

5.8: Polymer Assignment

Read the following sections borrowed from a textbook:

- **Proteins—Natural Polyamides**

Read pages 117 to 124.

Answer the following questions:

1. Are proteins addition polymers or condensation polymers? Explain.
2. How do chiral molecules differ from each other?
3. Draw a structural diagram of the linkage between amino acids in a peptide chain.
4. Differentiate between the primary, secondary, tertiary, and quaternary structure of proteins. Sketch a simple diagram of each structure to illustrate your answer.

- **Starch and Cellulose—Polymers of Sugar**

Read pages 125 to 128.

Answer the following questions:

1. Identify the functional groups present in a molecule of glucose and in a molecule of fructose.
2. Describe several functions of polysaccharides and how these functions are served by their molecular structures,
 - (a) in animals
 - (b) in plants.
3. Compare the following pairs of compounds, referring to their structure and properties:
 - (a) sugars and starch
 - (b) starch and cellulose
4. (a) Draw a structural diagram of the most common configuration of a glucose molecule.
 - (b) Why does glucose exist in two different forms?
5. Explain in terms of molecular structure why sugars have a relatively high melting point compared with hydrocarbons of comparable size.

- **Nucleic Acids**

Read pages 129 to 132.

Answer the following questions:

1. What do the letters DNA stand for, and what is its main function in an organism?
2. Describe the three main components of a monomer of a nucleic acid.
3. What type of linkage joins the nucleotides
 - (a) within a single DNA strand?
 - (b) between two single DNA strands?

4. Write a balanced chemical equation for the condensation reaction between deoxyribose and phosphoric acid.
5. (a) Describe three causes of chemical alterations to DNA.
(b) Explain briefly why a minor alteration in a DNA sequence can cause a change in cell function.

- ***Fats and Oils***

Read pages 133 to 136.

Answer the following questions:

1. Draw a structural diagram for the simple triglyceride of oleic acid, $\text{CH}_3(\text{CH}_2)_7\text{CH}=\text{CH}(\text{CH}_2)_7\text{COOH}$, the fatty acid found in corn oil.
2. Given the physical properties of corn oil, would you expect the fatty acid components to be saturated or unsaturated? What process may be necessary to convert corn oil into margarine?
3. Write a balanced chemical equation for the saponification of a simple triglyceride of stearic acid.
4. Explain, with the aid of a sketch, why the presence of double bonds in fatty acids tends to lower the melting points of their triglycerides.
5. Suggest reasons why fats and oils are an efficient form of energy storage for living systems.