

Macromolecule Models

Part 3: Structure and Function

Macromolecule polymers are typically made of monomer building blocks. The monomers have orientation and this directionality is important to the structure and function of the polymer. Changes in the subcomponents may change the structure and function of the polymer

- A. Nucleic acids have a linear sequence of nucleotides that have specific ends, defined by the 3' hydroxyl and 5' phosphates of the sugar in the nucleotides. During DNA and RNA synthesis, nucleotides are added to the 3' end of the growing strand, resulting in the formation of a covalent bond between nucleotides.
- B. DNA is structured as an antiparallel double helix, with each strand running in opposite 5' to 3' orientation. Adenine nucleotides pair with thymine nucleotides via two hydrogen bonds. Cytosine nucleotides pair with guanine nucleotides by three hydrogen bonds.
- C. Proteins comprise linear chains of amino acids, connected by the formation of covalent bonds at the carboxyl terminus of the growing peptide chain.
- D. Proteins have primary structure determined by the sequence order of their constituent amino acids, secondary structure that arises through local folding of the amino acid chain into elements such as alpha-helices and beta-sheets, tertiary structure that is the overall three-dimensional shape of the protein and often minimizes free energy, and quaternary structure that arises from interactions between multiple polypeptide units. The four elements of protein structure determine the function of a protein.
- E. Carbohydrates comprise linear chains of sugar monomers connected by covalent bonds. Carbohydrate polymers may be linear or branched.

Your group will be assigned one or more bullets (A-E) from the list above. Using the model pieces from **Macromolecule Models: Parts 1 and 2**, make an explanatory video. In your video predict what could cause a change or disruption to your polymer and what the effect would be.

A-E Bullets are from the AP Biology Course and Exam Description, 2019, The College Board, p. 39.