EDVOTEK Quick Guide:

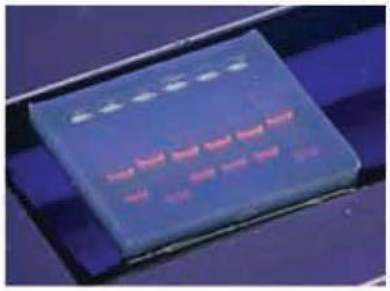
Visualizing DNA

Agarose gel electrophoresis is used to separate DNA fragments in complex mixtures according to their size. However, because DNA is clear and colorless, these bands cannot be seen with the naked eye. Edvotek® offers several different methods for visualizing the DNA separated by electrophoresis.

Fluorescent DNA Stains:

Research laboratories commonly use fluorescent DNA stains because they are extremely sensitive, making it easy to quantify small amounts of DNA. In order to visualize the DNA fragments, an ultraviolet (UV) light source (such as a transilluminator) is used to excite the fluorescent molecules. We offer two fluorescent DNA stains: InstaStain® Ethidium Bromide and SYBR® Safe DNA Stain.

InstaStain® Ethidium Bromide



SYBR@ Safe DNA Stain

Visible Dye-based DNA Stains:

Although they are less sensitive than fluorescent stains, dye-based DNA stains are an excellent alternative for the teaching classroom, as they are non-toxic and require no special equipment for visualization. The molecules of the DNA stain possess a positive charge, which allows them to bind to the negatively charged backbone of DNA. The DNA fragments are easily visualized because the bound dye molecules stain them with an intense blue color. We offer two visible dye-based DNA Stains: InstaStain® Blue and Flash Blue Stain.

InstaStain® Blue and FlashBlue™

Which DNA Stain Should I Use?

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

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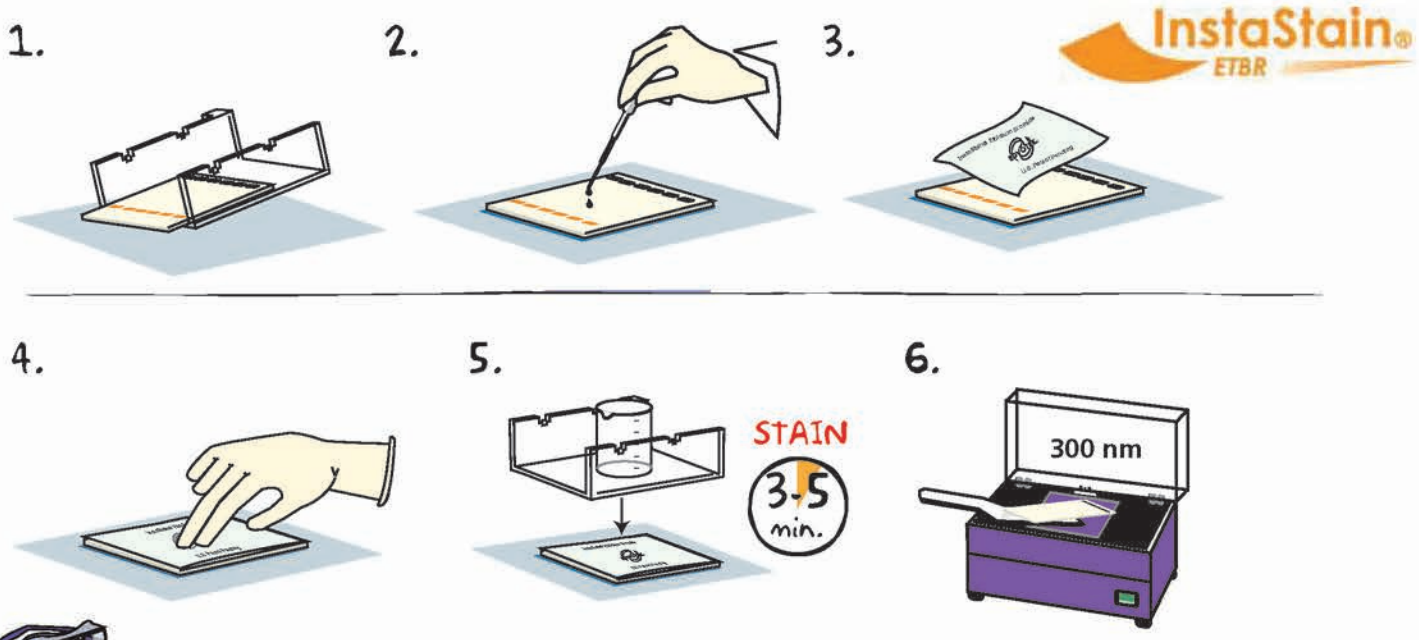
InstaStain® Ethidium Bromide

The most commonly used fluorescent DNA stain is Ethidium Bromide (EtBr). Individual EtBr molecules can squeeze between neighboring base pairs in a DNA double helix in a process known as "intercalation". When excited with UV light, any EtBr intercalated into the DNA fluoresces and produces a bright orange light. However, because EtBr is a potential mutagen, it must be handled with care. InstaStain® Ethidium Bromide provides the sensitivity of EtBr while minimizing potential contact with hazardous materials by delivering a small amount of stain to the agarose gel via a special paper backing.



WEAR GLOVES AND GOGGLES WHEN USING THIS PRODUCT.

1. Carefully REMOVE the agarose gel and casting tray from the electrophoresis chamber. SLIDE the gel off of the casting tray on to a piece of plastic wrap on a flat surface.

   DO NOT STAIN GELS IN THE ELECTROPHORESIS APPARATUS.

2. MOISTEN the gel with a few drops of electrophoresis buffer.

3. Wearing gloves, REMOVE and DISCARD the clear plastic protective sheet from the unprinted side of the InstaStain® card(s). PLACE the unprinted side of the InstaStain® Ethidium Bromide card(s) on the gel. Each InstaStain® Ethidium Bromide card will stain 49 cm^2 of gel (7 x 7 cm).

4. With a gloved hand, REMOVE air bubbles between the card and the gel by firmly running your fingers over the entire surface. Otherwise, those regions will not stain.

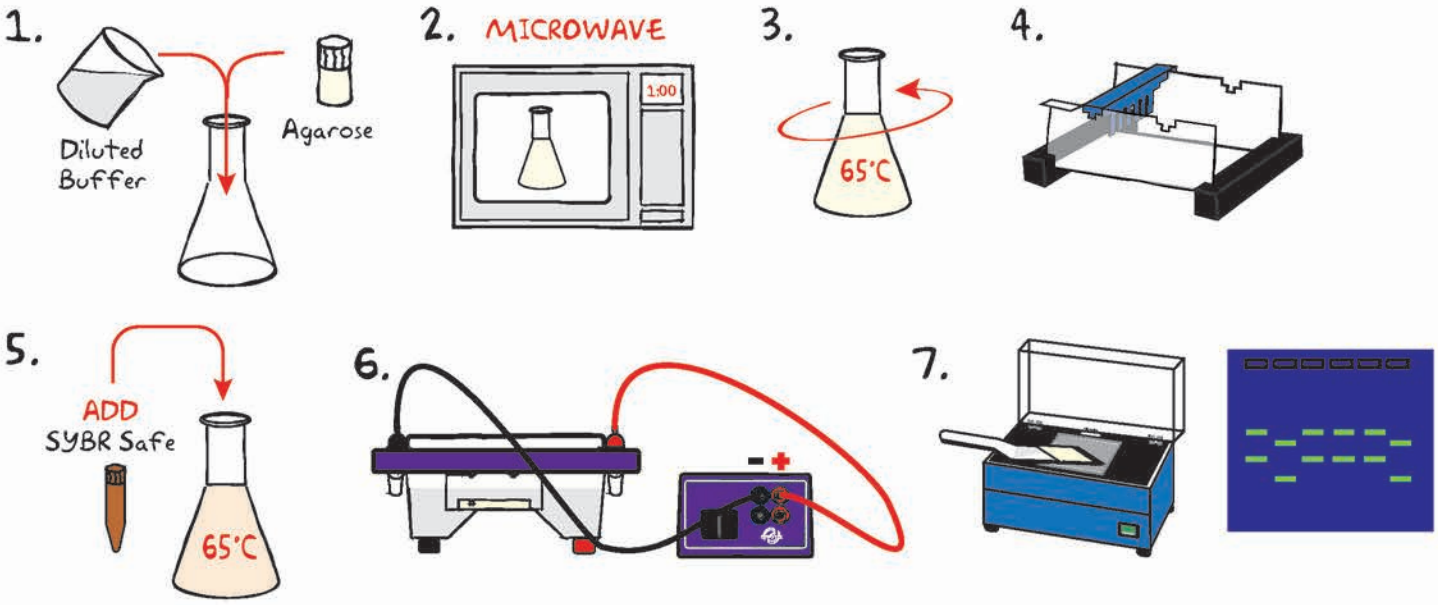
5. PLACE the casting tray on top of the gel/card stack. PLACE a small weight (i.e. an empty glass beaker) on top of the casting tray. This ensures that the InstaStain® Ethidium Bromide card is in direct contact with the gel surface. STAIN the gel for 3-5 minutes for an 0.8% gel or 8-10 minutes for a gel 1.0% or greater.

6. REMOVE the InstaStain® Ethidium Bromide card(s). VISUALIZE the gel using a long wavelength ultraviolet transilluminator (300 nm). DNA should appear as bright orange bands on a dark background.

BE SURE TO WEAR UV-PROTECTIVE EYEWEAR!

IN-GEL SYBR® SAFE DNA STAINING PROTOCOL *(Preferred Method)*

SYBR Safe® is a DNA stain that fluoresces with a bright green color when excited with UV light. Similarly to EtBr, SYBR Safe® binds specifically to the DNA double helix. Unlike EtBr, SYBR Safe® has been engineered to be less mutagenic then EtBr, making it much safer to use, particularly in the classroom.



WEAR GLOVES AND UV GOGGLES WHEN USING THIS PRODUCT.

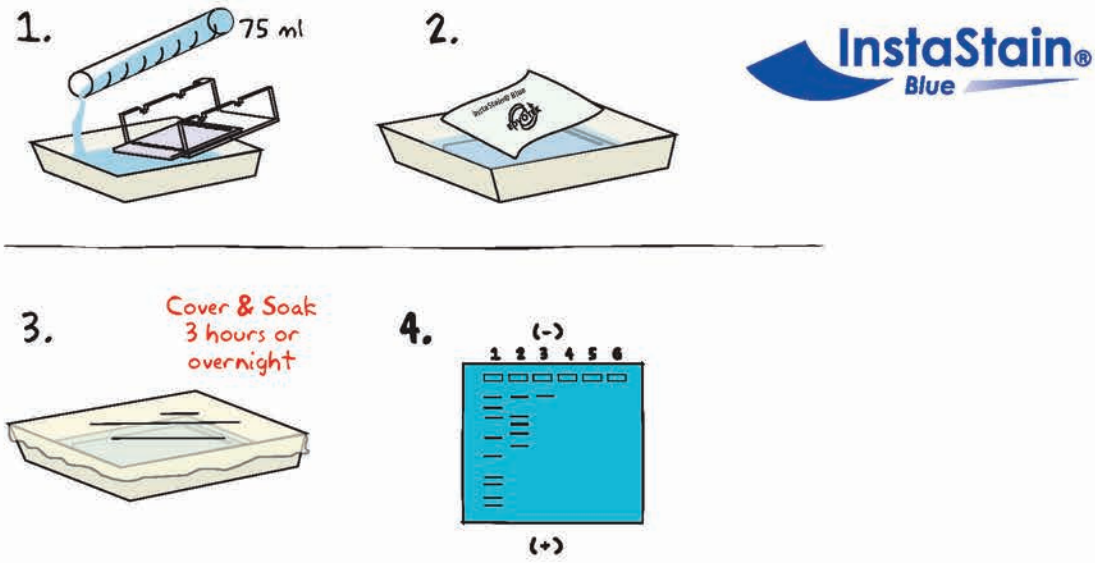
1. **MIX** diluted electrophoresis buffer and agarose powder as specified in your experimental protocol. **DISSOLVE** agarose powder by boiling the solution.
2. **MICROWAVE** the solution on high for one minute. Carefully **REMOVE** the flask from the microwave and **MIX** by swirling the flask. Continue to **HEAT** the solution in thirty-second bursts until the agarose is completely melted (the solution should be clear like water).
3. **COOL** the molten agarose to 65° C with careful swirling to promote even dissipation of heat.
4. **PREPARE** gel-casting tray while the gel is cooling.
5. Before casting the gel, **ADD** SYBR® Safe concentrate to the molten agarose and swirl to mix well. The agarose solution may appear pale orange in color.
6. **PERFORM** electrophoresis as specified in your experimental protocol. To avoid dye-front migration issues on long gels (>10 cm), we recommend adding SYBR® Safe to the Electrophoresis Buffer at a 1:10,000 dilution. Gels under 7 cm in length should not be affected.
7. After electrophoresis is complete, **REMOVE** gel and casting tray from the electrophoresis chamber. Carefully **SLIDE** gel off of the casting tray onto the viewing surface of the transilluminator and turn the unit on. DNA should appear as bright green bands on a dark background.

BE SURE TO WEAR UV-PROTECTIVE EYEWEAR!

FOR POST-ELECTROPHORESIS SYBR® SAFE DNA STAINING PROTOCOL, DOWNLOAD OUR SYBR® SAFE QUICK GUIDE:
www.edvotek.com/site/pdf/608.pdf

InstaStain® Blue

The easiest and most convenient DNA stain available is InstaStain® Blue. InstaStain® Blue does not require the formulation, storage and disposal of large volumes of liquid stain. Each InstaStain® Blue card contains a small amount of blue DNA stain. When the card is placed in water, the DNA stain is released. This solution simultaneously stains and destains the gel, providing uniform gel staining with minimal liquid waste and mess.



WEAR GLOVES AND GOGGLES WHEN USING THIS PRODUCT.

DO NOT STAIN GELS IN THE ELECTROPHORESIS APPARATUS.

1. Carefully **SLIDE** the agarose gel from its casting tray into a small, clean tray containing at least 75 ml of distilled/deionized water or used electrophoresis buffer. The gel should be completely submerged.

   Note: Appropriate staining trays include large weigh boats and small, plastic food containers.

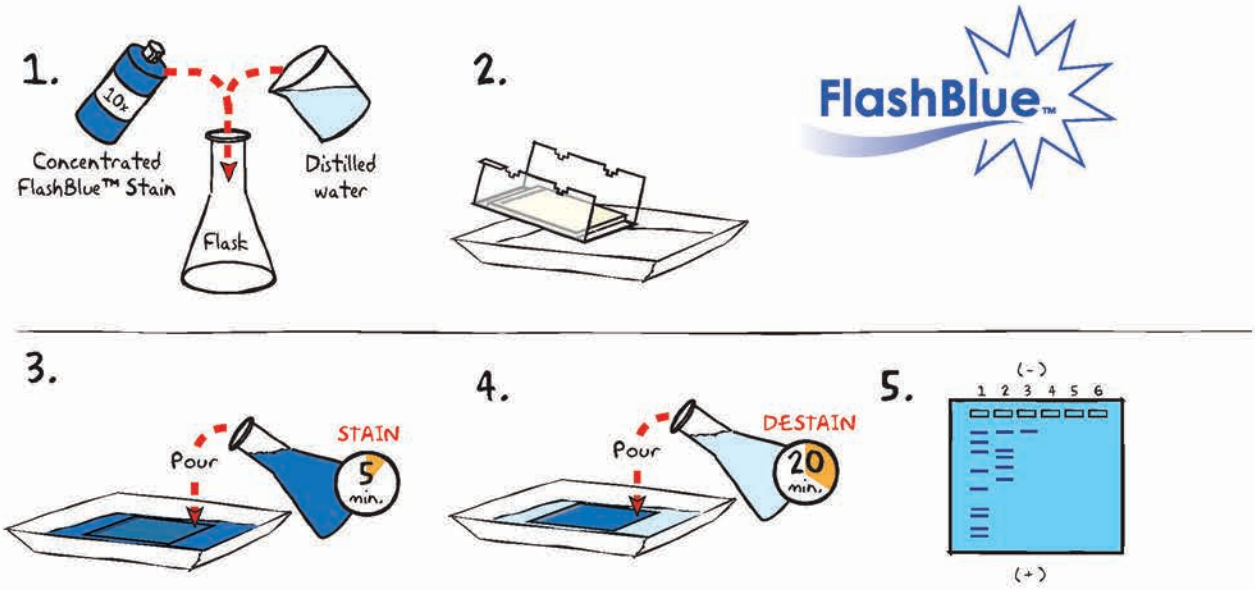
2. Gently **FLOAT** the InstaStain® Blue card(s) on top of the liquid with the stain (blue side) facing the gel. Each InstaStain® Blue card will stain 49 cm^2 of gel (7 x 7 cm). **REMOVE** the InstaStain® card(s) after 30 seconds.

3. **COVER** the tray with plastic wrap to prevent evaporation. **SOAK** the gel in the staining liquid for at least 3 hours. The gel can remain in the liquid overnight if necessary.

4. Carefully **REMOVE** the gel from the staining tray and **DOCUMENT** results.

FlashBlue™ Stain

FlashBlue™ is a proprietary DNA stain that offers simple and rapid staining of agarose gels. FlashBlue™ is provided as a concentrated liquid stain that, when diluted, can be used for both rapid and overnight staining of DNA fragments.



WEAR GLOVES AND GOGGLES WHEN USING THIS PRODUCT.

1. **DILUTE** 10 ml of 10x concentrated FlashBlue™ with 90 mL of water in a flask and **MIX** well.

2. **REMOVE** the agarose gel and casting tray from the electrophoresis chamber. **SLIDE** the gel off of the casting tray into a small, clean gel-staining tray.

3. **COVER** the gel with the 1x FlashBlue™ stain solution. **STAIN** the gel for 5 minutes. For best results, use an orbital shaker to gently agitate the gel while staining. **STAINING THE GEL FOR LONGER THAN 5 MINUTES WILL REQUIRE EXTRA DESTAINING TIME.**

4. **TRANSFER** the gel to a second small tray. **COVER** the gel with water. **DESTAIN** for at least 20 minutes with gentle shaking (longer periods will yield better results). Frequent changes of the water will accelerate destaining.

5. **REMOVE** the gel from the destaining liquid. **VISUALIZE** results using a white light visualization system. DNA will appear as dark blue bands on a light blue background.

Alternate Protocol:

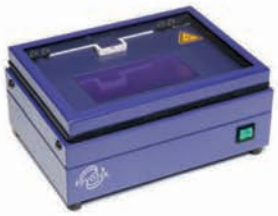
1. **DILUTE** one mL of concentrated FlashBlue™ stain with 149 mL dH_2O.
2. **COVER** the gel with diluted FlashBlue™ stain.
3. **SOAK** the gel in the staining liquid for at least three hours. For best results, stain gels overnight.

Equipment

Cat. #558

Midrange UV Transilluminator

7 x 14 cm UV filter



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.

Cat. #555

UV Digital Photodocumentation System

The UV Digital Photodocumentation System comes with both our Midrange UV transilluminator and our EdvoFoto™ Digital GelCam! (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. #557

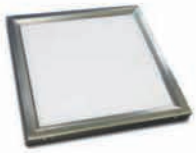
TruBlu™ Blue Light Transilluminator

14.5 x 18 cm viewing area

The all-new TruBlu™ Blue Light Transilluminator is ideal for viewing DNA gels stained with SYBR® Safe, thus eliminating the need for UV light or ethidium bromide. It's optimized to fit Edvotek® Gels as well as any other agarose gel. 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. #552

White Light Box



The White Light Box features a spacious 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.

InstaStain® Ethidium Bromide

Rapid, sensitive and contains only a few micrograms of ethidium bromide. In 2 minutes, an agarose gel is ready for visualization. Disposal is minimal compared to the volume of liquid waste generated from the standard ethidium bromide staining procedure.

For 40 gels, 7 x 7 cm
Cat. # 2001

For 100 gels, 7 x 7 cm
Cat. # 2002

SYBR® Safe Stain

- SAFE for the Biotechnology Classroom!
- More sensitive than ethidium bromide
- Non-mutagenic

Save time, money, the environment...and get better gel results!

Concentrate-
for 750 ml
Cat. # 608

FlashBlue™ DNA Staining System

FlashBlue™ is a proprietary visible light DNA stain that has been optimized to shorten the time required for both staining and destaining steps.

10X Concetrate, For 3 L
Cat. # 609

InstaStain® Blue

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

For 40 gels, 7 x 7 cm
Cat. # 2003

For 100 gels, 7 x 7 cm
Cat. # 2004