

Investigation 18.A: Modelling DNA Structure and Replication

Question: How can you design a working model of a short strand of DNA (eight to ten base pairs) that can be used to simulate the molecular structure of DNA and the process of DNA replication?

Experimental Plan

1. Brainstorm ideas for designing and constructing a model.
2. Use your ideas to develop a plan. List the materials and equipment you will need.
3. When all the members of your group have approved the plan, write it down and review it with your teacher.
4. Create your model. Keep a written record of the steps you followed and any changes you made to your plan.

Data and Observations

5. Record the nucleotide sequences for each strand of DNA in your molecule, using the correct conventions.

6. Use your model to simulate the process of DNA replication. Keeping in mind the action of DNA polymerase, use your model to demonstrate
 - a) replication along the leading strand
 - b) replication along the lagging strand
 - c) the actions of primase, helicase, DNA polymerase, and DNA ligase

Analysis

1. In what ways is your model useful for explaining the structure and replication of DNA? What are the limitations of your model?

