Section 5: Organic Molecules - Proteins and Nucleic Acids - Notes

Objectives:

- Explain how carbon is uniquely suited to form biological macromolecules.
- Describe how biological macromolecules form from monomers.
- Compare the structure and function of carbohydrates, lipids, proteins, and nucleic acids in organisms.
- Describe the role of an enzyme as a catalyst in regulating a specific biochemical reaction.
- Explain how factors such as pH, temperature, and concentration levels can affect enzyme function.

Warm-up:

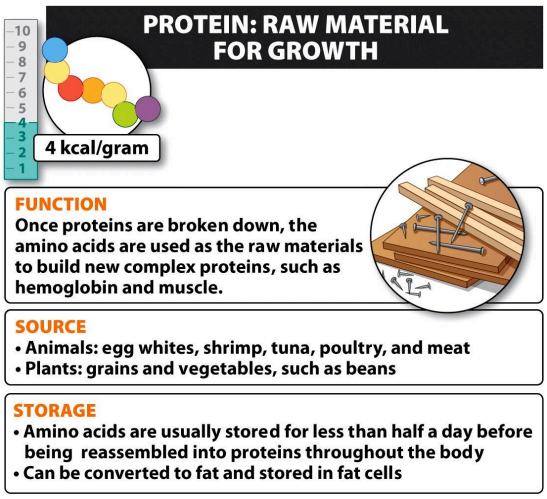
- Explain the difference between monomers and polymers.

- What is a monomer of carbohydrates?

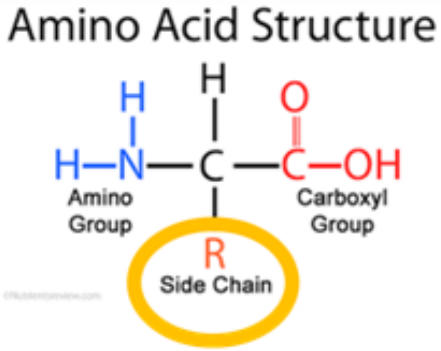
- What is a polymer of carbhoydrates?

Protein:

- **Protein:** a macromolecule that contains the principle components of organisms: _____
  - Proteins perform a variety of _____ and _____ functions for cells
  - Can have _____ and _____ regions depending on the R groups found throughout the protein
  - The instructions to make proteins are in _____

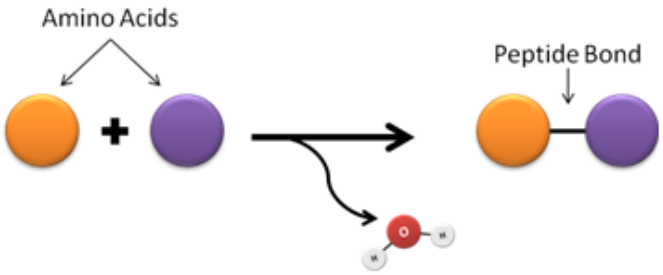


- **Monomers of Protein:**
  - _____
    - There are _____ different _____ _____ used to make protein
    - Each amino acid has a different _____ _____

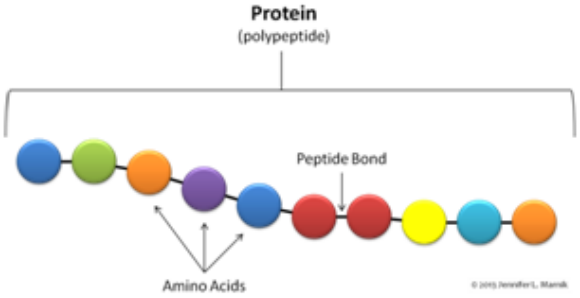


- Humans can synthesize _____ of the _____ amino acids that they need.

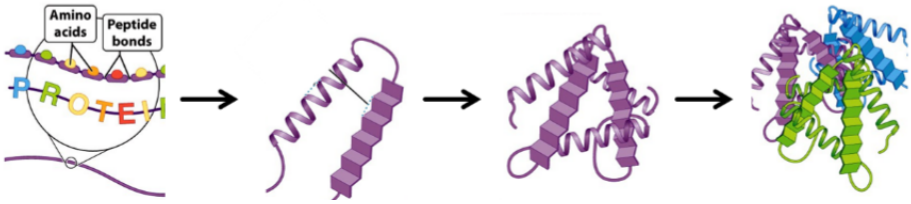
- We must get the other _____ amino acids from the _____.
  - These are called _____ amino acids.
- Amino acids will join together through _____ to create _____.
  - These bonds are called _____



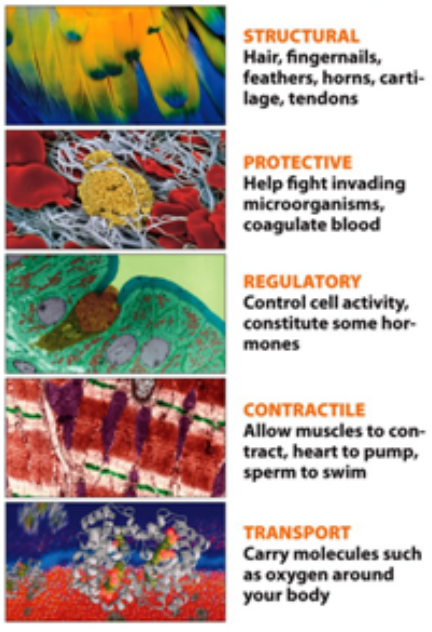
- **Polymers of Protein:**
  - _____
    - These are _____ of amino acids
    - _____ of _____ amino acids make up _____ proteins



- When _____ are being constructed, they will start to take on _____.
  - The polypeptides can then interact with other polypeptides to form _____.

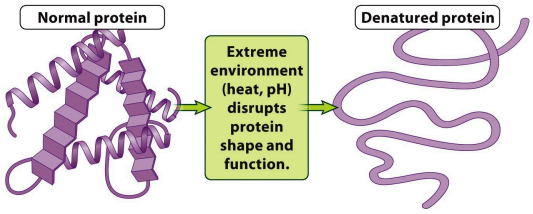


- When protein is consumed, it is mostly used for _____, _____ structures, and replacement of used _____.
  - Although protein contains chemical energy, it is not the body's _____ of fuel!



- **Check for Understanding:** Why do bodybuilders consume protein immediately after exercising?

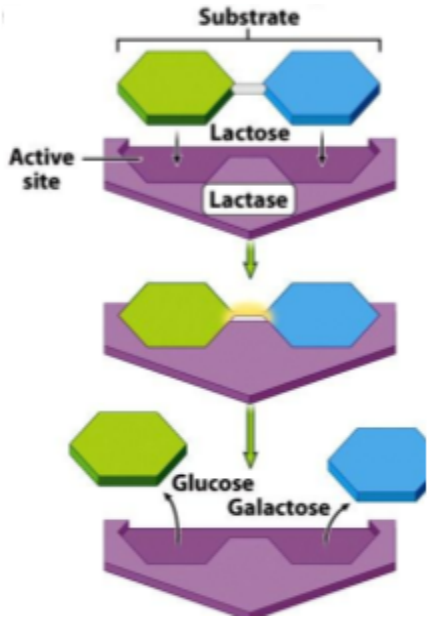
- Even though proteins are all built the _____, they perform many _____ functions.
- Proteins can be very _____ molecules.
    - If there is an extreme change in _____ or _____, the protein can lose its _____ (it becomes _____)
        - If the protein loses its _____, it loses its _____!



- **Check for Understanding:** A protein's function is most dependent on…
    A. Its size
    B. Its shape
    C. Its color
    D. Its location

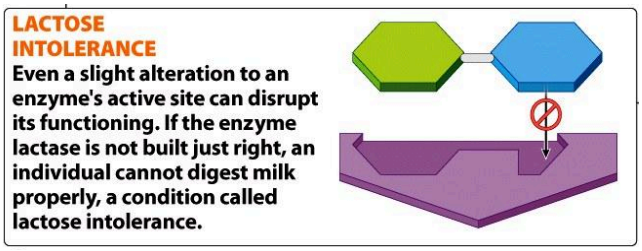
- **<u>Temperature:</u>** a measure of the _____ of particles in a sample of matter.
    - This can determine _____ and _____ of which chemical reactions can occur within living systems.

- There are many _____ that need to occur within cells. A lot of these reactions _____ take place on their own. They need the help of proteins called _____.
    - **<u>Enzyme:</u>** a _____ that increases the _____ of a chemical reaction without being _____ by the reaction.
        - Enzyme names usually end with _____



- An enzyme is an organic _____
    - **<u>Catalyst:</u>** a substance that enables a chemical reaction to proceed at a usually _____ rate or under _____ than otherwise possible without being changed by a reaction.

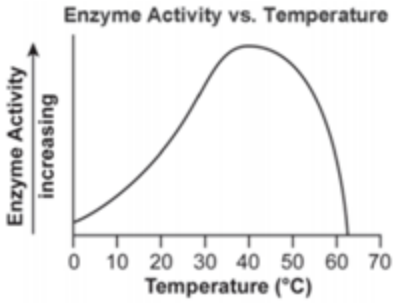
- Each enzyme has a place called the _____ that has a very specific _____.
    - A molecule called a _____ will fit into that active site.
        - **Substrate:** a substance on which an enzyme _____
- The enzyme works by _____ the _____ needed to start the chemical reaction
    - **Activation Energy (Ea):** the _____ energy required to _____ a specific chemical reaction
- Once the chemical reaction is over, the _____ will leave the active site.
    - The enzyme remains _____!
- If an enzyme is built _____, the active site will not have the _____ to fit with the substrate.
    - The chemical reaction will _____ be able to occur.



- An enzyme could also become _____ if there is a change in _____ or _____.

Check for Understanding:

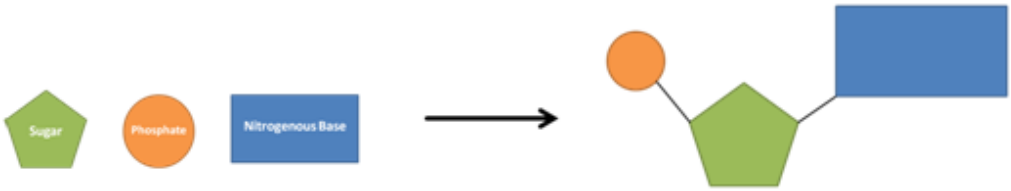
- The graph shows how the activity of an enzyme changes at different temperatures. Which statement best describes what happens to the enzyme when the temperature of the reaction increases to 63°C?
    A. The enzyme is used up and the reaction stops.
    B. The enzyme begins to decrease the rate of the reaction.
    C. The enzyme continues to increase the rate of the reaction.
    D. The enzyme changes shape and can no longer speed up the reaction.



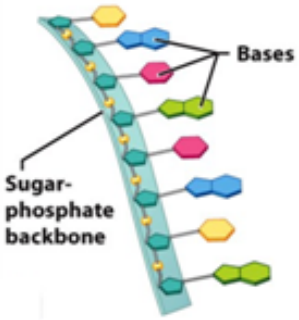
Nucleic Acids:

- **Nucleic Acid:** a biological macromolecule composed of the elements _____, _____, _____, _____, and _____ that stores _____
    - _____ or _____

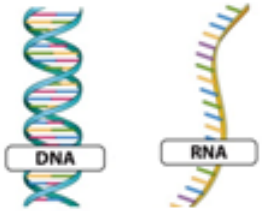
- **Monomers of Nucleic Acids:**
  - _____
    - Composed of three parts: _____, _____, and a _____



- The sugar and phosphate molecules make up the "_____" of nucleic acids.
- There are five possible nitrogenous bases: _____, _____, _____, _____, and _____
  - Genetic information is stored in the _____ of these bases.



- **Polymers of Nucleic Acids:**
  - _____ and _____



Check for Understanding:

- Which part of a nucleotide can be different in a DNA molecule?
  A. The sugar
  B. The nitrogen base
  C. The phosphate group

Biochemical Conversion:

- Organisms can use organic molecules as sources of _____ within _____.
- Humans have found ways to use this _____ outside of _____ as well:
  - **<u>Biochemical Conversion:</u>** The changing of _____ into other chemical forms such as _____.