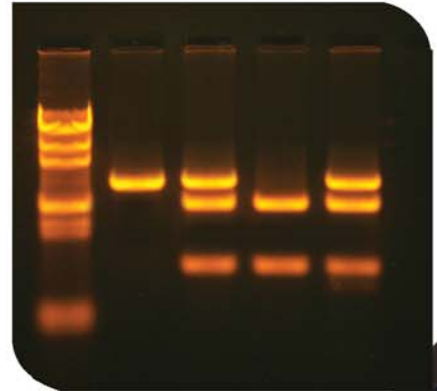
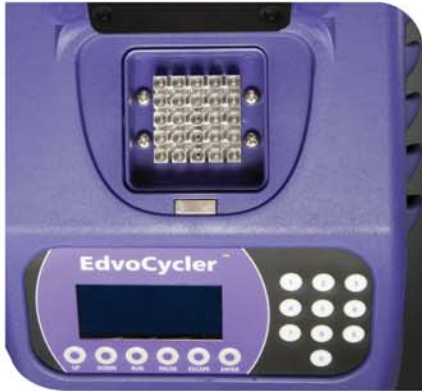




The Biotechnology Education Company®

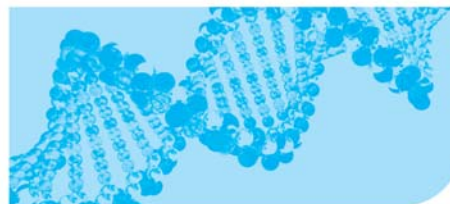
EDVOTEK® QUICK GUIDE

# Biotechnology Basics: Outfitting Your Biotech Classroom



[www.edvotek.com](http://www.edvotek.com)

# An Introduction to Biotechnology



Biotechnology represents the use of cellular, molecular, and biochemical technologies to improve society and the environment. Basic biotechnology techniques have been used for centuries for the production and preservation of food, selective breeding of livestock, and to improve human health. Modern laboratories that discover many of these biotechnological innovations use simple but powerful techniques to visualize and manipulate DNA and proteins.

Edvotek® offers multiple biotech products to outfit your classroom. From gel electrophoresis and PCR, to bacterial transformation and exciting forensics experiments, you can now bring a wide variety of inquiry-based activities into your classroom!

## Electrophoresis

Electrophoresis is a technique that allows scientists to separate DNA, RNA, or proteins according to their size. The molecules are pulled by an electrical field through a defined gel, forcing them to move through microscopic pores. This process separates the molecules based on size, with smaller fragments moving more easily through the gel. Because of this, electrophoresis experiments can be used to detect the presence and size of DNA from a variety of sources. We offer a broad range of exciting electrophoresis experiments for the classroom, including both dye and DNA-based gel electrophoresis.

**Cat. 5062**

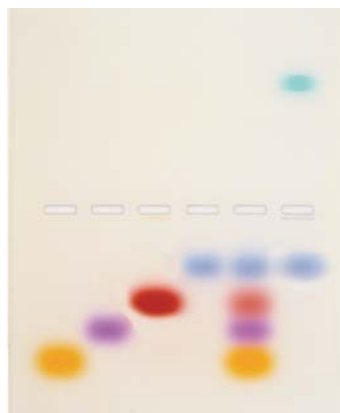
### Classroom DNA Electrophoresis LabStation™

Supports up to 24 students



#### Includes:

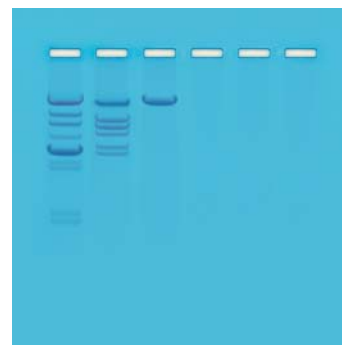
- 1 Cat. #515 M36 HexaGel™ Electrophoresis Apparatus
- 1 Cat. #509 DuoSource™ 150 (75/150 V for 1 or 2 units)
- 2 Cat. #588 Fixed Volume MiniPipet (40 µl)
- 1 Cat. #636 Yellow Micropipet Tips (1 - 200 µl / 2 Racks of 96)
- 1 Cat. #130 DNA Fingerprinting Classroom Experiment



**Cat. 101**

### Principles & Practice of Agarose Gel Electrophoresis

In this safe, colorful and fun experiment, students learn the basics of agarose gel electrophoresis. Groups of students will cast gels, load samples, and observe the separation of visible bands. This experiment arrives Ready-to-Load and does not require DNA or toxic chemicals.

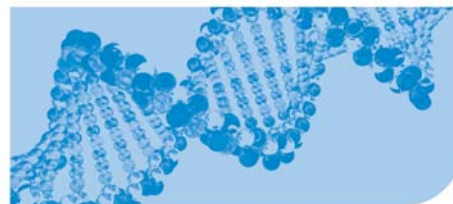


**Cat. 112**

### Restriction Enzyme Analysis of DNA

Restriction enzyme analysis of DNA Introduce your students to the concept of DNA digestion by restriction enzymes, followed by electrophoresis to examine the results. This Ready-to-load experiment examines digestion of lambda DNA at specific nucleotide sequences. You can also Save money with one of our convenient Classroom DNA Electrophoresis LabStations, designed to provide everything you need to perform many of our electrophoresis experiments!

# Staining Agarose Gels



**InstaStain®  
Ethidium  
Bromide**



**SYBR®  
Safe  
DNA Stain**



**InstaStain®  
Blue and  
FlashBlue™**



After electrophoresis, DNA fragments will have separated according to their size. However, DNA bands are colorless, and it necessary to first stain the DNA before it can be seen. EDVOTEK® offers several methods for visualizing DNA within agarose gels.

## Fluorescent DNA Stains:

The most frequently used method for visualizing DNA is through the use of fluorescent DNA stains. These stains are extremely sensitive and rapid, making them perfect for use in the classroom. Fluorescent stains must be visualized using an ultraviolet (UV) light source. We offer two options for fluorescent stains: InstaStain® Ethidium Bromide and SYBR® Safe DNA Stain.

## Visible Dye-based DNA Stains:

Dye-based DNA stains are an excellent alternative to fluorescent stains, requiring no special equipment or waste-disposal. Although they are less sensitive to DNA concentrations, our visible stains provide excellent results and dye DNA with an intense blue color. EDVOTEK® offers two visible dye-based DNA stains: InstaStain® Blue and FlashBlue™ stain.

Stain	Advantages	Disadvantages
InstaStain® EtBr	Very sensitive Very fast	Requires UV transilluminator Potentially mutagenic
SYBR® Safe	Very sensitive Non-mutagenic	Requires UV transilluminator More expensive
InstaStain® Blue	Easy to use Generates minimal waste	Less sensitive More time
FlashBlue™	Simple and fast Reusable, inexpensive	Less sensitive Disposal of liquid



**Cat. 558  
Midrange UV Transilluminator**

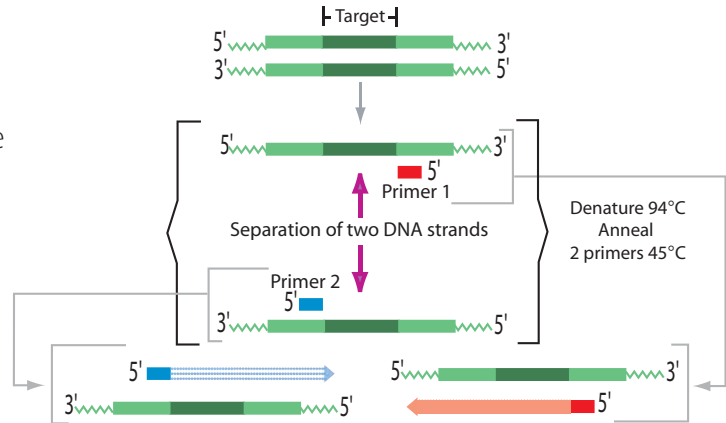
The EDVOTEK® Midrange UV Transilluminator is designed to visualize DNA stained with Ethidium Bromide or SYBR® Safe. The UV filter is 7 x 14 cm and is optimal for visualizing all of our gel sizes. Safety features include a UV-blocking cover and a power cut-off switch when the cover is opened.



# Polymerase Chain Reaction



Polymerase Chain Reaction (PCR) is a technique that allows researchers to rapidly create many copies of a desired stretch of DNA. PCR is currently used in disease screening, forensic testing, and biological research, and represents a valuable platform for students to explore STEM concepts. Edvotek® has developed a wide variety of PCR experiments and equipment, including the EdvoCycler™ and MegaCycler™ PCR machines.

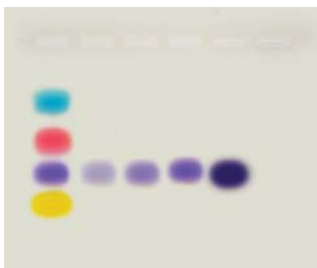


**Cat. 541 & 542**  
**EdvoCycler™ and MegaCycler™**

The EdvoCycler™ and MegaCycler™ are affordable, stand alone PCR machines. Each machine arrives ready-to-use, and comes pre-programmed with all EDVOTEK PCR protocols, with space for you to make your own!

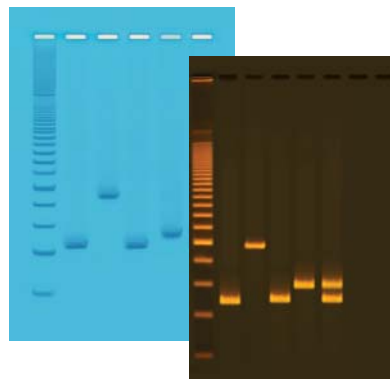


Research supported in part by NIH SBIR NCCR Grant #R44RR18670



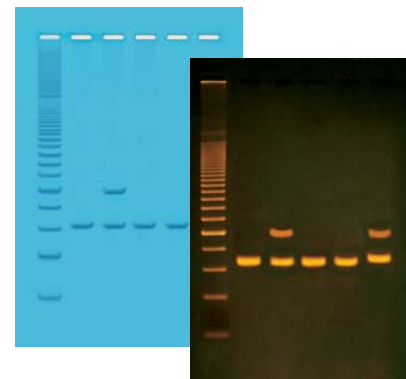
**Cat. S-48**  
**What is PCR?**

Students will be introduced to PCR with this easy to use kit. This experiment introduces the fundamental principles of PCR without the need for a thermocycler or staining!



**Cat. 953**  
**Multiplex PCR-based Testing of Water Contaminants**

PCR is commonly used to test drinking water for contamination. In this classroom-safe experiment, students will test for the presence of three organisms in a water sample using PCR.



**Cat. 333**  
**Alu-Human DNA Typing**

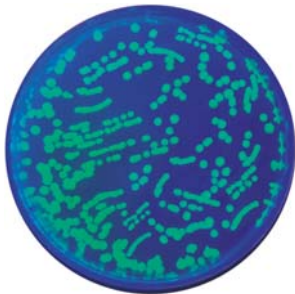
Students use with their own DNA to look for a 300 base pair Alu insertion in chromosome 16, allowing them to determine their genotype!

# Genetic Engineering



Genetically modified plants and bacteria are an important cornerstone of modern biology. Scientists can insert desired genes into bacteria, resulting in changes to behavior or the production of proteins. We provide a number of safe and fun experiments that allow students to explore this exciting aspect of biotechnology.

## Bacterial Transformation



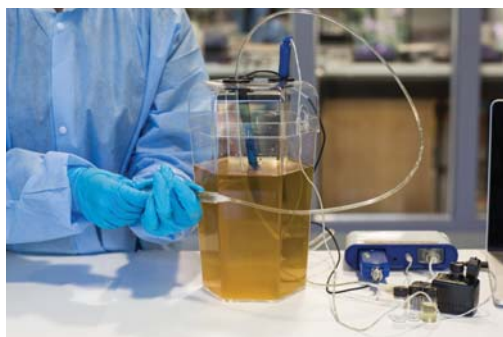
**Cat. 223**  
**Transformation of *E.coli* with Green Fluorescent Protein**

Green Fluorescent Protein (GFP), a bioluminescence protein identified in the *Aequorea victoria* jellyfish, will be transformed into *E.coli* bacteria. The resulting bacterial colonies will show a bright green fluorescence under UV light!



**Cat. 969**  
**Long Wave UV Light**

A hand-held UV light that is useful for observing fluorescence from Green (GFP) and Blue (BFP) fluorescent proteins.



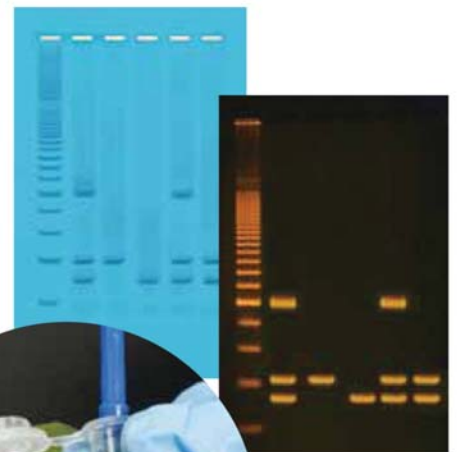
**Cat. 304**  
**Biofuel From Alcohol Fermentation**

Ethanol fermentation is a common biological process widely used in industry for its diverse applications. In this kit, *Saccharomyces cerevisiae* is used to break down sugar into ethanol. Great STEM activity for students!



**Cat. 962**  
**Identification of Genetically Modified Organisms**

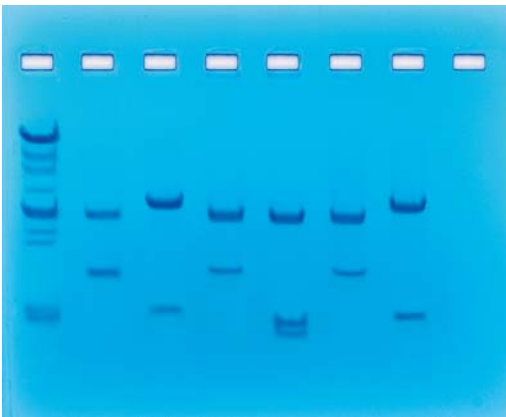
Many foods contain raw materials from genetically modified organisms (GMO). In this experiment, your students will extract DNA from food or plant material and perform PCR and gel electrophoresis to determine if any GM indicator genes are present.



# Forensic Analysis



Modern forensic scientists utilize state-of-the-art techniques to solve crimes. Using DNA fingerprinting and blood-type analysis, students will be tasked with solving crimes, while giving them an opportunity to explore exciting biotechnology concepts.



## Cat. 5-91 Whose Fingerprints Were Left Behind?

Even in this age of DNA, fingerprints and blood stains are important for helping to identify a criminal. Students will solve a crime by dusting for fingerprints and will use fluorescent dust to search for and identify trace amounts of blood.



## Cat. 225 DNA Fingerprinting Using Restriction Enzymes

DNA fingerprinting is featured in the Ready-to-load lab that compares crime scene DNA with suspect DNA. DNA fingerprint patterns are separated by agarose gel electrophoresis and the students determine who maybe have done-it!



## Edvotek® Variable Micropipets

Our Variable Micropipets can dispense volumes ranging from 0.1 to 5000  $\mu$ l. They are easy to use, highly accurate and use standard micropipet tips. The volume is easily selected by twisting the top.



## Cat. 140 Blood Typing

ABO and Rh typing of blood left at the scene of a crime can help to identify suspects. In this experiment your students will use agglutination to identify the blood group of unknown blood samples as a step to identify a criminal.

# Experimenting with Proteins

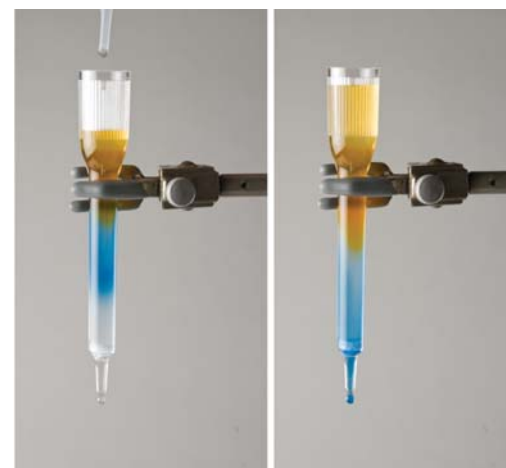


The study of proteins and their function is essential if we are to understand cellular behavior. Thus, it is important that scientists are able to rapidly detect and purify proteins for complex biological solutions. In addition, protein-based technologies are an essential component of modern disease: proteins are routinely purified for use in therapeutics, and the measurement of protein levels is vital for medical diagnostics and personalized therapy.



**Cat. 581**  
**MV10 Vertical Protein Electrophoresis Apparatus**

Designed for separation of proteins on polyacrylamide gels. The MV10 allows you to run one vertical polyacrylamide gel. All parts are color coded to ensure proper orientation.



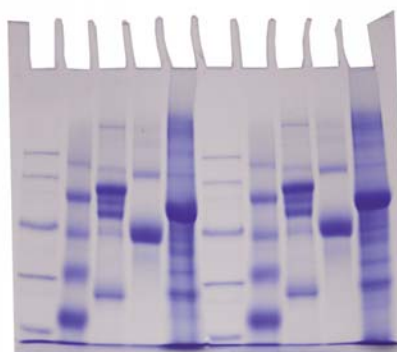
**Cat. 108**  
**Principles of Gel Filtration Chromatography**

Introduce gel chromatography to your class and demonstrate how dyes of different colors separate on the basis of their size and shape.



**Cat. 267**  
**Single Antibody ELISA**

Teach your students the ELISA technique in less than half the time of traditional ELISAs! This experiment eliminates the need for the primary and secondary antibody normally needed because the detection antibody has an enzyme linked to it directly.



**Cat. 150**  
**Survey of Protein Diversity**

Learn about the diversity of proteins by studying the electrophoretic profiles of various sources. Your students will separate proteins from bacterial, plant, serum, and milk proteins.



# What are LabStations™?



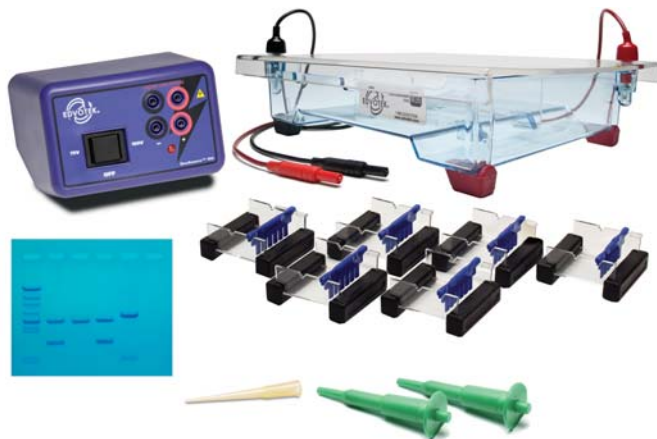
Our comprehensive LabStation™ packages contain pre-selected equipment to offer you the maximum value. We offer LabStations™ in a variety of sizes to fit all classroom sizes and budgets.

We can also provide you with **CUSTOM** LabStations™ to suit your individual need!

## Cat. 5067 Classroom PCR LabStation™ Supports up to 25 Students

### Includes:

- 6 Cat. #502  
M12 Electrophoresis Apparatus  
(7 x 14 cm Tray)
- 3 Cat. #509  
DuoSource™ 150  
(75/150 V, for 1 or 2 units)
- 6 Cat. #590  
Variable MicroPipet (5 - 50 µl)
- 2 Cat. #534  
Piccolo® Microcentrifuge
- 1 Cat. #541  
EdvoCycler™ (25 x 0.2 ml)
- 1 Cat. #558  
Midrange UV Transilluminator  
7.5 x 7.5 cm filter)
- 1 Cat. #539  
Edvotek® 1.8 L Waterbath



## Cat. 5062 Classroom DNA Electrophoresis LabStation™ Supports up to 24 Students

### Includes:

- 1 Cat. #515 M36 HexaGel™ Electrophoresis Apparatus  
(Six 7 x 7 cm Trays)
- 1 Cat. #509 DuoSource™ 150  
(75/150 V for 1 or 2 units)
- 2 Cat. #588 Fixed Volume MiniPipet (40 µl)
- 1 Cat. #636 Yellow Micropipet Tips  
(1 - 200 µl / 2 Racks of 96)
- 1 Cat. #130 DNA Fingerprinting Classroom Kit