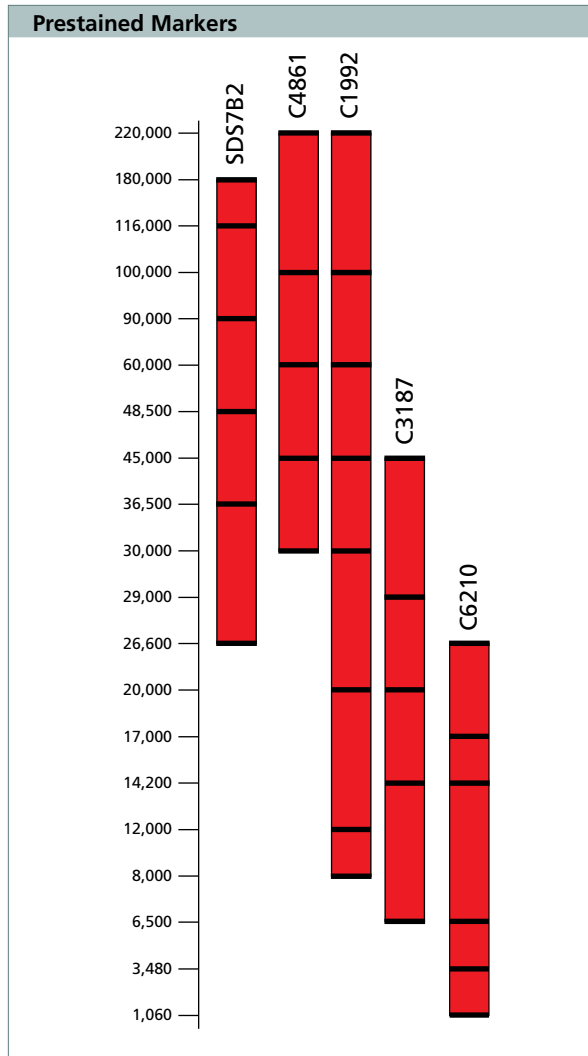


# Electrophoresis

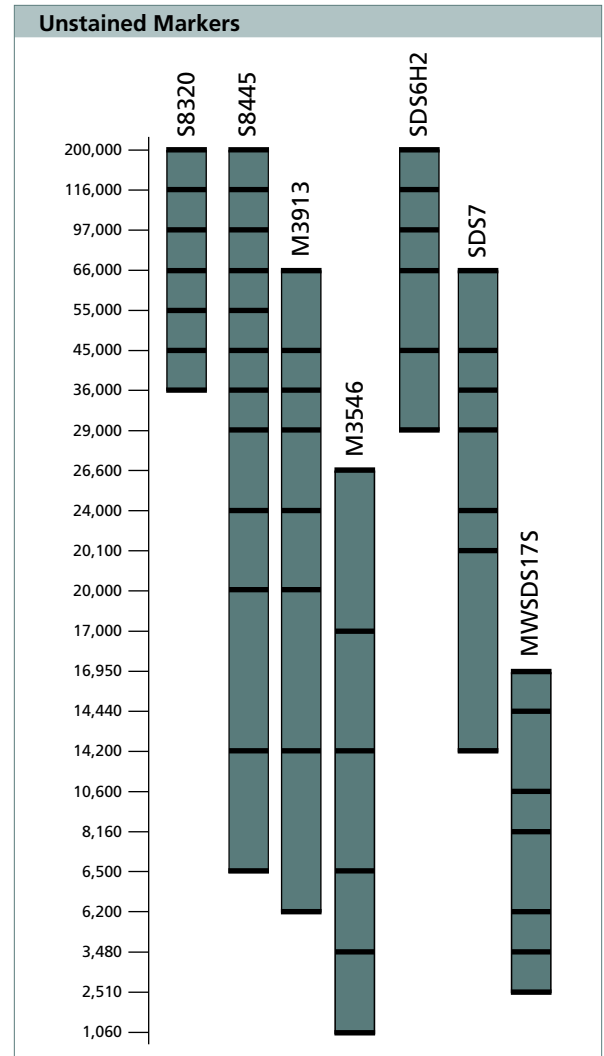
## Molecular Weight Markers

Protein molecular weight markers are used to calculate sample molecular weights, to monitor the progress of an electrophoretic run, or as a positive control for analysis conditions. Sigma offers a wide selection of markers for numerous protein electrophoresis applications. Sigma Molecular Weight Markers are available Prestained, Unstained, or Specialty designed for specific electrophoresis techniques. All have been use-tested to assure outstanding performance and are available in convenient package sizes.



### Prestained Markers

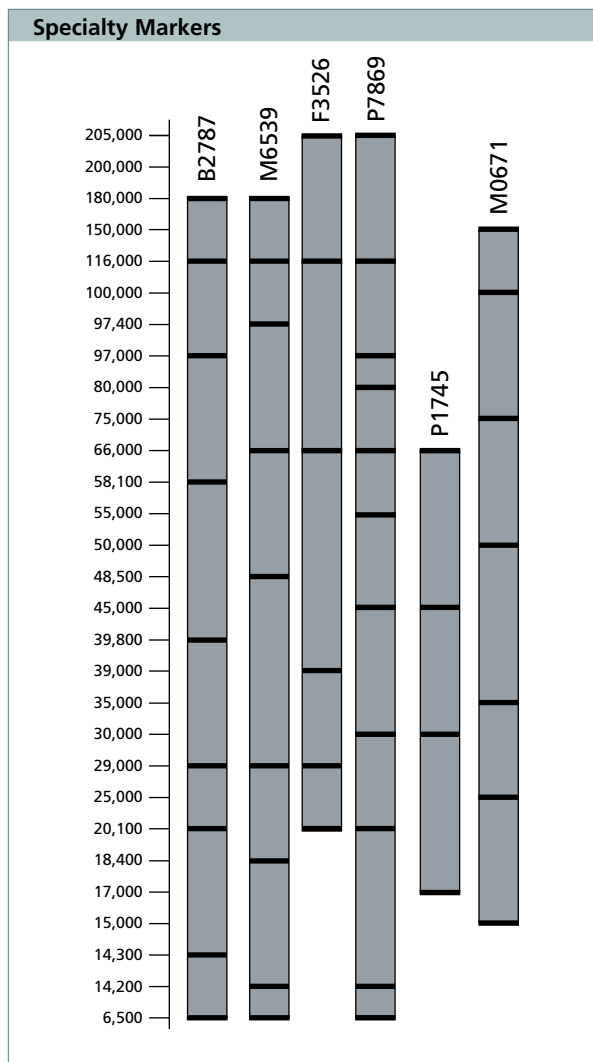
Prestained Markers are a category of molecular weight markers containing proteins that are conjugated to specific dyes. With these markers protein migration can be monitored as electrophoresis is occurring. Also these dyes are easily transferred to solid phase supports during Western blot analysis. This provides a great tool for monitoring effectiveness of electroblotting.



### Unstained Markers

The Unstained Markers category includes molecular weight markers that yield well-defined bands following electrophoresis and staining with Coomassie® Blue. These markers contain proteins with molecular weights ranging from 1,060–200,000 Da.

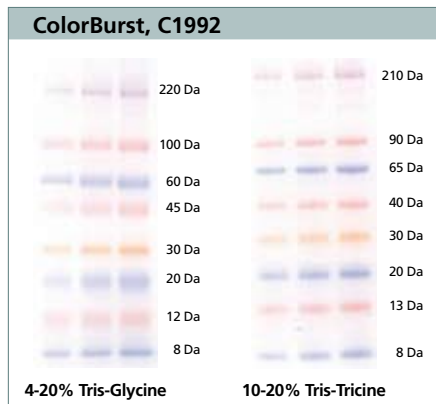




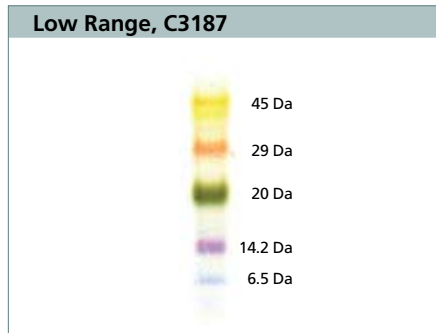
### Specialty Markers

Specialty Markers are developed for use in specific electrophoresis applications. This category includes fluorescent markers, silver stain markers, specific Western blot markers, and other molecular weight markers for a variety of electrophoresis techniques.

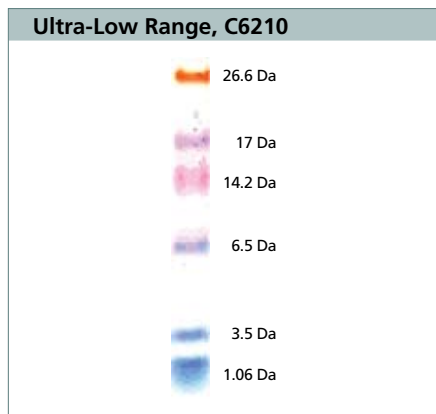
# Electrophoresis



Bands transferred to nitrocellulose membranes. Transfers were completed in 90 minutes at 70 volts with Towbin's buffer (Tris-Glycine in 20% methanol). Molecular Masses (Da) given are apparent values as compared to Sigma's wide range marker set (S8445). The ColorBurst markers migrate differently with respect to S8445 in the different gel systems tested.



C3187 was separated on a 16% Tris-tricine gel.



C6210 was separated on a 10-20% Tris-tricine gel.

## Prestained Markers

### ColorBurst™ Markers

Brilliantly colored, exceptionally well resolved, convenient, and stable, ColorBurst protein molecular weight markers perform impressively in a variety of gel compositions and concentrations. ColorBurst is composed of proteins, which have been chemically reduced, alkylated, and conjugated to brilliantly colored dyes. ColorBurst can be used to estimate sample molecular weights, to monitor the progress of an electrophoretic run, or to confirm that an electroblot is complete. Each vial contains 500 µl of marker solution and may be used for up to 100 applications.

#### Features and Benefits

- Exceptional resolution allows estimation of sample molecular weights
- No freeze/thaw cycle means decreased degradation and long shelf life
- Ready-to-use. No boiling required before use
- No chemical reduction necessary prior to gel loading

#### Ordering Information

Cat. No.	Product Description	M.W. Range
<b>C1992</b>	ColorBurst Electrophoresis Marker	8,000-220,000
<b>C4861</b>	ColorBurst Electrophoresis Marker, High Range	30,000-220,000

### Low Range and Ultra-Low Range Color Markers

The Low Range Sigma Color Marker is suitable for use in the Laemmli SDS-PAGE system and for transfer to a solid phase support. Each protein is conjugated to a different colored dye providing a monitor for protein migration and completion of electroblotting.

#### Ordering Information

Cat. No.	Product Description	M.W. Range
<b>C3187</b>	Color Marker, Low Range	6,500-45,000

The Ultra-Low Range Sigma Color Marker is suitable for use in the Tris-Tricine SDS-PAGE system and for transfer to a solid phase support. Each protein is conjugated to a different colored dye providing a monitor for protein migration and completion of electroblotting.

#### Ordering Information

Cat. No.	Product Description	M.W. Range
<b>C6210</b>	Color Marker, Ultra-low Range	1,060-26,600

## Prestained Blue Marker

Sigma's Prestained Blue Marker provides a lyophilized mixture of 7 proteins each conjugated to a blue dye. Distinct blue bands incorporate a wide range of normal protein and subunit weights upon completion of electrophoresis. This allows for monitoring of protein migration as well as electroblotting completion.

### Ordering Information

Cat. No.	Product Description	M.W. Range
<b>SDS7B2</b>	Prestained Molecular Weight Marker	26,600-180,000

## Unstained Markers

### SigmaMarker™

SigmaMarkers encompass the range of molecular weights common to most proteins and their subunits. Lyophilized with sample buffer, the wide, high, and low range markers are ready for use following reconstitution with water. They are formulated to yield a distribution of well-defined bands of approximately equal intensity following electrophoresis and Coomassie® Blue staining.

### Ordering Information

Cat. No.	Product Description	M.W. Range
<b>M3913</b>	SigmaMarker, Low Range	6,500-66,000
<b>S8445</b>	SigmaMarker, Wide Range	6,500-200,000
<b>S8320</b>	SigmaMarker, High Range	36,000-200,000

## Ultra-Low Range Marker

Sigma's Ultra-Low Range molecular weight marker is recommended for use with Tris-Tricine SDS-PAGE systems. Glutaraldehyde fixing is suggested to retain low molecular weight proteins.

### Ordering Information

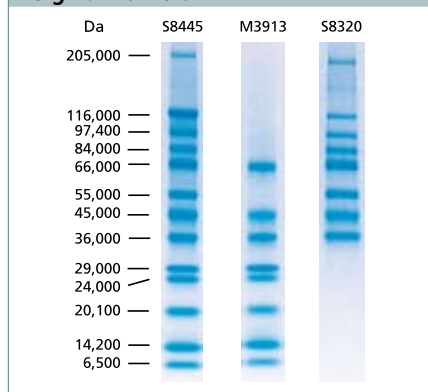
Cat. No.	Product Description	M.W. Range
<b>M3546</b>	Molecular Weight Marker for SDS-PAGE	1,060-26,600

### Prestained, SDS7B2



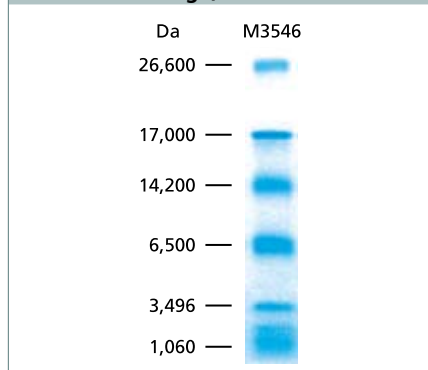
SDS7B2 was separated on a 4-20% Tris-glycine gel.

### Sigma Markers



S8445, M3913, and S8320 (5 µl) were run on a 4-20% PAGE gel and stained with EZBlue™ Gel Staining Reagent (G1041).

### Ultra-Low Range, M3546



M3546 (5 µl of a 1:20 dilution) was run on a 10-20% Tris-Tricine SDS-PAGE gel, fixed with 5% glutaraldehyde and stained with EZBlue Gel Staining Reagent (G1041).

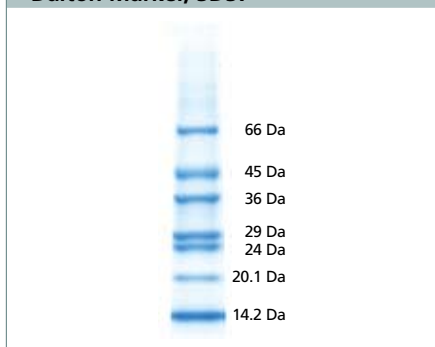
# Electrophoresis

## Dalton Marker, SDS6H2



SDS6H2 was separated on a 4-20% Tris-glycine gel and stained with EZBlue™ Gel Staining Reagent (G1041).

## Dalton Marker, SDS7



SDS7 was separated on a 4-20% Tris-glycine gel and stained with EZBlue Gel Staining Reagent (G1041).

## Dalton Markers

Suitable for both the Weber Osbourn and Laemmli systems of electrophoresis, these markers provide a molecular weight range appropriate for most proteins and subunits. After staining these markers provide well defined bands of approximately equal intensity. Available in mixtures and as individual proteins.

### Ordering Information

Cat. No.	Product Description	M.W. Range
<b>SDS6H2</b>	Molecular Weight Marker	30,000-200,000
<b>SDS7</b>	Molecular Weight Marker	14,000-66,000

## Individual Protein Markers

### Ordering Information

Cat. No.	Product Description	M.W. Range
<b>A7517</b>	Albumin from bovine serum	66,000
<b>G5262</b>	Glyceraldehyde-3-phosphate Dehydrogenase from rabbit muscle	36,000
<b>G8511</b>	$\beta$ -Galactosidase from <i>Escherichia coli</i>	116,000
<b>L4631</b>	Lysozyme from chicken egg white	14,700
<b>L4765</b>	Lactoferrin from bovine colostrum	90,000
<b>L6385</b>	$\alpha$ -Lactalbumin from bovine milk	14,200
<b>P4649</b>	Phosphorylase b from rabbit muscle	97,000
<b>T9011</b>	Trypsinogen, PMSF treated from bovine pancreas	24,000
<b>T9767</b>	Trypsin inhibitor from <i>Glycine max</i> (soybean)	20,100
<b>U7752</b>	Urease from <i>Canavalia ensiformis</i> (Jack bean)	545,000 (hexamer) 272,000 (trimer)

## Specialty Markers

### Native Marker

Available as a kit and sold separately as individual proteins, native markers allow for the estimation of molecular mass in non-denaturing electrophoresis systems. The native marker kit (MWND500) contains 5 individual proteins which are also sold separately in 1 mg quantities.

### Ordering Information

Cat. No.	Product Description	Quantity
<b>MWND500</b>	Kit for Molecular Weights 14,000-500,000 Non-denaturing	1 kit
<b>C5024</b>	Carbonic Anhydrase from Bovine Erythrocytes	1 mg
<b>A8654</b>	Albumin from Bovine Serum	1 mg
<b>L4385</b>	$\alpha$ -Lactalbumin from bovine milk	1 mg
<b>L5137</b>	$\beta$ -Lactoglobulin A from bovine milk	1 mg
<b>U7752</b>	Urease from <i>Canavalia ensiformis</i> (Jack bean)	1 mg



## Chemichrome™ Western Control and Chemichrome Ultimate

Chemichrome Western Control and Chemichrome Ultimate are ideal molecular weight markers and positive controls for electrophoresis and subsequent Western blotting. Chemichrome contains an additional band of mouse IgG. During electrophoresis, brightly colored protein bands serve as positive controls for protein migration. During blotting, the same brightly colored bands indicate that the transfer is complete. After incubation with mouse primary and secondary antibodies, the band of mouse IgG (heavy chain) serves as a positive control using either colorimetric or chemiluminescent substrates. In addition to mouse IgG, Chemichrome Ultimate also contains goat and rabbit IgG to serve as positive controls. Simple to use and extremely practical, Chemichrome enables researchers to confirm the success of their analyses every step of the way. Chemichrome is supplied in vials containing 200 µl of ready-to-use solution.

### Features and Benefits

- Confirms that a membrane transfer is complete
- Confirms successful Western blotting conditions
- Compatible with many peroxidase and phosphatase substrates, including TMB and ECL®

### Ordering Information

Cat. No.	Product Description	Quantity
<b>C2242</b>	Chemichrome Western Control	1 vial
<b>C2117</b>	Chemichrome Ultimate	1 vial

## Recombinant Marker

The Recombinant Molecular Weight Standard Mixture contains seven precisely sized proteins, molecular weights 15, 25, 35, 50, 75, 100, and 150 kDa. Recombinant proteins form well-resolved bands for accurate sample molecular weight calculations.

### Ordering Information

Cat. No.	Product Description	M.W. Range
<b>M0671</b>	Recombinant Molecular Weight Marker	15,000-150,000

## SYPRO® Marker

Molecular Probe's Protein Molecular Weight Standard provides excellent sharp bands to estimate molecular weights of proteins and their subunits. This marker contains 11 proteins and is suitable for SDS-PAGE analysis on any gradient gel.

### Ordering Information

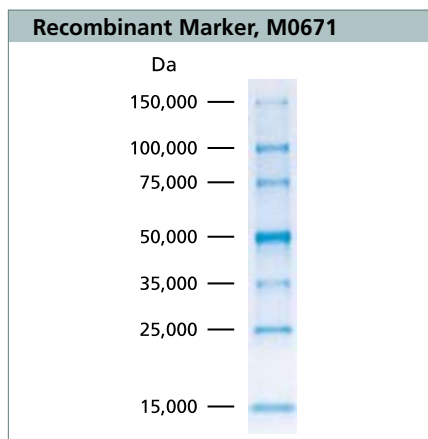
Cat. No.	Product Description	Quantity
<b>P7869</b>	SYPRO Molecular Weight Standard	1 vial



See SYPRO Stains, pages 77-78.

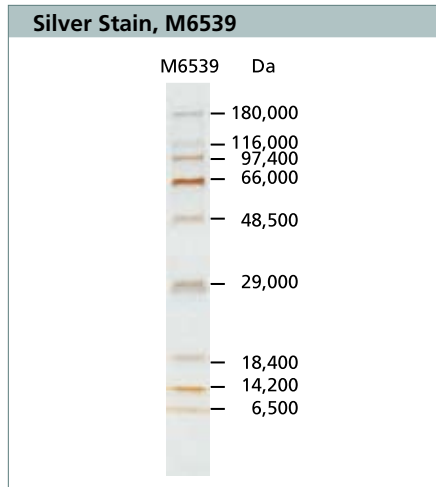


ColorBurst (lane 1), Chemichrome (lane 2), and FLAG®-BAP concentrations of 80 ng, 40 ng, 20 ng and 10 ng (lanes 3-6, respectively) were run on a 6-15% Tris-Acetate gel, transferred to PVDF and developed with a TMB substrate (T0565).



M0671 (5 µl) was run on a 4-20% PAGE gel and stained with EZBlue™ Gel Staining Reagent (G1041).

# Electrophoresis



M6539 (7.5  $\mu$ l of a 1:15 dilution) was run on a 10-18% SDS-PAGE gel and silver-stained.

## Silver Stain Marker

Designed for molecular weight determinations on silver stained gels, the Silver Stain SDS-PAGE molecular weight marker contains evenly distributed, well resolved proteins.

### Ordering Information

Cat. No.	Product Description	M.W. Range
<b>M6539</b>	Silver Stain Molecular Weight Marker	6,500-180,000



See ProteoSilver™ (Silver Stain Kits), page 75.

## Biotinylated Marker

The biotinylated molecular weight marker contains biotin-conjugated proteins which, following electrophoresis and membrane transfer, can be easily detected with a Streptavidin-Peroxidase Conjugate (S5512) and a color development reagent such as TMB (T0565).

### Ordering Information

Cat. No.	Product Description	M.W. Range
<b>B2787</b>	Biotinylated Molecular Weight Marker	6,500-180,000

## Fluorescent Marker

Sigma's fluorescent molecular weight marker is composed of FITC-conjugated proteins, which are well resolved and easily visualized with ultraviolet light on polyacrylamide gels or membranes.

### Ordering Information

Cat. No.	Product Description	M.W. Range
<b>F3526</b>	Fluorescent Molecular Weight Marker	20,100-205,000

## ProteoProfile™ PTM Marker

Glycosylation and phosphorylation are frequently encountered post-translational modifications in proteomic analysis. ProteoProfile PTM Marker, containing glycosylated and phosphorylated proteins, is designed for use as a positive and negative control in studying these post-translational modifications of proteins in SDS-PAGE. Electrophoresis will yield four protein bands:

BSA (not glycosylated, not phosphorylated)

Ovalbumin (glycosylated and phosphorylated)

β-Casein (not glycosylated, phosphorylated)

RNase B (glycosylated, not phosphorylated)

### Ordering Information

Cat. No.	Product Description	Quantity
<b>P1745</b>	ProteoProfile PTM Marker	0.1 ml

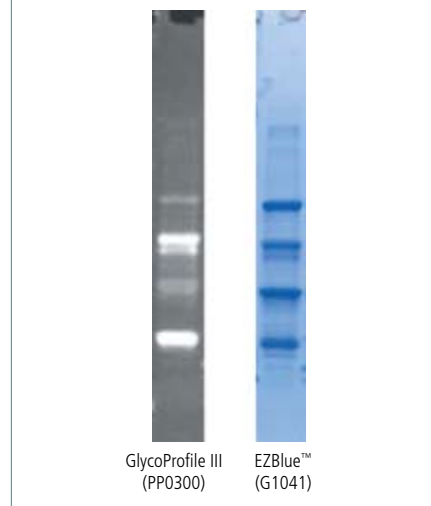
## 2D Electrophoresis Markers

Specifically designed for denaturing IEF and 2D electrophoresis, this molecular weight marker set contains four proteins selected to provide a diagonal pattern on a wide range 2D gel.

### Ordering Information

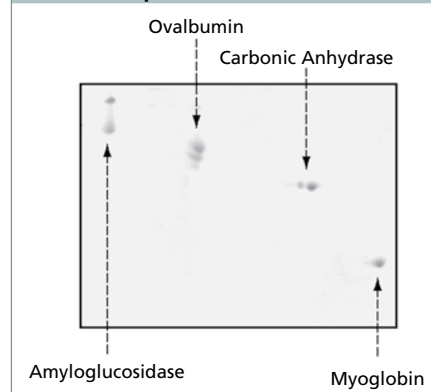
Cat. No.	Product Description	M.W. Range
<b>M3411</b>	Marker for 2D Electrophoresis	17,000-89,000 7.6-3.8 pI
<b>O4757</b>	Albumin from chicken egg white	45,000 5.1 pI

### Total Protein Determination



Superior Selectivity ProteoProfile PTM Marker (P1745), containing glycosylated and non-glycosylated proteins, was separated by electrophoresis on a 4-20% SDS-PAGE gel. The gel was stained with GlycoProfile III (PP0300) (left), fluorescently imaged, and then stained for total protein with EZBlue Gel Staining Reagent (G1041) (right). Each band represents ~300 ng of protein.

### 2D Electrophoresis Markers, M3411



5 µl of 2D markers (M3411) were separated with a mixture of ampholine pH 3.5-9.5 and ampholine pH 2.5-4.5 in the ratio 1:2.5 and then separated on a 12.5% SDS-PAGE gel. The gel was stained with Coomassie® Brilliant Blue G (B8522).

# Electrophoresis

## IEF Markers

Developed for use in IEF electrophoresis, the IEF mix (I3018) contains a mixture of 8 different proteins. The protein mixture forms evenly spaced, distinct bands over the pI range 3.6-9.3. Individual proteins for use as IEF markers are also available below.

### Ordering Information

Cat. No.	Product Description	Quantity
<b>I3018</b>	IEF Mix 3.6-9.3	1 vial
<b>C6403</b>	Carbonic Anhydrase Isozyme II from bovine erythrocytes, pI 5.9	1 vial
<b>C3666</b>	Carbonic Anhydrase Isozyme II from bovine erythrocytes, pI 5.4	1 vial
<b>A2910</b>	Amyloglucosidase from <i>Aspergillus niger</i> , pI 3.6	1 vial
<b>T1021</b>	Trypsin inhibitor from <i>Glycine max</i> (soybean), pI 4.6	1 vial
<b>T1146</b>	Trypsinogen from bovine pancreas, pI 9.3	1 vial
<b>M9267</b>	Myoglobin from equine heart, pI (1) 6.8, (2) 7.2	1 vial

## Capillary Electrophoresis Marker

Sigma offers a peptide standard for use in capillary electrophoresis systems. This lyophilized powder contains ~25 µg of 9 different peptides.

### Ordering Information

Cat. No.	Product Description	Quantity
<b>P2693</b>	Peptide Standards	1 vial

## Peptide Marker

The molecular weight marker for peptides has been developed to provide a useful molecular weight determination range between 2,500-17,000. This marker is a mixture of seven polypeptides, six derived from the cleavage of myoglobin and the seventh from naturally occurring glucagons.

### Ordering Information

Cat. No.	Product Description	M.W. Range
<b>MWSDS17S</b>	Peptide Molecular Weight Marker	2,500-17,000

## Protein Staining Reagents

To meet the great diversity of protein analysis needs, Sigma offers a wide selection of protein visualization (staining) reagents. EZBlue™ and ProteoSilver™, designed specifically for proteomics, and perform impressively in traditional PAGE formats.

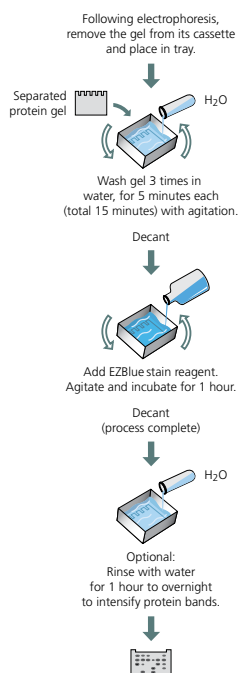
### Protein Dyes and Stains Selection Chart

	Method		Detection Targets					Compatibility							Special Features								
	Colorimetric	Fluorescent	Proteins	Glycoproteins	Lipids and/or Lipoproteins	Nucleic Acids	Phospholipids, Neutral Fats, & Sterols	PAGE	IEF (Acrylamide)	Agarose Gel	PVDF Membrane	Cellulose Acetate Membrane	Nitrocellulose Membrane	Nylon Membrane	MALDI-MS	High Sensitivity (10 ng)	Higher Sensitivity (1 ng)	Highest Sensitivity (0.1 ng/mm <sup>2</sup> )	Fixing Reagent	Requires No Destaining	Rapid Development (5 minutes)	Reversible	
<i>Optimize your protein detection by choosing the best reagent for your application.</i>																							
✓ <b>Good Choice</b>																							
★ <b>BEST Choice</b>																							
Alcian Blue 8GX — A3157	✓			✓				✓					✓										
Amido Black Staining Solution — A8181	✓		✓					✓		✓												✓	
Brilliant Blue G Concentrate — B8522	✓		✓					✓	✓										✓				
Brilliant Blue R Staining Solution — B6529	✓		✓					✓	✓	★	★							✓					
Coomassie® Violet R200 — 27817	✓		✓						★														
Eosin Y — 45235	✓		✓					✓															✓
EZBlue™ — G1041	★		★					✓			✓				✓	★		✓	★				
Fast Green FCF — F7252	✓		✓					✓	✓														
Fixing Solution — F7264								✓											★				
Fluorescamine — F9015		✓	✓																				
GlycoProfile™ III — PP0300		✓		★				✓			✓				✓								
GlycoProtein Detection Kit (Colorimetric) — GLYCOPRO	✓			★				✓			✓												
Gold Solution, Colloidal — 50755	✓		✓										✓										
Oil Red O — O9755	✓				★							★											
Ponceau S Solution — P7170	✓		✓								✓	✓	★									✓	✓
ProteoSilver™ — PROTSIL1	✓		★			✓		✓							✓		★	✓	✓	✓			
ProteoSilver Plus — PROTSIL2	✓		★			✓		✓							★		★	✓	✓	✓			✓
Reversible Protein Detection Kit — RPROB	✓		✓					✓			✓		✓	★									★
Sudan Black — 86015	✓			✓			★	✓		✓		✓											
SYPRO® Orange Protein Gel Stain — S5692		★	✓					✓								✓		✓	✓				
SYPRO Red Protein Gel Stain — S5817		★	✓					✓								✓		✓	✓				
SYPRO Ruby Protein Blot Stain — S4817		★	✓							✓		✓			✓								
SYPRO Ruby Protein Gel Stain — S4942		★	✓	✓	✓			✓	✓						✓								
SYPRO Tangerine Protein Gel Stain — S5942		★	✓					✓							✓	✓		✓	✓				

# Electrophoresis



## EZBlue Procedure



## Coomassie® Stains

### EZBlue™ Gel Staining Reagent

Convenient, sensitive, and safe, EZBlue Coomassie Brilliant Blue G250 colloidal protein stain improves protein electrophoresis results while significantly reducing staining time. Conveniently packaged, EZBlue requires no messy weigh-ups or additions of methanol or acid. As a colloidal stain, it reacts only with proteins, not the gel itself. Background staining is reduced, so protein bands can be visualized almost immediately. No destaining step is required, although a water wash may intensify bands and clarify the background. Most impressively, EZBlue is extremely sensitive, detecting as little as 5 ng of protein.

#### Features and Benefits

- Pre-mixed solution eliminates the time and effort required to prepare the stain
- Increased sensitivity ensures low abundance proteins can be detected (as little as 5 ng)
- Rapid reaction significantly reduces the amount of time required to stain and rinse
- Eliminates solvent waste so you save the expense of hazardous material disposal

#### Ordering Information

Cat. No.	Product Description	Quantity
<b>G1041</b>	EZBlue Gel Staining Reagent	500 ml 3.8 L

### Brilliant Blue G Concentrate

Brilliant Blue G Concentrate is a Coomassie G250 methanol-based stain designed for protein detection in polyacrylamide and agarose gels. Because this stain contains methanol and acetic acid, gels require no fixing step prior to staining. Each bottle dilutes to 1 L with water.

#### Ordering Information

Cat. No.	Product Description	Quantity
<b>B8522</b>	Brilliant Blue G Concentrate	1 btl

### Brilliant Blue R Staining Solution

Brilliant Blue R Staining Solution is designed specifically for staining protein in SDS-PAGE and agarose gels. Because this stain contains ethanol and acetic acid, gels require no fixing step prior to staining. The gel is immersed in staining solution for 30 minutes and destained with 10% acetic acid.

#### Ordering Information

Cat. No.	Product Description	Quantity
<b>B6529</b>	Brilliant Blue R Staining Solution	1 L

### Coomassie Violet R200

Coomassie Violet R200 is used for rapid detection of proteins in IEF without removal of carrier ampholytes.

#### Ordering Information

Cat. No.	Product Description	Quantity
210579	Coomassie Violet R200	25 g 100 g



## ProteoSilver™ and ProteoSilver Plus

Conveniently packaged and highly sensitive, ProteoSilver and ProteoSilver Plus are ideal products for any proteomics scientist. Both kits contain prepared solutions of silver staining reagents along with detailed instructions to achieve optimal results. With a detection limit of 0.1 ng/mm<sup>2</sup> of protein (BSA) and an extremely low background, ProteoSilver leads to superior detection of low abundance proteins.

ProteoSilver Plus is MALDI-MS compatible and does not contain glutaraldehyde, which crosslinks lysine residues, resulting in inaccurate spectra. This kit contains two additional reagents for destaining an excised protein spot, for those wishing to perform further characterization through tryptic digest and MALDI-MS analysis.

Both kits contain sufficient reagents for staining 25 mini-gels.

### Features and Benefits

- Pre-mixed and pre-weighed solutions reduce time and cost of purchasing and preparing individual components
- High sensitivity and low background ensure very low abundance proteins can be detected and resolved from other proteins
- MALDI-compatible. Protein spots of interest can be further characterized by mass spectrometry using ProteoSilver Plus

### Ordering Information

Cat. No.	Product Description	Quantity
<b>PROTSIL1</b>	ProteoSilver	1 kit
<b>PROTSIL2</b>	ProteoSilver Plus	1 kit



ProteoSilver



ProteoSilver Plus

### Gel Stained with ProteoSilver



4 µg of *E. coli* whole cell extract was separated by IEF using a ProteoGel™ IPG strip (pH 3-10) (I2531), equilibrated using ProteoGel IPG Equilibration Buffer (I7281), and run on a Tris-Acetate 2D 8-18% gel. Following electrophoresis, the gel was stained with ProteoSilver (PROTSIL1).

# Electrophoresis

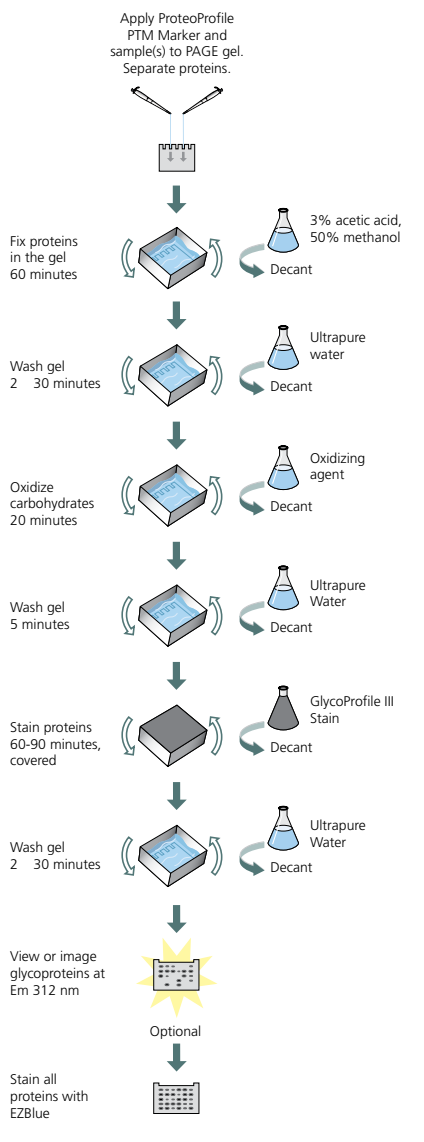


## GlycoProfile™ III Fluorescent Glycoprotein Staining Kit

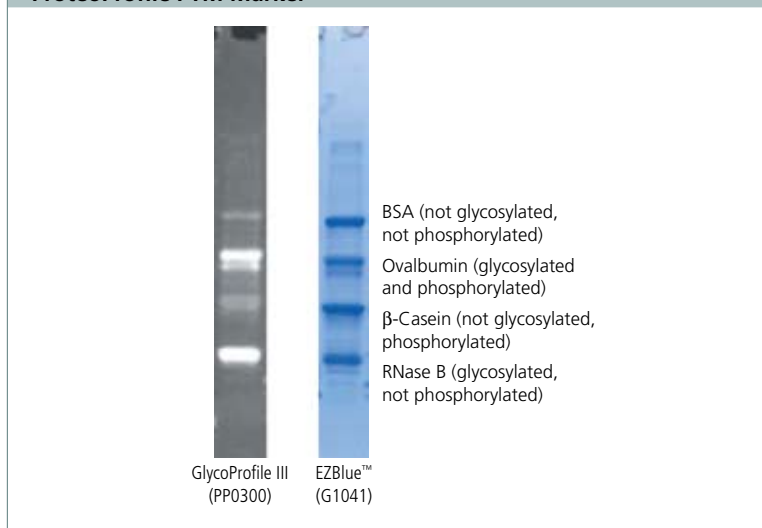
Identify glycoproteins with superior selectivity using Sigma's new GlycoProfile III. Glycoprotein study, or Glycomics, is a rapidly growing, dynamic new field of research. Accurate initial identification of glycoproteins plays an important role in this research. Sigma understands and meets your needs with the most selective glycoprotein detection product available.

ProteoProfile™ PTM Marker (Cat. No. P1745) contains a mix of glycosylated, phosphorylated and unmodified proteins and is available individually as well as with PP0300.

### GlycoProfile III Procedure



### ProteoProfile PTM Marker



Superior Selectivity ProteoProfile PTM Marker (P1745), containing glycosylated and non-glycosylated proteins, was separated by electrophoresis on a 4-20% SDS-PAGE gel. The gel was stained with GlycoProfile III (PP0300) (left), fluorescently imaged, and then stained for total protein with EZBlue Gel Staining Reagent (G1041) (right). Each band represents approximately 300 ng of protein.

### Ordering Information

Cat. No.	Product Description	Quantity
<b>PP0300</b>	GlycoProfile III	1 kit
<b>P1745</b>	ProteoProfile PTM Marker	0.1 ml

## SYPRO® Ruby Gel Stain

Molecular Probes' SYPRO Ruby gel stain is a ready-to-use, ultra sensitive, luminescent stain for the detection of proteins separated by PAGE. Designed especially for 2D PAGE, SYPRO Ruby also performs impressively in PAGE and IEF gels. Ex/Em = 280, 450/610 nm

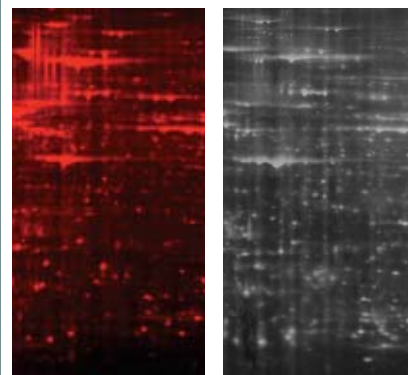
### Features and Benefits

- Uses a simple staining protocol with no possibility of over-staining
- Delivers a linear quantitation range over three orders of magnitude
- Stains glycoproteins, lipoproteins, calcium binding proteins, fibrillar proteins, and others
- Will not stain extraneous nucleic acids
- Sensitive to 1 ng of protein

### Ordering Information

Cat. No.	Product Description	Quantity
<b>S4942</b>	SYPRO Ruby Gel Stain	1 kit

### SYPRO Ruby



SYPRO Ruby Gel Stain compared to a silver stain. Proteins from a fibroblast cell lysate were run on identical 2D gels and stained with SYPRO Ruby protein gel stain (left) or silver stain (right). The grayscale values of the gel stained with SYPRO Ruby dye have been inverted for easier comparison with the silver-stained gel.



See SYPRO Marker on page 69.

## SYPRO Tangerine Gel Stain

Molecular Probes' SYPRO Tangerine gel stain is an extremely versatile stain for proteins in SDS gels. Proteins stained without fixation can be used for zymography (in-gel enzyme activity) assays. Stained proteins can also be eluted from gels and used for further analysis. The stain does not alter protein structure and does not interfere with mass spectrometry. In addition, staining does not interfere with the transfer of proteins to membranes, allowing visualization before proceeding with Western blotting. Ex/Em = 300, 490/640 nm

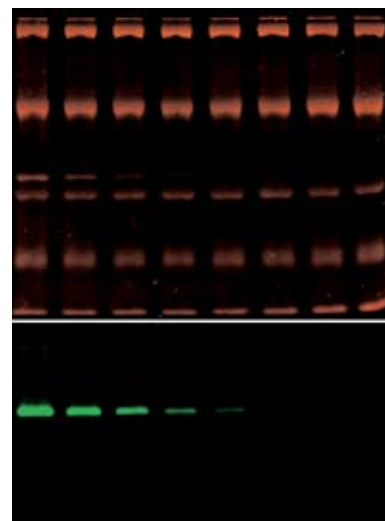
### Features and Benefits

- Detects 4-8 ng of protein per mini-gel band
- Staining is complete in less than an hour
- Selectively detects proteins without staining nucleic acids or lipopolysaccharide contaminants

### Ordering Information

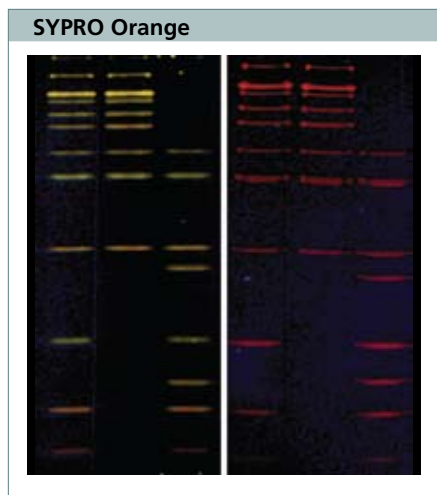
Cat. No.	Product Description	Quantity
<b>S5942</b>	SYPRO Tangerine Gel Stain	1 kit

### SYPRO Tangerine



SYPRO Tangerine Gel Stain zymographic detection of  $\beta$ -D-glucuronidase activity after visualization of total protein patterns using SYPRO Tangerine Gel Stain. Molecular weight standards containing decreasing amounts of *E. coli*  $\beta$ -glucuronidase were run on identical SDS-polyacrylamide gels and stained with SYPRO Tangerine Gel Stain (top) followed by incubation with ELF 97 D-glucuronidase substrate to detect the activity of  $\beta$ -D-glucuronidase (bottom).

# Electrophoresis



Protein Molecular Weight Standards separated on identical 12% SDS-PAGE gels and then stained with either SYPRO Orange (left) or SYPRO Red (right) protein gel stains.

## SYPRO® Orange Gel Stain

Molecular Probes' SYPRO Orange protein gel stain provides fast, simple, sensitive staining of proteins in electrophoretic gels.

### Features and Benefits

- Detect 4-8 ng of protein per mini-gel band
- Minimize protein-to-protein variability through increased staining consistency and eliminate negative staining
- Fluorescence intensity is linear with protein quantity over three orders of magnitude, much broader than Coomassie® or silver staining can provide

### Ordering Information

Cat. No.	Product Description	Quantity
<b>S5692</b>	SYPRO Orange Gel Stain	1 kit

## SYPRO Red Gel Stain

Molecular Probes' SYPRO Red protein gel stain provides fast, simple, sensitive staining of proteins in electrophoretic gels.

### Features and Benefits

- Detect 4-8 ng of protein per mini-gel band
- Minimize protein-to-protein variability through increased staining consistency and eliminate negative staining
- Fluorescence intensity is linear with protein quantity over three orders of magnitude, much broader than Coomassie® or silver staining can provide

### Ordering Information

Cat. No.	Product Description	Quantity
<b>S5817</b>	SYPRO Red Gel Stain	1 kit

## SYPRO Protein Gel Starter Kit

The SYPRO gel starter kit includes three fluorescent protein stains (SYPRO Orange, SYPRO Red, and SYPRO Tangerine) as well as a SYPRO photographic filter. Proteins as small as 6.5 kDa can be detected with no observed staining of lipopolysaccharides or nucleic acids.

### Ordering Information

Cat. No.	Product Description	Quantity
<b>SY0100</b>	SYPRO Protein Gel Starter Kit	1 kit

## Alcian Blue 8GX

Alcian Blue 8GX is suitable for detection of glycoproteins on nitrocellulose and in PAGE gels. Alcian Blue 8GX reacts with sulfate and carboxylate functional groups. The interaction of Alcian Blue (cationic) and polyanionic glycoproteins is influenced by pH; both sulfate and carboxylate groups will react at pH 2.5, but sulfate groups alone react at pH 1.

### Ordering Information

Cat. No.	Product Description	Quantity
<b>A3157</b>	Alcian Blue 8GX	10 g 25 g

## Amido Black Staining Solution, 2x concentrate

Amido Black Staining Solution is designed for rapid staining of protein bands on nitrocellulose membranes. Amido Black Staining Solution facilitates visualization of low concentration proteins with a low background. Proteins can be easily destained with 25% (v/v) isopropanol and 10% (v/v) acetic acid for further analysis. Amido black is also compatible with PAGE gels. Each bottle of 2x concentrate dilutes to 500 ml with water.

### Ordering Information

Cat. No.	Product Description	Quantity
<b>A8181</b>	Amido Black Staining Solution 2x Concentrate	1 btl

## Eosin Y

Eosin Yellowish reversibly stains peptides and proteins dark red following SDS-PAGE. Proteins can then be recovered from the gel and further characterized.

### Ordering Information

Cat. No.	Product Description	Quantity
<b>45235</b>	Eosin Y	25 g 100 g

## Fast Green FCF

Fast Green FCF is used for protein detection and quantitation in native PAGE, SDS-PAGE, and IEF gels. Following staining, protein concentration can be measured at 625 nm. Fast Green staining is linear over a wider range of detection than Brilliant Blue R. It is especially well suited to IEF because it does not bind to ampholytes.

### Ordering Information

Cat. No.	Product Description	Quantity
<b>F7252</b>	Fast Green FCF	5 g 25 g

## Fixing Solution, 5x concentrate

Fixing solution prevents diffusion or loss of proteins prior to staining with a visualization reagent. 1x fixing solution contains 12% (w/v) trichloroacetic acid and 3.5% (w/v) sulfosalicylic acid. Suitable for SDS-PAGE, non-denaturing PAGE, and IEF.

### Ordering Information

Cat. No.	Product Description	Quantity
<b>F7264</b>	Fixing Solution, 5x concentrate	500 ml 1 L

## Fluorescamine

This reagent reacts readily with primary amino groups in amino acids and peptides to form highly-fluorescent compounds.

### Ordering Information

Cat. No.	Product Description	Quantity
<b>F9015</b>	Fluorescamine	25 mg 100 mg 1 g

# Electrophoresis

## Glycoprotein Detection Kit

The glycoprotein detection kit is designed to selectively stain glycoproteins in polyacrylamide gels and membranes using a modification of the Periodic Acid-Schiff (PAS) method. Staining of sugar moieties of glycoproteins yields magenta bands with a colorless background. The detection limits using this kit are 25-100 ng of carbohydrate per band. Each kit contains sufficient materials for 10 mini-gels (10 × 10 cm).

### Ordering Information

Cat. No.	Product Description	Quantity
<b>GLYCOPRO</b>	Glycoprotein Detection Kit	1 kit

## Gold, Colloidal

As a widely used protein and polysaccharide marker for electron microscopy, colloidal gold is a useful general stain for proteins immobilized on nitrocellulose membranes following PAGE.

### Ordering Information

Cat. No.	Product Description	Quantity
<b>50755</b>	Gold, Colloidal	500 ml

## Naphthol Blue Black

Naphthol blue black dye can be used to stain proteins on polyacrylamide gels, agarose gels, and nitrocellulose membranes. After electrophoresis, fixing the proteins in the gel is recommended. The gel can then be stained with 0.1% Naphthol Blue Black in 7% (v/v) acetic acid for at least 2 hours and destained with a solution of 7% (v/v) acetic acid. Detection sensitivity is ~20% that of Coomassie® Blue R.

### Ordering Information

Cat. No.	Product Description	Quantity
<b>N3393</b>	Naphthol Blue Black	25 g 100 g

## Oil Red O

Oil Red O stain is suitable as a lipid/lipoprotein stain on cellulose acetate. A 2% stock solution in methanol is prepared and diluted with sodium hydroxide immediately before staining. The membrane is stained for approximately one hour and then destained in a methanol glycerol solution.

### Ordering Information

Cat. No.	Product Description	Quantity
<b>O9755</b>	Oil Red O	25 g 100 g

## Ponceau S

Ponceau S may be used to prepare a stain for rapid reversible detection of protein bands on nitrocellulose or PVDF membranes (Western blotting), as well as on cellulose acetate membranes. Common stain formulations include 0.1% (w/v) Ponceau S in 5% acetic acid or 2% (w/v) Ponceau S in 30% TCA and 30% sulfosalicylic acid.

### Ordering Information

Cat. No.	Product Description	Quantity
<b>P3504</b>	Ponceau S	10 g 50 g 100 g

## Ponceau S Solution

Ponceau S Solution is a ready-to-use, reversible staining solution designed for rapid (5 minute) staining of protein bands on nitrocellulose or PVDF membranes (Western blots), as well as cellulose acetate membranes. Ponceau S stain is easily reversed with water washes, facilitating subsequent immunological detection.

### Ordering Information

Cat. No.	Product Description	Quantity
<b>P7170</b>	Ponceau S Solution	1 L



## Reversible Protein Detection Kit for Membranes and Polyacrylamide Gels

The Reversible Protein Detection Kit for Membranes and Polyacrylamide Gels is a unique protein detection product for visualization of proteins on nylon, nitrocellulose, and PVDF membranes, as well as PAGE gels with sensitivity comparable to that of Coomassie stains. Many other stains produce high backgrounds on nylon membranes due to strong charge interactions. Application of activated RPROB produces lavender-stained protein bands, which are easily destained (reversed) with an EDTA solution. Each kit is sufficient for 200 applications (small blots on 8 × 10 cm PAGE gels).

### Ordering Information

Cat. No.	Product Description	Quantity
<b>RPROB</b>	Reversible Protein Detection Kit	1 kit

## Stains-All

Stains-All is uniquely suitable for differential staining of nucleic acids and proteins. RNA bands appear bluish-purple, DNA bands appear blue, and proteins appear red. Typically, PAGE gels are stained in the dark and destained through exposure to light. Staining solutions are commonly made by dissolving the dye in formamide and buffer.

### Ordering Information

Cat. No.	Product Description	Quantity
<b>E9379</b>	Stains-All	1 g 5 g

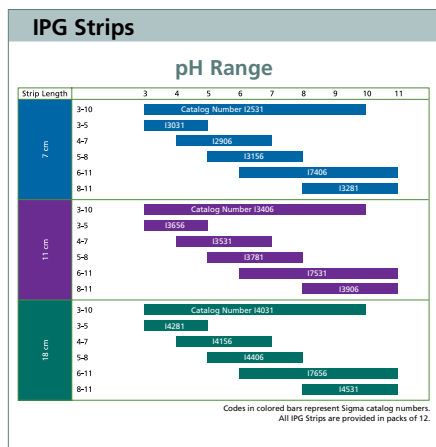
## Sudan Black B

Sudan Black B is a lipochrome (fat soluble dye) used to stain phospholipids, neutral fats, and sterols.

### Ordering Information

Cat. No.	Product Description	Quantity
<b>86015</b>	Sudan Black B	25 g 100 g

# Electrophoresis



## Two-Dimensional Electrophoresis ProteoGel™ IPG Strips

Isoelectric focusing (IEF) represents the first dimension of two-dimensional (2D) electrophoresis, and immobilized pH gradient (IPG) strips facilitate this analysis. Each sample protein applied to an IPG strip will migrate to its isoelectric point (pI), the point at which its net charge is zero. ProteoGel IPG strips are available in three lengths to accommodate various gel sizes and six pH ranges to allow optimal separation.

### Features and Benefits

- Narrow and wide range strips with overlap options, in three lengths, allow optimal resolution of most protein samples
- Control in manufacturing ensures reproducible performance
- IPG strips reduce preparation time and reduce reagent waste
- Strips are labeled for polarity to ensure proper orientation

### Ordering Information

Cat. No.	Product Description	Quantity
<b>I2531</b>	7 cm, pH 3-10, ProteoGel IPG Strips	12 each
<b>I3031</b>	7 cm, pH 3-5, ProteoGel IPG Strips	12 each
<b>I2906</b>	7 cm, pH 4-7, ProteoGel IPG Strips	12 each
<b>I3156</b>	7 cm, pH 5-8, ProteoGel IPG Strips	12 each
<b>I7406</b>	7 cm, pH 6-11, ProteoGel IPG Strips	12 each
<b>I3281</b>	7 cm, pH 8-11, ProteoGel IPG Strips	12 each
<b>I3406</b>	11 cm, pH 3-10, ProteoGel IPG Strips	12 each
<b>I3656</b>	11 cm, pH 3-5, ProteoGel IPG Strips	12 each
<b>I3531</b>	11 cm, pH 4-7, ProteoGel IPG Strips	12 each
<b>I3781</b>	11 cm, pH 5-8, ProteoGel IPG Strips	12 each
<b>I7531</b>	11 cm, pH 6-11, ProteoGel IPG Strips	12 each
<b>I3906</b>	11 cm, pH 8-11, ProteoGel IPG Strips	12 each
<b>I4031</b>	18 cm, pH 3-10, ProteoGel IPG Strips	12 each
<b>I4281</b>	18 cm, pH 3-5, ProteoGel IPG Strips	12 each
<b>I4156</b>	18 cm, pH 4-7, ProteoGel IPG Strips	12 each
<b>I4406</b>	18 cm, pH 5-8, ProteoGel IPG Strips	12 each
<b>I7656</b>	18 cm, pH 6-11, ProteoGel IPG Strips	12 each
<b>I4531</b>	18 cm, pH 8-11, ProteoGel IPG Strips	12 each

## ProteoGel IPG Equilibration Buffer

Following isoelectric focusing, IPG strips must be equilibrated to further denature proteins, maintain solubility, and establish an appropriate pH for SDS-PAGE analysis. Convenient and practical, ProteoGel IPG Equilibration Buffer is compatible with all SDS-PAGE gel systems. Sold as bottles of powder that reconstitute with water to produce 50 ml of solution containing 0.05 M Tris-acetate, 2% SDS, 6 M urea, and 0.0067% bromophenol blue pH 7.0.

### Ordering Information

Cat. No.	Product Description	Quantity
<b>I7281</b>	ProteoGel IPG Equilibration Buffer	1 btl



# Chromatography

## Affinity Chromatography

	Cat. No.	Quantity
<b>Activated/Functionalized Matrices</b>		
Aminoethyl Agarose	<b>A5224</b>	10 ml, 100 ml
Glyoxal Agarose	<b>G6167</b>	10 ml, 100 ml
Activated CH-Sepharose® 4B	<b>A9019</b>	5 g, 15 g
Activated Thiol-Sepharose 4B	<b>T8512</b>	1 g, 5 g
Adipic acid dihydrazide Agarose	<b>A0802</b>	10 ml, 50 ml
$\omega$ -Aminoethyl Agarose	<b>A2419</b>	50 ml
$\omega$ -Aminooctyl Agarose	<b>A5642</b>	10 ml, 100 ml
Cyanogen bromide-activated Agarose	<b>C9210</b>	1 g, 5 g, 15 g
Epichlorohydrin Agarose	<b>E5142</b>	1 g, 5 g
Epoxy-activated Sepharose 6B	<b>E6754</b>	5 g, 15 g
N-Hydroxysuccinimidyl Agarose	<b>H8280</b>	1 ml, 5 ml, 15 ml
<i>p</i> -Nitrophenyl chloroformate-activated Agarose	<b>N7759</b>	10 ml, 50 ml
Periodate-activated Agarose	<b>P9967</b>	5 ml, 50 ml
Thiopropyl-activated Agarose	<b>T5024</b>	5 ml
Vinylsulfone-activated Agarose	<b>V2755</b>	2 g, 10 g
<b>Amino Acid Resins</b>		
L-Arginine Agarose	<b>A1018</b>	5 ml, 25 ml
L-Lysine Agarose	<b>L6132</b>	1 g, 5 g, 15 g
O-Phospho-L-Serine Agarose	<b>P3578</b>	1 g
O-Phospho-L-Tyrosine Agarose	<b>P8438</b>	1 g, 5 g
Poly-L-Lysine Agarose	<b>P6893</b>	5 ml, 50 ml
L-Threonine Agarose	<b>T0387</b>	5 ml
<b>Avidin Biotin Matrices</b>		
Avidin Agarose	<b>A9207</b>	1 ml, 5 ml, 15 ml
Avidin (Monomeric) Agarose	<b>A2036</b>	1 ml, 5 ml
Avidin acrylic beads	<b>A4808</b>	50 units, 100 units
Biotin Agarose	<b>B0519</b>	5 ml, 25 ml
2-Iminobiotin Agarose	<b>I4507</b>	1 ml, 5 ml
Streptavidin Agarose	<b>S1638</b>	1 ml, 5 ml
EZView™ Red Streptavidin Affinity Gel	<b>E5529</b>	1 ml, 5 × 1 ml, 5 ml
SigmaScreen™ Streptavidin High Capacity Coated Plates	<b>S6940</b>	1 each, 5 × 1 each
<b>Carbohydrate Binding Resins</b>		
Concanavalin A from <i>Canavalia ensiformis</i> (Jack Bean) Agarose	<b>C7555</b>	5 ml, 25 ml, 100 ml
Lectin from <i>Arachis hypogaea</i> (peanut) Agarose	<b>L2507</b>	1 ml, 2 ml
Lectin from <i>Artocarpus integrifolia</i> (Jacalin) Agarose	<b>L5147</b>	2 ml, 5 ml
Lectin from <i>Galanthus nivalis</i> (snowdrop) Agarose	<b>L8775</b>	2 ml
Lectin from <i>Helix pomatia</i> Agarose	<b>L8639</b>	1 ml, 5 ml
Lectin from <i>Lens culinais</i> (lentil) Agarose	<b>L4018</b>	1 ml, 5 ml
Lectin from <i>Triticum vulgare</i> Agarose	<b>L1882</b>	1 ml, 5 ml
<b>Carbohydrate Resins</b>		
N-Acetyl-D-galactosamine Agarose	<b>A2787</b>	5 ml, 25 ml
N-Acetyl-D-glucosamine Agarose	<b>A2278</b>	1 ml, 5 ml, 25 ml
<i>p</i> -Aminobenzyl 1-thio- $\beta$ -D-galactopyranoside Agarose	<b>A0414</b>	5 ml, 10 ml, 25 ml

# Chromatography

## Affinity Chromatography (continued)

	Cat. No.	Quantity
<i>Carbohydrate Resins (continued)</i>		
<i>p</i> -Aminophenyl $\beta$ -D-thiogalactopyranoside Agarose	<b>A8648</b>	5 ml, 25 ml
$\alpha$ -Lactose Agarose	<b>L7634</b>	1 ml, 5 ml, 25 ml
Maltoheptaose Agarose	<b>M9676</b>	5 ml, 25 ml
Maltose Agarose	<b>M8896</b>	5 ml
Mannan Agarose	<b>M9917</b>	5 ml, 25 ml
D-Manose Agarose	<b>M6400</b>	5 ml, 10 ml, 25 ml
<i>Chelating Resins</i>		
Chelex 100 sodium form	<b>C7901</b>	25 g, 50 g, 100 g
Tris(carboxymethyl)ethylenediamine Agarose	<b>C4280</b>	1 g
Iminodiacetic acid Agarose	<b>I4758</b>	5 ml, 25 ml, 50 ml
<i>Dye Resins</i>		
Blue dextran Agarose	<b>B3760</b>	5 ml, 25 ml
Cibacron Blue 3GA Agarose	<b>C1535</b>	5 ml, 50 ml, 100 ml
Reactive Blue 4 Agarose	<b>R2507</b>	5 ml, 25 ml
Reactive Green 19 Agarose	<b>R2882</b>	25 ml, 100 ml
Reactive Red 120 Agarose	<b>R6143</b>	10 ml, 50 ml
Reactive Yellow 3 Agarose	<b>R3757</b>	10 ml, 25 ml, 100 ml
<i>Hydrophobic Interactions</i>		
Butyl Agarose	<b>B8645</b>	10 ml, 50 ml
Phenyl Agarose	<b>P8901</b>	50 ml, 100 ml
Octyl Agarose	<b>O6127</b>	10 ml, 50 ml
<i>Immunoaffinity Resins</i>		
Monoclonal Anti-Biotin Agarose	<b>A1559</b>	0.5 ml
Anti-GST Agarose	<b>A8580</b>	1 ml
Monoclonal Anti-Phosphoserine Agarose	<b>A8076</b>	0.5 ml, 1 ml
Monoclonal Anti-Phosphothreonine Agarose	<b>A7951</b>	0.5 ml, 1 ml
Monoclonal Anti-Phosphotyrosine Agarose	<b>A4720</b>	0.5 ml
Anti-BSA Agarose	<b>A4338</b>	1 ml
Anti-Mouse IgG Agarose	<b>A6531</b>	2 ml, 5 ml, 25 ml
Protein A Agarose	<b>P2545</b>	1 ml, 5 ml
EZview™ Red Protein A Affinity Gel	<b>P6486</b>	1 ml, 5 × 1 ml
Protein G Agarose	<b>P7700</b>	100 mg, 250 mg, 1 g
EZview Red Protein G Affinity Gel	<b>E3403</b>	1 ml, 5 × 1 ml
Protein L Agarose	<b>P3351</b>	5 ml
<i>Specialty Resins</i>		
Deoxyribonucleic Acid-Cellulose, Single-stranded from calf thymus DNA	<b>D8273</b>	1 g, 5 g, 10 g
Gelatin Agarose	<b>G5384</b>	5 ml, 10 ml, 25 ml
Glutathione Agarose	<b>G4510</b>	1 ml, 5 ml, 10 ml
Heparin Agarose	<b>H6508</b>	5 ml, 25 ml, 100 ml
Methotrexate Agarose	<b>M0269</b>	10 ml, 25 ml
Pepstatin A Agarose	<b>P2032</b>	5 ml, 10 ml, 25 ml
Polymyxin B Agarose	<b>P1411</b>	5 ml, 10 ml
Trypsin Inhibitor Agarose	<b>T0637</b>	5 ml, 10 ml, 25 ml
Ubiquitin Agarose	<b>U5632</b>	1 ml

## HPLC

HPLC has become a popular tool for analysis of a wide variety of compounds. Using very small, spherical particles of silica or rigid polymers, columns are packed under extreme pressure, eliminating much of the extra volume present in low pressure columns. As a result, HPLC columns are smaller and can generate sharper peaks in less time with less sample and less buffer. HPLC columns are available to meet virtually any analysis application, and some larger columns have been developed for preparative separations.

Supelco, a member of the Sigma-Aldrich family, offers HPLC columns in a variety of formats to meet a wide range of analytical applications. All of these columns are manufactured to exacting specifications and must meet rigorous quality control standards.

This section contains a select list of our most popular HPLC columns. For a complete list of available HPLC columns and accessories, see the Supelco catalog or visit our Web site.

### Discovery® BIO Wide Pore HPLC Columns

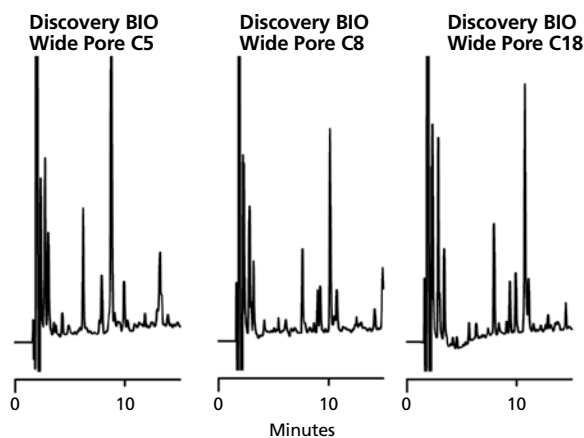
#### Solutions to Protein and Peptide Separation Challenges

Discovery BIO HPLC columns and capillaries provide sensitive, stable, efficient, reproducible separations of proteins and peptides. The different phase chemistries provide unique selectivity increasing your resolution options. Separations are completely scalable from analytical to prep. The low-bleed feature, and microbore and capillary dimensions make them ideal for proteomics and LC/MS applications.

#### Capillary and Microbore Dimensions

With the rapid growth of proteomics, the demand for detailed characterization on smaller sample volumes is increasing. So is the utility of smaller I.D. HPLC columns. Traditional column IDs of 4.6 mm and even 2.1 mm are being replaced by microbore (1 mm I.D.) and capillary (<1 mm I.D.) dimensions. The benefits are two fold: increased sensitivity and decreased sample consumption. Discovery BIO C18 and C5 is available in capillary and microbore dimensions to meet these criteria. Go to [www.sigma-aldrich.com/supelco-bio](http://www.sigma-aldrich.com/supelco-bio) to see the entire Discovery BIO line and download the most recent literature and applications.

#### Elution Profiles of Peptide Fragments



#### Each Discovery BIO Wide Pore Phase Gives Unique Elution Profiles of Carboxymethylated Apohemoglobin Peptide Fragments

Columns: (A) Discovery BIO Wide Pore C5 (Cat. No. 568422U),  
(B) Discovery BIO Wide Pore C8 (Cat. No. 568322U),  
or (C) Discovery BIO Wide Pore C18 (568222U),  
each 15 cm x 4.6 mm, 5  $\mu$ m

Mobile Phase: (A) 95:5, (0.1% TFA in water):(0.1% TFA in  $\text{CH}_3\text{CN}$ );  
(B) 50:50, (0.1% TFA in water):(0.1% TFA in  $\text{CH}_3\text{CN}$ )

Flow Rate: 1.0 ml/min

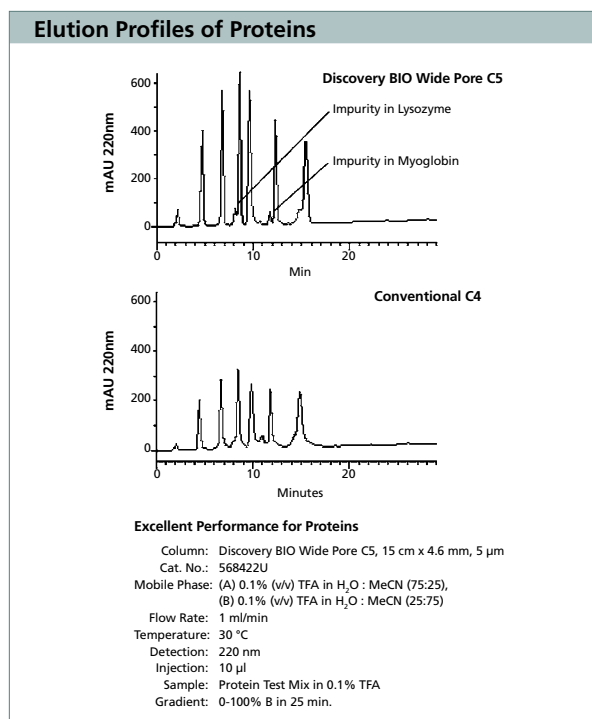
Temperature: 30  $^{\circ}\text{C}$

Detection: 215 nm

Injection: 50  $\mu$ l carboxymethylated apohemoglobin tryptic digest in 50 mM  $\text{NH}_4\text{HCO}_3$

Gradient: 0-100% B in 65 min.

# Chromatography



## Discovery® BIO Wide Pore C5

Discovery BIO Wide Pore C5 was designed for the efficient and reliable separation of proteins and peptides, especially hydrophobic peptides, by RP-HPLC. Long-chain phases, like C8 or C18, are often too hydrophobic for proteins and can cause excessively long retention time or even irreversible binding to the column. For this reason short-chain phases, typically C3 or C4, are often used for RP-HPLC of proteins. However, these short-chain phases are susceptible to hydrolysis resulting in short column lifetime, especially at low pH. The Discovery BIO Wide Pore C5 gives elution order similar to a conventional C4, yet has enhanced pH stability for longer column lifetime.

### Properties

- Bonded phase: Covalently bonded pentylsilane, endcapped
- Silica: Spherical, high purity (<10 ppm metals)
- Particle size: 3, 5, and 10  $\mu$ m
- Pore size: 300 Å
- Surface area: 100 m<sup>2</sup>/g
- %C: approximately 3%
- Coverage: ~4  $\mu$ moles/m<sup>2</sup>

Catalog Number	Length x ID (cm x mm)	Particle Size
Discovery BIO Wide Pore C5 (300 Å, 3.5% Carbon)		
65609U	5 x 0.18	3 $\mu$ m
65611U	10 x 0.18	3 $\mu$ m
65612U	5 x 0.18	5 $\mu$ m
65613U	10 x 0.18	5 $\mu$ m
65614U	15 x 0.18	5 $\mu$ m
65531U	5 x 0.32	3 $\mu$ m
65532U	2 x 4.0	3 $\mu$ m
65533U	15 x 0.32	5 $\mu$ m
65520U	5 x 0.5	3 $\mu$ m
65521U	10 x 0.5	3 $\mu$ m
65522U	15 x 0.5	5 $\mu$ m
65511U	5 x 1	3 $\mu$ m
65512U	10 x 1	3 $\mu$ m
65513U	15 x 1	5 $\mu$ m
567226U	5 x 2.1	3 $\mu$ m
567227U	10 x 2.1	3 $\mu$ m
567228U	15 x 2.1	3 $\mu$ m
568400U	5 x 2.1	5 $\mu$ m
568401U	10 x 2.1	5 $\mu$ m
568402U	15 x 2.1	5 $\mu$ m
568403U	25 x 2.1	5 $\mu$ m
568410U	5 x 4	5 $\mu$ m
568411U	10 x 4	5 $\mu$ m
568412U	15 x 4	5 $\mu$ m

Catalog Number	Length x ID (cm x mm)	Particle Size
Discovery BIO Wide Pore C5 (300 Å, 3.5% Carbon) cont'd		
568413U	25 x 4	5 $\mu$ m
567229U	5 x 4.6	3 $\mu$ m
567230U	10 x 4.6	3 $\mu$ m
567231U	15 x 4.6	3 $\mu$ m
568420U	5 x 4.6	5 $\mu$ m
568421U	10 x 4.6	5 $\mu$ m
568422U	15 x 4.6	5 $\mu$ m
568423U	25 x 4.6	5 $\mu$ m
567232U	25 x 4.6	10 $\mu$ m
568430U	25 x 10	5 $\mu$ m
567233U	5 x 10	10 $\mu$ m
567234U	15 x 10	10 $\mu$ m

### Supelguard Cartridges

567278U	2 x 2.1	3 $\mu$ m
567279U	2 x 2.1	3 $\mu$ m
568470U	2 x 2.1	5 $\mu$ m
568471U	2 x 2.1	5 $\mu$ m
567280U	2 x 4.0	3 $\mu$ m
567281U	2 x 4.0	3 $\mu$ m
568472U	2 x 4.0	5 $\mu$ m
568473U	2 x 4.0	5 $\mu$ m
567286U	7.5 x 4.6	10 $\mu$ m



## Discovery BIO Wide Pore C18 Columns

Ideal for high resolution peptide mapping, and synthetic and native peptide separations.

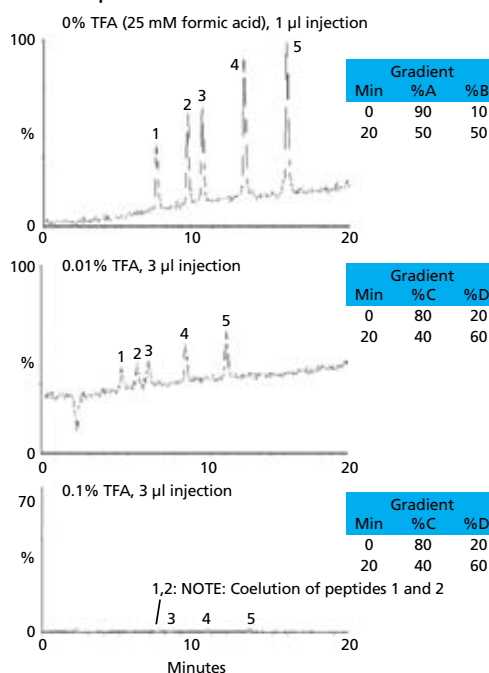
Peptide maps generated by RP-HPLC provide valuable information about protein structure, stability, and purity. To be effective, the RP-HPLC column must be able to resolve a high percentage of the peptides in the sample. The more peptides, the better the information. Discovery BIO Wide Pore C18 gives unsurpassed RP-HPLC resolution of peptide maps from tryptic digests. The improvements in silica and bonded phase chemistry we've incorporated into the Discovery BIO Wide Pore line improve resolution by increasing efficiency and reducing the peak tailing. An added benefit to this is the ability to analyze peptides without TFA in the mobile phase, thereby, increasing the LC/MS signal.

### Properties

- Bonded phase: Covalently bonded octadecylsilane, endcapped
- Silica: Spherical, high purity (<10 ppm metals)
- Particle size: 3, 5, and 10  $\mu\text{m}$
- Pore size: 300  $\text{\AA}$
- Surface area: 100  $\text{m}^2/\text{g}$
- %C: ~9%
- Coverage: ~4  $\mu\text{moles}/\text{m}^2$

### Mass Spectrometry Signals of Peptides

Peptide 1: ac-RGAGGLGLGK-amide  
 Peptide 2: ac-RGGGGLGLGK-amide  
 Peptide 3: ac-RGAGGLGLGK-amide  
 Peptide 4: ac-RGVGGLGLGK-amide  
 Peptide 5: ac-RGVVGLGLGK-amide



### Effect of Chromatographic Conditions on MS Signals of Peptides

Column: Discovery BIO Wide Pore C18, 15 cm x 2.1 mm, 3  $\mu\text{m}$   
 Cat. No.: 567202U  
 Mobile Phase: (A) 25 mM formic acid in water  
 (B) 50:50, (25 mM formic acid in water):  
 (20 mM formic acid in MeCN)<sup>1</sup>  
 (C) 0.01 or 0.1% TFA in water  
 (D) 50:50 (0.01 or 0.1% TFA in water):  
 (0.01 or 0.1% TFA in MeCN)  
 Flow Rate: 0.208  $\text{ml}/\text{min}^2$   
 Detection: +ES  
 Temperature: ambient  
 Injection: 1  $\mu\text{l}$  or 3  $\mu\text{l}$   
 Sample: RP Peptide Performance Standard, p/n RPS-P0010  
 (Alberta Peptide Institute)

1. Molarity of formic acid adjusted to provide minimum baseline drift.
2. Linear velocity equal to 1  $\text{ml}/\text{min}$  on 4.6 mm ID columns.

# Chromatography

Catalog Number	Length × ID (cm × mm)	Particle Size
Discovery® Bio Wide Pore C18 (300 Å, 9.2% Carbon)		
65603U	5 × 0.18	3 µm
65604U	10 × 0.18	3 µm
65606U	5 × 0.18	5 µm
65607U	10 × 0.18	5 µm
65608U	15 × 0.18	5 µm
65526U	5 × 0.32	3 µm
65527U	10 × 0.32	3 µm
65529U	15 × 0.32	5 µm
65517U	5 × 0.5	3 µm
65518U	10 × 0.5	3 µm
65519U	15 × 0.5	5 µm
65504U	5 × 1	3 µm
65506U	10 × 1	3 µm
65508U	15 × 1	5 µm
65509U	25 × 1	5 µm
567200U	5 × 2.1	3 µm
567201U	10 × 2.1	3 µm
567202U	15 × 2.1	3 µm
568200U	5 × 2.1	5 µm
568201U	10 × 2.1	5 µm
568202U	15 × 2.1	5 µm
568203U	25 × 2.1	5 µm
568210U	5 × 4	5 µm
568211U	10 × 4	5 µm
568212U	15 × 4	5 µm
568213U	25 × 4	5 µm
567203U	5 × 4.6	3 µm
567204U	10 × 4.6	3 µm
567205U	15 × 4.6	3 µm
568220U	5 × 4.6	5 µm
568221U	10 × 4.6	5 µm
568222U	15 × 4.6	5 µm
568223U	25 × 4.6	5 µm
567206U	25 × 4.6	10 µm
568230U	25 × 10	5 µm
567207U	5 × 10	10 µm
567208U	15 × 10	10 µm
567209U	25 × 10	10 µm
567210U	5 × 21.2	10 µm
567211U	15 × 21.2	10 µm
567212U	25 × 21.2	10 µm

Catalog Number	Length × ID (cm × mm)	Particle Size
Supelguard Cartridges		
567270U	2 × 2.1	3 µm
567271U	2 × 2.1	3 µm
567272U	2 × 4	3 µm
567273U	2 × 4	3 µm
568270U	2 × 2.1	5 µm
568271U	2 × 2.1	5 µm
568272U	2 × 4	5 µm
568273U	2 × 4	5 µm
567282U	1 × 10	10 µm

## The shape of Sigma® Life Science



**Shaped by innovation,** Sigma Life Science continues our strong tradition — from the original supplier of ATP to a leading solution provider for the revolutionary technology of RNAi.

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Our Innovation, Your Research  
Shaping the Future of Life Science



## Discovery BIO Wide Pore C8

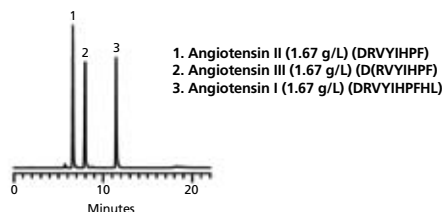
Discovery BIO Wide Pore C8 is an RP-HPLC phase for proteins and peptides that has hydrophobicity intermediate between the Discovery BIO Wide Pore C5 and the Discovery BIO Wide Pore C18. The difference in hydrophobicity gives it unique selectivity relative to these other phases. It is ideal for peptide mapping because it provides complementary information compared to a C18 separation. Because of its intermediate hydrophobicity we also recommend it for method development or scouting work. As with all Discovery BIO Wide Pore phases, the C8 phase gives efficient, symmetrical peaks, exceptional stability, long column lifetime, and LC/MS compatibility.

### Properties

- Bonded phase: Covalently bonded octylsilane, endcapped
- Silica: Spherical, high purity (<10 ppm metals)
- Particle size: 3, 5, and 10  $\mu\text{m}$
- Pore size: 300  $\text{\AA}$
- Surface Area: 100  $\text{m}^2/\text{g}$
- %C: ~5%
- Coverage: ~4  $\mu\text{moles}/\text{m}^2$

Catalog Number	Length $\times$ ID (cm $\times$ mm)	Particle Size
Discovery BIO Wide Pore C8 (300 $\text{\AA}$ , 5.0% Carbon)		
567213U	5 $\times$ 2.1	3 $\mu\text{m}$
567214U	10 $\times$ 2.1	3 $\mu\text{m}$
567215U	15 $\times$ 2.1	3 $\mu\text{m}$
568300U	5 $\times$ 2.1	5 $\mu\text{m}$
568301U	10 $\times$ 2.1	5 $\mu\text{m}$
568302U	15 $\times$ 2.1	5 $\mu\text{m}$
568303U	25 $\times$ 2.1	5 $\mu\text{m}$
568310U	5 $\times$ 4	5 $\mu\text{m}$
568311U	10 $\times$ 4	5 $\mu\text{m}$
568312U	15 $\times$ 4	5 $\mu\text{m}$
568313U	25 $\times$ 4	5 $\mu\text{m}$
567216U	5 $\times$ 4.6	3 $\mu\text{m}$
567217U	10 $\times$ 4.6	3 $\mu\text{m}$
567218U	15 $\times$ 4.6	3 $\mu\text{m}$
568320U	5 $\times$ 4.6	5 $\mu\text{m}$
568321U	10 $\times$ 4.6	5 $\mu\text{m}$
568322U	15 $\times$ 4.6	5 $\mu\text{m}$
568323U	25 $\times$ 4.6	5 $\mu\text{m}$
567219U	25 $\times$ 4.6	10 $\mu\text{m}$
568330U	25 $\times$ 10	5 $\mu\text{m}$
567220U	5 $\times$ 10	10 $\mu\text{m}$
567221U	15 $\times$ 10	10 $\mu\text{m}$
567222U	25 $\times$ 10	10 $\mu\text{m}$
567223U	5 $\times$ 21.2	10 $\mu\text{m}$
567224U	15 $\times$ 21.2	10 $\mu\text{m}$
567225U	25 $\times$ 21.2	10 $\mu\text{m}$

### Resolution of Angiotensins



#### Resolution of Angiotensins at Neutral pH

Column: Discovery BIO Wide Pore C8, 15 cm  $\times$  4.6 mm, 5  $\mu\text{m}$   
 Cat. No. 568322U  
 Mobile Phase: (A) 10 mM  $\text{NH}_4\text{H}_2\text{PO}_4/\text{NH}_4\text{OH}$ , pH 7;  
 (B) 50:50, (20 mM  $\text{NH}_4\text{H}_2\text{PO}_4/\text{NH}_4\text{OH}$ , pH 7):MeCN  
 Flow Rate: 1 ml/min  
 Temperature: 30  $^\circ\text{C}$   
 Detection: 215 nm  
 Injection: 6  $\mu\text{l}$  in water  
 Gradient: 30-60% B in 15 min

Catalog Number	Length $\times$ ID (cm $\times$ mm)	Particle Size
Supelguard Cartridges		
567274U	2 $\times$ 2.1	3 $\mu\text{m}$
567275U	2 $\times$ 2.1	3 $\mu\text{m}$
568370U	2 $\times$ 2.1	5 $\mu\text{m}$
568371U	2 $\times$ 2.1	5 $\mu\text{m}$
567276U	2 $\times$ 4	3 $\mu\text{m}$
567277U	2 $\times$ 4	3 $\mu\text{m}$
568372U	2 $\times$ 4	5 $\mu\text{m}$
568373U	2 $\times$ 4	5 $\mu\text{m}$
567284U	1 $\times$ 10	10 $\mu\text{m}$