# Pre-Lab Information

Purpose To use DNA evidence to solve a crime

Time Approximately 90 minutes

Question Which suspect was at the scene of the crime?

Summary In this investigation, you will use gel electrophoresis to create genetic profiles. You will then use these profiles to narrow a list of suspects from a crime scene.

# Safety

* Behavior in the lab needs to be purposeful.
* Wear safety goggles when working with sample testing substances.
* Report all accidents—no matter how big or small—to your teacher.

# Lab Procedure

1. **Gather materials.**

|  |  |
| --- | --- |
| * DNA samples * Gel electrophoresis chamber * Power supply | * Gloves * Safety goggles * Transfer pipettes |

1. **Become familiar with the crime scene.**
   1. Read the following scenario to become familiar with the crime scene.

*Early this morning, Mr. Mallard walked into his lab and found most of his lab equipment had been stolen. All that was left was a broken flask on the floor. Mr. Mallard had been in the middle of a cutting-edge experiment and is hopeful to find the suspect. There are only four other people who have access to the lab and there were no signs of forced entry. His two lab assistants, another scientist he shares the space with, and a custodian all have access to the lab. Looking closer at the broken flask, Mr. Mallard notices that there is some blood left on the flask. He predicts this belongs to whomever was in the lab. Taking a sample of the blood, he uses it to try and determine who broke into the lab.*

* 1. Make a prediction as to who is responsible. Write your prediction in your lab notebook.

1. **Prepare your samples.**
   1. Obtain DNA samples from your teacher. These have already been prepared with restriction enzymes, so you can assume the DNA is cut into sequences.
   2. Put the sample marker into the first well. Make sure to record which sample you put in each well so you can compare them later. Steps c–f will walk you through how to put samples into the wells.
   3. Load 15–20 μL of each sample into a pipette. Use two hands to steady the pipette as you load.
   4. Dip the pipette tip into the surface of the gel and position it just inside the well. Then, slowly expel the sample into the well.
   5. Carefully remove the pipette tip from the gel.
   6. Remove the loading device and replace it with a clean one for the next sample. Repeat for all samples.
2. **Conduct electrophoresis.**
   1. Once you have loaded all of your samples, make sure all leads are connected.
   2. Turn on the power supply and set the voltage to about 50 volts.
   3. Observe to make sure you see the samples migrating.
   4. Allow the DNA to electrophorese until the loading dye band is about 1 cm from the end of the gel. Your teacher will help you predict how long this might take.
3. **Analyze your results.**
   1. Examine your gel and samples.
   2. Compare the distance traveled by each sample.
   3. Determine which suspects do not match the DNA sample found at the scene.
   4. Use your results to develop a conclusion about the crime scene based on the data from your lab.
4. **Clean up your area.** 
   1. Return unused materials and dispose of any trash according to your teacher’s directions.

# Data

Record your data either in your lab notebook or in the space below.

**Table A: Suspects’ DNA**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Marker (bp)** | **Crime Scene DNA** | **Suspect A** | **Suspect B** | **Suspect C** | **Suspect D** |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

# Follow-Up Questions

Answer the following questions:

1. Use your data to construct a conclusion with claim, evidence, and reasoning components. Your claim should attempt to answer your question. Evidence should include any data you collected and analyzed. Your reasoning should include scientific reasoning for your results.
2. Why is it important to load the DNA by the negative electrode?