Discovering DNA

EXCITE | EXPLORE | ENGAGE

Resource Guide

2009–2010

EDVOTEK®

THE BIOTECHNOLOGY EDUCATION COMPANY®

Cutting-edge experiments without the pain!

Our Philosophy

Teaching should always be fun
Learning should always be enjoyable

Experiments should always work
Preparation should always be easy

Science shouldn't be expensive
The environment shouldn't suffer

Lessons should always be relevant
Science should never be called boring

DNA is nothing to be scared of
Science is a way of life

This catalogue is printed on paper from sustainable sources.

Contents

EDVOTEK®

Quantity of lab groups per kit · Time required · Product order number · Related products

Science Education that Doesn't Cost the Earth

what have we done so far?

- Redesigned our Resource Guide to reduce the number of pages by a third. This saves a huge amount of paper!
- The reduced weight of our Resource Guide means less energy was used to transport this copy to you.
- We chose wood-free or near wood-free paper for the Resource Guide.
- We've simplified our supply chain so we send more direct shipments to our customers. This will greatly improve our service and help the environment.
- We use recycled card in our kit box outer packaging.
- We encourage people to carpool or bicycle to work. Several of our employees telecommute.
- We recycle our toner cartridges – simple and easy yet effective.
- We recycle all of our paper. Even our shredded paper gets reused as bedding for Edvotek Europe's pet rabbits Chloë and Isobel before being composted!

what will we do next?

- Review our carbon footprint so we can reduce our emissions.
- Reduce our use of plastics & non-recyclable packaging and materials in our kits.
- Install eco-friendly lighting throughout our offices and manufacturing plants.
- Plant trees and take part in projects that enable us to offset our carbon emissions.
- Provide our instruction manuals online so less paper is used.
- Use recycled paper or wood-free paper throughout our business.

We don't promise to be perfect yet but during the next 5 years we will do our best to become even more eco friendly.

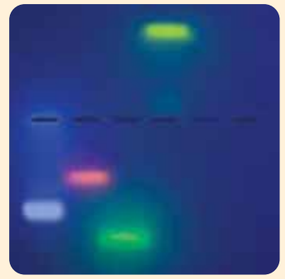
We feel that it is through small changes by many rather than grand actions by a few that will make the difference.

EDVOTEK®

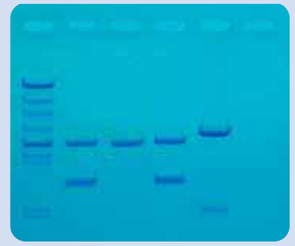
Over 20 years of Biotechnolgy Education Since 1987

What's New?

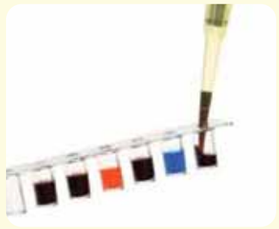
Edvotek WaterBaths are newly designed & **digital!**



Case of the Invisible Bands!
See Cat No S-52 on page 14.

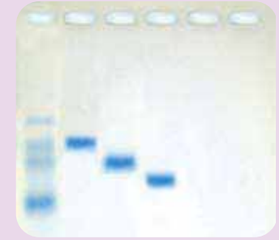


New Ready-to-Load Section! Discover how easy DNA electrophoresis can be!



QuickStrips™ samples are pre-aliquotted for you. Simply hand a strip of samples to your students!

EdvoCycler™ – our **affordable** PCR machine. Fast and easy to use, comes pre-programmed for all Edvotek kits. And it's **purple**!



New Protein & Enzymes Section! Explore the amazing world of proteins!

Coming Soon!

Rainbow Protein Marker - Yields a different color band for each protein standard.

The **DuoSource™ & EVT 300** power sources are newly designed. See our equipment section for more information!

Coming Soon!

GreenFlash™ Stain Ultra-sensitive stain without the safety concerns. A great alternative to Ethidium Bromide.

EDVOTEK® The Biotechnology Education Company®

SECTION ONE

1 Introduction to DNA

We have discovered the secret of life!

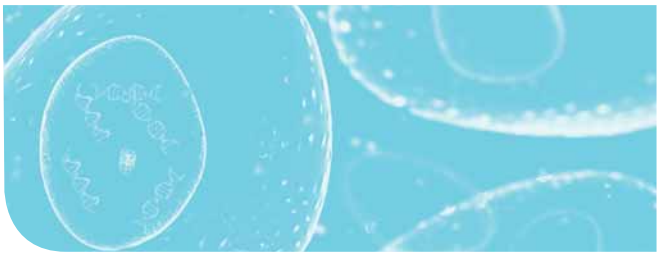
FRANCIS CRICK, AT THE EAGLE PUB, CAMBRIDGE, 28TH FEBRUARY 1953

In The Beginning...

The starting point for every molecular biology experiment is the extraction of DNA.

This was as true of Watson and Crick's unravelling of the DNA double helix structure as it was of the much more recent Human Genome Project. It is still true of present day DNA research and key to DNA fingerprinting, genetic testing and genetic engineering. Thus, it is important for students to understand how this fundamental technique is carried out.

It is also amazing to see DNA for the first time! Your students will enjoy extracting DNA from fruit and vegetables. However it's even more exciting for your students to see their own DNA as they can with our Genes in a Tube Kit.



As importantly as understanding the technique, students will see that DNA is a long, thread-like molecule. This will also help to demystify DNA for students, in contrast to its mythical portrayal in the media.

However, DNA extraction was just the beginning. Through understanding its structure, the genetic code was revealed and this led to our more complete understanding of transcription and translation today.

To help your students understand the molecular nature of life, our Genes of Fortune and Genetic Dice games explain the genetic code. To enhance these concepts further, your students can use our colourful models of DNA, RNA and protein synthesis.

We hope you enjoy helping your students discover the secret of life for themselves!

The Basics

What Does DNA Look Like?

BEST SELLER

This fun and easy lab activity shows your students what real chromosomal DNA looks like and allows them to explore the procedures involved in DNA extraction. Just overlay with 95% ethanol or isopropyl alcohol and spool the DNA on the glass rod!

For 10 Lab Groups
Complete in 30 minutes
Cat No S-10

Kit includes: instructions, DNA extraction buffer, DNA sample in capped test tube, transfer pipettes, minilinks, glass rod, DNA spooling rods, test tubes, salt.

How Do You Clone A Gene?

In this kit, a set of multi-coloured links demonstrate a variety of molecular biology simulations. Students learn about digesting DNA with restriction enzymes, cloning genes in plasmids, protein structure and more!

For 10 Lab Groups
Complete in 30 minutes
Cat No S-20

Kit includes: instructions, molecular biology models, small plastic bags.

What is Osmosis? NEW

Your students will be able to see and understand the principles of osmosis for themselves! Using dialysis tubing, various salt concentrations, and dyes of different molecular weights you can visually show osmosis in action.

For 10 Lab Groups
Complete in 45 minutes
Cat No S-74

Kit includes: instructions, high & low molecular weight dyes, dialysis tubing, transfer pipettes.

You need: 300-400 ml beakers, table salt, apple and beetroot juice, distilled water.

Genes in a Tube™ NEW

Teach your students how to extract and precipitate their own DNA in this exciting and easy activity. Students can transfer their DNA to a tube that can be used as a pendant on a necklace! All you need is ice cold alcohol (95% ethanol or isopropyl alcohol) and a 56°C waterbath.

For 25 students + One for you!

Complete in 30 minutes

Cat No 119

Kit includes: instructions, lysis buffer, NaCl solution, Protease, Tris buffer, Methylene Blue Plus solution, microcentrifuge tubes, sterile cotton tipped applicators, transfer pipettes, tubes for DNA precipitation, Gene Tubes, and string.

Do Onions, Strawberries and Bananas Have DNA?

Your students can construct DNA models and then extract DNA from onions, strawberries or bananas. You provide the fruit or vegetables and 95-100% isopropyl alcohol, your students extract DNA.

For 10 Lab Groups

Complete in 30 minutes

Cat No S-75

Kit includes: instructions, DNA extraction buffer, DNA sample in capped test tube, transfer pipettes, pop beads, glass rod, DNA spooling rods, test tubes, salt.

Principles of DNA Sequencing

DNA sequencing is used to determine the primary structure of DNA. This experiment is a dry lab that explains DNA sequencing and analysis. Actual autoradiograms from DNA sequencing experiments are provided for identification of mutated nucleotides.

For 6 Lab Groups

Complete in 20-30 min.

Cat No 106

Kit includes: instructions, 6 autoradiograms

You need: white light visualization system

Perfect Partner

White Light Box

Great for viewing gels! See page 88 for full details.

Cat No 552

The Basics

Classroom Molecular Biology Toys and Games

BEST SELLER

Gene of Fortune™
This novel "Bingo" game is an excellent resource to introduce concepts of the genetic code. The games can be played over several lessons. Concepts reinforced include the genetic code, single and three letter amino acid abbreviations, and the characteristics of amino acids. The game includes the Gene of Fortune Spinner, 10 different cards, game chips, and instruction manual.

Genetic Dice™
Using Genetic Dice, students will have fun while they learn about DNA. This resource utilizes a set of game boards, genetic dice, and game chips to reinforce concepts centering on Watson-Crick DNA base pair rules.

Cat No S-80

Watson & Crick Bobble Heads

Entertain your class and colleagues with these Bobble Heads of Nobel Prize winners James Watson and Francis Crick who were two of the discoverers of the DNA double helix. Would look good on a desk, in the prep room or even as a class prize?

Cat No 9001 Watson Bobble Head
Cat No 9002 Crick Bobble Head
Cat No 9003 Both Bobble Heads

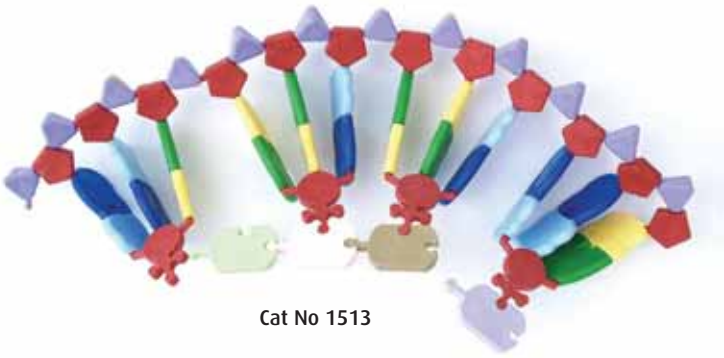
Cat No 1511

DNA Models

BEST SELLER

Your students can build a model of DNA with this simple and colourful system. The parts are colour-coded to represent the purines, pyrimidines, deoxyribose and phosphate groups that make up the double helix of DNA. This kit includes differently sized purines and pyrimidines, the correct number of hydrogen bonds and the minor and major grooves are shown. Ideal for modelling DNA replication. Use together with the RNA Protein Synthesis Kit to model translation and transcription.

Cat No 1511 12 Layer Kit
Cat No 1512 22 Layer Kit
Cat No 1513 RNA Protein Synthesis Kit



Cat No 1513

Coloured Beads

A set of coloured beads that can be designated to represent the Watson-Crick DNA bases (A, T, G, C). The beads can be used in a variety of ways to demonstrate concepts related to the structure and biology of DNA. Includes detailed outline of various sample demonstrations. Includes 150 beads of each colour.

Cat No 1500

EDVO-Links™

Set of 2 multi-coloured links excellent for demonstrating various molecular biology concepts.

Cat No 1504

SECTION TWO

2 Discovering DNA Electrophoresis

...although the work we did was often tedious and sometimes frustrating, it was generally great fun and a deep pleasure and joy to get an understanding to what seemed initially to be a great mystery.

CHRISTIANE NÜSSLEIN-VOLHARD, NOBEL PRIZE FOR FRUITFLY GENETICS

DNA Electrophoresis Made Easy

DNA electrophoresis is an easy, fun, exciting and safe activity to perform in the classroom. It is a widely used technique that is carried out in DNA fingerprinting, paternity testing, genetic testing and genetic engineering. For example, DNA electrophoresis was used to prove that Dolly the sheep was the world's first cloned mammal from an adult.

You can bring a wide variety of exciting classroom activities into your lessons with our electrophoresis kits. We save you time by providing complete scenarios that can be used with ANY age group!

See page 15
For an explanation of what you need to get started.

Using colourful dyes makes the results easy to understand and no staining is needed. For electrophoresis using real DNA, check out our Ready-to-Load Electrophoresis kits, or our DNA Extraction and Analysis kits.

Our classroom gel electrophoresis system enables you to simply and affordably introduce DNA electrophoresis into your lessons. All you need is an electrophoresis tank, power supply and one of our electrophoresis kits to get started!

We think you'll be amazed at how easy classroom electrophoresis can be!

What Are QuickStrips™?

An EDVOTEK Exclusive!

Spending a lot of time preparing for your classes?

QuickStrips provide each student group with what they need.

No need for any preparation. The mini-tubes have a foil cover that is easily punctured with a pipette tip!

Provided in all 100 series kits at no additional cost!

DISCOVERING DNA ELECTROPHORESIS

Simulations of DNA Electrophoresis

Whose DNA Was Left Behind?

BEST SELLER READY TO LOAD

DNA obtained from a single hair left behind at a crime scene can be used to identify a criminal. In this experiment, students will compare simulated crime scene DNA with that of two suspects.

- For 10 Lab Groups
- Complete in 45 minutes
- Cat No S-51

Kit includes: instructions, Ready-to-Load dye sample, agarose powder, practice gel loading solution, electrophoresis buffer, microtipped transfer pipettes.

All you need: electrophoresis tank and power supply.

In Search of My Father

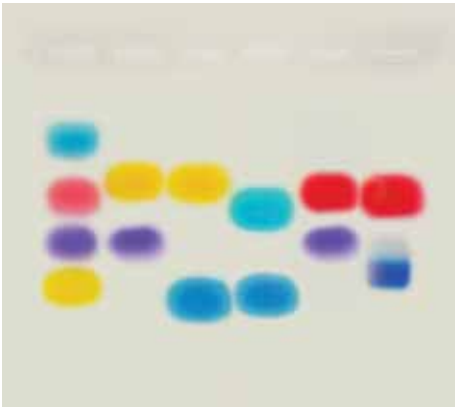
READY TO LOAD

Solve the mystery of two boys separated from their parents a decade ago. Their biological mother is identified by mitochondrial DNA and their biological father from chromosomal DNA.

- For 10 Lab Groups
- Complete in 45 minutes
- Cat No S-49

Kit includes: instructions, Ready-to-Load dye samples, agarose powder, practice gel loading solution, buffer, microtipped transfer pipettes.

All you need: electrophoresis tank and power supply.



Why Do People Look Different?

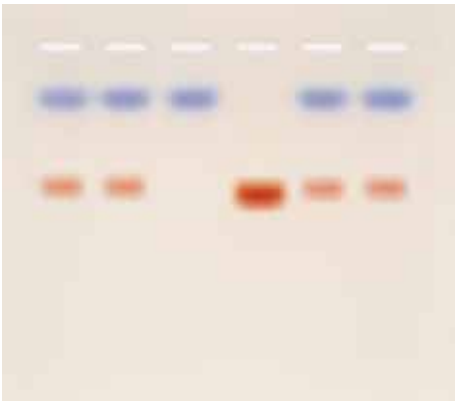
BEST SELLER READY TO LOAD

Teach your students how people's physical traits are a reflection of their genes. In this simulation your students will use electrophoresis to separate dyes which represent genetic traits.

- For 10 Lab Groups
- Complete in 45 minutes
- Cat No S-50

Kit includes: instructions, Ready-to-Load dye samples, agarose powder, practice gel loading solution, buffer, microtipped transfer pipettes.

All you need: electrophoresis tank and power supply.



Micropipetting Basics

BEST SELLER

Teach your students how to use a micropipette with ease and accuracy with multi-coloured dyes. A fun and cost effective way to learn this important skill.

For 10 Lab Groups
Complete in 45 minutes
Cat No S-44

Kit includes: instructions, various coloured dye samples and a Pipette Card.

All you need: 5-50 µl adjustable or 10 µl fixed micropipette and tips.

Perfect Partners

Edvotek Variable Micropipette

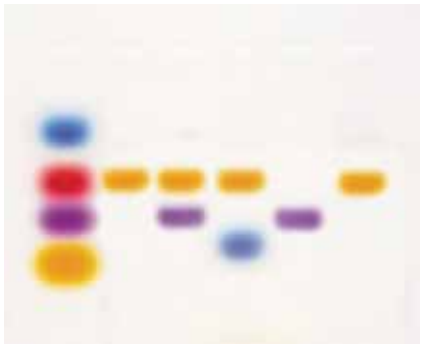
Sturdily designed, easy to use, & highly accurate! 5 - 50 µl Micropipette.

Cat No 590

10 µl Fixed Volume Minipipette

No need to calibrate. Impossible to measure the wrong volume!

Cat No 586



What Size Are Your Genes?

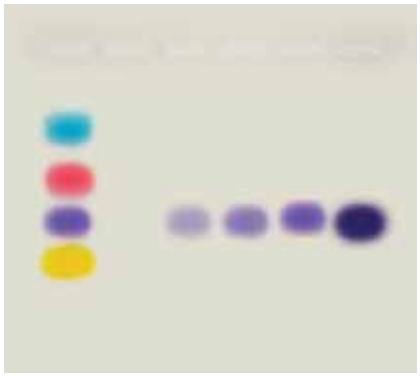
READY TO LOAD

Teach your students how agarose acts as a molecular sieve during electrophoresis to separate different sized pieces of DNA quickly and simply using brightly coloured dyes.

For 10 Lab Groups
Complete in 45 minutes
Cat No S-45

Kit includes: instructions, Ready-to-Load dye samples, agarose powder, practice gel loading solution, electrophoresis buffer, microtipped transfer pipettes.

All you need: electrophoresis tank and power supply.



What Is PCR & How Does It Work?

READY TO LOAD

This simulation experiment demonstrated the process of DNA amplification by PCR and how the amplified product is detected by separating the reaction mixture by agarose gel electrophoresis.

For 10 Lab Groups
Complete in 45 minutes
Cat No S-48

Kit includes: instructions, Ready-to-Load dye samples, agarose powder, practice gel loading solution, electrophoresis buffer, microtipped transfer pipettes.

All you need: electrophoresis tank and power supply.

Principles & Practice of Agarose Gel Electrophoresis

BEST SELLER READY TO LOAD

Show your class that electrophoresis separates molecules on the basis of size and charge. A safe, colourful, fast and simple way to teach the technique which will engage your students.

For 6 Lab Groups
Complete in 45 minutes
Cat No 101

Kit includes: instructions, Ready-to-Load dye samples, agarose powder, practice gel loading solution, electrophoresis buffer, microtipped transfer pipettes.

All you need: electrophoresis tank and power supply.

ALSO Available - Dye Samples Only
Cat No 101-B 12 Gels
Cat No 101-C 24 Gels

The Mystery of the Crooked Cell

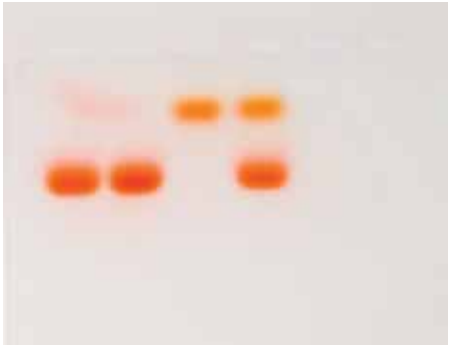
NEW READY TO LOAD

This simple experiment demonstrates detection of the mutation that causes Sickle Cell Anemia. In this simulation, your students will use electrophoresis to separate dyes that represent patient samples and controls.

For 10 Lab Groups
Complete in 45 minutes
Cat No S-53

Kit includes: instructions, Ready-to-Load dye samples, agarose powder, practice gel loading solution, electrophoresis buffer, microtipped transfer pipettes.

All you need: electrophoresis tank and power supply.



The Case of the Invisible Bands

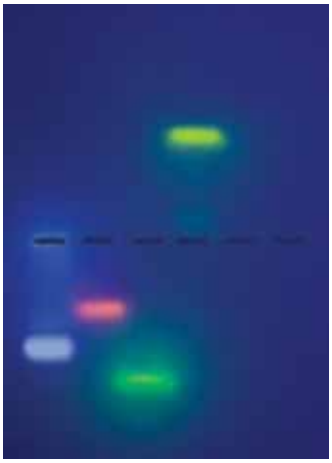
NEW READY TO LOAD

Solve the mystery of the invisible bands. Bring the excitement of fluorescence to your electrophoresis with this innovative and exciting experiment.

For 10 Lab Groups
Complete in 45 minutes
Cat No S-52

Kit includes: instructions, Ready-to-Load dye samples, agarose powder, practice gel loading solution, electrophoresis buffer, microtipped transfer pipettes.

All you need: electrophoresis tank, power supply, and black light (Cat No 969 recommended).



Perfect Partner

Long Wave UV Mini Lamp

A safe, long-wave UV lamp to view fluorescence.

Cat No 969

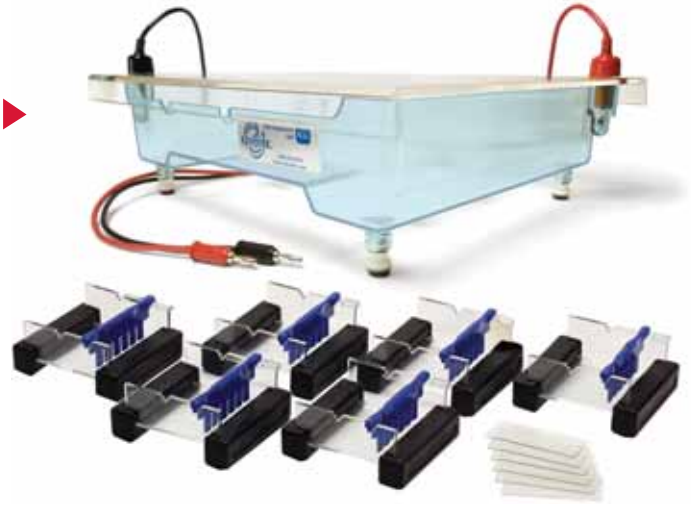
What Equipment Do I Need?

All you need to carry out any these dye experiments is an electrophoresis tank, power supply and pipettes.

HexaGel DNA Electrophoresis Tank

Easily run an entire class of samples in one go! Separates six groups of student samples in just 30-40 minutes. The gel tank is very easy to use. Excellent results every time!

Cat No 515



DuoSource Power Supply

Produce excellent results from your dye & DNA electrophoresis experiments quickly and easily. Run samples in just 40 minutes!

Cat No 507

Fixed Volume MiniPipettes

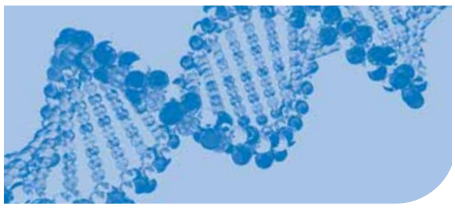
Our MiniPipettes are precise and cost-effective. They use standard disposable micropipette tips. Other sizes are available.

Cat No 588 40 µl

See our EQUIPMENT section on page 72 for our full range of electrophoresis and power supplies.

SECTION THREE

3 DNA Electrophoresis "Ready-to-Load"



Any sufficiently advanced technology is indistinguishable from magic.

SIR ARTHUR C. CLARKE, SCIENCE-FICTION AUTHOR, INVENTOR, AND FUTURIST.

What is Ready-to-Load™?

Take a step up from dye electrophoresis with our simple Ready to Load kits!

"Ready-to-load" means samples are prepared for your students to load directly onto the gel. A variety of topics are covered including DNA fingerprinting, PCR and genetic testing. The difference between these kits and our dye simulation kits is that you use real DNA so the gels must be stained to see the result. However, our easy to use InstaStain cards make this simple to do. The whole experiment takes around 50 minutes to complete.

All Ready-to-Load kits include:

instructions, DNA samples, agarose, running buffer, InstaStain DNA stain, practice gel loading solution, 1 ml calibrated drop pipette, 100 ml graduated cylinder and microtipped transfer pipettes.

All you need for Ready-to-Load kits:

electrophoresis tank, power supply, micropipettes (5-50 µl adjustable or 40 µl fixed volume) and a white light box is recommended (see page 88).

What Is InstaStain™?

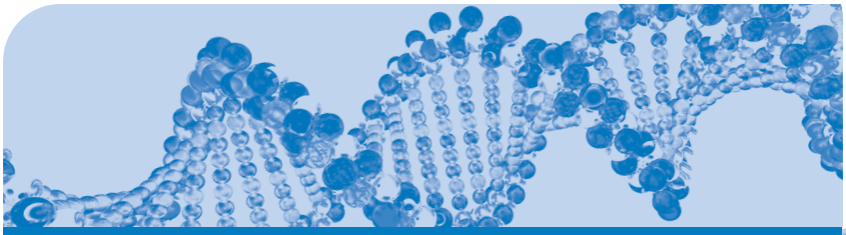
Our InstaStain sheets stain agarose gels in minutes!

InstaStain sheets produce high quality, uniform gel staining with excellent results.

Save time and minimize chemical waste with InstaStain.

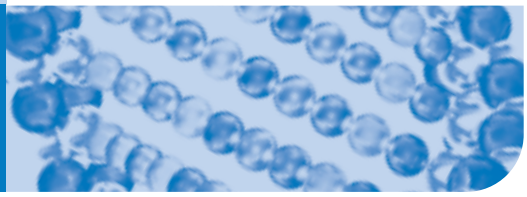
Replaces messy liquid Methylene Blue stain.

Provided in all EDVOTEK Ready-to-Load kits at no additional cost!



DISCOVERING DNA ELECTROPHORESIS

Ready-to-Load™ DNA Electrophoresis



Restriction Enzyme Cleavage Patterns of DNA

NEW READY TO LOAD

Plasmid and lambda DNA are pre-digested with restriction enzymes endonucleases that recognize and cut double-stranded DNA within or near defined base sequences. Digests are separated by agarose gel electrophoresis.

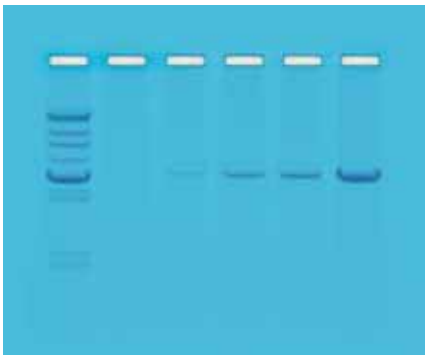
For 6 Lab Groups

Cat No 102	6 gels
Cat No 102-B	12 gels (DNA samples only)
Cat No 102-C	24 gels (DNA samples only)

PCR - Polymerase Chain Reaction

READY TO LOAD

This experiment introduces students to the principles and applications of the Polymerase Chain Reaction (PCR). This simulation experiment does not contain human DNA and does not require a thermal cycler.



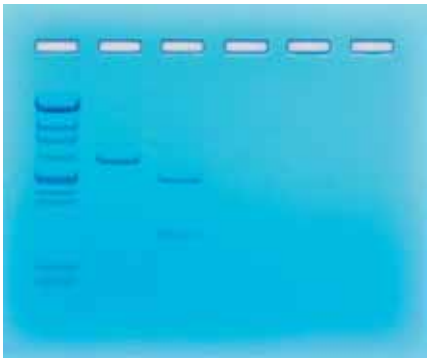
For 6 Lab Groups

Cat No 103	6 gels
Cat No 103-B	12 gels (DNA samples only)
Cat No 103-C	24 gels (DNA samples only)

Size Determination of DNA Restriction Fragments

NEW READY TO LOAD

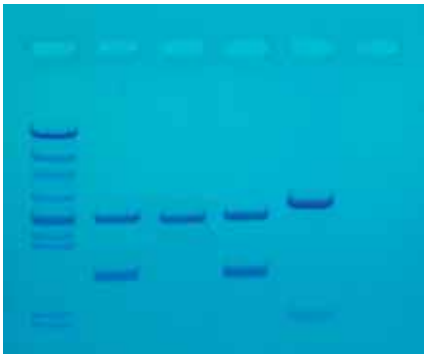
DNA sizing is an excellent tool used in many biotech applications, such as DNA mapping and forensic science. Your students will separate DNAs on agarose gels and learn how to use a standard curve to determine the sizes of unknown fragments.



For 6 Lab Groups

Cat No 104	6 gels
Cat No 104-B	12 gels (DNA samples only)
Cat No 104-C	24 gels (DNA samples only)

See page 17 for details of what comes in Ready-to-Load kits.



DNA Fingerprinting - Made Simple

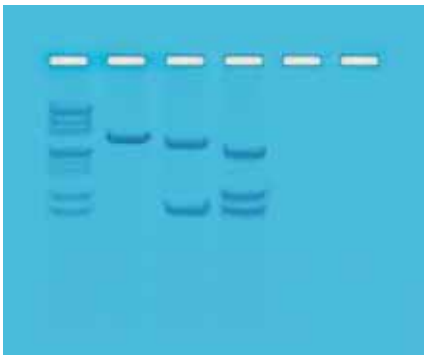
BEST SELLER

READY TO LOAD

Your students will solve a crime using real DNA! This Ready-to-Load kit means you can quickly teach DNA fingerprinting in your class and show your students how DNA evidence is used in modern forensics. This experiment allows for varied results depending on the selection of DNA fingerprinting patterns.

For 6 Lab Groups

Cat No 130 6 gels
Cat No 130-B 12 gels (DNA samples only)
Cat No 130-C 24 gels (DNA samples only)



Mapping of Restriction Sites on Plasmid DNA

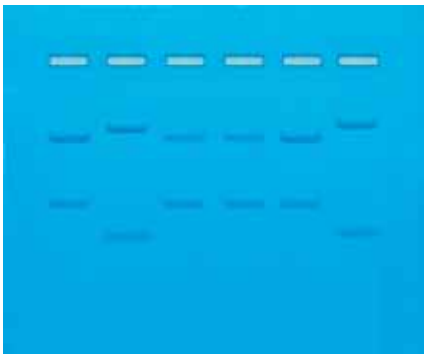
NEW

READY TO LOAD

DNA mapping is a common procedure used to determine the location of genes. In this experiment, DNA markers and pre-digested plasmid DNA fragments are mapped using agarose gel electrophoresis.

For 6 Lab Groups

Cat No 105 6 gels
Cat No 105-B 12 gels (DNA samples only)
Cat No 105-C 24 gels (DNA samples only)



DNA Fingerprinting I: I.D. of DNA by Restriction Fragmentation Patterns

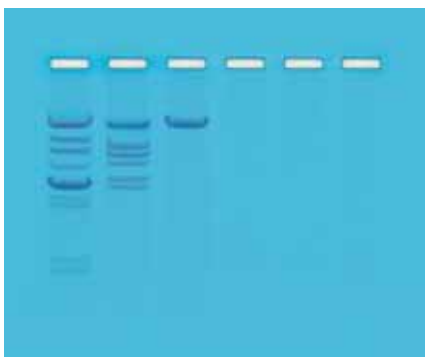
NEW

READY TO LOAD

Basic concepts of DNA fingerprinting are featured in this lab by comparing crime scene DNA with suspect DNAs. Fingerprint patterns are separated by agarose gel electrophoresis and the students determine who may have done-it!

For 6 Lab Groups

Cat No 109 6 gels
Cat No 109-B 12 gels (DNA samples only)
Cat No 109-C 24 gels (DNA samples only)



Analysis of *Eco* RI Cleavage Patterns of Lambda DNA

NEW

READY TO LOAD

Introduce the use of restriction enzymes as a tool to digest lambda DNA at specific nucleotide sequences.

For 6 Lab Groups

Cat No 112 6 gels
Cat No 112-B 12 gels (DNA samples only)
Cat No 112-C 24 gels (DNA samples only)

DNA Paternity Testing

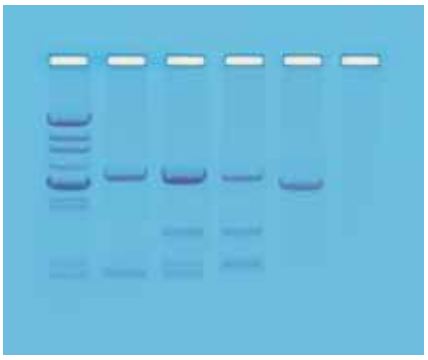
BEST SELLER

READY TO LOAD

This experiment introduces students to the use of DNA finger-printing in a simulated paternity determination. A child's DNA fingerprint is compared with his parents.

For 6 Lab Groups

Cat No 114	6 gels
Cat No 114-B	12 gels (DNA samples only)
Cat No 114-C	24 gels (DNA samples only)



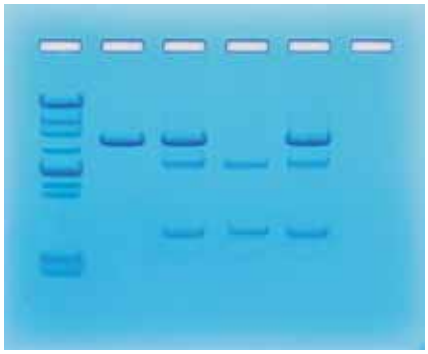
Family Pedigree Cancer Gene Detection

READY TO LOAD

In this experiment, students determine a pedigree for a family thought to be carriers of a mutation in their p53 genes. This is followed by a diagnostic agarose gel analysis to diagnose the state of the p53 gene in individual family members.

For 6 Lab Groups

Cat No 115	6 gels
Cat No 115-B	12 gels (DNA samples only)
Cat No 115-C	24 gels (DNA samples only)



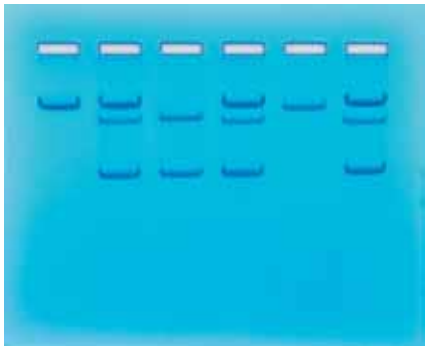
Genetic Disease Screening (DNA-based)

READY TO LOAD

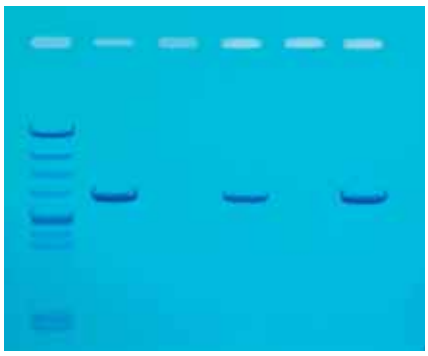
Genetic tests are becoming more commonplace than ever. This kit shows how a restriction enzyme can be used to screen DNA for Sickle Cell Anemia.

For 6 Lab Groups

Cat No 116	6 gels
Cat No 116-B	12 gels (DNA samples only)
Cat No 116-C	24 gels (DNA samples only)



See page 17 for details of what comes in Ready-to-Load kits.



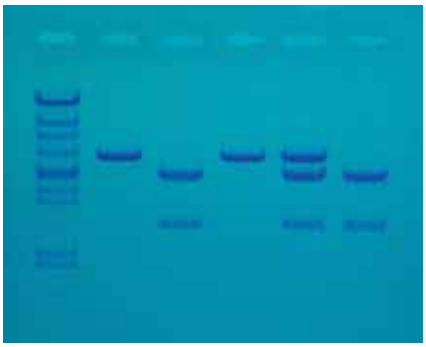
Detection of Mad Cow Disease

NEW READY TO LOAD

Bovine spongiform encephalopathy (BSE), better known as mad cow disease, is a neurodegenerative, fatal condition in cattle. Consuming BSE-infected beef is believed to be the cause of a similar condition in humans, Creutzfeldt-Jakob disease. In this experiment, students examine simulated PCR products from several feed mills, to determine any possible violations of the ban on including animal parts in cattle feed.

For 6 Lab Groups

Cat No 117	6 gels
Cat No 117-B	12 gels (DNA samples only)
Cat No 117-C	24 gels (DNA samples only)



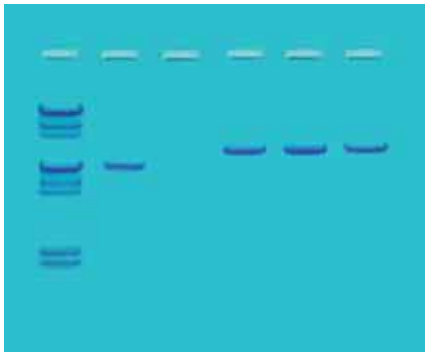
Cholesterol Diagnostics

READY TO LOAD

Genetic testing can be used to identify people with a genetic condition which causes them to have an elevated level of cholesterol and which can be fatal. Your students can see how genetic testing is carried out and learn about DNA electrophoresis.

For 6 Lab Groups

Cat No 118	6 gels
Cat No 118-B	12 gels (DNA samples only)
Cat No 118-C	24 gels (DNA samples only)



DNA-Based Screening for Smallpox

NEW READY TO LOAD

This experiment presents a bioterrorism scenario, with students examining a simulated DNA fingerprinting test for the detection of smallpox.

For 6 Lab Groups

Cat No 124	6 gels
Cat No 124-B	12 gels (DNA samples only)
Cat No 124-C	24 gels (DNA samples only)

SECTION FOUR

4 Forensic Science

At first the images looked a complicated mess. Then the penny dropped. We had found a method of DNA-based biological identification.

PROF SIR ALEC JEFFREYS, INVENTOR OF DNA FINGERPRINTING

Science In The News!

Use forensic science to excite your students about DNA!

Biological evidence left behind at the scene of a crime is essential to identify possible suspects. Traditionally, suspects have been found by matching descriptions about appearance, fingerprints and blood typing, but modern forensics can use DNA from a single hair to identify an individual.

When Alec Jeffreys first announced his discovery that DNA fingerprints could be used to identify individuals, the news media became fascinated by DNA. Since that announcement in 1985, DNA has been used in solving immigration cases, and of course in forensics. It should be remembered that DNA fingerprinting is not only used as evidence to convict criminals, but also to exonerate the innocent.

Now DNA analysis is mentioned daily on television crime programmes and in the news.

Give your students the opportunity to learn about DNA in the exciting context of forensics. Your students will enjoy solving a mystery through actual fingerprinting, blood typing simulated blood, and DNA Fingerprinting with dyes or real DNA.

Furthermore, your students can learn to compare "crime scene" DNA with "suspect" DNA in three different ways; with our DNA Fingerprinting-Made Simple Kit, DNA Fingerprinting - Using Restriction Enzymes Kit and our DNA Finger-printing - Using PCR Kit.

Bring the exciting world of modern forensics into your classroom!

"It is well known in teaching that students learn best by doing, less well by seeing and even less by hearing. In my experience they also learn best when they are interested, active and enjoying themselves. Hands on biotechnology has all of those essential elements. It grabs their interest because they can relate it to issues they hear about. It keeps them active because there are unusual pieces of equipment and new techniques to master. It is enjoyable because it is surprising and new."

Zoe Manning
Biology Teacher, Strode College

FORENSIC SCIENCE

Crime Solving & DNA Fingerprinting

Whose Fingerprints Were Left Behind?

Evidence left behind at a crime scene can identify a potential culprit. Even in this age of DNA, fingerprints and blood stains are still important at helping to identify a criminal. In this experiment, your students will solve a crime by dusting for fingerprints and use fluorescent dust to search for and identify trace amounts of blood.

For 10 Lab Groups
Complete in 50 minutes
Cat No S-91

Kit includes: instructions, brushes, magnifying lens, fingerprint cards, black dusting powder, fluorescent green and grey dye dusting powder, fingerprint lifters.

All you need: alcohol and long wave U.V. light.

Perfect Partner:

Long Wave UV Lamp

Cat No 969

Blood Typing

ABO and Rh typing of blood left at the scene of a crime can help to narrow down a list of 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.

For 10 Lab Groups
Complete in 45 minutes
Cat No 140

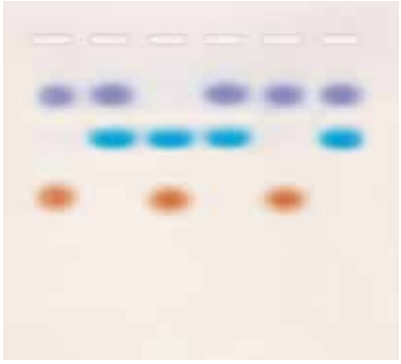
Kit includes: instructions, control ABO Rh simulated blood samples, unknown simulated blood samples, transfer pipettes, microscope slides.

All you need: Microscope with 400x magnification.

Whose DNA Was Left Behind?

READY TO LOAD

BEST SELLER



Incredibly DNA obtained from a single hair left at a crime scene can be used to identify a criminal. Students will use DNA fingerprinting to compare simulated crime scene DNA with that of two suspects and try to catch the criminal!

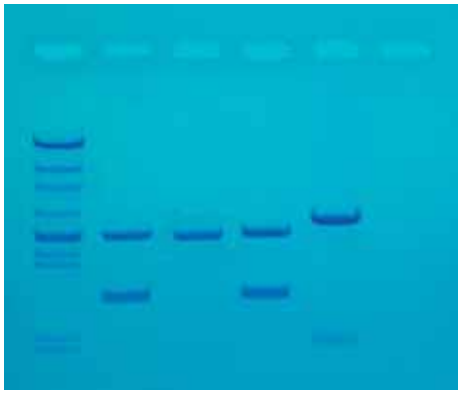
For 10 Lab Groups
Complete in 45 minutes
Cat No S-51

Kit includes: instructions, Ready-to-Load dye samples, agarose powder, practice gel loading solution, electrophoresis buffer, microtipped transfer pipettes.

All you need: electrophoresis tank and power supply.

FORENSIC SCIENCE

Crime Solving & DNA Fingerprinting



DNA Fingerprinting - Made Simple

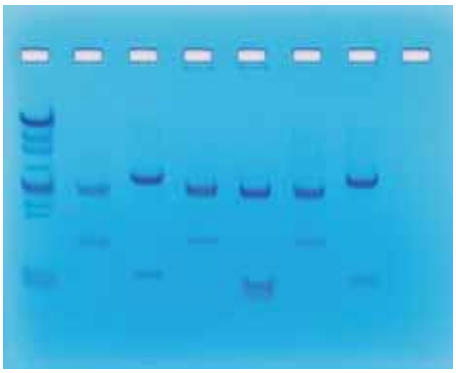
READY TO LOAD

Your students will solve a crime using real DNA! This Ready-to-Load kit means you can quickly teach DNA fingerprinting in your class and show your students how DNA evidence is used in modern forensics. This experiment allows for varied results depending on the selection of DNA fingerprinting patterns.

For 6 Lab Groups
Complete in 50 min.
Cat No 130

Kit includes: instructions, Ready-to-Load DNA samples, agarose powder, practice gel loading solution, electrophoresis buffer, InstaStain Methylene Blue, Methylene Blue Plus liquid stain, and microtipped transfer pipettes.

You need: electrophoresis tank, power supply, automatic micropipet with tips, balance, microwave or hot plate, 65°C waterbath, white light visualization system.



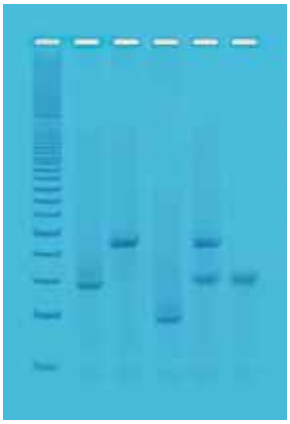
DNA Fingerprinting-Using Restriction Enzymes

Teach your students about restriction enzyme digests in the context of forensic science! Your students will cut DNA with restriction enzymes and then compare the "barcode" pattern of the crime scene DNA versus that of the suspects using DNA electrophoresis.

For 6 Lab Groups
Complete in 90 min.
Cat No 225

Kit includes: instructions, DNA samples, DNA ladder, Dryzymes (*Eco* RI and Hind III), agarose, practice gel loading solution, loading dye, electrophoresis buffer, microtipped transfer pipettes, gel stain.

All you need: micropipettes to measure between 5 & 50 µl (or 5, 10, 15 µl fixed volume minipipets), tips, waterbath, electrophoresis tank and power supply.



DNA Fingerprinting-Using PCR

Give your students the opportunity to carry out PCR in the classroom! This kit provides easy to follow instructions for your students to develop various crime scene scenarios independently. Plasmid DNA is provided that, when amplified by PCR, provides products that represent individual DNA profiles. Your students can then solve a crime!

For 6 Lab Groups
Complete in 2.5 hours
Cat No 371

Kit includes: instructions, PCR beads, DNA template, primers, DNA ladder, ultra pure water, wax beads, agarose, loading dye, electrophoresis buffer, gel stain.

All you need: micropipettes to measure between 5 & 50 µl (or 5, 10, 30, 50 µl fixed volume minipipets), tips, thermal cycler, electrophoresis tank and power supply.

SECTION FIVE

5 Polymerase Chain Reaction (PCR)

My scientific studies have afforded me great gratification; and I am convinced that it will not be long before the whole world acknowledges the results of my work.

GREGOR MENDEL

Nobel Prize Science in Your Classroom!

The invention of the Polymerase Chain Reaction (PCR) radically changed biology. The technique was considered so important that the Nobel Prize was awarded to its inventor, Kary Mullis, in 1993.

Thanks to this technique, very small samples of DNA (from as little as a single cell) can be analyzed. PCR works by making billions of copies of DNA in just a few hours. PCR is now routinely used in forensic investigations, infectious disease testing and screening for genetic disease. Amazingly, without harming it, a single cell can be removed from an 8-cell human embryo to test for many different genetic diseases at once. (Although these types of tests can raise many ethical issues.)

PCR is the systematic copying (or amplifying) of a target sequence of DNA using DNA polymerase from the heat stable bacteria *Thermus aquaticus (Taq*). The target sequence is located in the genome using primers. Primers are short pieces of DNA that are complementary to the ends of the target sequence. The DNA, primers and *Taq* DNA polymerase are mixed together, then cycled through three temperatures. This causes the DNA to be amplified. Originally, this was carried out by painstakingly moving tubes from waterbath to waterbath. Now, this is carried out using a thermal cycler or PCR machine. Following amplification, the DNA is then analyzed using electrophoresis.

See Page 81
for affordable PCR equipment

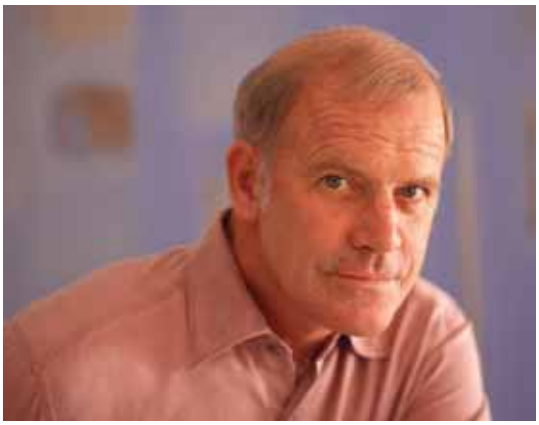
In this section, you will find kits to teach PCR to suit all student abilities and all budgets. With our Ready-to-Load kits, you can demonstrate the concept of PCR without using a thermal cycler! Alternatively, your students can try amplifying their own DNA.

We have developed a purpose built and affordable PCR machine for the classroom, the EdvoCycler. Details of the EdvoCycler can be found in the equipment section. Please see our equipment section for details of all of our electrophoresis equipment, designed to suit any class size.

Give your students the opportunity to perform this Nobel Prize winning technique!

"EUREKA!!!! I stopped the car at mile marker 46,7 on Highway 128. Somehow, I thought, it had to be an illusion. Otherwise it would change DNA chemistry forever. Otherwise it would make me famous. It was too easy. Someone else would have done it and I would surely have heard of it. We would be doing it all the time."

Kary Mullis
Nobel Prize winning inventor
of Polymerase Chain Reaction (PCR)



POLYMERASE CHAIN REACTION

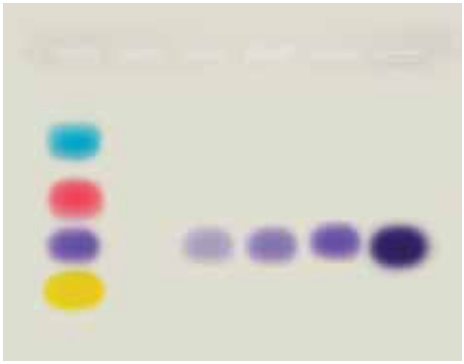
Experimenting with PCR

What is PCR and How Does it Work?

BEST SELLER

READY TO LOAD

Teach your students about PCR without a thermal cycler! Using colourful dyes, your students will see how increasing cycle number produces more DNA for analysis. NO preparation & NO staining!



- For 10 Lab Groups
- Complete in 45 minutes
- **Cat No S-48**

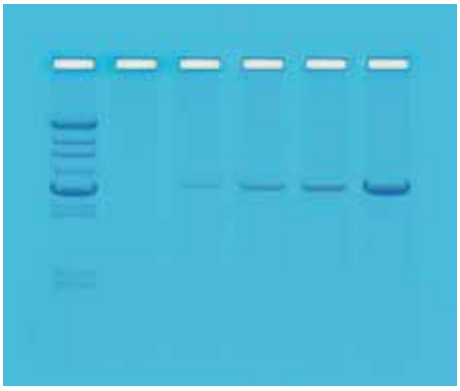
Kit includes: instructions, Ready-to-Load dye samples, agarose powder, practice gel loading solution, electrophoresis buffer, microtipped transfer pipettes.

All you need: electrophoresis tank and power supply.

PCR - Polymerase Chain Reaction

READY TO LOAD

Your students will learn the principles of PCR using real DNA in this Ready-to-Load experiment. Using gel electrophoresis your students will see for themselves that more DNA is produced with every cycle of the reaction. No thermal cycler is required.



- For 6 Lab Groups
- Complete in 45 minutes
- **Cat No 103**

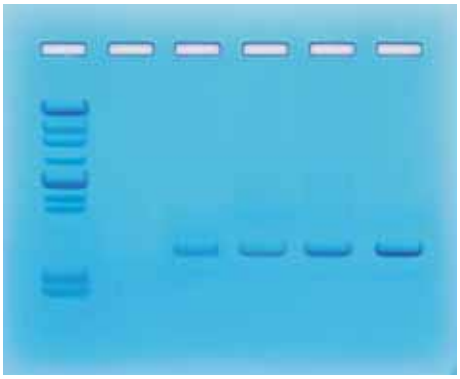
Kit includes: instructions, Ready-to-Load DNA samples, agarose, practice gel loading solution, electrophoresis buffer, microtipped transfer pipettes, gel stain.

All you need: electrophoresis tank and power supply.

Amplification of DNA by PCR

BEST SELLER

In this easy PCR experiment, students will make billions of copies of a small amount of DNA in just 90 minutes! They will just need to mix template DNA & primers with PCR beads that contain all of the other components required to carry out a PCR reaction. Students will see the increasing amounts of DNA for themselves, taking samples every few cycles and analyzing them on a DNA gel.



- For 10 Lab Groups
- PCR 3 hours or overnight Electrophoresis 45 min.
- **Cat No 330**

Kit includes: instructions, PCR beads, DNA template and primers, DNA size ladder, ultrapure water, wax beads, gel loading dye, agarose, electrophoresis buffer, gel stain.

All you need: 5-50 µl adjustable micropipettes, tips, thermal cycler, electrophoresis tank and power supply.

Quick PCR NEW

A real time saver, this experiment uses PCR to amplify a small section of Lambda DNA via a two-step process, saving valuable classroom time and allowing completion of the lab in one session.

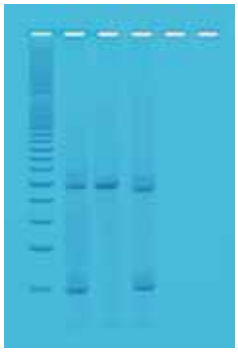
For 10 Lab Groups

Complete in 60 min.

Cat No 372

Kit includes: instructions, PCR beads, DNA template & primers, DNA size ladder, ultrapure water, wax beads, gel loading dye, agarose, electrophoresis buffer, gel stain.

All you need: 5-50 µl adjustable micropipettes, tips, thermal cycler, electrophoresis tank and power supply.



Drosophila Genotyping Using PCR

Students will learn about DNA polymorphisms by amplifying DNA regions that vary between wild & mutant *Drosophila*. Amplified DNA from wild-type and white-eyed flies are separated by agarose gel electrophosesis and analyzed.

For 10 Lab Groups

Set up 30 min.
PCR 2 hours or overnight
Electrophoresis 90 min.

Cat No 337

Kit includes: instructions, PCR beads, primers, DNA extraction buffer, 200 bp ladder, Proteinase K, *Drosophila* (wild type and white eye), agarose, electrophoresis buffer, gel stain.

All you need: thermal cycler, electrophoresis tank and power supply, automatic micropipette with tips, microwave, waterbath, UV transilluminator, microcentrifuge.

Real Time PCR

In Real Time PCR, amplification is monitored while the reaction is ongoing and allows for a quantitative analysis. A fluorescent dye added to the PCR reaction, binds to the DNA as it is being amplified, and the resulting fluorescence is measured during the reaction. In this Real Time PCR experiment, the reaction will be monitored for product throughout the cycling steps without the use of agarose gel electrophoresis.

For 10 Lab Groups

Requires 50 min.

Cat No 370

Kit includes: instructions, PCR beads, DNA template and primers, Ultrapure water, wax beads, ethidium bromide, microtiter plates.

All you need: thermal cycler, automatic micropipette with tips, microcentrifuge, balance, UV transilluminator.

Cloning of a PCR Amplified Gene INCLUDES LYPHOCELLS NEW

Teach your students about cloning with this exciting and exclusive lab! An antibiotic gene is amplified using PCR and then the size is determined by using DNA standard markers and agarose gel electrophoresis. T4 DNA Ligase is used to insert the antibiotic gene into a plasmid vector and the resulting recombinant DNA ("clone") is used to transform *E. coli* LyphoCells. The transformed cells are plated and transformants are counted to determine transformation efficiency.

For 5 Lab Groups

Set up 30 min.
PCR 2 hours or overnight
Electrophoresis 45 min.

Cat No 331

Kit includes: instructions, biologicals, buffers and reagents for PCR, ligation and transformation, ReadyPour Luria Broth agar, DNA size ladder, wax beads, agarose, electrophoresis buffer, gel stain.

All you need: thermal cycler, two waterbaths, incubation oven, electrophoresis tank and power supply, automatic micropipette with tips, UV transilluminator.

POLYMERASE CHAIN REACTION

Human PCR

Mitochondrial DNA Analysis Using PCR

The mitochondria are thought to have evolved from a symbiotic relationship between prokaryotic and eukaryotic cells. Mitochondria have their own DNA and are only inherited via the maternal line. In this experiment, your students will amplify two regions of their mitochondrial DNA.

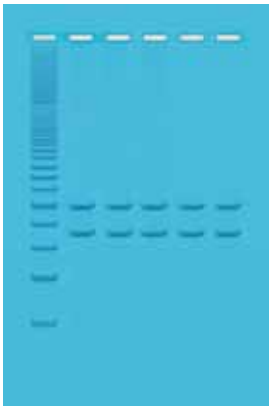
For 25 Students

Set up 30 min.
PCR 2 hours or overnight
Electrophoresis 45 min.

Cat No 332

Kit includes: instructions, proteinase K, PCR beads, control DNA and primers, microtubes, chelating agent, agarose, DNA ladder, practice gel loading solution, gel loading dye, electrophoresis buffer, gel stain.

All you need: micropipettes to measure between 5 and 50 µl, tips, waterbath, thermal cycler, electrophoresis tank and power supply.



PCR-Based Alu-Human DNA Typing

Your students use primers for a 300 base pair Alu insertion in chromosome 16 (PV92) to determine their own genotype! They can then compare their class results with others around the world over the internet.

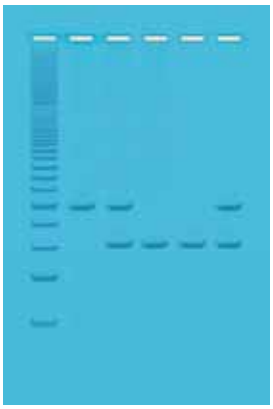
For 25 Students

Set up 30 min.
PCR 2 hours or overnight
Electrophoresis 45 min.

Cat No 333

Kit includes: instructions, proteinase K, PCR beads, control DNA and primers, microtubes, chelating agent, agarose, DNA ladder, practice gel loading solution, gel loading dye, electrophoresis buffer, gel stain.

All you need: micropipettes to measure between 5 and 50 µl, tips, waterbath, thermal cycler, electrophoresis tank and power supply.



PCR-Based VNTR Human DNA Typing

In DNA fingerprinting, variable number tandem repeats (VNTR) are used to identify individuals. In this kit, students will type themselves at the D1S80 locus on chromosome 1. This region contains between 14 and 40 copies of a 16 base pair repeat.

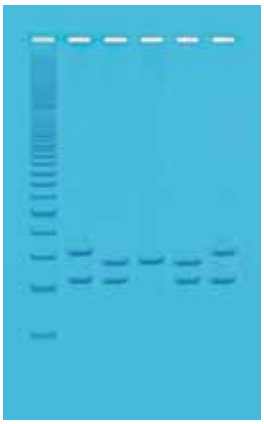
For 25 Students

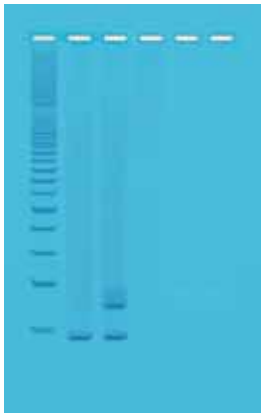
Set up 30 min.
PCR 2 hours or overnight
Electrophoresis 45 min.

Cat No 334

Kit includes: instructions, proteinase K, PCR beads, control DNA and primers, microtubes, chelating agent, agarose, DNA ladder, practice gel loading solution, gel loading dye, electrophoresis buffer, gel stain.

All you need: micropipettes to measure between 5 and 50 µl, tips, waterbath, thermal cycler, electrophoresis tank and power supply.





RT-PCR: A Model for the Molecular Biology of HIV Replication

A specific mRNA is reverse transcribed to double-stranded DNA. This DNA product is then amplified by PCR. This reaction demonstrates the mode of replication of HIV, which contains reverse transcriptase. This experiment is the first introduction of a commercial RNA experiment for the classroom laboratory.

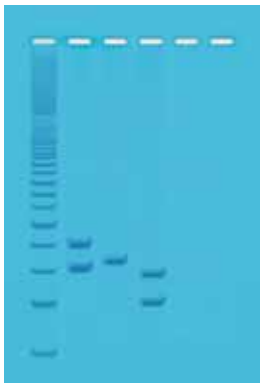
For 6 Lab Groups

Reverse Transcription 35 min.
PCR 2 hours or overnight
Electrophoresis 45 min.

Cat No 335

Kit includes: instructions, RNA Template, Primer Mix, RT-PCR reaction beads, RNase-free water, DNA size ladder, agarose, electrophoresis buffer, gel stain.

All you need: thermal cycler, electrophoresis tank and power supply, automatic micropipette with tips, microwave, waterbath, UV transilluminator.



Human PCR Tool Box™

Carry out three PCR experiments in your class at once! This kit provides three sets of primers to carry out the PCR amplification of Alu element (PV92) on chromosome 16, the VNTR locus (D1S80) on chromosome 1, and two regions of the mitochondrial gene. For 6 runs of each PCR reaction.

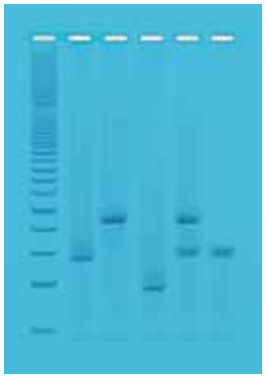
For 6 Lab Groups

Set up 30 min.
PCR 2 hours or overnight
Electrophoresis 45 min.

Cat No 369

Kit includes: instructions, proteinase K, PCR beads, control and primer DNA, microtubes, chelating agent, agarose, DNA ladder, practice gel loading solution, gel loading dye, electrophoresis buffer, gel stain.

All you need: micropipettes to measure between 5 and 50 µl, tips, waterbath, thermal cycler, electrophoresis tank and power supply.



DNA Fingerprinting - Using PCR

Your students can solve a crime using PCR. Plasmid DNA is provided that, when amplified by PCR, provides products that represent individual DNA profiles. Your students can then solve a crime!

For 6 Lab Groups

Set up 30 min.
PCR 2 hours or overnight
Electrophoresis 45 min.

Cat No 371

Kit includes: instructions, PCR beads, DNA templates, primers, DNA ladder, ultrapure water, wax beads, agarose, loading dye, electrophoresis buffer, gel stain.

All you need: micropipettes to measure between 5 and 50 µl, tips, waterbath, thermal cycler, electrophoresis tank and power supply.

Perfect Partner

EdvoCycler™

Our purpose built EdvoCycler™ PCR machine allows you to carry out PCR with your students quickly and at an affordable price!

Cat No 541

SECTION SIX

6 Medical Diagnostics

Nothing in life is to be feared. It is only to be understood.

MADAME MARIE CURIE, NOBEL PRIZE WINNING SCIENTIST

Can Cows Save the World?

Vaccinations were first developed by British doctor Edward Jenner in 1796. He famously noticed that milk maids were resistant to the disease, small pox. He made the connection that it was because of their exposure to the much milder cow pox. His highly unethical experiment to prove his theory involved exposing an eight year old boy to pus from cow pox pustule and then showing that the boy was immune to small pox.

Since then, many of our medical advances have centered on developing new ways to tackle old diseases. We are also using molecular biology to understand how diseases work and for their accurate diagnosis – often as crucial as the right treatment. However, prevention is still better than cure for infectious diseases so vaccinations play an important role in our medical care system.

In 1998, vaccinations became a topic of controversy when British scientists, led by Andrew Wakefield, suggested there was a link between autism and the MMR (measles, Mumps and Rubella) vaccination. The media picked up the story and ran with it. No one in the scientific community seriously believes such a link exists. Regardless, the level of childhood vaccinations has fallen to a level that children are once again developing old diseases like mumps.

Organizations like the Centers for Disease Control & Prevention in the U.S. and the National Health Service in the UK, advise that there is no evidence whatsoever of a connection between MMR and autism. It is merely a coincidence that these diseases emerge around the age that children are given the MMR vaccination.

The ELISA technique

In 1971, two scientists, Eva Engvall and Peter Perlman invented a new test that completely changed diagnostic testing forever. The Enzyme-Linked Immono Sorbent Assay (ELISA) test uses antibodies to seek out the presence of hormones or viruses. These convenient test have many applications (such as deteching Hiv or determining pregnancy) and can be performed in a matter of minutes.

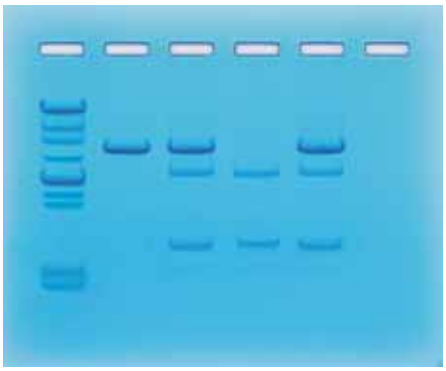
Right, Photograph of Dr Eva Engvall
Inventor of the ELISA technique

Cancer

Family Pedigree Cancer Gene Detection

READY TO LOAD

In this experiment, students determine a pedigree for a family thought to be carriers of a mutation in their p53 genes. This is followed by a diagnostic agarose gel analysis to diagnose the state of the p53 gene in individual family members.



For 6 Lab Groups
Complete in 60 min.
Cat No 115

Kit includes: instructions, Ready-to-Load DNA samples, agarose powder, practice gel loading solution, electrophoresis buffer, calibrated pipette, 100 ml graduated cylinder, microtipped transfer pipettes, stain.

All you need: electrophoresis tank and power supply.

Blood-based Cancer Diagnostics

Cancer cells differ from normal cells by the combinations of proteins that are present on their surfaces. Antibodies against these proteins will specifically bind to cancer cells and not to normal cells. This allows early detection of cancer and potentially a way of delivering cancer therapies. In this simulation experiment the reaction of cancer cell markers and their corresponding antigens are demonstrated.

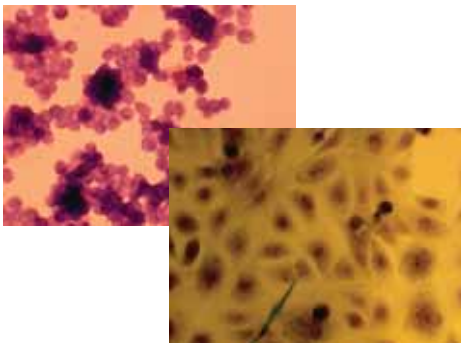
For 10 Lab Groups
Complete in 35 min.
Cat No 141

Kit includes: instructions, microtitre plates, cancer cell markers, normal cell markers, transfer pipettes, buffer.

All you need: water!

Morphology of Cancer Cells

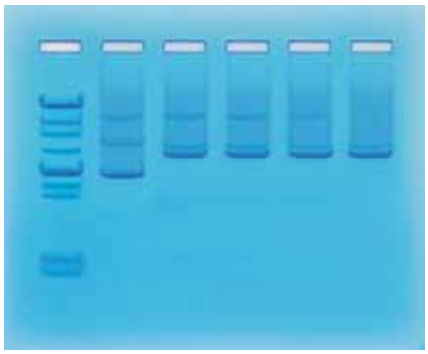
When normal cells are grown in culture they stop growing when they become overcrowded. This is called contact inhibition. Cancer cells in culture grow in an uncontrolled way because they have lost this property. This helps tumors to form in the body. In addition, many different cell types can be present in a single tumor. This experiment allows students to see the differences between normal and cancer cells in both their growth and cell types.



For 6 Lab Groups
Complete in 35 min.
Cat No 990

Kit includes: instructions, multispot slides (2 cell types each), fixing agent, eosin and methylene blue stain, mounting medium, cover slips, transfer pipettes, immersion troughs.

All you need: microscope with 400x magnification.



DNA Damage & Repair

According to the World Health Organization, between 2 and 3 million cases of skin cancer occur globally every year. Many of these cancers are caused by preventable damage to DNA by UV light. In this experiment, your students will expose plasmid DNA to shortwave UV light to simulate the effect of sunbathing. The DNA is then analyzed by agarose gel electrophoresis to observe the damage.

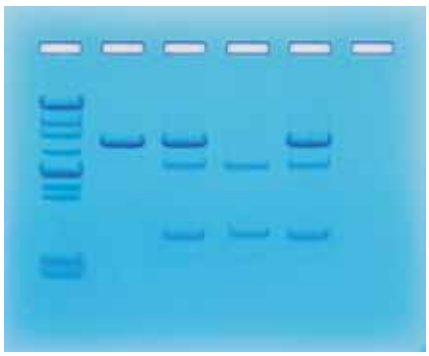
For 10 Lab Groups

Complete in 2 hours

Cat No 957

Kit includes: instructions, standard DNA fragments, plasmid DNA, gel loading solution, agarose, electrophoresis buffer, 1 ml pipette, microtest tubes, 100 ml graduated cylinder.

All you need: UV transilluminator, electrophoresis tank and power supply.



In Search of the Cancer Gene

READY TO LOAD

Suppressor genes such as p53 are essential for cell functions. Mutations in the p53 gene can be correlated to predisposition for certain cancers. Mutations in genes can either be inherited or accumulated due to environmental insults. This experiment deals with a family pedigree determination of several generations relating to cancer formation due to p53 gene mutation. This experiment does not contain human DNA.

For 6 Lab Groups

Complete in 60 min.

Cat No 314

Kit includes: instructions, Ready-to-load Predigested DNA samples, UltraSpec-Agarose powder, practice gel loading solution, electrophoresis buffer, stain, pipet, 5 autoradiograms.

You need: electrophoresis tank & power supply, automatic micropipette with tips, balance, microwave oven or hot plate, waterbath (65°C), UV Transilluminator, pipette pump or bulb, 250 ml Flasks, distilled or deionized water.

Cell Culture

Preparation of HeLa Cell Chromosomal Spreads

Show your students how to perform a chromosome spread by dropping cells onto a microscope slide, allowing the chromosomes to break out of the cells.

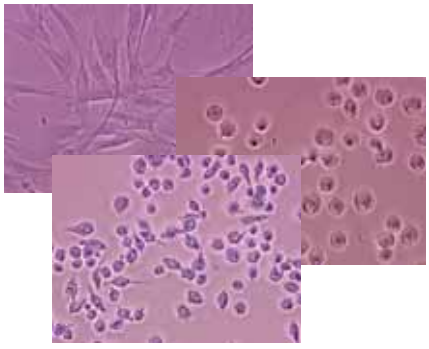
For 10 Lab Groups

Complete in 35 min.

Cat No 985

Kit includes: instructions, slides, HeLa cells, eosin and methylene blue stain, mounting medium, cover slips, transfer pipettes.

All you need: microscope with 400x magnification.



Analysis & Comparison of Mammalian Cell Types

Your students will be amazed at the differences they observe between various mammalian cell types and how these cells function. Cells are fixed on microscope slides and students stain the cells on the slide to view morphological characteristics of the cell types. These cells are very safe for classroom use.

For 6 Lab Groups

Complete in 35 min.

Cat No 986

Kit includes: instructions, multispot slides (4 cell types each), eosin and methylene blue stain, mounting medium, cover slips, transfer pipettes, immersion troughs.

All you need: is a microscope with 400x magnification.

Infectious Diseases

What is an Epidemic & How Does An Infection Spread?

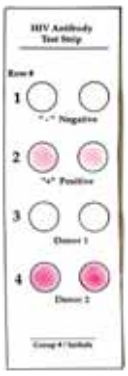
Infectious agents such as bacteria and viruses can spread rapidly through a population and cause widespread disease and death. In this experiment, students will use coloured solutions to simulate the spreading of a disease in the classroom.

For 10 Lab Groups
Complete in 30 min.
Cat No S-68

Kit includes: instructions, HCl solution, NaOH, colour indicator, test tubes & pipettes.

All you need: students!

How Does a Doctor Test for AIDS?



Your body defends itself from attack by infectious agents like bacteria & viruses by producing antibodies. Enzyme Linked Immunosorbent Assays (ELISA) test for antibodies present in the blood, which indicate infection. In this kit, students perform a simulated ELISA test to identify infected samples & compare them to control samples.

For 10 Lab Groups
Complete in 45 min.
Cat No S-70

Kit includes: instructions, antigens, positive and negative controls, sera, secondary antibody, substrate, detection strips, transfer pipettes and test tubes.

All you need: Just water!

Detection of a Simulated Infectious Agent NEW

An infectious outbreak requires prompt & accurate identification of the biological agent. Often, early clinical symptoms are first identified in exposed individuals & then infectious agents are identified by lab tests. In this experiment, students will transmit a simulated infectious agent (chemical dye) between classmates which is only visible under long UV light. The pattern of transmission and primary source will be documented.

For 25 students
Requires in 30-45 min.
Cat No 166

Kit includes: instructions, reagents for simulating an infectious agent (fluorescent dye indicator and negative sample), test tubes & caps, transfer pipets, one long UV mini-light, cotton swabs, petroleum jelly, gloves.

All you need: students!

Simulation of HIV Detection by ELISA BEST SELLER

An HIV test detects HIV infection indirectly using an ELISA test against HIV antibodies in the blood. The test works by taking antibodies from the patient's blood and adding them to a microtitre plate coated with HIV antigen. If HIV antibodies are present, they will bind to the antigens on the plate. In this experiment, your students will perform an ELISA test by coating microtitre plate wells with simulated HIV antigen and then test simulated donor serum for anti-HIV antibodies.

For 10 Lab Groups
Requires 1 hour
Cat No 271

Kit includes: instructions, simulated HIV antigens, positive and negative controls, simulated donor serum, secondary antibody, substrate, microtitre plates, transfer pipettes, microtubes.

All you need: 37°C incubation oven

Simulation of HIV Detection by Western Blot

The second assay used to confirm a positive HIV ELISA result is the Western Blot. Your students will separate protein samples from hypothetical patients on agarose gels. The proteins are then transferred to a membrane and simulated HIV proteins are detected.

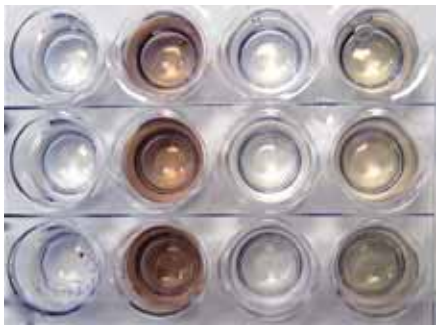
For 6 Lab Groups

Electrophoresis 45 min.
Blot overnight
Detection 25 min.

Cat No 275

Kit includes: instructions, positive and negative controls, simulated patient samples, standard molecular weight markers, protein agarose, buffer, PVDF membrane, protein stain, filter paper, practice gel loading solution.

All you need: electrophoresis tank, power supply, isopropanol, glacial acetic acid, 37°C incubation oven.



One-Step Antibody ELISA for Diagnostics

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 for ELISAs because the detection antibody has an enzyme linked to it directly. Simply add substrate to discover which patient is infected.

For 10 Lab Groups

Complete in 20 min.

Cat No 267

Kit includes: instructions, antigens & antibodies, substrate, phosphate buffered saline, tubes, plates, and transfer pipets.

All you need: 37° C incubation oven, automatic micropipets with tips.

In Search of the "Kissing Disease"

Infectious mononucleosis is commonly known as the "kissing disease". The causative agent is Epstein-Barr virus (EBV) which can be transmitted through saliva during kissing. In this experiment, students search for the presence of EBV using the ELISA reaction to detect specific viral proteins.

For 10 Lab Groups

Requires 50 min.

Cat No 274

Kit includes: instructions, samples, antigens & antibodies, various solutions and reagents, pipets and microtest tubes.

All you need: 37°C incubation oven, automatic micropipets with tips.

Vaccination Readiness

The ultimate aim of research into infectious diseases is eradication. Smallpox was eradicated through the development of a vaccine which completely prevented the spread of the disease. Vaccines stimulate the body to produce antibodies against an infectious agent. A single vaccination does not necessarily give a person immunity to an infectious disease for life, and so sometimes boosters may be required to prevent illness. With this kit, your students will test the sera of several patients to see if they still have immunity to a hypothetical infectious agent.

For 10 Lab Groups

Complete in 2 hours

Cat No 280

Kit includes: instructions, simulated sera from vaccinated and unvaccinated patients, PBS, blocking agent, stop solution, microtitre plates, transfer pipettes, microtubes.

All you need: 37°C incubation oven.

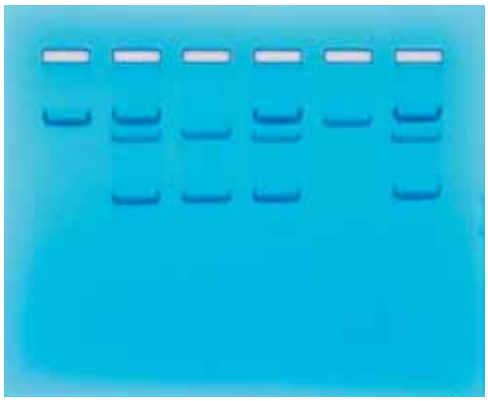
MEDICAL DIAGNOSTICS

Inherited Diseases

Genetic Disease Screening (DNA-based)

READY TO LOAD

Genetic tests are becoming more commonplace than ever. This kit shows how a restriction enzyme can be used to screen DNA for Sickle Cell Anemia.



For 6 Lab Groups

Complete in 45 min.

Cat No 116

Kit includes: instructions, Ready-to-Load DNA, agarose, practice gel loading solution, electrophoresis buffer, micro-tipped transfer pipettes, gel stain.

All you need: electrophoresis tank, power supply and waterbath.

Also Available - DNA samples only

Cat No 116-B 12 gels

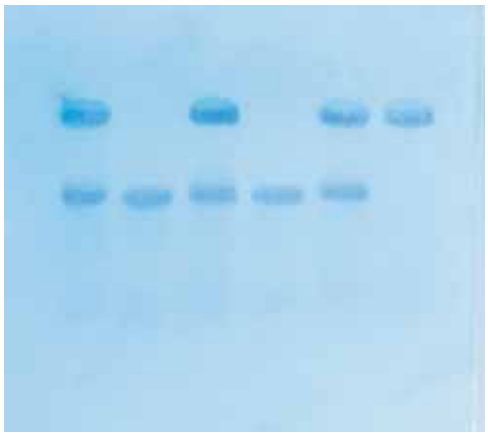
Cat No 116-C 24 gels

In Search of the Sickle Cell Gene by Southern Blot

READY TO LOAD

Southern blotting is an important technique used widely in clinical genetics and research. By transferring DNA from an agarose gel onto a membrane, the method allows you to analyse and identify the DNA bands on a gel precisely.

Your students will use Southern blotting to find a point mutation in the hemoglobin gene indicating Sickle Cell Anemia.



For 5 Lab Groups

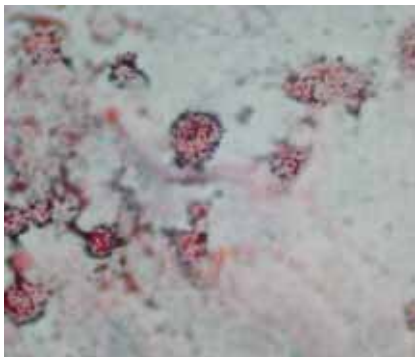
Electrophoresis 45 min
Blotting overnight
Staining & destaining 10 min

Cat No 315

Kit includes: instructions, Ready-to-Load DNA samples, agarose, electrophoresis buffer, nylon membranes, filter paper, blot stain.

All you need: electrophoresis tank, power supply, waterbath and 80°C incubation oven.

Lifestyle Diseases



Obesity - Differentiation of Fat Cells

Preadipocytes are the precursors of fat cells (adipocytes) but they are hard to study in the body as they are uncommon. Thus, scientists have developed a cell culture model of adipocyte differentiation to understand the steps involved. It is hoped that by chemically blocking one or more of these steps, it will be possible to stop adipocyte development and thus prevent obesity.

When cells called fibroblasts are treated with a combination of growth factors, they become preadipocytes. In this experiment, your students will be able to see the difference between adipocytes and preadipocytes by staining with Oil Red O.

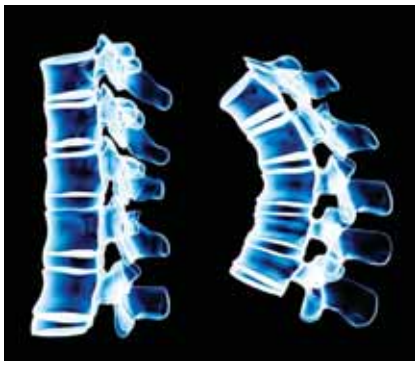
For 6 Lab Groups

Complete in 35 min.

Cat No 992

Kit includes: instructions, cell fixing agent, slide cover slips, fixing reagent, stains.

All you need: microscope with 400x magnification.



The Biochemistry of Osteoporosis NEW

Osteoporosis is a disease of decreased bone density that affects the entire skeleton. Osteoporosis is caused by an increase in the activity of bone-destroying cells known as osteoclasts. In this experiment, students will model the bone-destroying effects of osteoclasts by placing bones in acid and protease and observing their deterioration (as would occur in osteoporosis).

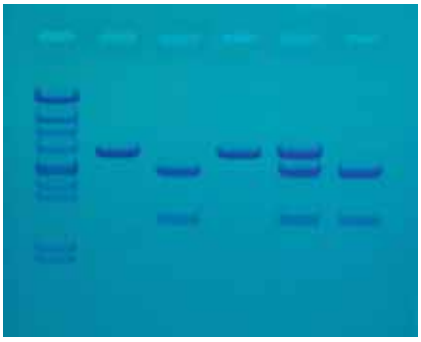
For 10 Lab Groups

Several weeks of observation.

Cat No 138

Kit includes: instructions, plastic petri dishes, collagenase enzyme, buffer.

All you need: chicken, turkey or steak bones, glacial acetic acid, automatic pipettes.



Cholesterol Diagnostics READY TO LOAD

Genetic testing can be used to identify people with a genetic condition which causes them to have an elevated level of cholesterol and which can be fatal. Your students can see how genetic testing is carried out and learn about DNA electrophoresis.

For 6 Lab Groups

Complete in 45 min.

Cat No 118

Kit includes: instructions, Ready-to-Load DNA, agarose, practice gel loading solution, electrophoresis buffer, microtipped transfer pipettes, gel stain.

All you need: electrophoresis tank, power supply and waterbath.

MEDICAL DIAGNOSTICS

Pregnancy & Paternity

In Search of My Father

READY TO LOAD

BEST SELLER

Your class will enjoy discovering the true identity of two boys who were separated from their parents a decade ago. Their mothers are identified by mitochondrial DNA and their fathers from chromosomal DNA. Will it be a happy ending?

For 10 Lab Groups

Complete in 45 min.

Cat No S-49

Kit includes: instructions, Ready-to-Load dye samples, practice gel loading solution, agarose, electrophoresis buffer, microtipped transfer pipettes.

All you need: electrophoresis tank and power supply.

Immunology of Pregnancy Tests

Use this simulation of a pregnancy test to show your student's how the widely used pregnancy test works. The kit also explains the important clinical and research technique of Enzyme-linked Immunosorbent Assay (ELISA) in its most familiar context.

For 10 Lab Groups

Complete in 60 min.

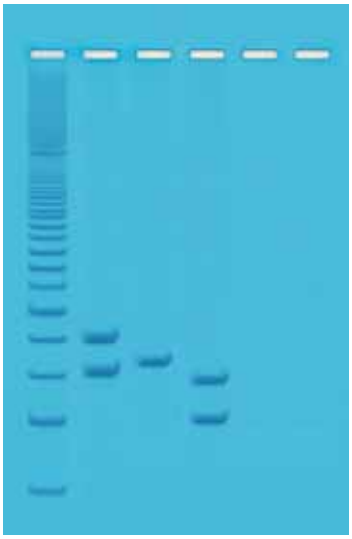
Cat No 279

Kit includes: instructions, positive control, hCG antibody, anti-hCG peroxidase conjugate, hydrogen peroxidase, peroxidase co-substrate, PBS, microtitre strips, microtubes.

All you need: 37°C incubation oven.

Human PCR Tool Box

Polymerase Chain Reaction (PCR) is commonly used to determine paternity as it is a very sensitive method for DNA analysis. Your students will gain an understanding of the principles behind this non-forensic use of DNA Fingerprinting using their own DNA! This kit provides three sets of primers to carry out the PCR amplification of Alu element (PV92) on chromosome 16, the VNTR locus (D1S80) on chromosome 1, or 2 mitochondrial genes. For 6 runs of each PCR reaction.



For 6 Lab Groups (18 Individuals)

Set up 30 min.
PCR 2 hours or overnight
Electrophoresis 45 min.

Cat No 369

Kit includes: instructions, proteinase K, PCR Beads, control and primer DNA, microtubes, chelating agent, agarose, DNA ladder, practice gel loading solution, gel loading dye, electrophoresis buffer, gel stain.

All you need: micropipettes to measure between 5 and 50 µl (or 5,10, 30, 50 µl fixed volume minipipets), waterbath, thermal cycler, electrophoresis tank and power supply.

DNA Paternity Testing Simulation

READY TO LOAD

Your students' will compare a child's DNA with DNA from two possible fathers to find out which is the biological father. The experiment is an excellent way to teach one of the most compelling and difficult social issues to arise from DNA testing. The kit also teaches your class the fundamentals of DNA electrophoresis.

For 6 Lab Groups

Complete in 45 min.

Cat No 114

Kit includes: instructions, Ready-to-Load DNA, agarose, practice gel loading solution, electrophoresis buffer, micro-tipped transfer pipettes, gel stain.

All you need: electrophoresis tank, power supply and waterbath.

Also Available - DNA samples only

Cat No 114-B 12 gels

Cat No 114-C 24 gels

Southern Blot Analysis

READY TO LOAD

This experiment introduces your students to Southern blotting as a tool for "DNA Fingerprinting" in a hypothetical paternity determination. DNA fragments are first separated by agarose gel electrophoresis, then transferred to a nylon membrane and finally visualised by staining.

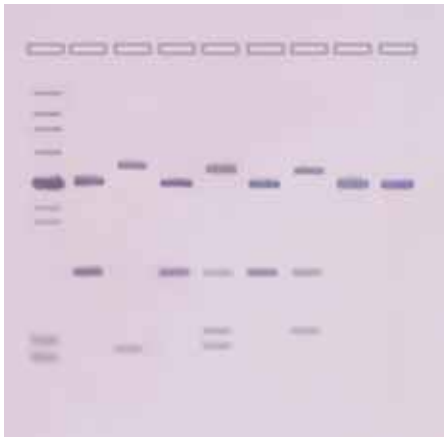
For 5 Lab Groups

Electrophoresis 45 min.
Blotting overnight
Staining & destaining 10 min.

Cat No 207

Kit includes: instructions, DNA samples for electrophoresis, practice gel loading solution, UltraSpec-Agarose, electrophoresis buffer, pipets, 5 pre-cut nylon membranes, 5 pre-cut blotting filter papers, Blue-Blot DNA Stain.

All you need: electrophoresis tank & power supply, 65° C Waterbath, DNA visualization system, staining net & tray, automatic micropipettes, lab glassware, microwave oven, distilled water, NaCl, NaOH, concentrated HCl, plastic wrap, forceps.



DNA Fingerprinting: Southern Blot Analysis Using Non-Isotopic Detection of DNA

In this experiment, students gain experience in non-isotopic DNA detection & the use of Southern Blot analysis in DNA fingerprinting for a hypothetical paternity test. Includes three modules: agarose gel electrophoresis, Southern Blot transfer, and non-isotopic detection of DNA.

For 5 Lab Groups

Electrophoresis - 45 min
Blotting - overnight
Non-Isotopic Detection 3-4 hrs.

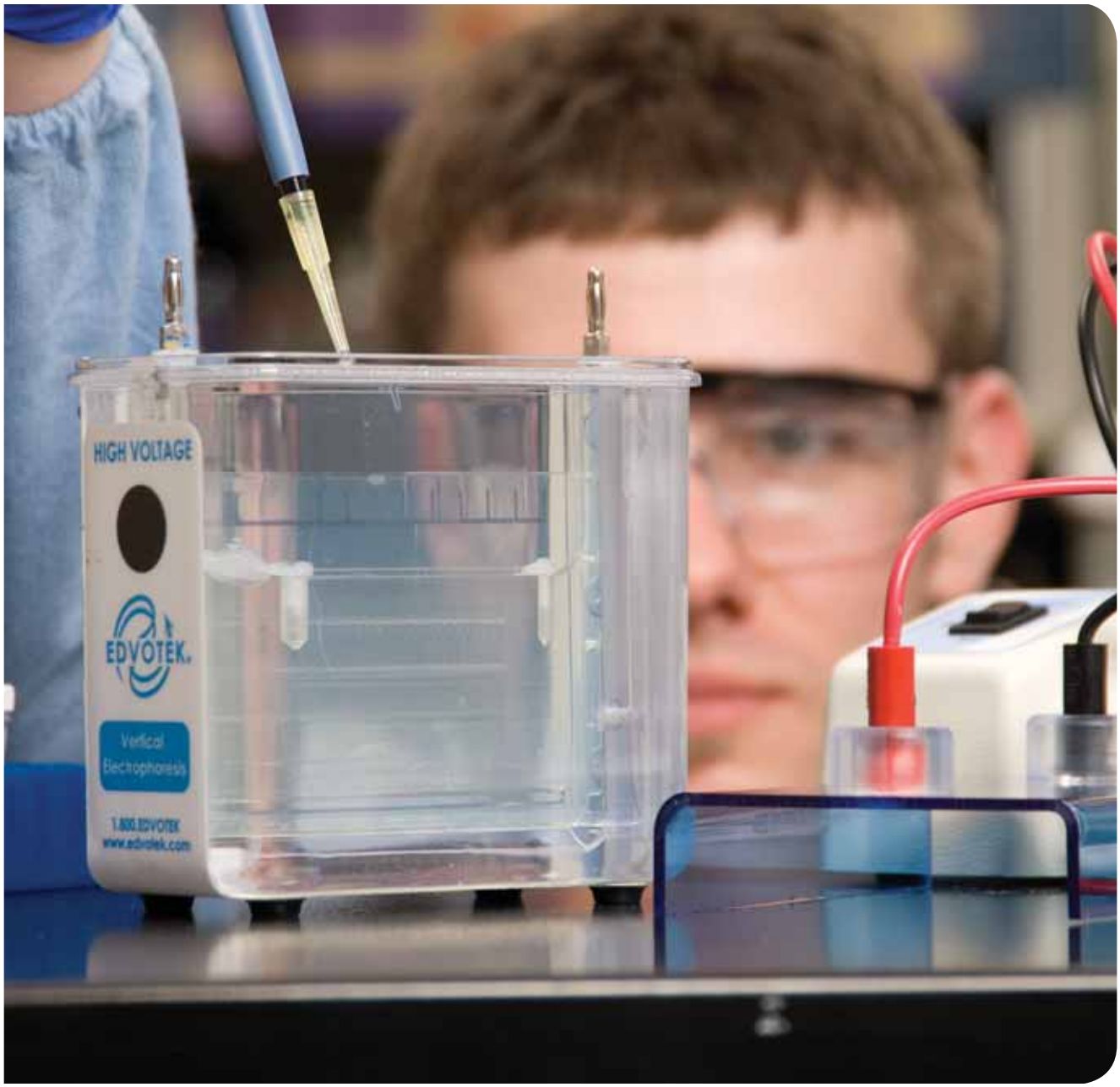
Cat No 311

Kit includes: instructions, predigested DNA samples, buffers, NBT/BCIP tablets, streptavidin-Alkaline Phosphatase, nylon membranes, filter paper, UltraSpec-Agarose powder.

You need: electrophoresis tank & power supply, automatic micropipette with tips, balance, waterbath, incubation oven.

SECTION SEVEN

7 Proteins, Enzymes & Chromatography



Systems biology is the science of discovering, modelling, understanding and ultimately engineering at the molecular level the dynamic relationships between the biological processes that define living organisms.

LEROY HOOD, PRESIDENT OF THE INSTITUTE FOR SYSTEMS BIOLOGY

Back to the Future

Alongside the genome, scientists now talk of the proteome (proteins), transcriptome (mRNA) and even the metabolome (metabolic pathways). These individual fields are gradually coming together (along with bioinformatics and other computer based technologies) under a single umbrella called "systems biology".

The idea behind the phenomenon of systems biology is that you must study of all the parts of the organisms from the molecular and cellular level through to the highest level together in a complete way to understand the complex multi-level interactions that govern what we call life. The theory underpinning systems biology is the old adage that the whole equals more than the sum of the parts.

A key element is the idea that the component parts, when combined together, have what are called "emergent properties". The Institute for Systems Biology in Seattle, uses the (non-eco) light bulb to explain this. When the parts of such a light bulb are taken individually (tungsten wire, metal cap and glass bulb) they don't give a clue that together they produce the emergent property of light! Complex systems (like life) have even less predictable emergent properties so it is necessary to study the whole, as well as the parts, for a full understanding.

Systems biology is a paradigm shift in our approach to biology away from the reductionist extremism of molecular biology. It sounds like an interesting approach and one that offers great hope for the future. It is also refreshing to see such a return to a more traditional whole organism approach to biology. Maybe macro and micro meet at last!

Protein & Enzyme Analysis

Enzyme Microarrays NEW

Microplate microarray technology is a new technology that allows scientists to screen large numbers of samples simultaneously. This technology has led to cost savings by saving time and reducing sample size, while yielding accurate results. Students will apply various reagents to enzyme reactions in a microtiter plate to screen for positive and negative reactions. They will also make quantitative determinations based on the colourimetric product.

For 10 Lab Groups
Requires 60 min.
Cat No 246

Kit includes: instructions, enzymes and substrates, microtiter plates, microtest tubes, pipettes.

All you need: 37°C incubation oven, 5-50 µl adjustable micropipette or 10 µl and 100 µl fixed volume micropipettes.

Principles of Enzyme Catalysis NEW

This easy and safe experiment allows your students to learn about enzyme catalysis, the nature of enzyme action and protein structure-function relationships. Students will perform an enzyme assay and determine the rate of the enzymatic reaction.

For 10 Lab Groups
Requires 30-45 min.
Cat No 282

Kit includes: instructions, catalase solution, hydrogen peroxide, phosphate buffer, assay reagent, acidification solution, colour enhancer & developer.

All you need: visible wavelength spectrophotometer, 1 ml, 5 ml & 10 ml pipettes, linear graph paper.

Biochemical Analysis of Plant Enzymes

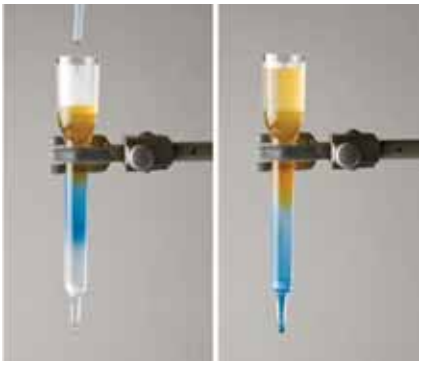
With this experiment, your students will demonstrate general enzyme principles using specific plant enzymes which have important functions in biotechnology. Students perform tissue prints of seeds to examine what happens during malting. An additional activity allows students to quantify the activity of the enzyme amylase.

For 10 Lab Groups
Requires 2 hours
Cat No 904

Kit includes: instructions, 3 types of barley seeds, iodine solution/stain, reaction buffer, starch, amylase enzyme powder, 1 ml pipettes, starch indicator paper, petri plates, graph paper template.

All you need: waterbath, spectrophotometer, 5-50 µl adjustable micropipette with tips, test tubes, microscope or magnifying lens.

Chromatography & Purification



Principles of Gel Filtration Chromatography

Introduce chromatographic separation to your class and show them how dyes of different colours separate on the basis of their size and shape. This experiment contains materials for dye separation which include dye sample, elution buffer and plastic disposables. Columns may be rinsed and reused.

For 10 Lab Groups

Packing Column 20 min.
Column Separation 40 min.

Cat No 108

Kit includes: instructions, sample mixture, chromatography columns, dry matrix, elution buffer, transfer pipettes, microtest tubes.

All you need: 50 or 100 ml beakers, 25 ml beaker or test tube, ring stands with clamps, distilled water.

Principles of Thin Layer Chromatography

This experiment introduces chromatographic theory and methods of thin layer chromatography. A mixture of dyes are separated on a cellulose-based TLC plate using two different solvent systems.

For 8 Lab Groups

Spotting Plates 20 min.
TLC Separation 5 min.

Cat No 113

Kit includes: instructions, samples, reagents and solvents, cellulose thin layer plate, 5 µl glass capillary pipettes.

All you need: 5 or 10 ml pipettes.

Ion Exchange Chromatography

Most molecules have a net charge within a pH range of 2 to 10. When the pH is altered, the net charge on molecules can change drastically. In this experiment, a mixture of two chemicals is absorbed onto a solid support ion-exchange column and separated during elution under conditions that influence their net charge.

For 6 Lab Groups

Requires 60-90 min.

Cat No 243

Kit includes: instructions, ion exchanger, chemical mixture, potassium acetate buffer, chromatography columns.

All you need: spectrophotometer & cuvettes, ring stands and clamps, 5 ml pipettes.

Microscale Enzyme Catalysis Using a Recombinant Enzyme

Genetically engineered microorganisms can produce a large amount of a desired product. In this experiment, recombinant ß-galactosidase is used in colourimetric microscale reactions carried out in microtiter wells. The enzyme reactions are rapid and can be visually quantitated.

For 10 Lab Groups

Requires 50 min.

Cat No 244

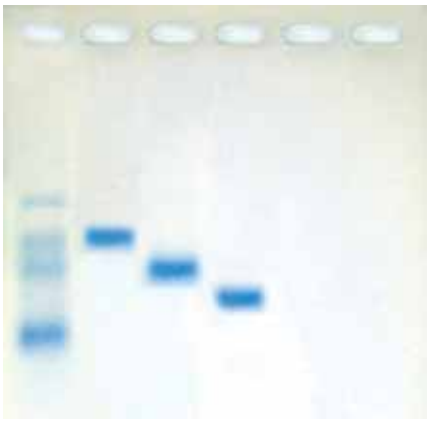
Kit includes: instructions, recombinant ß-galactosidase, colourimetric enzyme substrate, enzyme stop solution, microtiter plate.

All you need: spectrophotometer & cuvettes, .ring stands and clamps, 5 ml pipettes.

Electrophoresis of Proteins

Molecular Weight Determination of Proteins (Agarose-based) NEW

Introduce a simple method to determine protein subunit molecular weights using horizontal electrophoresis. As the protein standards and "unknowns" are prestained, the separation of proteins can be observed during electrophoresis. Included in the experiment is our formulation of protein grade agarose, which provides an alternative to the use of polyacrylamide gels.



For 4 Lab Groups

Complete in 1 hour followed by overnight staining.

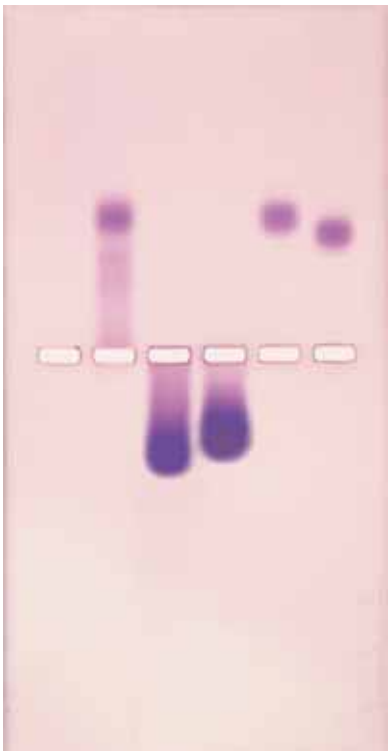
Cat No 110

Kit includes: instructions, prestained LyphoProtein samples, gel loading solution, agarose, electrophoresis buffer, stain, SDS solution.

All you need: horizontal electrophoresis apparatus, power supply, white light visualization system, 5-50 µl adjustable or 20 µl fixed volume micropipette, methanol, glacial acetic acid.

Electrophoretic Properties of Native Proteins (Agarose-based) NEW

Proteins are complex biomolecules with varying charge, size and shape that can be analyzed by agarose gel electrophoresis. Gel analysis of native proteins enables students to evaluate natural charge and shape characteristics of proteins. Following electrophoresis, the protein samples are stained for visualization.



For 6 Lab Groups

Complete in 1 hour followed by overnight staining.

Cat No 111

Kit includes: instructions, protein samples, gel loading solution, agarose, electrophoresis buffer, stain.

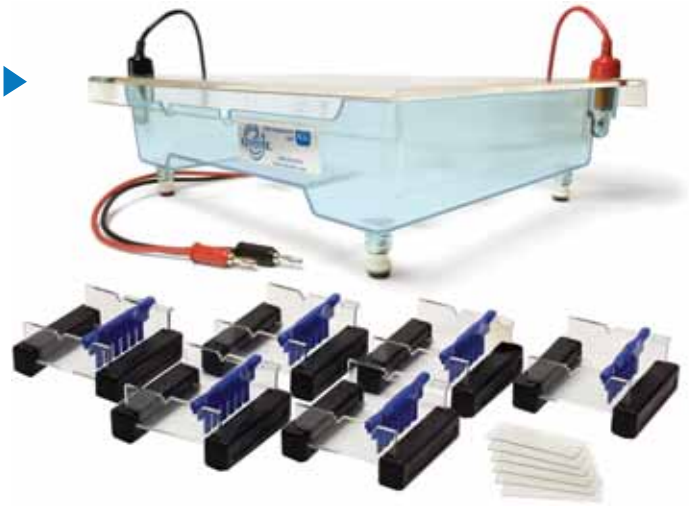
All you need: horizontal electrophoresis apparatus, power supply, white light visualization system, 5-50 µl adjustable or 40 µl fixed volume micropipette, methanol, glacial acetic acid.

What Equipment Do I Need for Agarose Protein Electrophoresis?

HexaGel DNA Electrophoresis Tank

Easily run an entire class of samples in one go! Separates six groups of student samples in just 30-40 minutes. The gel tank is very easy to use. Excellent results every time!

Cat No 515



DuoSource Power Supply

Produce excellent results from your dye & DNA electrophoresis experiments quickly and easily. Run samples in just 40 minutes!

Cat No 507

Fixed Volume MiniPipettes

Our MiniPipettes are precise and cost-effective. They utilise standard disposable micropipette tips.

Cat No 588
40 µl MiniPipette

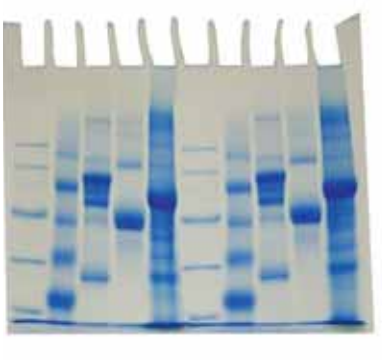
Cat No 586-1
20 µl MiniPipette

See our EQUIPMENT section for our full range of electrophoresis and power supplies.

Survey of Protein Diversity (Polyacrylamide-based)

NEW

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 alongside a standard protein marker.



For 6 Lab Groups (sharing 3 gels)

Electrophoresis 60 min.
Staining 20 min.
Destaining 2 hours

Cat No 150

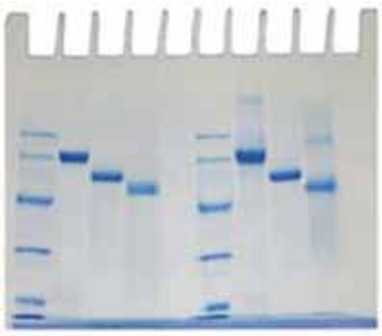
Kit includes: instructions, denatured LyphoProtein samples, standard protein markers, gel loading solution, buffer, Protein Plus stain & Protein InstaStain.

All you need: 3 polyacrylamide gels (12%), MV10 vertical gel electrophoresis apparatus, power supply, white light box, 5-50 µl adjustable or 20 µl fixed volume micropipette, fine tips, methanol, glacial acetic acid.

Determination of Protein Molecular Weight (Polyacrylamide-based)

NEW

Using prestained LyphoProteins, subunit molecular weights are determined by analysis using denaturing SDS vertical polyacrylamide gel electrophoresis. Prestained Proteins with unknown molecular weights are assigned molecular weights based on the relative mobility of prestained standard protein markers.



For 6 Lab Groups (sharing 3 gels)

Electrophoresis 60 min.
Staining 20 min.
Destaining 2 hours

Cat No 153

Kit includes: instructions, denatured LyphoProtein samples, standard protein markers, gel loading solution, buffer, Protein Plus stain & Protein InstaStain.

All you need: 3 polyacrylamide gels (12%), MV10 vertical gel electrophoresis apparatus, power supply, white light box, 5-50 µl adjustable or 20 µl fixed volume micropipette, fine tips, methanol, glacial acetic acid.

Diversity of Fish Proteins

NEW

Study the diversity of fish with these pre-stained, lyophilized proteins. Total protein from Perch, Walleye and Salmon is extracted and pre-stained using an indicator dye. Each fish protein sample has a characteristic banding pattern when separated by denaturing SDS-polyacrylamide gel electrophoresis, which can be used to identify the specific species.

For 6 Lab Groups (sharing 3 gels)

Electrophoresis 60 min.
Staining 20 min.
Destaining 2 hours

Cat No 253

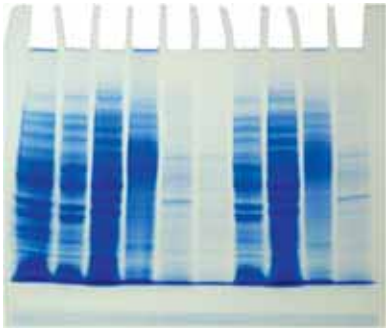
Kit includes: instructions, fish LyphoProtein samples, protein molecular weight standards, practice gel loading solution, buffer, Protein InstaStain.

All you need: 3 polyacrylamide gels (12%), MV10 vertical gel electrophoresis apparatus, power supply, microcentrifuge, white light box, 5-50 µl adjustable or 20 µl fixed volume micropipette, fine tips, methanol, glacial acetic acid.

Identification of Bacterial Protein Profiles

NEW

In this experiment, total protein extracts from several bacterial sources are extracted and compared. The unique patterns of protein bands, obtained by SDS vertical polyacrylamide electrophoresis, can be used to identify various bacterial strains.



For 6 Lab Groups (sharing 3 gels)

Grow up colonies overnight
Electrophoresis 60 min.
Staining 2-3 hours

Cat No 252

Kit includes: instructions, bacterial cultures and reagents, LyphoProteins, Lysozyme, buffers, Protein Plus stain & Protein InstaStain, practice gel loading solution, protein sample buffer, unknown proteins ready for electrophoresis, ReadyPour Agar, nutrient broth.

All you need: 3 polyacrylamide gels (12%), MV10 vertical gel electrophoresis apparatus, power supply, microcentrifuge, incubation oven, white light box, 5-50 µl adjustable or 15 µl, 20 µl, & 25 µl fixed volume micropipettes, fine tips, methanol, glacial acetic acid.

What Do I Need For Vertical Protein Electrophoresis?

MV10 Vertical Electrophoresis Tank

Designed for separation of proteins on Polyacrylamide gels. The MV10 holds one 9 x 10 cm pre-cast gel cassette. Features a unique gel clip system which enables the use of most pre-cast & self-made gels.

Cat No 581

DuoSource Power Supply

Produce excellent results from your dye & DNA electrophoresis experiments quickly and easily. Run samples in just 40 minutes!

Cat No 507

Fixed Volume MiniPipettes

Our MiniPipettes are precise and cost-effective. They utilise standard disposable micropipette tips.

Cat No 588 40 µl MiniPipette

Cat No 586-1 20 µl MiniPipette

Protein Reagents

Precast Polyacrylamide Gels

Cat No 651 3 gels (12%)
Cat No 652 6 gels (12%)

Tris-glycine-SDS Buffer

For vertical polyacrylamide gel electrophoresis
Cat No 655 (10x for 5 L) (500 ml)

Tris-glycine Buffer

For vertical polyacrylamide gel electrophoresis
Cat No 656 (10x for 5 L) (500 ml)

Tris-HCl-SDS-2-Mercaptoethanol

This sample preparation buffer contains mercaptoethanol to break disulfide bonds in proteins. This buffer solution can be used for molecular weight determination. Requires -20°C freezer storage.
Cat No 658 10 ml

Prestained Lyophilized Protein Gel Markers

Molecular Weight Standards
Cat No 752 For 20 gels

Protein InstaStain

Protein InstaStain sheets stain gels faster than conventional methods. Protein InstaStain gives high quality and uniform gel staining with excellent results for photography. They are also environmentally friendly because they use a solid matrix, avoiding large amounts of liquid stain and waste disposal.

Cat No 2016 For 15 gels, 10 x 10 cm

Cat No 2017 For 30 gels, 10 x 10 cm

SECTION EIGHT

8 Genetic Engineering & Transformation

It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is the most adaptable to change.

CHARLES DARWIN

Gene Transfer: An Old Controversy

Many modern medicines, such as insulin or growth hormone, are made using genetically engineered bacteria. Bacterial transformation is used to genetically engineer bacteria to produce medicines. It is now one of the most important and widely used techniques in genetics research but it has a controversial past.

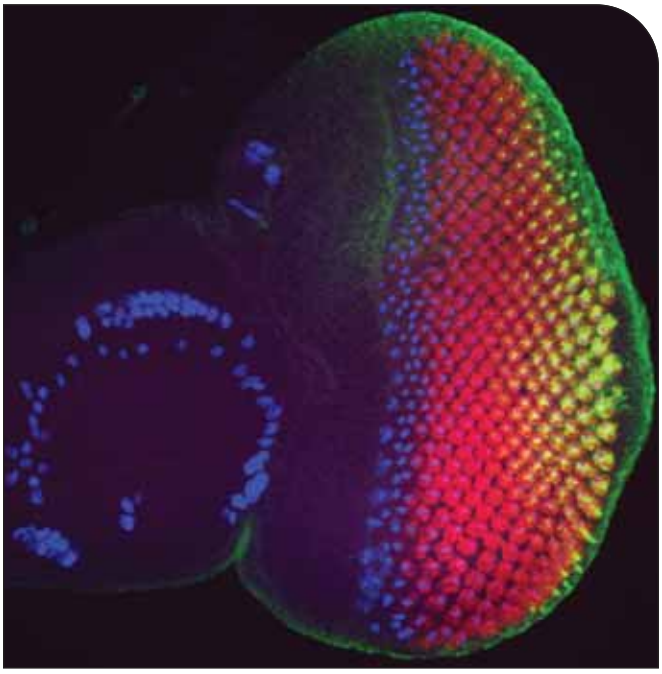
The versatility of the genetic code has enabled scientists to transfer DNA between all sorts of organisms. This is mediated by DNA vectors, of which the most frequently used are plasmids. These extrachromosomal loops of DNA naturally occur in bacteria and carry genes that confer a selective advantage to the host. Unfortunately, this can lead to antibiotic resistance and the emergence of "super-bugs" such as MRSA.
For genetic engineering, safe plasmids had to be developed. In the early 1970's, a group of scientists developed the first very useful plasmid for genetic engineering, which was pBR322 (the "B" stands for Bolivar and the "R" for Rodriguez, after the scientists who created it).

Around this time, when gene transfer became possible, scientists were so fearful that they imposed a voluntary moratorium on this research. This began in 1974 with the "Berg letter" from Paul Berg and other eminent scientists to the science journals, Nature and Science. The voluntary moratorium was in place until 1976 when safety guidelines were produced for conducting such experiments.

Today, bacterial transformation is one of the most widely carried out procedures in molecular biology.

"My lab uses the fruit fly to understand the fundamental biological processes of growth and neuronal development. We manipulate the flies genetically and use techniques such as bacterial transformation and PCR to help us find human versions of the fly genes. Amazingly these same genes are involved in cancer and neurological disease in humans!"

Joseph Bateman, PhD
The Wolfson Centre for Age-Related Diseases
King's College London

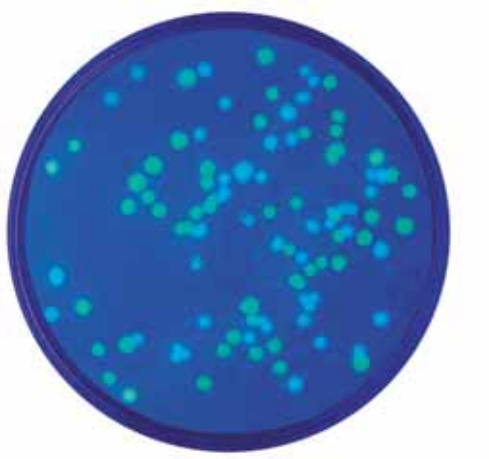


Magnified image of a fly's eye imaginal disc

Transformation

Transformation with Blue & Green Fluorescent Proteins

BEST SELLER



The Green Fluorescent Protein from the jellyfish *Aequorea victoria* is used extensively in all areas of science. Many organisms have been transformed with the GFP gene, the gene responsible for bioluminescence in jellyfish. It has proven to be so useful that scientists have mutated it to produce Blue Fluorescent Protein (BFP). In this simple experiment your students will transform bacteria either with GFP, BFP or both!

For 10 Lab Groups

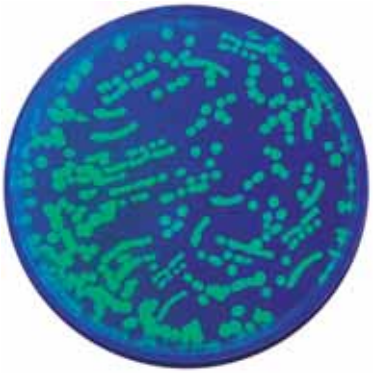
Complete in 50 minutes and grow overnight

Cat No 222

Kit includes: instructions, cells, plasmid DNA, IPTG, ampicillin, transformation solution, ReadyPour agar, Luria broth, petri dishes, sterile pipettes and loops.

All you need: waterbath, 37°C incubation oven, long wave UV lamp.

Transformation with Green Fluorescent Protein



In this experiment, transformed cells take up a plasmid containing the GFP gene. The GFP gene was isolated from the jellyfish *Aequorea victoria*. Transformed colonies expressing the GFP protein are visibly green in normal light but will fluoresce brightly when exposed to long wave UV light.

For 10 Lab Groups

Plating 5 min.
Incubation overnight
Transformation efficiency 15 min.

Cat No 223

Kit includes: instructions, cells, plasmid DNA, IPTG, ampicillin, transformation solution, ReadyPour agar, Luria broth, petri dishes, sterile pipettes, loops and microtubes.

All you need: waterbath, 37°C incubation oven, long wave UV lamp.

Perfect Partner for kits #222, 223, & 255

Long Wave UV Mini Lamp

A safe, long-wave UV lamp to view fluorescent transformed bacteria, GFP protein and BFP protein.

Cat No 969

Purification & Size Determination of Green & Blue Fluorescent Proteins

When bacteria are used to make medicinally useful proteins by transformation, the protein of interest must be separated from all of the other cellular proteins. In this experiment, the unique fluorescent properties of GFP and BFP will be used as an assay during their purification from an E. coli extract. The column fractions containing GFP or BFP will be identified by fluorescence and then purified. As an optional activity, purified protein fractions can be separated by SDS polyacrylamide gel electrophoresis (SDS-PAGE) to estimate the purity and size of the GFP and BFP proteins.

For 6 Lab Groups

Packing & running column 45 min.
Optional electrophoresis 60 min.
Staining 30 min.
Destaining 2 hours

Cat No 255

Kit includes: instructions, columns and matrix, GFP and BFP extracts, buffer, protein gel reagents for optional activity.

All you need: waterbath, long wave UV lamp, ring stand & clamps, automatic micropipette, vertical gel electrophoresis apparatus, power supply, polyacrylamide gels (12%).

What are fluorescent proteins?

Many jellyfish use bioluminescence (biologically produced light) to attract prey, defend themselves and to find a mate. They produce bioluminescence using special fluorescent proteins that when illuminated with one wavelength of light, emit light in a different wavelength.

Scientists have studied this most closely in the jellyfish *Aequorea victoria*. The bioluminsence protein Green Fluorescent Protein (GFP) was identified from these jellyfish in the 1960's and the gene characterised in 1992.

What was incredible was that the jellyfish gene causes bioluminescence in many other types of organism including bacteria, mammals and plants! By attaching the GFP gene to another gene, you can follow where the second gene is switched on (or expressed) in living cells. GFP has been so useful that scientists have introduced a mutation to generate Blue Fluorescent Protein (BFP). Nowadays there is a rainbow of fluorescent proteins available, including red, yellow and even purple!

Transformation of *E.coli* with pGAL™

INCLUDES LYPHOCELLS

BEST SELLER

In this experiment, your students can see a blue colour change in transformed cells due to the switching on of a gene. The pGAL plasmid gives them a blue colour due to the production of the ß-galactosidase protein by the *lacZ* gene. IPTG is not required in this experiment since pGAL contains the complete *lacZ* gene.

For 10 Lab Groups

Complete in 50 minutes and grow overnight

Cat No 221

Kit includes: instructions, Lyphocells, plasmid DNA, buffer, media, ampicillin, X-Gal, ReadyPour agar, petri dishes, sterile pipettes, loops and microtubes.

All you need: 37°C incubation oven, waterbath.

Transformation of *E.coli* with Plasmid pBR322

INCLUDES LYPHOCELLS

Transformation is of central importance in molecular cloning since it allows for the selection, propagation, expression and purification of a gene. Positive selection for cells containing plasmid DNA is accomplished by antibiotic growth selection. In this experiment, your students will transform bacteria with the first plasmid made for genetic engineering in 1970, pBR322.

For 10 Lab Groups

Complete in 50 minutes and grow overnight

Cat No 201

Kit includes: instructions, LyphoCells, plasmid DNA, buffer, ampicillin, calcium chloride, ReadyPour Agar, Luria broth, Petri dishes, sterile pipettes and loops, microtubes.

All you need: 37°C incubation oven, waterbath.

Transformation of *E.coli* with pUC8 Plasmid DNA

INCLUDES LYPHOCELLS

Your students will see how genes are switched on in this experiment. Transformed cells acquire antibiotic resistance and exhibit blue colour. The plasmid produces the *lacZ* peptide that complements the cell's incomplete, ß-galactosidase protein, producing a blue colour with X-Gal. The experiment includes IPTG for activation of the *lacZ* gene and lac operon.

For 10 Lab Groups

Complete in 50 minutes and grow overnight

Cat No 211

Kit includes: instructions, LyphoCells, plasmid DNA, buffer, media, ampicillin, X-Gal, ReadyPour agar, Petri dishes, sterile pipettes, loops and microtubes.

All you need: 37°C incubation oven, waterbath.

Have you heard of LyphoCells™?

The experiments with this icon include LyphoCells, an exclusive bacterial transformation system which eliminates the need for dry ice shipping and -70°C storage of competent cells. A simpler way to great science!

Transformation Supplies

Small Petri Dishes

60 x 15 mm (one shelf pack)

Cat No 633

Large Petri Dishes

100 x 15 mm (one shelf pack)

Cat No 643

Inoculating Loops

Sterile (pack of 20)

Cat No 772

Luria Broth Media

Cat No 611

Bacterial Plating Agar

Cat No 612

IPTG

Cat No 613

X-Gal

Cat No 614

ReadyPour™ Luria Broth (LB) Agar Base

Cat No 615

ReadyPour Luria Broth (LB) Agar with Ampicillin

Cat No 616

Transformation Reagents

Includes AMP, X-Gal, and pGal.

Cat No 617

LyphoCells for Transformation

Includes *E. coli* JM109 cells, reconstitution media & induction buffer.

Cat No 618

E.coli JM109

Cat No 726

E.coli HB101

Cat No 727

SECTION NINE

9 Plants

The imagination of nature is far, far greater than the imagination of man.

RICHARD FEYNMAN, NOBEL PRIZE WINNING PHYSICIST

From Peas to PCR!

Our present day understanding of the basis of genetics was largely unravelled by Gregor Mendel's study of pea plants over one hundred years ago. In recent years, the techniques of molecular biology have opened up our understanding of how plants evolve, develop, and can be used as crops and even as pharmaceutical factories.

The first plant genome to be sequenced in 2000 was that of the most humble member of the *Brassicacea* family, *Arabidopsis thaliana*. As with its animal counterpart, the fruit fly *Drosophila melanogaster, Arabidopsis* has been used to unravel the molecular genetics of the plant kingdom.

Similar to *Drosophila*, many thousands of *Arabidopsis* mutants are available for scientists to study and understand how plant genes function. These studies have contributed to the controversial

developments of GM plants for food, but also to plants for producing medicines, and plants to supplement people's diets in the developing world. They have also allowed horticulturists to develop new varieties for gardeners. A new classification of plants has emerged with the molecular basis supplementing morphological systems of classification.

The future of plant genetics is likely to remain controversial but with the current interest in climate change fueling speculation over what best to use as carbon sinks, perhaps a new chapter will emerge for nature's very own carbon sinks – plants. And who said plants were boring?

Engage your students with some of the key techniques of molecular biology that are changing the way we view and use plants. From growing mutants to tissue culture to PCR, we have something for you to try out in your classroom.

Arabidopsis thaliana is the most commonly used plant for studying genetics.

Plant Biology

Which Quick Plant™ Is the Mutant?

BEST SELLER

Gregor Mendel studied pea plants over the course of many years to understand inheritance. Now your students can use 3 different genetic strains of Quick Plants to see the genetic ratios for themselves.

For 15 Lab Groups

Requires several weeks for growth

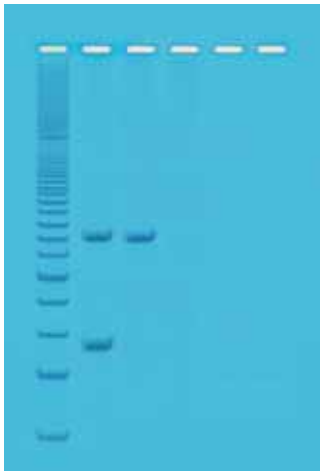
Cat No S-41

Kit includes: instructions, wild, sward, & pale seeds, seed gel, peat pellets, growth containers, fertilizer, and magnifying glasses.

All you need: fluorescent plant growth lights (recommended).

Determining Quick Plant Genetics Using PCR

Your students will see for themselves the relationship between genotype and phenotype by performing PCR using DNA extracted from Quick Plants. Unlike the wild type Quick Plants, the *glabra* mutant lacks trichomes (single-celled hairs) on its leaves. Using PCR your students will compare a region of DNA that differs between the *glabra* mutant and wild type plants, so they will see this variation at the DNA level.



For 10 Lab Groups

Set up 30 min.
PCR 2 hrs or overnight
Electrophoresis 45 min.

Cat No 336

Kit includes: instructions, Quick Plant seeds, potting soil pellets and pots, PCR Beads, microtubes, primers, DNA extraction buffer, plant homogenization pestles with tubes, agarose, electrophoresis buffer, DNA ladder, gel stain.

All you need: micropipettes to measure between 5 and 50 µl (or 5,10, 30, 50 µl fixed volume MiniPipettes), waterbath, thermal cycler, electrophoresis tank and power supply.

Isolation of Plant Mitochondria & Chloroplasts

In this two-part experiment, your students will explore the techniques used to isolate plant organelles. Two cell organelles are isolated from pea seedlings by differential centrifugation. First, students identify mitochondria by the enzyme activity of cytochrome c oxidase. Then, chloroplasts are isolated and identified under the microscope.

For 6 Lab Groups

Requires approx. 5.5 hrs. for completion over three consecutive lab periods.

Cat No 910

Kit includes: instructions, genomic DNA extraction solutions, chloroplast isolation reagents, mitochondrial DNA isolation reagents, transfer pipettes, pea seeds, UltraSpec-Agarose, electrophoresis buffer, gel loading solution, stains.

All you need: microscope, spectrophotometer, blender, waterbath, microcentrifuge, centrifuge (10,000 x g), cheesecloth, acetone, vermiculite, automatic micropipettes & tips, electrophoresis tank, power supply, white light box, isopropanol, ethanol, mortar & pestle.

Biochemical Analysis of Plant Enzymes

With this experiment, your students will demonstrate general enzyme principles using specific plant enzymes which have important functions in biotechnology. Students perform tissue prints of seeds to examine what happens during malting. An additional activity allows students to quantify the activity of the enzyme amylase.

For 10 Lab Groups

Requires 60 min.

Cat No 904

Kit includes: instructions, 3 types of barley seeds, iodine solution/stain, reaction buffer, starch, amylase enzyme powder, 1 ml pipettes, starch indicator paper, petri plates, graph paper template.

All you need: waterbath, spectrophotometer, 5-50 µl adjustable micropipette with tips, test tubes, microscope or magnifying lens.

Introduction to Plant Cell Culture

Genetic modification of plants is a highly controversial area of biotechnology. All such experiments in plants begin with establishing plant cells in culture. This involves de-differentiating plant cells to form plant "stem cells". Your students will establish cell cultures of African Violets from leaves. They will then use plant growth regulators to encourage root growth from the cultured cells, and produce a mature plant.

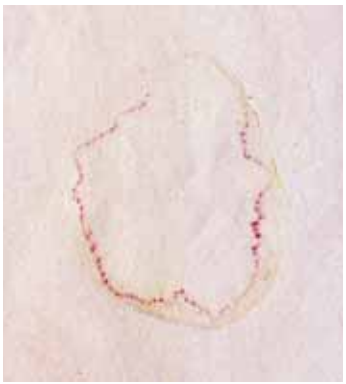
For 10 Lab Groups

Complete in 60 min. plus several weeks for growth

Cat No 908

Kit includes: instructions, shoot initiation and elongation growth medium, Tween, Petri dishes, growth containers, peat pellets.

All you need: A healthy African Violet (*Saintpaulia ionantha*)



Tissue Printing: Detection of *Brassica* Phloem Cells

Multicellular organisms are made up of many different types of highly specialized cells each with a particular function. Different cell types can be identified from the combination of proteins that are expressed on a cell's surface. These can be detected using monoclonal antibodies. In this experiment your students will identify phloem cells in any *Brassica* family member (broccoli, brussel sprouts or cauliflower) by tissue printing a freshly cut stem onto a charged membrane. Using a primary and secondary antibody, the phloem cells will be clearly identified as bright red.

For 10 Lab Groups

Complete 2.5 hrs.

Cat No 940

Kit includes: instructions, buffer, non-fat dry milk, primary and secondary antibodies, Fast Red Salt, Naphthol salt, Petri dishes, nylon membranes.

All you need: plant tissue (cauliflower, brussel sprout, broccoli or other *Brassica*), magnifying glass or microscope.

What Are Quick Plants?

Arabidopsis plants are used extensively in biotechnology and genetics laboratories because of their useful growth characteristics. They are small, self-pollinating and complete their life cycle in only 5-6 weeks which makes them ideal for both research and classroom use. *Arabidopsis* are members of the mustard family, *Brassicacea*, which includes cabbage, broccoli and watercress.

We have several different mutants for your students to study. They can see Mendelian ratios for themselves and even genotype the mutants using one of the most exciting molecular biology techniques in classroom - PCR.

SECTION TEN

10 Eco Science

Water is essential for life. Yet many millions of people around the world face water shortages. Many millions of children die every year from water-borne diseases. And drought regularly afflicts some of the world's poorest countries. The world needs to respond much better.

KOFI ANNAN FORMER UNITED NATIONS SECRETARY-GENERAL

Can biotechnology help the environment?

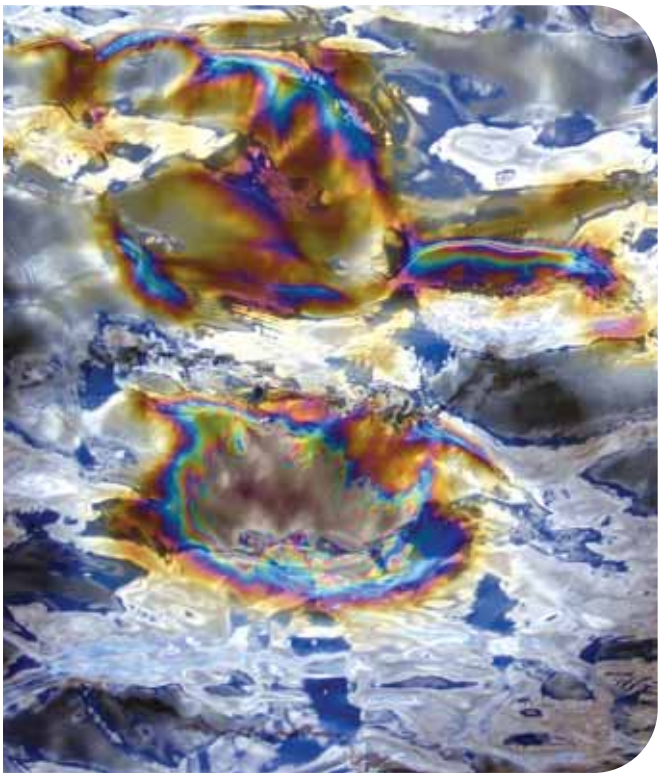
Biotechnology and the environment are not usually associated in a positive way these days. However, the use of molecular biology techniques has rapidly improved environmental monitoring in recent years and biotechnology may help to solve some environmental problems in the future.

The sensitivity of molecular biology enables scientists to quickly and accurately identify both the type of contamination and its source, and whether it is microbial or man made. For instance, use of Polymerase Chain Reaction (PCR) enables the identification of outbreaks of pathogens such as MRSA much more quickly than was possible using traditional microbiology techniques. Such methods could take days or even weeks to identify a pathogen and could never be sure to identify the source of contamination with complete accuracy. This has now all changed thanks to molecular biology.

Your students can try both traditional and molecular techniques for analyzing contamination. In our How Clean Is the Water We Drink and Air We Breathe Kit, your students can use simple microbiology techniques. They can try more sophisticated microbiological techniques using fluorescent dyes in our Water Quality Testing Kit 1.

However, for the latest in molecular techniques, try one of our PCR kits. Water Quality Testing Kit 2 shows how PCR is used to detect water contamination whereas our PCR-Based Identification of Genetically Modified Foods Kit can be used to look for GMO contamination in the environment.

In parallel with the increased use of molecular techniques to detect and identify contamination and pollution, the same techniques are being developed to remove pollution once it has happened. Traditional methods to clean up oil spills with detergents cause almost as much harm as the oil itself. New methods using oil eating bacteria remove the oil without causing harm to the environment. Your students can try this for themselves with our Oil Eating Bacteria Kit.



Oil spillages cause devastation to marine environments. Biotechnology offers new solutions.

Ecotechnology

How Clean Is the Water We Drink & the Air We Breathe?

Your class will make the invisible, visible! With this kit, your students will sample water and air and then grow any microbes present overnight. A safe and simple way to teach pollution.

For 10 Lab Groups

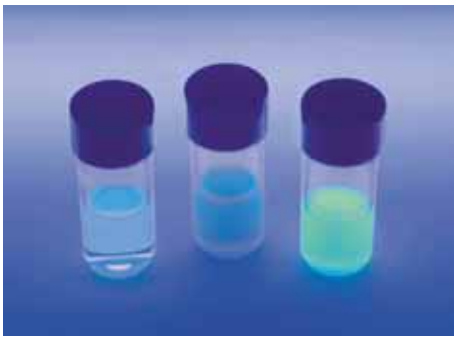
Complete in 30 minutes and grow overnight

Cat No S-30

Kit includes: instructions, multispot slides (4 cell types each), eosin and methylene blue stain, mounting medium, cover slips, transfer pipettes, immersion troughs.

All you need: microscope with 400x magnification.

Water Quality Testing I: Chromogenic Analysis of Water Bacteria Contaminants



Safe drinking water is vitally important to health. Both pathogenic and harmless bacteria can be found in the guts of mammals and birds. Testing water for every possible type of pathogenic bacteria is slow and costly. Thus, water is tested for a characteristic type of gut bacteria - the coliforms - including the familiar *E.coli*. Presence of coliforms is an indicator of fecal contamination.

In this experiment your students will test for coliforms in simulated contaminated water using colour and fluorescent reagents. They can use these same reagents to test water samples from the environment. As an extension activity, a Gram Stain test can be performed on the collected samples.

For 10 Lab Groups

Complete in 30 minutes and grow overnight

Cat No 951

Kit includes: instructions, ReadyPour Agar, fluorescent reagents, Petri dishes, inoculating loops, sterile swabs, microtubes.

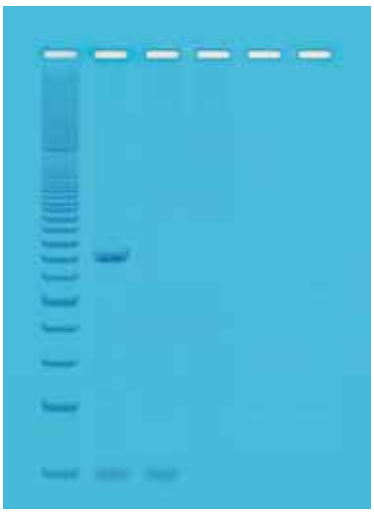
All you need: long wave UV lamp, microscope, slides and coverslips.

Perfect Partner

Long Wave UV Mini Lamp

A safe, simple to use battery-operated portable mini long wave ultraviolet light.

Cat No 969



Water Quality Testing II: PCR-Based Testing of Water Contaminants

Now your students can use PCR to detect water pollution due to sewage contamination. In this experiment safe bacterial strains will be provided and dilutions will be made to determine the number of bacterial cells that are required to obtain a successful PCR result. As an extension to this experiment students will be able to test for water contamination in samples they provide.

For 10 Lab Groups

PCR 120 min. or overnight Electrophoresis 45 min.

Cat No 952

Kit includes: instructions, control DNA and primers, DNA ladder, *E. coli* control strain, chelating agent, proteinase K, PCR beads, gel loading dye, agarose, electrophoresis buffer, gel stain.

All you need: micropipettes to measure between 5 and 50 µl (or 5,10, 30, 50 µl fixed volume minipipettes), waterbath, microcentrifuge, thermal cycler, electrophoresis tank and power supply.

Ecological Equilibrium I: NEW Population Studies of Unicellular Organisms

Students will test ecological conditions that impact microbial growth. Factors to be tested include growth conditions, population doubling time, and impact of environmental pressures such as nutrients, temperature, toxicity and growth limiting factors. Students will graph results that are obtained.

For 10 Lab Groups

Requires 2 hour lab session and overnight growth.

Cat No 958

Kit includes: instructions, various nutrient components, ReadyPour Luria Broth Agar, fluorescent reagents for bacterial detection, petri plates, pipettes, inoculating loops, sterile swabs.

All you need: incubation oven, microscope, slides & slide holders, 95% ethanol.

Bioremediation by Oil Eating Bacteria

Oil spills cause devastation to the environment killing sea life, birds, and coastal plants. Spraying areas of contamination with oil-eating microbes accelerates the degradation of the oil. This process is known as bioremediation. In this open-ended experiment, students will grow a mixture of oil-eating bacteria and observe their effectiveness at degrading a variety of oils.

For 10 Lab Groups

After establishment of cultures, lab requires 50 min. (Can be done over several days or weeks.)

Cat No 956

Kit includes: instructions, oil-eating bacteria, growth medium, pipettes.

All you need: incubation oven, growth flasks, vegetable oil (or other food oils).

SECTION ELEVEN

11 Bringing it All Together

Science is a way of thinking much more than it is a body of knowledge.

CARL SAGAN, ASTRONOMER AND ASTROCHEMIST.

Bringing it All Together

How did we discover green fluorescent protein is what causes bioluminescence in jellyfish? How did we engineer bacteria that could make insulin to treat people with diabetes? How did we discover there are genes that make people more susceptible to cancer?

The answer is, of course, through biotechnology. Scientists use many different biotechnology techniques to gain an understanding of how DNA, RNA and proteins produce a phenotype in an individual at the cellular or whole organism level.

How do scientists put the pieces of the puzzle together? In this section, you will find kits that link together many biotechnology techniques to answer a molecular question.

Whether you want to teach more advanced concepts or you want to bring together your students' knowledge of biotechnology, this section has something for you!

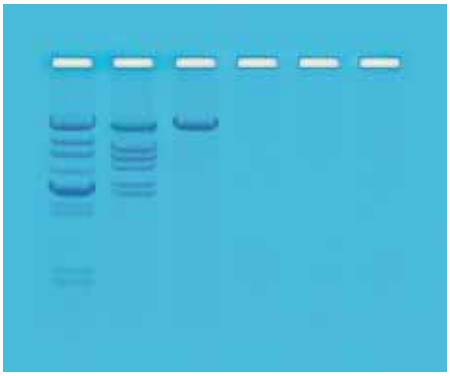
New uses of biotechnology are constantly being reported. Join us at one of our DNA in a Day™ training courses for an update on biotechnology and tips on how you can bring the latest into your classroom with Edvotek's kits and equipment.

See our website or email us at EUinfo@edvotek.com to find a course near you.

BRINGING IT ALL TOGETHER

Restriction Enzymes

Cleavage of Lambda DNA with *Eco* RI Endonuclease: Intro to Restriction Enzymes



The DNA from bacteriophage lambda is a well-characterised linear molecule containing six recognition sites for *Eco* RI (5 distinct sites; 2 are very close in size). In this experiment, Lambda DNA is digested by the *Eco* RI endonuclease. The digestion products are analysed by agarose gel electrophoresis.

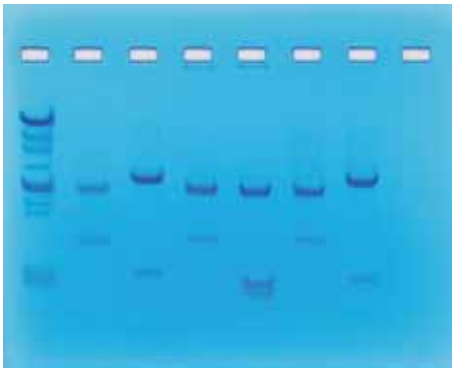
For 5 Lab Groups
Complete in 90 min.
Cat. No. 212

Kit includes: instructions, Lambda DNA, Dryzymes, Reconstitution buffer, Restriction enzyme reaction buffer, enzyme grade water, Standard DNA Fragments, various solutions and buffers, agarose powder, stains.

All you need: electrophoresis tank, power supply, 5-50 µl adjustable or 5 µl and 40 µl fixed volume micropipettes, waterbath, white light box.

DNA Fingerprinting - Using Restriction Enzymes

BEST SELLER

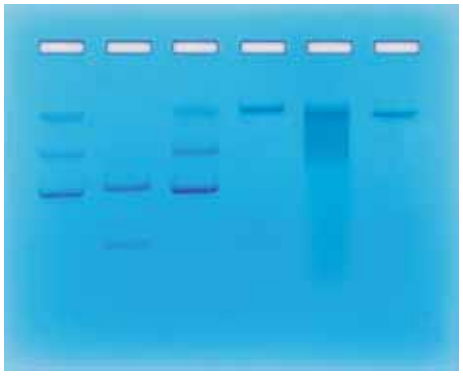


Teach your students about restriction enzyme digests in the context of forensic science! Your students will cut DNA with restriction enzymes and then compare the banding pattern of the crime scene DNA versus that of two suspects using agarose gel electrophoresis.

For 6 Lab Groups
Complete in 90 min.
Cat. No. 225

Kit includes: instructions, "crime scene" Ready-to-Load DNA samples, Standard DNA Fragments, Dryzymes - *Eco* RI and Hind III, various solutions & buffers, plasmid DNA, enzyme grade water, agarose powder, stains.

All you need: electrophoresis tank, power supply, 5-50 µl adjustable or 5, 10, 15 and 40 µl fixed volume micropipettes, waterbath, balance, white light box.



Restriction Modification (Methylation) of DNA

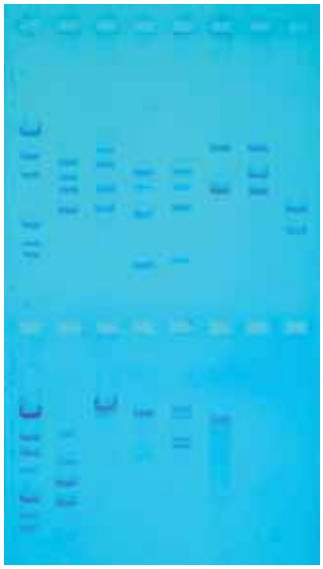
NEW

Bacteria that produce restriction enzymes also harbor a related DNA methylase that has identical base recognition sequences. When the recognition sequence is methylated, the restriction enzyme cannot cleave the DNA. In this experiment, the effect of the restriction enzyme on unmethylated and methylated DNA are examined. Reaction products are analysed by electrophoresis.

For 6 Lab Groups
Complete in 2 hours
Cat. No. 205

Kit includes: instructions, plasmid and chromosomal DNA, Hind III, Eco RI and Eco RI Methylase, Adomet, various solutions and buffers, agarose powder, stains.

All you need: electrophoresis tank and power supply, waterbath, 5-50 µl adjustable or 5, 25, and 40 µl fixed volume micropipettes, white light box.



Cleavage of DNA Restriction Enzymes

NEW

This open-ended laboratory activity allows students to design experiments that will generate specific DNA fragments and determine the accuracy of predicted sizes after separation by agarose gel electrophoresis.

For 6 Lab Groups
Complete in 90 min.
Cat. No. 213

Kit includes: instructions, plasmid DNAs, Lambda DNA, Standard DNA Fragments, Dryzymes - *Eco* RI and Bam HI, Restriction enzyme dilution and reaction buffers, enzyme grade water, various solutions and buffers, agarose powder, stains.

All you need: electrophoresis tank, power supply, waterbath, 5-50 µl adjustable or 5 µl and 35 µl fixed volume micropipettes, white light box.

Purification of the Restriction Enzyme *Eco* RI

In this experiment, students actually purify the restriction enzyme, *Eco* RI! This procedure utilizes an ion exchange chromatography step for *Eco* RI purification. Column fractions are assayed for the enzyme using Lambda DNA and digestion products are identified by agarose gel electrophoresis. Fractions that contain *Eco* RI are identified and pooled. The total & specific activities are calculated. Recommended for advanced courses.

For 5 Lab Groups
Complete in 3 hours
Cat. No. 302

Kit includes: instructions, ion exchange matrix, chromatography columns, *E.coli* cell extract, equilibration & elution buffer, Lambda DNA, Lambda/*Eco* RI Marker, KCl, glycerol, dilution & reaction buffers, gel loading solution, agarose, electrophoresis buffer, stain.

All you need: electrophoresis tank, power supply, UV visualization system, waterbath, microcentrifuge, UV spectrophotometer & cuvettes, automatic micropipet with tips, ring stands & clamps, 10 ml pipets.

DNA Isolation

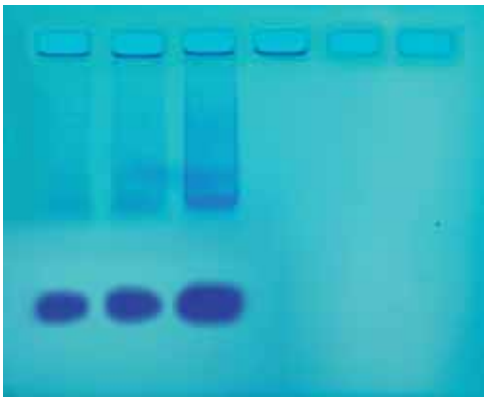
Mini-Prep Isolation of Plasmid DNA NEW

Small-scale rapid isolation of plasmid DNA is a routine procedure used for screening and analysis of recombinant DNAs in cloning and subcloning experiments. In this experiment, students isolate plasmid DNA without the use of toxic chemicals such as phenol or chloroform.

For 5 Lab Groups
Complete in 60 min.
Cat. No. 202

Kit includes: instructions, various solutions and buffers, agarose powder, stains.

All you need: electrophoresis tank and power supply, waterbath, microcentrifuge (10,000 rpm), 5-50 µl adjustable or 40 µl & 50 µl fixed volume micropipettes, 95-100% isopropanol, white light box.



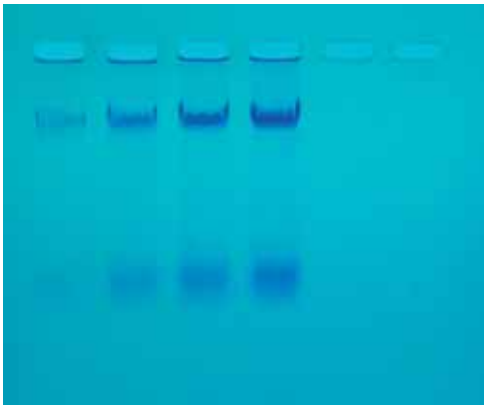
Isolation of *E. coli* Chromosomal DNA NEW

Isolation of high molecular weight chromosomal DNA is the first step in molecular cloning since it is the source of genes in cells. This experiment provides DNA Extraction LyphoCells and reagents for isolating chromosomal DNA from *E. coli*. After spooling from solution, the DNA can be dissolved and analysed by agarose gel electrophoresis as an optional lab extension activity.

For 5 Lab Groups
Complete in 60 min.
Cat. No. 203

Kit includes: instructions, LyphoCells, various solutions and buffers, agarose powder, stains.

All you need: waterbath, 95-100% isopropanol. For optional electrophoresis: electrophoresis tank, power supply, 5-50 µl adjustable or 40 µl fixed volume micropipette, white light box.



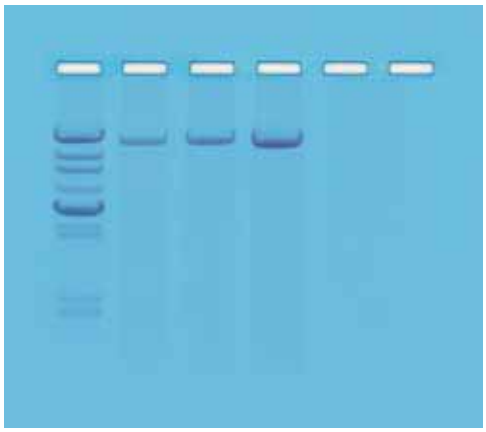
Isolation & Gel Analysis of DNA from Plants

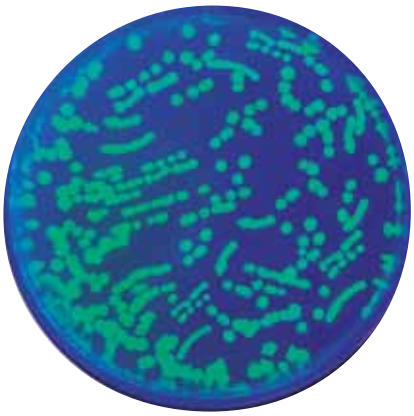
A complete experiment kit for the isolation of plant DNA from pea plants. Students will grow and then harvest plants, air dry them, and perform the steps necessary to isolate the plant DNA. The DNA is analysed by agarose gel electrophoresis.

For 6 Lab Groups
Complete in 90 min.
Cat. No. 907

Kit includes: instructions, pea seeds, DNA extraction buffer, B-mercaptoethanol, Ammonium acetate, TE buffer, standard genomic DNA, gel loading solution, UltraSpec-Agarose powder, electrophoresis buffer, InstaStain Methylene Blue.

All you need: electrophoresis tank, power supply, waterbath, Sorvall centrifuge, micropipet, microcentrifuge, 95-100% isopropanol, horticulture grade vermiculite, white light box.





Exploring Biotechnology with Green Fluorescent Protein (GFP)

Four experimental modules are combined into one experiment to provide a **comprehensive** biotechnology exploration focusing on the green fluorescent protein (GFP). Bacterial cells are transformed to express the green fluorescent protein (GFP). The transformed cells are then grown and the GFP is purified by column chromatography. Finally, the purity of the protein fractions are analysed by SDS polyacrylamide electrophoresis.

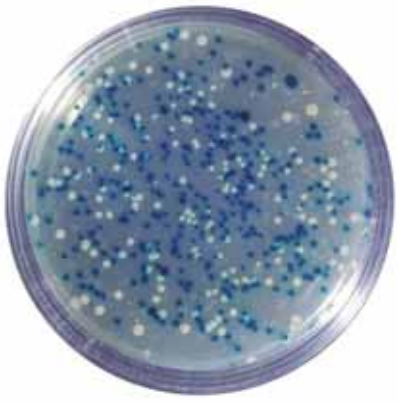
For 6 Lab Groups

Transformation 50 min.
plus overnight incubation
Chromatography 45 min.
Optional electrophoresis 90 min.

Cat. No. 303

Kit includes: instructions, transformation cells, plasmid DNA for GFP, IPTG, ampicillin antibiotic, calcium chloride, ReadyPour luria broth agar, luria broth media for recovery, petri plates, pipets, calibrated transfer pipets, inoculating loops, microtest tubes with attached caps, toothpicks, dry matrix for columns, chromatography columns, green and blue fluorescent protein extracts, elution buffer, protein molecular weight standards, protein denaturation solution, glycerol solution, Tris-Glycine-SDS buffer, stains

All you need: incubation oven, waterbaths, automatic micropipet and tips, long wave UV light, ring stand and clamps, lab glassware, ice, vertical gel electrophoresis apparatus and power supply, 3 Polyacrylamide Gels (12%), glacial acetic acid, methanol.



Blue/White Cloning of a DNA Fragment & Assay of ß-galactosidase

INCLUDES LYPHOCELLS

When DNA is subcloned in the pUC polylinker region, ß-galactosidase production is interrupted, resulting in the inability of cells to hydrolyse X-Gal. This results in the production of white colonies amongst a background of blue colonies. This experiment provides a DNA fragment together with a linear plasmid and T4 DNA Ligase. Following the ligation to synthesize the recombinant plasmid, competent *E. coli* cells are transformed and the number of recombinant antibiotic resistant white and blue colonies are counted. ß-galactosidase activity is assayed from blue and white bacterial cells.

For 5 Lab Groups

Ligation 60 min.
Transformation 40 min.
plus overnight incubation

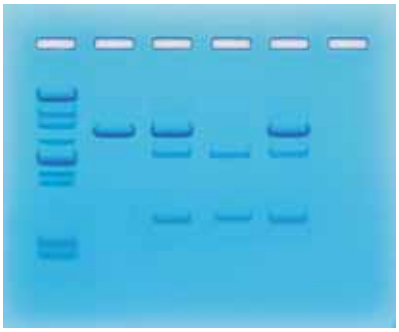
Cat. No. 300

Kit includes: instructions, Linearized pUC plasmid & DNA fragment, T4 Ligase, Bacterial LyphoCells for transformation, reconstitution buffer, X-Gal in solvent, IPTG, calcium chloride, antibiotic, ReadyPour Luria Broth Agar, Luria broth media for recovery, growth media, assay components, plastic supplies

All you need: incubation oven, waterbaths, automatic micropipet and tips, spectrophotometer, centrifuge, microcentrifuge.

Genetic Disorders

In Search of the Cancer Gene



Suppressor genes such as p53 are essential for cell functions. Mutations in the p53 gene can be correlated to predisposition for certain cancers. Mutations in genes can either be inherited or accumulated due to environmental insults. This experiment deals with a family pedigree determination of several generations relating to cancer formation due to p53 gene mutation.

For 6 Lab Groups

Complete in 60 min.

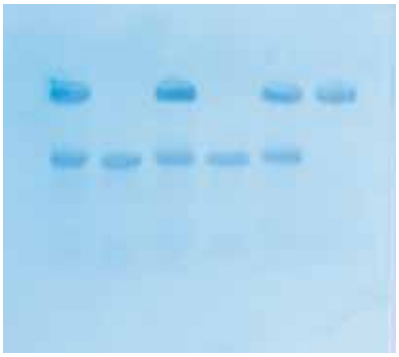
Cat. No. 314

Kit includes: instructions, Ready-to-load Predigested DNA samples, UltraSpec-Agarose powder, practice gel loading solution, electrophoresis buffer, InstaStain Ethidium Bromide, pipet, 5 autoradiograms.

All you need: electrophoresis tank & power supply, automatic micropipet with tips, waterbath (65°C), UV Transilluminator.

In Search of the Sickle Cell Gene by Southern Blot

READY TO LOAD



Southern blotting is an important technique used widely in clinical genetics and research. By transferring DNA from an agarose gel onto a membrane, the method allows you to analyse and identify the DNA bands on a gel precisely. Your students will use Southern blotting to find a point mutation in the hemoglobin gene indicating Sickle Cell Anemia.

For 5 Lab Groups

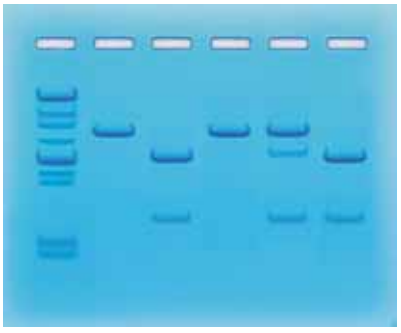
Electrophoresis 45 min
Blotting overnight
Staining & destaining 10 min

Cat. No. 315

Kit includes: instructions, Ready-to-Load DNA samples, agarose, electrophoresis buffer, nylon membranes, filter paper, blot stain.

All you need: electrophoresis tank, power supply, waterbath and 80°C incubation oven.

In Search of the Cholesterol Gene



Coronary heart disease and stroke are major causes of death in the Western world. Elevated blood cholesterol levels are a serious risk factor for both conditions. The genetic disease familial hypercholesterolemia (FH) causes an increase in blood levels of the "bad" form of cholesterol, low density lipoprotein (LDL). In untreated patients with the mutant FH gene, the condition can cause premature death. This experiment introduces the colourimetric enzymatic reaction which is the basis of the clinical cholesterol test. In addition, using agarose gel electrophoresis, students will analyse a simulated genetic screening for a disease.

For 10 Lab Groups

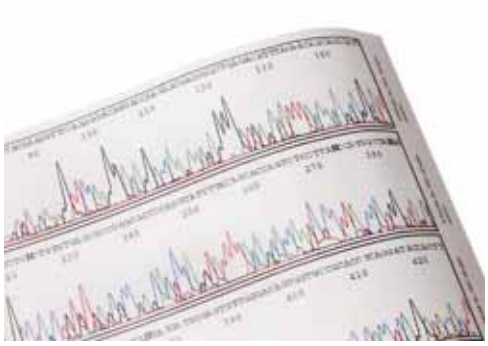
Gel Prep 30 min.
Electrophoresis 45 min.
Staining 2 min.
Cholesterol assay 60 min.

Cat. No. 316

Kit includes: instructions, cholesterol standard solution, standard DNA markers, control samples, simulated patient serum samples and DNA samples, cholesterol oxidase enzyme, potassium iodide, acidification solution, colour enhancer & colour developer, agarose, electrophoresis buffer, stain.

All you need: electrophoresis tank, power supply, automatic micropipet with tips, incubation oven or waterbath, spectrophotometer and cuvettes, transilluminator.

Human DNA



Sequencing the Human Genome

Actual data representing important genes from automated DNA Sequencers are provided. Students will determine the DNA sequence, compare and extrapolate database information and identify the gene product and other closely related proteins. Data is discussed within the framework of the Human Genome Project.

For 10 Lab Groups.
Complete in 45 min.
Cat. No. 339

Kit includes: instructions, automated sequencing printouts

All you need: the internet!

DNA Bioinformatics

DNA sequence information is being compiled by various genome initiatives and numerous research groups around the world. The management of this data is known as bioinformatics. This information is stored in various DNA sequence databases which can be readily accessed via the internet. In this experiment, students read x-rays containing DNA sequences which represent segments of important cellular genes. Using bioinformatics databases, students compare and extrapolate database information and identify the gene product.

For 12 Lab Groups.
Complete in 45 min.
Cat. No. 340

Kit includes: instructions, 3 sets of 4 autoradiograms

All you need: white light box, the internet.

DNA Fingerprinting: Southern Blot Analysis Using Non-Isotopic Detection of DNA

In this experiment, students gain experience in non-isotopic DNA detection & the use of Southern Blot analysis in DNA fingerprinting for a hypothetical paternity test. Includes 3 modules: agarose gel electrophoresis, Southern Blot transfer, and non-isotopic detection of DNA.

For 5 Lab Groups

Electrophoresis - 45 min
Blotting - overnight
Non-Isotopic Detection 3-4 hrs.

Cat. No. 311

Kit includes: instructions, predigested DNA samples, buffers, NBT/BCIP tablets, streptavidin-Alkaline Phosphatase, nylon membranes, filter paper, UltraSpec-Agarose powder.

All you need: electrophoresis tank & power supply, automatic micropipet with tips, waterbath, incubation oven, NaCl, NaOH, concentrated HCl.

SECTION TWELVE

12 Equipment & Reagents

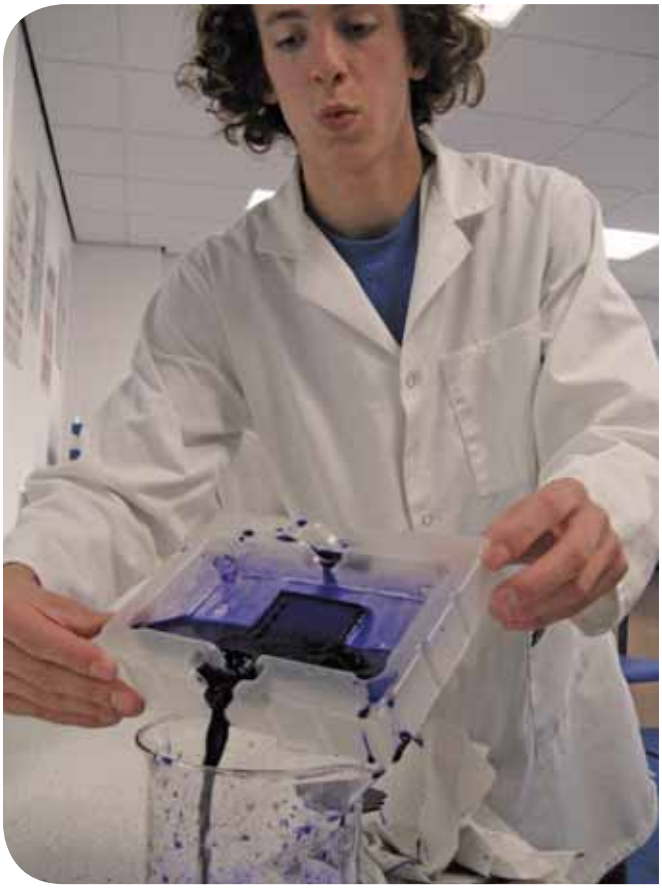
Technology Drives Biology

These days, advances in our understanding in biology are driven as much by advances in technology as in our ability to come up with new theories. The human genome project could not have happened until super fast DNA sequencing machines were developed nor could the data be interpreted until super fast computers were built. With advances in technology comes an ability to ask new questions.

Bring your students into this exciting world. Using the latest in molecular biology equipment, your classroom will be transformed into a state-of-the-art research lab!

See page 81

For information about our affordable EdvoCycler!



What Are LabStations™?

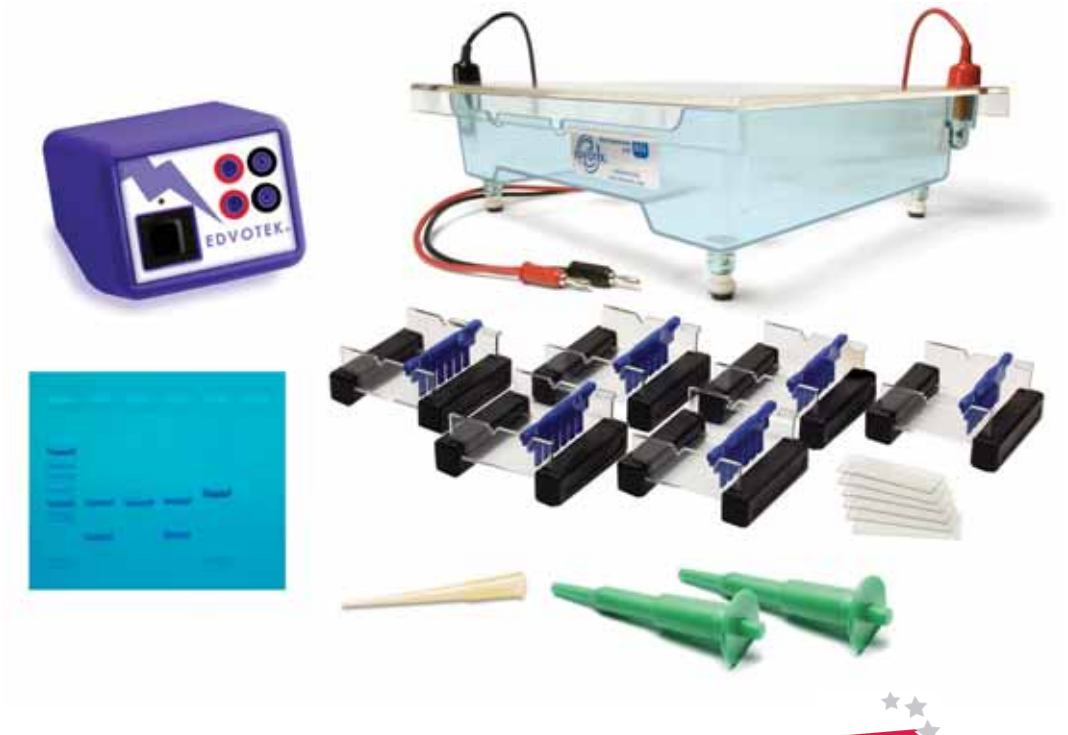
LabStations are pre-selected packages that save you money!

EDVOTEK offers a variety of LabStations for all classroom sizes and budgets.

We also offer CUSTOM LabStations to suit your individual needs.

For more information, contact a Bioeducation specialist at EUinfo@edvotek.com

Electrophoresis



Classroom DNA Electrophoresis LabStation

BEST SELLER

An amazingly good value way to bring DNA electrophoresis to your class! This LabStation provides all you need to run any of our DNA or dye electrophoresis kits with your students. It includes an electrophoresis tank, power supply, two pipettes, tips and even a DNA fingerprinting kit!

For 6 Lab Groups

Cat No 5062

LabStation Includes:

1	Cat No 515	M36 HexaGel Electrophoresis Tank (Six 7 x 7 cm Trays)
1	Cat No 507	DuoSource Power Source (75 V for 1 or 2 units)
2	Cat No 588	Fixed Volume MiniPipette (40 µl)
1	Cat No 636	Yellow Micropipette Tips (1 - 200 µl / 2 Racks of 96)
1	Cat No 130	DNA Fingerprinting Classroom Kit

SPECIAL OFFER

Upgrade this LabStation!

That's right – upgrade the *Classroom DNA Electrophoresis LabStation* to include an EVT 300 Power Supply (75/150 V) plus four extra pipettes!

Same specification as above but with Cat No 509 (instead of the 507) plus four extra pipettes.

Cat No 5062-2

Classroom PCR LabStation

NEW

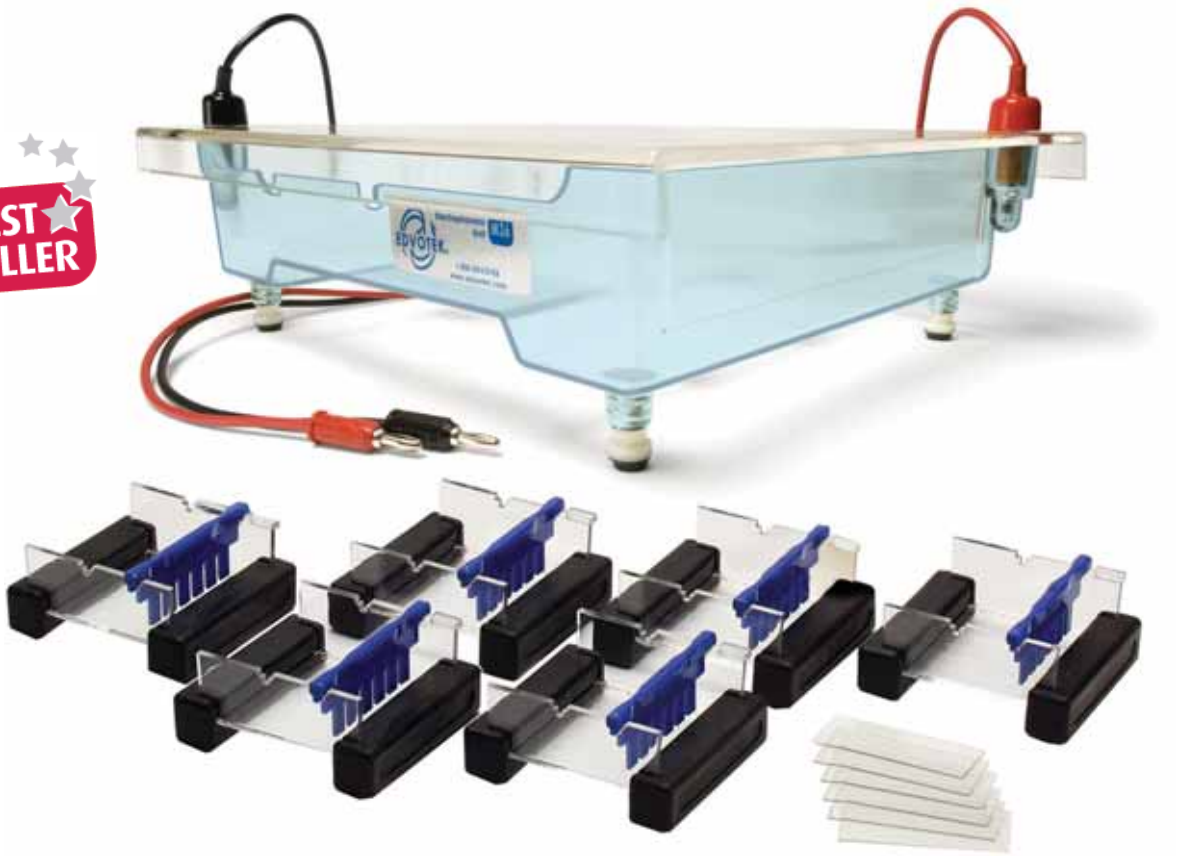
Our PCR LabStation gives you enough equipment to carry out any of our PCR kits with your entire class! This set is sure to give you great results every time!

For 6 Lab Groups

Cat No 5067-1

LabStation Includes:

6	Cat No 502	M12 Electrophoresis Tank (7 x 14 cm Tray)
3	Cat No 509	EVT 300 Dual Power Source (75/150 V, for 1 or 2 units)
6	Cat No 590	Variable MicroPipette (5 - 50 µl)
2	Cat No 534	Piccolo centrifuge
1	Cat No 541	EdvoCycler (25 x 0.2 ml)



M36 HexaGel™ Electrophoresis Tank

DNA electrophoresis for your whole class with just a single gel tank! Six groups of students can load their own individual gels and the six gels are run together in 30-40 minutes giving excellent results! Eliminate cumbersome gel tray taping and pour gels quickly and easily with our innovative gel tray sealing rubber end caps.

Features:
- Six 7 x 7 cm Trays
- Six 6-tooth combs
- Twelve rubber end caps
- Tank dimensions (W x D x H) 28 x 33 x 12 cm

For 6 Lab Groups

Cat No 515

All of our electrophoresis tanks feature:
- Seamless injection-molded bases
- Safety interlock cover
- Corrosion-resistant platinum electrodes
- Safety insulated electrical leads
- Adjustable leveling feet

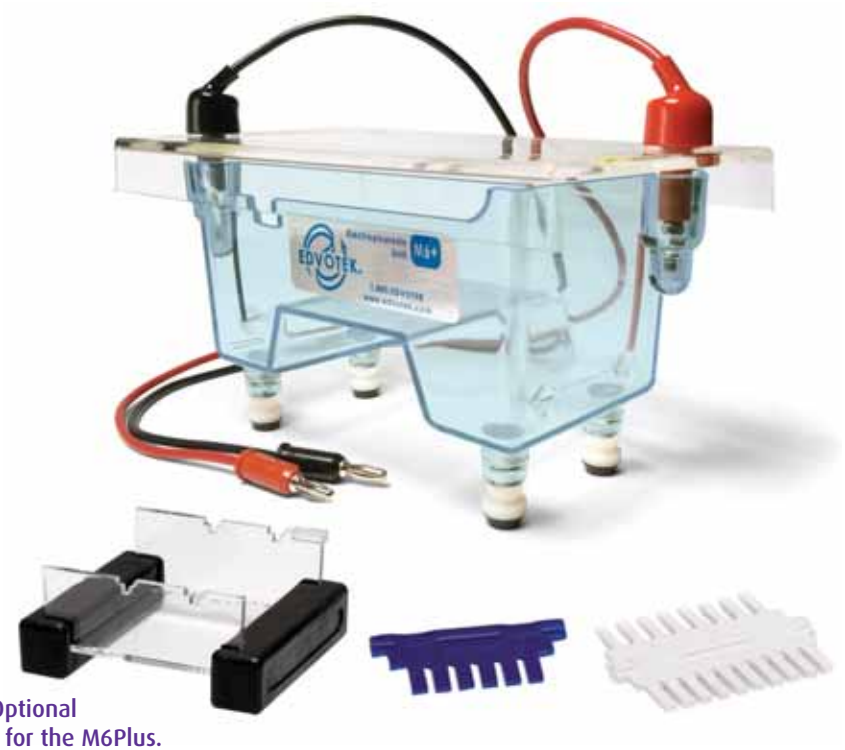
M6Plus Electrophoresis Tank

Runs one group of student samples (or a classroom demonstration) in 30-40 minutes.
Durable and easy to use!
Excellent results every time!

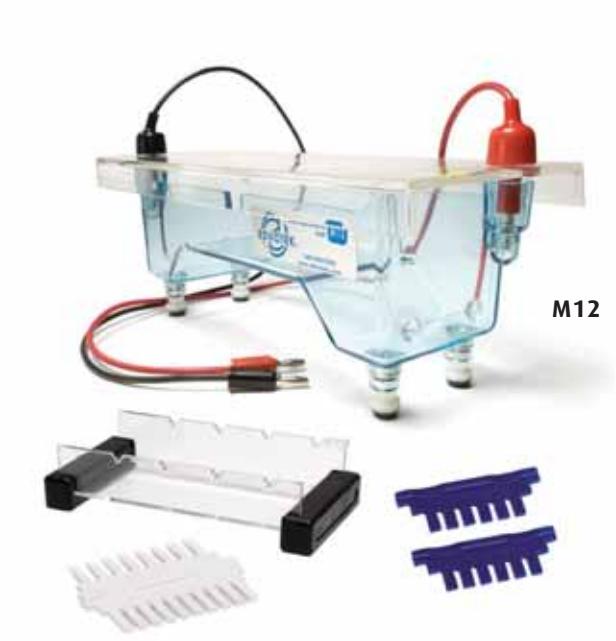
M6Plus Features:
- One 7 x 7 cm Tray
- One Six 6 tooth comb
- One 8/10 tooth comb
- Two rubber end caps

For 1 Lab Group

Cat No 500



New Optional
7 x 10 cm tray for the M6Plus.
See p. 79



M12

M12 Dual

M12 or M12 Dual Electrophoresis Tank

Run up to two groups of student samples at the same time. Chose either two 7 x 7 cm gel trays or one 7 x 14 cm gel tray. Gives excellent results in 30-40 minutes.

M12 Features:
- One 7 x 14 cm Tray
- Two Six 6 tooth combs
- One 8/10 tooth comb
- Two rubber end caps

For 2 Lab Groups

Cat No 502

M12 Dual Features:
- Two 7 x 7 cm Trays
- Two Six 6 tooth combs
- Two 8/10 tooth combs
- Four rubber end caps

For 2 Lab Groups

Cat No 504

Protein LabStation NEW

Bring the amazing world of proteins to life in your classroom! This set enables you to do most of our protein electrophoresis experiments (Cat No 150, 153 and 253). Show your students how modern protein electrophoresis is carried out!

For 4 Lab Groups

Cat No 5065

LabStation Includes:

2	Cat No 581	MV10 Vertical Electrophoresis Tank
1	Cat No 507	DuoSource 75 V Power Supply
6	Cat No 586-1	Fixed MiniPipette (20 µl)
1	Cat No 638	Fine Tip Micropipette Tips (1 - 200 µl), 2 racks of 96

PreCast Polyacrylamide Gels

Cat No 651
Includes three 12% precast gels
Requires refrigeration

Cat No 652
Includes six 12% precast gels
Requires refrigeration

MV10 Vertical Electrophoresis Tank

Designed for separation of proteins on polyacrylamide gels. The MV10 unit holds one 9 x 10 cm gel cassette and can accommodate most pre-cast or self-made gels.

MV10 Features:
- Holds one gel cassette
- All platinum electrodes
- Safety interlock cover
- Safety electrical leads

For 2 Lab Groups (sharing a gel)

Cat No 581

Electrophoresis Accessories

6 Tooth Comb
Cat No 680

Double Comb 8/10
Cat No 683

Gemini Split Tray for #M12
Cat No 535

E-Z Align™ Tray 7 x 7 cm
Cat No 684

NEW

E-Z Align Tray 7 x 10 cm
New double tray for the M6Plus!
Cat No 686

E-Z Align Tray 7 x 14 cm
Cat No 685

Power Supplies

DuoSource™ & EVT 300 Power Supplies

BEST SELLER

These great value power supplies run gels quickly! Both power supplies operate two M6Plus units, two M12 units or two HexaGels (at 75 V). The DuoSource runs gels in 40-50 minutes (at 75 V) and the EVT 300 runs gels as fast as 20-30 minutes (at 150 V).

DuoSource

75 V for 1 or 2 units

Cat No 507

EVT 300

75 V /150 V for 1 or 2 units

Cat No 509

TetraSource™ 300 Power Supply

Designed to power four M6 or M12 units, or two HexaGels units at a time! Features an easy-to-use fully programmable interface for setting voltage, current or timer control with each parameter displayed in real-time. You can even pause or resume the program at any point. It gives you maximum control and flexibility.

10-300 V for 1 to 4 units

Cat No 5010

PCR Equipment

NEW BEST SELLER

EdvoCycler™

Finally, a PCR machine at an affordable price!

Now you can teach your students about PCR with a practical! The EdvoCycler is a purpose built classroom PCR machine that is easy to use. Your students can amplify DNA from a variety of sources, including their own DNA, with one of our many PCR kits. (See Section 5 for more details.)

EdvoCycler Features:

- Holds 25 x 0.2ml tubes
- Heated lid with magnetic latch
- Pre-programmed with all Edvotek PCR kit protocols
- Vivid LCD display with live programme information
- Easy to use

Dimensions 41cm x 22cm x 18cm

Cat No 541

Teachers and technicians learning about PCR at our DNA in a DAY™ course.

Pipettes & Liquid Handling

Variable Micropipettes

Our Variable Micropipettes are sturdily designed with volumes ranging from 0.1 to 5000 µl. They are easy to use, highly accurate and use standard micropipette tips. The volume is easily selected by twisting the top. The lightweight design and tip ejector makes operation fast & easy. A tool and instructions are included for self-calibration.

Cat No 589-2 0.1 - 2.5 µl Micropipette
Cat No 589 0.5 - 10 µl Micropipette
Cat No 589-1 2 - 20 µl Micropipette
Cat No 590 5 - 50 µl Micropipette
Cat No 591 10 - 100 µl Micropipette
Cat No 591-1 20 - 200 µl Micropipette
Cat No 592-1 100 - 1000 µl Micropipette
Cat No 593-1 1000 - 5000 µl Micropipette

BEST SELLER

Micropipette Tips

Ultra Micropipette Tips (0.5-10 µl)
Cat No 635 2 racks of 96 each

Yellow Micropipette Tips (1-200 µl)
Cat No 636 2 racks of 96 each

Cat No 636-B Bag of 1000 tips

Blue Micropipette Tips (200-1000 µl)
Cat No 637 2 racks of 96 each

Cat No 637-B Bag of 1000 tips

Fine Tip Micropipette Tips (1-200 µl)
Cat No 638 2 racks of 96 each

Pipette Stand

For 6 Micropipettes
Cat No 796

Pipettes & Liquid Handling

Fixed Volume MiniPipettes™

Robust, accurate, easy to use, colour coded, fun & cost effective micropipettes which use standard micropipette tips. No need to calibrate and impossible to measure the wrong volume!

Cat No 585	5 µl	**Cat No 588-1**	50 µl
Cat No 586	10 µl	**Cat No 588-2**	75 µl
Cat No 586-1	20 µl	**Cat No 588-3**	100 µl
Cat No 587	25 µl	**Cat No 588-4**	200 µl
Cat No 587-1	30 µl		
Cat No 587-2	35 µl		
Cat No 588	40 µl		

BEST SELLER

Electronic Pipetting Pump

The all-new Electronic Pipetting Pump is a lightweight cordless pipetting controller ideally suited as an aliquoting tool for instructors and teaching assistants. It uses all standard serological pipettes. The speed can be fine-tuned by applying varying finger pressure to the operating buttons.

Cat No 594

Pumps & Pipettes

Green Pipetting Pump (For pipettes 5-10 ml)
Cat No 640

Blue Pipetting Pump (For pipettes up to 2 ml)
Cat No 641

1 ml Pipettes, Disposable
Cat No 644 200/pkg

5 ml Pipettes, Disposable
Cat No 645 50/pkg

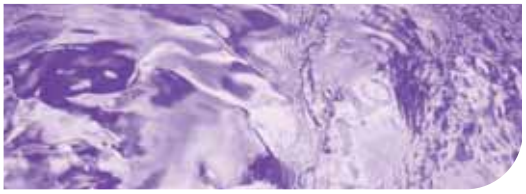
10 ml Pipettes, Disposable
Cat No 646 50/pkg

Transfer Pipettes

Micro Transfer Pipettes, Disposable
Cat No 632 400/pkg

Calibrated 1 ml Transfer Pipettes
Cat No 647 200/pkg

Waterbaths



Edvotek 1.8 L Digital Waterbath

BEST SELLER NEW

This classic Edvotek waterbath has been improved to now include digital temperature control! We've also added a low-water sensor and deepened the chamber to hold more bottles and flasks. The stainless steel chamber is corrosion resistant and temperature controlled from ambient to 95°C with cover. Chamber Dimensions (W x D x H): 15 x 14 x 10 cm.

Cat No 539

Edvotek 10 L Digital Waterbath

NEW

The all-new Edvotek 10 L waterbath incorporates digital temperature control and an optional shaking capability! We've also added a low-water sensor and the deep chamber holds virtually any bottle or flask. The stainless steel chamber is corrosion resistant and temperature controlled from ambient to 95°C with cover.
Chamber Dimensions (W x D x H): 22 x 38 x 15 cm.

Cat No 538

Dual Waterbath

The two-chambered Dual Waterbath is designed for sample incubation at multiple temperatures from ambient to 75° C. Each chamber has capacity of 0.9 L and is great for transformation experiments.
Chamber Dimensions (W x D x H): 13 x 6 x 6 cm

Cat No 543

PCR Bath™

Our unique three-chambered PCR waterbath is ideal for both PCR experiments and for general lab use. Three individual 1.2 L chambers are built into one casing, allowing multiple temperature settings. Temperature control is from ambient to 99°C (with cover). Includes a chamber cover and test tube rack to easily transport samples between baths. Chambers are stainless steel, corrosion resistant, and temperature controlled with an accuracy of ±0.5°C. Chamber dimensions (W x D x H): 15 x 14 x 6 cm
External dimensions: 52 x 20 x 10 cm.

Cat No 544

Dry Block Baths

Dry Block Baths NEW

No more mess! A great alternative to water baths for incubating your samples. Perfect for many uses, such as incubating restriction enzyme digests, and transformation tubes accurately. Base unit comes with a standard single or double block. Other blocks are available - please specify if you want an alternative when ordering.
Dimensions (W x D x H): 20 x 27 x 8 cm.

Cat No 520
Dry Block Bath with Single Block
(20 x 1.5/2.0 ml Tubes)

Cat No 521
Dry Block Bath with Double Block
(40 x 1.5/2.0 ml Tubes)

Cat No 522
Block (24 x 0.5 ml Tubes)

Cat No 523
Block (48 x 0.2 ml Tubes)

Cat No 524
Block (12 x 15 ml Tubes)

Cat No 525
Block (5 x 50 ml Tubes)

Incubator, Rocker, Vortexer

Mini Incubator NEW

Compact and accurate with a broad temperature range, our mini incubator is great for all experiments requiring incubation such as transformation and ELISA.

- Temperature range: ambient +5 to 60°C
- Dimensions (W x D x H)
  Exterior 28.5 x 28 x 33.5 cm
  Interior 23 x 20 x 20 cm

Cat No 545

Perfect Partner

Non Mercury Thermometer

Range: -20 to 110°C NEW

Cat No 765

Rock 'n' Roll Rocker™ NEW

Our rockers are designed for use when staining gels and for general mixing. The rockers are compact with a choice of one or two platforms. You just provide the samples and the music!

Features:
- Variable rocking speed
- Compact size
- Large, corrosion resistant stainless steel platforms
- Dimensions (W x D x H) 29 x 32 x 14.5 cm

Cat No 527
Rock 'n' Roller - Single decker

Cat No 528
Rock 'n' Roller - Double decker

Tornado Vortexer™ NEW

A compact vortex mixer that will accommodate single tubes or a whole handful at once! Two modes, "touch" or continuous operation, make this ideal for any experiments that require vigorous mixing.

Features:
- Powerful motor for efficient mixing
- Two modes: "touch" or continuous operation
- Speed range: 0 - 2,850 rpm
- Dimensions (W x D x H) 14 x 16 x 13 cm

Cat No 5023

Microcentrifuges

Piccolo Centrifuge™ NEW

Our smallest size yet big enough for many classroom uses.
Ideal for quickly spinning down samples and for mixing solutions.
Available in 5 cool colours!

Features:
- Maximum speed 6,000 rpm/2,000 x g
- Safe on/off switch
- Starts and stops in seconds
- Capacity for 6 x 1.5/2.0 ml tubes
- Dimensions (W x D x H) 15 x 15 x 12 cm

Cat No 534 (Grey Piccolo Centrifuge)
Cat No 534-B (Blue Piccolo Centrifuge)
Cat No 534-T (Teal Piccolo Centrifuge)
Cat No 534-P (Purple Piccolo Centrifuge)
Cat No 534-R (Red Piccolo Centrifuge)

Mezzo Centrifuge™ NEW

Perfectly proportioned for an entire class to use.
For quick spins and general mixing.

Features:
- Maximum speed 10,000 rpm/7,176 x g
- Quiet and cool running
- Timer 1 to 60 minutes or continuous
- Capacity for 12 x 1.5/2.0 ml tubes
- Dimensions (W x D x H) 21 x 23 x 19 cm

Cat No 533

Grande Centrifuge™ NEW

Our largest centrifuge - suitable for an entire class to use!
Ideal for more demanding applications such as PCR.
Choose from 5 funky colours!

Features:
- Maximum speed 14,000 rpm/16,000 x g
- Extremely quiet and cool running
- Quick button for momentary operation
- Timer 1 to 30 minutes or continuous
- Capacity for 18 x 1.5/2.0 ml tubes
- Dimensions (W x D x H) 21 x 23 x 19 cm

Cat No 530-G (Grey Grande Centrifuge)
Cat No 530-B (Blue Grande Centrifuge)
Cat No 530-T (Teal Grande Centrifuge)
Cat No 530-P (Purple Grande Centrifuge)
Cat No 530-R (Red Grande Centrifuge)

Cat No 530-1
Adaptor for 0.2 ml tubes & strips.

Cat No 530-2
Grande centrifuge with 24 x 1.5/2.0 capacity

Gel Visualization

White Light Box NEW

Our White Light Box is designed to make viewing gels easier. The viewing surface of 15 x 23 cm is big enough to see any stained gel clearly! It is also great for seeing autoradiograms.

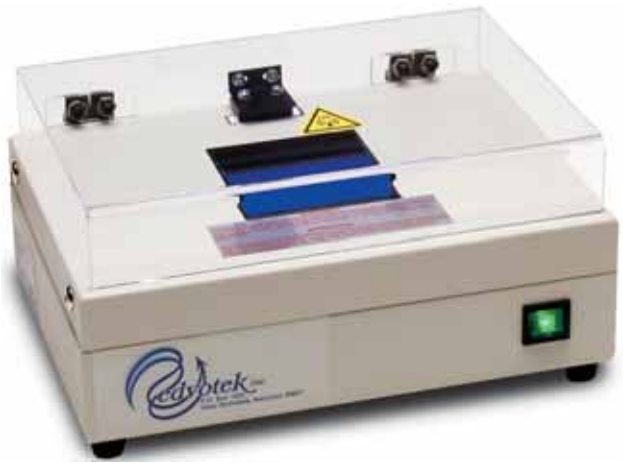
Cat No 552

Midrange UV Transilluminators

The all-new Midrange UV Transilluminators are designed to visualize DNA stained with ethidium bromide. UV filter sizes are either 7.5 x 7.5 cm (Cat No 558) or 10 x 10 cm (Cat No 557). They are optimal for visualizing experiments utilizing ethidium bromide. Safety features include a UV-blocking cover and a power cut-off switch when the cover is opened.

Cat No 558
7.5 x 7.5 cm UV Filter

Cat No 557
10 x 10 cm UV Filter



Long Wave UV Light

A safe, simple to use battery-operated portable mini long wave ultraviolet light.

Cat No 969

Gel Photodocumentation

Personal Digital Photodocumentation

UV System or White Light System

EDVOTEK has combined an easy-to-use digital camera and specially designed hood to provide a low cost alternative for gel photos. Custom hood blocks reflections so lab lights can be left on during use. All close-up lenses and filters are built into the hood for easy operation. Will accommodate gels up to 9.5 x 11 cm. Photos may be downloaded to computer and printed, or stored for future use.

Cat No 551-WL
Digital White LIght System

Cat No 551-UV
Digital UV System

Advanced Digital Photodocumentation

This compact workstation is for capturing images of fluorescent and colourimetric gels, membranes, plates, blots, film and assays. The system combines an advanced camera, lightweight camera hood with sample viewer and easy access door, UV transilluminator and software. Transilluminator includes a 2-year warranty.

Features:

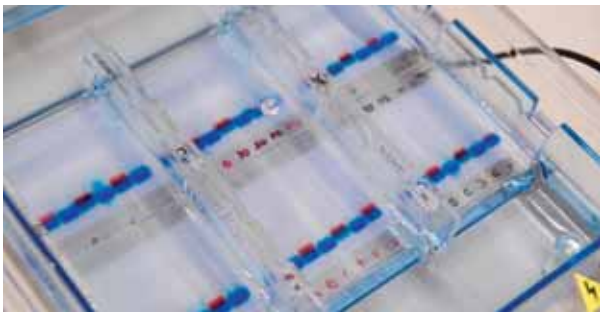
- Advanced digital camera
- Midrange Transilluminator (20 x 20 cm filter)
- Rechargeable battery, charger and AC adapter
- USB 2.0 computer interface
- Analysis software

Cat No 556

Reagents

What is UltraSpec Agarose™ ?

UltraSpec Agarose is tougher than normal agarose so its perfect for classroom use and because you use lower gel concentrations, you use less agarose and save money!



Melt & Pour™ UltraSpec-Agarose

A quick & easy way to make gels! 0.8% UltraSpec-Agarose prepared with TAE buffer. Melt, cool, and pour!

Cat No 601
UltraSpec-Agarose 400 ml

Cat No 601-B
UltraSpec-Agarose 5 x 400 ml

UltraSpec-Agarose Powder

Agarose powder for making DNA gels. Gels are both clearer and stronger than the standard DNA agarose.

Cat No 605
UltraSpec-Agarose 20 g

Cat No 605-B
UltraSpec-Agarose 100 gl

InstaStain Methylene Blue

InstaStain Methylene Blue sheets stain gels in minutes and give high quality and uniform gel staining with excellent results for photography. They are environmentally friendly, avoiding large amounts of liquid stain and waste disposal.

Cat No 2003
40 gels, 7 x 7 cm

Cat No 2006
For various gel sizes, roll - 14 x 350 cm

Cat No 2004
100 gels, 7 x 7 cm

Methylene Blue Plus™ DNA Staining System

Solutions in this system are optimised to shorten the time required for both staining and destaining steps (for 3L).

Cat No 609

Gel Loading (10x) Solution

1 ml concentrate for 200 samples.

Cat No 606

Electrophoresis Buffer 50x TAE

This 50-fold concentrated solution (Tris-acetate, EDTA, pH 7.8) os sufficient for making 5 litres of diluted working buffer for making agarose gels and electrophoresis chamber buffer.

Cat No 607

DNA Gel Markers

Standard DNA Fragments (20 µg for 20 gels).

Cat No 750

Digested Lambda DNA

20 µg for 20 gels.

Cat No 709
Eco RI

Cat No 710
Eco RI and Hind III

Cat No 711
Hind III

Digested pUC8 Plasmid DNA with Eco RI

20 µg for 20 gels.

Cat No 712

What are Dryzymes™?

The three most frequently used restriction enzymes are Eco RI, Bam HI, and Hind III. Each enzyme catalyses cleavage at the defined base sequence. Because of this property, they are important reagents for biotechnology. All enzymes are lyophilized and contain 1500 units. One unit is defined as the amount of enzyme required to digest 1.0 µg of lambda DNA in 60 minutes at 37°C in a total reaction mixture of 50µl.

Dryzyme Bam HI

Recognition 5′-GGATCC-3′
Site: 3′-CCTAGG-5′

The restriction endonuclease Bam HI is isolated from *Bacillus amyloliquefaciens* H cells.

Cat No 717

Dryzyme Hind III

Recognition 5′-AAGCTT-3′
Site: 3′-TTCGAA-5′

The first type restriction endonuclease activity was isolated from *Haemophilus influenzae* Rd cells. Subsequently the presence of two enzymes (Hind II and Hind III) in this cell strain was established.

Cat No 716

Dryzyme Eco RI

Recognition 5′-GAATTC-3′
Site: 3′-CTTAAG-5′

This enzyme is isolated from the RY13 strain of *E.coli*.

Cat No 715

Dryzymes are shipped at room temperature.

Restriction Enzyme Reaction Buffer

Concentrated reaction buffer (2 ml) for restriction enzymes. Sufficient for 200 reactions.
Requires storage in the freezer.

Cat No 610

DNA

Bacteriophage Lambda DNA

50 micrograms

Cat No 701

Plasmid pUC8

10 micrograms

Cat No 703

Plasmid pBR322

10 micrograms

Cat No 702

Plasmid pUC18

10 micrograms

Cat No 704

PCR Bead

Each PCR Bead contains:
- Taq DNA Polymerase
- Taq DNa Polymerase Buffer
- dNTP Mixture
- $MgCl_2$

Cat No 625
PCR Bead for 25 Reactions

Proteinase K

Proteinase K is required to prepare the lysis solution for isolation of DNA from hair.

Cat No 626

Chelating Agent

Chelating agent required for extraction of DNA to be used for PCR. Includes 0.4 grams of chelating resin & buffer for resuspension.

Cat No 629

Nylon Membranes for Southern Blots

Use nylon membranes to perform Southern blots on any of your favourite DNA electrophoresis experiments. Set of 5 blots.

Cat No 665

Microtube Boxes

Perfect for organising up to one hundred 1.5/2.0 ml microtubes. Can be frozen (to -80°C). Available in 5 colours or in a rainbow pack.

Cat No 695-G
Microtube Box with green lid
Cat No 695-B
Microtube Box with blue lid
Cat No 695-P
Microtube Box with pink lid
Cat No 695-O
Microtube Box with orange lid
Cat No 695-Y
Microtube Box with yellow lid

Cat No 695-R
Rainbow - one of each colour

Floating Foam Tube Rack

Cat No 691

Nano Cooler

No more ice buckets! Small benchtop cooler for enzymes and samples. Fit 12 x 1.5/2.0 ml tubes. Keeps samples at 0°C for at least 8 hours!

Cat No 526

Microtest Tubes

500 tubes - 1.5 ml

Cat No 630

Microtest Tube Racks

Set of 5 Racks

Cat No 639

Index & Ordering Information

Acknowledgments

We'd like to thank the following for quotes and images:

Dr. Joseph Bateman, Kings College London, UK
Prof Sir Alec Jeffreys, Leicester University, UK
Dr. Kary Mullis, Newport Beach, California, USA
David Mack/Science Photo Library
Zoë Manning, Strode College Street, UK
Kofi Annan, United Nations Secretary-General, at the launch of the Water for Life Decade
Prof. Eva Engvall, The Burnham Institute, California, USA
Prof. Dr. Christiane Nüsslein-Volhard, Max Planck Institute for Developmental Biology, Tübingen, Germany
iStockphoto
Mark Robert Halper
Aydan Stuart and the biology students at Strode College
Melanie Fields and the Sidwell Friends School

Please visit www.edvotek.co.uk for details of upcoming events and training courses where you can meet our friendly staff and see our latest products!

Ordering Information

5 Easy Ways to Order

Simply place your order one of the following ways:

web	**www.edvotek.co.uk**
email	**EUinfo@edvotek.com**
phone	**+44 (0) 1992 410 140**
fax	**+44 (0) 1992 410 106**
mail	**Edvotek Europe Ltd, PO Box 280, Hertford, Hertfordshire, SG13 9DG, UK**

Shipping

UK & Europe A standard delivery charge of £10/€15 is applied to all orders. Normal time for UK deliveries is 5-10 working days.

International Delivery of goods to international destinations will be calculated per order. To obtain a price quote, please email EUinfo@edvotek.com.

Terms and Conditions

Definitions

"Seller" means Edvotek Europe Ltd.

"Buyer" means individual, company or other party with whom the seller contracts.

"Contract" means the contract or order for the purchase and sale of goods or services.

Terms

No minimum order required.

All prices are quote in Pounds Sterling and Euros and are subject to change.

All prices exclude VAT.

The seller reserves the right to invoice the buyer prior to delivery.

Payment is due within 30 days of the invoice date.

The buyer shall be responsible to the seller for ensuring the accuracy of any order submitted and for giving the seller any necessary information relating to the goods or services within a sufficient time to enable the seller to perform the contract in accordance with its terms.

No order shall be binding on the seller unless or until such order is accepted by the seller in writing.

Any special delivery requirements must have been notified by the buyer to the seller at the time of placing the order. The seller reserves the right to recover delivery costs due to the failure of the buyer to accept delivery or to have given inadequate delivery instructions.

The seller reserves the right to make any changes in the specification of the goods which are required to conform with any applicable safety or other statutory requirements or, where the goods are to be supplied to the buyer's specification, which do not materially affect their quality or performance.

Delivery dates quoted are approximate only, and the seller shall not be liable for any delay in delivery. Time of delivery shall note be of the essence unless previously agreed by the seller in writing. The buyer shall not be entitled to cancel, delay or refuse payment should delivery be made after the established delivery date.

Claims for missing articles, shipping damages or losses must be made within 15 days of receipt.

The buyer shall be required to pay a restocking fee for wrongly ordered goods at the discretion of Edvotek Europe Ltd.

Conditions

Any statement (whether written or oral), description,drawing, photograph, illustration, diagram or specification concerning the goods made before the contract are for the purpose of information and guidance only.

Where goods are sold by reference to a description in the catalogue, the goods are sold subject to tolerances and variations expressed or implied in the catalogue.

All equipment is under warranty for one year. The liability of the seller is limited to the repair of defects or the replacement of the product at its option. The seller cannot accept responsibility for user conversion, abusive use, lack of or improper maintenance or equipment.

The items supplied by the seller are intended for laboratory experimental use only and are not intended to be used with food or drink for human consumption or for use as drugs.

International Orders

All terms and conditions apply to international orders. The shipping costs to international orders will be added to the cost of goods.

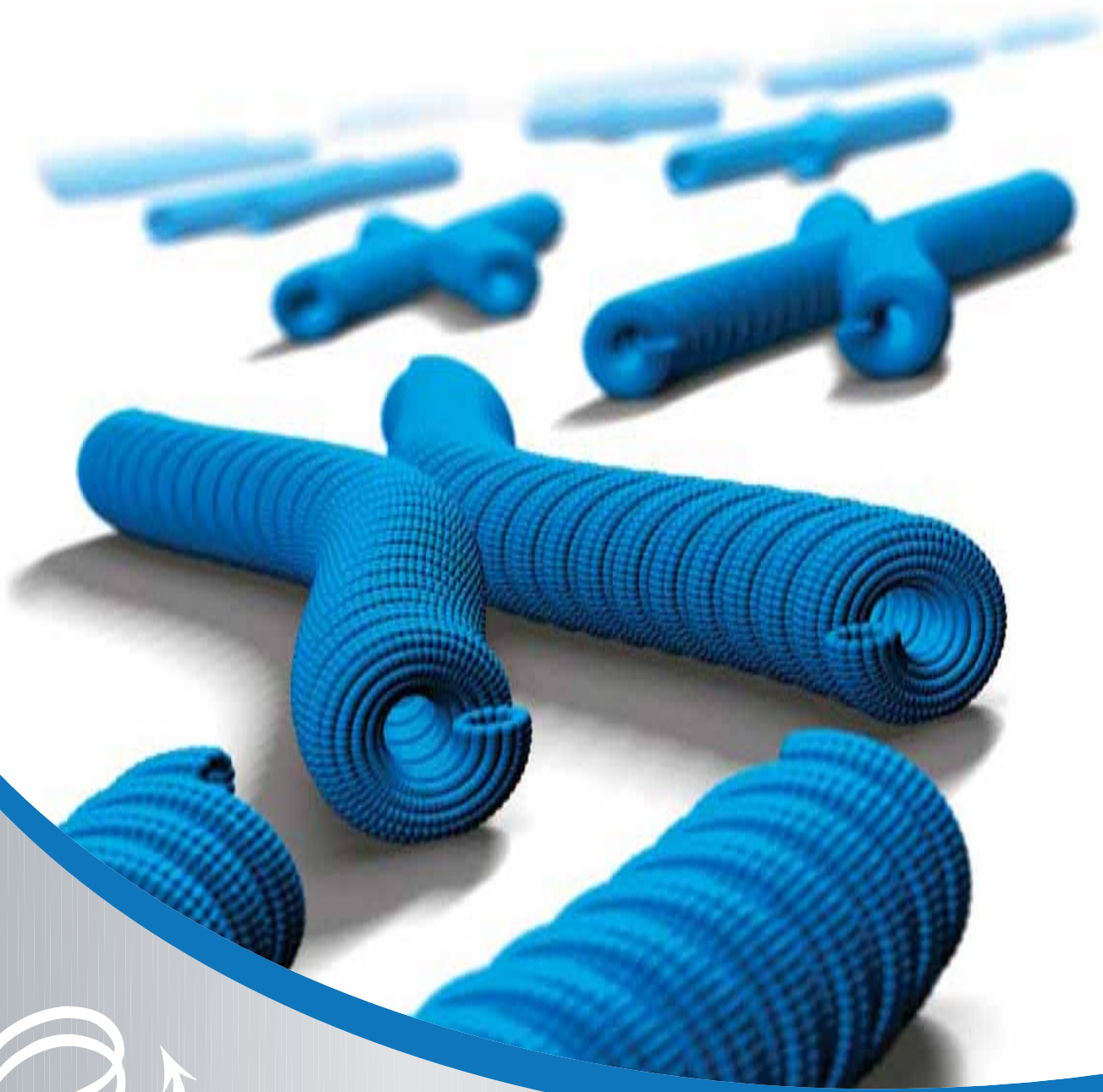
Registered Trade Marks

Edvotek Europe Ltd.

PO Box 280 | Hertford | Hertfordshire | SG13 9DG | UK

tel: +44 (0) 1992 410 140 | fax: +44 (0) 1992 410 106

email: EUinfo@edvotek.com | www.edvotek.co.uk



EDVOTEK®

THE BIOTECHNOLOGY EDUCATION COMPANY®