



Pre-Laboratory Questions

1. The structure of DNA is critical to understanding how to manipulate it during an experiment. What is the charge of DNA and what component in the structure is the source of this charge?
2. Enzymes are important molecules in biochemistry.
 - a. What do enzymes do?
 - b. How do pH and temperature affect enzyme function, and why?
3. Today's experiment uses a common technique in molecular biology, gel electrophoresis. What is the purpose of gel electrophoresis?

Laboratory Questions – answer these questions during the lab.

1. Bacteriophages are viruses that specifically target and attack bacterial cells. Why do they do this? What organelle do bacteria have that viruses lack?
2. Using arrows, indicate the position of the following components on the diagram of λ phage below.



- | |
|---|
| Components:
Capsid
Tail
Membrane Binding Proteins
Phage DNA
Tail Fibers |
|---|

3. Restriction Enzymes:
 - a. What do restriction enzymes do and what type of enzyme are they?
 - b. What living things naturally produce restriction enzymes?
 - c. What purpose do restriction enzymes serve in these organisms?
4. What are sticky ends? Is it possible to join DNA from bacteria with DNA from a human? Explain how this could be done.

Post-Laboratory Questions

1. What is the purpose of adding distilled H₂O to the “-” treatment in the restriction digest?
2. What are 3 functions of the SYBR green loading dye?
3. What is the identity of the unknown enzyme based on the results of the gel in class?
4. You identify a particular silk protein encoded by a single gene in a spider that demonstrates incredible biophysical properties. You’d like to research this protein further, but spiders are difficult to farm. How might you retrieve and incorporate this silk gene into a bacterial species for large-scale production? Use the words **restriction enzymes**, **recombinant DNA**, and **transformation** in your response.
5. A segment of DNA has two restriction sites. When digested with restriction enzymes I and II, three fragments will be formed: A, B and C. Which of the following gels produced by electrophoresis would represent the separation and identity of these fragments? Select the number of the gel and explain your results.

