Labnet Enduro™ Gel XL

Instruction Manual

Catalog Numbers:

E0160

E0160-230V

E0160-230V-UK

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1.0 Introduction

Labnet Enduro™ Gel XL is a gel electrophoresis solution with a compact design that redefines simplicity and efficiency. With its direct-connect power supply, quick gel casting, and user-friendly operation, the system ensures seamless performance for high throughput applications.

2.0 Symbols and Conventions

The electrical warning symbol indicates the presence of a potential hazard which could result in electrical shock.

CAUTION: This symbol refers you to important operating and maintenance (servicing) instructions within this Instruction Manual. Failure to heed this information may present a risk of damage or injury to persons or equipment.

Identifies a Protective Earth (PE) terminal, which is provided for connection of the supply system's protective earth (green or green/yellow) conductor.

This symbol indicates double insulation – no serviceable parts.

3.0 Safety Information

- Do not expose the unit or its accessories to temperatures above 60°C.
- Do not expose the unit to organic solvents.
- Do not clean the unit with abrasive cleaners or cleaning aids.

In most cases, rinsing with deionized water will sufficiently clean the unit. For heavier dirt, use a mild cleansing solution such as dish soap (alkaline cleansers are not recommended). Hand wash and dry with a soft cloth. To remove residual ethidium bromide, occasionally soak the unit in 1% commercial bleach solution for 16 hours. Rinse well.

NOTE: The degradation of acrylic due to solvents may result in substantial discoloration, cracking, warpage, or etching of the electrophoresis unit.

- Do not apply any of the following solvents: benzene, xylene, toluene, chloroform, carbon tetrachloride, alcohols, phenols, ketones, or esters.
- Do not expose the ABS combs supplied with this unit to formaldehyde for extended periods. When casting gels containing formaldehyde, remove the combs promptly upon hardening of the gel and rinse completely with deionized water.

CAUTION:

- Injury, damage to equipment, or property, may result if used in a manner not specified by the manufacturer.
- A pinch hazard exists between the plastic enclosure and the shaking head.
- Not for use with flammable liquids.

3.1. Elimination of RNase Contamination

Should treatment of the unit to eliminate RNase contamination be desired, clean the unit with a mild detergent as described above followed by soaking for 10 minutes in a solution of 3% hydrogen peroxide, and then for 1 hour in 0.1% DEPC (diethyl pyrocarbonate). Pour out final rinse, and air dry.

CAUTION: DEPC is a suspected carcinogen; handle with care.

Alternatively, soak the unit and accessories in freshly made 2.2 mM acetic anhydride treated water (200 µL/liter) for at least five minutes. Solutions for RNA work (electrophoresis buffers, etc.) may be made from the same acetic anhydride treated water as well.

4.0 Package Contents

- Labnet Enduro Gel XL
- UV Transmittant casting tray (1), 12.5 x 12 cm (Cat. No. E0161)
- UV Transmittant casting trays (2), 12.5 x 6 cm (Cat. No. E0162)
- Casting stand with divider (Cat. No. E0167)
- Reversible tooth combs (4), 1 mm thick 14/28 (Cat. No. E0164)
- Power cord
- Instruction manual

5.0 Accessories (sold separately)

Cat. No.	Description	Qty/Pk
E0161	UV Transmittant casting tray, 12.5 x 12 cm	1
E0162	UV Transmittant casting tray, 12.5 x 6 cm	2
E0163	UV Transmittant casting tray, 6 x 6 cm	4
E0164	Reversible tooth combs, 1 mm thick 14/28	2
E0165	Reversible tooth combs, 1 mm thick 5/8	2
E0166	Micro casting set: ◗ UV Transmittant casting tray, 6 x 6 cm, pack of 4 ◗ Reversible tooth combs, 1 mm thick 5/8, pack of 2 ◗ Casting stand with divider	1
E0167	Casting stand with divider	1
E0168	Standard casting set: ◗ UV Transmittant casting tray, 12.5 x 12 cm ◗ UV Transmittant casting tray, 12.5 x 6 cm, pack of 2 ◗ Reversible tooth combs, 1 mm thick 14/28, pack of 4 ◗ Casting stand with divider	1
R1000-100BP	Molecular weight marker, 100 bp	1
R1000-1KB	Molecular weight marker, 1 Kb	1

6.0 Specifications

Unit Dimensions (W x D x H)	9.7 x 3.0 x 2.5 in. (24.5 x 17.0 x 6.2 cm)
Gel Dimensions (W x D)	5.0 x 4.7 in. (12.5 x 12.0 cm)
Maximum Sample Capacity	112 samples (4 combs, 26 samples each)
Buffer Capacity	300 mL
Distance Between Electrodes	5.3 in (13.5 cm)
Electrophoresis Tank	
Overall Dimensions (W x D x H)	7.2 x 6.5 x 2.2 in. (18.3 x 16.4 x 5.6 cm)
Material Characteristic	UV transmitting (50% at 254 nm, 80% at 312 nm)
Solution Volume	300 mL (includes buffer and gels)
Safety Lid	
Overall Dimensions (W x D x H)	7.8 x 6.7 x 1.5 in. (19.7 x 16.9 x 3.8 cm)
Material Characteristic	UV non-transmitting polycarbonate
Power Supply	
Overall Dimension (W x D x H)	3.0 x 6.7 x 2.5 in. (7.5 × 17.0 × 6.2 cm)
Weight	0.9 lb. (410 g)
Input Voltage	AC100 - 240V, 50/60Hz
Output Voltage	10 to 150V, constant peak voltage of 150V
Output Amperage	10 to 400 mA
Maximum Wattage	45 W
Timer	99 hours 59 min. and continuous model
Safety Switch	Micro-sensor (hall) in the power supply. No output without safety lid.
Memory Function	Automatic memory (the last used V and T)
Temperature Range	5°C to 40°C (up to 80% RH at 31°C, decreasing linearly to 50% RH at 40°C)
Protection Class	IP21

The Labnet Enduro™ Gel XL is designed to be safe at least when operated under the following conditions:

- Indoor use
- Pollution Degree 2
- Altitude up to 2,000 meters
- Installation Category II

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. The equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the user manual, may cause harmful interference to radio communications. Operation of equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference.

CAUTION: This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

This ISM device complies with Canadian ICES-001.

Cet appareil ISM est conforme à la norme NMB-001 du Canada.

7.0 Operating Instructions

7.1. Preparation of the Agarose Gel and Electrophoresis Buffer – DNA

1. Select the percentage gel necessary to effectively resolve your sample.

Concentration of Agarose in Gel (% w/V)	Efficient Range of Separation of Linear DNA (Kb)
0.3%	5-60
0.6%	1-20
0.7%	0.8-10
0.9%	0.5-7
1.2%	0.4-6
1.5%	0.2-3
2.0%	0.1-2

Sambrook J, Fritsch EF, and Maniatis T (1989).
Molecular Cloning, A Laboratory Manual, 1, 6.8 613.

2. Weigh an appropriate quantity of agarose (0.3% means 0.3 g of agarose per 100 mL of gel volume) and place it into a 250 mL flask.
   NOTE: 4 mm gel will use 100 mL of agarose solution.
3. Make 500 mL of either 1X TAE or 1X TBE electrophoresis buffer (see below).

   Electrophoresis Buffers
   The two most commonly used buffers for horizontal electrophoresis of double stranded DNA in agarose gels are Tris-Acetate-EDTA (TAE) and Tris-Borate-EDTA (TBE). While the resolving powers of these buffers are very similar, the relative buffer capacities are very different, conferring different run attributes which are summarized below:

   - TAE: Tris-acetate has traditionally been the more commonly used buffer. However, its relatively low buffer capacity will become exhausted during extended electrophoresis, making buffer recirculation necessary in runs exceeding 140 mA-hours. Potential advantages of using TAE buffer over TBE buffer include superior resolution of supercoiled DNA and approximately 10% faster migration of double-stranded linear DNA fragments[1].
   - TBE: Tris-borate's significantly greater buffering capacity and its relatively low current draw eliminates the need for recirculation in all but the most extended runs (>300 mA-hours). TBE buffer systems are not recommended when fragments are to be recovered from the gel after electrophoresis.

4. Add ethidium bromide to the diluted electrophoresis buffer to a final concentration of 0.5 µg/mL.

   NOTE: The addition of ethidium bromide to both the gel and the running buffer will result in maximum detection levels by providing high levels of sample fluorescence with an evenly low level of background.

5. Add 6.6 mL of the 1X electrophoresis buffer containing ethidium made in Step 4 per millimeter of gel thickness desired, up to a maximum to 100 mL, to the flask containing the agarose. A 100 mL gel solution will make a 7.6 mm thick gel. Thinner gels may be made; however, care must be taken that the wells are deep enough to accommodate the desired sample volume.

Comb Description	Well Width (mm)	Sample Volume 1 mm (µL)
1 mm, 14-tooth	5	5
1 mm, 28-tooth	2.5	2.5
1 mm, 5-tooth	8	8
1 mm, 8-tooth	4	4

6. Make note of the total solution volume so that degree of evaporation can be determined and corrected for.
7. Heat the agarose slurry in a microwave oven for 90 seconds. Swirl the flask to make sure any grains sticking to the walls enter into the solution. Undissolved agarose appears as small "lenses" floating in the solution. Heat for an additional 30 to 60 seconds. Re-examine the solution, and repeat the heating process until the agarose completely dissolves.
8. Add deionized water to replace any volume lost through evaporation during the heating process.
9. Proceed to Section 7.3 Casting the Gel.

7.2. Preparation of the Agarose Gel and Electrophoresis Buffer – RNA

RNA molecules are separated by electrophoresis through denaturing gels prior to analysis by northern hybridization. Agarose gels containing formaldehyde[1-3] are commonly used for RNA electrophoresis. Presented below is a general protocol for electrophoresis of RNA using formaldehyde gels.

CAUTION: All equipment and solutions used in the following protocol should be treated with DEPC (diethyl pyrocarbonate) or acetic anhydride prior to use to inhibit RNase activity (see Section 3.1). It is recommended that dedicated solutions be made solely for RNA work to minimize the risk of sample degradation due to RNase activity.

NOTE: Staining RNA samples with ethidium bromide has been reported to reduce sample blotting efficiency. Therefore, if samples are to be analyzed by northern hybridization after electrophoresis, run duplicate lanes for staining, or minimize the exposure of RNA samples to ethidium bromide by following the post-electrophoresis staining protocol (see Appendix).

The following protocol will make 50 mL of a 1.5% agarose gel containing 1X MOPS [3-(N-morpholino)-propanesulfonic acid]-Acetate-EDTA (MAE) buffer and 2.2 M formaldehyde, resulting in a 7.5 mm thick gel.

1. Weigh out 0.5 g of agarose, and place into a 125 mL flask.
2. Add 43.5 mL of DEPC (or acetic anhydride) treated water.
3. Make note of the total solution volume so that degree of evaporation can be determined and corrected for.
4. Heat the agarose slurry in a microwave oven for 60 seconds. Swirl the flask to make sure any grains sticking to the walls enter into the solution. Undissolved agarose appears as small "lenses" floating in the solution. Heat for an additional 30-60 seconds. Re-examine the solution, and repeat the heating process until the agarose completely dissolves.
5. Add deionized water to replace any volume lost through evaporation during the heating process.
6. Allow the solution to cool to 60°C. Place the flask in a hood, and add 5 mL of 10X MAE buffer (see Appendix for recipe) and 1.5 mL of 37% formaldehyde.

CAUTION: Formaldehyde vapors are toxic. Gel preparation should take place in a hood and solutions and gels containing formaldehyde should be kept covered when possible.

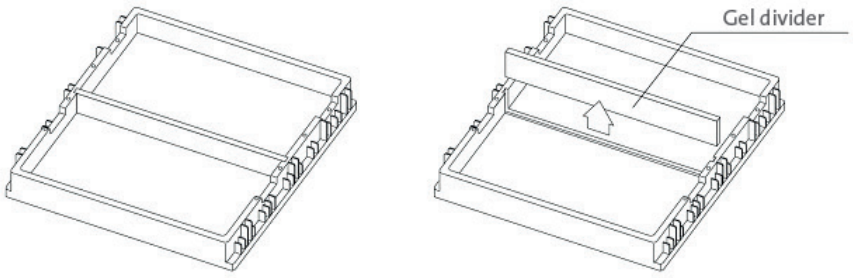
7. Proceed to Section 7.3 Casting the Gel.

7.3. Casting the Gel

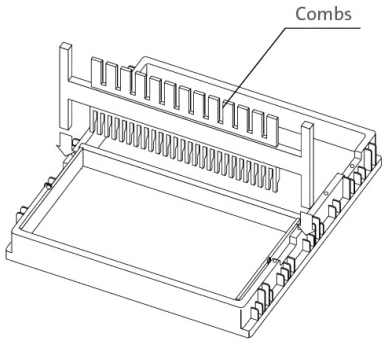
1. Place the gel casting stand on a lab bench.

CAUTION: Cast agarose gels containing formaldehyde in a hood.

2. Insert the gel casting tray into the casting stand. If you are using the 12 x 6 cm gels place the spacer in the center of the casting stand, then insert the two 12 x 6 cm landscape gel trays.



3. When the gel solution has cooled to approximately 55°C to 60°C , slowly pour it into the gel tray. If hotter gel solutions are routinely poured the tray may warp over time.



4. If bubbles form on the surface of the gel upon pouring, use the comb to either pop them or lightly brush them to the sides of the gel. If large bubbles are allowed to harden within the gel, they may cause artifacts to occur during electrophoresis.
5. Insert one or more combs by placing them into the slots in the casting stand. For best results, place the comb in the slot nearest the end of the casting fixture. If two combs are desired, place the second in the center comb slot.
6. Allow the gel to harden undisturbed for at least 30 minutes.

7.4. Removing the Comb

When the gel is solidified and fully opaque, carefully remove the comb with a gentle wiggling, upward motion. If the comb is difficult to remove or if a low percentage gel is being used, overlay the comb area with a small volume of 1X electrophoresis buffer to preserve the integrity of the wells. Check the wells to ensure their bases are intact.

CAUTION: Prolonged exposure of the combs supplied to gels containing formaldehyde will cause them to degrade. Be sure to remove the comb(s) from formaldehyde gels as soon as gel hardening is complete, and rinse them well prior to storage.

If a gel is not to be used immediately after preparation, remove it from the casting stand, and place it in a plastic bag or container, and submerge in 1X electrophoresis buffer containing 1 mM NaN_3. Store at +4°C.

7.5. Loading the Samples onto the Gel

1. Remove the casting tray containing the hardened agarose gel from the casting stand, by lifting the ends. Place the tray and gel into the main unit assembly such that the sample wells are on the same end as the negative (black) electrode.
2. Fill the unit with the remaining 1X electrophoresis buffer containing ethidium bromide made previously (or 1X MAE buffer for RNA gels), covering the gel to a depth of 1 to 5 mm. Approximately 300 mL of buffer will be required.

   NOTE: Use of the same batch of electrophoresis buffer for both the gel and the running buffer is very important. Slight variations in buffer composition between gel and running buffer may result in ionic or pH gradients that can significantly impact the mobility of the samples.
3. Pre-run RNA gels at 100V for five minutes prior to loading the samples.
4. Load the samples into the wells with a micropipette or similar device taking care not to puncture the bottom of the wells or load the sample onto the top of the gel.

7.6. Electrical Connections to the Safety Lid

The Labnet Enduro™ Gel XL can only be operated with the safety lid in place. Electrical current is supplied through the tank electrodes to the power supply by placing the lid on the tank the circuit is completed. A simple gravity connector in the cover ensures a complete current path, yet allows the lid to be removed from the unit without disturbing the loaded samples.

1. Make sure the power supply is turned off.
2. Plug the male ends of the black (-) and red (+) electrodes into the jacks on the side of the power supply.
3. After the samples have been loaded into the gel, place the lid over the unit so that the lid covers align with the tank.
4. Set the lid straight down so that the lid rests squarely on the tank, connection is inside the end of the lid which engages the power supply.
5. Plug the power supply into a wall outlet. Ensure an approved power cord that satisfies your regional voltage standard is used. Input voltage is automatically detected by the system. A transformer is not necessary in Europe and any other region where the standard voltage is higher than 100V.
6. Set the timer. Increase or decrease the value with the Up and Down buttons. Timer can be set between 1 min. to 99 hours. Set "--:--" for continuous operation.
7. Select the required output voltage up to 150V or 400 mA.
8. Press the Run/Pause button to start the run.

To pause a run and change parameters:

1. To pause the run, press the Run/Pause button once. During the pause mode the voltage amperage or time can be changed by highlighting the function and using the arrow keys then pressing the mode key. Once the changes have been made the start button can be pressed to resume the run.
2. To stop the run, press the Run/Pause button for 3 seconds. Stop will appear on the display.

NOTE: Do not jar or bump the gel box once the lid is in place. The safety switch is operated by a hall-effect sensor which relies on a lid mounted magnet. Moving the gel box can move the lid and cause the unit to pause until the lid is put back into position.

7.7. Sample Electrophoresis

The maximum suggested applied voltage for the electrophoresis of DNA in agarose gels using the Enduro Gel XL is 150V. In a 1% TBE gel, this translates into a run time of approximately 1 hour. Lower voltages may be used, of course, and as a general rule, a 70V run will take twice as long as a 140V run. Higher voltages may be used to decrease run time; however, if the unit is being operated at higher voltages than 140V, the heat generated during electrophoresis may decrease sample resolution. Such artifacts may be avoided by running the unit in a cold room or adding 1X electrophoresis buffer "ice cubes" to keep the unit properly cooled.

CAUTION:

- Do not exceed the maximum operating voltage of 150 volts. The suggested run parameters for the electrophoresis of RNA in agarose gels containing formaldehyde is 60 to 80 volts.
- Formaldehyde vapors are toxic. Electrophoresis of RNA in gels containing formaldehyde should take place within a fume hood.

Follow the sample migration into the gel using the loading dye as an indicator. (See Appendix for the sample loading buffer recipe). Allow the samples to migrate until the fragments have separated, normally until the bromophenol blue dye front has migrated 3/4 of the way down the gel.

NOTES:

- If the gel contains ethidium bromide, the progress of electrophoresis may be monitored during the run by turning off the power supply, removing the lid, and shining a medium-wave UV light onto the gel. The resolved bands will appear as orange bands against a dark purple background.
- When working with UV equipment, use the correct protective gear.

7.8. Detection and Documentation of Separated Fragments

1. At the completion of the run, turn off the power supply and disconnect the power cord. Remove the lid and remove the gel tray. Alternatively the entire tank can be placed on a Transilluminator.
2. To stain RNA gels containing formaldehyde post electrophoresis, soak the gel in 1L of DEPC-treated water overnight at room temperature. Transfer the gel to a solution of 20X SSC containing 0.5 µg/mL of ethidium bromide, stain for 5-10 minutes.
3. Ethidium bromide stained samples are visualized by exposing them to medium wavelength (312 nm) UV light. Because the gel casting tray is UV transmittant, the gel does not need to be removed from the tray before viewing. Place the gel casting tray containing the gel on the filter surface of a UV Transilluminator for convenient viewing.
4. Sample banding patterns may be documented by autoradiography.

8.0 Troubleshooting

Should you have a question about the operation of the Labnet Enduro™ Gel XL or if service is required, contact Customer Service. Do not send in a unit for service without first calling to obtain a repair authorization number. Should the unit require return for service, it should be properly packed to avoid damage. Any damage resulting from improper packaging shall be the responsibility of the user.

Problem	Cause	Solution
The LCD screen is blank	AC power cord is not connected.	Check AC power cord connections at both ends. Use the correct cords.
	The power switch is not on.	Toggle the power switch.
Operation stops with alarm: The screen displays LOAD	Electrophoresis tank is not connected to the power supply or there is a broken circuit in the electrophoresis cell.	◗ Check the connections to the power supply and on your electrophoresis cell to make sure the connection is intact. ◗ Check condition of wires in electrophoresis unit. ◗ Close the circuit by reconnecting the cables. Press Run/Pause to restart the run.
	Buffer concentration incorrect.	Replace buffer.
Operation stops with alarm: The screen displays Lid	Lid was removed during a run.	◗ Verify the lid is properly seated. ◗ Verify all connections are attached correctly. ◗ Press the Run/Pause button to restart.
Other error		Turn off the power, disconnect the power cord from the outlet, and contact Customer Service.

9.0 Limited Warranty

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This warranty is valid only if the product is used for its intended purpose and within the guidelines specified in the supplied instruction manual. This warranty does not cover damage caused by accident, neglect, misuse, improper service, natural forces or other causes not arising from defects in original material or workmanship. This warranty does not cover motor brushes, fuses, light bulbs, batteries or damage to paint or finish. Claims for transit damage should be filed with the transportation carrier.

In the event this product fails within the specified period of time because of a defect in material or workmanship, contact Corning Customer Service at: USA/Canada 1.800.492.1110, outside the U.S. +1.978.442.2200, visit **www.corning.com/lifesciences**, or contact your local support office.

Corning's Customer Service team will help arrange local service where available or coordinate a return authorization number and shipping instructions. Products received without proper authorization will be returned. All items returned for service should be sent postage prepaid in the original packaging or other suitable carton, padded to avoid damage. Corning will not be responsible for damage incurred by improper packaging. Corning may elect for onsite service for larger equipment.

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No individual may accept for, or on behalf of Corning, any other obligation of liability, or extend the period of this warranty.

For your reference, make a note of the serial and model number, date of purchase, and supplier here.

Serial No. _____ Date Purchased _____

Model No. _____ Supplier _____

10.0 Equipment Disposal

According to Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE), this product is marked with the crossed-out wheeled bin and must not be disposed of with domestic waste.

Consequently, the buyer shall follow the instructions for reuse and recycling of waste electronic and electrical equipment (WEEE) provided with the products and available at **www.corning.com/weee**.

Appendix

Buffers for Electrophoresis

Tris Acetate EDTA Buffer (TAE)

1X Working Concentration

- 40 mM Tris base
- 20 mM Glacial Acetic Acid
- 2.0 mM EDTA, pH 8.3

10X Stock Solution

- 48.4 g Tris base
- 11.42 mL Glacial Acetic Acid
- 7.4 g EDTA or 20 mL 0.5 M
- EDTA, pH 8.0
- H_2O to 1L

Tris Borate EDTA Buffer (TBE)

1X Working Concentration

- 89 mM Tris base
- 89 mM Boric Acid
- 2.0 mM EDTA, pH 8.0

10X Stock Solution

- 108 g Tris base
- 55 g Boric Acid
- 6.72 g EDTA or 40 mL 0.5 M EDTA, pH 8.0
- H_2O to 1L

RNA Electrophoresis Running Buffer

MOPS Acetate EDTA (MAE)

Solutions containing MOPS should be wrapped in aluminum foil and stored at room temperature. The buffer tends to yellow with age. Light yellow buffer may be used; however, dark yellow solutions should be discarded.

1X Working Concentration

- 20 mM MOPS, pH 7.0
- 8 mM Glacial Acetic Acid
- 1 mM EDTA, pH 8.0

10X Stock Solution

- 41.8 g MOPS
- 800 mL DEPC treated H_2O
- Adjust pH to 7.0 with NAOH and add:
  – 16.6 mL 3 M DEPC-treated Glacial Acetic Acid
  – 20.0 mL 0.5 M DEPC-treated EDTA, pH 8.0
- Bring to 1L and filter

Sample Loading Buffer, DNA

10X Stock Solution

- 50% Glycerol
- 100 mM Na_3EDTA
- 1% SDS
- 0.1% Bromophenol blue, pH 8.0

Sample Loading Buffer, RNA

5X Stock Solution

- 1 mM EDTA, pH 8.0
- 0.25% Bromophenol blue
- 0.25% Xylene Cyanol
- 50% Glycerol

Physical Properties of Electrophoretic Plastics

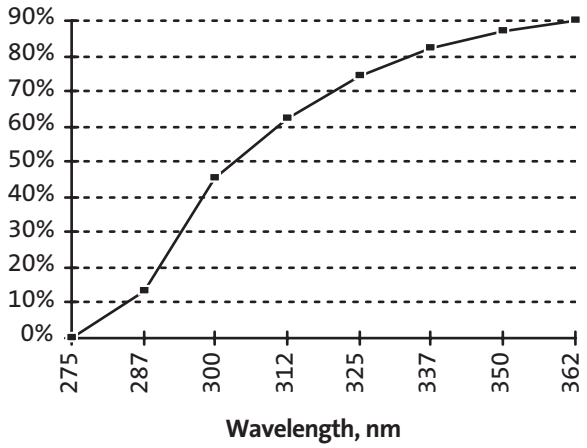

Figure A. UV Transmission characteristics of UV gel tray.

The UV transmittant tray is ideal for monitoring the progress of electrophoresis without removing the gel from the tray. Figure A above delineates the absorption specifications of the UV transmittant plastic gel tray.

References

1. Lehrach H, et al. (1977), RNA Molecular Weight Determinations by Gel Electrophoresis Under Denaturing Conditions, a Critical Reexamination, Biochemistry 16:4743.
2. Sambrook J, Fritsch EF, and Maniatis T (1989), Molecular Cloning, A Laboratory Manual, vol 1. Cold Spring Harbor Press, New York.
3. Selden RF (1988), Analysis of RNA by Northern Hybridization, in Current Protocols in Molecular Biology, Ausubel FM et al., editors, volume 1, p.4.9.1. Green Publishing Associates and Wiley-Interscience.

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