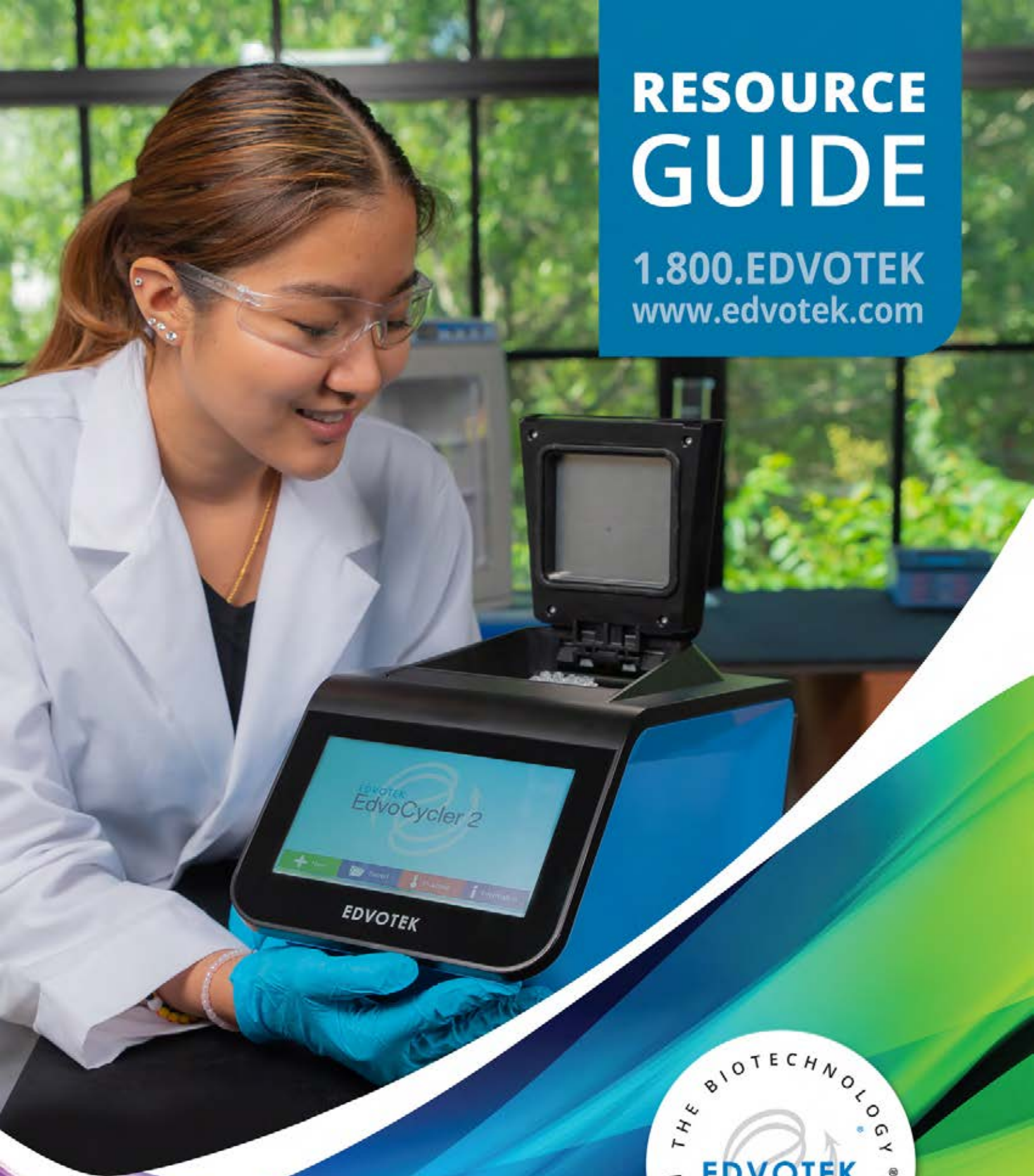
RESOURCE GUIDE

1.800.EDVOTEK
www.edvotek.com



THE BIOTECHNOLOGY EDUCATION COMPANY®
EDVOTEK

Designed for the Classroom
SINCE 1987

Our Philosophy

Teaching should always be fun
Learning should always be enjoyable

Experiments should foster learning
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

EDVOTEK®

Contents

*Advanced Placement Program is a registered trademark of the College Entrance Examination Board.

Science Education That Doesn't Harm the Environment

eco friendly education

What have we done so far?

- We've gone digital! Our Resource Guide can be downloaded from our website.
- The reduced weight of our Resource Guide means less energy was used to transport this copy to you.
- We now send more direct shipments to our customers. This greatly improves our service and helps the environment.
- We use recycled cardboard in our kit box outer packaging.
- We decreased our plastic kit packaging.
- We recycle all toner cartridges and paper.
- We went paperless and now post all our instruction manuals online.
- The SDS for every product is now available online at www.edvotek.com/Safety-Data-Sheets
- Employees commute using public transportation to further reduce our carbon footprint. We also encourage people to walk, jog, and bicycle. Several of our employees telecommute.
- We moved into a renovated historic building centrally located in downtown Washington, DC. Reusing an existing structure saves a tremendous amount of energy! We also installed state-of-the-art high efficiency energy and water systems throughout.

EDVOTEK®

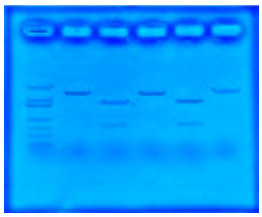
The Biotechnology Education Company®

Proudly serving you for over 25 years!

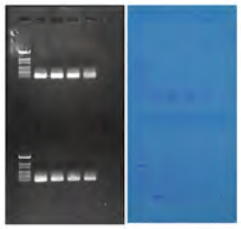
What's NEW?

Cat. 541-542
EdvoCycler™ 2
Redesigned! Doubles the capacity of the original! See page 7!

Cat. 540
EdvoCycler™ Jr.
Introducing our new 16-well personal PCR machine! See page 6!



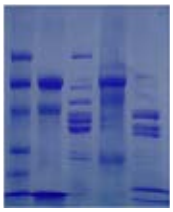
Cat. 135
Using CRISPR to Treat Cystic Fibrosis
See page 34!



Cat. 380
Discovering Quantitative PCR Amplification & Analysis See page 53!

Cat. 226
Living Art: Adding STEAM to Transformations
See page 55!

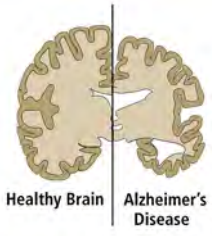
Cat. 5010-Q
QuadraSource™ Power Supply
See page 10!



Cat. 1110
Cell Types in the Brain
Examine cell types based on their protein profiles! See page 93!

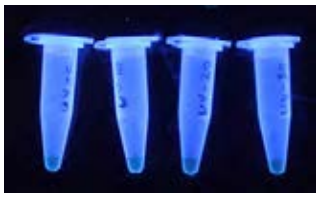
Cat. 331
Investigating Synthetic Biology
See page 51!

Cat. 557
TruBlu™ Transilluminator
Utilizes blue LED light instead of UV light! See page 13!



Cat. 1116
Researching Alzheimer's Disease by ELISA
See page 121!

Cat. 1115
Detecting Risk Factors for Alzheimer's Disease
Using Wester Blot. See page 93!



Cat. 381
Quantification of DNA Damage by PCR
See page 53!

1

Technology Drives Biology

These days, advances in our understanding of biology are driven as much by advances in technology as in our ability to come up with new ideas. 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!

NEW

Cat. #540

EdvoCycler™ Jr.

For Up to 16 Samples. The EdvoCycler™ Jr. sets the standard for personal DNA machine technology! Based on the advanced EdvoCycler™ 2 platform, our newest member of the PCR machine family has been scaled so that student groups can run individual PCR experiments. At 16 wells, the EdvoCycler™ Jr. has the largest capacity of any personal PCR machine and offers superior performance and ease-of-use in a sleek form factor with a vivid touchscreen display. Proudly made in the USA and backed by a 2 year warranty!

EdvoCycler™ Jr. Features:

- Holds 16 x 0.2 ml PCR Samples & 8-Tube Strip Compatible
- 7" HD Color Touchscreen Displays Real-Time Cycling Data
- Edvotek PCR Programs Included + Storage for 100 More
- Standalone Machine - No PC or Smartphone Required!
- High Precision Algorithm Yields Superior Results
- Heated Lid Prevents Sample Evaporation
- Active Cooling to 4° C
- Instant Incubate Function
- Temperature Range: 4-99° C, Maximum Ramp Rate: 4° C
- 2 Year Warranty & Made in USA

NEW

Cat. #541-542

EdvoCycler™ 2

For Up to 48 Samples. The sequel to the bestselling EdvoCycler™ has been reimagined to offer the classroom advanced PCR functionality at the lowest sample price. At 48 wells, the EdvoCycler™ 2 doubles the capacity of the original machine and offers superior performance and ease-of-use in a sleek new form factor with a vivid touchscreen display. Proudly made in the USA and backed by a 2 year warranty!

EdvoCycler™ 2 Features:

- Easy to use and program!
- Holds 48 x 0.2 mL PCR Samples & 8-Tube Strip Compatible
- 7" HD Color Touchscreen Displays Real-Time Cycling Data
- Edvotek PCR Programs Included + Storage for 100 More
- Standalone Machine - No PC or Smartphone Required!
- High Precision Algorithm Yields Superior Results
- Heated Lid Prevents Sample Evaporation
- Active Cooling to 4° C
- Instant Incubate Function
- Temperature Range: 4-99° C
- Maximum Ramp Rate: 4° C
- 2 Year Warranty; Extended Warranty Available
- Made in USA

Cat. #502/504

M12 Complete™ Electrophoresis Package

For up to 2 Lab Groups. Run the full spectrum of horizontal electrophoresis experiments with this versatile package! Our newly reimagined M12 Complete™ supports one or two student groups in two standard length gel trays for experiments that require less separation, or one long gel tray for experiments that require more. Produces excellent results in 30-40 minutes and includes a lifetime warranty.

M12 Complete™ Features:

- Sleek New Design Speeds Electrophoresis
- Complete Set of Electrophoresis Accessories Included
- Large Color Coded Push Tabs for Easy Lid Insertion & Removal
- Pour Spout for Buffer Disposal
- Improved Ventilation Reduces Lid Condensation
- User Replaceable Electrodes
- Reverse Compatible with Previous Edvotek® Accessories
- US Design Patent No. D749,235
- Made in USA

M12 Complete™ Includes:

- (2) 7 x 7 cm Gel Trays
- (1) 7 x 14 cm Gel Tray
- (2) 6/8 Tooth Combs
- (4) Rubber End Caps

Lifetime Warranty & Tech Support!

Electrophoresis Accessories

Newly Updated Trays & Combs

Cat. #684-N
E-Z Align™ Tray
7 x 7 cm tray with end caps.

Cat. #685-N
E-Z Align™ Tray
7 x 14 cm tray with end caps.

Cat. #535-N
Gemini Split Tray™ II
Two updated 7 x 7 cm trays with end caps and two 6/8 Tooth Combs.

Cat. #687-N
Rubber End Caps
Caps for new, updated trays.

Cat. #681
Double 6/8 Tooth Comb

Cat. #515

M36 HexaGel™ Electrophoresis Apparatus

BEST SELLER

For up to 6 Lab Groups. The latest in electrophoresis design! Our newly reengineered M36 Electrophoresis Apparatus supports up to six groups of students. Produces excellent results in 30-40 minutes and includes a lifetime warranty.

M36 HexaGel™ Features:

- Sleek New Design Speeds Electrophoresis
- Complete Set of Electrophoresis Accessories Included
- Large Color Coded Push Tabs for Easy Lid Insertion & Removal
- Pour Spout for Buffer Disposal
- Improved Ventilation Reduces Lid Condensation
- User Replaceable Electrodes
- Reverse Compatible with Previous Edvotek® Accessories
- US Design Patent No. D749,235
- Made in USA

M36 HexaGel™ Includes:

- (6) 7 x 7 cm Gel Trays
- (6) 6 Tooth Combs
- (12) Rubber End Caps

Lifetime Warranty & Tech Support!

Cat. #581

MV10 Vertical Electrophoresis Apparatus

For 1 or 2 Groups. The latest in electrophoresis design! Our newly redesigned MV10 gel tank is designed for easy separation of proteins on polyacrylamide gels utilizing our unique gel support cassette clip. It allows gels to be easily inserted or removed and holds them in place securely. The MV10 unit holds one 9 x 10 cm gel cassette and can accommodate most precast polyacrylamide gels.

MV10 Features:

- Sleek New Design Improves Run Speed
- Improved Support Clip Holds Gel Securely
- Push Tabs for Easy Lid Insertion & Removal
- Color-Coded for Foolproof Setup
- Stabilizing Feet Improve Balance & Cooling
- US Design Patent No. D757,958
- Made in USA

MV10 Includes:

- (1) Gel Support Cassette
- Lifetime Warranty

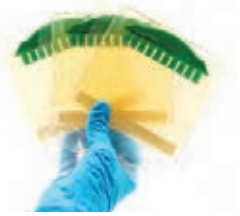
Precast Polyacrylamide Gels

Requires refrigeration.

Cat. # 650
One 12% precast gel. 9x10 cm.

Cat. # 651
Three 12% precast gels. 9x10 cm.

Cat. # 652
Six 12% precast gels. 9x10 cm.



Lifetime Warranty & Tech Support!

Cat. #5010-Q

QuadraSource™ Power Supply

NEW

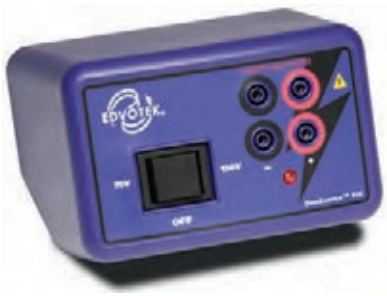
10-300 Volts for 1 to 4 units. Power any combination of EDVOTEK® electrophoresis units with this mighty power supply! Features an easy-to-use, fully programmable interface for setting voltage, current or timer control with each parameter displayed in real-time. Programs may be paused or resumed at any point. Run experiments in the least time possible with this powerful and versatile unit! Now features a sleek new design without the added bulk!

QuadraSource™ Features:

- Max Voltage: 300 Volts
- Voltage Steps: 10-300 Volts
- Max Current: 500 Milliamps
- Output Type: Variable Voltage
- Lead Inputs: 4 Sets, Recessed, Color Coded
- Made in USA

Cat. #509

DuoSource™ 150 Power Supply



BEST SELLER

75/150 Volts for 1 or 2 units. The DuoSource™ 150 is our most popular electrophoresis power supply and runs gels quickly - in only 20 to 30 minutes at 150 V!

DuoSource™ 150 Features:

- Max Voltage: 150 Volts
- Voltage Steps: 75 or 150 Volts
- Max Current: 300 Milliamps
- Output Type: Constant Voltage
- Lead Inputs: 2 Sets, Recessed, Color Coded
- Fuse: 1.0 Amp 250 V Glass Fuse
- Input Power: #509: 60 Hz, 110 V; #9509: 50 Hz, 220 V
- Made in USA

Cat. #507

DuoSource™ 75 Power Supply

75 Volts for 1 or 2 units. The DuoSource™ 75 runs gels in 40-50 minutes at 75 V!

DuoSource™ 75 Features:

- Voltage: 75 Volts
- Max Current: 300 Milliamps
- Output Type: Constant Voltage
- Lead Inputs: 2 Sets, Recessed, Color Coded
- Fuse: 1.0 Amp 250 V Glass Fuse
- Input Power: #507: 60 Hz, 110 V
- Made in USA

Cat. #589 thru #593

EDVOTEK® Variable Micropipettes

Lifetime Warranty & Tech Support!

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. # 589-2	0.1 - 2.5 µL Micropipette
Cat. # 589	0.5 - 10 µL Micropipette
Cat. # 589-1	2 - 20 µL Micropipette
Cat. # 590	5 - 50 µL Micropipette
Cat. # 591	**10 - 100 µL Micropipette**
Cat. # 591-1	20 - 200 µL Micropipette
Cat. # 592-1	100 - 1000 µL Micropipette
Cat. # 593-1	500 - 5000 µL Micropipette

BEST SELLER

- New & Improved
- Better Quality, Same Price
- More Durable
- More Ergonomic

Cat. #585 thru #588

Fixed Volume MiniPipettes™

Robust, accurate, easy to use, color coded, fun & cost effective micropipettes which use standard micropipette tips. No need to calibrate and impossible to measure the wrong volume! *All sizes use standard 1-200 µL tips.*

Cat. # 585	5 µL	MiniPipette
Cat. # 586	10 µL	MiniPipette
Cat. # 586-1	20 µL	MiniPipette
Cat. # 587-1	30 µL	MiniPipette
Cat. # 587-2	35 µL	MiniPipette

Cat. # 588	**40 µL**	**MiniPipette**
Cat. # 588-1	50 µL	MiniPipette
Cat. # 588-2	75 µL	MiniPipette
Cat. # 588-3	100 µL	MiniPipette
Cat. # 588-4	200 µL	MiniPipette

BEST SELLER

Ultra Micropipette Tips
0.5-10 µL, 2 racks of 96 each
Cat. # 635
0.5-10 µL, Bag of 1000 tips
Cat. # 635-B

Yellow Micropipette Tips
1-200 µL, 2 racks of 96 each
Cat. # 636
1-200 µL, Bag of 1000 tips
Cat. # 636-B

Blue Micropipette Tips
100-1000 µL, 2 racks of 100 ea.
Cat. # 637
100-1000 µL, Bag of 1000 tips
Cat. # 637-B

Fine Tip Micropipette Tips
1-200 µL, 1 rack of 204
Cat. # 638
1-200 µL, Bag of 1000
Cat. # 638-B

Jumbo Micropipette Tips
1000-5000 µL, Bag of 100 tips

For Modern Variable Pipettes
Cat. # 637-3
For Legacy Variable Pipettes (pre-2015)
Cat. # 637-2

Micro Transfer Pipets
400/pkg, disposable
Cat. # 632

Cat. # 594

EdvoPette™ Pipet Controller

Newly Redesigned

The all-new EdvoPette™ is a lightweight cordless pipetting controller ideally suited as an aliquoting tool for instructors and teaching assistants. It utilizes pipets from 1 - 100 mL and can be used for up to twenty hours when fully charged. Equipment bundle includes a charging station, long life Li-ion rechargeable (and replaceable) battery, adaptor nozzle for use with small volume pipets, multicolored nose cones, AC adapter with four international plugs, and three replacement filters. Dimensions: 15 x 152 x 41 mm.

EdvoPette™ Features:

- Operates with 100-240 volt (50/60 Hz 06.A) electrical supplies worldwide
- UV resistant housing and autoclavable pipette nozzle
- Universal (left/right), balanced, and ergonomic grip
- Three operation modes: high, low, and gravity
- Fits most filters – no need for pipet specific brands!

Green Pipetting Pump
For pipets 5-10 mL
Cat. # 640

Blue Pipetting Pump
For pipets up to 2 mL
Cat. # 641

Serological Pipets
5 mL Pipets, 50/pkg
Cat. # 645

10 mL Pipettes, 50/pkg
Cat. # 646

Pipette Carousel Stand
For 6 Modern Variable Micropipettes.
Cat. # 796

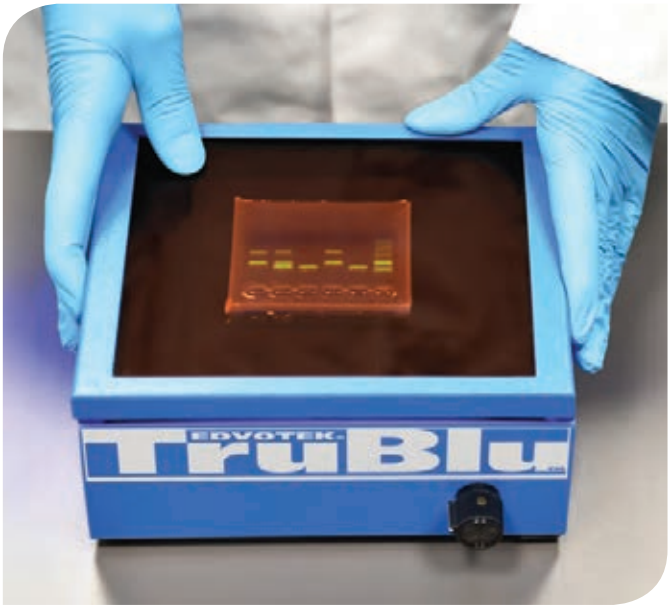
Classic Pipette Stand
For 6 Legacy Variable Micropipettes (pre-2015).
Cat. # 796-C

NEW

Cat. #557

TruBlu™ LED Transilluminator

The all-new TruBlu™ LED Transilluminator utilizes blue light to view DNA gels stained with SYBR® Safe, thus eliminating the need for UV light or ethidium bromide. The spacious viewing area fits multiple agarose gels. And the high intensity control and orange lid ensure superior visualization.



TruBlu™ Features:

- Large Viewing Area: 14.5 x 18 cm
- Blue Light High Intensity Control
- Orange Contrast Lid
- Durable Steel Casing
- Most Vivid Results in Education
- US Patent Nos. 6,198,107, 6,512,236, 6,914,250
- EP Patent No. 0 965 034
- Made in USA

Developed in concert with the inventor of the technology under license from Clare Chemical Research, Inc.

Cat. # 558

Midrange UV Transilluminator

EDVOTEK®'s Midrange UV Transilluminator is designed to visualize DNA stained with either ethidium bromide or SYBR® Safe. The UV filter measures 7 x 14 cm which is optimized for viewing gels cast from EDVOTEK® electrophoresis chambers. Safety features include a UV blocking cover and an automatic power-cut off when the cover is opened.

ALSO Available: Replacement Bulb *Cat. #558-B*

Cat. # 552

White LED Transilluminator

Our White LED Transilluminator features a 25 x 25 cm viewing area illuminated by long life LEDs and is housed in a slim aluminum body. It's designed to safely enhance the visualization of DNA stained with FlashBlue™, proteins stained with Coomassie Blue and autoradiograms.

Cat. #552 Features:

- 25 x 25 cm Viewing Area
- 90 Lumens LED Chips
- Power Rating: 8 Watts
- Universal Voltage: 110/220 V
- Frequency: 50/60 Hz
- Two-Year Warranty
- Made in USA

Cat. # 969

Long Wave UV Mini-Light

A hand-held UV light that is used to detect hydrolysis of the fluorescent substrate and fluorescent *Artemia* and *Daphnia* after their ingestion. Also useful for observing fluorescence in Green (GFP) and Blue (BFP) fluorescent proteins.

Cat. # 551

EdvoFoto™ Digital GelCam

EDVOTEK® has integrated an easy-to-use digital camera and specially designed hood to provide a low cost alternative for gel photos. Will accommodate gels up to 7 x 14 cm. Photos may be downloaded to a computer. Made in the USA.

Cat. # 555

UV Digital Photodocumentation System

Save money by purchasing both our Midrange UV transilluminator and our Photodocumentation system together! Comes with both Cat. #558 and #551

The hood accommodates gels up to 9.5 x 11 cm. Photos may be downloaded to a computer.

The Midrange UV transilluminator is designed to visualize DNA stained with Ethidium Bromide, SYBR® Safe, and other fluorescent stains.

Cat. #539

EDVOTEK® 1.8 L Digital Water Bath

BEST SELLER

This classic Edvotek® water bath has been improved to now include digital temperature control. We've also added a low-water sensor to prevent burn-outs and deepened the chamber to hold more bottles and flasks. The stainless steel chamber is corrosion resistant and temperature controlled from ambient to 99° C while using the included cover. 14 x 15 x 10 cm chamber. Made in USA.

Cat. #538

EDVOTEK® 10 L Digital Water Bath

The EDVOTEK® 10 L Digital water bath incorporates digital temperature control. We've also added a low water sensor to prevent burn-outs and the deep chamber holds virtually any bottle or flask. The stainless steel chamber is corrosion resistant and temperature controlled from ambient to 99° C while using the included cover. 30 x 24 x 15 cm chamber. Made in the USA.

Cat. #5027

EDVOTEK® 10 L Digital Shaking Water Bath

The EDVOTEK® 10 L Digital Shaking Water Bath is designed for optimal sample incubation. Solutions are simultaneously shaken, heated and aerated to speed and improve reactions. The stainless steel shaker chamber may be set to rotate from 5-100 RPM. Temperature control is from ambient to 75° C or 99° C with the optional cover. 30 x 24 x 15 cm chamber. Made in the USA.

ALSO Available: Cover for 10 L Shaking Water bath Cat. #5027-C

Cat. # 546

Incubation Oven

This economical bacterial incubator features a digital temperature control with a range from Ambient +1° C to 60° C. Ideal for growing bacteria on agar plates at 37° C or for Southern and Western Blot analysis at 60° C. Includes two adjustable/removable shelves for increased capacity. Accepts bottles and flasks up to 2 L.

Internal dimensions: 126.2 x 23.6 x 33 cm
External dimensions: 34 x 37 x 47.5 cm

Cat. # 689

Water Bath Floats

Set of two, 11 x 8 cm.

Cat. # 534

Piccolo™ Microcentrifuge

The Piccolo™ Microcentrifuge is reliable, flexible, and convenient for quick spin downs, micro-filter cell separations and cell pelleting. Its small footprint, non-slip base, and quiet operation make it ideal for the classroom. Other design features include a snap-spin rotor for tool-free hub exchanges and a palm-shaped lid that is suitable for left or right-handed users. Dimensions: 15 x 13 x 10 cm.

Piccolo™ Microcentrifuge Features:

- Operates with 110- 240 volt (50/60 Hz 06.A) electrical supplies worldwide.
- Robust body designed that is maintenance free and easily cleaned.
- Maximum Speed of approx. 6,000 rpm (2000 x g).
- Holds six 1.5 mL/2 mL (or smaller) tubes or sixteen PCR tubes.
- Includes a one-year warranty.· Powered by 12 V DC, includes double insulated worldwide power adapter, 110 V to 240 V, supplied with 4 different plugs for power adapter
- Maintenance free
- Easily cleaned

Cat. # 533

Mezzo™ Microcentrifuge

Compact and easy to use, yet powerful enough to enable each workstation to be equipped with a centrifuge for a wide range of molecular biology separations and quick spins. Ideal for most protocols requiring fast spins (12,500 rpm / 9,800 x g). The Mezzo™ Microcentrifuge includes a 12-place rotor for 1.5/2.0 mL tubes, a 32-place rotor for 0.2 mL tubes, and twelve 0.2 mL and 0.5 mL tube adapters. A digital timer allows programs running from 15 seconds to 30 minutes. Dimensions: 20 x 17 x 11 cm.

Cat. # 5023

Tornado Vortexer™

The Tornado™ is your go-to appliance for vigorous and uniform vortexing. The versatile head can accommodate a wide range of common lab tubes and assay plates as well as any hand held items. A highly absorbent body shell and elastomeric feet effectively dampen vibrations and limit movement. Great for both intermittent and continuous mixing! Dimensions: 17 x 19 x 20 cm.

Tornado Vortexer™ Features:

- Variable speed rotary for 1000, 2000, 3000 rpm.
- Slider for intermittent, continuous, and off settings.
- Innovative head has diverse holding capacity and can be removed for cleaning.
- Includes a two-year warranty.

Cat. # OR100

Digital Orbital Shaker

EDVOTEK®'s Digital Orbital Shaker offers precise control with a microprocessor-based keypad with digital display. The user can control the RPM (40-350 RPM) and mode of operation. The unit can be used in Continuous Run mode and programmable Timed Run mode. Includes: 9 x 10" platform and 12 x 12" platform. Features a full one-year warranty.

Cat. #567

UNICO® S1200 Visible Spectrophotometer

The UNICO® Model S1200 Visible Spectrophotometer is the best value in a precise, accurate 5 nm design. Featuring a large, easy to read digital display, visible wavelength range of 335-1000 nm, 5 nm bandpass, an USB & RS-232C interface, Four modes: T = transmittance, A = absorbance, C =concentration & F = factor, auto-zero function and a sample compartment that accepts round tube or square cuvettes. The S1200 also features built-in automatic second order filters for quick and easy operation, and bulb changes require no tools or alignment. Includes a box of 12 round optical glass cuvettes, a set of two optical square glass cuvettes, users manual and dust cover.

What Are LabStations™?

Are you excited to introduce electrophoresis to your students? Or maybe you're ready to see them running their own PCR or transformation experiments next year! Equipping your classroom with a biotechnology lab can be a challenge. What equipment do you absolutely need? How easily is it shared between students? How can you get maximum value for every item? Edvotek LabStations™ are our answer to these questions!

LabStations™ are pre-selected packages curated for specific activities, classroom sizes, and budgets. We've utilized our experience in the field of biotechnology education - and decades of important feedback from teachers - to select the best equipment combinations for the job. And by combining several products into a single comprehensive package, we are able to sell them at a lower total price.

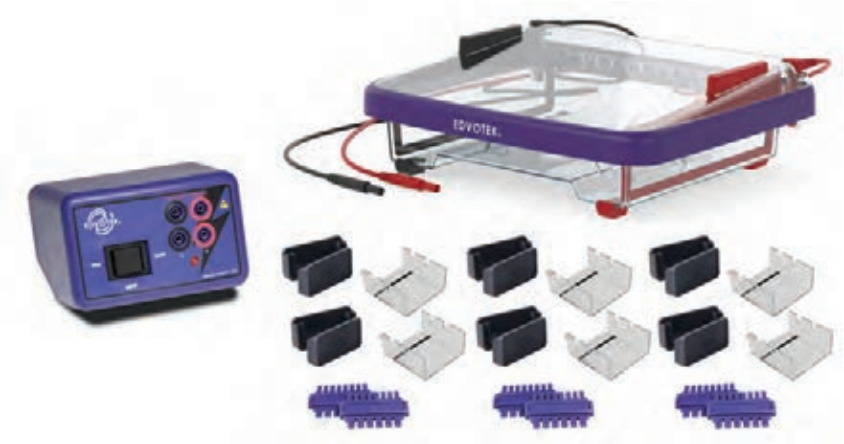
We also offer CUSTOM LabStations™ to suit your individual needs. For more information, consult with a BioEducation specialist at 1.800.EDVOTEK.

Cat. #5071

DNA HexaGel™ LabStation™

Includes:

1 Cat. #515 M36 HexaGel™ Electrophoresis Apparatus (includes six 7 x 7 cm Trays, comb, and end caps)
1 Cat. #507 DuoSource™ 75 (75 V for 1 or 2 units)



BEST SELLER

Cat. #5062

Classroom DNA Electrophoresis LabStation™

Includes:

1 Cat. #515 M36 HexaGel™ Electrophoresis Apparatus (includes six 7 x 7 cm Trays, comb, and end caps)
1 Cat. #509 DuoSource™ 150 (75/150 V for 1 or 2 units)
2 Cat. #588 Fixed Volume MiniPipette (40 µl)
1 Cat. #636 Yellow Micropipette Tips (1 - 200 µl / 2 Racks of 96)
1 Cat. #130 DNA Fingerprinting Classroom Kit

Cat. #RLHSE-3

HexaGel™ DNA LabStation™

Includes:

1 Cat. #515 M36 HexaGel™ Electrophoresis Apparatus (includes six 7 x 7 cm Trays, comb, and end caps)
1 Cat. #509 DuoSource™ 150 (75/150 V for 1 or 2 units)
6 Cat. #588 Fixed Volume MiniPipette (40 µl)
1 Cat. #636 Yellow Micropipette Tips (1 - 200 µl / 2 Racks of 96)

Cat. #5067

Classroom PCR LabStation™

Includes:

1 Cat. #541-542 EdvoCycler™ 2 (48 x 0.2 ml)
6 Cat. #502/504 M12 Complete™ Package (each package includes one 7 x 14 cm Tray, two 7 x 7 cm Trays, combs, and end caps)
3 Cat. #509 DuoSource™ 150 (75/150 V, for 1 or 2 units)
6 Cat. #590 Variable Micropipette (5 - 50 µl)
2 Cat. #534 Piccolo Microcentrifuge
1 Cat. #557 TruBlu™ Blue Light Transilluminator (14.5 x 18 cm filter)
1 Cat. #539 1.8 L Waterbath

Cat. #5068

Comprehensive Biotechnology LabStation™

Includes:

1 Cat. #541-542 EdvoCycler™ 2 (48 x 0.2 ml)
6 Cat. #502-504 M12 Complete™ Electrophoresis Package (each package includes one 7 x 14 cm Tray, two 7 x 7 cm Trays, combs, and end caps)
3 Cat. #581 MV10 Protein Electrophoresis Apparatus
3 Cat. #5010-Q QuadraSource™ Power Supply (30-300 V for 1 or 4 units)
6 Cat. #589 Variable Micropipette (0.5 - 10 µl)
6 Cat. #591 Variable Micropipette (10 - 100 µl)
6 Cat. #592-1 Variable Micropipette (100 - 1000 µl)
1 Cat. #551 EdvoFoto™ Digital GelCam
1 Cat. #552 White Light Box
1 Cat. #557 TruBlu™ Blue Light Transilluminator
10 Cat. #969 Long Wave UV Mini-Light
2 Cat. #539 1.8 L Digital Waterbath
1 Cat. #546 Incubation Oven
3 Cat. #534 Piccolo Microcentrifuge
1 Cat. #5023 Tornado Vortexer™
3 Cat. #635 Ultra Micropipette Tips (0.1 - 10 µl / 2 Racks of 96)
6 Cat. #636 Yellow Micropipette Tips (1 - 200 µl / 2 Racks of 96)
3 Cat. #637 Blue Micropipette Tips (200 - 1000 µl / 2 Racks of 100)
3 Cat. #638 Fine Tip Micropipette Tips (1 - 200 µl / 1 Rack of 204)

Cat. #5069

Ultimate Biotechnology LabStation™

Includes:

1 Cat. #541-542 EdvoCycler™ 2 (48 x 0.2 ml)
8 Cat. #502/504 M12 Complete™ Electrophoresis Package (7 x 14 cm Tray & 7 x 7 cm Trays (2))
4 Cat. #581 MV10 Protein Electrophoresis Apparatus
4 Cat. #5010-Q QuadraSource™ Power Supply (30-300 V for 1 or 4 units)
8 Cat. #589 Variable Micropipette (0.5 - 10 µl)
8 Cat. #591 Variable Micropipette (10 - 100 µl)
8 Cat. #592-1 Variable Micropipette (100 - 1000 µl)
1 Cat. #594 EdvoPette™ Pipet Controller
1 Cat. #551 EdvoFoto™ Digital GelCam
1 Cat. #552 White Light Box
1 Cat. #557 TruBlu™ Blue Light Transilluminator
1 Cat. #558 Midrange UV Transilluminator
10 Cat. #969 Long Wave UV Mini-Light
4 Cat. #539 1.8 L Digital Waterbath
1 Cat. #5027 10 L Digital Shaking Waterbath
4 Cat. #5023 Tornado Vortexer™
3 Cat. #533 Mezzo™ Microcentrifuge
2 Cat. #546 Incubation Oven
8 Cat. #680 6 Tooth Comb
8 Cat. #684 E-Z Align™ Tray 7 x 7 cm
4 Cat. #685 E-Z Align™ Tray 7 x 14 cm
4 Cat. #687 Rubber End Caps (Set of 2)
8 Cat. #635 Ultra Micropipette Tips (0.1 - 10 µl / 2 Racks of 96)
16 Cat. #636 Yellow Micropipette Tips (1 - 200 µl / 2 Racks of 96)
8 Cat. #637 Blue Micropipette Tips (200 - 1000 µl / 2 Racks of 100)
8 Cat. #638 Fine Tip Micropipette Tips (1 - 200 µl / 1 Rack of 204)

2

What is Electrophoresis?

Electrophoresis is a technique that allows us to separate DNA, RNA, proteins or dyes according to their size.

What Do I Need To Separate a Mixture of Biomolecules?

- **Horizontal electrophoresis apparatus** - holds the buffer and the gel, has positive and negative electrodes.
- **Power supply** - generates the current necessary to move biomolecules through gel.
- **Micropipette** - used to transfer samples into wells.
- **Agarose** - a polysaccharide used as the separation matrix.
- **Electrophoresis Buffer** - contains ions necessary to conduct an electrical current, maintains pH of experiment.
- **Gel Loading Solution** - includes glycerol, etc. to help biomolecule samples enter into the wells and a visible dye to monitor migration through the gel.
- **Stain** - specially designed for visualizing DNA or proteins. (EDVOTEK® also has many dye electrophoresis kits that do not require staining.)

Loading gel, agarose, buffer and stain come with all kits!

How Does Electrophoresis Separate Biomolecules?

The mixture of biomolecules is added into depressions (or "wells") within a gel, and then an electrical current is passed through the gel (Fig. 1A). Because the sugar-phosphate backbone of DNA has a strong negative charge, the current drives the DNA through the gel towards the positive electrode (Fig 1B).

At first glance, an agarose gel appears to be a solid at room temperature. On the molecular level, the gel contains small channels through which the biomolecules can pass. Small fragments move through these holes easily, but large fragments have a more difficult time squeezing through the tunnels. Because molecules with dissimilar sizes travel at different speeds, they become separated and form discrete "bands" within the gel. After the current is stopped, the bands can be visualized using a stain that sticks to biomolecules (Figure 1C).

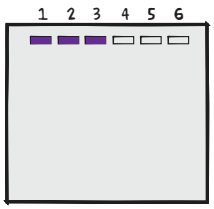


Figure 1A:
The mixture of biomolecules is pipetted into the wells within a gel and then an electrical current is passed through the gel.

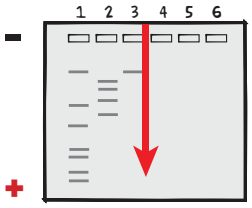


Figure 1B:
In the case of DNA, because the sugar-phosphate backbone of DNA has a strong negative charge, the current drives the DNA through the gel towards the positive electrode.

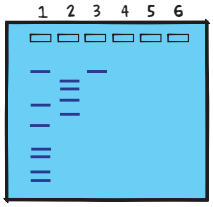


Figure 1C:
After the current is stopped, the bands can be visualized using a stain that sticks to biomolecules.

Cat. #S-43

DNA DuraGels™

DNA DuraGel™ gels are permanent polymer gels that allow students to practice the critically important skill of pipetting/gel loading. The clear, reusable gels are designed for the practice of loading 5-35 µL of samples. Gel models are imprinted with a ruler for sizing DNA fragments. Also included are simulated FlashBlue™ and InstaStain® Ethidium Bromide gel images, ideal for representing how actual gels are stained with Methylene Blue and Ethidium Bromide.

EDVOTEK® exclusive!

Kit Includes: reusable DNA DuraGels™; FlashBlue™ and InstaStain® Ethidium Bromide gel images, practice gel loading solution and mini-transfer pipets.

All you need: micropipettes are recommended.

For 12 to 24 Students
Cat # S-43
6 Gels and 8 images (4 FlashBlue™ and 4 InstaStain® Ethidium Bromide gel images)

For 4 Students or Classroom Demo
Cat # S-43-20
2 Gels and 4 images (2 FlashBlue™ and 2 InstaStain® Ethidium Bromide gel images)

Cat. #S-44

Micropipetting Basics

For 10 Lab Groups. Teach your students how to use a micropipette with ease and accuracy by experimenting with multicolored dyes. A fun and cost effective way to learn this important skill.

Kit includes: instructions, various colored dye samples and a Pipet Card™.

All you need: micropipette and tips.

Storage: Room Temperature.

Check Out These FREE Resources!

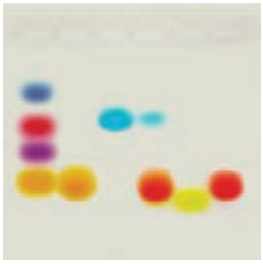
QUICK GUIDE:
Micropipetting Basics
www.edvotek.com/Quick-Guides

RELATED VIDEO:
Measuring Liquids with an Adjustable Micropipette
youtube.com/EdvotekInc

NEW

Cat. #S-47

Linking Food Science to Biotechnology: Unlock the Color of Candies



For 10 Gels/10 Lab Groups. Investigate how agarose gel electrophoresis unlocks the color code used by food scientists to make colorful candies. Students will extract colors from common candies and separate the dyes using agarose gel electrophoresis. A fun lab extension involves the use of candy to build a DNA model. *Note: Dye samples are not provided for #S-47 as students will extract their own dyes from colorful candies.*

BEST SELLER

Cat. #101

Principles & Practice of Agarose Gel Electrophoresis

For 8 Gels/8 Lab Groups. Demonstrate to your class how electrophoresis separates molecules on the basis of size and charge. A safe, colorful, fast and simple way to teach a technique that will engage your students.

ALSO Available: Dye Samples Only in Microtest Tubes For 24 gels Cat. #101-C

Kits in this section include the following*:

Instructions, Ready-to-Load™ QuickStrip™ Dye samples, UltraSpec-Agarose™ powder, electrophoresis buffer, practice gel loading solution, disposable pipets.

All you need:
Electrophoresis apparatus, power supply, automatic micropipette and tips (optional), white light box (optional), microwave or hot plate, distilled water.

Storage:
Room Temperature Stable. Storage of Ready-to-Load QuickStrip™ samples in the Refrigerator is Recommended.

These kits require approximately 45 min. to complete.

45 min.

**Unless otherwise stated. Please refer to our website for the current contents, requirements, storage, and time requirements.*

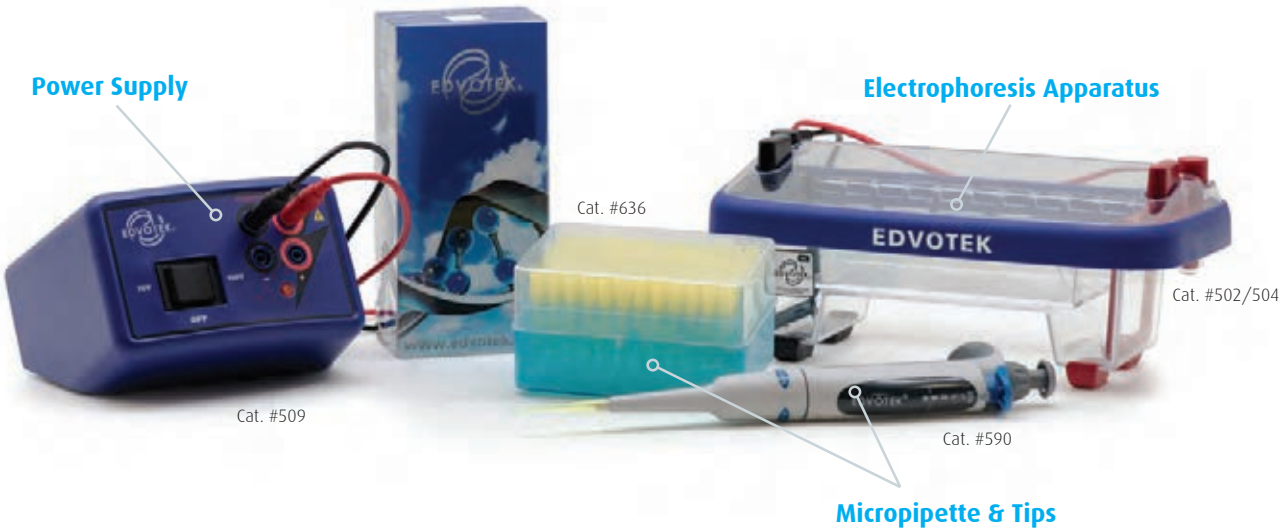
QuickStrips™

Conveniently provides the required samples and eliminates the need for PreLab teacher sample preparation.

Provided in EDVOTEK® 100 series and "S" series kits at no additional cost!

What Equipment Do I Need?

All you need to carry out any of these dye experiments is an electrophoresis apparatus, power supply, pipettes, and tips. Review the **EQUIPMENT** section for full descriptions, prices, and many additional options.



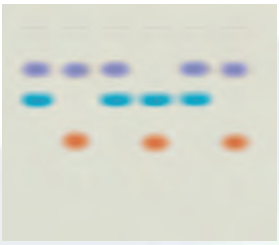
BEST SELLER

Cat. #S-51

Whose DNA Was Left Behind?

Forensics

For 10 Gels/10 Lab Groups. DNA obtained from a single hair left behind at a crime scene can be used to identify a criminal. In this experiment, your students will compare simulated crime scene DNA with that of two suspects. *NGSS-aligned with MS-LS3-A.*



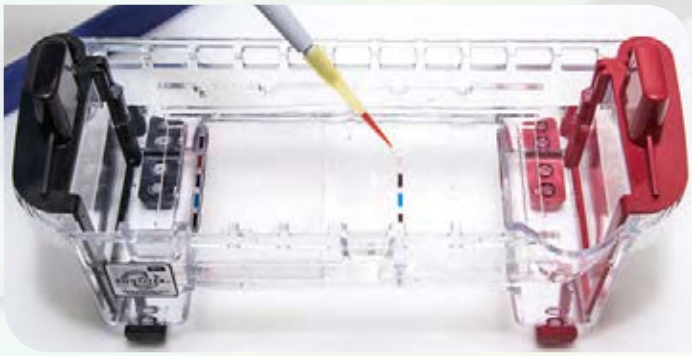
BEST SELLER

Cat. #S-46

Linking STEM to Agarose Gel Electrophoresis

STEM

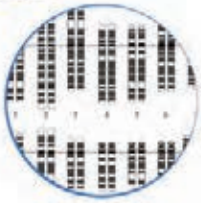
For 10 Gels/10 Lab Groups. Link important STEM concepts using Agarose Gel Electrophoresis. Help your students learn about the application of gel electrophoresis in DNA Fingerprinting, DNA Paternity Testing, Genetics (related to health and well-being), or the detection of Genetically Modified Foods. These dyes can be separated in agarose gels and students will use core STEM tools to determine band size and utilize critical thinking and reasoning skills. Four unique module options are supplied.



Milestones in Biotechnology

TODAY

Your students discover for themselves the amazing world of biotechnology!



2003

The complete consensus sequence of the human genome was published.

2013

The "Human Brain Project (HBP)" is founded with the objective to simulate the human brain as completely as possible over the next ten years.

1994

The FDA approved the first genetically modified food (the FlavrSavr® tomato).

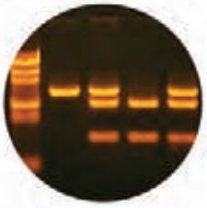
EDVOTEK®

1987

Edvotek®, The Biotechnology Education Company®, was founded as the world's first company dedicated to providing cutting-edge biotechnology kits designed specifically for education.

1986

Sir Alec Jeffreys developed DNA fingerprinting analysis.



1983

Kary Mullis developed the Polymerase Chain Reaction, a technique that copies DNA in vitro.

1982

FDA approves the use of recombinant insulin for humans.

1973

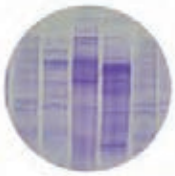
Stanley N. Cohen and Herbert Boyer transferred foreign DNA into E.coli, creating the first recombinant bacteria.

1970

Werner Arber, Daniel Nathans, and Hamilton O. Smith characterized restriction enzymes.

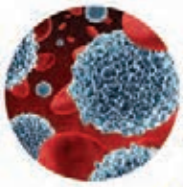
1953

James Watson and Francis Crick publish the structure of DNA.



1937

Arne Tiselius separated biomolecules by size, shape and charge using electrophoresis.

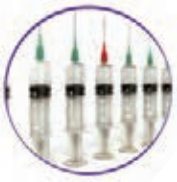


1868

Friedrich Miescher purified DNA from the nucleus of white blood cells.

1862

Louis Pasteur demonstrated that microorganisms were responsible for fermentation.



1789

Edward Jenner created the first vaccine against smallpox.

1675 CE

Antoni van Leeuwenhoek identified single-celled organisms using a microscope.

~7,000 BCE

Corn is domesticated in Mesoamerica.

~12,000 BCE

Dogs are domesticated in Europe and Asia.

Cat. #S-52

The Secret of the Invisible DNA: A Genetics Exploration

For 10 Gels/10 Lab Groups. Explore genetics with our "out of this world" experiment! In this lesson, we explore how DNA technology can be used to explore the relationship between genotype and phenotype using one of two exciting scenarios (medical diagnostics or alien genetics). Fluorescent dyes simulate DNA fragments, eliminating post-electrophoresis staining and saving you valuable classroom time! *Note: A long wave UV light (Cat. #969) or black light and UV safety googles are required for viewing the fluorescent dyes.*

Cat. #969

Long Wave UV Mini-Light

Cat. #S-49

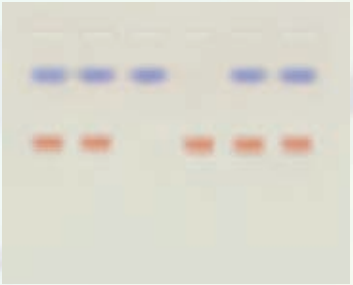
In Search of My Father

For 10 Gels/10 Lab Groups. 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?

BEST SELLER

Cat. #S-50

Why Do People Look Different?

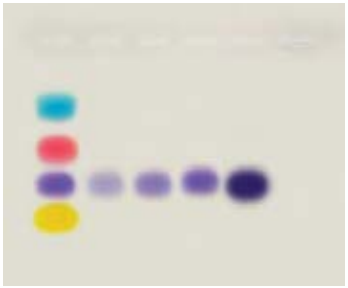


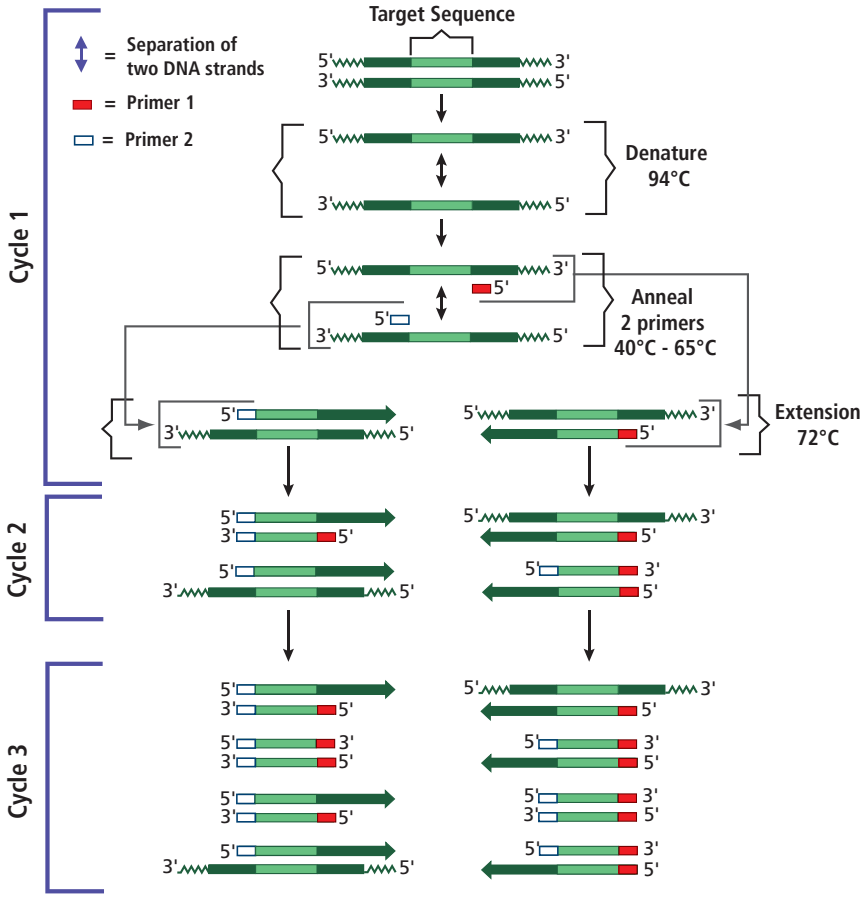
For 10 Gels/10 Lab Groups. Teach your students how an individual's physical traits are a reflection of one's genes. In this simulation, your students will use electrophoresis to separate dyes which represent genetic traits. *NGSS-aligned with MS-LS3-B.*

Cat. #S-48

What is PCR & How Does It Work?

For 10 Gels/10 Lab Groups. This simulation experiment demonstrates the process of DNA amplification by PCR and how the amplified product is detected by separating the reaction mixture by agarose gel electrophoresis. *NGSS-aligned with MS-LS1.*





Cat. #S-53

Mystery of the Crooked Cell

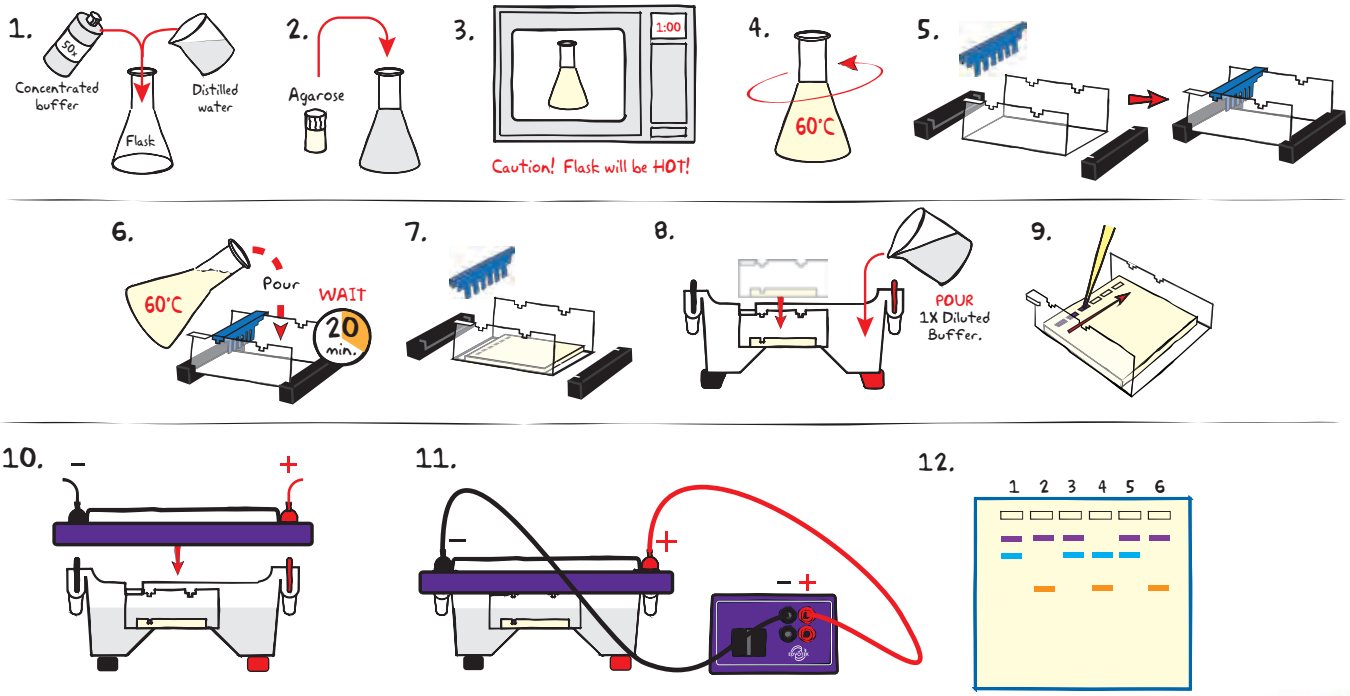
For 10 Gels/10 Lab Groups. This simple lab demonstrates detection of the mutation that causes Sickle Cell Anemia. In this simulation, your students will use electrophoresis to separate dyes that represent patient samples and controls.

Developed in Partnership with CityLab Boston University School of Medicine

Department of Health and Human Services · National Institutes of Health Supported by a Science Education Partnership Award (SEPA) from the National Center for Research Resources.

QUICK GUIDE:

Agarose Gel Electrophoresis



1. **DILUTE** 50X buffer with distilled water to create 1X buffer (see Table A).
2. **MIX** 1X buffer with agarose powder in a 250 ml flask (see Table A).
3. **DISSOLVE** the solution by boiling in the **MICROWAVE** for 1 minute. **REMOVE** flask and **MIX** by swirling. Continue **HEATING** in 15-second bursts until completely dissolved and solution is clear.
4. **COOL** to 60° C with careful swirling.
5. **SEAL** the gel-casting tray with rubber end caps. **PLACE** the comb in the appropriate notch.
6. **POUR** cooled agarose into prepared gel-casting tray. **WAIT** 20 minutes for the gel to solidify.
7. **REMOVE** end caps and comb.
8. **PLACE** gel (on the tray) into electrophoresis chamber. **COVER** the gel with 1X electrophoresis buffer (See Table B).
9. **PUNCTURE** the foil overlay of the QuickStrip™ with a pipette tip. **LOAD** samples into wells in consecutive order.
10. **PLACE** safety cover. **CHECK** that the gel is properly oriented.
11. **CONNECT** leads to the power source and **PERFORM** electrophoresis (See Table C for guidelines).
12. When complete, **REMOVE** gel and casting tray from the electrophoresis chamber and proceed to **STAINING & VISUALIZATION**, if required. Kits that feature dye samples require no staining and may be visualized immediately.

Table A — Individual 0.8% UltraSpec-Agarose™ Gel

Size of Gel Casting tray	Concentrated Buffer (50x)	+ Distilled Water	+ Amt of Agarose	= TOTAL Volume
7 x 7 cm	0.6 ml	29.4 ml	0.23 g	30 ml
7 x 10 cm	1.0 ml	49.0 ml	0.39 g	50 ml
7 x 14 cm	1.2 ml	58.8 ml	0.46 g	60 ml

Table B — 1x Electrophoresis Buffer (Chamber Buffer)

EDVOTEK Model #	Total Volume Required	Dilution: 50x Conc. Buffer	+ Distilled Water
M6+ & M12 (new)	300 ml	6 ml	294 ml
M12 (classic)	400 ml	8 ml	392 ml
M36	1000 ml	20 ml	980 ml

Table C — Time and Voltage Guidelines (0.8% Agarose Gel)

	Electrophoresis Model		
	M6+	M12 (new)	M12 (classic) & M36
Volts	Min. / Max.	Min. / Max.	Min. / Max.
150	15/20 min.	20/30 min.	25 / 35 min.
125	20/30 min.	30/35 min.	35 / 45 min.
75	35 / 45 min.	55/70 min.	60 / 90 min.

DOWNLOAD Quick Guides at: www.edvotek.com/Quick-Guides

3

What is DNA?

The basic unit of all living organisms, from bacteria to humans, is the cell. Contained within the nucleus of these cells is a molecule called deoxyribonucleic acid (or DNA). Today, we know that DNA is the blueprint used to build an organism – our genetic makeup, or genotype, control our phenotype (observable characteristics). The directions coded for by our genes control everything from growth and development to cell specification, neuronal function, and metabolism.

How Was DNA Discovered?

The Swiss physician Friedrich Miescher discovered DNA in 1868, when he purified a novel substance from the nucleus of white blood cells. This molecule, which he called "nuclein", had chemical properties unlike any substance previously identified. By the end of the 19th century, scientists had described DNA as a polymer composed of building blocks known as nucleotides. Most scientists believed that DNA was too simple to comprise the genetic material, so the biological importance of DNA was not realized until much later.

How Did Scientists Determine DNA Was the Genetic Material?

In 1928, Frederick Griffith observed that living cultures of a normally non-pathogenic strain of *S. pneumonia* were able to kill mice, but only after being mixed with a heat-killed pathogenic strain. Because the non-pathogenic strain had been "transformed" into a pathogenic strain, he named this transfer of virulence "transformation". In 1944, Oswald Avery purified DNA, RNA and protein from the virulent strain of *S.pneumonia* to determine which was responsible for transformation. Only those recipient cells exposed to DNA became pathogenic, leading to the recognition of DNA as the genetic material. These experiments kicked off a worldwide race to unlock the secrets coded for in our DNA.

Kits in this section include the following*:

Instructions, Ready-to-Load™ QuickStrip™ DNA samples, UltraSpec-Agarose™ powder, electrophoresis buffer, FlashBlue™ DNA stain, InstaStain® Blue cards, and disposable pipets.

QuickStrips™ InstaStain® Blue FlashBlue™

All You Need:

Electrophoresis apparatus, power supply, automatic micropipette and tips, microwave or hot plate, distilled water, white light box

Storage:

Room temperature stable.
Storage of Ready-to-Load QuickStrip™ samples in the refrigerator is recommended.

Time Requirements:

Approximately 45 min.

45 min.

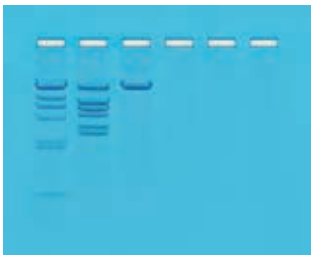
Unless otherwise stated. Please refer to our website for the current contents, requirements, storage, and time requirements.

What's in Your 100-Series Kit?

For many years, EDVOTEK® has worked with teachers to make electrophoresis experiments easy to perform in a classroom setting. For example, we have streamlined our pre-lab preparations by providing the Ready-to-Load™ DNA samples as pre-aliquoted QuickStrips™. The agarose powder and electrophoresis buffer are also supplied in pre-measured quantities, meaning that you just need to dilute, dissolve and go!

Cat. #AP09/112

Restriction Enzyme Analysis of DNA



For 8 Gels/8 Lab Groups. This experiment introduces the use of restriction enzymes as a tool to digest DNA at specific nucleotide sequences. Bateriophage lambda DNA has a linear structure and 6 *Eco* RI recognition sites. Separation by agarose gel electrophoresis of an *Eco* RI digest of lambda DNA will yield 6 bands (5 distinct bands, two are very close in size) corresponding to the DNA fragments.

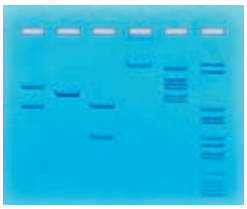
ALSO Available: DNA Samples Only in Microtest Tubes For 24 gels *Cat. #AP09-C*

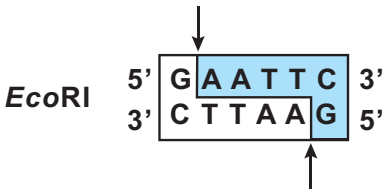
Cat. #102

Restriction Enzyme Cleavage of Plasmid & Lambda DNA

For 8 Gels/8 Lab Groups. 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.

ALSO Available: DNA Samples Only in Microtest Tubes For 24 gels
Cat. #102-C





Cat. #105

Mapping of Restriction Sites on Plasmid DNA

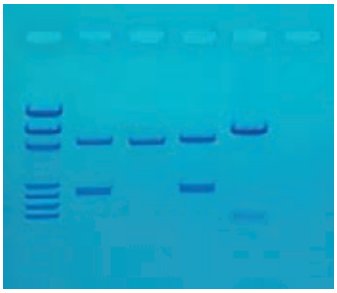
For 8 Gels/8 Lab Groups. DNA mapping is a common procedure used to determine the location of genes. In this experiment, DNA markers and pre-digested plasmid DNA fragments are mapped using agarose gel electrophoresis.

ALSO Available: DNA Samples Only in Microtest Tubes For 24 gels *Cat. #105-C*

Cat. #130

DNA Fingerprinting by PCR Amplification

For 8 Gels/8 Lab Groups. Forensic DNA fingerprinting has become a universally accepted crime-fighting tool. Recent advances use the polymerase chain reaction (PCR) to amplify human DNA obtained from crime scenes. This experiment, based on a crime scene scenario, has an inquiry-based component.



ALSO Available: DNA Samples Only in Microtest Tubes For 24 gels Cat. #130-C

Cat. #109

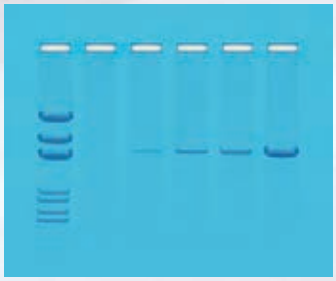
DNA Fingerprinting by Restriction Enzyme Patterns

For 8 Gels/8 Lab Groups. 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!

ALSO Available: DNA Samples Only in Microtest Tubes For 24 gels Cat. #109-C

Cat. #103

Principles of PCR

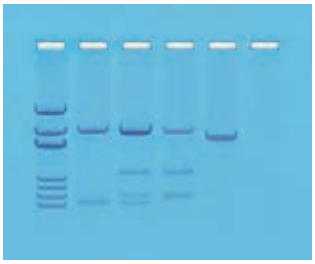


For 8 Gels/8 Lab Groups. Can students explore this Nobel prize winning biotechnology in under an hour and without a thermocycler? Yes! With this simulated PCR experiment, students will perform electrophoresis on PCR samples collected at various time points in a PCR program. The results vividly convey how the Polymerase Chain Reaction begins with a small amount of DNA and by exponentially increasing the amount, the human eye can see it!

ALSO Available: DNA Samples Only in Microtest Tubes For 24 gels Cat. #103-C

Cat. #114

DNA Paternity Testing Simulation



For 8 Gels/8 Lab Groups. This experiment introduces students to the use of DNA fingerprinting in a simulated paternity determination. A child's DNA fingerprint is compared with his parents. The experiment does not contain human DNA.

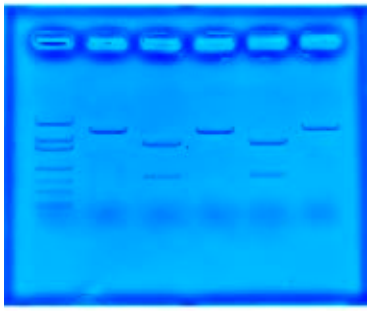
ALSO Available: DNA Samples Only in Microtest Tubes For 24 gels Cat. #114-C

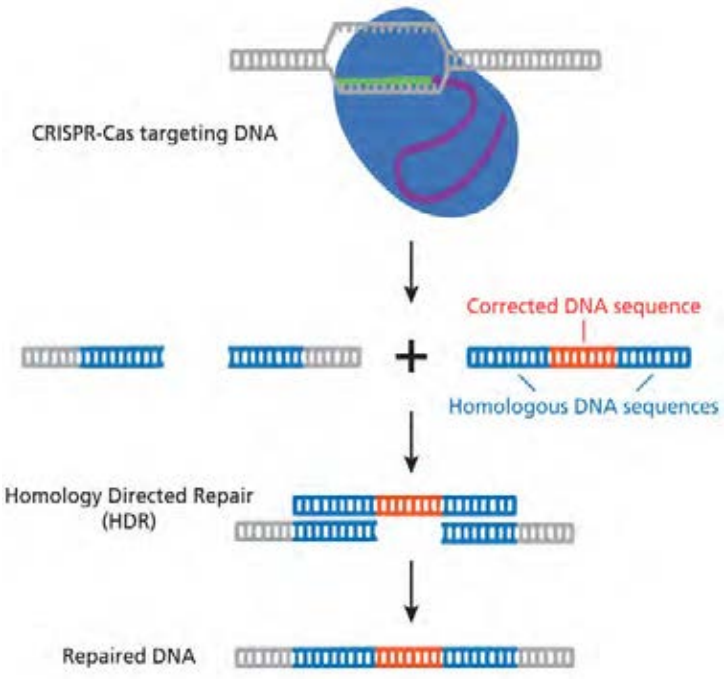
NEW

Cat. #135

Using CRISPR to Treat Cystic Fibrosis

For 8 Gels/8 Lab Groups. In this experiment, students will simulate the use of CRISPR-Cas9 to target a genetic mutation found in a patient suffering from Cystic Fibrosis. Students will develop an understanding of guide RNA (gRNA) design, and use agarose gel electrophoresis to examine pre-prepared DNA samples after CRISPR treatment.





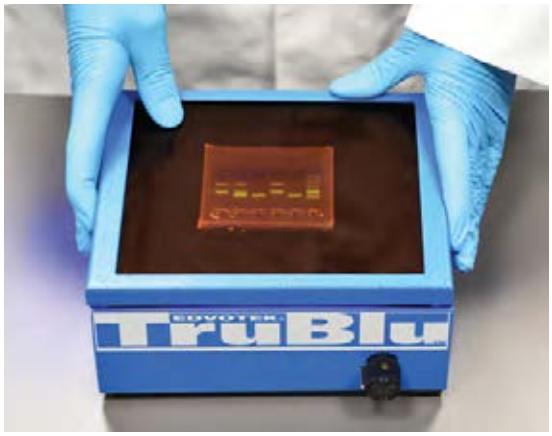
Cat. #557

TruBlu™ LED Transilluminator

NEW

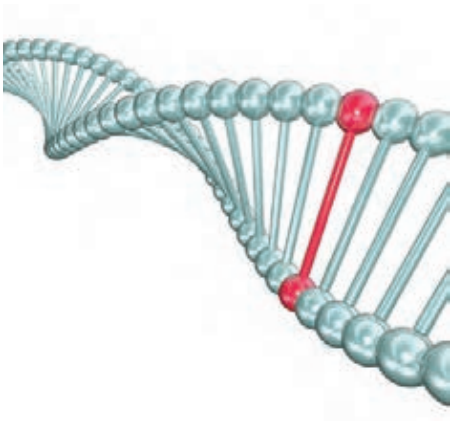
The all-new TruBlu™ LED Transilluminator utilizes blue light to view DNA gels stained with SYBR® Safe, thus eliminating the need for UV light or ethidium bromide. The spacious viewing area fits multiple agarose gels. And the high intensity control and orange lid ensure superior visualization

Developed in concert with the inventor of the technology under license from Clare Chemical Research, Inc.



Cat. #115

Cancer Gene Detection



For 8 Gels/8 Lab Groups. Immortality through uncontrolled cell division is a characteristic of cancer cells. The p53 gene is a tumor suppressor gene which prevents this. Mutations in this gene are present in more than 50% of cancers. Testing people for mutations in their p53 gene can indicate an increased risk for developing cancer. These tests raise intriguing ethical questions for both the individual tested and the family of an individual who chooses to be tested. In this experiment, students determine a pedigree for a family suspected to be carriers of mutations in their p53 genes. A DNA test indicates their likelihood of developing cancer.

ALSO Available: DNA Samples Only in Microtest Tubes For 24 gels Cat. #115-C

Cat. #116

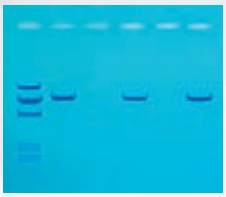
Sickle Cell Gene Detection (DNA-based)

For 8 Gels/8 Lab Groups. Sickle Cell Anemia is a common genetic disease that causes long rods in red blood cells, giving them a "sickled" appearance. These cells get stuck in small capillaries of the blood stream leading to oxygen deprivation that causes pain and organ damage. Sickle Cell Anemia is caused by a single point mutation in the hemoglobin gene that results in a faulty protein. In this experiment, your students will investigate the restriction enzyme that discriminates between HbA (normal) and HbS (disease) genes and perform a simulated test on a patient.

ALSO Available: DNA Samples Only in Microtest Tubes For 24 gels Cat. #116-C

Cat. #117

Detection of Mad Cow Disease



For 8 Gels/8 Lab Groups. 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 a 1997 ban which ended the practice of including animal parts in cattle feed.

ALSO Available: DNA Samples Only in Microtest Tubes For 24 gels Cat. #117-C

Cat. #118

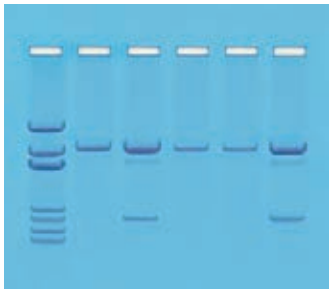
Cholesterol Diagnostics

For 8 Gels/8 Lab Groups. Elevated blood cholesterol has been established as a serious risk factor for coronary heart disease and stroke which are leading causes of death in the United States. A disease known as familial hypercholesterolemia (FH) causes an increase in blood levels of the "bad" form of cholesterol, known as low density lipoprotein (LDL). In this electrophoresis experiment, a simulated genetic test for hypercholesterolemia is demonstrated in which patients are tested for a DNA polymorphism linked to the FH gene.

ALSO Available: *DNA Samples Only in Microtest Tubes For 24 gels* *Cat. #118-C*

Cat. #121

Detection of Genetically Modified Organisms



For 8 Gels/8 Lab Groups. For centuries, humans have used selective breeding and conventional hybridization to produce desirable qualities and to increase crop yields. Today, scientists use genetic engineering to directly manipulate the DNA, quickly producing these desirable traits. In this experiment, students will use agarose gel electrophoresis to explore the molecular methods used by scientists to identify genetically modified organisms. No thermal cycler is required. Students are also encouraged to explore the controversy surrounding the use of genetically modified organisms.

ALSO Available: *DNA Samples Only in Microtest Tubes For 24 gels* *Cat. #121-C*

Cat. #120

Ready-to-Load™ DNA Sequencing

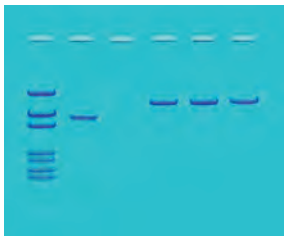
For 8 Gels/8 Lab Groups. Introduce your students to the exciting science of DNA Sequencing. This kit contains the four Ready-to-Load sequenced DNAs (nucleotides A, C, G, & T) in an easy to use, safe format. Students load the four separate reactions into agarose gels, run the gels, stain them, and actually read the DNA sequence. This experiment can be used to introduce genome concepts and help your students gain a better understanding of the science behind DNA sequencing.

Cat. #124

DNA Screening for Smallpox

For 8 Gels/8 Lab Groups. The objective of this experiment is to develop an understanding of Smallpox and the causative agent of the disease. Students will analyze simulated PCR products to confirm or rule out the presence of the Smallpox virus.
This experiment does NOT contain smallpox.

ALSO Available: DNA Samples Only in Microtest Tubes For 24 gels *Cat. #124-C*



Cat. #5062

Classroom DNA Electrophoresis LabStation™

Supports up to 24 Students. The latest in electrophoresis design - durable, flexible, safe, cost effective, and fast! This comprehensive equipment package can be used in countless classroom activities involving the separation of charged molecules by size, shape, and polarity. Teach key concepts in genetics, inheritance, molecular structure, and electricity in the context of medical diagnostics, criminal cases, alien phenotypes, or even your student's own sense of taste. Includes all the equipment needed to support six groups and a complimentary electrophoresis experiment. Produces excellent results in 30-40 minutes and includes a lifetime warranty.

Includes:
- One M36 HexaGel™ Electrophoresis Apparatus
- One DuoSource™ 150 (75/150 V for 1 or 2 units)
- Two Fixed Volume MiniPipets (40 µl)
- Yellow Micropipet Tips (1 - 200 µl / 2 Racks of 96)
- One DNA Fingerprinting Classroom Kit (Cat. #130)

Tech Video **youtube.com/EdvotekInc** Watch us on YouTube

Preparing Agarose Gels • Performing Agarose Gel Electrophoresis • Staining with FlashBlue™ Staining with InstaStain® Blue • Staining with InstaStain® Ethidium Bromide Staining with SYBR® Safe

4

What Are Restriction Enzymes?

Restriction endonucleases (also known as restriction enzymes) act like molecular scissors, cutting double-stranded DNA at specific sequences. They are produced by many species of bacteria to protect themselves from invading viral DNA. The utility of restriction enzymes has made molecular cloning, DNA mapping, sequencing and various genome-wide studies possible.

How Do Restriction Enzymes Know Where to Cut DNA?

In general, restriction enzymes recognize palindromic stretches of DNA that are 4-8 base pairs in length. The restriction enzyme cuts through both strands of DNA, creating fragments with one of two types of DNA ends -- "blunt" or "sticky" (Figure 1). Enzymes like *Hae*III cleave through both DNA strands at the same position, which generates fragments without an overhang. These so-called "blunt" ends can be joined with any other blunt end without regard for complementarity. In contrast, enzymes like *Eco*RI cut through the DNA strands at staggered positions, creating short overhangs of single-stranded DNA. Such overhangs are referred to as "sticky" ends because the single strands can interact with—or stick to—other overhangs with a complementary sequence.

How Many Times Can a Restriction Enzyme Cut a Piece of DNA?

The probability that a given enzyme will cut, or "digest", a piece of DNA is directly proportional to the length of its recognition site. Statistically, an enzyme will average one cut for every 4^n base pairs, where n is the length of the recognition site. Therefore, the longer a DNA molecule is, the greater the probability is that it contains one or more restriction sites. For instance, an enzyme that recognizes six base pairs (e.g., *Eco*RI) will cut once every 4,096 (or 4^6) base pairs. If *Eco*RI is used to digest both human chromosomal DNA and a plasmid, it will cut the chromosomal DNA over 700,000 times (3 billion base pairs, cut every 4,096 base pairs), but may only cut the plasmid once (5,000 base pairs, cut every 4096 base pairs).

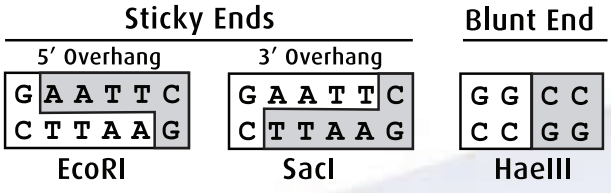


Figure 1:
Different Types of DNA Ends Produced by Restriction Enzymes

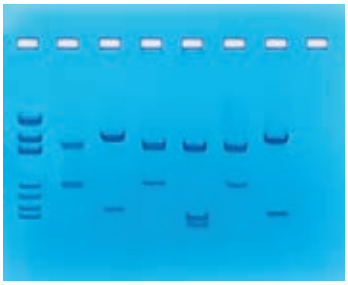
Cat. #225

DNA Fingerprinting Using Restriction Enzymes

BEST SELLER

No Ice Shipment Dryzymes

Forensics



For 6 Gels. 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.

Kit includes: instructions, "crime scene" and "suspect" Ready-to-Load™ DNA samples, DNA Standard Marker, Dryzymes® - *Eco*RI and *Hind*III, Enzyme Reaction Buffer, Reconstitution Buffer, Enzyme Grade Water, UltraSpec-Agarose™, 10X Gel Loading Solution, 50X Concentrated Electrophoresis Buffer, Practice Gel Loading Solution, InstaStain™ Blue Cards, FlashBlue™ DNA Stain, Disposable Pipets, & Microcentrifuge Tubes.

All you need: electrophoresis apparatus, power supply, automatic pipette with tips, water bath, microwave or hot plate, visualization (white light), misc. labware, pipet pumps or bulbs, metric rulers, floating racks, distilled or deionized water, ice.

Storage: Some Components Require Freezer Storage Upon Receipt.

Complete in 1 hour 20 minutes to 1 hour 45 minutes

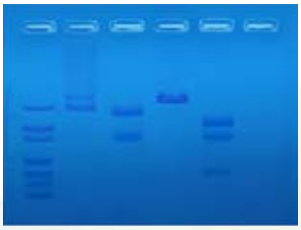
Cat. #206

Restriction Enzyme Mapping

No Ice Shipment Dryzymes

Newly Updated!

Complete in 1 hour 20 minutes to 1 hour 45 minutes



For 6 Sets of Restriction Digestions. In this experiment, a plasmid DNA is cleaved with different combinations of restriction enzymes. By determining the fragment size and using agarose gel electrophoresis, the relative positions of the restriction sites can be mapped.

Kit includes: instructions, Plasmid DNA for Restriction Digest, Restriction Enzyme Reaction Buffer, UltraPure Water, Restriction Enzyme Dilution Buffer, *Eco*RI Dryzyme, *Bam*HI Dryzyme, DNA Standard Marker, UltraSpec-Agarose™, Electrophoresis Buffer (50X), 10X Gel Loading Solution, InstaStain® Ethidium Bromide, FlashBlue™ Stain, Microcentrifuge Tubes with attached caps.

All you need: electrophoresis apparatus and power supply, automatic micropipet with tips, microwave or hot plate, water bath, floating racks, misc. lab glassware, ice.

Storage: Some Components Require Freezer Storage Upon Receipt.

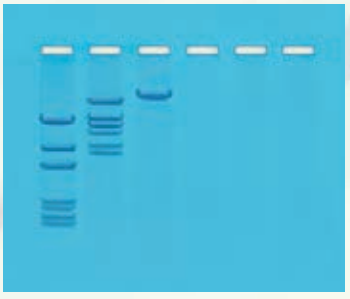
Now with Dryzymes™! NO WET ICE/OVERNIGHT SHIPPING FEES!

Cat. #212

Cleavage of Lambda DNA with *Eco*RI Restriction Enzyme

No Ice Shipment Dryzymes

Complete in 90 min.



For 10 Restriction Digestions and 5 Gels. The DNA from bacteriophage lambda is a well-characterized linear molecule containing six recognition sites for *Eco*RI (generating 5 fragments with distinct sizes and 2 fragments that are very close in size). In this experiment, Lambda DNA is digested by the *Eco*RI endonuclease. The digestion products are analyzed by electrophoresis.

Kit includes: instructions, Lambda phage DNA, Concentrated Restriction Enzyme Reaction Buffer, EDVOTEK® Enzyme Grade Water, *Eco*RI Dryzymes™ endonuclease, DNA Standard Marker, Reconstitution Buffers, UltraSpec-Agarose™, 10X Gel Loading Solution, 50X Concentrated Electrophoresis Buffer, Practice Gel Loading Solution, FlashBlue™ DNA Stain, InstaStain™ Blue Cards, Disposable Pipets, Microtest Tubes, & Semi-log Graph Paper Template.

All you need: electrophoresis apparatus, power supply, automatic pipet with tips, water bath, balance, microwave or hot plate, visualization (white light), misc. lab glassware, pipet pumps or bulbs, metric rulers, floating racks, distilled or deionized water, ice.

Storage: Some Components Require Freezer Storage Upon Receipt.

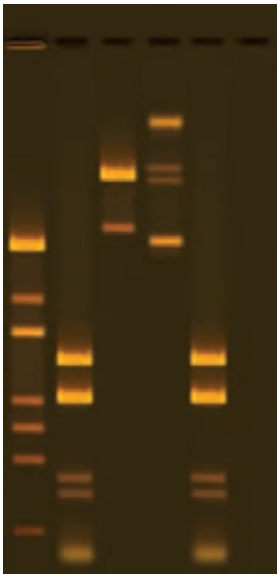
AP Biology Investigation #9 Option

Cat. #205

NEW

Analysis of DNA Methylation Using Restriction Enzymes

Complete in under 2 hours and 30 minutes



For 6 Groups. In this experiment, students explore the effects of DNA methylation on restriction enzyme activity. Plasmid DNA will be digested with the restriction enzymes DpnI and DpnII. When digested with these enzymes, methylated and unmethylated DNA will produce restriction fragments that are distinct from one another. The restriction fragments are then analyzed using agarose gel electrophoresis. After visualizing the gel, students determine which sample is methylated.

Requires wet ice shipment for next day delivery (by 3:00 pm in most areas.)

Kit includes: instructions, methylated and unmethylated Plasmid DNA, EdvoQuick™ DNA Ladder, DpnI and DpnII Restriction Enzymes, Restriction Enzyme Dilution Buffer, UltraSpec-Agarose™, Electrophoresis Buffer (50X), InstaStain® Ethidium Bromide, & Microcentrifuge Tubes.

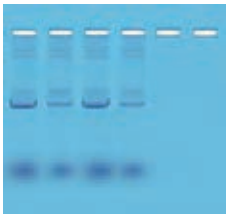
All you need: electrophoresis apparatus, power supply, automatic pipet with tips, water bath, balance, microwave or hot plate, visualization (white light or UV), misc. labware, pipet pumps or bulbs, metric rulers, floating racks, photodocumentation system (optional), distilled or deionized water, ice.

Storage: Some Components Require Freezer Storage Upon Receipt.

Cat. #202

Mini-Prep Isolation of Plasmid DNA

For up to 20 plasmid isolations for twelve 7x7 cm gels. 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.



Isolation of Plasmid DNA 60 min.
Electrophoresis 45 min.

Kit includes: instructions, PPlasmid LyphoCells™, Tris Buffer Concentrate, Sodium Hydroxide Solution, SDS Solution, Resuspension Buffer, Potassium Acetate Solution, RNase Solution, UltraSpec-Agarose™, 10X Gel Loading Solution, 50X Concentrated Electrophoresis Buffer, Practice Gel Loading Solution, FlashBlue™ DNA Stain, InstaStain™ Blue Cards, Disposable Pipets, & Microcentrifuge Tubes.

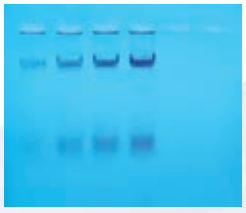
All you need: electrophoresis apparatus, power supply, water bath, balance, microcentrifuge, microwave or hot plate, automatic pipet, tips, visualization (white light), misc. labware, 95-100% isopropanol, distilled or deionized water, ice.

Storage: Some Components Require Freezer Storage Upon Receipt.

Cat. #203

Isolation of *E.coli* Chromosomal DNA

For up to 20 DNA isolations and 5 gels. 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 analyzed by agarose gel electrophoresis as an optional lab extension activity.



Complete in 1 hour 45 minutes

Kit includes: instructions, Chromosomal LyphoCells™, various solutions and buffers, agarose powder, FlashBlue™.

All you need: water bath, pipet pumps or bulbs, lab glassware, distilled or deionized water, 95-100% isopropanol.

For optional electrophoresis: electrophoresis apparatus, power supply, automatic micropipet with tips, balance, microwave or hot plate, misc. labware, white light visualization system, and photodocumentation system.

Storage: Room Temperature.

Cat. #204

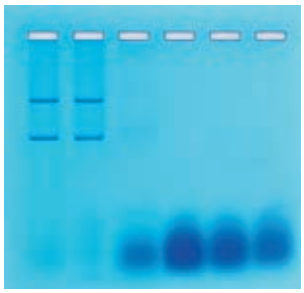
Separation of RNA and DNA by Gel Filtration Chromatography

For 5 Separations and 5 Gels. Gel filtration chromatography separates molecules on the basis of size and shape. This experiment provides a LyphoSample™ mixture of RNA and DNA that is separated on a gel exclusion column. The purified fractions of DNA and RNA are analyzed by agarose gel electrophoresis.

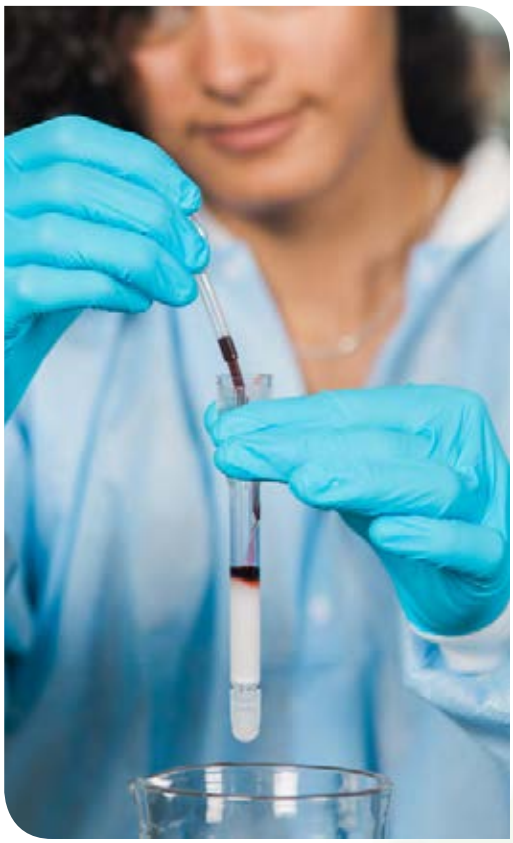
Kit includes: instructions, DNA/RNA LyphoSample™, Dry matrix, elution buffer, chromatography columns, agarose, gel loading solution, buffer, InstaStain® Blue and FlashBlue™.

All you need: electrophoresis apparatus and power supply, ring stands and clamps, balance, microwave or hot plate, automatic pipet, tips, pipet pumps or bulbs, labware, white light visualization, photodocumentation system (optional).

Storage: Refrigerator.



Complete in 90 minutes



Cat. #300

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

For 5 Groups. When DNA is subcloned in the pUC polylinker region, ß-galactosidase production is interrupted, resulting in the inability of cells to hydrolyze 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. This experiment can be broken down into three modules: ligation, transformation, and assay of ß-galactosidase.

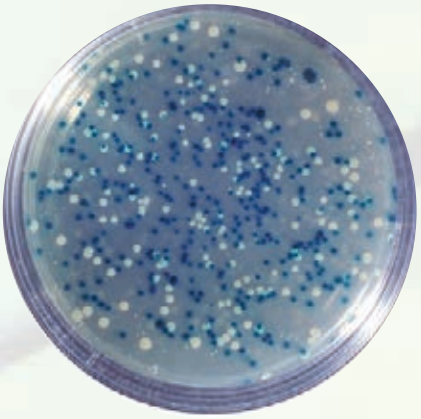
Kit includes: instructions, Linearized pUC plasmid & DNA fragment, T4 Ligase, Bacto-Beads™ for transformation, XGal in solvent, IPTG, calcium chloride, antibiotic, ReadyPour™ Luria Broth Agar, Luria broth media for recovery, growth media, assay components, plastic supplies.

All you need: incubation oven, two water baths, shaking incubator or shaking water bath, microwave or hot plate, automatic micropipet and tips, spectrophotometer, balance, centrifuge, microcentrifuge, glassware and cuvettes, distilled water, ice.

Storage: Some Components Require Refrigerator and Freezer Storage Upon Receipt.

Complete three modules in 3 hours 10 minutes

Cat. #300 is recommended for college level courses.

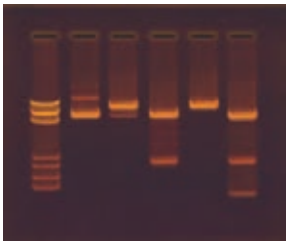


Cat. #301

Construction & Cloning of a DNA Recombinant

Newly Updated!

Complete 5 modules in approximately 5 hours



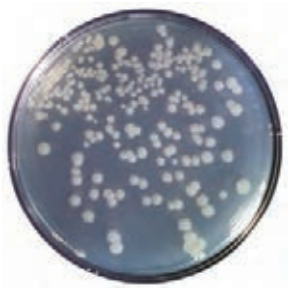
For 5 Plasmid Constructs & Analyses. Cloning is frequently performed to study gene structure and function, and to enhance gene expression. This experiment is divided into five modules. Clones are constructed by ligation of a vector and a fragment insert. The constructs are then transformed into competent cells and the cells are grown and selected for resistance. Plasmid DNA is then isolated from the transformants, cleaved with restriction enzymes, and analyzed by agarose gel electrophoresis.

Kit includes: instructions, BactoBeads™, enzymes, plasmid DNA, restriction enzyme dilution buffer, enzyme grade water, standard DNA fragments, restriction enzyme reaction buffer, gel loading solution, agarose powder, electrophoresis buffer, stains, calibrated pipet.

All you need: electrophoresis apparatus and power supply, automatic micropipet with tips, balance, microwave or hot plate, water bath, large weigh boats for staining, UV transilluminator, floating racks for microtest tubes, pipet pump or bulb, 5 or 10 ml pipets, laboratory glassware, metric rulers, distilled water, ice.

Storage: Some Components Require Refrigerator and Freezer Storage Upon Receipt.

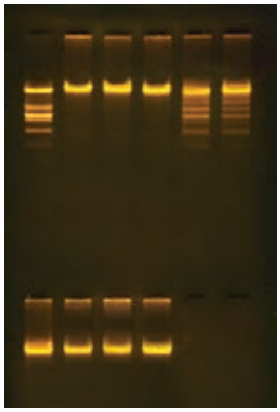
Cat. #301 is recommended for college level courses.



Cat. #302

Purification of the Restriction Enzyme *Eco*RI

STEM



For 5 Purifications. 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 and specific activities are calculated. Recommended for college level courses.

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, InstaStain® Ethidium Bromide.

All you need: horizontal gel electrophoresis apparatus, power supply, UV visualization system, water bath, microcentrifuge, microwave or hot plate, UV spectrophotometer & cuvettes, automatic micropipet with tips, ring stands & clamps, 10 ml pipets, lab glassware, ice and ice buckets.

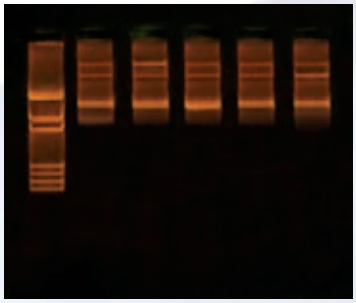
Storage: Some Components Require Freezer Storage Upon Receipt.

Packing column 45 min.
Restriction Analysis A 35 min.
Restriction Analysis B 50 min.
Gel Prep 30 min.
Electrophoresis 30 min.
Staining 2 min.

Cat. #302 is recommended for college level courses.

Cat. #957

DNA Damage and Repair

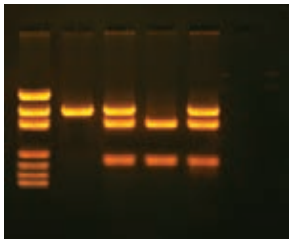


For 10 Groups. According to the World Health Organization, between 2 and 3 million cases of skin cancer occur globally every year. Many of these cancers are caused by preventable damage to DNA by UV light during sunbathing. In this experiment, your students will expose plasmid DNA to shortwave UV light to simulate the effect of sunbathing. The DNA is then analyzed by agarose gel electrophoresis to observe the damage. *See page 82 for more information!*

Cat. #314

In Search of the Cancer Gene

For 6 Groups. 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.



Complete in 60 minutes

Kit includes: instructions,Ready-to-load™ Predigested DNA samples, UltraSpec-Agarose™ powder, electrophoresis buffer, InstaStain® Ethidium Bromide, 5 autoradiograms.

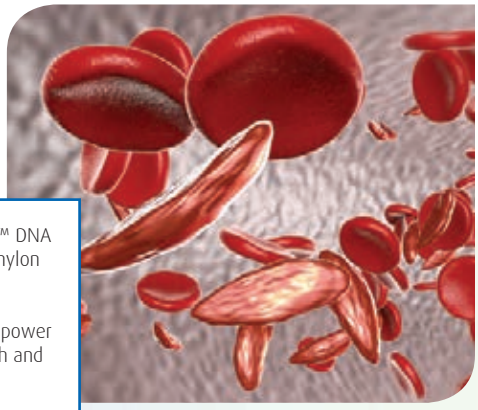
All you need: electrophoresis aapparatus & power supply, automatic micropipette with tips, balance, microwave or hot plate, water bath (65ºC), UV Transilluminator, pipet pump or bulb, 250 ml Flasks, distilled or deionized water.

Storage: Refrigerator.

Cat. #315

In Search of the Sickle Cell Gene by Southern Blot

For 5 Groups. 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 analyze 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.



Electrophoresis 45 min.
Blotting Overnight
Staining & Destaining 10 min.

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

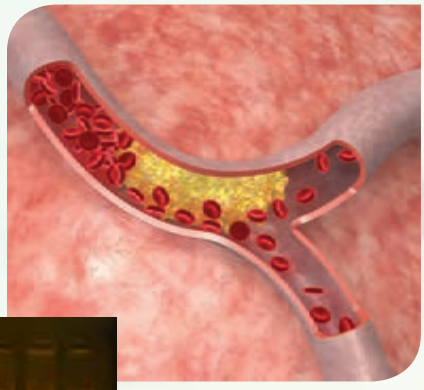
All you need: electrophoresis apparatus, power supply, microwave or hot plate, water bath and incubation oven.

Storage: Some Components Require Freezer Storage Upon Receipt.

Cat. #316

In Search of the Cholesterol Gene

For 10 Groups. 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). This experiment includes reagents for the colorimetric enzymatic reaction which is the basis of the clinical cholesterol test. In addition, students will analyze a simulated genetic screening for a disease using agarose gel electrophoresis.



Complete in 2 hours 15 minutes

Kit includes: instructions, cholesterol standard solution, standard DNA markers, control samples, simulated patient serum samples and DNA samples, cholesterol oxidase enzyme, potassium iodide, color enhancer & color developer, agarose, electrophoresis buffer, InstaStain® Ethidium Bromide.

All you need: electrophoresis apparatus, power supply, automatic micropipet with tips, balance, microwave oven or hot plate, incubation oven or water bath, spectrophotometer and cuvettes, UV transilluminator, pipet pumps or bulbs, lab glassware, large weigh boats.

Storage: Some Components Require Refrigerator and Freezer Storage Upon Receipt.

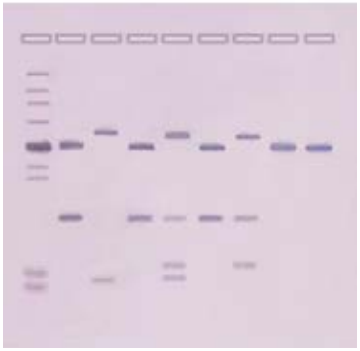
Cat. #311

DNA Fingerprinting by Southern Blot

Advanced Topic

Cat. #311 is recommended for college level courses.

For 5 Groups. 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. *Requires wet ice shipment for next day delivery (by 3:00 pm in most areas).*



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

All you need: electrophoresis apparatus & power supply, automatic micro-pipet with tips, balance, microwave or hot plate, water bath, incubation oven, pipet pumps or bulbs, pipets, floating Racks for microtest tubes, lab glassware, plastic wrap, distilled or deionized water, NaCl, NaOH, Concentrated HCl, ice.

Storage: Some Components Require Refrigerator and Freezer Storage Upon Receipt.

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

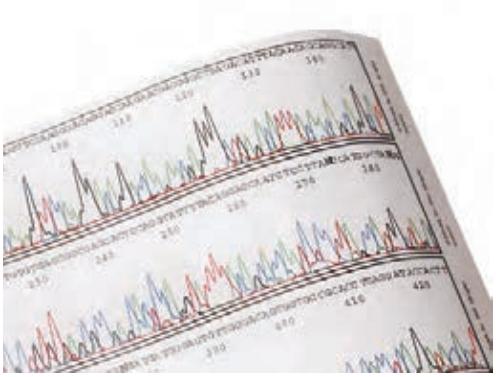
Cat. #339

Sequencing the Human Genome

Newly Updated!

45 min.

Sequences For 10 Groups. 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.



Kit includes: instructions, automated sequencing printouts

All you need: computer access to the internet

Cat. #340

DNA Bioinformatics

Newly Updated!

45 min.

For 12 Groups. 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 autoradiographs containing DNA sequences which represent segments of important cellular genes. Using bioinformatics databases, students compare and extrapolate database information and identify the gene product.

Kit includes: instructions, 3 sets of 4 autoradiograms

All you need: white light visualization system, computer access to the internet.

Cat. #303

Exploring Biotechnology with GFP

Complete in 3 hours 15 minutes

For 6 experiments with 4 modules each. 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 analyzed by SDS polyacrylamide electrophoresis.

Kit includes: instructions, BactoBeads™, 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 fluorescent protein extracts, elution buffer, protein molecular weight standards, protein denaturation solution, glycerol solution, Tris-Glycine-SDS buffer, Protein Instastain

All you need: Incubation oven, two water baths, microwave or hot plate, automatic micropipette and tips, pipet pumps or bulbs, ice, long wave UV light, ring stand and clamps, lab glassware, ice, vertical gel electrophoresis apparatus and power supply, 3 Polyacrylamide Gels (12%), plastic trays or large weigh boats for optional staining & destaining, glacial acetic acid, ethanol.

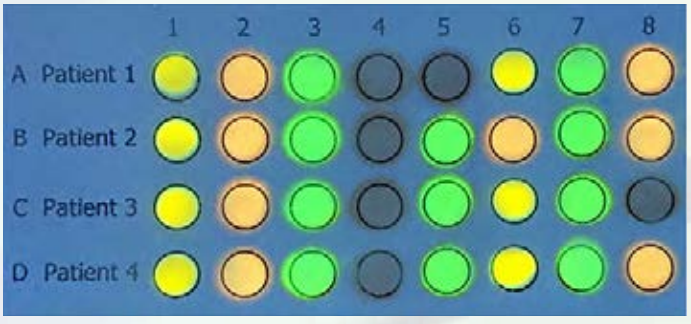
Storage: Some Components Require Freezer Storage Upon Receipt.

Cat. #235

DNA/RNA Microarrays

For 10 lab groups. Membrane microarray technology is enabling scientists to screen large numbers of samples in one assay. This technology has led to cost savings by reducing the sample size, while saving time and yielding accurate results. Students will apply simulated DNA and RNA samples to a membrane to screen for positive and negative samples.

Complete in 60 minutes



Kit includes: instructions, simulated patient DNA and RNA samples, controls, microarray cards, plastic bags to incubate membrane, microtest tubes, pipets.

All you need: Automatic micropipettes and tips, distilled water, beakers or flasks.

Storage: Refrigerator.

5

Nobel Prize Winning 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, Dr. 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.

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! Your students can even try amplifying their own DNA.

We have also re-designed our EdvoCycler™, an affordable PCR machine for the classroom! Give your students the opportunity to perform this Nobel Prize winning technique!

Cat. #541-542

EdvoCycler™ 2

The EdvoCycler™ 2 offers superior performance and ease-of-use in a sleek new form factor. Features 48 wells and a vivid touchscreen display. Proudly made in the USA and backed by a 2 year warranty!

See page 7 or visit our website for more information!

NEW

Cat. #540

EdvoCycler™ Jr.

At 16 wells, the EdvoCycler™ Jr. has the largest capacity of any personal PCR machine. It offers superior performance in a sleek form factor with a vivid touchscreen display. Proudly made in the USA and backed by a 2 year warranty!

See page 6 or visit our website for more information!

NEW

Kits in this section include the following:

Instructions, PCR EdvoBeads™, control DNA and primers, microtubes, agarose, DNA ladder, buffer, and SYBR® Safe Stain.

All You Need:

Micropipets to measure between 5 and 50 µL, tips, water bath, thermal cycler, electrophoresis apparatus, power supply, microwave or hot plate, UV or blue light transilluminator.

Storage:

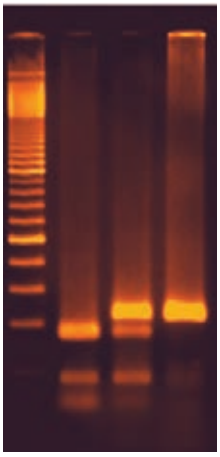
Some components require freezer storage upon receipt.

BEST SELLER

Cat. #345

Exploring the Genetics of Taste: SNP Analysis of the PTC Gene Using PCR

Extraction 30 min.
PCR Set Up 10 min.
PCR 2 hrs.
DNA Digest 60 min.
Electrophoresis 30 min.
Staining 5 min.



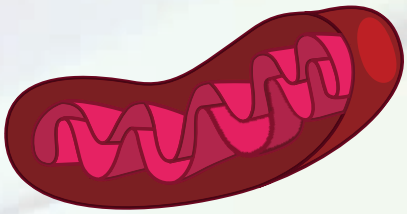
For 25 Reactions. The objective of this experiment is to identify the presence of the single nucleotide polymorphism (SNP) in an amplified segment of the PTC gene that links detection of the characteristic taste of PTC paper. This is a set of five modules that starts with (I) extraction of DNA from buccal cells (II) amplifying the segment that contains the polymorphic nucleotide (III) digestion of the amplified fragment with the restriction enzyme that recognizes the SNP (IV) analysis by gel electrophoresis (V) tasting the PTC paper to confirm the results obtained.

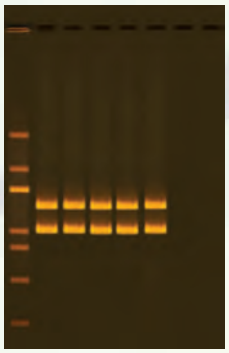
Cat. #332

The Mother of All Experiments: Exploring Human Origin by PCR Amplification of Mitochondrial DNA

Extraction 50 min.
PCR Set Up 10 min.
PCR 2 hrs.
Electrophoresis 60 min.
Staining 5 min. to overnight

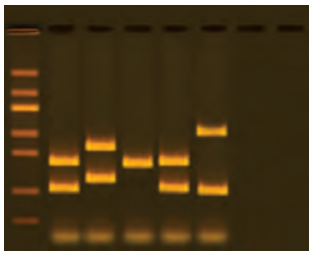
For 25 Students. In this experiment, students will isolate their mitochondrial DNA and use the Polymerase Chain Reaction (PCR) to amplify two separate regions of the mitochondrial genome. Results are analyzed using agarose gel electrophoresis.





Cat. #334

VNTR Human DNA Typing Using PCR

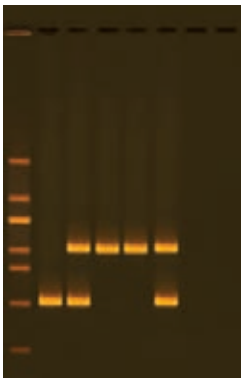


For 25 Students. In DNA fingerprinting, variable number tandem repeats (VNTR) are used to identify individuals. In this kit, students will type themselves at the D1S80 locus on chromosome 1. This region contains between 14 and 40 copies of a 16 base pair repeat.

Extraction 30 min.
PCR Set Up 10 min.
PCR 90 min.
Electrophoresis 30 min.
Staining 5 min.

Cat. #333

Alu Human DNA Typing Using PCR

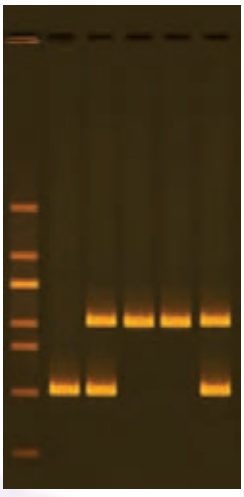


For 25 Students. Your students use primers for a 300 base pair Alu insertion in chromosome 16 (PV92) to determine their own genotype! They can then compare their class results with others around the world over the internet.

Extraction 50 min.
PCR Set Up 10 min.
PCR 90 min.
Electrophoresis 60 min.
Staining 5 min. to overnight

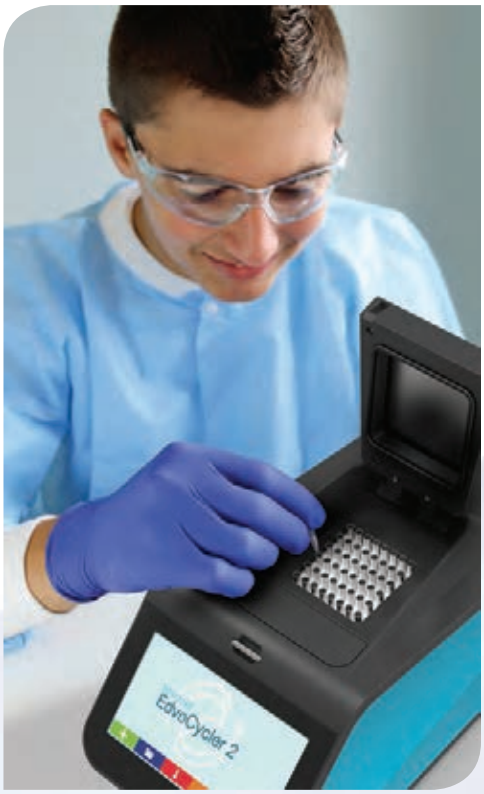
Cat. #369

Human PCR Tool Box™



For 25 Students. 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.

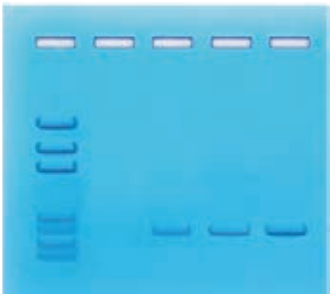
Extraction 50 min.
PCR Set Up 10 min.
PCR 2 hrs.
Electrophoresis 60 min.
Staining 5 min. to overnight



Cat. #330

PCR Amplification of DNA

For 10 Groups. 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.



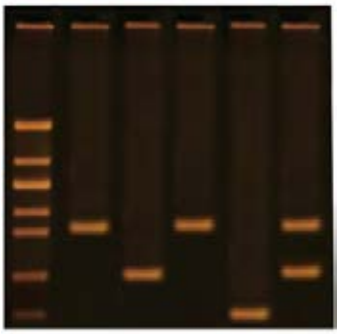
PCR Set Up 10 min.
PCR 90 min.
Electrophoresis 30 min.
Staining 5 min. to overnight

Cat. #371

DNA Fingerprinting Using PCR

Forensics

Advanced Topic



For 25 students working in 5 groups. 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, when amplified by PCR, provides products that represent individual DNA profiles. Your students can then solve a crime!

PCR Set Up 10 min.
PCR 2 hrs.
Electrophoresis 60 min.
Staining 5 min. to overnight

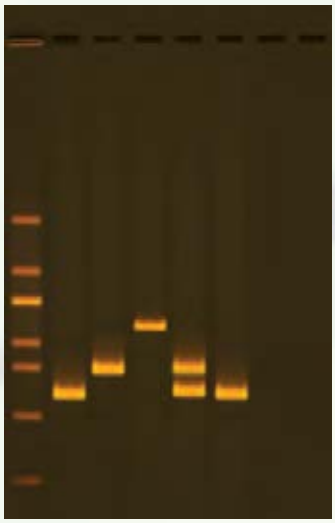
Cat. #953

Multiplex PCR Testing of Water Contaminants

AP ENVIRONMENTAL

NIH

For 25 Students. Drinking water is routinely tested for contamination. If a screening tests positive, more sophisticated tests are required. One such test uses PCR in multiplex format. In this experiment, students will test for the presence of three separate, classroom-safe organisms in a water sample using a single PCR reaction.



Extraction 60 min.
PCR Set Up 10 min.
PCR 2 hrs.
Electrophoresis 60 min.
Staining 5 min. to overnight

NEW

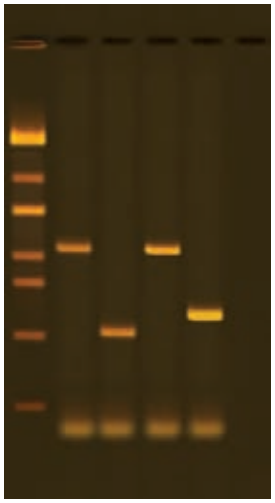
Cat. #338

Exploring Plant Diversity with DNA Barcoding

AP ENVIRONMENTAL

For 10 Groups. In this inquiry-based lab, your class will explore the genetic diversity of ten selected plants. Students will isolate plant DNA and use PCR to amplify two polymorphic regions of the chloroplast genome. Digestion of PCR products and analysis by agarose gel electrophoresis will then be used to generate unique identification profiles for each plant. ***Requires shipment on wet ice.***

Extraction 2 hrs.
PCR Set Up 10 min.
PCR 2 hrs.
DNA Digest 60 min.
Electrophoresis 60 min.
Staining 5 min. to overnight



Cat. #962

Identification of Genetically Modified Foods Using PCR

AP ENVIRONMENTAL

For 10 Groups. Some foods contain raw materials from genetically modified organisms (GMO). Examples include tofu, corn flakes and corn meal. In this experiment, your students will extract DNA from food or plant material and perform PCR to determine if any GM indicator genes are present. Amplified DNA is separated and sized by agarose gel electrophoresis. ***Requires 1 to 3 day shipping.***

Extraction 45 min.
PCR Set Up 10 min.
PCR 2 hrs.
Electrophoresis 60 min.
Staining 5 min.

PCR EdvoBeads™

Room Temperature Stable. Requires no wet ice shipping!

25 Beads
Cat. #625

Each PCR EdvoBead™ contains: dNTP Mixture, *Taq* DNA Polymerase, *Taq* DNA Polymerase Buffer, and $MgCl_2$

NEW PCR EdvoBeads™ PLUS

Room Temperature Stable. Requires no wet ice shipping!

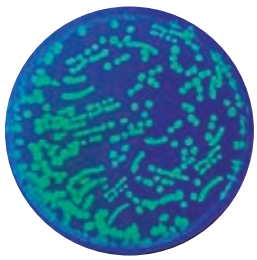
25 Beads
Cat. #PCR EdvoBeads™ PLUS

Each PCR EdvoBead™ PLUS contains: dNTP Mixture, *Taq* DNA Polymerase, *Taq* DNA Polymerase Buffer, MgCl2, and Reaction Buffer. Used with kits 330, 332, 333, 345, 858, and 962.

NEW

Cat. #323

GFP Transformation Extension: Colony PCR



For 10 Groups. Colony PCR represents a simple and easy way to determine whether cloning and transformation experiments were successful. In this experiment, students will use colony PCR to analyze bacteria transformed with pFluoroGreen. A single colony will be used as the DNA template for PCR. The resulting PCR sample will then be analyzed using agarose gel electrophoresis. If the bacteria have been transformed successfully, a PCR product representing the GFP gene will be produced. A bacterial housekeeping gene is amplified at the same time as a positive control. The presence of both bands is indicative of a successful transformation experiment. ***This kit is intended for use in conjunction with Edvotek Transformation Kits 222, 223 or 303.***

Extraction 60 min.
PCR Set Up 10 min.
PCR 2 hrs.
Electrophoresis 60 min.
Staining 5 min. to overnight

Kit includes: all necessary reagents for PCR and electrophoresis.

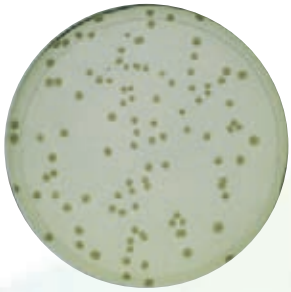
All you need: 5-50 µl adjustable micropipets, tips, 37°C incubator, microwave or hot plate, thermal cycler, electrophoresis apparatus, power supply, UV transilluminator, GFP transformation plates.

Storage: Some Components Require Refrigerator and Freezer Storage Upon Receipt.

Cat. #331

Investigating Synthetic Biology

Advanced Topic



For 5 Groups. Teach your students about synthetic biology with this exciting and exclusive lab! Students use PCR to amplify the coding sequence of the BSMT1 enzyme. This interesting enzyme is responsible for the formation of methyl salicylate, a chemical with a strong "wintergreen" odor. The PCR product is purified, restriction digested, and inserted into a plasmid vector. The resulting recombinant DNA is then used to transform *E. coli* BactoBeads™. Finally, students design an experiment to express the enzyme from their transformants and perform a smell test to confirm that the bacterial factories are working!

Kit includes: instructions, DNA template & primers, PCR beads, buffers & reagents for PCR, Dryzyme®, T4 ligase, DNA size ladder, gel loading dye, agarose, electrophoresis buffer, InstaStain® Ethidium Bromide, ReadyPour™ Luria Broth, Bactrobeads, reagents for transformation & smell assay.

All you need: thermal cycler, two waterbaths, incubation oven, electrophoresis apparatus, power supply, automatic micropipet with tips, microwave or hot plate, UV transilluminator, shaking incubator or shaking waterbath, microcentrifuge.

Storage: Some Components Require Refrigerator and Freezer Storage Upon Receipt.

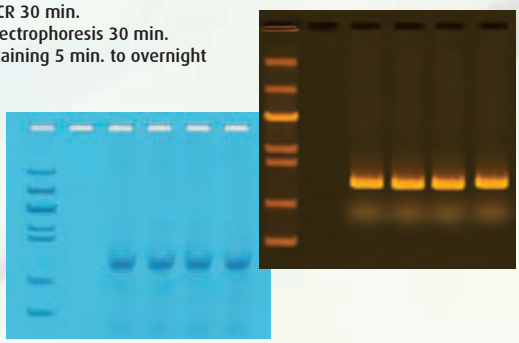
Module I: 2 hours
Module II: 60 minutes
Module III: 2 hours
Module IV: 75 minutes
Module V: 2 hours + overnight
Module VI: 3 hours 20 minutes + overnight
Module VII: 15 minutes
**This experiment requires a multiple day transformation.*

Cat. #372

Quick PCR

For 10 Groups. In this experiment, students will gain an understanding of the traditional three-step Polymerase Chain Reaction (PCR). Using PCR and Agarose Gel Electrophoresis, they will analyze a small section of Lambda DNA in a time-saving two-step process.

PCR Set Up 10 min.
PCR 30 min.
Electrophoresis 30 min.
Staining 5 min. to overnight



Kit includes: all necessary reagents for DNA extraction, electrophoresis, and PCR.

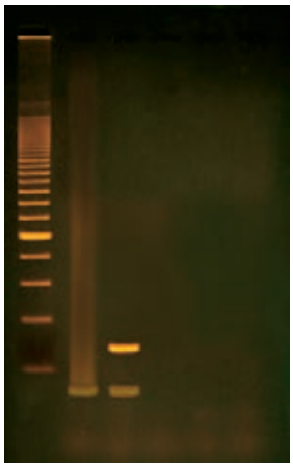
All you need: 5-50 µl adjustable micropipets, tips, thermal cycler, electrophoresis apparatus, power supply, microwave or hot plate, UV transilluminator.

Storage: Some Components Require Freezer Storage Upon Receipt.

Cat. #335

Reverse Transcription PCR (RT-PCR) The Molecular Biology of HIV Replication

Advanced Topic



For 6 Groups. 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. ***Requires shipment on wet ice.***

Kit includes: all necessary reagents for DNA extraction, electrophoresis, and PCR.

All you need: thermal cycler, electrophoresis apparatus, power supply, automatic micropipet with tips, microwave or hot plate, water bath, UV transilluminator.

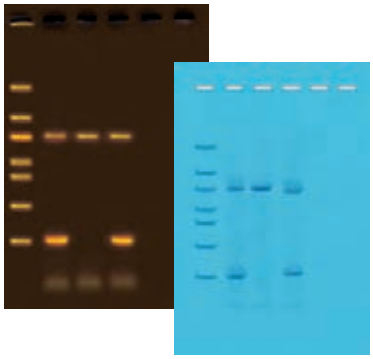
Storage: Some Components Require Freezer Storage Upon Receipt.

PCR Set Up 10 min.
PCR 3 hrs.
Electrophoresis 60 min.
Staining 5 min.

Cat. #337

Drosophila Genotyping Using PCR

Advanced Topic



For 10 Groups. 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 electrophoresis and analyzed.

Kit includes: all necessary reagents for DNA extraction, electrophoresis, and PCR.

All you need: thermal cycler, electrophoresis apparatus and power supply, automatic micropipet with tips, microwave or hot plate, water bath, UV transilluminator, microcentrifuge.

Storage: Some Components Require Freezer Storage Upon Receipt.

Kit contains LIVE materials which must be requested 3 weeks prior to lab.

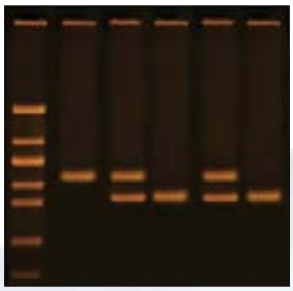
Extraction 45 min.
PCR Set Up 10 min.
PCR 2 hrs.
Electrophoresis 60 min.
Staining 5 min. to overnight

ALSO Available:
All kit components, excluding Drosophila.
Cat. #337-ND

NEW

Cat. #1125

Diagnosing Huntington's Using PCR



For five complete sets of reactions. In this experiment, students will conduct a DNA fingerprinting exercise on simulated patient samples to determine if family members are heterozygous or homozygous for Huntington's Disease. Students will then analyze the amplified DNA segments by agarose gel electrophoresis.

Kit includes: all necessary reagents for PCR and electrophoresis.

All you need: thermal cycler, electrophoresis apparatus and power supply, automatic micropipet with tips, microwave or hot plate, water bath, UV transilluminator, microcentrifuge.

Storage: Some Components Require Freezer Storage Upon Receipt.

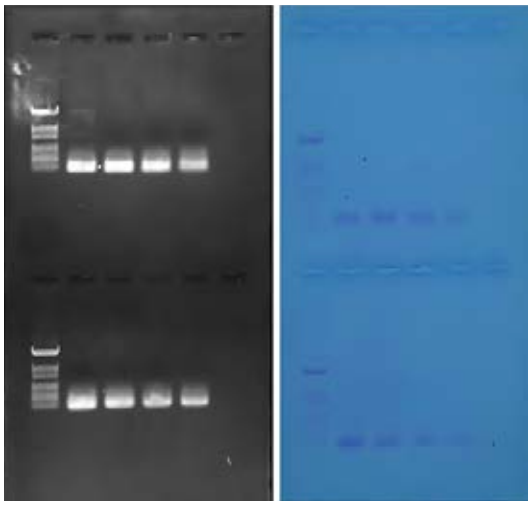
NEW

Cat. #380

Discovering Quantitative PCR Amplification and Analysis

For 4 Groups. Quantitative PCR (qPCR, also known as real time PCR) simultaneously amplifies and detects targeted DNA allowing scientists to discover the starting amount of a specific DNA sequence in an experimental sample. This powerful and precise technology has become a cornerstone of modern genetics research, biological monitoring, and medical diagnostics. For students, performing qPCR offers the challenge of performing a mathematically and technically advanced experiment, the opportunity to understand key molecular concepts through hands on learning, and an essential skill for future research work. In this specially adapted education qPCR experiment, students will quantify the DNA concentration of four experimental samples using a standard curve approach and then confirm the experiment's specificity and accuracy through gel electrophoresis, melt curve analysis, and data analysis. ***This kit must be used with a RT (qPCR) Thermal Cycler.***

Visit our website for more info!
www.edvotek.com/380



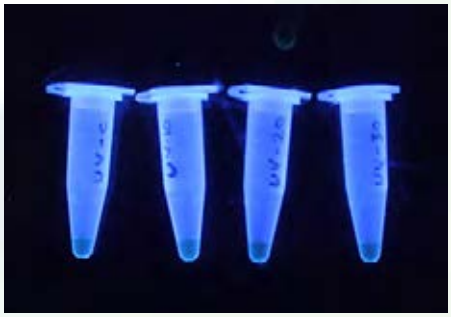
NEW

Cat. #381

Break Through! Testing DNA Damage Using Quantitative PCR

Visit our website for more info!
www.edvotek.com/381

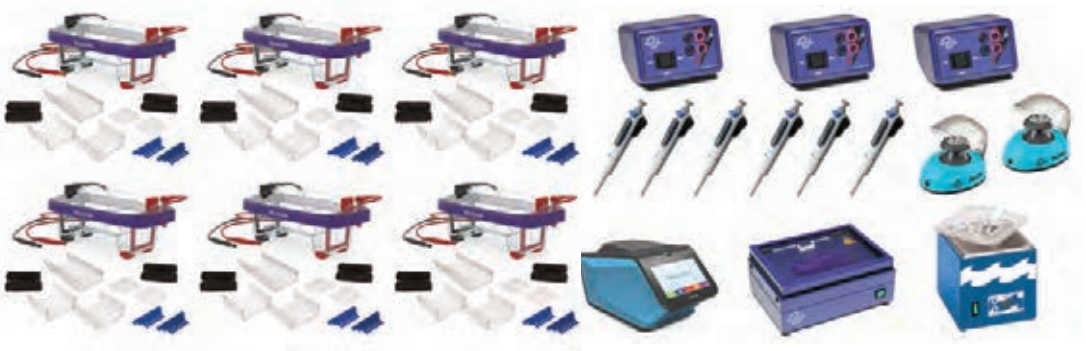
For 4 Groups. The integrity and stability of DNA is essential to life. However, everyday this molecule is under assault from environmental stressors like UV radiation, mutagenic chemicals, and even normal metabolic processes. In this guided inquiry lab students will use the cutting edge technology of QPCR to investigate and quantify DNA damage due to physical (UV radiation) or chemical (DNAseI) disruptions. By designing and performing the experiments students will master advanced analytical and technical skills as well as deepen their understanding of key molecular biology and medical concepts. ***This kit must be used with a RT (qPCR) Thermal Cycler.***



Cat. # 5067

Classroom PCR LabStation™

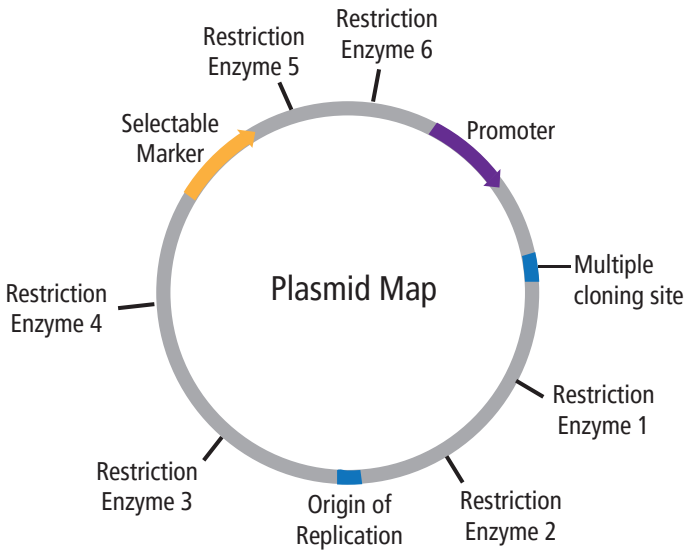
See page 19 for details!



6

What is a Plasmid?

In addition to their chromosomal DNA, many bacteria possess extra, non-essential genes on small, circular pieces of double-stranded DNA. These pieces of DNA, known as plasmids, allow bacteria to exchange beneficial genes. For example, some genes that confer antibiotic resistance can be transferred between bacteria on plasmids.



What is Transformation?

In nature, some species of bacteria can acquire exogenous DNA from the surrounding environment through a process called transformation. The newly acquired genetic information is both stable and heritable.

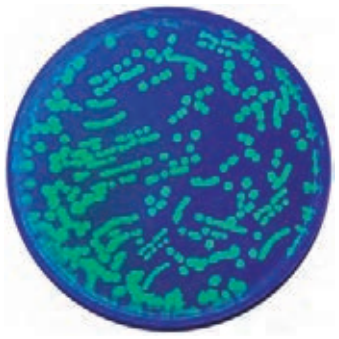
In the laboratory, scientists can force bacteria like *E.coli* to take up DNA and become transformed, even though many bacteria are not naturally competent. It is believed that the combination of calcium chloride and a rapid change in temperature—or "heat shock"—alters the permeability of the cell wall and membrane, allowing DNA molecules to enter the cell.

What is Genetic Engineering?

Genetic engineering is the use of biotechnology to alter an organism's DNA. Recombinant DNA technology has allowed scientists to insert genes from different sources into bacterial plasmids. Once transformed, the bacteria can produce large amounts of important proteins from such plasmids, essentially converting cells into living factories. Insulin, which is used to control diabetes, was the first medication for human use to be produced by genetic engineering.

Cat. #223-AP08

Transformation of *E.coli* with Green Fluorescent Proteins (GFP)



For 10 Groups. In this experiment, students will explore the biological process of bacterial transformation using *E. coli* and plasmid DNA. At the end of the activity, students will have experience observing and analyzing acquired traits (ampicillin resistance and fluorescence) as exhibited by transformed bacterial cells.

Kit includes: instructions, BactoBeads™, Growth Additive, plasmid DNA, IPTG, ampicillin, transformation solution, ReadyPour™ Agar, Luria broth, petri dishes, sterile pipets, loops and microtubes.

All you need: water bath, 37°C incubation oven, microwave or hot plate, long wave UV lamp.

Storage: Some Components Require Refrigerator and Freezer Storage Upon Receipt.

Set Up & Plating 50 min.
Incubation overnight
Transformation 15 min.

Cat. #224

Rainbow Transformation

For 10 Groups. 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 a new set of rainbow color plasmids that transform non-pathogenic bacterial cells into bright, colorful cells.

Kit includes: instructions, BactoBeads™, plasmid DNA, IPTG, Ampicillin, transformation solution, ReadyPour™ Agar, Luria broth, petri dishes, sterile pipets and loops.

All you need: water bath, 37° C incubation oven, microwave or hot plate.

Storage: Some Components Require Refrigerator and Freezer Storage Upon Receipt.

Set Up & Plating 50 min.
Incubation overnight
Transformation efficiency 15 min.

NEW

Cat. #226

Living Art: Adding STEAM to Transformations

For 25 Students. In this experiment, students will harness the color producing power of transformed bacteria to create works of living microbial art. ***This kit is to be used in conjunction with EDVOTEK® Cat. 222, 223, 224 or 303.***

Kit includes: instructions, ampicillin, IPTG, GFP BactoBeads™, ReadyPour™ Luria Broth agar, sterile, Luria Broth liquid media, inoculating loops, sterile, plastic loops, non-sterile, toothpicks, petri plates, 1.5 mL microcentrifuge tubes, & 10 mL pipet, sterile.

All you need: Transformed colonies from EDVOTEK® Cat. 222, 223, 224 or 303, distilled water, gloves, UV light source, microwave, incubator or water bath, adjustable pipette and tips (20-200µl), pipet pump (optional), vortexer (optional), & fine tip paint brushes (optional).

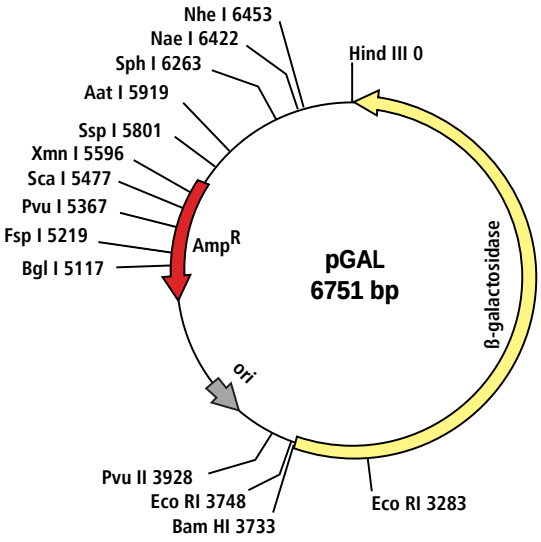
Storage: Some Components Require Refrigerator and Freezer Storage Upon Receipt.

Cat. #221

Transformation of *E.coli* with pGAL™ (Blue Colony)

For 10 Groups. In this experiment, your students will develop an understanding of bacterial transformation of plasmid DNA by introducing an opportunity to observe an acquired phenotypic trait of the transformed bacterial cells. The presence of blue bacterial colonies visually demonstrates the expression of a specific gene for the Lac+ phenotype.

Complete in 50 min. and grow overnight



Kit includes: instructions, BactoBeads™, plasmid DNA, buffer, media, ampicillin, X-Gal, ReadyPour™ Agar, petri dishes, sterile pipets, loops and microtubes.

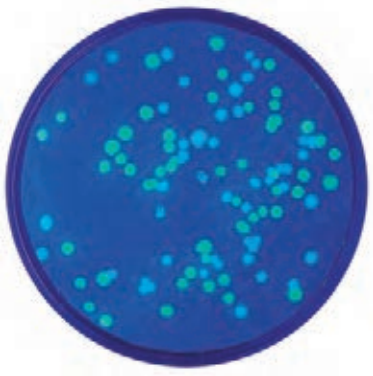
All you need: 37°C incubation oven, water bath, microwave or hot plate.

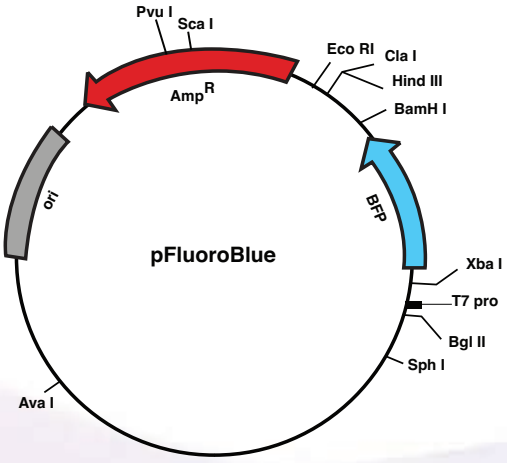
Storage: Some Components Require Refrigerator and Freezer Storage Upon Receipt.

Cat. #222

Transformation of *E.coli* with Blue and Green Fluorescent Proteins

For 10 Groups. The Green Fluorescent Protein (GFP), which is responsible for bioluminescence in the jellyfish *Aequorea victoria*, is used extensively in all areas of science. Many organisms have been transformed with the GFP gene. 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!





Complete in 50 min. and grow overnight

Kit includes: instructions, BactoBeads™, Growth Additive, plasmid DNA, IPTG, ampicillin, transformation solution, ReadyPour™ Agar, Luria broth, petri dishes, sterile pipets and loops.

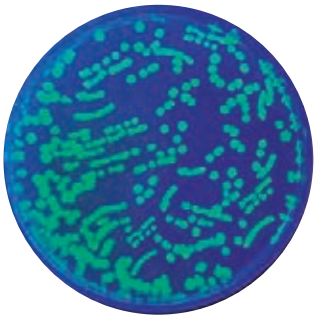
All you need: water bath, 37°C incubation oven, microwave or hot plate, long wave UV lamp.

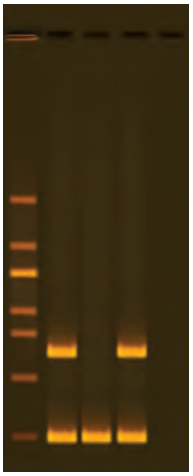
Storage: Some Components Require Refrigerator and Freezer Storage Upon Receipt.

NEW

Cat. #323

GFP Transformation Extension: Colony PCR





For 10 Groups. Colony PCR represents a simple and easy way to determine whether cloning and transformation experiments were successful. In this experiment, students will use colony PCR to analyze bacteria transformed with pFluoroGreen. A single colony will be used as the DNA template for PCR. The resulting PCR sample will then be analyzed using agarose gel electrophoresis. If the bacteria have been transformed successfully, a PCR product representing the GFP gene will be produced. A bacterial housekeeping gene is amplified at the same time as a positive control. The presence of both bands is indicative of a successful transformation experiment.

Extraction 60 min.
PCR Set Up 10 min.
PCR 2 hrs.
Electrophoresis 60 min.
Staining 5 min. to overnight

This kit is intended for use in conjunction with Edvotek Transformation Kits 222, 223 or 303.

Kit includes: all necessary reagents for PCR and electrophoresis.

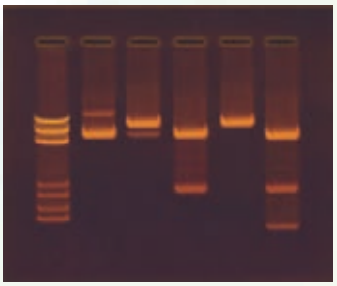
All you need: 5-50 µl adjustable micropipets, tips, 37°C incubator, microwave or hot plate, thermal cycler, electrophoresis apparatus, power supply, UV transilluminator, GFP transformation plates.

Storage: Some Components Require Refrigerator and Freezer Storage Upon Receipt.

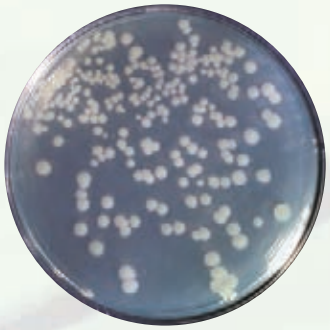
BEST SELLER

Cat. #301

Construction & Cloning of a DNA Recombinant



For 5 Plasmid Constructs & Analyses. Cloning is frequently performed to study gene structure and function, and to enhance gene expression. This experiment is divided into five modules. Clones are constructed by ligation of a vector and a fragment insert. The constructs are then transformed into competent cells and the cells are grown and selected for resistance. Plasmid DNA is then isolated from the transformants, cleaved with restriction enzymes, and analyzed by agarose gel electrophoresis. ***Recommended for college-level courses.***



Kit includes: instructions, BactoBeads™, enzymes, plasmid DNA, restriction enzyme dilution buffer, enzyme grade water, standard DNA fragments, restriction enzyme reaction buffer, gel loading solution, agarose powder, electrophoresis buffer, stains, calibrated pipet.

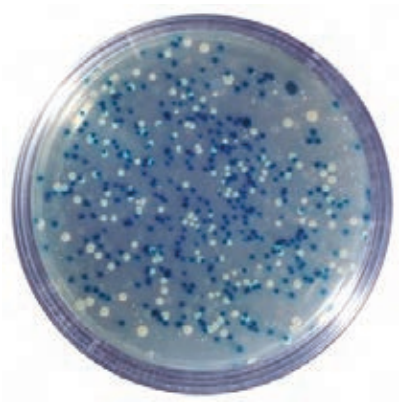
All you need: electrophoresis apparatus and power supply, automatic micropipet with tips, balance, microwave or hot plate, water bath, large weigh boats for staining, UV transilluminator, floating racks for microtest tubes, pipet pump or bulb, 5 or 10 ml pipets, laboratory glassware, metric rulers, distilled water, ice.

Storage: Some Components Require Refrigerator and Freezer Storage Upon Receipt.

Module I:	**Ligation 70 min.**
	Electrophoresis 45 min.
Module II:	**Transformation 70 min.**
	Overnight incubation
Module III:	**Culture 15 min.**
Module IV:	**Extraction 65-80 min.**
Module V:	**Restriction Enzyme Reaction 70 min.**

Cat. #300

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



For 5 Groups. When DNA is subcloned in the pUC polylinker region, ß-galactosidase production is interrupted, resulting in the inability of cells to hydrolyze 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. This experiment can be broken down into three modules: ligation, transformation, and assay of ß-galactosidase. ***Recommended for college-level courses.***

Kit includes: instructions, Linearized pUC plasmid & DNA fragment, T4 Ligase, BactoBeads™ 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, two water baths, shaking incubator or shaking water bath, microwave or hot plate, automatic micropipet and tips, spectrophotometer, balance, centrifuge, microcentrifuge, glassware and cuvettes, ethanol, distilled water, ice.

Storage: Some Components Require Refrigerator and Freezer Storage Upon Receipt.

Module I: Ligation 70 min.
Module II: Transformation and Selection 60 min. Overnight incubation
Module III: Assay of ß-galactosidase 60 min.

Cat. #303

Exploring Biotechnology with Green Fluorescent Protein (GFP)

For 6 experiments with 4 modules each. 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 analyzed by SDS polyacrylamide electrophoresis.

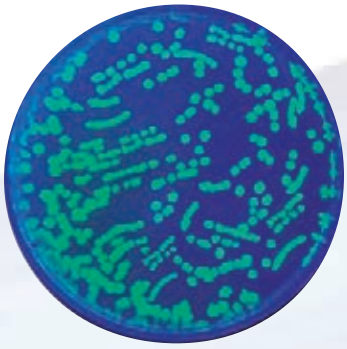
Kit includes: instructions, BactoBeads™, plasmid DNA for GFP, IPTG, ampicillin antibiotic, calcium chloride, ReadyPour™ luria broth agar, luria broth media for recovery, petri plates, pipets, calibrated transfer pipets, inoculating loops, microtest tubes with attached caps, toothpicks, dry matrix for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

All you need: incubation oven, two water baths, microwave or hot plate, automatic micropipet and tips, pipet pumps or bulbs, ice, long wave UV light, ring stand and clamps, lab glassware, ice, vertical gel electrophoresis apparatus and power supply, 3 Polyacrylamide Gels (12%), plastic trays or large weigh boats for optional staining & destaining, glacial acetic acid, ethanol.

Storage: Some Components Require Refrigerator and Freezer Storage Upon Receipt.

Module I: Transformation 45 min.
Module II: Isolation of GFP 45 min.
Module III: Purification of GFP by Chromatography 45 min.
Module IV: Analysis of GFP by Denaturing SDS Gel Electrophoresis 60 min.

Also includes a classroom demonstration option!



Cat. #255

Purification & Size Determination of Green & Blue Fluorescent Proteins

Packing & running column 45 min.
Optional electrophoresis 60 min.
Staining (optional) 30 min.
Destaining (optional) 2 hours/overnight

For 6 Groups. 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 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.

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

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

Storage: Some Components Require Freezer Storage Upon Receipt.

Cat. #304

The Future of Biofuels: Alcohol Fermentation

Complete over multiple lab periods.

For 5 Groups. Ethanol fermentation is the most common method for biofuel production worldwide. In this experiment, students will use small-scale flask fermenters to quantify ethanol production and sugar utilization by Saccharomyces cerevisiae. By controlling variables such as temperature and aeration, the students can compare the efficiency of the fermentations over a three day experiment.

Kit includes: instructions, yeast, yeast growth media concentrate, glucose concentrate, ampicillin, yeast growth media, 10% glucose solution, Benedict's Reagents, transfer pipets, snap top microcentrifuge tubes, screw top microcentrifuge tubes, pH paper, hydrometer, 50 ml and 15 ml centrifuge tubes.

All You Need: stir plate and stir bars, thermometer, graduated cylinders, Erlenmeyer flasks, 70% ethanol, distilled water, water bath (99˚C), air pump (optional), autoclave or oven (optional), centrifuge (optional), spectrophotometer (optional).

Storage: Some Components Require Refrigerator and Freezer Storage Upon Receipt.

Cat. #305

Fermentation & Bioprocessing of Chromogenic Proteins

Complete over multiple lab periods.

For 5 Groups. Bioprocessing is the production and isolation of desired products from living cells. In this introduction to bioprocessing, students will use small-scale fermenters to produce chromogenic proteins using *E. coli*. Protein extracts will then be separated using column chromatography to analyze the success of the fermentation process. Finally, the protein solutions will be examined by SDS polyacrylamide gel electrophoresis to determine the purity of the chromogenic proteins.

Kit includes: instructions, BactoBeads™ with purple and pink plasmid, LB Growth Media, Ampicillin, IPTG, protein extraction buffer, wash buffer, elution buffer, dry ion exchange matrix, standard protein markers, 50% glycerol solution, protein denaturing solution, Microcentrifuge Tubes, pH paper, centrifuge tubes, chromatography columns, protein Protein InstaStain®, practice gel loading solution, tris-glycine-SDS electrophoresis buffer, transfer pipets, loops.

All you need: long wave UV light, centrifuge, pH probe (optional), temperature probe, colorimeter and fermentor vessel, ring stands and clamps, stir plate and stir bars, air pump (optional), autoclave (optional), centrifuge (optional), and dry ice (optional).

Storage: Some Components Require Refrigerator and Freezer Storage Upon Receipt.

Cat. #962

Identification of Genetically Modified Foods Using PCR

AP ENVIRONMENTAL

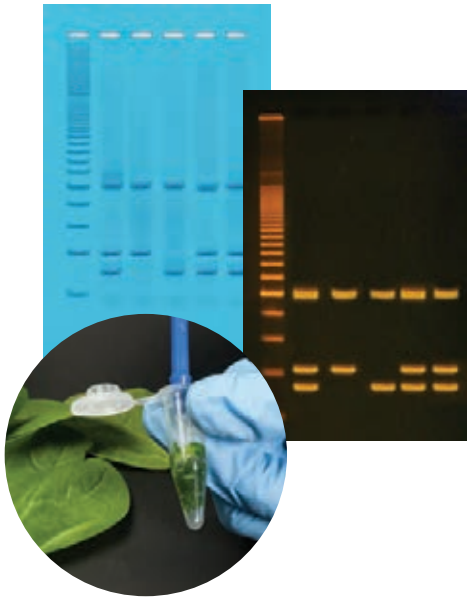
For 10 Groups. Some foods contain raw materials from genetically modified organisms (GMO). Examples include tofu, corn flakes and corn meal. In this experiment, your students will extract DNA from food or plant material and perform PCR to determine if any GM indicator genes are present. Amplified DNA is separated and sized by agarose gel electrophoresis. ***Requires 1 to 3 day shipping.***

Kit includes: all necessary reagents for DNA extraction, electrophoresis, and PCR.

All you need: micropipets to measure between 5 and 50 µl, tips, water bath, microcentrifuge, thermal cycler, electrophoresis apparatus, power supply, microwave or hot plate, UV transilluminator, 70% ethanol and isopropanol.

Storage: Some Components Require Freezer Storage Upon Receipt.

Extraction 45 min.
PCR Set Up 10 min.
PCR 2 hrs.
Electrophoresis 60 min.
Staining 5 min.

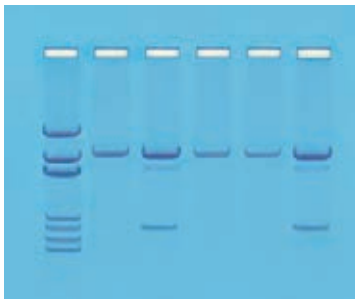


Cat. #121

Detection of Genetically Modified Organisms

AP ENVIRONMENTAL

Complete in 60 minutes



For 8 Gels/8 Lab Groups. For centuries, humans have used selective breeding and conventional hybridization to produce desirable qualities and to increase crop yields. Today, scientists use genetic engineering to directly manipulate the DNA, quickly producing these desirable traits. In this experiment, students will use agarose gel electrophoresis to explore the molecular methods used by scientists to identify genetically modified organisms. No thermal cycler is required. Students are also encouraged to explore the pros and cons surrounding the use of genetically modified organisms.

Kit includes: instructions, Ready-to-Load™ QuickStrip™ DNA samples, UltraSpec-Agarose™ powder, electrophoresis buffer, InstaStain® Blue and FlashBlue™ stain, calibrated pipet, and microtipped transfer pipets.

All you need: electrophoresis apparatus, power supply, automatic micropipet and tips, balance, microwave or hot plate, visualization system.

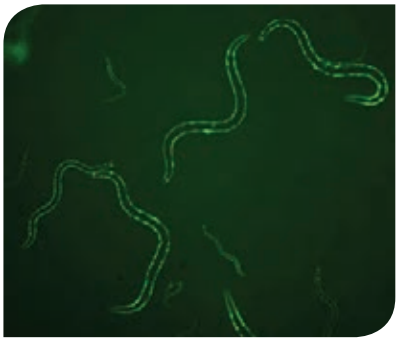
Storage: Room Temperature Stable. Storage of Ready-to-Load QuickStrip™ samples in the Refrigerator is Recommended.

Cat. #858

Lighting Up Life: Expression of GFP in *C. elegans*

For 10 Groups. Scientists can directly manipulate an organism's genome to produce a phenotype using engineered genes called transgenes. In this experiment, students will use fluorescent microscopy and PCR to analyze *C. elegans* (nematodes) that have been engineered to express the Green Fluorescent Protein (GFP). ***Cat. #858 is recommended for college level courses.***

Growing Bacteria Overnight
Plating Worms 15 min.
Worm Growth 3-4 days
Set Up 30 min.
PCR 2 hours or overnight
Electrophoresis 90 min.



Kit contains LIVE materials. Please request materials 2 weeks prior to lab*

Kit includes: instructions, *C. elegans, E. coli* OP50 cells, S-Buffer, Ready-Pour NGM Agar, NGM Medium Salts, UltraSpec-Agarose™ powder, electrophoresis buffer (50x), 10x Gel Loading Solution, InstaStain® Ethidium Bromide, FlashBlue™ Liquid Stain, tubes, pipets, wax beads, petri dishes, counting chamber, microscope slides, sterile loops.

All you need: covered box, fluorescent and dissecting microscopes, timers, water bath, incubator (optional), thermal cycler or three water baths, electrophoresis apparatus, power supply, balance, microcentrifuge, UV transilluminator or white light visualization system, automatic micropipettes with tips, microwave or hot plate, pipet pump, flasks or beakers, hot gloves, distilled or deionized water, ice buckets and ice.

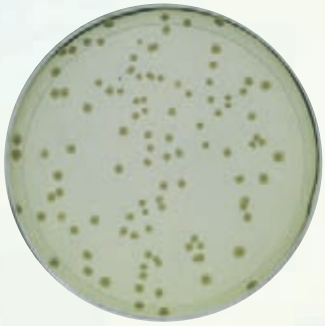
Storage: Some Components Require Refrigerator and Freezer Storage Upon Receipt.

Cat. #331

Investigating Synthetic Biology

Advanced Topic

For 5 Groups. Teach your students about synthetic biology with this exciting and exclusive lab! Students use PCR to amplify the coding sequence of the BSMT1 enzyme. This interesting enzyme is responsible for the formation of methyl salicylate, a chemical with a strong "wintergreen" odor. The PCR product is purified, restriction digested, and inserted into a plasmid vector. The resulting recombinant DNA is then used to transform *E. coli* Bactobeads™. Finally, students design an experiment to express the enzyme from their transformants and perform a smell test to confirm that the bacterial factories are working! ***Cat. #331 is recommended for college level courses.***



Kit includes: instructions, DNA template & primers, PCR beads, buffers & reagents for PCR, Dryzyme®, T4 ligase, DNA size ladder, gel loading dye, agarose, electrophoresis buffer, InstaStain® Ethidium Bromide, ReadyPour™ Luria Broth, Bactrobeads, reagents for transformation & smell assay.

All you need: thermal cycler, two waterbaths, incubation oven, electrophoresis apparatus, power supply, automatic micropipet with tips, microwave or hot plate, UV transilluminator, shaking incubator or shaking waterbath, microcentrifuge.

Storage: Some Components Require Refrigerator and Freezer Storage Upon Receipt.

Module I: Amplification by PCR 2 hours or overnight
Electrophoresis 45 to 60 min.
Module II: Preparation for Ligation 90 to 110 min.
Module III: Ligation into vector 40 to 70 min
Module IV: Transformation 30 to 45 min and overnight incubation
Module V: Smell Assay 15 to 30 min and overnight incubation
**This experiment requires a multiple day transformation.*

7

What is a DNA Fingerprint?

If we analyze the polymorphisms (small differences in the DNA sequence) within a person's genome, we can generate a unique "DNA fingerprint." After DNA is extracted from biological samples, scientists use the polymerase chain reaction (PCR) to amplify specific places (loci) throughout the genome. The PCR products are analyzed using agarose gel electrophoresis. The PCR products appear on the gel as a series of bands with various sizes. Because DNA samples from different individuals produce different patterns of bands, scientists can use a DNA fingerprint to distinguish between individuals.

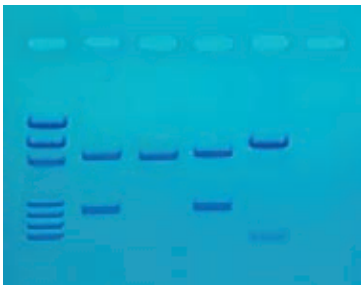
The best-known application of DNA fingerprinting is in forensic science. DNA fingerprinting techniques are utilized to analyze blood, tissue, or fluid evidence collected at accidents and crime scenes. The DNA fingerprint from a crime scene can be compared with the DNA fingerprints of different suspects or those stored in CODIS (COmbined DNA Index System), a computer database of DNA fingerprints collected from convicted offenders, arrested persons, crime scene evidence and missing persons. A match between the crime scene DNA and a suspect's DNA at a single locus does not prove guilt, nor does it rule out innocence. Therefore, multiple loci are tested. For example, the DNA fingerprints stored in CODIS contain data on thirteen loci. The odds of a match at all thirteen loci are less than one in a trillion!

Using our experiments, your students will compare "crime scene" DNA with "suspect" DNA! Try Kit #130- DNA Fingerprinting by PCR Amplification, DNA Fingerprinting Using Restriction Enzymes (Kit #225), or DNA Fingerprinting Using PCR (Kit #371).

Cat. #130

DNA Fingerprinting by PCR Amplification

45 min.



For 8 Gels/8 Lab Groups. Forensic DNA fingerprinting has become a universally accepted crime-fighting tool. Recent advances use the polymerase chain reaction (PCR) to amplify human DNA obtained from crime scenes. This experiment, based on a crime scene scenario, has an inquiry-based component.

Kit includes: instructions, Ready-to-Load™ QuickStrip™ DNA samples, UltraSpec-Agarose™ powder, electrophoresis buffer, InstaStain® Blue and FlashBlue™ stain, calibrated pipet, and microtipped transfer pipets.

All you need: electrophoresis apparatus, power supply, automatic micropipet and tips, balance, microwave or hot plate, visualization system.

Storage: Room Temperature Stable. Storage of Ready-to-Load QuickStrip™ samples in the Refrigerator is Recommended.

Cat. #S-51

Whose DNA Was Left Behind?

35 min.

For 10 Gels/10 Lab Groups. DNA obtained from a single hair left behind at a crime scene can be used to identify a criminal. In this experiment, your students will compare simulated crime scene DNA with that of two suspects. ***NGSS-aligned with MS-LS3-A.***

Kit includes: instructions, Ready-to-Load™ dye samples, agarose powder, practice gel loading solution, electrophoresis buffer, micro-tipped transfer pipets.

All you need: Electrophoresis apparatus , power supply, microwave or hot plate.

Storage: Room temperature stable. Storage of Ready-to-Load™ QuickStrip™ Dye Samples in the refrigerator is recommended.

Cat. #225

DNA Fingerprinting Using Restriction Enzymes

Restriction Enzyme Digests 35-60 min.
Electrophoresis 45 min

For 6 Gels. 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.

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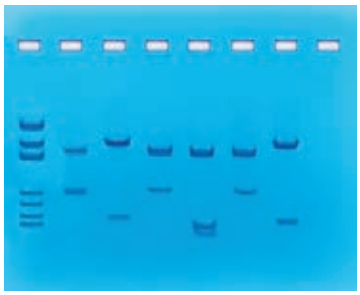
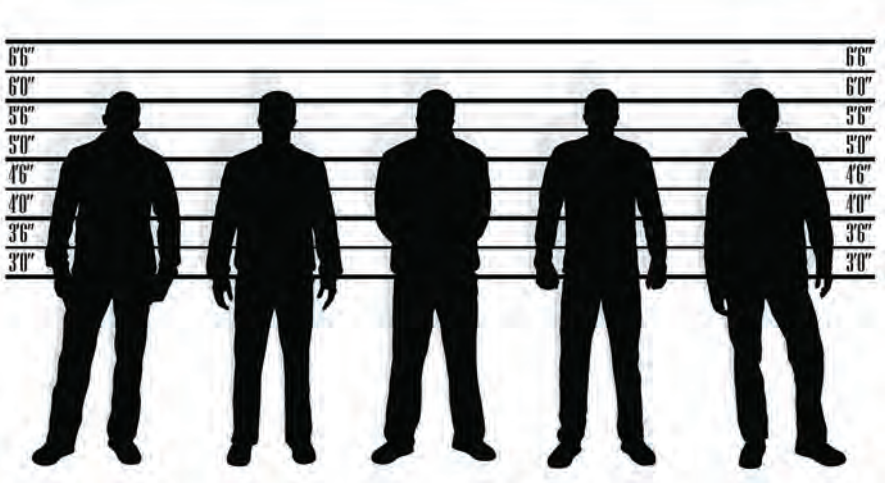
Dryzymes®





Kit includes: instructions, DNA samples, DNA ladder, Dryzymes® (*Eco*RI and *Hin*dIII), agarose, practice gel loading solution, loading dye, buffer, microtipped transfer pipets, FlashBlue™ stain.

All you need: Micropipets to measure between 5 & 50 µl (or 5, 10, 15 µl fixed volume minipipets), tips, water bath, electrophoresis apparatus, power supply, microwave or hot plate.

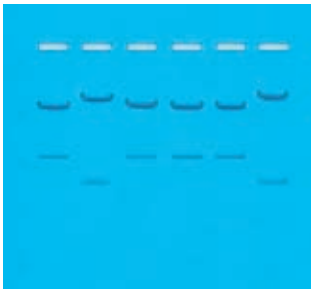
Storage: Some Components Require Refrigerator and Freezer Storage Upon Receipt.

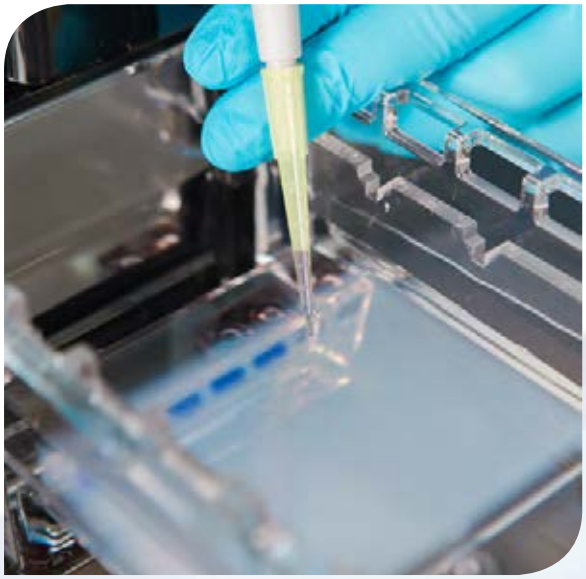
Cat. #109

DNA Fingerprinting by Restriction Enzyme Patterns

45 min.

For 8 Gels/8 Lab Groups. 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!





Kit includes: instructions, Ready-to-Load™ DNA samples, agarose powder, practice gel loading solution, electrophoresis buffer, InstaStain® Blue, FlashBlue™ stain, and microtipped transfer pipets.

All you need: Electrophoresis apparatus, power supply, automatic micropipet with tips, balance, microwave or hot plate, 65°C water bath, white light visualization system.

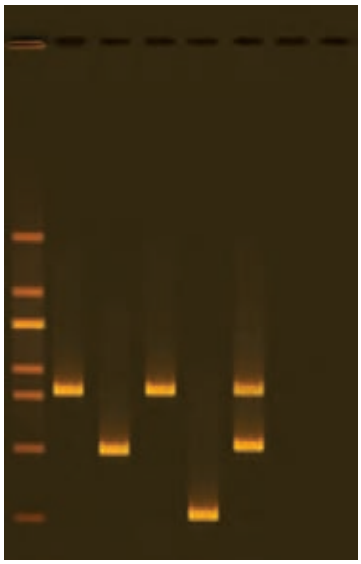
Storage: Room temperature stable. Storage of Ready-to-Load QuickStrip™ DNA Samples in the refrigerator is recommended.

Cat. #371

DNA Fingerprinting Using PCR

Advanced Topic

For 25 students working in 5 groups. 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, when amplified by PCR, provides products that represent individual DNA profiles. Your students can then solve a crime!



Kit includes: all necessary reagents for DNA extraction, electrophoresis, and PCR.

All you need: 5-50 µl adjustable micropipets,, tips, water bath, thermal cycler, electrophoresis apparatus, power supply, microwave or hot plate, UV or blue light transilluminator.

Storage: Some Components Require Freezer Storage Upon Receipt.

Set Up 30 min.
PCR 2 hrs.
Electrophoresis 45 min.

FREE LESSON PLAN:
Left at the Scene of the Crime!
An Introduction to Forensic Science

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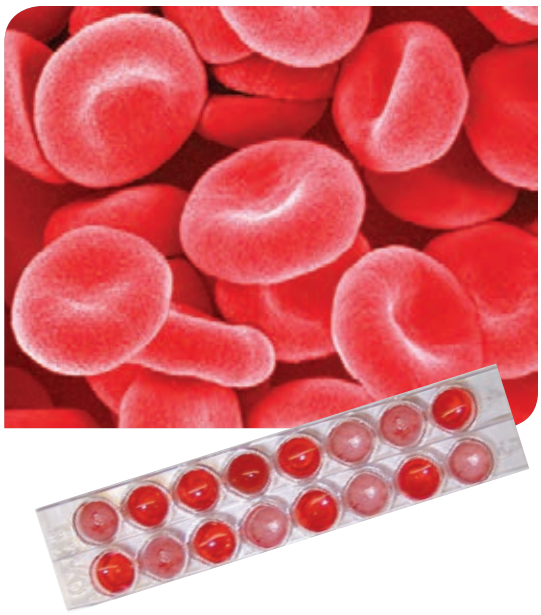
Cat. # 191

Forensic Blood Typing



For 10 Groups. This objective of this experiment is to introduce students to some of the techniques used by forensics scientists for analyzing blood. The students first check for the presence of blood typing using the phenolphthalein test. Then the students will apply the concept of blood type-based screening for potential suspect(s) present at a crime scene.

50 min.

Kit includes: instructions, Control ABO simulated blood samples, simulated crime scene, and suspect blood samples, Anti-A and Anti-B serums, blood detection stock solutions, transfer pipets, microtiter plates, tubes, filter paper, cotton swab.

All you need: 95-100% Ethanol, marking pen, distilled water. Optional: automatic micropipet (5 – 50 µl).

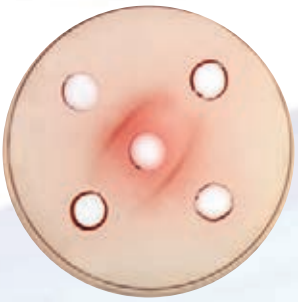
Storage: Store in Refrigerator Upon Receipt.

Cat. #192

Forensic Antigen Detection

Module I: Complete in 35 min.
Module II: Incubation overnight.

For 10 Groups. An athletic young woman and her cat live alone in a penthouse. Last seen during an afternoon jog, her worried friends report her as missing to the police following two days of absence. Upon entering her apartment, the detectives happen across the cat, which lies deceased in a pool of blood. A thin trail of blood leads from the cat to the bed of his owner. The detective concludes that both the cat and his owner were brutally murdered and that during the hasty cover-up and disposal of the woman's body, the intruder overlooked this trail of blood. In an effort to determine if the blood came from the cat or a human, the detective collected samples of the blood surrounding the cat, as well as of the bloodstain leading to the bed. In this experiment, students will determine the validity of the hypothesis set forth by the detective.



Kit includes: instructions, simulated control and crime scene blood samples, antigen/antibody detection reagents, microtiter plates, UltraSpec™-Agarose, practice loading solution, petri plates, well cutters.

All you need: Distilled or deionized water, beakers, 37°C Incubation oven, disposable lab gloves, safety goggles, automatic micropipets (100 µl) and tips recommended, Plastic container, plastic wrap, Pipets - 5 or 10 ml, marking pen, measuring spatula or toothpicks, hot plate, Bunsen burner, or microwave, paper towels, water bath.

Storage: Some Components Require Refrigerator Storage Upon Receipt.

Cat. #193

Forensic Enzymology

Modules I and II: Complete in 45 min. each

For 10 Groups. In a head-on automobile collision, each driver claimed the other driver caused the accident by falling asleep at the wheel. The two passengers, one from each car, were critically injured, yet the drivers walked away with barely a scratch. Upon arrival at the local hospital, one of the passengers succumbed to his injuries and the accident is now a case of vehicular manslaughter. The attending physician completed a thorough examination of the two drivers by collecting blood and urine samples, as well as by taking their temperature. The physician saved the disposable plastic mouthpiece and tongue depressor used during the examination, knowing that sleep deprivation causes the level of saliva amylase to increase in humans. Students will determine the level of saliva amylase for the two drivers to discover who was responsible for the accident.

Kit includes: instructions, simulated control and driver saliva samples, starch, HCl, Iodine, and detection solutions, transfer pipets, microtiter plates, microtest tubes.

All you need: Visible wavelength spectrophotometer, water bath, test tube racks, lab permanent markers, test tubes, beakers, distilled water, linear graph paper.

Storage: Store in Refrigerator Upon Receipt.

Cat. #194

Forensic Enhancement Techniques

35 min.

For 10 Groups. Trace amounts of blood are often sufficient to identify the individual responsible for any number of crimes, including murder, burglary, or assault. Enhancement procedures can make a small stain of body fluid or tissue visible to the naked eye. In this experiment, students will act as detectives following the aftermath of a drug bust involving gang warfare over territory. Reagents that are routinely used as a first screen will be utilized to detect simulated blood and DNA. In addition, biological materials will be recovered from splatters, blood trajectory, and small droplets of simulated human materials.

Kit includes: instructions, simulated blood, leucocrystal violet solution, luminol solution, spray bottle, transfer pipets, microtest tubes.

All you need: UV light, gloves, paper towel, face masks. Optional - fume hood.

Storage: Store in Refrigerator Upon Receipt.

NEW

Cat. #195

Forensic Toxicology

60 min.

For 10 Groups. In today's forensic science laboratory, toxicologists identify drugs and toxins in samples collected from crime scenes, victims, and potential suspects. If present, the toxicologist also determines whether the drug or toxin contributed to a person's behavioral changes or death. In this forensic science experiment, students will use the Enzyme Linked Immunosorbent Assay (ELISA) to analyze simulated crime scene samples for the presence of drugs.

Kit includes: instructions, simulated crime scene samples, antibodies, buffers, microtiter plates, assorted pipets and microcentrifuge tubes.

All you need: Automatic micropipets with tips (optional), pipet pumps, laboratory glassware, distilled or deionized water.

Storage: Some Components Require Refrigerator Storage Upon Receipt.

Cat. #140

Blood Typing

45 min.

For 10 Groups. ABO 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. ***NGSS-aligned with MS-LS1.***

ALSO Available: Simulated Blood Samples and Serum ONLY. For 10 Lab Groups. Cat. #140-B

Kit includes: instructions, control ABO simulated blood samples, unknown simulated blood samples, transfer pipets, microtiter plate.

All you need: automatic micropipet (5-50 µl) with tips (optional).

Storage: Room Temperature.

Cat. #S-91

Whose Fingerprints Were Left Behind?

For 10 Gels/10 Lab Groups. After a crime has been committed, the evidence left behind can identify a potential culprit, although a single piece of evidence is not usually enough to convict someone. 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 learn to detect and analyze fingerprints and then use these techniques to solve a classroom crime.

50 min.

Kit includes: instructions, brushes, magnifying lens, fingerprint cards, black dusting powder, gray dye dusting powder, fingerprint lifters.

All you need: Students!

Storage: Room temperature.

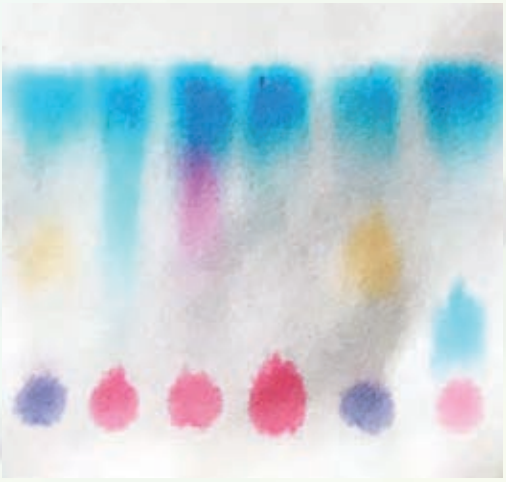
NEW

Cat. #196

Write to a Fair Trial: Forensic Handwriting Analysis

Spotting 10 min.
Separation 45 min.

For 10 Groups. Your lab notebook has been stolen, replaced with a ransom note demanding lunch money in exchange for its safe return! In this hands-on experiment, students will use principles of forensic handwriting analysis and paper chromatography to examine writing samples from 5 potential suspects. Only after careful analysis will they be able to solve the classroom crime.



Kit includes: instructions, samples, reagents and solvents, transfer pipets, chromatography paper.

All you need: 500 ml beakers, metric rulers, distilled water.

Storage: Room Temperature.

8

What is an Antibody?

Antibodies (also called immunoglobulins, or Igs) are specialized proteins that allow the immune system to distinguish between "self" and "non-self" proteins or polysaccharides. Antibody molecules comprise four linked polypeptide chains: two "heavy chains" and two "light chains" that are connected by disulfide bonds (Fig. 1). The amino acid sequence of the antigen-binding site is variable, allowing each antibody to recognize a unique epitope (a particular location within an antigen). Because of their specificity, antibodies can be used to detect the presence of specific biomolecules (e.g. peptides, proteins, antigens and hormones) in a complex sample.

Antibodies are produced when animals (e.g. rabbits, mice and guinea pigs) are exposed to an antigen. Since many different immune cells within the animal produce antibodies in response to the antigen, the serum will contain a mixture of antibodies that vary in their ability to bind the antigen. This mixture of antibodies is called polyclonal. If we isolate and culture individual immune cells from these animals, we can create a monoclonal antibody that recognizes a single epitope.

Experiments in this section are recommended for college/health science and upper level high school biology.

In the laboratory, the Western blot (or immunoblot) uses antibodies to detect the presence of a protein in a mixed sample. Ouchterlony double diffusion is used to determine whether an antibody will react with a particular antigen. Radial immunodiffusion is used to determine the relative concentration of an antigen. The Enzyme Linked Immuno-Sorbent Assay (ELISA) is an extremely sensitive technique that detects the quantity of antigens within a sample.

To be used in the laboratory, antibodies must have a specific, robust and reproducible interaction with their antigen. Antibodies that have a high affinity for non-specific antigens will have unwanted cross-reactions that can result in high backgrounds. In contrast, an antibody with a weak affinity may not be sensitive enough for antigen detection. These antibodies would produce results with a high false-positive or false-negative rate.

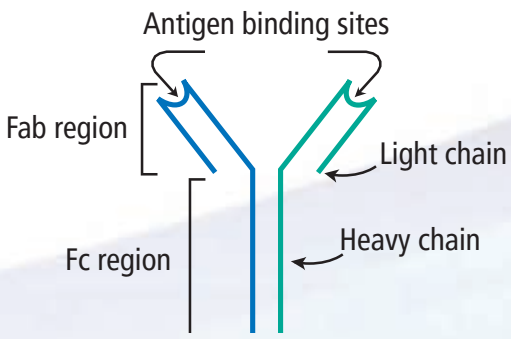


Figure 1: General Structure of an Antibody

Cat. #269

Introduction to ELISA Reactions

45 min.

Newly Updated!

For 10 Groups. Your students will learn the basic principles of the Enzyme-Linked Immunosorbent Assay (ELISA) in this precise and sensitive antibody-based detection kit. Experiment components do not contain human serum.

Kit includes: instructions, antigen, primary & secondary antibodies, peroxide co-substrate, hydrogen peroxide, ABTS substrate, phosphate buffered saline, tubes, plates, and transfer pipets.

All you need: distilled or deionized water, automatic micropipets with tips, laboratory glassware.

Storage: Some Components Require Refrigerator Storage Upon Receipt.

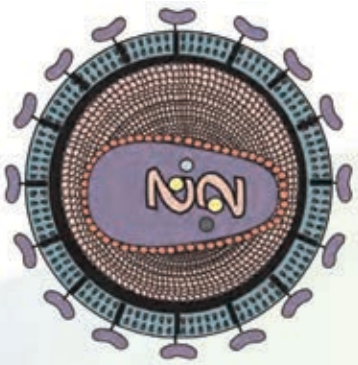
BEST SELLER

Cat. #271

AIDS Kit I: Simulation of HIV Detection by ELISA

Requires 1 hour.

For 10 Groups. 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 microtiter plate coated with HIV antigen. If HIV antibodies are present in the blood, they will bind to the antigens on the plate. This binding is detected with an enzyme-linked secondary antibody that causes a color change upon addition of substrate. In this experiment, your students will perform an ELISA test by coating microtiter plate wells with simulated HIV antigen and then test simulated donor serum for anti-HIV antibodies.



Kit includes: instructions, simulated HIV antigens, serum samples, antibodies, buffers, microtiter plates, assorted pipets and microtest tubes.

All you need: automatic micropipets with tips (optional), pipet pumps, laboratory glassware, distilled or deionized water.

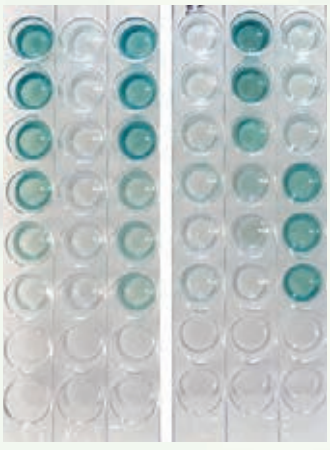
Storage: Some Components Require Refrigerator Storage Upon Receipt.

Cat. #278

Quantitative ELISA

Complete in 2 hours

For 6 Groups. Now with NEW substrate! Antibodies are highly specific in their recognition of antigens. This ELISA experiment demonstrates the quantitation of varying concentrations of viral antigens as detected by the intensity of the color reaction due to the accumulation of products. This laboratory activity meets the requirements in the BSCS Blue Biology curriculum.



Kit includes: instructions, antigens, primary; secondary antibodies, substrate solution, phosphate buffered saline, blocking agent, tubes, plates, and transfer pipets.

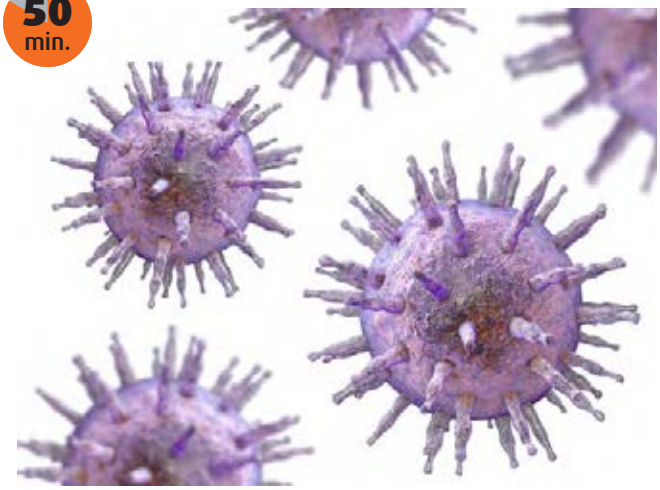
All you need: distilled or deionized water, 37° C incubation oven, automatic micropipets with tips, laboratory glassware.

Storage: Some Components Require Refrigerator Storage Upon Receipt.

Cat. #274

In Search of the Kissing Disease

50 min.



For 10 Groups. 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.

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

All you need: automatic micropipets with tips, laboratory glassware, distilled or deionized water.

Storage: Some Components Require Refrigerator Storage Upon Receipt.

Cat. #266

What's In My Lunch? Quantitative Food Allergy ELISA

STEM

Complete in 2 hours

For 10 Groups. Milk proteins are the most common food allergens in children. Accurate detection and labeling is vital to inform consumers about potentially dangerous foods. In this inquiry-based experiment, students will master the concepts behind the enzyme-linked immunosorbent assay (ELISA). Students will perform an ELISA to detect the presence and measure the concentration of whey protein in various food products.

Kit includes: instructions, 10X Dilution Buffer, Whey Antigen, 10X PBST (Wash Buffer), Primary Antibody, Secondary Antibody, Aminosalicylic Acid, Hydrogen Peroxide, microtiter plates, snap-top microcentrifuge tubes, homogenization pestles with tubes, 15 & 50 ml conical tubes, transfer pipets.

All you need: Various food samples to be tested, distilled or deionized water, beakers or flasks, paper towels, 37° C incubator, disposable lab gloves, safety goggles, automatic micropipets (5-50µl, 100-1000µl) and tips, digital camera or cell phone with camera (optional), computers with internet, image analysis program, and graphing program (optional).

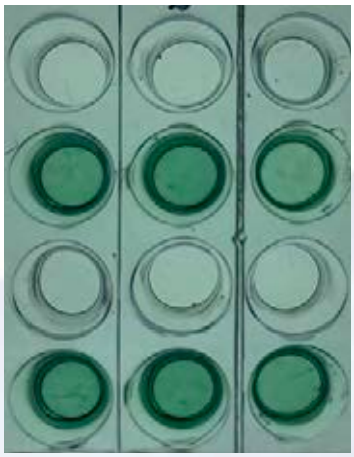
Storage: Some Components Require Refrigerator Storage Upon Receipt.

Cat. #267

Single Antibody ELISA Diagnostics

For 10 Groups. 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.

20 min.



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

All you need: distilled or deionized water, 37° C incubation oven, automatic micropipets with tips, laboratory glassware.

Storage: Some Components Require Refrigerator Storage Upon Receipt.

Cat. #279

Investigating Human Health Using the ELISA

Complete in 50 min.

For 10 Groups. In this experiment, students will perform an Enzyme-Linked Immunosorbent Assay (ELISA) to examine the impact of this powerful test on human health. Antibodies will be used to detect minuscule amounts of antigens and determine the status of simulated samples. Three different scenarios can be explored, including pregnancy testing, early detection of heart attacks, and identification of gluten in food products.

Kit includes: instructions, 10X ELISA wash buffer, ELISA dilution buffer, antigen (lyophilized), primary antibody (lyophilized), secondary antibody (lyophilized), ABTS substrate (lyophilized), & ABTS reaction buffer, small transfer pipets, microtiter plate, 15 mL conical tubes, & snap-top microcentrifuge tubes.

All you need: automatic micropipettes with tips (recommended), paper towels, distilled or deionized water, beakers or flasks, disposable lab gloves, & safety goggles.

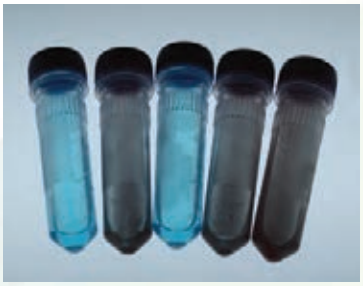
Storage: Some Components Require Refrigerator Storage Upon Receipt.

Cat. #280

Detecting the Silent Killer: Clinical Diagnosis of Diabetes

Complete in 90 min.

For 10 Groups. Over 380 million people worldwide are afflicted by diabetes mellitus, a chronic disease that leads to high blood sugar. Due to genetic predisposition and high-calorie, low-activity lifestyles, that number continues to grow. Without early detection and treatment of diabetes, severe medical complications can occur. In this simulation, students will diagnose diabetes in three patients using the urine glucose test and Enzyme-linked Immunosorbent Assay (ELISA).



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

All you need: 37° C incubation oven, water bath, automatic micropipets with tips, laboratory glassware, distilled or deionized water.

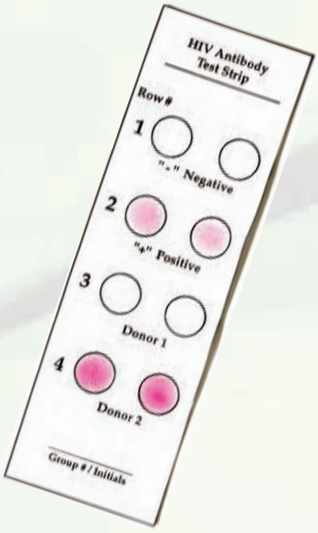
Storage: Some Components Require Refrigerator Storage Upon Receipt.

Cat. #S-70

How Does a Doctor Test for AIDS?

45 min. INTRO

For 10 Groups. 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.



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

All you need: Just water!

Storage: Room Temperature.

Cat. #270

Antigen-Antibody Interaction: The Ouchterlony Procedure

EDVOTEK® exclusive!

For 10 sets of reactions. Introduce your students to the principles of antigen-antibody interactions by using the Ouchterlony procedure. Antibodies and antigens form complexes that precipitate, making it possible to assay antibody-antigen systems. The binding interaction results in the formation of distinct white precipitate patterns after diffusion in agarose.

Kit includes: instructions, animal serum antigens & antibodies, practice gel loading solution, agarose, powdered buffer, transfer pipets, petri plates, well cutters, microtest tubes.

All you need: automatic micropipets with tips, 5 or 10 ml pipets, 55°C water bath, measuring spatulas or toothpicks, microwave or hot plate, distilled water, incubation oven (optional).

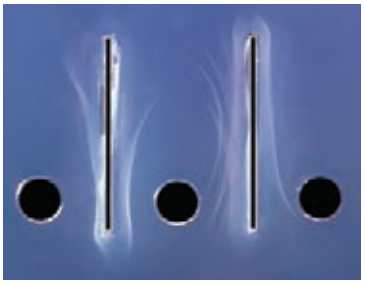
Storage: Some Components Require Refrigerator Storage Upon Receipt.

Set up 35 min.
Incubation overnight

Cat. #272

Immunoelectrophoresis

EDVOTEK® exclusive!



For 10 separations. Learn how immunoelectrophoresis identifies proteins based on their combined electrophoretic and immunological properties. This method is useful to monitor antigen and antigen-antibody purity and to identify a single antigen in a mixture of antigens. In this experiment, serum proteins are separated by agarose gel electrophoresis and the point of equivalence is observed by the antigen-antibody complex formation.

Kit includes: instructions, proteins, antibodies; reagents, agarose, buffer, transfer pipets, well cutters, tubes, filter paper, 10mL pipettes, & 60mm petri plates.

All you need: horizontal electrophoresis apparatus, power supply, automatic micropipets with tips, water bath, microwave or hot plate, incubation oven, laboratory glassware, microscope slides, paper towels, distilled water.

Storage: Some Components Require Refrigerator Storage Upon Receipt.

Electrophoresis 60 min.
Incubation overnight

Cat. #273

Radial Immunodiffusion

EDVOTEK® exclusive!

For 10 quantifications 6 reactions each. Radial immunodiffusion quantitatively determines the level of an antigen. Antibody is incorporated into liquefied agar and allowed to gel. The antigen is added to small wells and radiates throughout the antibody-containing medium, leaving a precipitate throughout the gel. The amount of diffusion is quantified.

Kit includes: instructions, antigen and antibody, petri plates, pipets, well cutters, agarose, buffer, microtest tubes.

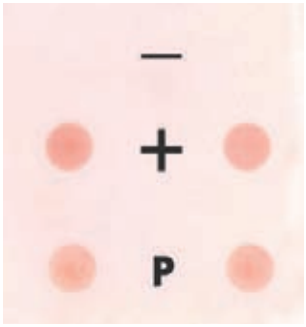
All you need: automatic micropipets with tips, water bath, microwave or hot plate, incubation oven, laboratory glassware, pipet pumps or bulbs, rulers, paper towels, distilled water.

Storage: Some Components Require Refrigerator Storage Upon Receipt.

Set up 35 min.
Incubation overnight

Cat. #276

Clinical Diagnostic Immunoblot



For 10 Groups. The immunoblot technique is used to determine the presence of an antigen. Clinical diagnostic kits employ the principles of the dot blot. In this experiment, antigens are absorbed to a membrane that is then treated with an antigen-specific antibody solution and then a secondary antibody conjugated to an enzyme. The enzyme-substrate reaction generates a color product that precipitates onto the membrane, indicating a positive reaction. No human serum is used in this experiment.

Kit includes: instructions, antigen & antibodies, various reagents and buffers, instant nonfat dry milk, hydrogen peroxide, nylon membranes and petri dishes.

All you need: automatic micropipet with tips, pipet pumps, forceps, distilled water, shaking platform (optional)

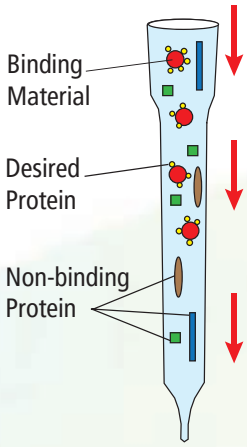
Storage: Some Components Require Refrigerator Storage Upon Receipt.

Set up 45 min.
Experiment 1.5 - 2 hrs.

Cat. #277

Affinity Chromatography of Glucose Binding Proteins

EDVOTEK® exclusive!



For 10 Groups. In this experiment, students will prepare a seed extract from Jack Bean Meal, fractionate the extract by affinity chromatography, and elute the bound glucose binding protein. The presence of biological activity is determined by an immunoblot enzyme assay.

Kit includes: instructions, affinity gel, jack bean meal, various solutions and buffers, membranes, petri plates, columns with tips, conical tubes and transfer pipets.

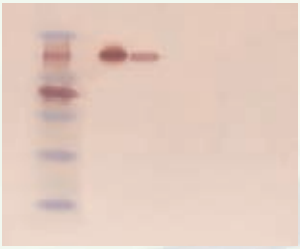
All you need: clinical centrifuge, vortex or shaking platform, micropipet and tips, ring stands and clamps, lab glassware, pipets & pumps, microtest tubes, forceps, water.

Storage: Some Components Require Refrigerator Storage Upon Receipt.

Requires 2 hours

Cat. #317

Western Blot Analysis
(Polyacrylamide-based)



For 6 Groups. In Western blot analysis, protein identification is based on antibody and antigen reactions. Proteins are separated on polyacrylamide gels and are transferred (blotted) to a nylon membrane. The membrane is exposed to solutions containing primary antibody, followed by a secondary antibody coupled to an enzyme. The membrane is then soaked in a substrate solution to develop the color reaction, which results in identification on the antigen protein band. The molecular weights of the visible bands are measured using prestained protein markers of known molecular weight. This kit does not require an electrotransfer apparatus.

Electrophoresis 60 min.
Blot overnight
Detection 2.5 hours

Kit includes: instructions, negative control, all samples & antibodies, various reagents and buffers, membrane and filter paper.

All you need: 3 polyacrylamide gels (12%), Vertical gel electrophoresis apparatus, power supply, automatic micropipet with fine tips, laboratory glassware, metric rulers, distilled or deionized water, glacial acetic acid, methanol.

Storage: Some Components Require Refrigerator Storage Upon Receipt.

Cat. #275

AIDS Kit II: Simulation of HIV Detection by Western Blot

For 6 Groups. One assay used to confirm a positive HIV ELISA result is the Western Blot. Students separate protein samples from hypothetical patients on agarose gels, transfer the samples to a membrane and detect the simulated HIV proteins. This kit is an introductory level experiment. For a comprehensive advanced course, we recommend Cat. #317.

Kit includes: instructions, samples, standard molecular weight markers, protein agarose, various buffers and reagents, PVDF membrane, filter paper, stain, 1 ml pipet, 100 ml graduated cylinder.

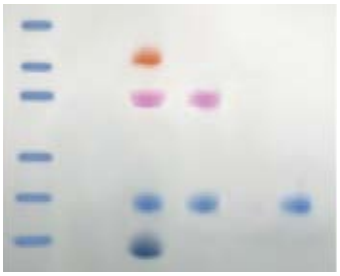
All you need: electrophoresis apparatus, power supply, automatic micropipets with tips, microwave or hot plate, incubation oven, shaker platform, lab glassware, small plastic trays, microtest tubes, pipet pumps or bulbs, metric rulers, distilled water, methanol, glacial acetic acid.

Storage: Some Components Require Refrigerator Storage Upon Receipt.

Electrophoresis 45 min.
Blot overnight
Detection 25 min.

Cat. #151

AIDS Kit III: Simulation of HIV Detection by Protein Electrophoresis



For 6 Groups. The Human Immunodeficiency Virus (HIV) causes acquired immune deficiency syndrome (AIDS), a serious disease that suppresses a patient's immune system which leaves them susceptible to infections. In this experiment, students will use SDS-PAGE to simulate the identification of HIV proteins in simulated patient samples. The results of this test are used to diagnose an HIV infection.

Kit includes: instructions, denatured LyphoProtein™ samples, standard protein markers, practice gel loading solution, buffer, transfer pipets, Protein InstaStain®.

All you need: 3 polyacrylamide gels (12%), vertical gel electrophoresis apparatus, power supply, hot plate or burner, aluminum foil or foam water bath float, white light visualization system, automatic micropipette with fine tips, microcentrifuge tube holder, lab glassware, methanol, glacial acetic acid, glass tray, plastic wrap, and distilled or deionized water.

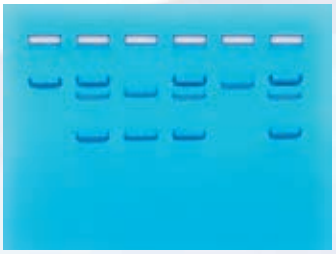
Storage: Some Components Require Freezer Storage Upon Receipt.

Electrophoresis 60 min.
Staining/destaining (optional)
2 hours.

Cat. #116

Sickle Cell Gene Detection *(DNA-based)*

45 min.



For 8 Gels. Sickle Cell Anemia is a common genetic disease that causes misshapen red blood cells, giving them a "sickled" appearance. These cells get stuck in small capillaries of the blood stream leading to oxygen deprivation which causes pain and organ damage. Sickle Cell Anemia is caused by a single point mutation in the hemoglobin gene that results in a faulty protein. In this experiment, your students will investigate the restriction enzyme that discriminates between HbA (normal) and HbS (disease) genes and perform a simulated test on patients or a "family."

See page 30 for a list of kit components and requirements.

Cat. #118

Cholesterol Diagnostics

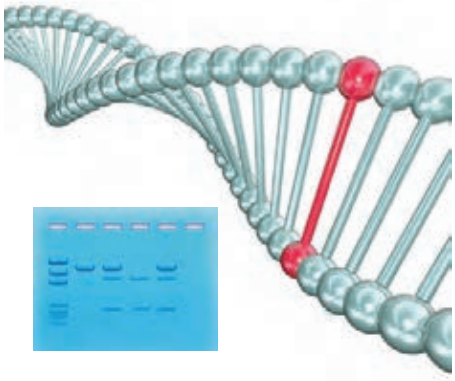
45 min.

For 8 Gels. Elevated blood cholesterol has been established as a serious risk factor for coronary heart disease and stroke which are leading causes of death in the United States. An inherited disorder, known as "familial hypercholesterolemia" (FH), causes an increase in blood levels of the "bad" form of cholesterol, known as low density lipoprotein (LDL). In this experiment, students will carry out a simulated genetics test for FH by analyzing patients' DNA polymorphisms. *See page 30 for a list of kit components and requirements.*

Cat. #115

Cancer Gene Detection

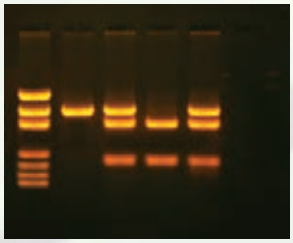
45 min.



For 8 Gels. Immortality through uncontrolled cell division is a characteristic of cancer cells. The p53 gene is a tumor suppressor gene which prevents this. Mutations in this gene are present in more than 50% of cancers. Testing people for mutations in their p53 gene can indicate an increased risk in developing cancer. These tests raise intriguing ethical questions for both the individual tested and the family of an individual who chooses to be tested. In this experiment, students determine a pedigree for a family suspected to be carriers of mutations in their p53 genes. A DNA test indicates their likelihood of developing cancer. *See page 30 for a list of kit components and requirements.*

Cat. #314

In Search of the Cancer Gene



For 6 Groups. 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.

Complete in 60 min.

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 apparatus, power supply, automatic micropipet with tips, balance, microwave or hot plate, UV Transilluminator, pipet pump or bulb, 250 ml Flasks, distilled or deionized water.

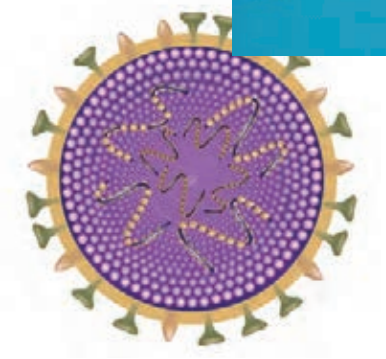
Storage: Some Components Require Refrigerator Storage Upon Receipt.

Cat. #122

Detection of the Influenza Virus

Complete in 90 min.

For 8 Gels. The influenza virus, or "the flu," is a common contagious disease that affects the respiratory system. In this simulation, students will perform two common tests (RIDT, RT-PCR) used to diagnose the flu in a clinical setting.



Kit includes: instructions, Ready-to-Load QuickStrip™ DNA samples, Flu Detection Strips, Flu Antibody Solution, Simulated Patient Samples, UltraSpec-Agarose™, Electrophoresis Buffer, Flash-Blue™ DNA Stain, InstaStain® Blue Cards, Microtipped Transfer Pipets, Microcentrifuge Tubes.

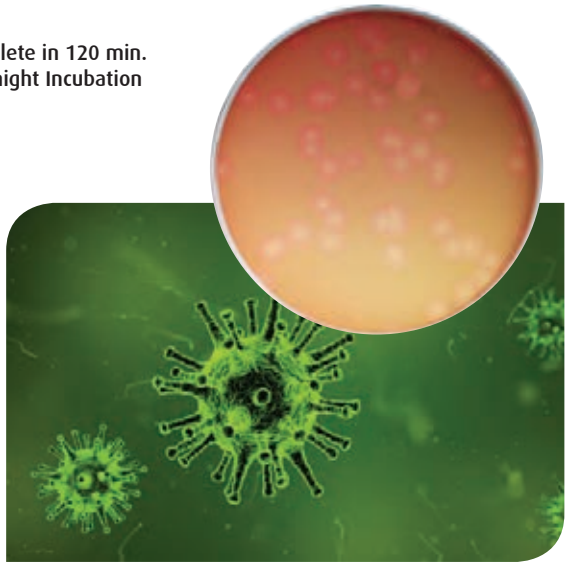
All you need: Horizontal gel electrophoresis apparatus, D.C. power supply, automatic micropipets and tips, balance, microwave or hot plate, pipet pump, 250 ml flasks or beakers, hot gloves, safety goggles and gloves, small plastic trays or large weigh boats, DNA visualization system (white light), distilled or deionized water.

Storage: Room Temperature Stable. Storage of Ready-to-Load QuickStrip™ samples in the Refrigerator is Recommended.

Cat. #209

Going Un-Viral: Quantification Using Plaque Assays

Complete in 120 min.
Overnight Incubation



For 10 Groups. Although bacterial viruses, or bacteriophages, are present in many natural environments, they cannot survive autonomously. They require a host cell to reproduce and survive. In this experiment, students will learn about the different life cycles of bacterial viruses. They will then perform a viral plaque assay to indirectly visualize the viruses and to determine viral titer and multiplicity of infection (MOI).

Kit includes: instructions, cells, Phage Beads, Ready Pour Agar, COLORTOP™ Agar, Microcentrifuge tubes, Sterile loops, Petri Plates, Luria Broth, PBS.

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

Storage: Some Components Require Refrigerator Storage Upon Receipt.

Cat. #S-68

What is an Epidemic and How Does An Infection Spread?

30 min. INTRO

For 10 Groups. Infectious agents such as bacteria & viruses can spread rapidly through a population and cause widespread disease and death. In this experiment, your students will use colored solutions to simulate the spreading of a disease in the classroom.

Kit includes: instructions, HCl solution, NaOH, color indicator, test tubes & pipets.

All you need: students!

Storage: Room Temperature.

Cat. #166

Detection of a Simulated Infectious Agent

INTRO

For 25 Students. 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 determined by lab tests. In this kit, students will transmit a simulated infectious agent (chemical dye) between classmates. The simulated infections agent is only visible under long-wave UV light. The pattern of transmission and primary source will be documented. ***NGSS-aligned with MS-LS2.C***

Requires in 30-45 min.

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

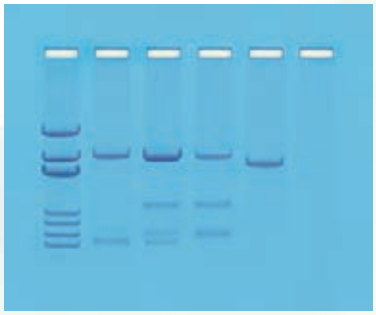
All you need: students!

Storage: Room Temperature.

Cat. #114

DNA Paternity Testing Simulation

45 min.



For 8 Gels/8 Lab Groups. This experiment introduces students to the use of DNA fingerprinting in a simulated paternity determination. A child's DNA fingerprint is compared with his parents. The experiment does not contain human DNA.

Kit includes: instructions, Ready-to-Load™ QuickStrip™ DNA samples, UltraSpec-Agarose™ powder, electrophoresis buffer, FlashBlue™ DNA stain, InstaStain® Blue cards, and disposable pipets.

All you need: electrophoresis apparatus, power supply, automatic micropipette and tips, microwave or hot plate, distilled water, white light box.

Storage: Room temperature stable. Storage of Ready-to-Load QuickStrip™ samples in the refrigerator is recommended.

Cat. #S-49

In Search of My Father

35 min.

For 10 Gels/10 Lab Groups. 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?

Kit includes: instructions, Ready-to-Load™ QuickStrip™ dye samples, UltraSpec-Agarose™ powder, electrophoresis buffer, practice gel loading solution, and disposable pipets.

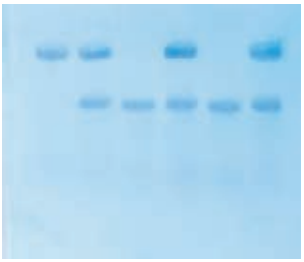
All you need: electrophoresis apparatus, power supply, automatic micropipette and tips, microwave or hot plate, distilled water, white light box (optional).

Storage: Room temperature stable. Storage of Ready-to-Load QuickStrip™ samples in the refrigerator is recommended.

Cat. #315

In Search of the Sickle Cell Gene by Southern Blot

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



For 5 Groups. Southern blotting is an important technique widely used in clinical genetics and research. By transferring DNA from an agarose gel onto a membrane, the method allows you to analyze and identify the DNA bands on a gel precisely. Students will use Southern blotting to find a point mutation in the hemoglobin gene indicating Sickle Cell Anemia.

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

All you need: electrophoresis apparatus, power supply, microwave or hot plate, water bath, 80° C incubation oven.

Storage: Some Components Require Refrigerator Storage Upon Receipt.

Cat. #207

Southern Blot Analysis

For 5 Groups. 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 visualized by staining.

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 apparatus, power supply, 65° C Water-bath, DNA visualization system, staining net & tray, automatic micropipets, lab glassware, microwave or hot plate, distilled water, NaCl, NaOH, concentrated HCl, plastic wrap, forceps.

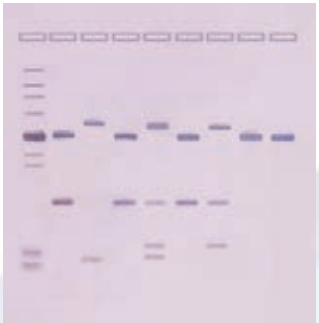
Storage: Some Components Require Freezer Storage Upon Receipt.

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

Cat. #311

DNA Fingerprinting by Southern Blot

Advanced Topic



For 5 Groups. 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. ***Requires shipment on wet ice.***

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

All you need: electrophoresis apparatus, power supply, automatic micropipet with tips, balance, microwave or hot plate, water bath, incubation oven, pipet pumps or bulbs, pipets, floating Racks for microtest tubes, lab glassware, plastic wrap, distilled or deionized water, NaCl, NaOH, Concentrated HCl, ice.

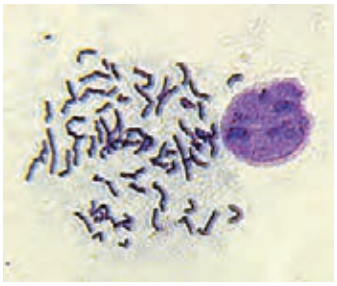
Storage: Some Components Require Refrigerator and Freezer Storage Upon Receipt.

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

Cat. #987

Chromosome Spread
(Pre-Fixed Slides)

35 min.



For 6 Groups. During mitosis, each of our chromosomes is duplicated. The chromosomes are then separated during mitosis, moving to opposite ends of the cell before cell division. In this experiment, cells have been arrested during metaphase and fixed to slides, allowing students to stain and observe the condensed chromosomes. Students will develop an understanding of karyotyping and the association of chromosomal abnormalities with diseases.

Kit includes: instructions, multispot slides, giemsa stain, mounting media, cover slips, transfer pipets, immersion troughs.

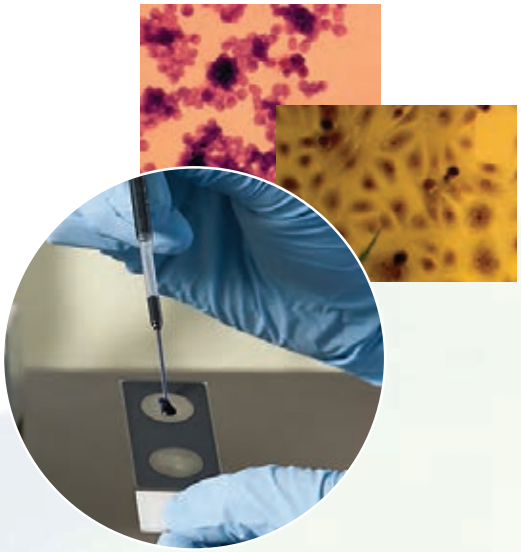
All you need: microscope with 400x magnification.

Storage: Room Temperature.

Cat. #990

Morphology of Cancer Cells

35 min.



For 6 Groups. 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.

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

All you need: microscope with 400x magnification.

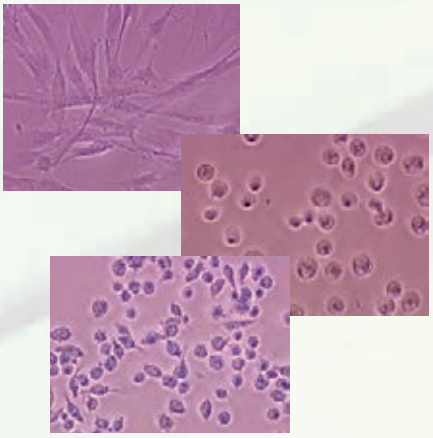
Storage: Room Temperature.

BEST SELLER

Cat. #986

Comparison of Mammalian Cell Types

35 min.



For 6 Groups. 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 fixed and very safe for classroom use.

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

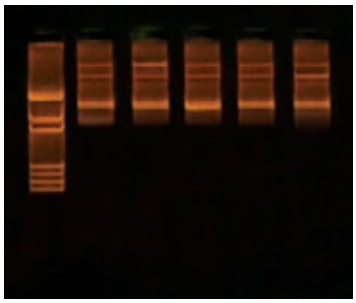
All you need: microscope with 400x magnification.

Storage: Room Temperature.

Cat. #957

DNA Damage and Repair

For 10 Groups. 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 during sunbathing. 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.



Kit includes: instructions, standard DNA fragments, plasmid DNA, gel loading solution, agarose, electrophoresis buffer, 1 ml pipet, microtest tubes, SYBR® Safe stain.

All you need: UV transilluminator (254 nm or short wave) or sunny window, electrophoresis apparatus, power supply, microwave or hot plate.

Storage: Some Components Require Freezer Storage Upon Receipt.

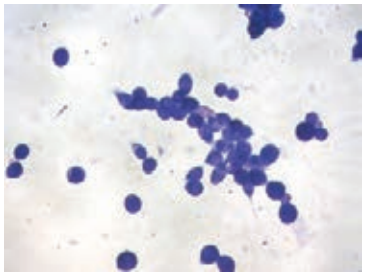
Complete in 2 hours

Cat. #1001

Eukaryotic Cell Biology

Supported by NCMHD grant R43 MD005202 from the National Center on Minority Health and Health Disparities.

For 6 Groups. Cell Culture is a vital technology used in life science research and in biotechnology laboratories. The study of basic cell biology, diseases and cancer, the development and testing of new therapeutics, and the production of new drugs relies on using the techniques introduced in this experiment. Students will learn how to grow eukaryotic cells in culture, basic cell staining and how to count cells. The techniques used in these experiments will provide the student with a skill set desired in both academic research and industry.



Kit includes: instructions, growth media, flasks, Giemsa stain, Trypan blue dye, sterile T25 flasks, sterile culture dishes, sterile large pipets, small pipets, cell counting chambers, Sf9 insect cells.

All you need: Pipet bulb or pipet controller, Microscope and spray bottle with 70% ethanol.

Storage: Some Components Require Refrigerator Storage Upon Receipt.

Basic cell culture techniques - 30 min.
Examination of Insect Cell Cultures - 30 min.
Maintenance of Insect Cell Cultures - 1 hour
Cell viability using trypan blue - 30 min.
Differential staining using giemsa stain - Overnight

IMPORTANT:

- ***Kit #1001 contains LIVE materials which must be requested 2 weeks prior to day of the lab.***
- ***Culturing of cells is required upon receipt.***
- ***Additional medium may be required if culturing of cells multiple times or if the experiment is not performed within 3 days upon receipt.***

ALSO Available:
Insect Cell Media, 120ml
Cat. #1120

Cat. #140

Blood Typing

45 min.

For 10 Groups. In human blood, there are two major antigens and antibodies designated as A or B and anti-A or anti-B. Blood type (A, B, AB, or O) can be determined using an agglutination assay where roughly equal concentrations of sample antigen and previously isolated antibodies are mixed and then monitored for precipitation. This test is often used to ensure safe blood transfusions. However, it can also be used in the field of forensics. Agglutination assays can confirm that collected evidence is human blood before more time intensive tests are performed. In addition, blood typing can screen potential suspects by blood group.

Kit includes: instructions, control ABO simulated blood samples, unknown simulated blood samples, transfer pipets, microtiter plate.

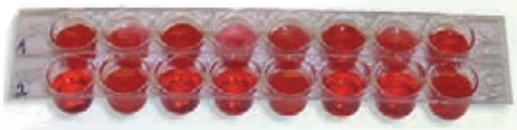
All you need: automatic micropipet (5-50 µl) with tips (optional).

Storage: Room Temperature.

Cat. #141

Blood-based Cancer Diagnostics

35 min.



For 10 Groups. 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.

Kit includes: instructions, microtiter plates, cancer cell markers, normal cell markers, transfer pipets, buffer.

All you need: automatic micropipet (5-50 µl) with tips (optional).

Storage: Room Temperature.

9

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.

Students can try both traditional and molecular techniques for analyzing contamination. In Kit #S-30 How Clean Is the Water We Drink and Air We Breathe, your students can identify contamination using simple microbiology techniques. Kit #951 Chromogenic Analysis of Water Contaminants uses more sophisticated microbiological techniques and fluorescent dyes.

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 Kit #956 Bioremediation by Oil Eating Bacteria.

eco friendly education

Science Education that Doesn't Harm the Planet!

Here at EDVOTEK® we are consistently looking for ways to reduce waste, save energy, and provide you with new and improved products that are safer for you and better for the environment. From our staining techniques, to our packaging, to our Safety Data Sheets and experiment literature, we believe that it is through the small changes by many rather than grand actions by a few that will make the difference.

Cat. #951

Chromogenic Analysis of Water Contaminants

For 10 Groups. Testing drinking water for every possible type of pathogenic bacteria is slow and costly. Thus, drinking water is tested for coliforms - including the familiar *E. coli*. Presence of coliforms is an indicator of fecal contamination.

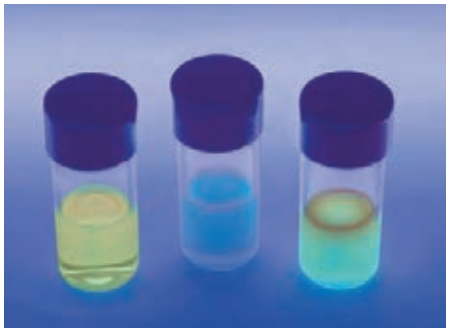
In this experiment, students will test for coliforms in simulated contaminated water using color and fluorescent reagents. They can use these same reagents to test water samples from the environment. As an extension activity, a Gram Stain test can be performed on the collected samples.

Kit includes: instructions, BactoBeads™, coliform detection broth, nutrient broth, Petri dishes, inoculating loops, sterile swabs, microtubes.

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

Storage: Some Components Require Refrigerator Storage.

EDVOTEK® has received two Small Business Innovation Research (SBIR) grants from the National Institute of Health/ National Center for Research Resources for the development of experiments for Environmental Science. Opinions expressed are those of the authors and not necessarily those of the NIH/NCRR. NIH Grant #SBIR-IR44-RR018670



Complete in 30 min. and grow overnight

Cat. #969

Long Wave UV Mini Lamp

Cat. #953

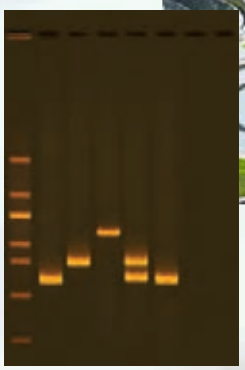
Multiplex PCR-based Testing of Water Contaminants

For 25 Students. Drinking water is routinely tested for contamination. If a screening tests positive, more sophisticated tests are required. One such test uses PCR in multiplex format. In this experiment, students will test for the presence of three separate, classroom-safe organisms in a water sample using a single PCR reaction.

Kit includes: instructions, PCR EdvoBeads™, Universal DNA Buffer, LyphoPrimer™ Mix, EdvoQuick™ DNA Ladder, LyphoControl™ (Complete PCR Control), TE Buffer, Proteinase K, Potassium Acetate, DNA Extraction Buffer, BactoBeads™, UltraSpec-Agarose™, Electrophoresis Buffer (50X), SYBR® Safe Stain, FlashBlue™ Stain, Microcentrifuge & PCR Tubes.

All you need: thermal cycler, water baths or heating blocks for PCR, water bath, electrophoresis apparatus, power supply, micropipets with tips, balance, microcentrifuge, microwave or hot plate, UV transilluminator, isopropanol, water & ice.

Storage: Some Components Require Refrigerator and Freezer Storage.



Extraction - 60 minutes
PCR Setup - 10 minutes
PCR - 2 hours
Electrophoresis - 60 minutes
Staining - 5 mins or overnight

Cat. # 956

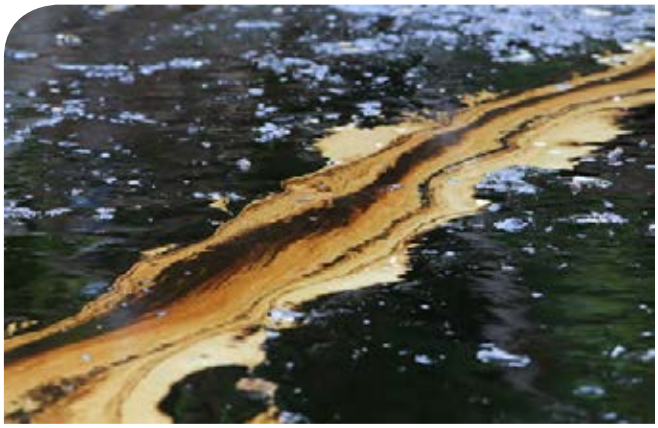
Bioremediation by Oil Eating Bacteria

AP ENVIRONMENTAL

Newly Updated!

For 10 Groups. 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.

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



Kit includes: instructions, oil-eating bacteria, growth medium, pipets, tetrazolium powder.

All you need: shaking incubation oven (optional) or stir plate and stir bars, growth flasks, vegetable oil (or other food oils), distilled water, pipet pumps.

Storage: Some Components Require Refrigerator Storage.

Cat. #S-30

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

For 10 Groups. 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. ***NGSS-aligned with MS-LS1 and MS-LS2***

Complete in 30 min. and grow overnight

Kit includes: instructions, Ready Pour agar, Petri plates, pipets, sterile water sample.

All you need: water samples, test tubes, pipet pump or bulb, hot plate or water bath, aluminum foil or plastic wrap, 10% bleach solution.

Storage: Room Temperature.

Cat. # 905

The Dose Makes the Poison: Testing the Environmental Impacts of Pollution

For 10 Lab Groups. Biological assays, or bioassays, are powerful tools that allow scientists to determine the effects of a given substance on living organisms. In this inquiry-based lab students plan and perform a plant bioassay to determine the environmental hazard of common point and non-point source pollutants. The results are analyzed using averages, standard deviations, and TC50 calculations, integrating STEM.

Kit includes: instructions, radish seeds, plant growth medium, antifungal powder, pollutant solutions, cheese cloth, petri dishes, transfer pipets, serological pipet, conical tubes, microcentrifuge tubes, small loops.

All you need: water bath, pipet pump, microwave or hot plate, 70% ethanol, sterile water, bleach, automatic micropipet and tips, parafilm, string, rulers, growth light (optional), analytical balance (optional).

Storage: Some Components Require Refrigerator & Freezer Storage.

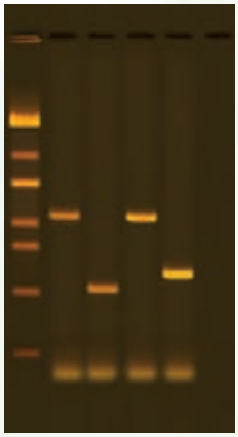
STEM

2 hours, 15 min.
(plus 1 week growing)

Cat. #338

Exploring Plant Diversity with DNA Barcoding

For 10 Groups. In this inquiry-based lab, your class will explore the genetic diversity of ten selected plants. Students will isolate plant DNA and use PCR to amplify two polymorphic regions of the chloroplast genome. Digestion of PCR products and analysis by agarose gel electrophoresis will then be used to generate unique identification profiles for each plant. ***Requires shipment on wet ice.***



Kit includes: all necessary reagents for DNA extraction, electrophoresis, and PCR.

All you need: Thermal cycler, centrifuge, isopropanol, distilled water, electrophoresis apparatus, power supply, adjustable micropipets and tips, microwave or hot plate, water bath, UV or blue light transilluminator.

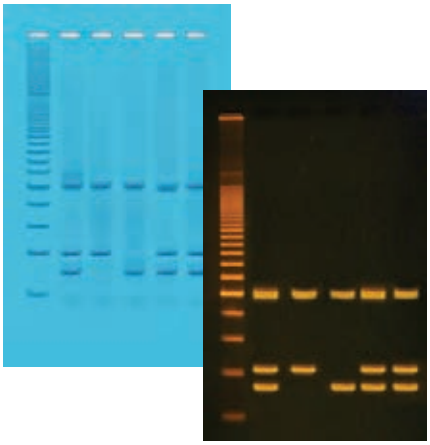
Storage: Some Components Require Freezer Storage.

Extraction 2 hrs.
PCR Set Up 10 min.
PCR 2 hrs.
DNA Digest 60 min.
Electrophoresis 60 min.
Staining 5 min. to overnight

Cat. #962

Identification of Genetically Modified Foods Using PCR

AP ENVIRONMENTAL



For 10 Groups. Some foods contain raw materials from genetically modified organisms (GMO). Examples include tofu, corn flakes and corn meal. In this experiment, your students will extract DNA from food or plant material and perform PCR to determine if any GM indicator genes are present. Amplified DNA is separated and sized by agarose gel electrophoresis.

Kit includes: all necessary reagents for DNA extraction, electrophoresis, and PCR.

All you need: micropipets to measure between 5 and 50 µl, tips, water bath, microcentrifuge, thermal cycler, electrophoresis apparatus, power supply, microwave or hot plate, UV transilluminator, isopropanol, 70% ethanol..

Storage: Some Components Require Freezer Storage.

Extraction 45 min.
PCR Set Up 10 min.
PCR 2 hrs.
Electrophoresis 60 min.
Staining 5 min.

Cat. #121

Detection of Genetically Modified Organisms

45 min.

AP ENVIRONMENTAL

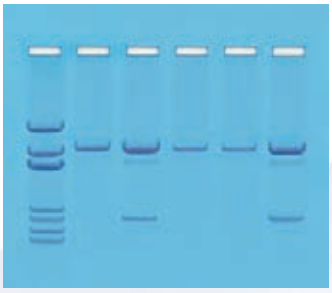
For 8 Gels/8 Lab Groups. For centuries, humans have used selective breeding and conventional hybridization to produce desirable qualities and to increase crop yields. Today, scientists use genetic engineering to directly manipulate the DNA, quickly producing these desirable traits. In this experiment, students will use agarose gel electrophoresis to explore the molecular methods used by scientists to identify genetically modified organisms. No thermal cycler is required. Students are also encouraged to explore the controversy surrounding the use of genetically modified organisms.

ALSO Available: DNA Samples Only in Microtest Tubes For 24 gels. Cat. #121-C

Kit includes: instructions, Ready-to-Load™ QuickStrip™ DNA samples, Ultra-Spec-Agarose™ powder, electrophoresis buffer, InstaStain® Blue, FlashBlue™ stain, calibrated pipet, microtipped transfer pipets.

All you need: electrophoresis apparatus, power supply, automatic micropipet and tips, balance, microwave or hot plate, visualization system.

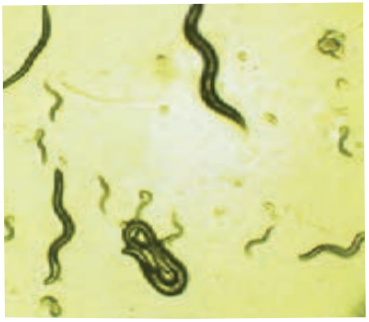
Storage: Room Temperature Stable. Storage of Ready-to-Load QuickStrip™ samples in the Refrigerator is Recommended.



Cat. # 851

Effects of Alcohol on C.elegans

For 10 Groups. You will not believe how similar we are to worms! The genome of the tiny worm, *Caenorhabditis elegans*, was sequenced and found to be 40% similar to us. It is now used as a model system by researchers to address fundamental questions in developmental biology, neurobiology and behavioral biology. The objective of this experiment is to observe and record the effects of alcohol on normal and alcohol mutant strains of *Caenorhabditis elegans*.



Kit includes: instructions, *C.elegans*-normal, *C.elegans* Alcohol-resistant, petri dishes, NGM medium, *E.coli* OP50 Bactobeads™, cell counting chambers, buffer, pipets, sterile loops, tubes, and 10% alcohol.

All you need: ethanol, timers, microscopes, covered box.

Storage: Some Components Require Refrigerator Storage.

Kit contains LIVE materials which much be requested 2 weeks prior to lab.

Supported by SBIR grant R44 AA 015026 from the National Institute on Alcohol Abuse and Alcoholism.

Growing Bacteria Overnight
Plating Worms 15 min.
Worm Growth 3-4 days
Alcohol Experiment 45-60 min.

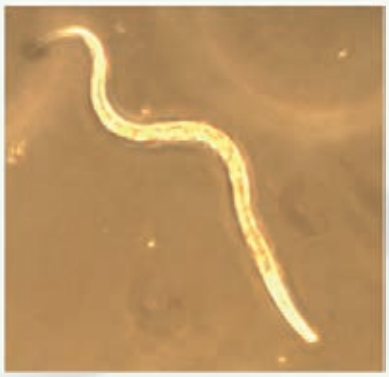
Model Organisms Made Easy with E-Z elegans™!

EDVOTEK's E-Z *elegans*™ are specially prepared cultures of the nematode *Caenorhabditis elegans* that make using model organisms in the classroom a snap! This gives you more flexibility when they can be used since they can be stored in the refrigerator for up to 2 weeks, unlike perishable plates that must be used within 3-5 days of receipt. Furthermore, since they can be stored in the refrigerator, there is no requirement for a freezer!

Cat. # 852

Chemotaxis: The Science of Attraction in C.elegans

For 10 Groups. All organisms are affected by "scent" molecules in the environment, including a multicellular organism called Caenorhabditis elegans. These worms are composed of 959 somatic cells, of which 300 are neurons comprising organs for taste, smell, temperature and touch. In this experiment, your students will observe and record the phenomenon by which normal and mutant strains of C. elegans can direct their movement in response to certain chemicals in the environment.



Kit includes: instructions, *C.elegans*- normal, *C.elegans* Chemotaxis- mutant, petri dishes, NGM medium, *E.coli* OP50 Bactobeads™, cell counting chambers, buffer, pipets, sterile loops, tubes and chemical compounds.

All you need: ethanol, timers, microscopes, covered box.

Storage: Some Components Require Refrigerator Storage.

Kit contains LIVE materials which much be requested 2 weeks prior to lab.

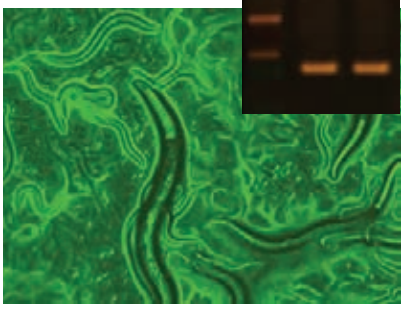
Growing Bacteria Overnight
Plating Worms 15 min.
Worm Growth 3-4 days
Chemotaxis Expt. 45-60 min.

Cat. #858

Lighting Up Life: Expression of GFP in C. elegans

Kit contains LIVE materials which much be requested 2 weeks prior to lab.

For 10 Groups. Scientists can directly manipulate an organism's genome to produce a phenotype using engineered genes called transgenes. In this experiment, students will use fluorescent microscopy and PCR to analyze C. elegans (nematodes) that have been engineered to express the Green Fluorescent Protein (GFP).

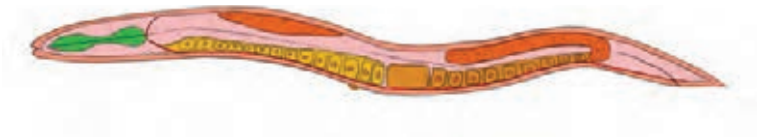


Kit includes: instructions, C. elegans, E. coli OP50 cells, S-Buffer, Ready-Pour NGM Agar, NGM Medium Salts, UltraSpec-Agarose™ powder, electrophoresis buffer (50x), 10x Gel Loading Solution, InstaStain® Ethidium Bromide, FlashBlue™ Liquid Stain, tubes, pipets, wax beads, petri dishes, counting chamber, microscope slides, sterile loops

All you need: covered box, fluorescent and dissecting microscopes, timers, water bath, incubator (optional), thermal cycler or three water baths, electrophoresis apparatus, power supply, balance, microcentrifuge, UV transilluminator or white light visualization system, automatic micropipettes with tips, microwave or hot plate, pipet pump, flasks or beakers, hot gloves, distilled or deionized water, ice buckets and ice.

Storage: Some components will require freezer and refrigerator storage.

Growing Bacteria Overnight
Plating Worms 15 min.
Worm Growth 3-4 days
Set Up 30 min.
PCR 2 hours or overnight
Electrophoresis 90 min.



Cat. # 856

Environmental Toxicity Response in C.elegans

Supported in part by NIH SBIR NCRR Grant.

For 10 Groups. Caenorhabditis elegans is a soil nematode with great potential for educational research, partly because of its rapid (3-day) life cycle, small size (1.0-mm-long adult), and ease of laboratory growth cultivation. In this experiment, students will observe and compare the effects of heavy metals found in the environment on normal and mutant strains of *Caenorhabditis elegans (C. elegans)*.

Kit includes: instructions, *C.elegans*-normal, *C.elegans*-Toxicity mutant, petri dishes, NGM medium, *E.coli* OP50 Bactobeads™, cell counting chambers, buffer, pipets, sterile loops, tubes and heavy metal compounds.

All you need: ethanol, timers, microscopes, covered box.

Storage: Some Components Require Refrigerator Storage.

Kit contains LIVE materials which much be requested 2 weeks prior to lab.

Growing bacteria Overnight
Plating Worms 15 min.
Worm Growth 3-4 days
Toxicity Experiment 45-60 min.

Cat. # 1002

Cell Culture Toxicity Screening

STEM

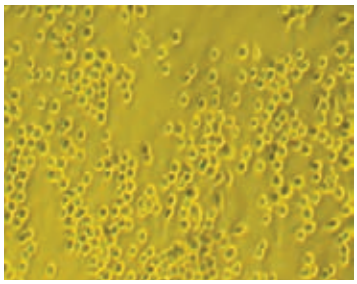
For 6 Lab Groups. Toxicity screening is a powerful technique that allows scientists to determine the effect of potentially harmful substances on living cells. In this inquiry-based lab, students will plan and implement a toxicity screening experiment using insect cell culture. The results will be analyzed to determine cell viability and to estimate the LD50 of the toxic solution.

Kit includes: instructions, insect cells, insect cell media, dilution media, copper sulfate, zinc sulfate, 50% alcohol, Trypan Blue Dye, cell culture flask, cell counting chambers, disposable pipets, tubes, culture plates, cell scraper.

All you need: incubator, covered plastic container, or cardboard box to grow cultures, 70% Ethanol in spray bottles, pipet pump or bulb, inverted phase contrast or bright field microscope suitable for cell culture, 10-100 µl micropipets and tips, safety goggles, disposable lab gloves, and lab coats, marking pens, containers for trash, bleach.

Storage: Some Components Require Refrigerator Storage.

Module I	15 min.
Module II	15 min.
Module III	PreLab: 5 min. Experiment: 15 min.
Module IV	PreLab: 20 min. Experiment: 30 min. Overnight Incubation
Module V	PreLab: 20 min. Experiment: 60-90 min.



ALSO Available:
Insect Cell Media, 120ml
Cat. #1120

Kit contains LIVE materials which much be requested 2 weeks prior to lab.

Cat. #908

Introduction to Plant Cell Culture

Complete in 60 min. plus several weeks for growth

For 10 Groups. Genetic modification of plants is a highly controversial area of biotechnology. Experiments in plants begin with establishing plant cells in culture. This involves de-differentiating plant cells to form plant "stem cells". In this experiment, 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.

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*), microwave or hot plate.

Storage: Some Components Require Refrigerator Storage.

10

How Does SDS-PAGE Separate Proteins?

SDS polyacrylamide-gel electrophoresis, or SDS-PAGE, is a technique that is used to separate proteins according to their molecular weight.

Proteins produce a unique challenge for electrophoresis because they have complex shapes and different charges, which affect how they migrate through the gel. In order to accurately separate proteins by molecular weight and not by shape or charge, the secondary structure of the protein is unfolded using the anionic detergent sodium dodecyl sulfate (SDS) and a reducing agent. The SDS molecules form a complex with the protein, negating its inherent charge. The reducing agent breaks covalent bonds that link protein subunits.

After denaturation, the mixture of proteins is added into depressions (or "wells") within a gel, and then an electrical current is passed through the gel. Because the SDS-protein complex has a strong negative charge, the current drives the proteins through the gel towards the positive electrode. At first glance, a polyacrylamide gel appears to be a solid. On the molecular level, the gel contains channels through which the proteins can pass. Small proteins move through these holes easily, but large proteins have a more difficult time squeezing through the tunnels. Because molecules of different sizes travel at different speeds, they separate into discrete "bands" within the gel. After the current is stopped, the bands are visualized using a stain that sticks to proteins.

Cat. #581

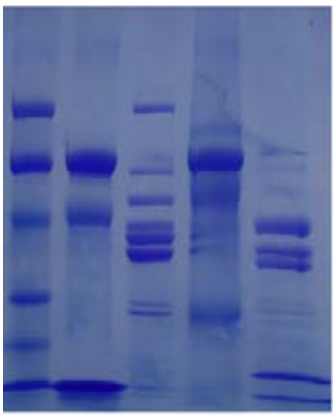
MV10 Vertical Electrophoresis Apparatus

The latest in electrophoresis design! Our newly redesigned MV10 gel tank is designed for easy separation of proteins on polyacrylamide gels utilizing our unique gel support cassette clip. It allows gels to be easily inserted or removed and holds them in place securely. The MV10 unit holds one 9 x 10 cm gel cassette and can accommodate most precast polyacrylamide gels. For 1 Group.

NEW

Cat. #1110

Cell Types in the Brain



For 6 Groups Sharing 3 Polyacrylamide Gels. The brain is an incredibly complex organ and is responsible for regulating almost everything within our body. It allows us to form complex thoughts, read, write, move, breathe, play sports, and listen to music. It does this through a network of cells working together to function.

The objective of the experiment is for students to examine the differences between cell types in the brain based on their profiles of proteins.

Kit includes: instructions, Pre-stained protein standard markers (lyophilized), protein samples (lyophilized), 10x Tris-Glycine-SDS buffer (chamber buffer), Protein InstaStain®, practice gel loading solution, transfer pipets..

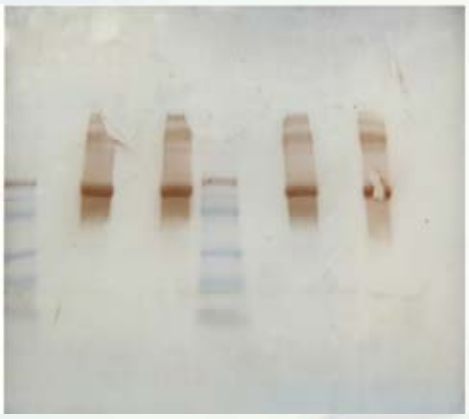
All you need: 12% denaturing polyacrylamide gels (3), vertical gel electrophoresis apparatus, power supply, shaker platform (optional), automatic pipettes with tips, glacial acetic acid, methanol, beakers, transfer pipets, foil, trays or containers, spatula, latex or vinyl lab gloves, safety goggles, distilled water.

Storage: Some components require freezer storage.

NEW

Cat. #1115

Detecting the Risk Factors for Alzheimer's Disease Using Western Blot



For 6 Lab Groups, With 2 Groups Sharing a Gel. The objective of this experiment is for students to understand the theory and application of western blotting. Students will perform a western blot to determine simulated clinical trial participants' risk of developing Alzheimer's Disease.

Kit includes: instructions, pre-stained LyphoProtein™ gel marker, pre-stained LyphoProteins™, immunochemical and blotting reagents, 10x Tris-glycine-SDS buffer (chamber buffer), 10x Tris-glycine powdered buffer (transfer buffer), practice gel loading solution, nylon membrane, filter paper, and large filter paper.

All you need: 12% denaturing polyacrylamide gels (3), vertical gel electrophoresis apparatus, power supply, shaker platform (optional), automatic pipettes with tips, microtest tubes, beakers, transfer pipets, graduated cylinders, plastic wrap, scissors, trays or containers, forceps, several packs of paper towels, latex or vinyl lab gloves, safety goggles, methanol, and distilled water.

Storage: Some components require refrigerator storage.

Cat. #255

Purification & Size Determination of Green & Blue Fluorescent Proteins

For 6 Groups. 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.

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

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

Storage: Some Components Require Freezer Storage Upon Receipt.

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

Cat. #969

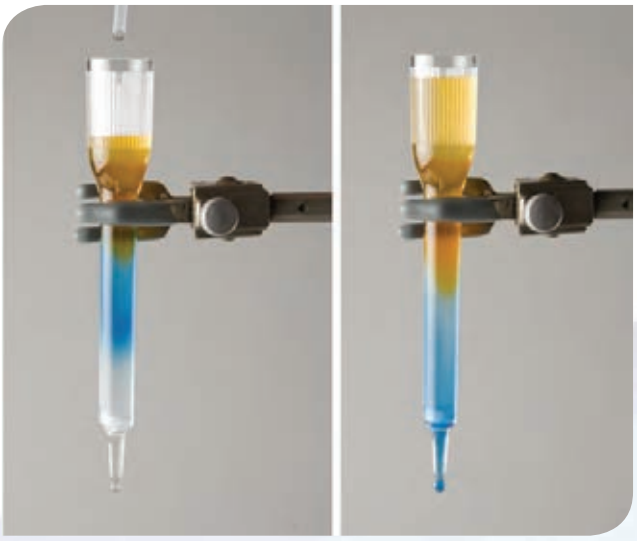
Long Wave UV Mini Lamp

Cat. #108

Principles of Gel Filtration Chromatography

STEM

Packing Column 20 min.
Column Separation 40 min.



For 10 Groups. Introduce chromatographic separation to your class and show them how dyes of different colors 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.

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

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

Storage: Room Temperature.

Cat. #243

Ion Exchange Chromatography

STEM

Requires 60-90 min.

For 6 Separations. 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.

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

All you need: spectrophotometer & cuvettes, ring stands and clamps, test tubes, lab glassware, distilled water, 5 ml pipets and pumps.

Storage: Room Temperature.

Cat. #113

Principles of Thin Layer Chromatography

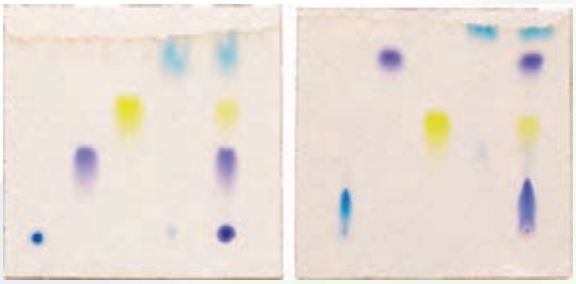
Spotting Plates 20 min.
TLC Separation 5 min.

For 8 Separations. 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.

Kit includes: instructions, samples, reagents and solvents, cellulose thin layer plate, small transfer pipets.

All you need: 250 ml beakers, metric rulers, pipet pump, 5 or 10 ml pipets, distilled water.

Storage: Store in Refrigerator Upon Receipt.



NEW

Cat. #196

Write to a Fair Trial: Forensic Handwriting Analysis

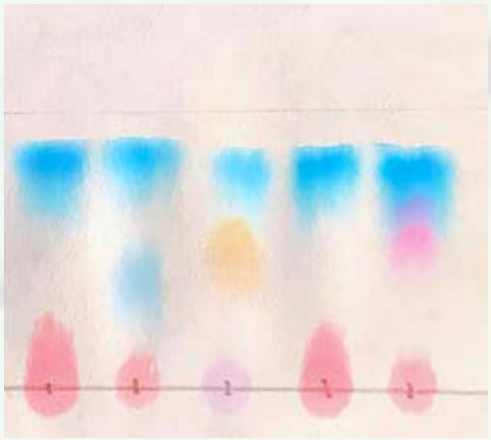
Spotting 10 min.
Separation 45 min.

For 10 groups. Your lab notebook has been stolen, replaced with a ransom note demanding lunch money in exchange for its safe return! In this hands-on experiment, students will use principles of forensic handwriting analysis and paper chromatography to examine writing samples from 4 potential suspects. Only after careful analysis will they be able to solve the classroom crime.

Kit includes: instructions, "suspect" and "crime scene" ink samples, handwriting samples, mini transfer pipets, & chromatography filter paper.

All you need: Beakers (400 ml or 1000 ml recommended), metric rulers, & pencils.

Storage: Room Temperature.



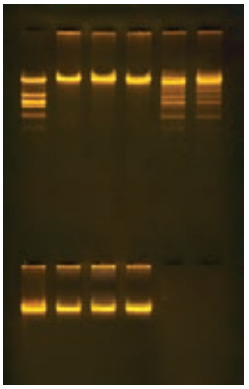
Cat. #302

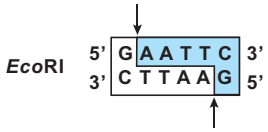
Purification of the Restriction Enzyme *Eco*RI

Advanced Topic

For 5 Purifications. 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 and specific activities are calculated. ***Recommended for college level courses.***

EDVOTEK® exclusive!





STEM

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, InstaStain® Ethidium Bromide.

All you need: horizontal gel electrophoresis apparatus, power supply, UV visualization system, water bath, microcentrifuge, microwave or hot plate, UV spectrophotometer & cuvettes, automatic micropipet with tips, ring stands & clamps, 10 ml pipets, lab glassware, ice and ice buckets.

Storage: Some Components Require Freezer Storage Upon Receipt.

Packing column 45 min.
Restriction analysis A 35 min.
Restriction analysis B 50 min.
Gel Prep 30 min.
Electrophoresis 30 min.
Staining & Destaining 2 min.

Cat. #277

Affinity Chromatography of Glucose Binding Proteins

EDVOTEK® exclusive!

For 10 Groups. In this experiment, students will prepare a seed extract from Jack Bean Meal, fractionate the extract by affinity chromatography, and elute the bound glucose binding protein. The presence of biological activity is determined by an immunoblot enzyme assay.

Kit includes: instructions, affinity gel, jack bean meal, various solutions and buffers, membranes, petri plates, columns with tips, conical tubes and transfer pipets.

All you need: clinical centrifuge, vortex or shaking platform, micropipet and tips, ring stands and clamps, lab glassware, pipets & pumps, microtest tubes, forceps, water.

Storage: Some Components Require Refrigerator Storage Upon Receipt.

Requires 2 hours

Protein Reagents

Precast Polyacrylamide Gels
Cat. #650 1 gel (12%)
Cat. #651 3 gels (12%)
Cat. #652 6 gels (12%)

Tris-glycine-SDS Powdered Buffer
For protein gel electrophoresis.
Enough powder to make 5L of 1X buffer.
Cat. #655

Tris-glycine Powdered Buffer
For protein gel electrophoresis.
Enough powder to make 5L of 1X buffer.
Cat. #656

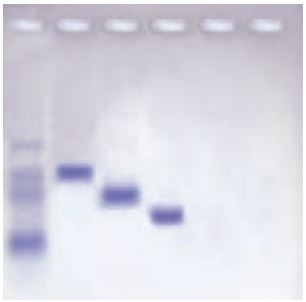
Prestained Lyophilized Protein Standard Marker
Molecular Weight Standards
Cat. #752 For 6 gels

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. For staining gels of various sizes (ranging from 8x8 cm to 13x13 cm).
Cat. #2016 For 15 gels
Cat. #2017 For 30 gels

Cat. #110

Molecular Weight Determination of Proteins *(Agarose-based)*

For 6 Groups. Introduce a simple method to determine protein subunit molecular weights using horizontal electrophoresis. Because the protein standards and "unknowns" are prestained, the separation of proteins can be observed during electrophoresis. Included in the experiment is EDVOTEK®'s formulation of protein grade agarose, which provides an alternative to the use of polyacrylamide gels.



Kit includes: instructions, prestained LyphoProtein™ samples, practice gel loading solution, agarose, electrophoresis buffer, Protein InstaStain®.

All you need: horizontal electrophoresis apparatus, power supply, white light visualization system, automatic micropipet with tips, microwave or hot plate, water bath, metric rulers, lab glassware, methanol, glacial acetic acid, distilled or deionized water.

Storage: Some Components Require Freezer Storage Upon Receipt.

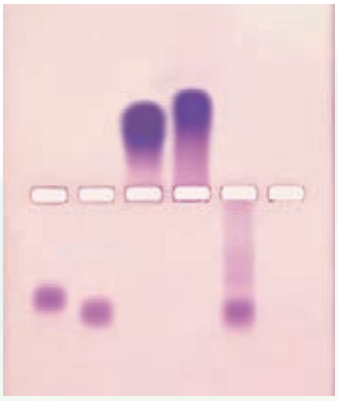
Gel Prep 40 min.
Electrophoresis 60 min.

Cat. #111

Electrophoretic Properties of Native Proteins *(Agarose-based)*

Gel Prep 30 min.
Electrophoresis 45 min.
Staining 60 min.
Destaining overnight

For 6 Groups. 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.



Kit includes: instructions, protein samples, practice gel loading solution, agarose, electrophoresis buffer, Protein InstaStain®.

All you need: horizontal electrophoresis apparatus, power supply, white light visualization system, automatic micropipet with tips, microwave or hot plate, water bath, metric rulers, lab glassware, methanol, glacial acetic acid, distilled or deionized water.

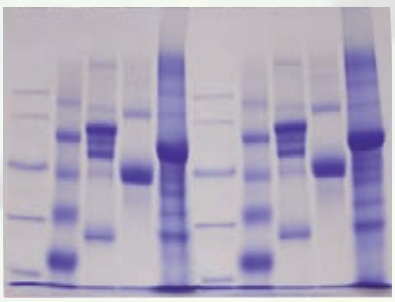
Storage: Some Components Require Refrigerator Storage Upon Receipt.

Cat. #150

Survey of Protein Diversity

Electrophoresis 60 min.
Staining 20 min.
Destaining 2 hours

For 6 Groups sharing 3 gels. Learn about the diversity of proteins by studying the electrophoretic profiles of various sources. Your students will separate proteins from plant, animal serum, and milk proteins alongside a standard protein marker.



Kit includes: instructions, denatured LyphoProtein™ samples, standard protein markers, practice gel loading solution, buffer, Protein InstaStain®.

All you need: 3 polyacrylamide gels (12%), vertical gel electrophoresis apparatus, power supply, hot plate or burner, white light visualization system, automatic micropipet with fine tips, microtest tube holder, lab glassware, methanol, glacial acetic acid, distilled or deionized water.

Storage: Some Components Require Freezer Storage Upon Receipt.

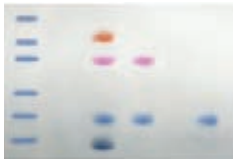
ALSO Available - Bulk Protein Samples
LyphoProtein™ for 12 groups
Cat. #150-B

Cat. #151

AIDS Kit III: Simulation of HIV Detection by Protein Electrophoresis

For 6 Groups sharing 3 gels. The Human Immunodeficiency Virus (HIV) causes acquired immune deficiency syndrome (AIDS), a serious disease that suppresses a patient's immune system which leaves them susceptible to infections. In this experiment, students will use SDS-PAGE to simulate the identification of HIV proteins in simulated patient samples. The results of this test are used to diagnose an HIV infection.

Electrophoresis 60 min.
Staining/Destaining Optional, 2 hours



Kit includes: instructions, denatured LyphoProtein™ samples, standard protein markers, practice gel loading solution, buffer, transfer pipets, Protein InstaStain®.

All you need: 3 polyacrylamide gels (12%), vertical gel electrophoresis apparatus, power supply, hot plate or burner, aluminum foil or foam water bath float, white light visualization system, automatic micropipet with fine tips, microcentrifuge tube holder, lab glassware, methanol, glacial acetic acid, glass tray, plastic wrap, and distilled or deionized water.

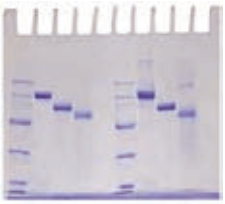
Storage: Some Components Require Freezer Storage Upon Receipt.

Cat. #153

Determination of Protein Molecular Weight

For 6 Groups sharing 3 gels. 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.

Electrophoresis 60 min.
Staining 20 min.
Destaining 2 hours



Kit includes: instructions, denatured LyphoProtein™ samples, standard protein markers, practice gel loading solution, buffer, Protein InstaStain®.

All you need: 3 polyacrylamide gels (12%), vertical gel electrophoresis apparatus, power supply, hot plate or burner, white light visualization system, automatic micropipet with fine tips, microtest tube holder, lab glassware, methanol, glacial acetic acid, distilled or deionized water.

Storage: Some Components Require Freezer Storage Upon Receipt.

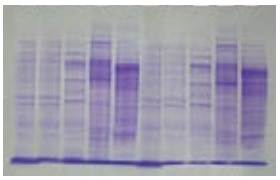
ALSO Available - Bulk Protein Samples LyphoProtein™ for 12 groups, Cat. #153-B

Cat. #252

Fingerprinting of Bacterial Proteins

For 6 Groups sharing 3 gels. In this experiment, total protein extracts from several bacterial sources are compared. The unique patterns of protein bands, obtained by SDS vertical polyacrylamide electrophoresis, can be used to identify various bacterial strains.

Day One Set Up 15 min.
Day Two Set Up 60 min.
Electrophoresis 60 min.
Staining 20 min.
Destaining 2 hours



Kit includes: instructions, bacterial cultures and reagents, LyphoProteins™, Lysozyme, buffers, 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%), vertical gel electrophoresis apparatus, power supply, Microcentrifuge, incubation oven, hot plate or burner, white light visualization system, automatic micropipet with fine tips, lab glassware, methanol, glacial acetic acid, distilled water.

Storage: Some Components Require Freezer Storage Upon Receipt.

Cat. #275

AIDS Kit II: Simulation of HIV Detection by Western Blot

For 6 Blots. The second assay used to confirm a positive HIV ELISA result is the Western Blot. Students separate protein samples from hypothetical patients on agarose gels, transfer the samples to a membrane and detect the simulated HIV proteins. This kit is an introductory level experiment. For a comprehensive advanced course, we recommend Cat. #317.

Electrophoresis 45 min.
Blot overnight
Detection 25 min.

Kit includes: instructions, samples, standard molecular weight markers, protein agarose, various buffers and reagents, PVDF membrane, filter paper, stain, 1 ml pipet, 100 ml graduated cylinder.

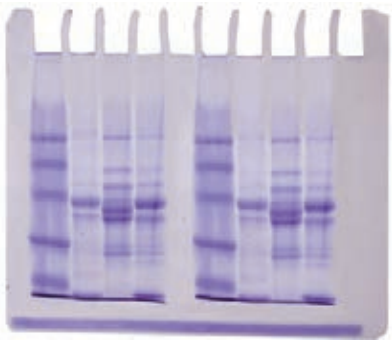
All you need: electrophoresis apparatus, power supply, automatic micropipets with tips, microwave or hot plate, incubation oven, shaker platform, lab glassware, small plastic trays, microtest tubes, pipet pumps or bulbs, metric rulers, distilled water, methanol, glacial acetic acid.

Storage: Some Components Require Refrigerator Storage Upon Receipt.

Cat. #253

Diversity of Fish Proteins

For 6 Groups sharing 3 gels. Study the diversity of fish with these pre-stained, lyophilized proteins. Total protein from Perch, Walleye and Salmon have been 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.



Electrophoresis 60 min.
Staining 20 min.
Destaining 2 hours

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

All you need: 3 polyacrylamide gels (12%), vertical gel electrophoresis apparatus, power supply, microcentrifuge, hot plate or burner, vortex, white light visualization system, automatic micropipet with fine tips, test tube holders, lab glassware, methanol, glacial acetic acid, distilled water.

Storage: Some Components Require Freezer Storage Upon Receipt.

ALSO Available - Bulk Protein Samples LyphoProtein™ for 12 groups, Cat. #253-B

Cat. #282

Principles of Enzyme Catalysis

For 10 Groups. 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.

Requires 30-45 min.

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

All you need: visible wavelength spectrophotometer, timer, pipet pumps or bulbs, 1 ml pipets, test tubes & tube racks, beakers, 1, 5 & 10 ml pipets, linear graph paper, ice, lab markers, distilled water.

Storage: Some Components Require Refrigerator and Freezer Storage Upon Receipt.

11

BEST SELLER

Cat. #119

Genes In A Tube™

30 min.

For 26 Students. Teach your students how to extract and spool 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!

Kit includes: instructions, lysis buffer, NaCl solution, Protease, Tris buffer, Flash-Blue™ solution, microcentrifuge tubes, sterile cotton tipped applicators, transfer pipets, tubes for DNA precipitation, Gene Tubes™, and string.

All you need: ice cold ethanol or isopropanol, waterbath, test tube rack.

Storage: Room Temperature.

NEW

Cat. #1100

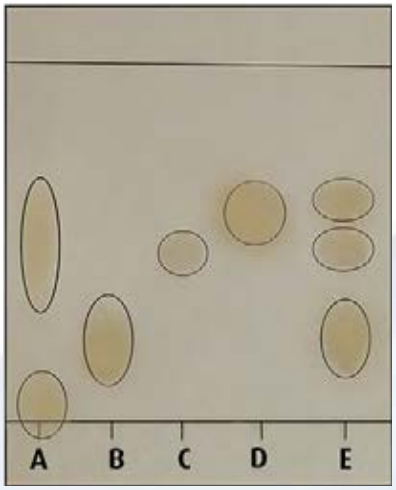
Scents & Sense-ability

For 10 Groups. The objective of this experiment is for students to understand that olfactory receptors respond to smells and transmit them as signals to the brain. Students will also be able to understand the principles of thin layer chromatography and how they apply to the separation of olfactory compounds.

Kit includes: instructions, limonene, anethole, eugenol, s-carvone, unknown sample, anhydrous sodium carbonate, potassium permanganate, TLC paper, transfer pipets, microcentrifuge tubes.

All you need: pencils, 100ml beakers, 400ml beakers, gloves, rulers, saran wrap, 100% ethanol (200 or 190 proof), 15ml conical tubes, & distilled water.

Storage: Room Temperature.



Cat. #S-75

Do Onions, Strawberries and Bananas Have DNA?

30 min.

For 10 Lab Groups. 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.

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

All you need: fruit, vegetables, and 95-100% isopropyl alcohol.

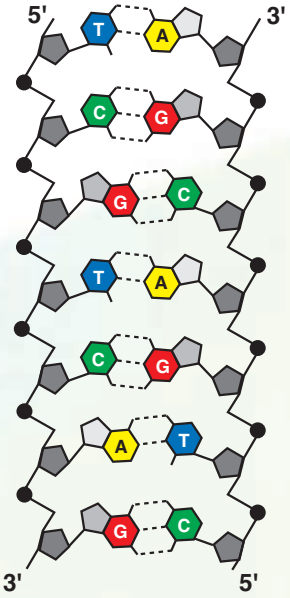
Storage: Store in Refrigerator Upon Receipt.

Cat. #S-10

What Does DNA Look Like?

30 min.

For 10 Lab Groups. 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!



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

All you need: pipet, beakers, isopropanol, distilled water, ice.

Storage: Store in Refrigerator Upon Receipt.

Cat. #S-74

What Is Osmosis?

45 min.

For 5 Lab Groups. Students will be introduced to the principles of osmosis. Activities will be performed utilizing dialysis tubing and various concentrations of salt. Dyes of different molecular weights will also be used to visually demonstrate the size selectivity of membranes.

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

All you need: 300-400 ml beakers, table salt, apple and beet juice, distilled water.

Storage: Room Temperature.

Cat. #S-30

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

Complete in 30 min. and grow overnight

For 10 Groups. 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. ***NGSS-aligned with MS-LS1 and MS-LS2***

Kit includes: instructions, Ready Pour agar, Petri plates, pipets, sterile water sample.

All you need: water samples, test tubes, pipet pump or bulb, hot plate or water bath, aluminum foil or plastic wrap, 10% bleach solution.

Storage: Room Temperature.

Cat. #166

Detection of a Simulated Infectious Agent

For 25 Students. 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 determined by lab tests. In this kit, students will transmit a simulated infectious agent (chemical dye) between classmates. The simulated infections agent is only visible under long-wave UV light. The pattern of transmission and primary source will be documented. ***NGSS-aligned with MS-LS2.C***

Requires in 30-45 min.

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

All you need: students!

Storage: Room Temperature.

Cat. #S-68

What is an Epidemic and How Does An Infection Spread?

30 min.

For 10 Groups. Infectious agents such as bacteria & viruses can spread rapidly through a population and cause widespread disease and death. In this experiment, your students will use colored solutions to simulate the spreading of a disease in the classroom.

Kit includes: instructions, HCl solution, NaOH, color indicator, test tubes & pipets.

All you need: students!

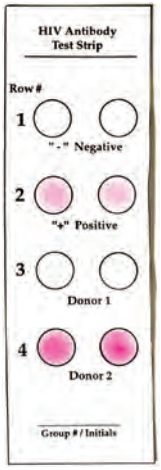
Storage: Room Temperature.

Cat. #S-70

How Does a Doctor Test for AIDS?

45 min.

For 10 Groups. 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.



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

All you need: Just water!

Storage: Room Temperature.

Cat. #140

Blood Typing

45 min.

For 10 Groups. In human blood, there are two major antigens and antibodies designated as A or B and anti-A or anti-B. Blood type (A, B, AB, or O) can be determined using an agglutination assay where roughly equal concentrations of sample antigen and previously isolated antibodies are mixed and then monitored for precipitation. This test is often used to ensure safe blood transfusions. However, it can also be used in the field of forensics. Agglutination assays can confirm that collected evidence is human blood before more time intensive tests are performed. In addition, blood typing can screen potential suspects by blood group.

Kit includes: instructions, control ABO simulated blood samples, unknown simulated blood samples, transfer pipets, microtiter plate.

All you need: automatic micropipet (5-50 µl) with tips (optional).

Storage: Room Temperature.

Cat. #269

Introduction to ELISA Reactions

45 min.

For 10 Groups. Your students will learn the basic principles of the Enzyme-linked Immunosorbent Assay (ELISA) in this precise and sensitive antibody-based detection kit. Experiment components do not contain human serum.

Kit includes: instructions, antigens, primary; secondary antibodies, peroxide co-substrate, hydrogen peroxide, ABTS substrate, phosphate buffered saline, tubes, plates, and transfer pipets.

All you need: Distilled or deionized water, automatic micropipettes with tips, laboratory glassware.

Storage: Some Components Require Refrigerator Storage Upon Receipt.

The kits on pages 104-105 include the following:

Instructions, Ready-to-Load™ QuickStrip™ Dye samples, UltraSpec-Agarose™ powder, electrophoresis buffer, practice gel loading solution, disposable pipets.

All you need:
Electrophoresis apparatus, power supply, automatic micropipette and tips (optional), white light box (optional), microwave or hot plate, distilled water.

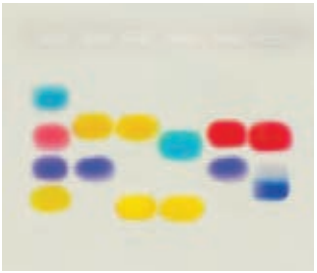
Storage:
Room Temperature Stable. Storage of Ready-to-Load QuickStrip™ samples in the Refrigerator is Recommended.

These kits require approximately 45 min. to complete.

45 min.

Cat. #S-49

In Search of My Father

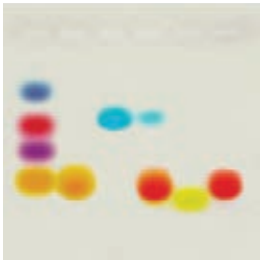


For 10 Gels/10 Lab Groups. Your class will enjoy discovering the true identity of two boys who were separated from their parents a decade ago. Their mothers are identified by mitochondrial DNA and their fathers from chromosomal DNA. Will it be a happy ending? ***NGSS-aligned with MS-LS3.B & MS- LS3.A.***

NEW

Cat. #S-47

Linking Food Science to Biotechnology: Unlock the Color of Candies



For 10 Gels/10 Lab Groups. Investigate how agarose gel electrophoresis unlocks the color code used by food scientists to make colorful candies. Students will extract colors from common candies and separate the dyes using agarose gel electrophoresis. A fun lab extension involves the use of candy to build a DNA model. *Note: Dye samples are not provided for #S-47 as students will extract their own dyes from colorful candies.* ***NGSS-aligned with MS-PS1.***

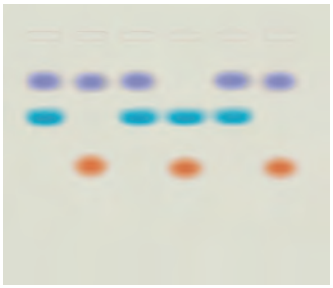
Cat. #S-50

Why Do People Look Different?

For 10 Gels/10 Lab Groups. Teach your students how an individual's physical traits are a reflection of one's genes. In this simulation, your students will use electrophoresis to separate dyes which represent genetic traits. ***NGSS-aligned with MS-LS3-B.***

Cat. #S-51

Whose DNA Was Left Behind?



For 10 Gels/10 Lab Groups. DNA obtained from a single hair left behind at a crime scene can be used to identify a criminal. In this experiment, your students will compare simulated crime scene DNA with that of two suspects. ***NGSS-aligned with MS-LS3-A.***

Cat. #S-46

Linking STEM to Agarose Gel Electrophoresis

For 10 Gels/10 Lab Groups. Link important STEM concepts using Agarose Gel Electrophoresis. Help your students learn about the application of gel electrophoresis in DNA Fingerprinting, DNA Paternity Testing, Genetics (related to health and well-being), or the detection of Genetically Modified Foods. These dyes can be separated in agarose gels and students will use core STEM tools to determine band size and utilize critical thinking and reasoning skills. Four unique module options are supplied.

Cat. #S-53

Mystery of the Crooked Cell

For 10 Gels/10 Lab Groups. This simple lab 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. ***NGSS-aligned with MS-LS1-A & LS3.A.***

Developed in Partnership with CityLab Boston University School of Medicine

Department of Health and Human Services • National Institutes of Health
Supported by a Science Education Partnership Award (SEPA) from the National Center for Research Resources.

Cat. #S-48

What is PCR & How Does It Work?

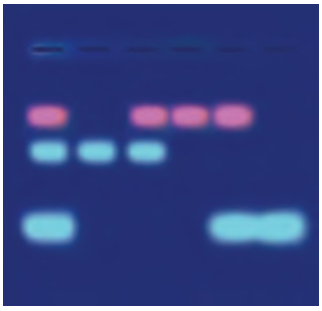
For 10 Gels/10 Lab Groups. This simulation experiment demonstrates the process of DNA amplification by PCR and how the amplified product is detected by separating the reaction mixture by agarose gel electrophoresis. ***NGSS-aligned with MS-LS1.***

Cat. #S-52

The Secret of the Invisible DNA: A Genetics Exploration

45 min.

For 10 Gels/10 Lab Groups. Explore genetics with our "out of this world" experiment! In this lesson, we explore how DNA technology can be used to explore the relationship between genotype and phenotype using one of two exciting scenarios (medical diagnostics or alien genetics). Fluorescent dyes simulate DNA fragments, eliminating post-electrophoresis staining and saving you valuable classroom time! *A long wave UV light (Cat. #969) or black light and UV safety googles are required for viewing the fluorescent dyes.*



Kit includes: instructions, Ready-to-Load™ QuickStrip™ Dye samples, UltraSpec-Agarose™ powder, electrophoresis buffer, practice gel loading solution, disposable pipets.

All you need: electrophoresis apparatus, power supply, automatic micropipette and tips (optional), microwave or hot plate, distilled water, long wave UV light or black light, UV safety goggles.

Storage: Room Temperature Stable. Storage of Ready-to-Load QuickStrip™ samples in the Refrigerator is Recommended.

Cat. #969
Long Wave UV Mini-Light

Cat. #5062

Classroom DNA Electrophoresis LabStation™

Supports up to 24 Students. This comprehensive equipment package includes all the equipment needed to support six groups and a complimentary electrophoresis experiment. Produces excellent results in 30-40 minutes and includes a lifetime warranty.

Includes:

- One M36 HexaGel™ Electrophoresis Apparatus
- One DuoSource™ 150 (75/150 V for 1 or 2 units)
- Two Fixed Volume MiniPipets (40 µl)
- Yellow Micropipet Tips (1 - 200 µl / 2 Racks of 96)
- One DNA Fingerprinting Classroom Kit (Cat. #130)

Cat. #S-43

DNA DuraGels™

EDVOTEK® exclusive!

DNA DuraGel™ gels are permanent polymer gels that allow students to practice the critically important skill of pipetting/gel loading. The clear, reusable gels are designed for the practice of loading 5-35 µL of samples. Gel models are imprinted with a ruler for sizing DNA fragments. Also included are simulated FlashBlue™ and InstaStain® Ethidium Bromide gel images, ideal for representing how actual gels are stained with Methylene Blue and Ethidium Bromide.

Kit Includes: reusable DNA DuraGels™; FlashBlue™ and InstaStain® Ethidium Bromide gel images, practice gel loading solution and mini-transfer pipets.

All you need: micropipettes are recommended.

Cat # S-43
DNA DuraGels™
For 12 to 24 Students
Includes 6 Gels and 8 images (4 FlashBlue™ and 4 InstaStain® Ethidium Bromide gel images)

Cat # S-43-20
DNA DuraGels™
For 4 Students or Classroom Demo
Includes 2 Gels and 4 images (2 FlashBlue™ and 2 InstaStain® Ethidium Bromide gel images)

Cat. #S-44

Micropipetting Basics

For 10 Lab Groups. Teach your students how to use a micropipette with ease and accuracy by experimenting with multicolored dyes. A fun and cost effective way to learn this important skill.

Kit includes: instructions, various colored dye samples and a Pipet Card™.

All you need: micropipette and tips.

Storage: Room Temperature.

Check Out These FREE Resources!

QUICK GUIDE:
Micropipetting Basics
www.edvotek.com/Quick-Guides

RELATED VIDEO:
Measuring Liquids with an Adjustable Micropipette
youtube.com/EdvotekInc

12

Cat. #S-20

How Do You Clone A Gene?

30 min.

For 5 Lab Groups. In this kit, a set of multicolored links demonstrates a variety of molecular biology simulations. Students learn about digesting DNA with restriction enzymes, cloning genes in plasmids, protein structure and more!

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

All you need: Your students!

Storage: Room Temperature.

Cat. #1500

Colored DNA Beads

A set of colored 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 color.

Cat. #S-80

Classroom Molecular Biology Toys & Games

EDVOTEK® exclusive!

Gene of Fortune™ Game

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

Genetic Dice™ Game

For 10 Groups. 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. #1511, #1512, and #1513

DNA and RNA Models

Your students can build a model of DNA with this simple and colorful system. The parts are color-coded to represent the purines, pyrimidines, deoxyribose and phosphodiester 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 (Cat. #1513) to model transcription and translation. Easy to assemble and disassemble.

Cat. #1511 12 Layers, 6 Pieces per Layer = 72 pieces
Cat. #1512 22 Layers, 6 Pieces per Layer = 132 pieces
Cat. #1513 24 base RNA Protein Synthesis kit

Cat. #1511 Includes:
12 Spacers
12 Nitrogenous base-pairs:
- 6 Thymine (orange)
- 6 Adenine (blue)
- 6 Guanine (green)
- 6 Cytosine (yellow)

2 Polynucleotide side-chains:
- 24 Ribose (red)
- 24 Phosphate (purple)

Stand, support rod, & cap
Assembly leaflet

Cat. #1512 Includes:
24 Spacers
22 Nitrogenous base-pairs:
- 11 Thymine (orange)
- 11 Adenine (blue)
- 11 Guanine (green)
- 11 Cytosine (yellow)

2 Polynucleotide side-chains:
- 44 Ribose (red)
- 44 Phosphate (purple)

Stand, support rod, & cap
Assembly leaflet

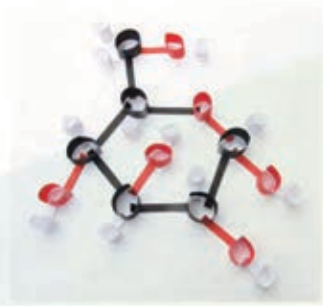
Cat. #1511

Cat. #1513

Cat. #1513 Includes:
3 (U) Uracil, Light Blue
3 (A) Adenine, Blue
3 (G) Guanine, Green
3 (C) Cytosine, Yellow
6 (R) Ribose, Claret
6 (P) Phosphate, Purple
2 tRNA (transfer RNA) Part
2 Amino Acid Unit
Assembly leaflet

Origami Organelles

Building an Origami Organelle model can help make science concepts easier to understand! Simply purchase an Origami Organelle model, download the files, and print as many times as you wish! Easy-to-follow colorful instructions make building your 3D model exciting and fun. Visit our website for more information on all of these models.
www.edvotek.com/Experiments/Origami-Organelles



Simple Animal Cell Model
Cat. #EVT-033

Simple Plant Cell Model
Cat. #EVT-034

Simple Bacterial Cell Model
Cat. #EVT-035

Human Heart Model
Cat. #EVT-038

Beautiful Brain Model
Cat. #EVT-039

Digestive System Model
Cat. #EVT-040

Cell Membranes Model
Cat. #EVT-025

CRISPR Model
Cat. #EVT-031

Eye Model
Cat. #EVT-037

Robotic Ribosomes Model
Cat. #EVT-004

Human Kidney Model
Cat. #EVT-044

Nimble Nerve Impulses Model
Cat. #EVT-005

Osmosis & Diffusion Model
Cat. #EVT-043

DNA Replication Model
Cat. #EVT-023

Apoptosis Model
Cat. #EVT-066

Polymerase Chain Reaction (PCR) Model
Cat. #EVT-032

Receptor Tyrosine Kinases (RTKs) Model
Cat. #EVT-069

Lac Operon Model
Cat. #EVT-071

Mitosis & Meiosis Model
Cat. #EVT-036

Transcription Model
Cat. #EVT-070

Super Stem Cells Model
Cat. #EVT-017

Cell Signaling Model
Cat. #EVT-047

Incredible Immune System Model
Cat. #EVT-020

Mighty Mitochondria Model
Cat. #EVT-001

Cool Chloroplasts Model
Cat. #EVT-002

Colorful Chromosomes Model
Cat. #EVT-003

Muscle Shuffle Model
Cat. #EVT-009

Alveoli Model
Cat. #EVT-018

Amino Acids Model
Cat. #EVT-517

Amoeba Model
Cat. #EVT-051

Antibodies Model
Cat. #EVT-008

ATP Synthase Model
Cat. #EVT-011

Biochemistry of Vision Model
Cat. #EVT-048

Calvin Cycle Model
Cat. #EVT-067

Carbon Cycle Model
Cat. #EVT-604

Cell Nucleus Model
Cat. #EVT-026

Chlamydomonas Model
Cat. #EVT-072

Citric Acid Cycle Model
Cat. #EVT-064

Crucial Krebs and the Link Reaction
Cat. #EVT-014

Easy Eye Model
Cat. #EVT-055

Electron Transport Chain Model
Cat. #EVT-012

Endoplasmic Reticulum Model
Cat. #EVT-028

Euglena Model
Cat. #EVT-052

Fermentation Model
Cat. #EVT-065

Fermentation & Anaerobic Respiration Model
Cat. #EVT-015

Fertilization and Reproductive Technology Model
Cat. #EVT-016

Fun with Flowers Model
Cat. #EVT-042

Gluconeogenesis Model
Cat. #EVT-068

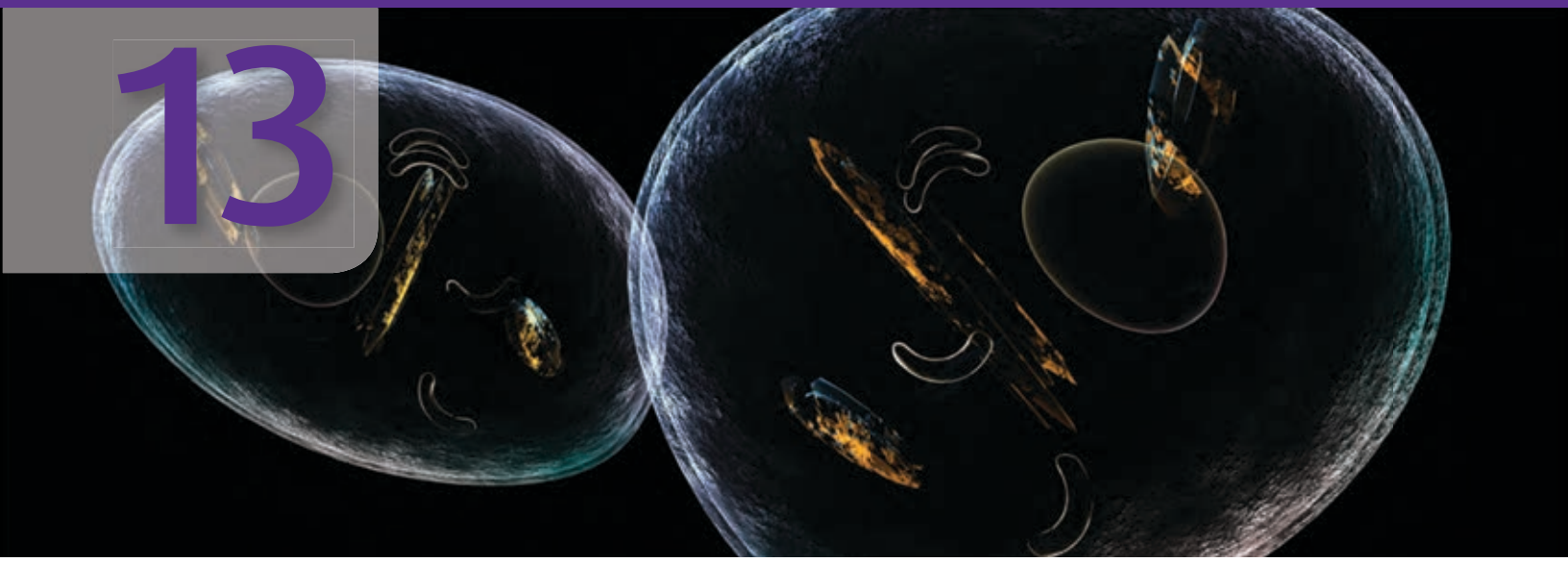
Glucose Uptake by the Small Intestine Model
Cat. #EVT-010

Glycolysis Model
Cat. #EVT-062

Golgi Apparatus & the Lysosome Model
Cat. #EVT-029

Groovy Glycolysis Model
Cat. #EVT-013

13



Advanced Placement® Biology

The Advanced Placement* Biology curriculum, developed by the College Board, offers high school students the opportunity to gain credit for introductory college level biology courses. Since 1991, EDVOTEK® has proudly offered reagents and equipment for all labs necessary to fulfill the AP Biology Lab requirement.

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EDVOTEK's **BIG IDEA AP Biology Investigations** are designed with three principles in mind: safety, value, and reproducibility. We've eliminated the need for using toxic chemicals that not only have the potential for causing harm to students, but also pose a threat to the environment. Our labs provide the most value and are tested to ensure that you get the results you expect.

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BIG IDEA AP BIOLOGY

Cat. # AP-PKG

SPECIAL PACKAGE

Big Idea 1: Evolution

Investigation 1: Artificial Selection
Investigation 2: Mathematical Modeling: Hardy-Weinberg
Investigation 3: Comparing DNA Sequences to Understand Evolutionary Relationships with BLAST

Big Idea 2: Cellular Processes - Energy and Communication

Investigation 4: Diffusion and Osmosis
Investigation 5: Photosynthesis
Investigation 6: Cellular Respiration

Big Idea 3: Genetics and Information Transfer

Investigation 7: Cell Division - Mitosis and Meiosis
Investigation 8: Biotechnology - Bacterial Transformation
Investigation 9: Biotechnology - Restriction Enzyme Analysis of DNA

Big Idea 4: Interactions

Investigation 10: Energy Dynamics
Investigation 11: Transpiration
Investigation 12: Fruit Fly Behavior
Investigation 13: Enzyme Activity

Cat. # AP-PKG

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EDVOTEK®

BIG IDEA 1: Evolution

Most AP Biology kits are designed for 10 lab groups!

Cat. #AP01

Investigation 1: Artificial Selection

STEM

For 10 Groups. Students will perform artificial selection on a population of Quick Plant™, and identify traits that vary in the population. Then they will perform artificial selection by cross-pollinating only selected plants and observe the trait differences between the two populations to learn how selection works.

Kit includes: instructions, Quick Plant™ seeds, Nylon mason twine, potting mix, Miracle-Gro Fertilizer, vermiculite, bees, plastic magnifier, and wooden toothpicks.

All you need: growing system (reused 500 mL plastic soda or water bottles), light box system, Digital cameras, Lab notebook, water, tape, razor.

Storage: Room Temperature.

30 min. lab periods over the course of 5-7 weeks.

Cat. #AP02

Investigation 2: Mathematical Modeling Hardy-Weinberg

For 10 Groups. The application of the Hardy-Weinberg law of genetic equilibrium demonstrates that mutations, genetic drift and natural selection have a dramatic effect on gene frequency in a population. Using computer and Internet access, students will explore how a hypothetical gene pool changes from one generation to the next.

	A	a
A	AA	Aa
a	Aa	aa

Kit includes: instructions, PTC taste paper and control taste paper.

All you need: computer with spreadsheet software and calculator with square root function.

Storage: Room Temperature.

Requires 2 hours.

Investigation 2 Alternative:
Cat. #333 PCR-based Alu-Human DNA Typing

Cat. #AP03 **FREE DOWNLOAD**

Investigation 3: Comparing DNA Sequences to Understand Evolutionary Relationships with BLAST

45 min.

For 10 Groups. In this experiment, several genes will be submitted to an internet database to identify and compare the genes. Students will then use this information to construct a cladogram - a phylogenetic tree representing evolutionary relatedness of species.

Kit includes: instructions.

All you need: computer with internet access.

Download instructions at www.edvotek.com/AP03

Investigation 3 Alternatives:
Cat. #339 Sequencing the Human Genome
Cat. #340 DNA Bioinformatics

BIG IDEA 2:
Cellular Processes, Energy & Communication

Cat. #AP04

Investigation 4: Diffusion and Osmosis

For 10 Groups. In this experiment, students use artificial cells to study the relationship of surface area and volume. Then they will create models of living cells to explore osmosis and diffusion, and observe osmosis in living cells. Various diffusion and osmosis principles are performed in this lab.

Kit includes: instructions, Agar powder, phenolphthalein solution, sodium hydroxide (NaOH) pellets, powdered sucrose, NaCl, powdered glucose, ovalbumin, dialysis tubing, large transfer pipets, microscope slides and cover slips.

All you need: beaker, ruler, razor, plastic spoon, paper towel, timer, scales, graph paper, distilled or deionized water, elodea tip or Moss, microscope

Storage: Room Temperature.

Complete in 60-90 min.

Cat. #AP05

Investigation 5: Photosynthesis STEM

For 10 Groups. In this experiment, students will learn how to measure the rate of photosynthesis indirectly by studying the floating leaf disk assay, and test different variables that might affect the photosynthesis process.

Kit includes: instructions, Sodium Bicarbonate (baking soda), liquid soap, plastic syringes, transfer pipets, plastic cups, metric rulers.

All you need: leaves, timer, light source, hand-held hole punch, beakers.

Storage: Room Temperature.

Complete in 1.75 hours (2 lab periods).

Cat. #AP06

Investigation 6: Cellular Respiration STEM

For 10 Groups. In this experiment, students learn how to apply the gas laws to the function of the microrespirometer. Students will observe cell respiration of germinating seeds and describe the effects of temperature on the rate of cell respiration.

Kit includes: instructions, 1 ml pipet, glass beads, peas, potassium hydroxide solution, cork stoppers, absorbent cotton, nonabsorbent cotton, plastic vials, parafilm.

All you need: thermometers, trays (at least 14" long), silicon glue, ice, cork borer, tape, timers.

Storage: Room Temperature.

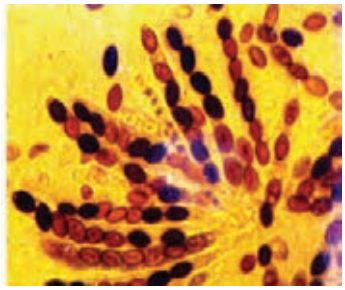
Requires 2 hours (2 lab periods).

BIG IDEA 3:
Genetics and Information Transfer

Cat. #AP07

Investigation 7: Cell Division Mitosis and Meiosis

Requires 60 min.



For 10 Groups. Students learn to identify and differentiate various stages in mitosis and meiosis. Onion root tips are stained to identify the various stages and duration of mitosis. Meiosis and Crossing Over in Sordaria are also demonstrated in this experiment. Students will also have an opportunity to analyze the mechanism involved with loss of cell cycle control in cancer.

Kit includes: instructions, Pipe cleaners (in 2 colors), plastic beads, carbol-fuchsin (Ziehl-Neelson) stain, lectin, plastic bags, slides, cover slips, sand, conical tubes, plastic cups.

All you need: colored pencils (2 colors), microscope, 10 onion bulbs, ethanol, glacial acetic acid, hydrochloric acid, razor blades, scissors, scientific cleaning wipes (kimwipes), disposable gloves.

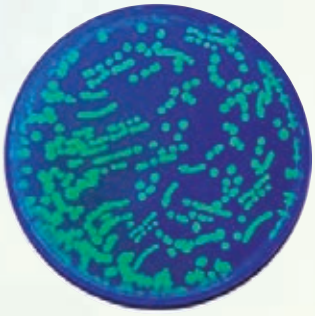
Storage: Room Temperature.

Cat. #AP08/223

Investigation 8: Biotechnology - Bacterial Transformation

Transformation of E.coli with Green Fluorescent Protein

For 10 Groups. In this experiment, transformed cells take up a plasmid containing the GFP gene, which has been 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.



Kit includes: instructions, BactoBeads™ *E.coli* GFP Host, supercoiled pFluoroGreen, ampicillin, IPTG, $CaCl_2$, Bottle ReadyPour™ Luria Broth Agar (sterile), bottle Luria Broth Medium for Recovery (sterile), petri plates (small), petri plates (large), plastic microtipped transfer pipets, wrapped 10 ml pipet (sterile), toothpicks (sterile), inoculating loops (sterile), microcentrifuge tubes.

All you need: automatic micropipet (5-50 µl) and tips, two water baths (37°C and 42°C), thermometer, incubation oven (37°C), pipet pumps or bulbs, ice, marking pens, bunsen burner, hot plate or microwave, hot gloves, long wave UV light.

Storage: Some Components Require Refrigerator and Freezer Storage Upon Receipt.

Set Up & Plating 50 min.
Incubation overnight
Transformation efficiency 15 min.

Investigation 8 Alternative:
Cat. #221 Transformation of *E.coli* with pGAL™

STEM

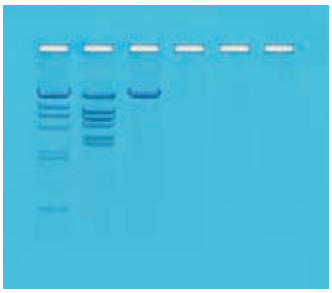
BIG IDEA 3:
Genetics and Information Transfer

Cat. #AP09/112

Investigation 9: Biotechnology Restriction Enzyme Analysis of DNA

45 min. STEM

For 8 Gels/8 Lab Groups. Restriction enzyme digestion and size separation by agarose gel electrophoresis are essential research tools that helped launch the era of biotechnology. In this activity, students will use agarose gel electrophoresis to separate, analyze, and compare bacteriophage lambda DNA before and after digestion with *Hin*dIII and *Eco*RI restriction enzymes. Using lambda DNA cut with *Hin*dIII, students can also construct a standard curve and determine the molecular weights of the two other samples.



ALSO Available: DNA Samples Only in Microtest Tubes For 24 gels Cat. #AP09-C

Kit includes: instructions, Ready-to-Load™ QuickStrip™ DNA samples, UltraSpec-Agarose™ powder, electrophoresis buffer, InstaStain® Blue and FlashBlue™ stain, calibrated pipet, and microtipped transfer pipets.

All you need: electrophoresis apparatus, power supply, automatic micropipet and tips, balance, microwave or hot plate, visualization system.

Storage: Room Temperature Stable. Storage of Ready-to-Load QuickStrip™ samples in the Refrigerator is Recommended.

Investigation 9 Alternatives:
Cat. #212 Cleavage of Lambda DNA with *Eco*RI Restriction Enzyme
Cat. #109 DNA Fingerprinting by Restriction Enzyme Pattern

BIG IDEA 4:
Interactions

Cat. #AP10 FREE DOWNLOAD

Investigation 10: Energy Dynamics

STEM Requires 30-40 min.

For 10 Groups. In this activity, students model how energy flows through a meadow ecosystem with an emphasis on the concepts of trophic levels and entropy. This is an alternative lab activity that does not require growing *Brassica rapa* or rearing the invasive pest, *Pieris rapae*. Following the exercise, students will be able to explain how biological systems use free energy, predict the effects of community changes on energy and nutrient flow, and apply mathematical equations to describe key abiotic and biotic interactions.

Kit includes: instructions, role cards, energy unit templates, and supply and loss station labels..

All you need: printer paper, scissors, containers (5"x5"x5" or larger), sandwich bags, laminator (optional), beans or tokens (optional).

Storage: Room Temperature.

Download instructions at www.edvotek.com/AP10

BIG IDEA 4: Interactions

Cat. #AP11

Investigation 11: Transpiration

STEM

Requires 1-2 hours

For 10 Groups. In this activity, students explore water potential and transport within plants as well as the environmental factors and cellular adaptations that affect this key biological process. Using a photometer, students will observe transpiration in bean seedlings under multiple growing conditions, graph water loss, and relate their results to the opening and closing of stomates. They will then stain, visualize, describe, and classify cell structure from several plant tissue types.

Kit includes: instructions, Bush Bean seeds (*Phaseolus vulgaris*), 2x Toluidine Blue O stain, parawax, plastic tubing, microtomes (nuts and bolts), petri plates, 0.1 mL pipets.

All you need: 10 mL pipets, petroleum jelly, light source with 100 Watt bulb, fans(s), plant mister (a spray bottle), potting soil, large plastic bags, ring stands & clamps (or buret holder), microscope slides, microscope(s), cover slips, slide mounting medium (i.e. 50% glycerol), 50% ethanol, new razor or scalpel blades, weighing scale or balance, small spatula.

Storage: Room Temperature.

Cat. #AP12

Investigation 12: Fruit Fly Behavior

Requires 1.5 - 2 hours

For 10 Groups. This experiment introduces students to the field of ethology and the model organism *Drosophila melanogaster*. After constructing choice chambers, students will investigate fruit fly responses to gravity (geotaxis), chemicals (chemotaxis), and light (phototaxis). The resulting data is analyzed to highlight environmental factors that trigger different orientation behaviors and to identify possible patterns. This lab also encourages additional student-direct investigations.

Kit includes: instructions, Wild-type *Drosophila,* transfer pipets, cotton balls, Edvotek® Instant *Drosophila* Growth Media, *Drosophila* vials, vial plugs.

All you need: plastic water bottles (2 per group and extra caps), any combination of household condiments, fruits, and lab chemicals, laboratory notebook, dissecting microscopes, color pens (for graphing), transparent colored film (for wrapping chamber), clear tape, goggles, funnel, timer, water.

Storage: Room Temperature.

Cat. #AP13

Investigation 13: Enzyme Activity

STEM

Requires 30-45 min.

For 10 Groups. In this easy and safe experiment, students will learn about enzyme catalysis, the nature of enzyme action, and protein structure-function relationships. First, students will develop a method for measuring peroxidase in plant material. Next, they will experiment with the effects of pH and temperature on enzymatic activity and determine optimal reaction conditions for the test enzyme. This experiment uses a safer system that eliminates the need for sulfuric acid and potassium permanganate. Quantification in this lab requires access to a spectrometer.

Kit includes: instructions, hydrogen peroxide solution, guaiacol solution, phosphate buffer pH 3, phosphate buffer pH 7, phosphate buffer pH 10, phosphate buffer pH 14.

All you need: turnip root, distilled or deionized water, pipet pumps or bulbs, Erlenmeyer flask, 500 ml, spectrophotometer, water baths, filter paper and funnel, test tube racks, test tubes (13 x 150 mm), thermometer, cheesecloth, parafilm, hot plate, timer or clock with second hand, lab permanent markers, ice, razor, goggles, and blender.

Storage: Store in Refrigerator Upon Receipt.

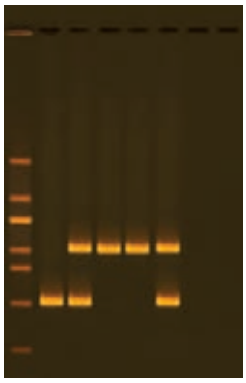
Cat. #333

Alu-Human DNA Typing Using PCR

Investigation #2 Option

For 25 Students. Your students use primers for a 300 base pair Alu insertion in chromosome 16 (PV92) to determine their own genotype! Although the DNA of two individuals is very similar, sequence differences called "polymorphisms" do exist. Students will examine a polymorphism caused by a 300 base pair Alu insertion in chromosome 16 (PV92). *See page 48 for a list of components and requirements.*

Extraction 50 min.
PCR Set-Up 10 min.
PCR 90 min.
Electrophoresis 60 min.
Staining 5 min. to overnight



Cat. #337

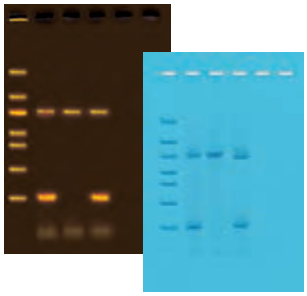
Drosophila Genotyping Using PCR

Investigation #2 Option

Advanced Topic

For 10 Groups. 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 electrophoresis and analyzed. *See page 52 for a list of components and requirements.*

Extraction 45 min.
PCR Set-Up 10 min.
PCR 2 hrs.
Electrophoresis 60 min.
Staining 5 min. to overnight



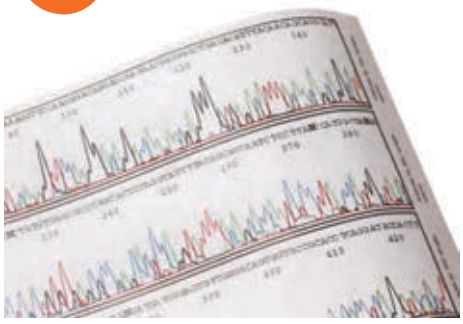
Cat. #339

Sequencing the Human Genome

Investigation #3 Option

45 min.

For 10 Groups. Biotechnology is a field of big data! Success in this field requires strong laboratory skills, an understanding of the underlying biology, and an ability to interpret results using computationally intensive techniques. In this exercise, students use data mining and machine learning algorithms to interpret actual data representing important genes from automated DNA sequence. They will determine the sequence, compare and extrapolate database information, identify a gene product, and discover closely related proteins. Data and results are discussed in the framework of the human genome project. *See page 44 for a list of components and requirements.*



Cat. #340

DNA Bioinformatics

Investigation #3 Option

45 min.

For 12 Groups. 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 autoradiographs containing DNA sequences which represent segments of important cellular genes. Using bioinformatics databases, students compare and extrapolate database information and identify the gene product. *See page 44 for a list of components and requirements.*

Cat. #221

Transformation of *E.coli* with pGAL™ (Blue Colony)

Investigation #8 Option

Complete in 50 min. and grow overnight

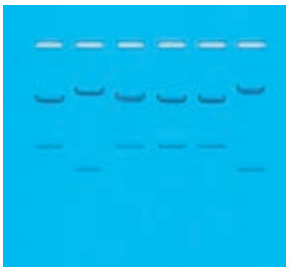
For 10 Groups. In this experiment, your students can see a blue color change in transformed cells due to the switching on of a gene. The pGAL™ plasmid gives them a blue color due to the production of the production of the ß-galactosidase protein by the *lacZ* gene. IPTG is not required in this experiment since pGAL™ contains the complete *lacZ* gene. *See page 56 for a list of components and requirements.*

Cat. #109

DNA Fingerprinting by Restriction Enzyme Patterns

Investigation #9 Option

55 min.



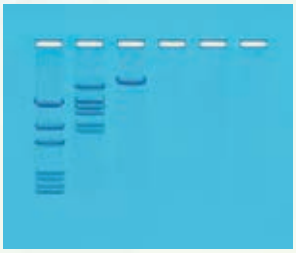
For 8 Groups. DNA fingerprinting examines highly variable regions of DNA in order to create a genetic profile of an individual. Criminal investigators use DNA fingerprinting to help identify individuals, place a person at a crime scene, or eliminate a suspect from consideration. Importantly, DNA fingerprinting has less than a one in a billion chance of matching another individual (except an identical twin) and is very difficult to fake or change. In this experiment, students use gel electrophoresis to compare crime scene DNA to the DNA of two suspects. Particular emphasis is placed on RFLP analysis, the power of restriction enzymes to detect DNA sequence differences, and the importance of combining evidence from multiple DNA locations. *See page 64 for a list of components and requirements.*

Cat. #212

Cleavage of Lambda DNA with *Eco*RI Restriction Enzyme

Investigation #9 Option

Complete in 90 min.



For 10 restriction digestions and 5 gels. Restriction enzymes are endonucleases that catalyze the cleavage of DNA. This process can be observed using agarose gel electrophoresis - a powerful separation method frequently used in molecular biology. In this lab, the DNA from bacteriophage lambda is digested with the restriction enzyme *Eco*RI. Students will digest DNA, run agarose gel electrophoresis, size the fragments using a standard curve, and compare the fragments to undigested lambda DNA. A great way to teach key research tools that helped launch the era of biotechnology! *See page 39 for a list of components and requirements.*

Check Out These FREE Resources!

QUICK GUIDE:
Agarose Gel Electrophoresis
www.edvotek.com/Quick-Guides

RELATED VIDEO:
Performing Agarose Gel Electrophoresis
youtube.com/EdvotekInc

14

NEW

Cat. #1100

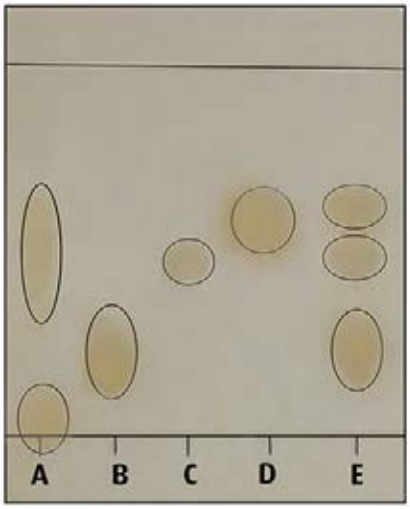
Sense and Sense-ability

For 10 Groups. The objective of this experiment is for students to understand that olfactory receptors respond to smells and transmit them as signals to the brain. Students will also be able to understand the principles of thin layer chromatography and how they apply to the separation of olfactory compounds. ***NGSS-aligned with MS-LS8***

Kit includes: instructions, limonene, anethole, eugenol, s-carvone, unknown sample, anhydrous sodium carbonate, potassium permanganate, TLC paper, transfer pipets, microcentrifuge tubes.

All you need: pencils, 100ml beakers, 400ml beakers, gloves, rulers, saran wrap, 100% ethanol (200 or 190 proof), 15ml conical tubes, & distilled water.

Storage: Room Temperature.



NEW

Cat. #1110

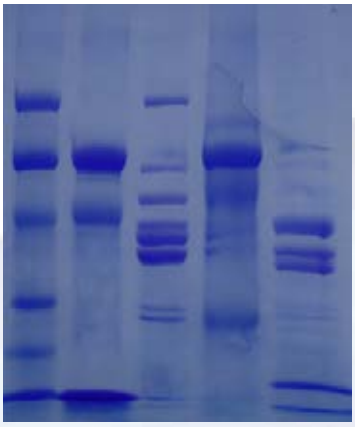
Cell Types in the Brain

For 6 Groups Sharing 3 Polyacrylamide Gels. The brain is an incredibly complex organ and is responsible for regulating almost everything within our body. It allows us to form complex thoughts, read, write, move, breathe, play sports, and listen to music. It does this through a network of cells working together to function. The objective of the experiment is for students to examine the differences between cell types in the brain based on their profiles of proteins.

Kit includes: instructions, limonene, anethole, eugenol, s-carvone, unknown sample, anhydrous sodium carbonate, potassium permanganate, TLC paper, transfer pipets, microcentrifuge tubes.

All you need: pencils, 100ml beakers, 400ml beakers, gloves, rulers, saran wrap, 100% ethanol (200 or 190 proof), 15ml conical tubes, & distilled water.

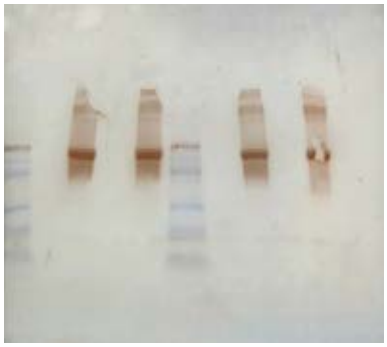
Storage: Room Temperature.



NEW

Cat. #1115

Detecting Risk Factors for Alzheimer's Disease Using Western Blot



For 6 Groups, With 2 Groups Sharing a Gel. The objective of this experiment is for students to understand the theory and application of western blotting. Students will perform a western blot to determine simulated clinical trial participants' risk of developing Alzheimer's Disease.

Kit includes: instructions, pre-stained LyphoProtein™ gel marker, pre-stained LyphoProteins™, immunochemical and blotting reagents, 10x Tris-glycine-SDS buffer (chamber buffer), 10x Tris-glycine powdered buffer (transfer buffer), practice gel loading solution, nylon membrane, filter paper, and large filter paper.

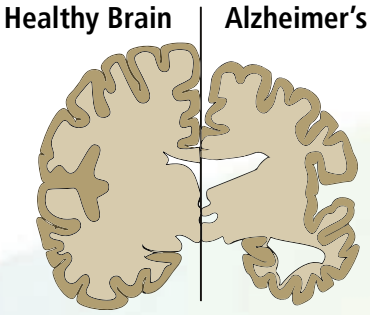
All you need: 12% denaturing polyacrylamide gels (3), vertical gel electrophoresis apparatus, power supply, shaker platform (optional), automatic pipettes with tips, microtest tubes, beakers, transfer pipets, graduated cylinders, plastic wrap, scissors, trays or containers, forceps, several packs of paper towels, latex or vinyl lab gloves, safety goggles, methanol, and distilled water.

Storage: Some components require refrigerator storage upon receipt.

NEW

Cat. #1116

Researching Alzheimer's Disease by ELISA



For 10 Groups. The objective of this experiment is for students to understand the theory and application of western blotting. Students will perform a western blot to determine simulated clinical trial participants' risk of developing Alzheimer's Disease.

Kit includes: instructions, 10X ELISA wash buffer, ELISA dilution buffer, Aß, primary antibody, secondary antibody, ABTS, ABTS reaction buffer, stop solution, small transfer pipets, strip tubes, 15 mL plastic tube, 1.5 mL snap-top tubes.

All you need: paper towels, distilled or deionized water, beakers or flasks, glassware, gloves, safety goggles, automatic micropipettes (recommended).

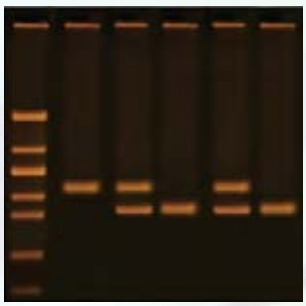
Storage: Some components require refrigerator storage upon receipt.

NEW

Cat. #1125

Diagnosing Huntington's Using PCR

For five complete sets of reactions. In this experiment, students will conduct a DNA fingerprinting exercise on simulated patient samples to determine if family members are heterozygous or homozygous for Huntington's Disease. Students will then analyze the amplified DNA segments by agarose gel electrophoresis.



Kit includes: instructions, PCR EdvoBeads™, LyphoPrimer™ and LyphoTemplate™ DNA, DNA samples, TE buffer, UltraSpec-Agarose™, electrophoresis buffer (50x), SYBR® Safe stain, FlashBlue™ liquid stain, microcentrifuge tubes, 0.2 ml PCR tubes, and wax beads.

All you need: thermal cycler, horizontal gel electrophoresis apparatus, power supply, microcentrifuge, UV transilluminator or UV photodocumentation system, UV safety goggles, white light visualization system (optional if staining with FlashBlue™), automatic micropipettes and tips, microwave or hot plate, 250 ml flasks or beakers, hot gloves, and disposable lab gloves.

Storage: Some components require freezer storage upon receipt.

Electrophoresis Reagents

InstaStain® Ethidium Bromide
7 x 7 cm sheets
Cat. #2001 For 40 gels
Cat. #2002 For 100 gels

InstaStain® Blue
7 x 7 cm sheets
Cat. #2003 For 40 gels
Cat. #2004 For 100 gels

SYBR® Safe Stain
10,000X Concentrate, For 750 mL
Cat. #608

FlashBlue™ DNA Staining System
10X Concentrate, For 1.2 L
Cat. #609

Melt & Pour UltraSpec-Agarose™
Cat. #601 400 mL
Cat. #601-B 5 x 400 mL

UltraSpec-Agarose™
DNA Electrophoresis Grade.
Cat. #605-3g 3 grams
Cat. #605-20g 20 grams
Cat. #605-100g 100 grams
Cat. #605-500g 500 grams

Electrophoresis Buffer 50x TAE
Cat. #607 100 mL
Cat. #607-XL 500 mL

TBE Powdered Electrophoresis Buffer
Cat. #607-1 Yields 5 Liters

Restriction Enzyme Reaction Buffer
2 mL concentrate for 200 reactions.
Cat. #610

DNA Standard Marker
For 20 gels (20 µg) Base pairs: 6751, 3652, 2827, 1568, 1118, 825, 630.
Cat. #750-1

100 bp DNA Ladder
For 20 gels
Cat. #755

Electrophoresis Reagent Package with FlashBlue™
Includes: UltraSpec-Agarose™ (10 g), 100 mL Electrophoresis Buffer (50x), 0.5 mL Gel Loading (10x) Solution with tracking dye, and FlashBlue™ stain (for 1.2 L).
Cat. #604

10X Gel Loading Solution
Cat. #606 Yields 5 mL

Practice Gel Load Solution
Cat. #606-P 5 mL

Digested DNAs

Lambda DNA
20 µg for 20 gels
Cat. #709 Digested w/*Eco*RI
Cat. #710 Digested w/*Eco*RI and *Hind*III
Cat. #711 Digested w/*Hind*II

Plasmid pUC8 DNA
20 µg for 20 gels
Cat. #712 Digested w/*Eco*RI

Polymerase Chain Reaction (PCR)

PCR EdvoBeads™
Cat. #625 25 Beads

PCR EdvoBeads™ PLUS
Cat. #625-PLUS 25 Beads

Proteinase K
Cat. #626

"Universal" DNA Extraction Buffer
For 50 extractions.
Cat. #627

Bacterial Transformation

Luria Broth Media
Cat. #611 100 grams

Bacterial Plating Agar
Plain agar, no nutrients.
Cat. #612 30 grams

X-Gal
Cat. #614 250 mg

ReadyPour™ Luria Broth
Agar Base
Cat. #615 170 mL
Agar Base with Ampicillin
Cat. #616 170 mL

Restriction Enzymes

Dryzymes®
Lyophilized, contains 1500 units.
Cat. #715 *Eco*RI
Cat. #716 *Hind*III
Cat. #717 *Bam*HI

Restriction Enzyme Reaction Buffer
2 mL, for 200 extractions.
Cat. #610

BactoBeads™

***E.coli* JM109 BactoBeads™**
Cat. #726 5 beads

***E.coli* GFP Host BactoBeads™**
Cat. #728 5 beads

***E.coli* OP50 BactoBeads™**
(for *C.elegans*)
Cat. #729 5 beads

***Serratia marcescens* BactoBeads™**
Cat. #741 5 beads

***Bacillus subtilis* BactoBeads™**
Cat. #743 5 beads

Protein Electrophoresis

Precast Polyacrylamide Gels
12% Tris-Glycine-SDS Precast Polyacrylamide Gel, 9 x 10 cm, 10 Wells, Well Volume is 30 µL.
Cat. #650 1 gel
Cat. #651 3 gels
Cat. #652 6 gels

Tris-glycine-SDS Powdered Buffer
Enough to make 5 L of 1X buffer.
Cat. #655

Tris-glycine Powdered Buffer
Enough to make 5 L of 1X buffer.
Cat. #656

Protein Standard Marker (Prestained Lyophilized)
For 6 gels.
Cat. #752

Protein InstaStain®
For staining gels ranging from 8x8 cm to 13x13 cm.
Cat. #2016 For 15 gels
Cat. #2017 For 30 gels

Quick Plant™ Seeds

Brassica Quick Plant™ Seeds
Cat. #1226 200 seeds

Wild Type Quick Plant™ Seeds
Arabidopis Thaliana
Cat. #1251 150 seeds
Cat. #1252 300 seeds

Dwarf Type Quick Plant™ Seeds
Arabidopis Thaliana
(Smaller, more compact)
Cat. #1256 300 seeds

Lab Supplies

Microtest Tube Rack
Single rack
Cat. #639

Microtest Tubes
500 snap-top tubes (1.5 mL)
Cat. #630

Thin-walled PCR Microtest Tubes
100/pkg (0.2 mL)
Cat. #642.2

Microtiter Plates
Six transparent 96-well plates.
Cat. #666

Small Petri Plates
60 x 15 mm, 1 shelf pack of 20
Cat. #633

Large Petri Plates
100 x 15 mm, 1 shelf pack of 20
Cat. #643

Waterbath Floats
Set of 2, 11 x 8 cm
Cat. #689

Nonmercury Thermometer
Graduated in 1° C divisions.
Range of -20° C to 110° C.
Cat. #765

Safety Supplies

Disposable Nitrile Gloves
Latex free for sensitive allergy.
100/pkg
Cat. #774-1 Small
Cat. #774-2 Medium
Cat. #774-3 Large
Cat. #774-4 X-Large

UV Safety Goggles
Laboratory safety goggles with UV light protection.
Cat. #631

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web	www.edvotek.com
email	orders@edvotek.com
phone	1.800.EDVOTEK (1.800.338.6835)
fax	202.370.1501
mail	1121 5th Street NW, Washington, DC 20001

Shipping

USA All orders are shipped from Washington, DC via EDVOTEK preferred carriers. A shipping, handling and insurance charge is applied to all shipments. Normal delivery time within the US and Puerto Rico is 2-7 business days by ground delivery. Additional fees or surcharges may apply for expedited shipping methods, or for shipments requiring wet or dry ice. International orders are shipped by preferred air services, unless instructed otherwise.

International All orders are shipped from Washington, DC via EDVOTEK preferred carriers. An international shipping, handling and insurance charge is applied to all orders.

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