Choose the right protein gel to get publication-quality results the first time
Choice without compromise

With a focus on your evolving protein research needs, we offer you a complete array of products to support rapid, reliable protein electrophoresis optimized for a variety of applications, whether it’s at the first or last step in your workflow. All of our precast protein gels are designed to deliver superior performance, reliability, reproducibility, and consistency of quality. Our extensive portfolio of precast protein gels provides a wide variety of gel options available for your research.

Whether your protein is 2.5 kDa or as large as 500 kDa, or you’re looking for separation under native conditions or by isoelectric point—or you wish to identify protease activity—we have the right gel for your application.

Use this brochure to compare gel chemistries, learn about the benefits you can expect from each, and select recommended protein ladders to enable better-quality protein separation results.
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Overview

Four optimized precast gel chemistries

Our precast protein gels are offered in four different chemistries. The choice of whether to use one chemistry or another depends on the abundance of the protein you’re separating, the size of the protein, and your downstream application, as illustrated in the selection guide on the following page.

For separation of a broad range of proteins, two chemistries, Bis-Tris and Tris-glycine, have been optimized for performance and long shelf life.

Choose Bis-Tris gel chemistry when you have a low abundance of protein or when your downstream applications require high protein integrity, such as posttranslational modification analysis, mass spectrometry, or sequencing. Bis-Tris gel chemistry provides greater sensitivity for protein detection compared to Tris-glycine gel chemistry. The innovative Bis-Tris chemistry offered in Invitrogen™ Bolt™ and NuPAGE™ gels is a modification of the conventional Laemmli Tris-Glycine system. Bis-Tris chemistry provides a neutral (pH 7.0) environment during electrophoresis, which may result in better sample integrity and stability of the gel. This helps reduce protein modifications and helps produce sharp band resolution and better-looking western blots. Invitrogen™ Bolt™ Bis-Tris Plus mini gels build on the legacy of the highly published Invitrogen™ NuPAGE™ Bis-Tris gels.

To separate high-abundance proteins, select our robust Invitrogen™ Novex™ Tris-Glycine gel chemistry, which offers maximum protein separation performance and crisp, straight bands.

Tris-acetate gel chemistry, offered in Invitrogen™ NuPAGE™ Tris-Acetate gels, is recommended for the separation of high molecular weight proteins up to 500 kDa.

Tricine gel chemistry is designed for the separation of low molecular weight proteins and peptides. Invitrogen™ Novex™ Tricine gels provide increased resolution of proteins with molecular weights as low as 2.5 kDa.

For separation of proteins under nondenaturing conditions, Invitrogen™ NativePAGE™ gels, also based on Bis-Tris chemistry, are designed to separate proteins up to 10,000 kDa.

Acrylamide concentration options

A wide range of gel concentrations is offered to enable the separation of a broad range of proteins. The size of the molecule being separated should determine the gel concentration selected. As a general rule, molecules should migrate through about 70% of the length of the gel for the best resolution. Use a lower-percentage gel to resolve larger molecules and a higher-percentage gel to resolve smaller proteins and peptides. Gradient gels separate a broader range of proteins than a gel with a constant percentage. As gradient gels are more difficult to hand cast, the convenience and reproducibility of Invitrogen™ gradient gels may reduce your lab’s protein separation anxiety.

Refer to the insert in the back of this brochure to view gel migration charts for ladders of various size ranges.

Mini gels and midi gels

Invitrogen™ precast gels are available in two size formats: mini gels and midi gels. Both gels are the same height and have similar running times, but midi gels are a wider gel format (8 cm x 13 cm), designed for your higher-throughput electrophoresis needs. The additional wells in the midi gels permit more samples or large sample volumes to be loaded onto one gel.

Learn more at thermofisher.com/proteingels
## Gel selection guide

Find the right gel for your research needs based on sample type, separation type, and molecular weight.

### Denaturing separation*

<table>
<thead>
<tr>
<th>Molecular weight range</th>
<th>Sample type</th>
<th>Sample type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-abundance proteins and posttranslationally modified proteins</td>
<td>NuPAGE Bis-Tris Gels</td>
<td>Novex Tris-Glycine Mini Gels, WedgeWell format</td>
</tr>
<tr>
<td>High-abundance proteins</td>
<td>NuPAGE Bis-Tris Gels</td>
<td>Novex Tris-Glycine Mini Gels, WedgeWell format</td>
</tr>
</tbody>
</table>

* Low-throughput applications. For medium or high throughput, see Invitrogen™ E-PAGE™ 48-well or 96-well gels at [thermofisher.com/specialtygels](http://thermofisher.com/specialtygels)

### Native separation

<table>
<thead>
<tr>
<th>Molecular weight</th>
<th>Isoelectric point</th>
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<tbody>
<tr>
<td>NativePAGE gels</td>
<td>Novex IEF gels</td>
</tr>
<tr>
<td>Novex Tris-Glycine Mini Gels, WedgeWell format</td>
<td>Novex Tris-Glycine Gels, 2D well</td>
</tr>
<tr>
<td>NuPAGE Tris-Acetate Gels</td>
<td>NuPAGE Bis-Tris Gels, 2D well</td>
</tr>
<tr>
<td>ZOOM IPG strips</td>
<td>ZOOM IPG strips</td>
</tr>
</tbody>
</table>

### Protease activity

- Novex Zymogram gels (casein, blue casein, or gelatin substrates)

Learn more at [thermofisher.com/specialtygels](http://thermofisher.com/specialtygels)

Find the right protein gel using our interactive gel selection tool at [thermofisher.com/minigelselection](http://thermofisher.com/minigelselection)
Bolt Bis-Tris Plus mini gels help provide better western blotting results. A western blot of a Bolt gel shows clean, sharp protein signals corresponding to only full-length proteins, whereas a western blot of a Bio-Rad™ TGX™ gel shows multiple low molecular weight degradation products. Protein kinases implicated in cancer (IKKβ, EPHB3, HCK, MAPK14, FLT1, and DDR2) were analyzed on a Bolt Bis-Tris Plus gel and a Bio-Rad TGX Tris-Glycine gel. The purified kinases (50 ng each), along with Invitrogen™ MagicMark™ XP Western Protein Standard and purified recombinant GST protein, were loaded on a 10-well, 4–12% Bolt gel and a 10-well, 4–20% Bio-Rad TGX gel. The samples were separated and transferred to 0.45 μm PVDF membranes using the respective manufacturers’ protocols. Immunodetection was performed using an anti-GST antibody and Invitrogen™ WesternBreeze™ chemiluminescence detection. The blots were imaged using an LAS-1000 system (FujiFilm).
Greater sensitivity with Bolt Bis-Tris Plus gels. Total cell extracts from A431 cells were transferred to NC and PVDF membranes from a 4–12% Bolt Bis-Tris Plus gel, and 4–20% Tris-Glycine precast gel using the Invitrogen™ iBlot™ 2 Gel Transfer Device. The cells were treated with 100 ng/mL of human epidermal growth factor (hEGF) to up-regulate expression of the phospho-EGF receptor. The protein loads of the cell extracts ranged from 20 μg to 1.2 μg of extract. The blots were processed on the Invitrogen™ iBind™ Western System with a 1:200 dilution of Phospho-EGF Receptor (Tyr1068) (1H12) Mouse mAb (Cell Signaling Technology) and a 1:2,000 dilution of anti-mouse HRP secondary antibody (Jackson ImmunoResearch). Detection was performed with Invitrogen™ Novex™ ECL HRP Substrate. Detection sensitivity was nearly two-fold greater using blots from Bolt gels compared to blots from Tris-glycine gels.

### Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gel percentages</td>
<td>8%, 10%, 12%, 4–12%</td>
</tr>
<tr>
<td>Gel dimensions</td>
<td>Mini (8 x 8 cm), 1.0 mm thick</td>
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<tr>
<td>Shelf life</td>
<td>16 months at 4–25°C</td>
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<tr>
<td>Separation range</td>
<td>15 kDa to 260 kDa (MOPS buffer), 3.5 kDa to 160 kDa (MES buffer)</td>
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<tr>
<td>Run time</td>
<td>20 min (MES buffer)</td>
</tr>
<tr>
<td>Running buffer</td>
<td>MES SDS Running Buffer or MOPS SDS Running Buffer</td>
</tr>
<tr>
<td>Sample buffer</td>
<td>Bolt LDS Sample Buffer with Bolt Sample Reducing Agent</td>
</tr>
<tr>
<td>Recommended ladders</td>
<td>iBright Prestained Protein Ladder</td>
</tr>
</tbody>
</table>

Invitrogen™ iBright™ Prestained Protein Ladder. Gel: Novex™ 4–20% Tris-Glycine Mini Gel, WedgeWell format; left: prestained ladder after gel separation; center: chemiluminescent substrate on western blot; right: near-IR fluorescence on western blot.
Bis-Tris gel chemistry maintains proteins in a neutral-pH environment that preserve protein integrity, resulting in sharp, straight bands. NuPAGE Bis-Tris gels provide the benefits of Bis-Tris chemistry and have been proven reliable in over 20,000 publications. Tried, trusted, and true, NuPAGE Bis-Tris gels give you superior broad-range protein resolution and are offered in mini and midi formats.

Benefits you can expect from NuPAGE Bis-Tris gels include:

- **Preserved protein integrity**—neutral-pH formulation minimizes protein modifications or degradation

- **High lot-to-lot consistency**—coefficient of variation (CV) of only 2% for R<sub>f</sub> values (migration)

- **A long shelf life**—12 months at room temperature

### Specifications

<table>
<thead>
<tr>
<th>Gel percentages</th>
<th>10%, 12%, 4–12%, and 8% (midi only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gel dimensions</td>
<td>Mini (8 x 8 cm), 1.0 mm and 1.5 mm thick; midi (8 x 13 cm), 1.0 mm thick</td>
</tr>
<tr>
<td>Shelf life</td>
<td>12 months at 4–25°C</td>
</tr>
<tr>
<td>Separation range</td>
<td>15 kDa to 260 kDa (MOPS buffer), 3.5 kDa to 160 kDa (MES buffer)</td>
</tr>
<tr>
<td>Run time</td>
<td>As little as 35 minutes</td>
</tr>
<tr>
<td>Running buffer</td>
<td>NuPAGE MES SDS Running Buffer for small proteins or NuPAGE MOPS SDS Running Buffer for medium to large proteins; use NuPAGE Antioxidant in the running buffer to maintain reduced state during the run</td>
</tr>
<tr>
<td>Sample buffer</td>
<td>NuPAGE LDS Sample Buffer with NuPAGE Sample Reducing Agent</td>
</tr>
<tr>
<td>Recommended ladders</td>
<td>iBright Prestained Protein Ladder (western blotting applications), PageRuler Plus Prestained Protein Ladder (for in-gel staining)</td>
</tr>
</tbody>
</table>

NuPAGE Bis-Tris gels deliver straighter lanes and straighter bands. A NuPAGE 4–12% Bis-Tris midi gel with MOPS buffer and a Bio-Rad<sup>™</sup> 4–12% Criterion<sup>™</sup> XT Bis-Tris gel with MOPS buffer were loaded with 5 μL Invitrogen™ Mark12<sup>™</sup> Unstained Standard in each lane and stained with Coomassie dye.

Learn more at [thermofisher.com/nupage](http://thermofisher.com/nupage)
Tris-glycine gels are robust for a wide range of sample types. Based on the traditional Laemmli chemistry, Novex Tris-Glycine gels provide high-quality performance and separation of a wide range of proteins into well-resolved bands and are compatible with samples containing detergent and high salt.

As an added bonus, Novex Tris-Glycine Mini Gels in the WedgeWell format feature easier-to-load, larger-capacity wells that let you load up to 60 μL of sample.

Highlights:

- **High performance**—excellent protein band resolution and sharpness

- **Wedge-shaped wells**—easily load up to 60 μL of sample without sacrificing gel width or length (mini format only)

- **Fast run conditions**—quickly separate your proteins using constant voltage in less than 60 minutes

- **Flexible**—Novex Tris-Glycine gels do not contain SDS and can be used to run your proteins in native or denatured form

Wedge-shaped well design of Novex Tris-Glycine Mini Gels, WedgeWell format.

Better protein resolution and band sharpness with Novex Tris-Glycine Mini Gels, WedgeWell format. Protein ladder, purified proteins, and E. coli lysate were loaded on a gradient Novex 4–20% Tris-Glycine Mini Gel, WedgeWell format, and a Bio-Rad TGX 4–20% gradient gel. The Bio-Rad TGX gel displays numerous low molecular weight protein degradation products below major bands in lanes 3, 4, 7, 8. These are not seen in the Novex Tris-Glycine gel. The Novex gel also displays better protein band sharpness and resolution of lysate than the Bio-Rad gel. **Lanes 1, 10:** 5 μL Mark12 Unstained Standard; **lane 2:** 10 μg E. coli lysate (10 μL sample volume); **lane 3:** 6 μg catalase (10 μL sample volume); **lane 4:** 6 μg carbonic anhydrase (10 μL sample volume); **lane 5:** 6 μg lysozyme (10 μL sample volume); **lane 6:** 6 μg hIgM (10 μL sample volume); **lane 7:** 6 μg BSA (10 μL sample volume); **lane 8:** 6 μg beta-galactosidase (10 μL sample volume); **lane 9:** 20 μg E. coli lysate (20 μL sample volume).
**Increased sample volume capacity of Novex Tris-Glycine mini gels, WedgeWell format.** Increasing volumes (20–60 µL) of a fluorescent protein ladder were loaded in every other lane of a Novex Tris-Glycine 10-well mini gel, WedgeWell format and a Bio-Rad TGX 10-well gel. In the Bio-Rad gel, sample spillover is observed in lanes adjacent to the 50 µL and 60 µL load lanes.

### Specifications

**Gel percentages**
- 6%, 8%, 10%, 12%, 14%, 16%, 4–12%, 4–20%, 8–16%, 10–20%

**Gel dimensions**
- Mini (8 x 8 cm), midi (8 x 13 cm); 1.0 mm thick

**Shelf life**
- Up to 12 months at 4°C

**Separation range**
- 8 kDa to 260 kDa

**Run time**
- 60 min

**Running buffer**
- Novex Tris-Glycine SDS Running Buffer; for native gels, we recommend Novex Tris-Glycine Native Running Buffer

**Sample buffer**
- Novex Tris-Glycine SDS Sample Buffer; for native gels, we recommend Novex Tris-Glycine Native Sample Buffer

**Recommended ladders**
- iBright Prestained Protein Ladder (western blotting applications), PageRuler Plus Prestained Protein Ladder (for in-gel staining)

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**iBright Prestained Protein Ladder. Gel:** Novex 4–20% Tris-Glycine Mini Gel, WedgeWell format; **left:** prestained ladder after gel separation; **center:** chemiluminescent substrate on western blot; **right:** near-IR fluorescence on western blot.

**PageRuler Plus Prestained Protein Ladder. Gel:** 4–20% Tris-glycine (SDS-PAGE).
Tris-acetate gel chemistry enables the optimal separation of high molecular weight proteins when used with an SDS running buffer. NuPAGE Tris-Acetate gels offer a pH 8.1 environment that minimizes protein modifications and results in sharper bands. NuPAGE Tris-Acetate gels can also be run with Novex Tris-Glycine Native Running Buffer to resolve native proteins more effectively than a Tris-glycine gel system.

**NuPAGE Tris-Acetate gels and buffers are designed to allow:**

- Optimal separation of high molecular weight proteins
- Preservation of protein sample integrity using optimized sample preparation processes
- Excellent transfer of high molecular weight proteins

### Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gel percentages</td>
<td>7%, 3–8%</td>
</tr>
<tr>
<td>Gel dimensions</td>
<td>Mini (8 x 8 cm), 1.0 mm and 1.5 mm thick; midi (8 x 13 cm), 1.0 mm thick</td>
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<tr>
<td>Shelf life</td>
<td>6 months at 2–8°C</td>
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<tr>
<td>Separation range</td>
<td>30 kDa to 500 kDa</td>
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<tr>
<td>Run time</td>
<td>60 min for denaturing gel; 2–3 hours for native gel</td>
</tr>
<tr>
<td>Running buffer</td>
<td>For denatured proteins we recommend NuPAGE Tris-Acetate SDS Running Buffer; for native proteins we recommend Novex Tris-Glycine Native Running Buffer</td>
</tr>
<tr>
<td>Sample buffer</td>
<td>For denatured proteins we recommend NuPAGE LDS Sample Buffer; for native proteins we recommend Novex Tris-Glycine Native Sample Buffer</td>
</tr>
<tr>
<td>Recommended ladders</td>
<td>Spectra Multicolor High Range Protein Ladder (western blotting applications), HiMark Unstained Protein Standard (for in-gel staining)</td>
</tr>
</tbody>
</table>

**Improved transfers of high molecular weight proteins enhance western detection sensitivity.** Western blotting analysis of EGFR from A431 lysates transferred from a Novex 4–20% Tris-Glycine mini gel, WedgeWell format, and a NuPAGE 3–8% Tris-Acetate mini gel using the iBlot 2 gel transfer device.
Low molecular weight protein separation

Tricine chemistry: designed for separation and detection of low molecular weight proteins

Tricine gel chemistry enables the optimum separation of low molecular weight proteins and peptides. Novex Tricine gels are high-resolution gels for peptide and low molecular weight protein analyses. The Novex Tricine gel system is a modification of the Tris-glycine system in which tricine replaces glycine in the running buffer. This system uses a discontinuous buffer system specifically designed for the resolution of low molecular weight proteins.

Advantages of Novex Tricine gels over Tris-glycine gels include:
- Increased resolution of proteins with molecular weights as low as 2.5 kDa
- Improved compatibility with direct protein sequencing applications after transferring to PVDF membranes
- Minimized protein modification due to the lower pH of the tricine buffering system
- Minimized protein blow-through during protein transfer

Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gel percentages</td>
<td>10%, 16%, 10–20%</td>
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<tr>
<td>Gel dimensions</td>
<td>Mini (8 x 8 cm), 1.0 mm thick</td>
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<tr>
<td>Shelf life</td>
<td>1–2 months at 2–8°C</td>
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<tr>
<td>Separation range</td>
<td>2 kDa to 20 kDa</td>
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<tr>
<td>Run time</td>
<td>90 min</td>
</tr>
<tr>
<td>Running buffer</td>
<td>Novex Tricine SDS Running Buffer</td>
</tr>
<tr>
<td>Sample buffer</td>
<td>Novex Tricine SDS Sample Buffer</td>
</tr>
<tr>
<td>Recommended ladders</td>
<td>Spectra Multicolor Low Range Protein Ladder</td>
</tr>
<tr>
<td></td>
<td>(western blotting applications), PageRuler</td>
</tr>
<tr>
<td></td>
<td>Unstained Low Range Protein Ladder (for in-</td>
</tr>
<tr>
<td></td>
<td>gel staining)</td>
</tr>
</tbody>
</table>

Novex Tricine gels better resolve low molecular weight proteins. Lane 1: Thermo Scientific™ PageRuler™ Prestained NIR Protein Ladder; lanes 2–9: 1 µL loads per well of a 1.5x dilution series of a Jurkat cell lysate after cytochrome C treatment. After separation on Novex 16% Tricine and Bio-Rad TGX 4–20% Tris-Glycine gels, transfers were probed with primary antibodies against caspase-3 and α-tubulin, followed by secondary antibodies labeled with Invitrogen™ Alexa Fluor™ Plus 680 and Invitrogen™ Alexa Fluor™ Plus 800 dyes, respectively. The Novex 16% Tricine gel resolved the 17 and 19 kDa bands of cleaved caspase-3, whereas the Bio-Rad TGX Tris-Glycine gel did not provide such resolution.
Native protein gel electrophoresis

Bis-Tris chemistry: superior resolution of native proteins and protein complexes

Bis-Tris chemistry offers sensitive, high-resolution analysis of native proteins and protein complexes for molecular mass estimations and assessment of purity. NativePAGE Bis-Tris gels are based on the blue native polyacrylamide gel electrophoresis (BN-PAGE) technique that overcomes the limitations of traditional native electrophoresis by providing a near-neutral operating pH and detergent compatibility.

We offer NativePAGE Bis-Tris gels for blue-native electrophoresis of proteins and protein complexes.

Advantages of the NativePAGE Bis-Tris Gel System over traditional Tris-glycine gels include:

- **Wide molecular weight resolving range**—from 15 kDa to 10,000 kDa
- **Neutral-pH separation**—better preserves the native state of protein complexes
- **BN-PAGE technique**—resolution of all proteins in the gel regardless of their isoelectric point (pI)
- **High performance**—higher resolution than with Tris-glycine native electrophoresis

NativePAGE Bis-Tris mini gel electrophoresis resolves very large proteins and protein complexes. Two-fold dilution series of protein extracts were run on an Invitrogen™ NativePAGE™ 3–12% Bis-Tris mini gel using an Invitrogen™ Mini Gel Tank. Lanes 1 and 10: blank; lanes 2 and 6: 5 μL Invitrogen™ NativeMark™ Unstained Protein Standard; lanes 3, 4, and 5: 10, 5, and 2.5 μg spinach chloroplast extract; lanes 7, 8, and 9: 10, 5, and 2.5 μg bovine mitochondrial extract.

### Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tbody>
<tr>
<td>Gel percentages</td>
<td>3–12%, 4–16%</td>
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<td>Gel dimensions</td>
<td>Mini (8 x 8 cm), 1.0 mm thick</td>
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<td>Shelf life</td>
<td>1–2 months at 2–8°C</td>
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<td>Separation range</td>
<td>15 kDa to 10,000 kDa</td>
</tr>
<tr>
<td>Run time</td>
<td>90 min</td>
</tr>
<tr>
<td>Running buffer</td>
<td>NativePAGE Running Buffer and</td>
</tr>
<tr>
<td></td>
<td>NativePAGE Cathode Buffer Additive</td>
</tr>
<tr>
<td>Sample buffer</td>
<td>NativePAGE Sample Buffer</td>
</tr>
<tr>
<td>Recommended ladders</td>
<td>NativeMark Unstained Protein Standard</td>
</tr>
</tbody>
</table>

NativeMark Unstained Protein Standard.

**Gel:** 4–16% NativePAGE Bis-Tris Gel;
**Stain:** Coomassie G-250.
Gel tanks and protein stains

One tank, 181 gels

The Invitrogen™ Mini Gel Tank is designed for more intuitive use and greater convenience compared to traditional electrophoresis tanks. The unique, side-by-side tank design allows you to perform electrophoresis of 1 or 2 mini gels.

The Mini Gel Tank offers:

• Versatility—compatible with all of our mini gels, including Bolt, NuPAGE, Novex, and NativePAGE gels

• Easy sample loading—forward-facing well configuration

• Simultaneous visualization of both gels—streamlined, side-by-side tank configuration

• Simple monitoring of gels—white tank stand provides easy visualization of prestained markers

• Less running buffer required—gel chambers are separated, so you only need to load sufficient buffer for each gel to the specified fill line

• Convenient western blotting—innovative Mini Blot Module fits into Mini Gel Tank chamber for easy protein transfer

Gel stains

A wide variety of gel staining options are available for your applications, including Coomassie, silver, and fluorescent staining.

Coomassie staining

Invitrogen™ SimplyBlue™ SafeStain is a ready-to-use, fast, sensitive, and safe Coomassie G-250 stain for visualizing protein bands on polyacrylamide gels. SimplyBlue SafeStain is completely nonhazardous and does not require methanol or acetic acid fixatives or destains.

Silver staining

The Thermo Scientific™ Pierce™ Silver Stain Kit is a rapid, ultrasensitive, and versatile silver stain system for protein detection in polyacrylamide gels. The Pierce Silver Stain Kit is a metallic silver (Ag) protein stain that yields a remarkably clear and uniform gel background while enabling consistent, high-sensitivity staining results.

Learn more at thermofisher.com/minigeltank

Learn more at thermofisher.com/proteinstains
Our broad range of prestained and unstained protein ladders are supplied in a ready-to-use format to facilitate easy protein analysis during gel electrophoresis and western blotting.

**Prestained protein ladders are recommended for:**
- Approximate determination of molecular weight
- Monitoring the progress of electrophoresis runs
- Estimating the efficiency of protein transfer to the membrane during western blotting

**Unstained protein ladders are recommended for:**
- Precise determination of target protein molecular weights in any buffer system

Our protein ladders offer extraordinary value—high quality without the high price:
- **Performance**—sharp protein bands and consistent migration patterns enable easy molecular weight determination
- **Convenience**—protein ladders are ready to load, with no heating required
- **Reliability**—exceptional lot-to-lot consistency and reproducibility

Find out more at thermofisher.com/proteinladders

**Total protein normalization of western blots**

Total protein normalization is a useful method for obtaining accurate, quantitative western blotting data, as housekeeping proteins can often be affected by experimental conditions. The Invitrogen™ No-Stain™ Protein Labeling Reagent is a fast, easy-to-use, covalent protein labeling reagent. When applied to a membrane after gel transfer, it provides sensitive, linear detection of protein for total protein normalization of western blotting data. The No-Stain Protein Labeling Reagent can also be used as a fast, sensitive gel stain.

1. After transfer step, wash membrane
2. Prepare 1X Labeling Buffer
3. Add No-Stain™ Activator
4. Add No-Stain™ Derivatizer
5. Incubate with membrane for 10 min

Wash, then process western blot or image

Learn more at thermofisher.com/no-stain
These charts map the migration patterns of proteins of various sizes in our mini gels. Use them to help you select the best gel to separate your protein of interest.
Protein gels welcome packs
Protein gels welcome packs contain the components for outstanding protein separation and are available for each of our protein gels. The typical protein gels welcome pack provides all of the necessary gels, buffers, and reagents you need, as well as the Mini Gel Tank.

Learn more at thermofisher.com/proteingelwelcome

Get useful information for improving your protein separation and western blot results from our protein separation, transfer, and detection technical handbooks. Download your free copies today.

thermofisher.com/pagehandbook  thermofisher.com/transferhandbook  thermofisher.com/detecthandbook

Learn about our protein gel performance guarantee at thermofisher.com/proteingelguarantee

Find out more at thermofisher.com/proteingels