Macromolecules Module
(Grades 9-12)

What are the essential questions for this module?

- How do atoms bond?
- What does determine molecular structure?
- How do molecules interact?
- How are proteins formed?

What central concepts are discussed?

Proteins, peptide bond, hydrogen bond, intermolecular forces, Lewis structure, amino acids, polarity

What National Science Education Standards are addressed?

- Physical Science: Content Standard B
  Structure and properties of matter

- Life Science: Content Standard C
  Matter, energy and organization in living systems

What do students need to know to work with this module?

Understandings

- Matter is made of molecules and atoms.
- The structure of atoms.
- Molecules are made of elements.

Skills

- Familiarity with the use of computers and the internet
- Basic reading skills
<table>
<thead>
<tr>
<th>What will the students understand as a result of their work with this module?</th>
<th>How will students come to this understanding?</th>
<th>How will Students demonstrate this understanding?</th>
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<tbody>
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<td>They will:</td>
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| Atoms commonly find in living organisms can only form a specific number of bond determined by the number of electrons in the valence shell. | • Read and analyze information  
• Complete exploratory activity | Construct molecular structures. |
| Amino acids are made of carboxylic acid and amino groups. | • Read and analyze information  
• Complete exploratory activity | Build molecular models of amino acids. |
| Polarity is deduced from the geometry of molecules. | • Read and analyze information  
• Complete exploratory activity | Build 3d models of molecules and amino acids. |
| Amino acids interact with each other through hydrogen bonding. | • Read and analyze information  
• Complete exploratory activity | Determine hydrogen bonds between different amino acids. |
| Proteins are made of amino acids connected by peptides bonds. | • Read and analyze information  
• Complete exploratory activity | Make amino acids react and identify the characteristics of peptide bonds. |