
    - Acids:
    - Neutral:

- Bases:

## Properties of Water

- ☐ Essential to life
  - o Makes up \_\_\_\_\_ of most organisms
- ☐ Unique characteristics
  - o Water is \_\_\_\_\_
    - Meaning that the \_\_\_\_\_ and \_\_\_\_\_ atoms do not share the electrons \_\_\_\_\_
      - The shared electrons spend more time near the \_\_\_\_\_ nucleus than near the hydrogen nucleus
        - o Which makes the oxygen atoms slightly more \_\_\_\_\_ and the hydrogen more \_\_\_\_\_
          - This creates \_\_\_\_\_ bonds between water molecules
            - Allows water to dissolve ionic compounds and other polar molecules
            - Helps to hold \_\_\_\_\_ together
            - Creates \_\_\_\_\_
            - Creates \_\_\_\_\_ in plants
            - Creates a high \_\_\_\_\_ (makes water resistant to temperature change)
              - o Water in cells act as an insulator to help maintain a steady environment (\_\_\_\_\_)



- ☐ Water and Diffusion
  - o Diffusion is the net movement of particles from an area of \_\_\_\_\_ concentration to \_\_\_\_\_ concentration
    - Results because all particles are constantly \_\_\_\_\_
    - The rate of diffusion can be increased by:
      - Increasing the \_\_\_\_\_
      - Increasing the \_\_\_\_\_
      - Increasing the \_\_\_\_\_
    - Molecules will continue to move...even after dynamic equilibrium has been reached

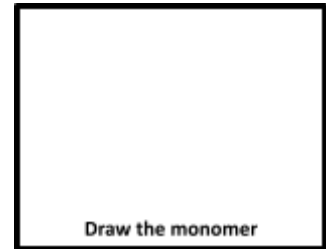
## Carbon and Biomolecules

- ☐ Carbon...the building block of life
  - o Atomic number of \_\_\_\_\_, so...
    - Protons = \_\_\_\_\_
    - Electrons = \_\_\_\_\_
    - Valence electrons = \_\_\_\_\_
      - Which means that carbon can make \_\_\_\_\_ bonds
      - These bonds can be: \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_
- ☐ Biomolecules (A.K.A macromolecules and polymers)
  - o Biomolecules are large \_\_\_\_\_ compounds made up of smaller subunits called monomers
  - o There are 4 main biomolecules
    - \_\_\_\_\_
    - \_\_\_\_\_
    - \_\_\_\_\_

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☐ **Carbohydrates** (elements present = \_\_\_\_\_)

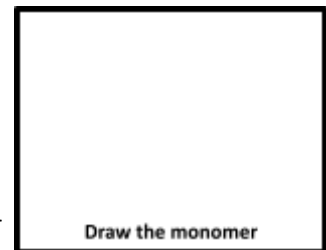
- o Monomer: \_\_\_\_\_ (simple sugar)
  - Example: \_\_\_\_\_
- o Combining monomers:
  - Disaccharides (di = \_\_\_)
    - Example: \_\_\_\_\_ (glucose + fructose)
  - Polysaccharides (poly = \_\_\_\_\_)
    - Examples:
      - o Starch-
      - o Glycogen-
      - o Cellulose-
- o Function: \_\_\_\_\_



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☐ **Lipids** (elements present = \_\_\_\_\_)

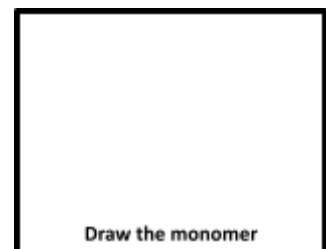
- o Monomer: \_\_\_\_\_ (1 glycerol + 3 fatty acids)
- o Fatty Acid Chains:
  - **Saturated** = \_\_\_\_\_
  - **Unsaturated** = \_\_\_\_\_
- o Examples: \_\_\_\_\_
- o Function:
  - Long term \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_ (cell membranes)



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☐ **Nucleic Acids** (elements present = \_\_\_\_\_)

- o Monomer: \_\_\_\_\_ (sugar, phosphate, and nitrogenous base)
  - Sugars: \_\_\_\_\_ (DNA) and \_\_\_\_\_ (RNA)
  - Nitrogen Bases: Adenine, Guanine, Cytosine, Thymine (only in \_\_\_\_\_) and Uracil (\_\_\_\_\_)
- o Combining Monomers:
  - Single stranded
    - Example: \_\_\_\_\_
  - Double stranded
    - Example: \_\_\_\_\_



o Function: \_\_\_\_\_

7 **Proteins** (elements present = \_\_\_\_\_)

o Monomer: \_\_\_\_\_

o Combining Monomers:

- Amino acids are held together by \_\_\_\_\_ bonds
- Examples: \_\_\_\_\_

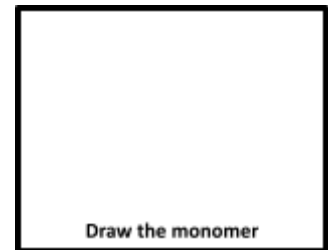
o Function: \_\_\_\_\_

o Structure:

- Proteins have the \_\_\_\_\_ structures of all the biomolecules
- The \_\_\_\_\_ (**structure**) of a protein and its \_\_\_\_\_ (**function**) are inseparable!!!
- Can have up to \_\_\_\_\_ of structure:
  1. Primary- Sequence of amino acids of the polypeptide (protein) chain.
  2. Secondary- The substructure (organization) of the polypeptide (protein) chain.
    - a. \_\_\_\_\_ - Amino Acid chain is twisted into a helical structure.
    - b. \_\_\_\_\_ - Multiple Amino Acid chains are connected side by side into layered sheet.
  3. Tertiary- The overall \_\_\_\_\_ of the polypeptide (protein).
  4. Quaternary- The overall three-dimensional shape of a polypeptide (protein) complex made up of multiple \_\_\_\_\_.

o Enzymes are specialized \_\_\_\_\_

- Enzymes act as \_\_\_\_\_
  - Therefore they can change the \_\_\_\_\_ of chemical reactions
- An enzyme's \_\_\_\_\_ allows only certain reactants ( \_\_\_\_\_ ) to bind to the active site
- Factors that can Denature a Protein
  - The number of \_\_\_\_\_ and how they interact determines the \_\_\_\_\_ shape and twist of a protein
  - If the amino acid sequence is changed, the shape changes, and the \_\_\_\_\_ changes



- Factors that affect the proper folding of a protein are \_\_\_\_\_

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