

# ELECTROPHORESIS

## Mini-PROTEAN® TGX™

### Precast Gels

Get superior results with the convenient and fast Mini-PROTEAN system:

- Direct drop-in for Laemmli system
- Inexpensive buffer system, low running costs
- Fast run times
- Accurate molecular weight estimation
- Robust system for difficult samples
- Bottom-open cassette design compatible with Mini-PROTEAN electrophoresis cells
- Easy to open cassette for faster downstream processing

## Superior Performance of Laemmli PAGE with Extended Shelf Life

### Introduction

SDS-PAGE is a widely used tool for analyzing protein mixtures. The Laemmli system is regarded as the gold standard for SDS-PAGE techniques due to its ability to resolve complex samples from a wide variety of sources with different buffer backgrounds.

The disadvantage of the traditional Laemmli system is the loss of gel matrix stability over time. Handcast gels should be used immediately and commercially available precast Laemmli system gels typically have a shelf life of only a few months, with gel performance degrading steadily over time.

The new Mini-PROTEAN TGX (Tris-Glycine eXtended) precast gels for PAGE are based

on a novel modification of the Laemmli system, which significantly increases the gel matrix stability. The TGX gels use the standard sample and Tris/Glycine/SDS running buffers and retain Laemmli-like separation characteristics. The modification extends the shelf life to over 12 months with exceptionally reproducible results.

Mini-PROTEAN TGX gels are currently available in 7.5%, 10%, 12%, 4–15%, 4–20%, and a unique formulation, Any kD™, which offers optimal resolution of proteins in the 20–100 kD molecular weight range and is ideal for 2-D PAGE. Additional gel percentages will be introduced soon, please visit [www.miniprotean.com](http://www.miniprotean.com) for their availability.

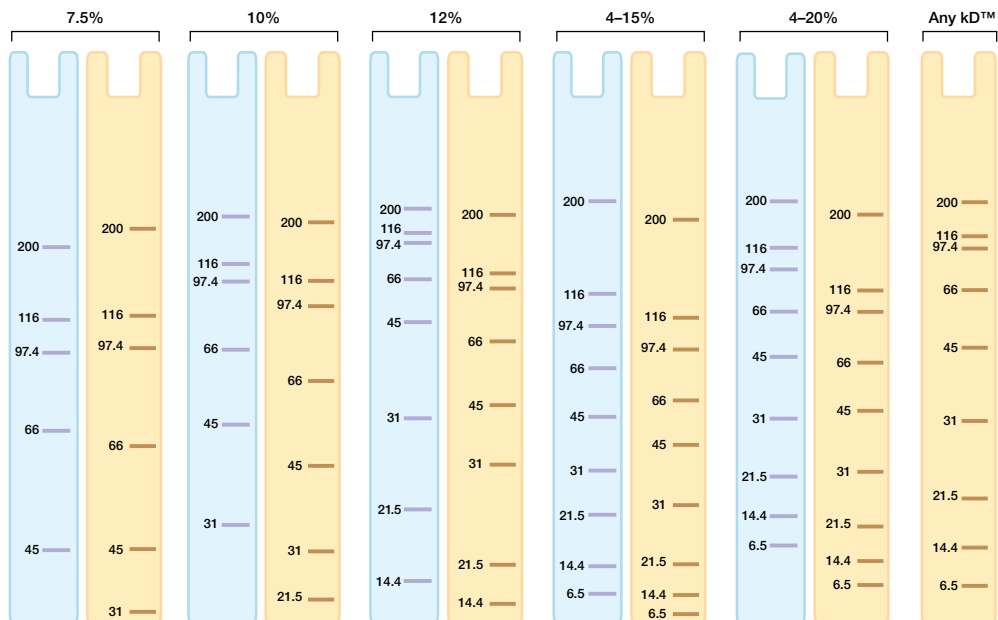


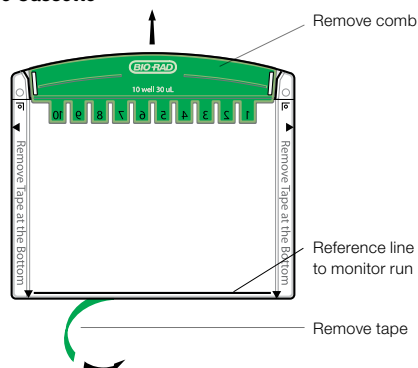
Fig. 1. Side-by-side comparison of migration patterns of broad range SDS-PAGE unstained standards (catalog #161-0317) run on Ready Gel precast gels (■) and Mini-PROTEAN TGX gels (■).



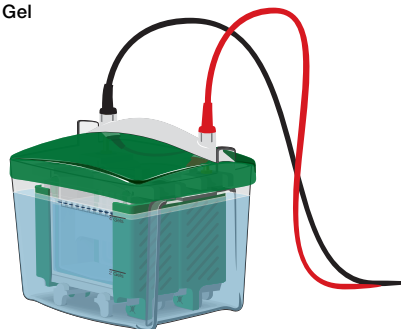
### Easy-To-Use Cassette Design

The new Mini-PROTEAN precast gel cassette is easy to use and is compatible with the Mini-PROTEAN Tetra, Mini-PROTEAN 3, and Mini-PROTEAN 3 Dodeca™ electrophoresis cells. Numbered and marked well outlines make sample loading and identification easy. The bottom-open design provides increased resolving gel length and minimizes post-run handling of the gels. The cassette can be easily opened by breaking the seal at the four indicated points, facilitating faster set-up for downstream applications like blotting.

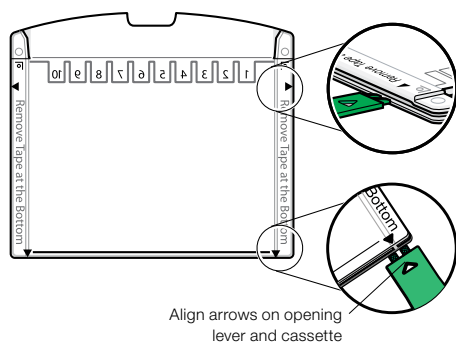
#### Preparing the Cassette



#### Running the Gel



#### Opening the Cassette



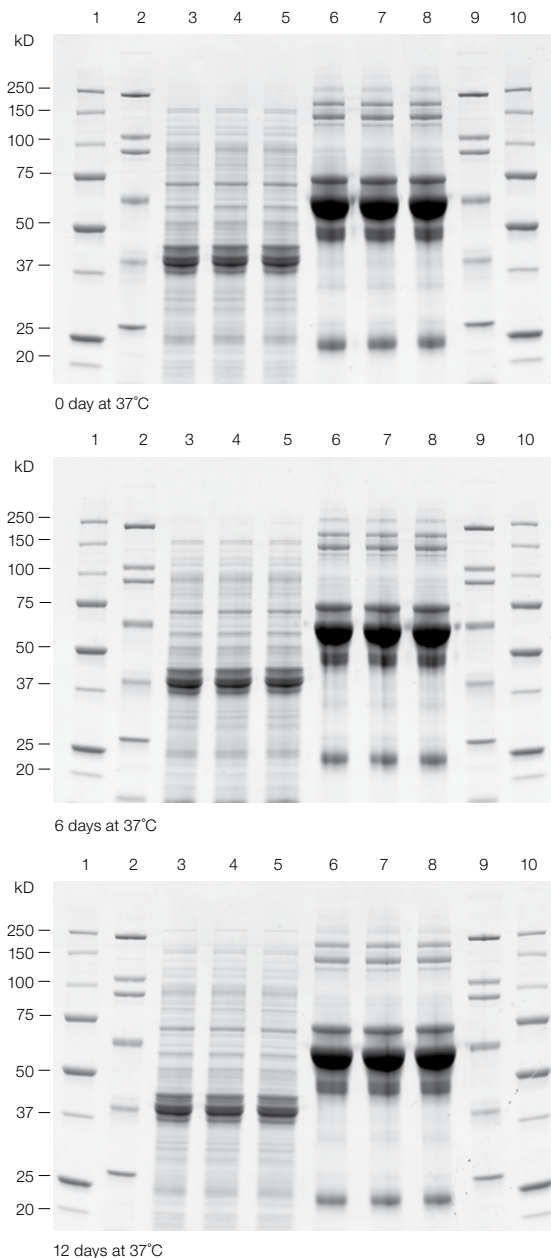
To open the cassette:

1. Align the arrows on the opening lever and on the cassette.
2. Insert the lever between the plates.
3. Apply downward pressure to break the seal.
4. Repeat the steps with the remaining three locations.

**Fig. 2. Mini-PROTEAN cassette set up and opening features.**

### Consistent Performance

The Mini-PROTEAN TGX chemistry is a modified Laemmli formulation that ensures the stability of the gel matrix over 12 months. The new precast gels deliver superior resolution and reproducibility through the entire shelf life of the precast gel.

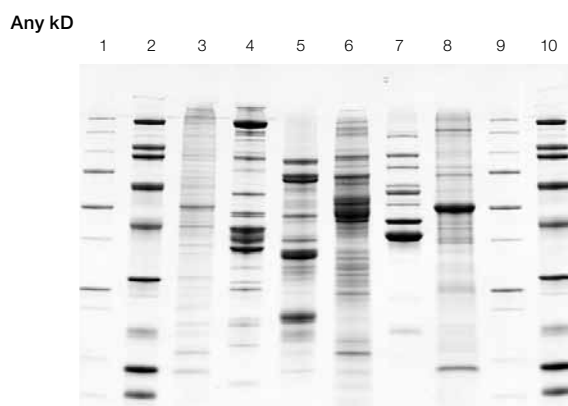
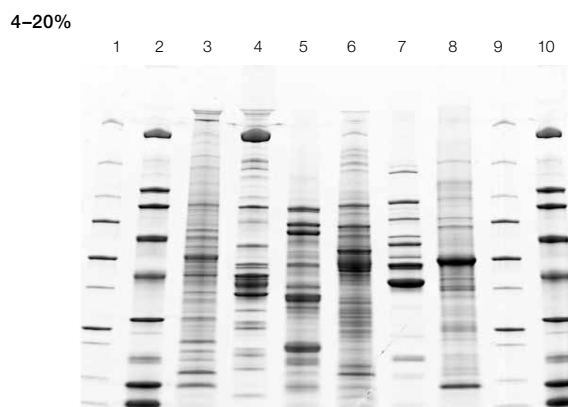
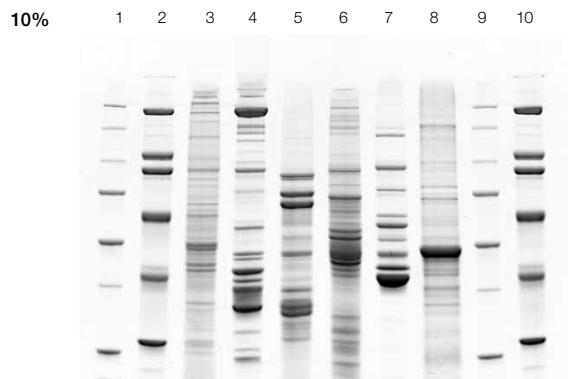


**Fig. 3. Performance of Mini-PROTEAN TGX gels following prolonged storage at 37°C.** Freshly prepared 10% Mini-PROTEAN TGX gels were incubated at 37°C for the amount of time indicated. Following the treatment, they were loaded as follows: Lanes 1 and 9, Precision Plus Protein™ unstained standards; lanes 2 and 10, broad range SDS-PAGE standards; lanes 3–5, *E. coli* lysate; lanes 6–8, mouse serum. Following electrophoresis at 200 V, gels were stained with Bio-Safe™ Coomassie stain and scanned with Molecular Imager® GX-800™ calibrated densitometer.

## Robust PAGE System

The Mini-PROTEAN TGX precast gel can handle a wide variety of samples and sample compositions. The gels deliver well-defined straight lanes with symmetrical band shapes regardless of sample composition.

### Mini-PROTEAN TGX Gels

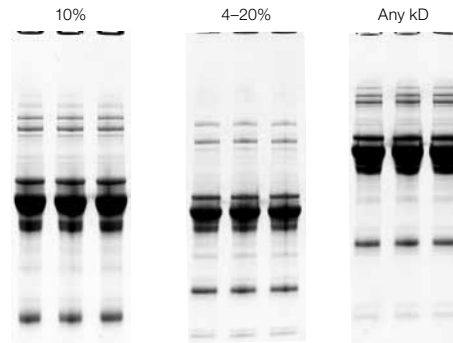


**Fig. 4. Superior resolution of a variety of samples.** Samples were loaded in a volume of 5  $\mu$ l. Lanes 1, 9, Precision Plus Protein unstained standards; Lanes 2, 10, broad range SDS-PAGE standards; Lane 3, rat midbrain extract; Lane 4, salmon muscle extract; Lane 5, soybean extract; Lane 6, rat liver microsomes; Lane 7, bacteriophage T5; Lane 8, soluble spinach protein.

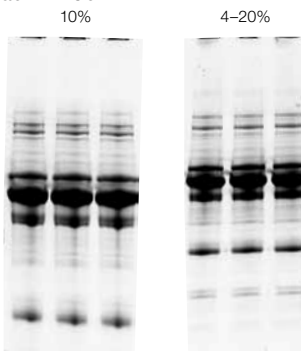
## Sample Load Tolerance

Overloading SDS-PAGE gels results in vertical streaking and impaired resolution. Mini-PROTEAN TGX gels exhibit greater lane and band symmetry, even in the overloaded lanes. The increased dynamic range of these gels enables the analysis of both high- and low-abundance species in the same sample.

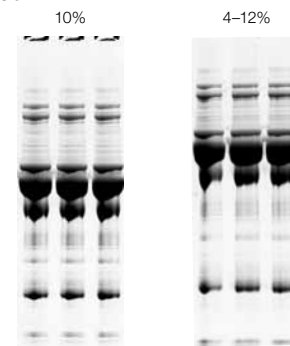
### Mini-PROTEAN TGX Gel



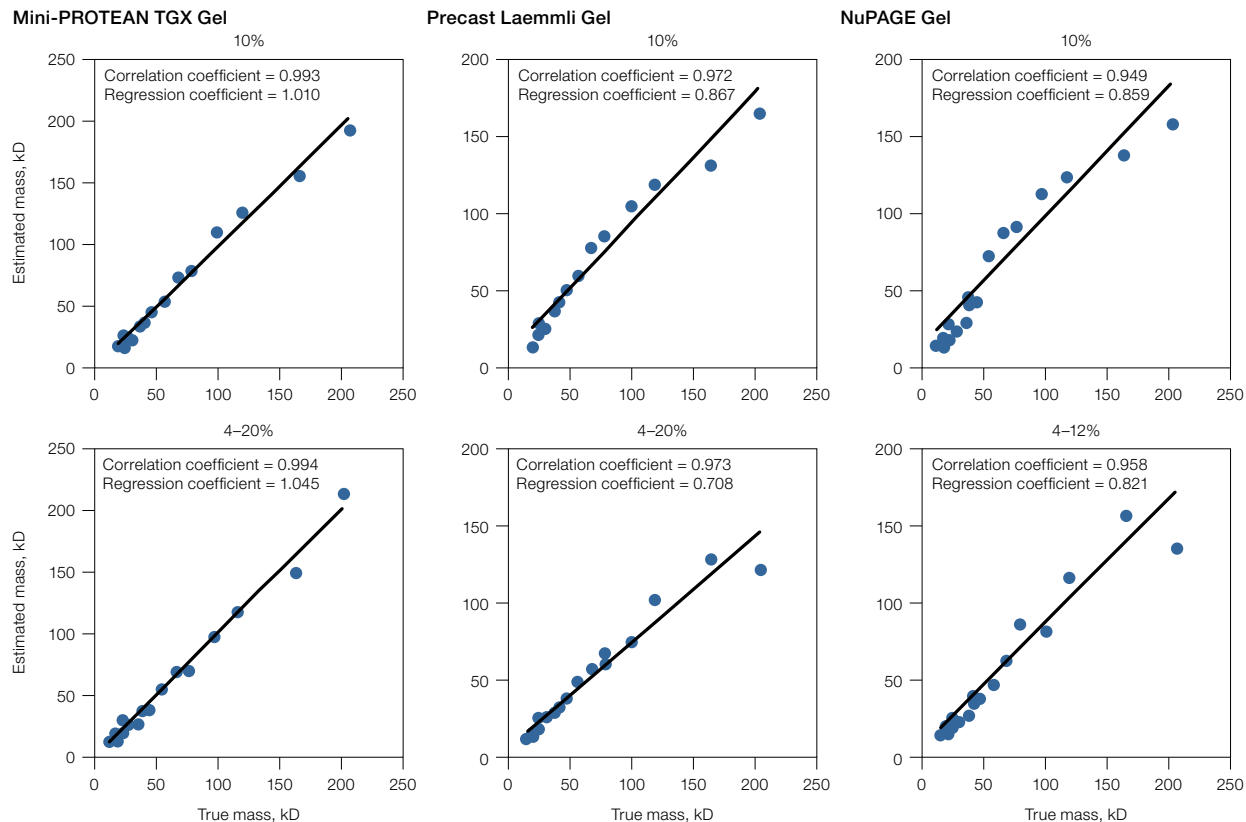
### Precast Laemmli Gel



### NuPAGE Gel



**Fig. 5. Comparison of gel performance when overloaded with mouse serum.** Mouse serum was diluted 20-fold into Laemmli sample buffer for Mini-PROTEAN TGX gels and precast Laemmli gels or NuPAGE sample buffer for NuPAGE gels (Invitrogen Corporation). Samples were loaded in a volume of 10  $\mu$ l and run according to manufacturers' instructions. MOPS running buffer was used for the NuPAGE gels. Gels were stained with Bio-Safe Coomassie stain and scanned with Molecular Imager GS-800 calibrated densitometer.



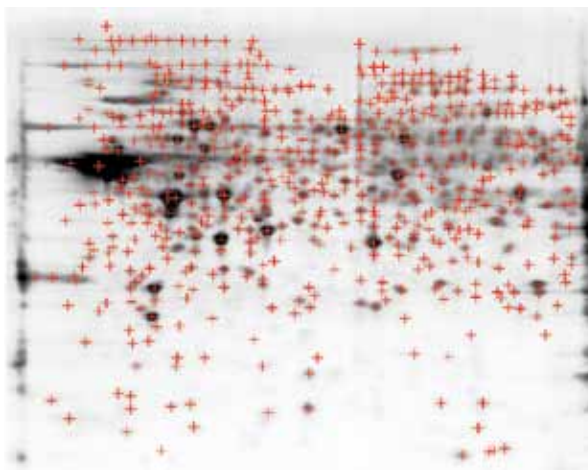
**Fig. 6. Accuracy of molecular weight estimation among different gel types.** Eighteen different purified proteins were run on the gel types indicated along with Precision Plus Protein unstained standards. The molecular weight of each purified protein was estimated by fitting the mobility of each protein to the line generated by plotting log MW vs. mobility ( $R_f$ ) for the standards. The graphs present the mass of each protein estimated in this manner vs. its true mass (as estimated from the gene sequence or determined by mass spectrometry). Refer to bulletin 5910 for further details.

### Greater Molecular Weight Estimation Accuracy

A primary purpose of SDS-PAGE is to estimate the molecular weight of proteins. In addition to the improved shelf life, Mini-PROTEAN TGX gels demonstrate advantages in terms of separation quality (uniform band shape and symmetry) and linearity of separation. The greater linearity of separation of Mini-PROTEAN TGX gels results in increased accuracy of molecular weight estimation in comparison to any other gel formulation (Figure 6).

### Introducing a Unique Percentage for a Wide Range of Protein Separations

Mini-PROTEAN TGX Any kD precast gel has a wide separation range of 10–250 kD and can be used as a screening gel for 1-D separations. The Any kD gel delivers its best resolution in the 20–100 kD molecular weight range. As this size range is most strongly represented in samples prepared for 2-D applications, the Any kD gel is ideally suited for the second dimension of 2-D electrophoresis for rapid proteomic analysis (Figure 7).



**Fig. 7. 2-D analysis of rat midbrain extract using Mini-PROTEAN TGX Any kD gel.** Rat midbrain extract was prepared and then separated on TGX Any kD precast gel. The spots were analyzed after staining the gel with Flamingo™ fluorescent gel stain and were detected and counted using PDQuest™ 2-D analysis software. A total of 617 individual protein components were unambiguously identified using the combination of 7 cm IPG strip (pH 5–8) and Mini-PROTEAN TGX Any kD gel. Refer to bulletin 5910 for further details.

### Downstream Applications

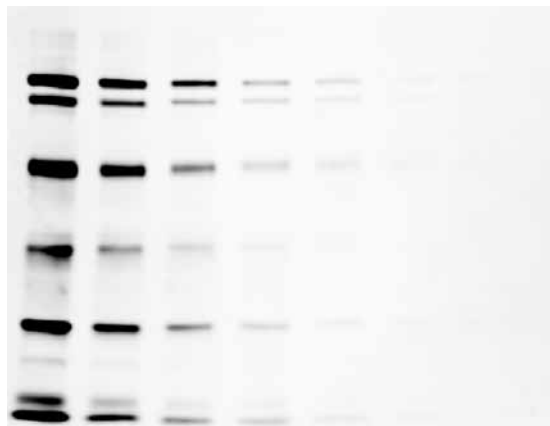
The Mini-PROTEAN TGX gels deliver superior staining with low background. These gels are compatible with all commonly used stains and mass spectrometry applications.

### Greater Transfer Efficiency

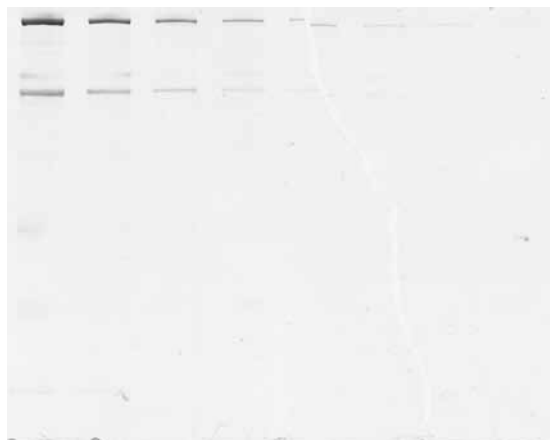
The Mini-PROTEAN TGX precast gels provide fast and excellent transfer efficiency using either wet/tank or semi-dry transfer systems. The proteins from the gel can be transferred onto a PVDF or nitrocellulose membrane in as little as 15 minutes.

#### 10% Mini-PROTEAN TGX Precast Gels

##### A. Blot Stain (protein transferred to membrane)



##### B. Gel Stain (protein remaining in gel)

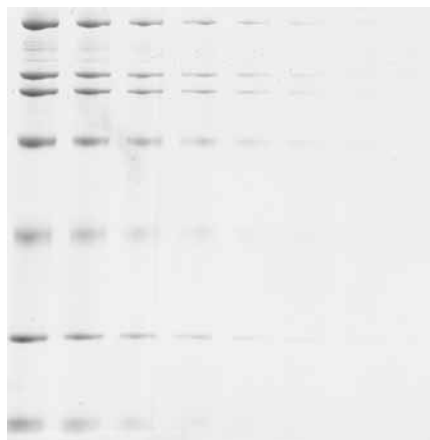


#### 10% NuPAGE Precast Gels (with MOPS Buffer)

##### A. Blot Stain (protein transferred to membrane)



##### B. Gel Stain (protein remaining in gel)



**Fig. 8. High transfer efficiency of Mini-PROTEAN TGX precast gels.** Broad range protein standards were prepared as 50-fold dilutions in Laemmli sample buffer for precast TGX gels or NuPAGE sample buffer for NuPAGE gels. Serial 2-fold dilutions of this sample were loaded on the 10% precast gels in a volume of 5  $\mu$ l. Gels were run using Tris/Glycine/SDS buffer for TGX gels or MOPS buffer for NuPAGE gels. The proteins from the gel were then transferred onto nitrocellulose membrane in a Mini-PROTEAN Tetra cell using the Mini Trans-Blot<sup>®</sup> module at 110 V (constant voltage) for 15 min with pre-chilled Towbin buffer. Protein transfer was evaluated by staining the membrane with SYPRO Ruby blot stain and imaging on the Molecular Imager<sup>®</sup> VersaDoc<sup>™</sup> 4000 instrument with a 3 sec exposure **(A)**. Proteins remaining in the gel following transfer were visualized by staining with Bio-Safe Coomassie stain and imaging with the Molecular Imager GS-800 densitometer **(B)**.

#### Specifications

Gel dimensions (W x L x thickness)	8.6 x 6.7 x 0.1 cm	Shelf life at 4°C*	12 months
Cassette dimensions (W x L x thickness)	10.0 x 8.0 x 0.46 cm	Recommended sample buffer (Laemmli, dilute 1:1 with sample)	62.5 mM Tris-HCl, pH 6.8, 2% SDS, 25% glycerol, 0.01% bromophenol blue 0.01% bromophenol blue
Cassette material	Styrene copolymer	Recommended running buffer	(Tris/Glycine/SDS) 25 mM Tris, 192 mM Glycine, 0.1% SDS, pH 8.3
Comb material	Polycarbonate		
Gel storage conditions	Store flat at 2–8°C; do not freeze		

\* From date of manufacture.

## Ordering Information

Description	8+1-Well 30 µl	10-Well 30 µl	10-Well 50 µl	12-Well 20 µl	15-Well 15 µl	IPG Well 7 cm IPG Strip
<b>Mini-PROTEAN TGX Precast Gels</b>						
7.5% Resolving Gel	456-1029	456-1023	456-1024	456-1025	456-1026	456-1021
10% Resolving Gel	456-1039	456-1033	456-1034	456-1035	456-1036	456-1031
12% Resolving Gel	456-1049	456-1043	456-1044	456-1045	456-1046	456-1041
4–15% Resolving Gel	456-1089	456-1083	456-1084	456-1085	456-1086	456-1081
4–20% Resolving Gel	456-1099	456-1093	456-1094	456-1095	456-1096	456-1091
Any kD Resolving Gel	456-9039	456-9033	456-9034	456-9035	456-9036	456-9031

All formats are available as both ten packs (catalog numbers listed) and two packs. To order as a two pack, add an "S" to the end of the catalog number for the corresponding ten pack. For further information or to request a sample, visit [www.miniprotean.com](http://www.miniprotean.com).

Catalog # Description

### Mini-PROTEAN Tetra Cell

165-8004	<b>Mini-PROTEAN Tetra Cell for Mini Precast Gels</b> , 4-gel system includes electrode assembly, clamping frame, companion module, tank, lid with power cables, mini cell buffer dam
165-8005*	<b>Mini-PROTEAN Tetra Cell for Mini Precast Gels</b> , 2-gel system includes electrode assembly, clamping frame, tank, lid with power cables, mini cell buffer dam
165-8030	<b>Mini-PROTEAN Tetra Cell for Mini Precast Gels and Mini Trans-Blot Module</b> , includes 165-8004 and 170-3935
165-8034	<b>Mini-PROTEAN Tetra Cell for Mini Precast Gels, Mini Trans-Blot Module, and PowerPac™ Basic Power Supply</b> , includes 165-8004, 170-3935, and 164-5050
165-8036	<b>Mini-PROTEAN Tetra Cell for Mini Precast Gels, Mini Trans-Blot Module, and PowerPac HC Power Supply</b> , includes 165-8004, 170-3935, and 164-5052

### Mini-PROTEAN 3 Dodeca Cell

165-4100	<b>Mini-PROTEAN 3 Dodeca Cell</b> , includes electrophoresis tank with built-in cooling coil, lid with power cables, 6 electrophoresis clamping frames, 2 buffer dams, drain line, 2 gel releasers
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### Buffers and Reagents

#### Sample Buffers

161-0737	<b>Laemmli Sample Buffer</b> , 30 ml
161-0738	<b>Native Sample Buffer</b> , 30 ml
161-0610	<b>Dithiothreitol (DTT)</b> ,** 1 g
161-0710	<b>2-Mercaptoethanol</b> , 25 ml

#### Running Buffers

161-0732	<b>10x Tris/Glycine/SDS</b> , 1 L
161-0734	<b>10x Tris/Glycine</b> , 1 L
161-0416	<b>SDS Solution</b> , 10% (w/v), 250 ml
161-0418	<b>SDS Solution</b> , 20% (w/v), 1 L

### Stains

#### Bio-Safe Coomassie Stain

161-0786	<b>Bio-Safe Coomassie Stain</b> , 1 L
161-0787	<b>Bio-Safe Coomassie Stain</b> , 5 L

#### Oriole™ Fluorescent Gel Stain

161-0495	<b>Oriole Fluorescent Gel Stain</b> , 1x, 200 ml
161-0496	<b>Oriole Fluorescent Gel Stain</b> , 1x, 1 L
161-0497	<b>Oriole Fluorescent Gel Stain</b> , kit for 5 L

#### Silver Stain

161-0449	<b>Silver Stain Plus™ Kit</b> , includes fixative enhancer concentrate, silver complex solution, reduction moderator solution, image development reagent, development accelerator reagent; stains 13 full size or 40 mini gels
161-0443	<b>Silver Stain Kit</b> , includes oxidizer concentrate, silver reagent concentrate, silver stain developer; stains 20 full size or 48 mini gels

Catalog # Description

### Flamingo Stain

161-0490	<b>Flamingo Fluorescent Gel Stain</b> , 10x solution, 20 ml
161-0491	<b>Flamingo Fluorescent Gel Stain</b> , 10x solution, 100 ml
161-0492	<b>Flamingo Fluorescent Gel Stain</b> , 10x solution, 500 ml

### Protein Standards

#### Precision Plus Protein Standards

161-0363	<b>Precision Plus Protein Unstained Standards</b> , 1 ml, 100 applications
161-0373	<b>Precision Plus Protein All Blue Standards</b> , 500 µl, 50 applications
161-0374	<b>Precision Plus Protein Dual Color Standards</b> , 500 µl, 50 applications
161-0375	<b>Precision Plus Protein™ Kaleidoscope™ Standards</b> , 500 µl, 50 applications
161-0376	<b>Precision Plus Protein™ WesternC™ Standards</b> , 250 µl, 50 applications
161-0385***	<b>Precision Plus Protein WesternC Pack</b> , 50 applications

#### Natural Unstained Standards

161-0303	<b>SDS-PAGE Standards</b> , high range, 200 µl
161-0304	<b>SDS-PAGE Standards</b> , low range, 200 µl
161-0317	<b>SDS-PAGE Standards</b> , broad range, 200 µl

\* The 2-gel systems do not include the companion running module.

\*\* Store desiccated at 2–8°C; store other reagents at room temperature, dry, and away from direct sunlight. Hazardous shipping charges may apply.

\*\*\* Each pack includes 250 µl of Precision Plus Protein™ WesternC™ standards and 125 µl of StrepTactin-HRP conjugate.

For additional products or product sizes, please refer to the Bio-Rad catalog or visit [www.bio-rad.com](http://www.bio-rad.com).

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### Related Literature

1658100	Mini-PROTEAN Precast Gels Instruction Manual and Application Guide
Bulletin 5535	Mini-PROTEAN Electrophoresis Platform Brochure
Bulletin 5910	Mini-PROTEANTGX Precast Gel: A Gel for SDS-PAGE with Improved Stability — Comparison with Standard Laemmli Gels Tech Note
Bulletin 5911	Mini-PROTEAN TGX Gel: A Versatile and Robust Laemmli-Like Precast Gel for SDS-PAGE Tech Note
Bulletin 5932	Ready Gel to Mini-PROTEAN TGX Precast Gels Catalog Number Conversion Chart



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