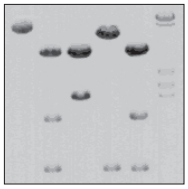


Lesson

Gel Electrophoresis

What is it and how does it work?

Gel **electrophoresis** is a powerful tool that enables scientists to study DNA molecules. With this technique, scientists first use enzymes to cut the very long DNA molecules into fragments of varying size. The enzymes cut the DNA molecules at specific places. The DNA molecule fragments are then separated by size using electrophoresis. In this lesson, you will discover what gel electrophoresis is and how it works.

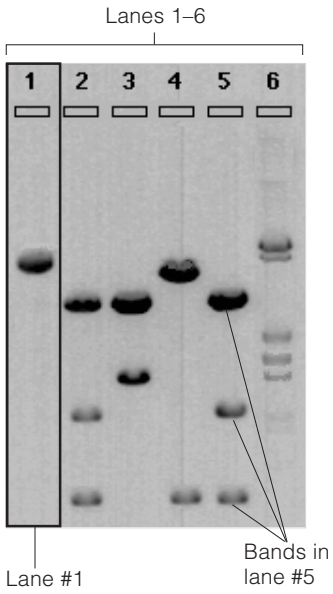
In Greek,
electro = electrical
phoresis = carrying

File Open Samples **Methods of GE**. Use the < and > keys to move through the stack one slice at a time. Study each image in the stack before answering the question below.

1. Draw and label a diagram showing the basic design of the electrophoresis chamber. Include the **gel**, the **wells** in the gel, the **positive** and **negative electrodes**, and an arrow showing the direction of travel of the DNA fragments.

File OpenSamples **Cartoon of GE**. Examine each image in this stack using the > and < keys.

2. How does the size of the DNA molecule fragments relate to the speed at which they travel through the gel? (Do smaller or larger fragments travel faster?)
3. Explain how the gel matrix causes some molecules to travel faster than others.
4. DNA molecule fragments are invisible to the naked eye as they travel through the gel. What might happen if no dye were added to the DNA and the electricity were left on too long?



Electrophoresis in action

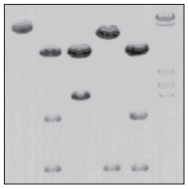
File OpenSamples **Animation of GE**.

You are watching a time-lapse sequence of a gel electrophoresis. The DNA molecules in the gel were stained so they glow when placed under a UV light. Pictures of the gel were taken every 10 minutes during the electrophoresis. Each band on the gel contains many DNA molecule fragments, all of which are the same size.

5. DNA fragments of different sizes are loaded into a well together. Describe the movement of the bands of different-sized DNA fragments as the electrophoresis progresses from start to finish.
6. DNA molecule fragments are negatively charged. Where is the positive electrode located on this image?
7. What would happen to the DNA fragments if the electrodes were reversed?

8. How many bands of DNA fragments are in Lane 3? How many in Lane 5?
9. In which bands would you expect to find the shortest fragments of DNA (those closest or furthest from the wells)? In which bands would you expect to find the longest DNA fragments?
10. Explain how gel electrophoresis separates DNA molecule fragments according to size. Include the following terms in your explanation: electric field, positive electrode, gel matrix, wells, large DNA molecule fragments, small DNA molecule fragments.

Gel Electrophoresis



Data Sheet

Name(s)_____ Class_____

_____ Date_____

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