

DNA & Principles of Gel Electrophoresis

Field Trip Background MS

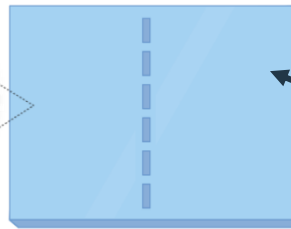
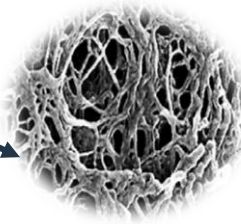
Background Information

DNA and Principles of Gel Electrophoresis will help students understand how gel electrophoresis works using colored dyes. Students will also model DNA structure and understand how that structure determines behavior in gel electrophoresis.

Agarose Gel Electrophoresis

Agarose is a sugar from seaweed. It does not dissolve in room temperature water (or buffer). However, it does melt in boiling water (or buffer). As it cools, agarose sugars link with each other and cause the solution to "gel", much like JELL-O. Adding more agarose gives firmer gels. If you were inside a gel, it would resemble a thick spider web.

Scanning electron micrograph of agarose; 50,000 x magnification
Anders S. Medin, PhD Thesis, Uppsala University 1995



An agarose gel
(via Biorender.com)

Students will use a 1% agarose gel made with 1x [sodium borate buffer](#) for this field trip. Gels are prepared by pouring molten agarose into molds that have a comb. As the gel cools, it solidifies. When the comb is removed from the solid gel, it leaves behind pockets called 'wells.'

The gel box is prepared by placing the gel in the box and pouring buffer over the top. Dye samples are loaded into the wells of the agarose gel. Next, the gel box is connected to a power supply to send an electric current through the gel box.



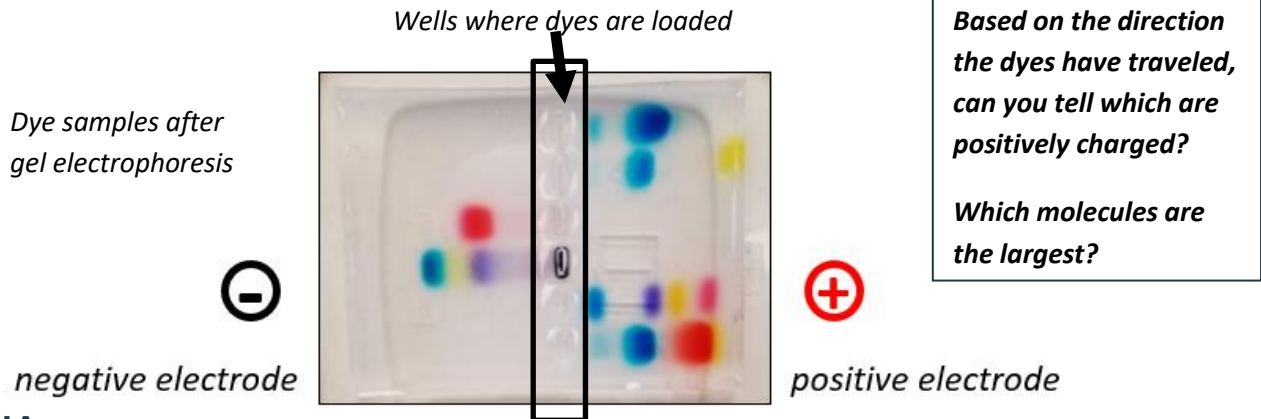
Gel box connected to power supply

Agarose Gel Electrophoresis (continued)

The electric current will separate dye molecules of different sizes and of different charges from one another. The technique is called “**agarose gel electrophoresis.**” If you were a small molecule, then you could easily crawl through the spaces between the webs. If you were a large molecule, it would be harder to crawl through the spaces between the webs. As you increase in size, it gets harder and harder for you to fit through the spaces.

Analysis

After running the gel, students will be able to see color patterns in the gel. This is based on the size and charge of the dye molecules.

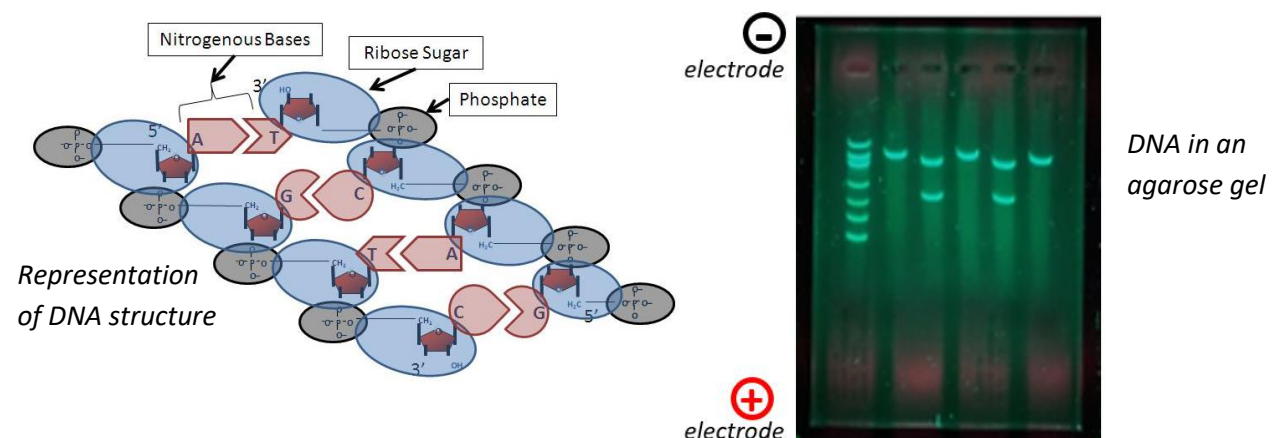


DNA

Agarose Gel Electrophoresis is an important process in science. Scientists use gel electrophoresis to analyze DNA by separating DNA molecules from one another.

DeoxyriboNucleic Acid (DNA) is sometimes called the “Code of Life”. DNA is important because it can make proteins. Proteins perform many functions for living things. Learning about DNA helps us better understand cells and living things.

Students will learn how sugars, phosphates, and nucleotide bases (A, T, G, C) of DNA connect by creating a model. Students will also learn that phosphates are the part of DNA that gives it a negative charge.



If you would like more information before you bring your students to the BTC Institute for this field trip, please contact us. We look forward to working with you and your students.

Thank you for your interest in the BTC Institute's Biotechnology Field Trips program!