

DNA Fingerprinting

STEM Sims

Lesson 1: Gel Electrophoresis

Gel electrophoresis is the method used to compare DNA samples. First, enzymes cut the DNA into pieces at different locations. Then a gel bed is created to make a medium that the DNA will travel through. After the cut DNA fragments are placed in the gel bed wells, power is turned on. The power supply provides a voltage. Since DNA has a negative charge, it will be attracted towards a positive charge. The electricity moves the DNA fragments through the gel at different rates depending on the fragment size. Smaller fragments move faster and further. At the end of electrophoresis, there will be bands based on the location of the DNA fragments. Load up the DNA samples and let the electrophoresis begin!

Doing the Science

1. Start the DNA Fingerprinting Simulation by clicking on the “Sim” tab.
2. Drag a swab to a bloodstain and write down the bloodstain’s location into Table 1 below.
3. Swab the same bloodstain for Swabs 2 and 3, and swab different bloodstains for Swabs 4-6.
4. Click on “Analysis Lab” to analyze the DNA samples.
5. Drag the bottle labeled “Gel Buffer” onto the top of the gel electrophoresis tray.
6. Drag the pipette to the box of “Clean Tips” (make sure that the end of the pipette is on top of the box).
7. Drag the pipette from the box of clean tips to the first test tube that holds the DNA sample.
8. From the test tube, drag the pipette’s contents to a well near the left side of the gel electrophoresis tray and release.
9. Drag the pipette from the tray to the box labeled “Used Tips”.
10. Repeat steps 6-9 for the remaining five DNA samples.
11. Connect the black and red wires to the appropriate sides of the gel electrophoresis tray.
12. Click on the switch of the black box to give power to the gel electrophoresis tray.
13. Click on “DNA Results” to view the results of the electrophoresis.
14. Drag the ruler to each of the bands and measure the locations of the purple bands. Record these locations into the table.
15. Using the “Suspect DNA Profile Database” table, identify the ID number of the blood for each of the DNA samples and record the ID number into the table.
16. Lastly, record in Table 1 the DNA Results Code shown in the simulation.

Table 1.

	Swab 1	Swab 2	Swab 3	Swab 4	Swab 5	Swab 6
Location of DNA at the crime scene						
Location of the purple bands						
ID Number						
DNA Results Code:						

Do You Understand?

1. Are the DNA samples from one person alike or different? Please explain your response.

2. Are the DNA samples from multiple people alike or different? Please explain your response.