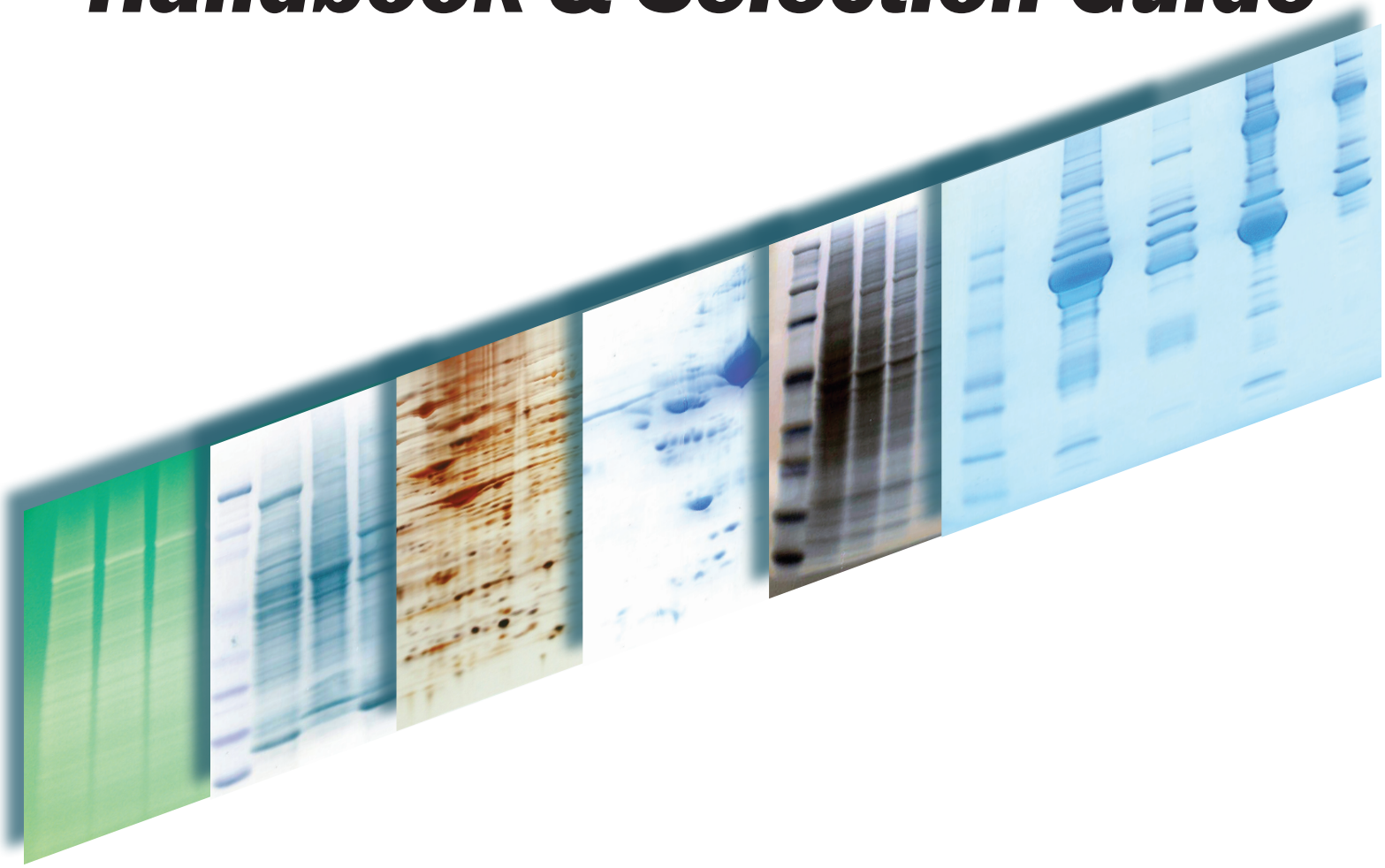
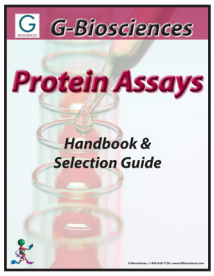
G-Biosciences

Protein Electrophoresis

Handbook & Selection Guide





- Protein Estimation Assays
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- SAM Methyltransferase Assays
- Protease Assays
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- Peroxide Assay

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- Electrophoresis Clean-Up
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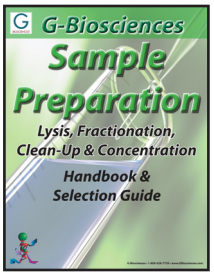

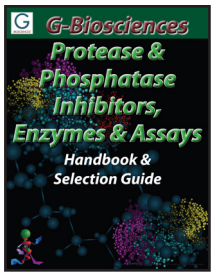

- Protease Inhibitor Cocktails
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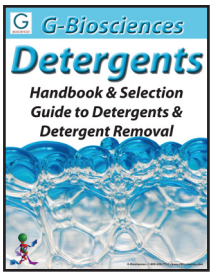

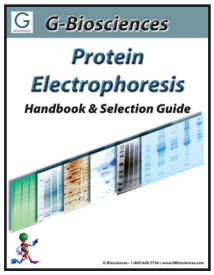

- Gel Preparation Chemicals
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- Detection Reagents
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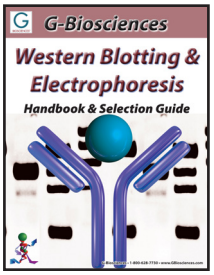

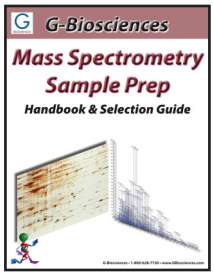

- Protein Sample Preparation
- Protein Clean-Up Systems
- Electrophoresis Reagents
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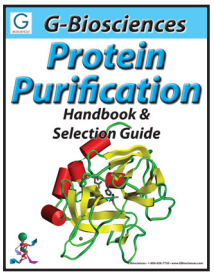
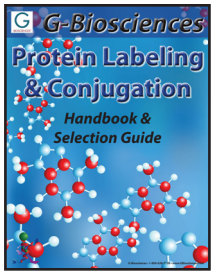
- Activated Resins
- Buffers & Reagents





- Biotin Labeling
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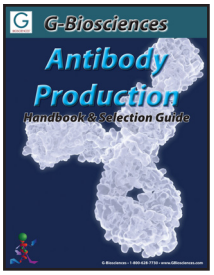

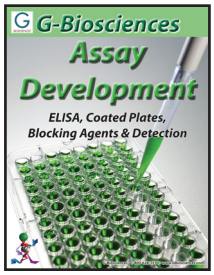

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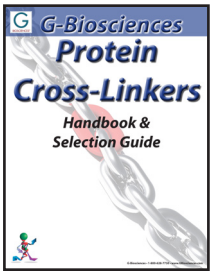
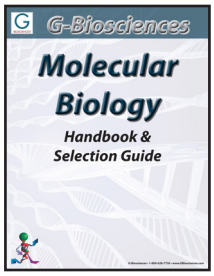
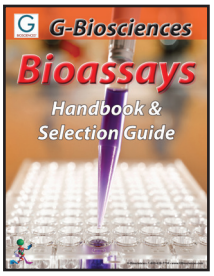




- DNA Isolation
- Transformation & Screening
- Polymerase Chain Reaction
- Agarose Electrophoresis
- RNA Isolation
- Yeast Transformation

- Apoptosis Assays
- Cytotoxicity Assays
- SAM Methyltransferase Assays
- Protease Assays
- Phosphatase Assays
- Peroxide Assay
- ELISA



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Introduction

Protein electrophoresis is a routinely used technique in proteomic research that separates proteins based on their physical properties, including their molecular weight and their native charge (isoelectric point (pI)). The standard matrix used for protein separation is polyacrylamide in a process commonly known as PAGE (polyacrylamide gel electrophoresis).

Protein electrophoresis is a relatively simple, rapid and highly sensitive tool to study the properties of proteins. It is the principle tool in analytical chemistry, biochemistry, and molecular biology. The separation of proteins by electrophoresis is based on the fact that charged molecules will migrate through a matrix upon application of an electrical field.

The chemical agents used to form polyacrylamide are monomeric acrylamide and N, N'-methylene-bis-acrylamide (bis-acrylamide). The most popular method for polymerizing acrylamide and bis-acrylamide is using TEMED (tetramethylethylenediamine) and ammonium persulfate.

The size of pores in the polyacrylamide gel matrix is determined by the amount of total acrylamide used per unit volume and relative percentage of bis-acrylamide used. The effective range of polyacrylamide gel is between 3-30%.

Several different types of PAGE are used as an analytical or purification tool for proteins.

Non-Denaturing PAGE (Native PAGE): Separates proteins based on their native charge and mass.

SDS-PAGE: The most commonly used PAGE technique that separates proteins by their mass.

2D PAGE (Two dimensional PAGE): Combines two separations to first separate proteins by their isoelectric point and then by mass.

Two fundamentally different types of gel system exist, non-dissociating (non-denaturing) and dissociating (denaturing). Non-dissociating (non-denaturing) system is designed to separate native protein under conditions that preserve protein function and activity. In contrast, a dissociating system is designed to denature protein into their constituent's polypeptides and hence examines the polypeptide composition of samples.

Sodium dodecyl sulfate (SDS) is commonly used for denaturing proteins into their constituents and the method is known as sodium dodecyl sulfate (SDS)-polyacrylamide gel electrophoresis (SDS-PAGE). Sodium dodecyl sulfate (SDS)-polyacrylamide gel electrophoresis is the most commonly used system and this separates proteins strictly by their size.

SDS-PAGE uses two types of buffer systems: the continuous buffer system and the discontinuous buffer system. In the continuous buffer system the pH of the gel matrix remains constant throughout the separation. In contrast, the discontinuous buffer system consists of a narrow layer of stacking gel (of large pore size and acidic pH) above the main separating or resolving gel matrix of alkaline pH (pH 8.8). The stacking gel concentrates the protein sample before entering the separating gel and hence enhancing resolution. SDS-PAGE with a discontinuous buffer system is the most popular electrophoresis technique used to analyze polypeptides.

In SDS-PAGE, the protein mixture is denatured by heating at 100°C in the presence of excess SDS and a reducing reagent is employed to break disulfide bonds. Under these conditions, all reduced polypeptide bind the same amount of SDS on a weight basis (1.4g SDS/g polypeptide) independent of the amino acid composition and sequence of the protein. The SDS-protein complex forms a rod with its length proportional to the molecular weight of the protein. All proteins are now negatively charged with similar charge density and thus can be separated on the basis of their size only.

SDS-PAGE is used mainly for the following purpose:

1. Estimation of protein size.
2. Determination of protein subunits or aggregation structures.
3. Estimation of protein purity.
4. Protein quantitation.
5. Monitoring protein integrity.
6. Comparison of the polypeptide composition of different samples.
7. Analysis of the number and size of polypeptide subunits.
8. Post-electrophoresis applications, such as Western blotting.

2D Electrophoresis

Two-dimensional gel electrophoresis is a powerful tool for analyzing proteins and peptides based on their charge and mass. Unfortunately, 2D electrophoresis often leads to frustration due to issues with achieving good resolution and reproducibility.
The basic principle of 2D electrophoresis is to use two separating techniques:

1. ***Isoelectric Focusing (IEF):*** Proteins or peptides are separated in an immobilized pH gradient based on their isoelectric point
2. ***SDS-PAGE:*** The IEF strip containing the separated proteins is then layed on a SDS-PAGE gel to further separate the proteins by mass.

G-Biosciences has a large range of products known as the FOCUS™ line of products. These products are designed to be fully compatible with 2D electrophoresis and include products for sample preparation, sample clean-up and the actual electrophoresis of the proteins or peptides.

SDS PAGE Gel Recipes

G-Biosciences provides high quality reagents for the preparation of homemade gels, including acrylamide, bis-acrylamide, TEMED, APS and buffers. The table below provides a recipe guide for the preparation of SDS-PAGE gels.

Distilled Water (ml)	11.6	19.3	17.3	15.3	13.3	11.3
40% Acrylamide[1] (ml) *(Cat. No. 786-502)*	3	4	6	8	10	12
1.5M Tris, pH8.8 (ml)	-	8				
0.5M Tris, pH6.8 (ml)	5	-				
10% SDS (µl) *(Cat. No. R014)*	200	320				
10% APS (µl) *(Cat. No. 786-510)*	200	320				
TEMED (µl) *(Cat. No. RC-101)*	20	32				

[1] 40% Solution, 38.96% solution containing acrylamide (40%) and bisacrylamide (1.04%) for cross-linker ratio of 37.5:1

Acrylamide/ Bisacrylamide

Acrylamide (Electrophoresis grade) is supplied as a powder or a 40% solution in ultrapure water.

Bisacrylamide (Bis (N,N'-methylenebisacrylamide)) (Electrophoresis grade) is supplied as a powder or a 2% solution in ultrapure water.

Acrylamide/Bisacrylamide Solutions are available at the most common ratios (37.5:1 or 29:1) for use in protein and nucleic acid electrophoresis. The concentration is based on the total weight of both the acrylamide and bisacrylamide. Supplied as 40% solutions Solutions prepared from electrophoresis grade acrylamide and bis-acrylamide in ultra-pure water.

Acrylamide/Bisacrylamide Powders Ready to reconstitute dry powder blends are accurately pre-blended to produce a 40% (w/v) stock solution for use in protein and nucleic acid electrophoresis. The concentration is based on the total weight of both the acrylamide and bis-acrylamide. Available at the most common ratios (37.5:1 or 29:1. Eliminates the need to weigh toxic acrylamide and bisacrylamide.

Cat. No.	Description	Size
RC-001	Acrylamide Powder	100g
RC-002	Acrylamide Powder	500g
786-508	Acrylamide Solution, 40%	500ml
RC-024	Bis (N,N'-methylenebisacrylamide) Powder	50g
RC-025	Bis (N,N'-methylenebisacrylamide)	250g
786-509	Bis (N,N'-methylenebisacrylamide) Solution, 2%	500ml
786-502	Acrylamide/ Bisacrylamide (37.5:1); 40% Solution 38.96% solution containing acrylamide (40%) and bisacrylamide (1.04%) for cross-linker ratio of 37.5:1	500ml
786-503	Acrylamide/ Bisacrylamide (37.5:1); Premixed powder	40g
786-504	Acrylamide/ Bisacrylamide (37.5:1); Premixed powder	200g
786-505	Acrylamide/ Bisacrylamide (29:1); 40% Solution 40% solution containing acrylamide (38.67%) and bisacrylamide (1.33%) for cross-linker ratio of 29:1	500ml
786-506	Acrylamide/ Bisacrylamide (29:1); Premixed powder	40g
786-507	Acrylamide/ Bisacrylamide (29:1); Premixed powder	200g

SDS (Sodium Dodecyl Sulfate)

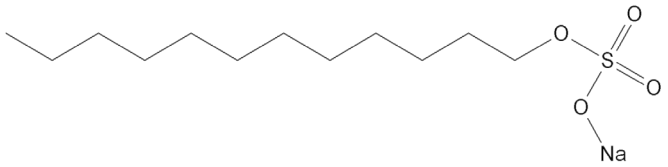


Figure 1: Structure of SDS.

Type: Anionic detergent
Mol. Formula: $C_{12}H_{25}NaO_4S$
Mol Weight: 288.38
Form: White to off white powder, 10% or 20% solution
Purity: >99%
Solubility: Water
Critical micelle concentration (CMC): 7-10mM (25°C)
Aggregation number: 62
Cloud point: >100°C
Average micellar weight: 18,000
Application: Capable of almost complete disruption of cellular structures and denaturation. Used for solubilization of a wide variety of proteins, including membrane proteins, for electrophoretic separation. Detergent molecules tightly bind with the protein molecules masking their native charge and rendering the protein molecules with an overall negative charge.

Cat. No.	Description	Size
DG092	SDS	100g
DG093	SDS	500g
R014	SDS, 10% Solution	100ml
786-016	SDS, 20% Solution	500ml
786-017	SDS, 20% Solution	1L

Ammonium Persulfate (APS)

The catalyst for the polymerization of polyacrylamide gels. APS is available as a ready to use tablets or as a powder. For the tablets, simply add 1 tablet to 1.5ml ultrapure water for a 10% solution.

FEATURES

- Available as tablets or powder
- Synonym: Ammonium peroxodisulfate
- CAS#: 7727-54-0
- Molecular Formula: $H_8N_2O_8S_2$
- Molecular Weight: 228.18

Cat. No.	Description	Size
RC-017	Ammonium Persulfate Powder	100g
786-510	Ammonium Persulfate, 150mg tablets	100 tablets

TEMED

Polymerization reagent of polyacrylamide gels.

FEATURES

- Purity >99.9%
- Synonym: N,N,N',N'-Tetramethylethylenediamine, 1,2-Bis(dimethylamino)ethane, TMEDA
- CAS#: 110-18-9
- Molecular Formula: $C_6H_{16}N_2$
- Molecular Weight: 116.24

Cat. No.	Description	Size
RC-101	TEMED	50ml
RC-102	TEMED	100ml

PROTEIN MARKERS

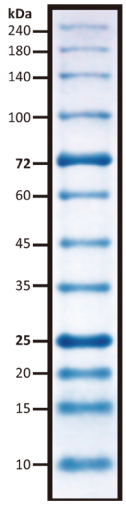
PAGEmark™ Blue PLUS

A blue protein standard with 12 prestained proteins covering a wide range of molecular weights:

- 10-240kDa in Tris-Glycine buffer
- 9-235kDa in Bis-Tris (MOPS) buffer or Bis-Tris (MES) buffer

Proteins are covalently coupled with a blue chromophore and two reference bands, 25kDa and 72kDa, are enhanced in intensity for easier reference. Use 3-5µl/well on mini gels for clear visualization during electrophoresis or 1.2-2.5µl per well for Western transfers.

Color	Tris-Glycine	Bis-Tris (MOPS)	Bis-Tris (MES)
Blue	240	235	235
	180	170	170
	140	130	130
	100	93	93
	72	**68**	**70**
	60	53	53
	45	41	42
	35	30	30
	25	**22**	**23**
	20	18	18
	15	14	14
	10	9	9



4-20% Tris-Glycine

Figure 2: PAGEmark™ Blue PLUSmarkers.

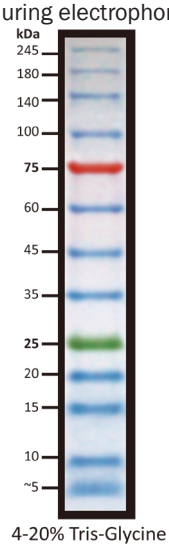
PAGEmark™ Tricolor PLUS

A ready-to-use three-color protein standard with 13 prestained proteins covering a wide range of molecular weights:

- 5-245kDa in Tris-Glycine buffer
- 3.5-235kDa in Bis-Tris (MOPS) buffer or Bis-Tris (MES) buffer

Proteins are covalently coupled with a blue chromophore except for two reference bands. A green at 25kDa and a red at 75kDa. Use 3-5µl/well on mini gels for clear visualization during electrophoresis or 1.2-2.5µl per well for Western transfers.

Color	Tris-Glycine	Bis-Tris (MOPS)	Bis-Tris (MES)
Blue	245	235	235
Blue	180	170	170
Blue	140	130	130
Blue	100	93	93
Red	**75**	**70**	**72**
Blue	60	53	53
Blue	45	41	42
Blue	35	30	30
Green	**25**	**22**	**23**
Blue	20	18	18
Blue	15	14	14
Blue	10	9	10
Blue	~5	3.5	3.5



4-20% Tris-Glycine

Figure 3: PAGEmark™ TriColor PLUSmarkers.

Cat. No.	Description	Size
786-418	PAGEmark™ Blue PLUS Marker	100 loads at 5µl/well
786-419	PAGEmark™ Tricolor PLUS Marker	100 loads at 5µl/well

ELECTROPHORESIS BUFFERS

For SDS-PAGE

SDS polyacrylamide gel electrophoresis is the most common protein electrophoresis that separates predominantly by protein mass.

Available buffers are:

- **SDS-PAGE Sample Loading Buffer [2X] & [6X]:** *1X: 0.1M Tris, pH6.8, 2% Glycerol, 2% SDS, 0.005% Bromophenol Blue*
- **SDS PAGE Running Buffer [10X]:** *0.24M Tris, 1.92M Glycine, 1% SDS*
- **LDS Sample Loading Buffer [4X]** *It has Lithium Dodecyl Sulfate instead of SDS. Uses Coomassie G250 and Phenol Red as tracking dyes.*

For Native Gel Electrophoresis

Native gel electrophoresis separates proteins based on their native charge and mass.

Available buffers are:

- **Native Sample Loading Buffer [2X]:** *0.2M Tris, 10% Glycerol, 0.01% Bromophenol Blue*
- **Tris Glycine Native Gel Running Buffer [10X]:** *0.24M Tris, 1.92M Glycine,*

For Tris Tricine Gel Electrophoresis

Tris Tricine Gel Electrophoresis is routinely used for the separation of small proteins and peptides with a molecular weight of <10kDa. Available buffers are:

- **Tricine Sample Buffer [2X]:** *0.2M Tris, 2% SDS, 40% Glycerol, 0.04% Coomassie Blue, pH 6.8*
- **Tris-Tricine [10X]:** *1M Tris, 1M Tricine, pH 8.3*
- **Tris-Tricine-SDS [10X]:** *1M Tris, 1M Tricine, 1% SDS, pH 8.3*

For Bis Tris Gel Electrophoresis

Bis Tris gels are polyacrylamide gels designed to give optimal separation of small- to medium-sized proteins under denaturing conditions. The gels can be run using either MES SDS running buffer or MOPS/SDS running buffer to obtain different separation ranges. Available buffers are:

- **MES SDS Running Buffer [20X]:** *1M MES, 1M Tris, 1% SDS, 20mM EDTA, pH 7.25*
- **MOPS SDS Running Buffer [20X]:** *1M MOPS, 1M Tris, 20.5mM EDTA, 2% SDS,*
- **MES SDS Buffer Kit (for Bis Tris Gels):** *MES SDS Running Buffer [20X], DTT [0.5 M,10X], Protein Antioxidant [200X] and LDS Sample Loading Buffer [4X]*
- **MOPS SDS Buffer Kit (for Bis Tris Gels):** *MOPS SDS Running Buffer [20X], DTT [0.5 M,10X], Protein Antioxidant [200X] and LDS Sample Loading Buffer [4X]*

For Tris Acetate Gel Electrophoresis

Tris-HEPES/ SDS Running Buffer [20X] is made to be used with Tris-HEPES gels.

- **Tris-Acetate/SDS Buffer Kit (for Tris-Acetate Gels):** *Tris-Acetate/ SDS Running Buffer [20X], DTT [0.5 M,10X], Protein Antioxidant [200X] and LDS Sample Loading Buffer [4X]*

For Tris HEPES Gel Electrophoresis

Tris-Acetate SDS Buffer Kit is a complete kit to resolve high molecular weight proteins (36-400 kDa) under denaturing conditions on Tris/Acetate gels. Available buffers are:

- **Tris-HEPES/SDS Running Buffer:** *1 X concentration: 0.1 M Tris Base, 0.1 M HEPES, 0.1% SDS*
- **JAW™ Tris-HEPES-SDS Buffer Packs:**

For Isoelectric Focusing (IEF)

Isoelectric focusing separated proteins based on their charge. The technique can be used on its own, but is more routinely used as the first dimension of 2D electrophoresis. Available buffers are:

- **IEF Anode Buffer [10X]:** *70mM Phosphoric Acid*
- **IEF Cathode Buffer (pH3-10) [10X]:** *0.2M Lysine, 0.2M Arginine*
- **IEF Cathode Buffer (pH3-7) [10X]:** *0.4M Lysine*

For Zymography

Zymography is an electrophoretic technique, based on SDS-PAGE, that includes an enzyme substrate copolymerized with the polyacrylamide gel. Samples are prepared in Zymogram Sample Buffer without boiling to preserve the structure and activity of the enzyme. Following electrophoresis, the SDS is removed from the gel by washing in Zymogram Renature Buffer that contains a non-ionic detergent. The gels are then equilibrated in Zymogram Developing Buffer, which contains the divalent metal cation required for enzymatic activity. The zymogram is subsequently stained (commonly with Amido Black or Coomassie Brilliant Blue), and areas of digestion appear as clear bands against a darkly stained background where the substrate has been degraded by the enzyme.

- **Zymogram Sample Buffer [2X]:** *62.5mM Tris, 4% SDS, 25% Glycerol, 0.01% Bromophenol Blue, pH 6.8*
- **Zymogram Renature Buffer [10X]:** *25% Triton® X-100*
- **Zymogram Development Buffer [10X]:** *0.5M Tris, 2M NaCl, 50mM $CaCl_2$, 0.2% Brij® 35, pH 7.5*

Discontinuous Buffer System

For increased resolution and concentration of the protein sample band. Supplied as a two buffer system consisting of 425ml Anode Buffer and 500ml Cathode Buffer.

- **Anode Buffer [2X]:** *70.6mM Tris, 47.1mM CAPS, pH 9.6*
- **Cathode Buffer [10X]:** *260mM Tris, 40mM CAPS, 0.1% SDS, pH 9.6*

CITED REFERENCES

1. *Keefer, K. and True H. (2016) PLoS Genet.doi:10.1371/journal.pgen.1006431*
2. *Christensen, L.F.B et al (2016) Biochem.55-3674.*
3. *Friedrick, R.P at al (2016) Nanoscale Res Lett.DOI: 10.1186/s11671-016-1521-7*
4. *Koppaka, V. et al (2015) Mol Vis. 21:502*
5. *Choi, H.J. et al (2012) J. Nanopart. Res. 14:1092*

Cat. No.	Description	Size
786-025	SDS-PAGE Sample Loading Buffer [2X]	2.5ml
786-701	SDS-PAGE Sample Loading Buffer [6X]	25ml
786-029	SDS-PAGE Running Buffer [10X]	1L
786-029G	SDS-PAGE Running Buffer [10X]	1gal
786-323	LDS Sample Loading Buffer	10ml
786-421	Native Sample Loading Buffer [2X]	2.5ml
786-420	Tris Glycine Native Gel Running Buffer [10X]	1L
786-477	Tris-Glycine [10X]	1 L
786-478	Tris-Glycine [10X]	1gal
786-475	Tricine Sample Buffer [2X]	30ml
786-479	Tris-Tricine [10X]	1L
786-480	Tris-Tricine-SDS [10X]	1L
786-531	MES SDS running buffer [20X]	500ml
786-924	MES SDS running buffer [20X]	1L
786-925	MES SDS running buffer [20X]	1gal
786-554	MES SDS Buffer Kit (for Bis Tris Gels)	1 kit
786-532	MOPS SDS Running Buffer [20X]	500ml
786-926	MOPS SDS Running Buffer [20X]	1L
786-927	MOPS SDS Running Buffer [20X]	1gal
786-1218	MOPS SDS Buffer Kit (for Bis Tris Gels)	1 kit
786-589	Tris-Acetate/SDS Buffer Kit (for Tris-Acetate Gels)	1 kit
786-278	Tris-HEPES/ SDS Running Buffer [20X]	500ml
786-1209	JAW™ Tris-HEPES-SDS Buffer Packs	10 packs
786-484	IEF Anode Buffer [10X]	250ml
786-485	IEF Cathode Buffer (pH3-10) [10X]	250ml
786-486	IEF Cathode Buffer (pH3-7) [10X]	250ml
786-483	Zymogram Sample Buffer [2X]	30ml
786-482	Zymogram Renature Buffer [10X]	125ml
786-481	Zymogram Development Buffer [10X]	125ml
786-472	Discontinuous Buffer System	1 kit

PROTEIN REDUCTION & ALKYLATION

Protein-S-S-Reductant™

A water soluble, odorless, non-toxic and stable protein reductant. Protein-S-S-Reductant™ uses TCEP (Tris [2-carboxyethyl] phosphine), a popular alternative to β-mercaptoethanol and DTT (dithiothreitol). TCEP improves stability, increases effectiveness, and reduces proteins over a wider range of pH, including lower acidic pHs.

Protein-S-S-Reductant™ completely reduces stable disulfide bonds in less than 5 minutes at room temperature and is compatible with the protein alkylation reactions. This ready-to-use solution remains at a neutral pH and stabilized for long-term storage.

Simply supplement Protein-S-S-Reductant™ in place of DTT or β-mercaptoethanol and boil the sample. TCEP powder is also available.

FEATURES

- Ready-to-use solution, odorless, stable and non-toxic
- Neutral protein reduction solution
- Compatible with the alkylation reaction
- Works over a wide range of pH, including lower acidic pHs

APPLICATIONS

- Reduction of protein disulfide bonds
- Reduction for protein electrophoresis and other applications

CITED REFERENCES

1. *Fagerquist, C.K. et al (2012) J. Am. Soc. Mass. Spectrom. 23:2102*

Cat. No.	Description	Size
786-25PR	Protein-S-S-Reductant™	200 Preps
786-030	TCEP	1g
786-873	TCEP	5g
786-874	TCEP	10g
786-875	TCEP	25g

Dithiothreitol (DTT)

A common reducing agent used for the cleavage of disulfide bonds. DTT is supplied in bulk 5gm quantities.

OneQuant™ DTT are single aliquots of DTT that eliminate the need for weighing; preventing loss of reagent and saving time. Add 90µl water to a single tube to generate a 0.5M DTT solution. Supplied with 40 individual tubes.

CITED REFERENCES

1. *Garapaty, A. and Champion, J. (2016) Bioengineering and Translational Medicine doi: 10.1002/btm2.10047*

Cat. No.	Description	Size
BC99	DTT	5g
RC-046	DTT (Dithiothrietol)	25g
786-077	OneQuant™ DTT [0.5M]	40 vials

FOCUS™ DTT [2M]

Ultra pure proteomic grade DTT for protein reduction. FOCUS™ DTT is supplied as 5 vials containing dry powder to maintain the activity of the reducing agent. Add 1ml aliquot of water to give a 2M concentration, which is then added to your buffer solution to maintain protein reduction potential.

Cat. No.	Description	Size
786-227	FOCUS™ DTT [2M]	5 x 1ml

ß-Mercaptoethanol

Cat. No.	Description	Size
BC98	β-mercaptoethanol	100ml

FOCUS™ Protein Reductant

FOCUS™ Protein Reductant is a water soluble, odorless, non-toxic and stable TCEP reductant with improved stability and efficiency compared to DTT. FOCUS™ Protein Reductant reduces proteins over a wide range of pH (including lower acidic pH), and completely reduces highly stable disulfide bonds in under 5 minutes at room temperature.

FOCUS™ Protein Reductant is compatible with the alkylation of thiol groups for 2D analysis, as it does not compete with the alkylation reagent iodoacetamide, unlike DTT and other commonly used reductants.

The kit is supplied with a proprietary buffer necessary for efficient reduction of disulfide bonds, while minimizing reoxidation of the competing thiol pairs in protein samples.

FEATURES

- A water soluble, odorless, non-toxic and stable reducing agent
- Reduces disulfides and minimizes re-oxidation of the competing thiol pairs in protein samples

Cat. No.	Description	Size
786-230	FOCUS™ Protein Reductant	100 preps

FOCUS™ Protein Alkylation

The kit is supplied with a proprietary buffer necessary for efficient alkylation of thiols, while minimizing reoxidation of the competing thiol pairs in protein samples. Simply add an appropriate amount to reagent solutions for alkylation of protein thiol groups.

APPLICATIONS

- Preparation of protein samples for 2D electrophoresis
- Blocking of thiols for preventing re-oxidation of proteins

Cat. No.	Description	Size
786-232	FOCUS™ Protein Alkylation Kit	100 preps

FOCUS™ Protein Reduction-Alkylation

Improves resolution and prevents streaking

A simple two-step method for reduction and alkylation of protein samples for 2D gel analysis. The disulfide bonds are reduced with a highly reactive and stable TCEP [Tris (2-carboxyethyl) phosphine] followed by blocking of the thiols by alkylation with iodoacetamide reagent preparation. The kit is supplied with proprietary buffers and reagents necessary for an efficient reduction and alkylation of the disulfide bridges while minimizing reoxidation of the thiols.

FEATURES

- 2D electrophoresis compatible
- Reduction & alkylation of protein samples in two simple steps
- Minimizes reoxidation of the competing thiol pairs

CITED REFERENCES

1. *Wilks, A.M. et al (2015) J. Exp. Biol. 218:3128*
2. *Carter, M.Q. et al (2012) Appl. Envir. Microbiol. 78:1004*
3. *Fagerquist, C.K. (2012) Rapid Commun. Mass Sp. 26:1241*
4. *Järvinen, K.M. et al (2012) Clin. Exper. Allergy. 42:238*

Cat. No.	Description	Size
786-231	FOCUS™ Protein Reduction-Alkylation	100 preps

Iodoacetamide

Iodoacetamide is supplied in 5 gram bulk quantities or in the *OneQuant*™ format. Add 150µl water to a single *OneQuant*™ vial to generate a 0.5M iodoacetamide solution.

CITED REFERENCES

Iodoacetamide

1. Wilks, A.M. et al (2015) J. Exp. Biol. 218:3128
2. Bora de Oliveira, K. et al (2017) Biotechnol Bioeng. DOI: 10.1002/bit.26266
3. Provan, F. et al (2016) J Toxicol Environ Health A doi.org/10.1080/15287394.2016.1210494

OneQuant™ Iodacetamide

1. Thompson, J.H. et al (2014) Rapid Comm. Mass Spec. 28:855

Cat. No.	Description	Size
786-228	Iodoacetamide	5g
RC-150	Iodoacetamide	25g
786-078	*OneQuant*™ Iodoacetamide	40 vials

2D ELECTROPHORESIS ACCESSORIES

Agarose Sealing Solution

For sealing IPG strips while running 2D gels

Simply heat and use for sealing the IPG strips for SDS-PAGE analysis. The Agarose Sealing Solution is prepared in a proprietary buffer to minimize reoxidation of the competing thiol pairs as proteins enter into the second dimension gel. Improves resolution and prevents streaking of protein spots on 2D gels.

Cat. No.	Description	Size
786-226	Agarose Sealing Solution	50ml

Equilibration Buffer for IPG Strips

Add an appropriate volume of the supplied rehydration buffer to the dry, ready-to-use, urea based equilibration buffer.

Eliminates worries about urea induced protein carbamylation or waste of unused reagents, as fresh and ready-to-use reagents are prepared every time.

Supplied with a proprietary buffer necessary to support efficient reduction of the disulfide bridges and alkylation of the thiols, while minimizing reoxidation of the competing thiol pairs in protein samples. Improves resolution and prevents streaking of protein spots on 2D gels.

CITED REFERENCES

1. Brasier, A. et al (2004) J. Virol. 78:11461

Cat. No.	Description	Size
786-224	Equilibration Buffer for IPG Strips	For 50ml

Proteomic Grade Water

Ultra-pure water for 2D and mass spectrometry analysis.

Cat. No.	Description	Size
786-228	Proteomic Grade Water	1L

Proteomic Grade Tubes

Specifically prepared and certified protein and dust free.

Cat. No.	Description	Size
786-300	Proteomic Grade Microfuge Tubes (1.5ml)	100

Proteomic Protein Controls

Protein preparations specifically prepared for standardizing electrophoresis methods and protocols.

Substantially free from non-protein agents such as nucleic acids, detergents, salts, lipids and other common laboratory agents. The protein preparation has low conductivity (< 50µS). Supplied as dry protein pellets (2 x 2mg/vial).

A control set containing one 2mg vial of mammalian, E. coli, yeast and plant proteins is also offered.

Cat. No.	Description	Size
PSC-01	Proteomic Protein Control, Yeast	2 x 2mg
PSC-02	Proteomic Protein Control, Animal cells	2 x 2mg
PSC-03	Proteomic Protein Control, E. coli	2 x 2mg
PSC-04	Proteomic Protein Control, Plant	2 x 2mg
PSC-05	Proteomic Protein Control Set	4 x 2mg

ELECTROPHORESIS CLEAN UP

PAGE-Perfect™

Improved resolution & publication quality gels

Many lysis buffers and reagents are incompatible with routinely used electrophoretic analysis. The presence of interfering agents, such as salts, acids, bases and detergents, result in band distortion and poor protein resolution. As a result, SDS-PAGE gels are hard to analyze and lack reproducibility.

PAGE-*Perfect*™ is a simple, two-step method for concentrating, cleaning and preparing protein solutions for running publication quality gels. Treat (1-100µl) protein solution with Universal Protein Precipitation Agent (UPPA™), which results in precipitation of the protein solution. Protein precipitation is not affected by the presence of detergents, chaotropes, or other common laboratory agents. The protein precipitate is collected by centrifugation and washed to remove all interfering agents. Suspend the precipitate in the sample loading buffer for loading on the gel for electrophoresis. The figure demonstrates the effect of PAGE-*Perfect*™ on the clean-up of 10µg mouse liver lysate that contain the indicated contaminants.

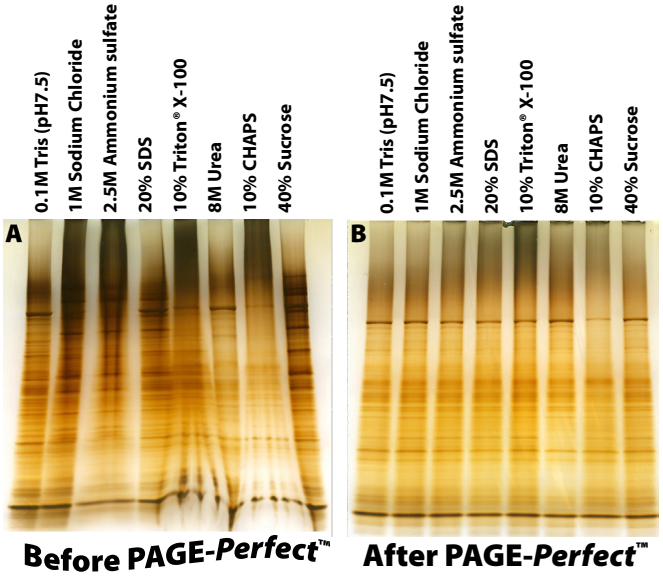


Figure 4: Analysis of mouse liver lysate before and after treatment with PAGE-Perfect™. A. 10µg mouse liver lysates, in the presence of various interfering agents, were loaded onto a SDS polyacrylamide gel. B. 10µg mouse liver lysates, in the presence of various interfering agents, were treated with PAGE-Perfect™ and then loaded onto a SDS polyacrylamide gel. Both gels were stained with FASTsilver™ protein.

FEATURES

- Removes electrophoresis interfering agents, including:
  - Detergents • Salts • Chaotropes • Reducing agents • Sugars
- Concentrates and cleans dilute (>1ng/ml) protein samples
- Increase gel quality and reproducibility
- Protein recovery >99%

CITED REFERENCES

1. Devillard, E. et al (2004) J Bacteriol 186:136
2. Rincon, M. et al (2004) J Bacteriol 186:2576
3. Kovacina, K. et al (2003) JBC 278:10189
4. Yi, F. et al (2003) Cancer Res. 63:2923
5. Grimaldi, M. et al (2003) J Neurosci 23:4737
6. Wu, X. et al (2002) JBC 277:13597

Cat. No.	Description	Size
786-123	PAGE-*Perfect*™	50 preps
786-123T	PAGE-*Perfect*™	5 preps

Perfect-FOCUS™

Streak free 2D gels & improved spot resolution

Designed to clean and concentrate protein samples that give poor protein spot resolution during 2D electrophoresis. Protein samples containing interfering agents, including ionic detergents, metal ions, substrates, substrate analogs, inhibitors, and other charged molecules, routinely result in smeared or low resolution gels. Protein solutions are treated with Perfect-FOCUS™ that quantitatively precipitates the proteins, which are subsequently collected by centrifugation. The non-protein interfering agents are washed away and the protein pellet is ready to be solubilized in an appropriate sample loading buffer.

The collected protein has conductivity <50µS and is substantially free from non-protein agents, which improves spot resolution and greatly reduces spot streaking. Compatible with mass spectrometry analysis and shows identical peptide spectra.

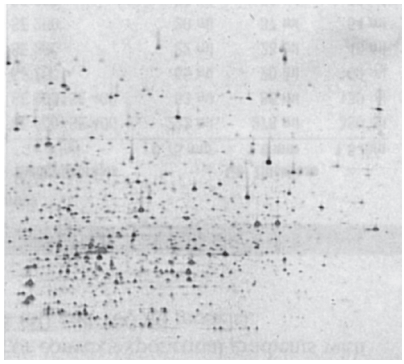


Figure 5: Treatment of protein samples with Perfect-FOCUS™ results in streak free, high spot resolution gels.

FEATURES

- Removes interfering agents from protein solutions
- Conductivity lower than 50µS after treatment
- Samples free from non-protein agents
- Kit suitable for 50 x 1-100µl protein solutions

APPLICATIONS

- Suitable for concentrating and cleaning protein samples for isoelectric focusing (IEF) and 2D-gel electrophoresis

CITED REFERENCES

1. Ghosal, K. et al (2016) AACIJournal, DOI: 10.1186/s13223-016-0135-z
2. Nardi, J.B. et al (2016) Dev Biol.doi:10.1016/j.ydbio.2016.03.029
3. Dey, D. et al (2016) Biochim. Biophys. Acta.doi:10.1016/j.bbapap.2016.03.012
   "Zhang, J. et al (2015) Int J Coal Geo. 146:91
4. Kanaujia, P.K. et al (2015) J Proteomics. 124:39
5. Chen, W. et al (2014) Acta Physiol Plant 37:1723
6. Freiberg, J. A. et al (2014) Infect and Immun. doi: 10.1128/IAI.01831-14
7. Frapsauce, C. et al (2014) Fertil Steril. http://dx.doi.org/10.1016/j.fertnstert.2014.04.039
8. Kerns, P.W. et al (2014) Pathogens and Disease. DOI: 10.1111/2049-632X.12142
9. Kokjohn, T.A. et al (2013) J. Neurotraum. 30:981
10. Solazzo, C. et al (2013) Int. Biodeter. Biodegrad. 80:48
11. Fekkar, A. et al (2012) J. Infect Dis. 205:1163
12. Shen, J. et al (2012) Carcinogenesis. 33:2208
13. Gandaharen, Y.D. et al (2012) Protein Phosphorylation in Human HealthDOI: 10.5772/50472.
14. Wang, H. et al (2012) Method Mol. Biol. 876:83
15. Walseth, T.F. et al (2012) Messenger. 1:86
16. Perrot, A. et al (2012) Blood. 2:e88
17. Li, L. et al (2011) PNAS 108:9378
18. Perrot, A. et al (2011) Blood. 118:e1
19. Rosenkranz, M.E. et al (2010) Arthritis Rheum. 62:1813
20. Bouley, J. et al (2010) Proteomics-Clin Appl. 4:489
21. Peters, B.M. et al (2010) FEMS Immunol. Med. Mic. 59:493
22. Shen, J. and Fischer, S.M. (2010) Meth. Mol. Biol. 585:225
23. Straub, C. et al (2009) Proteom. Clin. Appl.3:1151
24. Boulatnikov, I.G. et al (2008) Biochemistry 47:7228
25. Jang, S. and Imlay, J. (2007) JBC 282:929
26. Shen, J. et al (2007) Mol. Carcinogen. 46:331
27. Shen, J. et al (2007) J. Proteome Res. 6:273
28. Laughton, J. et al (2006) Microbiol 152:1155
29. Shen, J. et al (2004) Cancer Res. 64:9018

Cat. No.	Description	Size
786-124	*Perfect*-FOCUS™	50 preps
786-124T	*Perfect*-FOCUS™	6 preps

COOMASSIE STAINS

LabSafe GEL Blue™

Ultra-sensitive, fast, ready-to-use protein stain

LabSafe GEL Blue™ is an enhanced protein stain that is based on Coomassie dye that offers unsurpassed sensitivity and rapid band visualization. LabSafe GEL Blue™ is supplied in a ready-to-use format, which is added directly to protein gels following electrophoresis, after a brief wash step.

LabSafe GEL Blue™ is a sensitive stain that is able to detect as little as 4ng protein. Protein bands are visible in as little as three minutes, with maximal staining achieved in an hour. The figure shows that LabSafe GEL Blue™ can detect protein levels as low as 4ng BSA. 60-1000ng BSA is detectable in 5-10 minutes and the low levels of BSA (4-8ng) become clearly visible when washed in water.

Supplied as a liter; sufficient reagent to stain up to 50 mini gels (8 x 10cm) or as a 1 gallon size for staining up to 200 mini gels.

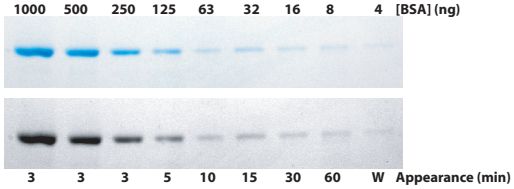


Figure 6: The sensitivity and speed of protein band visualization with LabSafe GEL Blue™. Serial dilutions (4ng-1mg) of bovine serum albumin (BSA) were reduced and loaded onto a SDS gel. Following electrophoresis, the gel was washed in deionized water to remove excess SDS. LabSafe GEL Blue™ was added and shaken for 1 hour. Protein bands (>250ng) appeared in 3 minutes and all bands >8ng were visible after 60 minutes. The gel was washed (W) in water to reveal the 4-8ng protein.

FEATURES

- Sensitive, 4-8ng BSA
- Saves time, band develops within three minutes
- Avoids the use of methanol, acetic acid, or other toxic agents

APPLICATIONS

- Staining of protein electrophoresis gels
- For native PAGE, SDS-PAGE, isoelectric focusing, or 2D gels

CITED REFERENCES

1. *Riascos, J. J. at al (2016) Food Chem.DOI: 10.1021/acs.jafc.5b05873. Kanaujia, P.K. et al (2015) J Proteomics. 124:39*
2. *Keffer, C.R. et al (2015) Appl Environ Microbiol 81:3442*
3. *Lara-Chavez, A. et al (2015) J. Exp. Bot. DOI: 10.1093/jxb/erv096*
4. *Bhalla, A. et al (2014) BMC Biotechnol. 14:106*
5. *Tsen, S.D. et al (2014) PLOS. DOI: 10.1371/journal.pone.0111673*
6. *Lawrence, J. et al (2014) J. Neurosci. DOI: 10.1523/JNEUROSCI.0326-14.2014*
7. *Khatibi, P. A. et al (2014) Biotechnol Biofuels. doi:10.1186/1754-6834-7-104*
8. *McGraw, J. et al (2014) Protein Expres. Purif. 96:48*
9. *Deiab, S. et al(2013) Eur. J. Med. Plants. 3:603*
10. *Tsen, S.D. et al (2012) J. Biomed. Opt. 17:128002*
11. *Mazot, P. et al (2012) PLOS. DOI: 10.1371/journal.pone.0033581*
12. *Kwak, J. et al (2012) Physiol. Behav. 107:112*
13. *Kwak, J. et al (2011) Chem Senses. 36:443*
14. *Sabatte, J. et al (2011) J. Immunol. 187:5299*
15. *Zhang, D. et al (2010) Protein Exp Purif. 74:69*

Cat. No.	Description	Size
786-35	LabSafe GEL Blue™	1L
786-35G	LabSafe GEL Blue™	1gal

RAPIDstain™

An ultra sensitive and ready-to-use protein stain based on Coomassie dye. No mixing or preparation is involved. No fixation step is needed. Simply rinse gel, add RAPIDstain™ and protein bands develop within 5-10 minutes, reaching a maximum visibility in an hour. Mini-gels can be stained in ten minutes.

RAPIDstain™ only stains protein, leaving a crystal-clear background resulting in high band visibility. The gels require no destaining. The protein band intensity is enhanced by simply rinsing with water.

RAPIDstain™ has the sensitivity to detect as little as 4-8ng BSA. Staining shows a linear response for densitometric gel analysis and produces sharp scanning or photographic results.

It is supplied as a liter; sufficient reagent to stain up to 50 mini gels (8 x 10cm) or as a 1 gallon size for staining up to 200 mini gels.

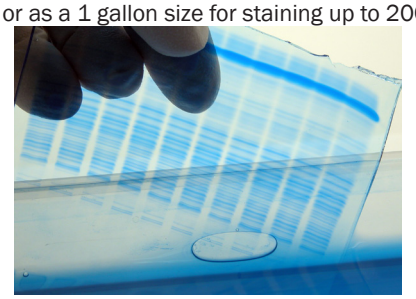


Figure 7: Polyacrylamide gel stained with RAPIDstain™.

FEATURES

- Sensitive, 4-8ng BSA
- Saves time, band develops within 5-10 minutes
- Uses a single step method
- No methanol or acetic acid destaining agents

APPLICATIONS

- Staining of protein electrophoresis gels
- For native, denaturing, isoelectric focusing, and 2D gels

CITED REFERENCES

1. *Bachert, B.A. et al (2016) Cell. Infect. Microbiol. doi.org/10.3389/fcimb.2016.00090*
2. *Morozov, I. G. et al (2016) Pnas. doi: 10.1073/pnas.1519894113 Atkins, S. et al (2016) WJC. 8:89*
3. *Specht, A. C. et al (2015) Mbio. 6:6*
4. *Wolframm S. et al (2015) PLoS ONE DOI: 10.1371/journal.pone.0140927*
5. *Flores, A. R. et al (2015) Infect. Immun. DOI: 10.1128/IAI.02860-14*
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7. *Wolfram, S. et al (2014) Beilstein J. Org. Chem. 10:2470*
8. *Dyrlund, T.F. et al (2014) Hum. Reprod. doi: 10.1093/humrep/deu220*
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14. *Kellner, S. et al (2011) Nuc Acid Res 39:7348*
15. *Wang, Y. et al (2011) J Pharmacol Exp Ther 336:56*
16. *Monetti, C. et al (2011) Electrophoresis. 32:1292*
17. *Li, D. et al (2011) J. Pathol. 223:88*
18. *Kim, Y. et al (2011) BMC Vet. Res. 7:51*
19. *Li, D. et al (2011) PLOS. DOI: 10.1371/journal.pone.0021618*
20. *Baumgart, M. and Bott, M. (2011) J. Biotech. 154:163*

Cat. No.	Description	Size
786-31	RAPIDstain™	1L for 50 mini gels
786-31G	RAPIDstain™	1gal for ~200 mini gels

Coomassie Brilliant Blue

Coomassie Brilliant Blue R-250/ G-250 are both offered as dry power form and convenient ready-to-use solutions. Destaining solution is also offered.

CITED REFERENCES

1. Marley, K. et al (2015) Translational Oncology. 8:231
2. Tseng, Y. et al (2014) Phytomedicine. 21:724
3. Foster, A. et al (2013) Syst, Appl. Microbiol. 36:457
4. Shim, S. et al (2008) Mol Biol Cell 19:2661
5. Foster, A. et al (2013) Syst, Appl. Microbiol. 36:457
6. Tseng, Y. et al (2014) Phytomedicine. http://dx.doi.org/10.1016/j.phymed.2013.11.001

Cat. No.	Description	Size
786-495	Coomassie Brilliant Blue R-250 Dye	10g
786-496	Coomassie Brilliant Blue G-250 Dye	10g
786-497	Coomassie Brilliant Blue G-250 Solution	1L
786-498	Coomassie Brilliant Blue R-250 Solution	1L
786-499	Coomassie Brilliant Blue Destaining Solution	1L

Colloidal Blue Stain

A mass spectrometry compatible stain that offers nanogram sensitive detection of proteins. The stain offers ten times more sensitivity compared to classical Coomassie R- or G-250 detection. The Colloidal Blue Stain is able to detect <10ng BSA. In addition, the protein bands are visualized on crystal clear backgrounds, following a water wash, allowing for optimal densitometry results.

Using the colloidal properties of G-250 that reduces free dye in solution, they demonstrated shorter staining times, high sensitivity, clear background without the need for destaining or stepwise staining.

G-Biosciences Colloidal Blue Stain is a single, ready-to-use reagent. The stain is compatible with polyacrylamide, agarose and IEF gels.

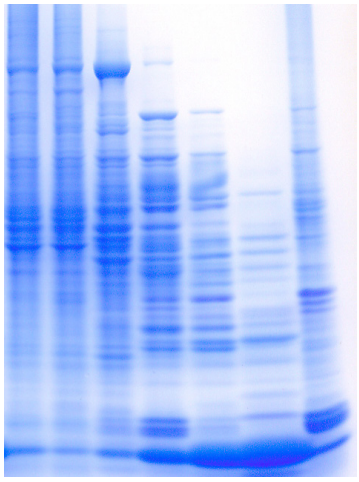

Figure 8: Polyacrylamide gel stained with Colloidal Blue Stain.

FEATURES

- Mass spectrometry compatible
- Highly sensitive (>10ng BSA), outperforms classical Coomassie staining methods
- Ideal for densitometry analysis, blue bands on clear background
- Single reagent

APPLICATIONS

- For mass spectrometry analysis of proteins
- Staining proteins in polyacrylamide and agarose gels
- Staining of proteins in isoelectric focusing gels (IEF)

Cat. No.	Description	Size
786-500	Colloidal Blue Stain	1L

Destaining Solutions

- Destain I: (<50% Methanol, <10% Acetic Acid)
- Destain II: (<5% Methanol, <10% Acetic Acid)

Cat. No.	Description	Size
786-526	Desatin I	1L
786-860	Desatin I	1gal
786-527	Destain II	1L
786-863	Destain II	1gal

SILVER STAINS

FASTsilver™

A rapid silver stain for proteins

A nanogram sensitive silver staining kit that produces crystal clear background and maximal sensitivity needed for critical analysis.

A unique formulation that leaves the background clear and produces sharp images of protein bands. FAST*silver*™ detects as little as 1ng BSA protein.

FAST*silver*™ does not use the protein modifier glutaraldehyde and therefore allows for the complete recovery of proteins and trypsin digested peptides.

It also stains nucleic acids and is able to detect as little as 0.3ng.

The kit contains ready-to-use reagents for 25 mini gels and comes with a simple to follow 60-90 minute protocol.

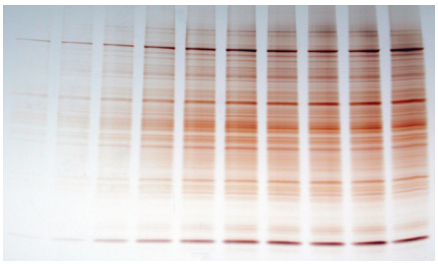

Figure 9: Tissue extract loaded on 4-20% gradient gel and developed with FASTsilver™. Protein loaded; 0.25µg to 5µg per well.

FEATURES

- Stains both proteins and nucleic acids
- Produces clear background for maximum visibility
- Protocol time 60-90 minutes

APPLICATIONS

- Staining of proteins and nucleic acids in electrophoresis gels
- For native, denaturing, isoelectric focusing and 2D gels

CITED REFERENCES

1. Winkelmann, A. et al (2014) J Clin Invest. 124:696
2. Jagota, S. and Rajadas, J. (2013) Med. Chem. Res. 22:3991
3. Sharma, S. et al (2013) J. Plant Biochem. Biotechnol. DOI: 10.1007/s13562-013-0213-y
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12. Petersen, S. et al (2009) JLMN.4:71
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14. Kaplan, B. et al (2007) Brit. J. Maematol. 136:723
15. Ortega, N. et al (2005) Mol Biol Cell 16:3028
16. Kaplan, B. et al (2005) Modern Pathol. 18:1610

Cat. No.	Description	Size
786-30	FAST*silver*™ Kit	25 Mini Gels

FOCUS™ FASTsilver™

Mass spectrometry compatible silver stain

FOCUS™ FAST*silver*™ produces crystal clear backgrounds and maximal peptide recovery needed for critical analysis by mass spectrometry.

For mass spectrometry analysis, complete proteolytic digestion and recovery of peptides is required for optimal analysis. However, silver ions in traditional silver staining kits inhibit proteolytic digestion. In addition, glutaraldehyde, a common sensitizer in silver stains, modifies lysine residues, preventing complete digestion and recovery.

FOCUS™ FAST*silver*™ produces high quality silver staining without the use of glutaraldehyde and is supplied with a highly efficient silver ion removal reagent, *Silver*OUT™. *Silver*OUT™ removes silver ions, which permits complete peptide digestion and extraction of peptides for maximal recovery.

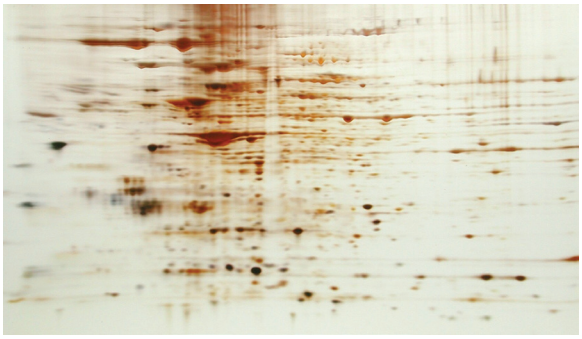

Figure 10: A 2D electrophoresis gel stained with FOCUS™ FASTsilver™.

FEATURES

- Protease digestion uninhibited: Supplied with *Silver*OUT™ to completely remove silver ions that inhibit protease digestion by binding at the active sites of various proteases. This allows for optimal protease digestion
- Complete peptide recovery: Glutaraldehyde-free silver stain that results in no lysine modification, protein cross linking or reduced peptide recovery. FOCUS™ FAST*silver*™ allows enhanced protease digestion and efficient recovery of digested peptides
- Sensitivity: ~0.3ng protein and crystal clear background
- Short protocol time: Protein can be detected in <90 minutes

CITED REFERENCES

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7. Berg, M. et al (2014) PLOS. DOI: 10.1371/journal.pone.0089436
8. MacLeod, G. et al (2014) Reproduction. 147:1
9. Kharenko, O.A. et al (2013) J. Biochem.154:383

Cat. No.	Description	Size
786-240T	FOCUS™ FAST*silver*™ Kit	5 mini Gels
786-240	FOCUS™ FAST*silver*™ Kit	25 mini Gels

Silver D-Stain™

Destain & restain your protein or nucleic acid gels

The staining of gels with silver stains often results in over staining or unevenly stained gels. Silver D-Stain™ saves the trouble of repeating the electrophoresis.

FEATURES

- Reduces staining of silver stained gels to reveal over stained bands
- Destain gels completely and restain or follow other downstream applications, such as Western transfer or sequencing. Suitable for both protein and nucleic acid gels

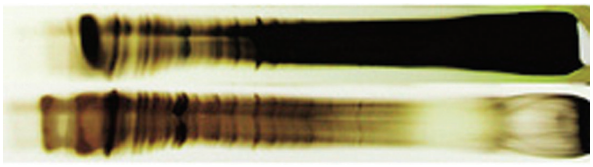


Figure 11: Top lane shows a gel over stained with FASTsilver™ and the bottom lane shows the same gel destained with Silver D-Stain™ and then restained with FASTsilver™, this allows more protein bands to be visualized.

CITED REFERENCES

1. Helias, V. et al (2012) Nature Genetics. 44:170
2. Saison, C. et al (2012) Nature Genetics. 44:174

Cat. No.	Description	Size
786-199	Silver D-Stain™	25 Mini Gels

FLUORESCENT STAIN

RUBEO™

RUBEO™ is a fluorescent protein stain that is ideal for staining proteins in 1D and 2D electrophoresis gels. The fluorescent stain has a red emission at 605nm. The fluorescent stain has nanogram sensitivity and is compatible with mass spectroscopy, microsequencing and immunostaining. The stained gels can be visualized on a simple UV transilluminatoror the most complex laser scanners.

Available in 200ml and 1L size suitable for 4 or 20 mini gels.

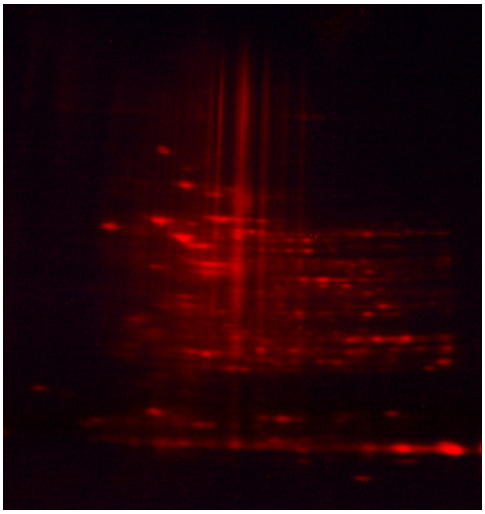


Figure 12: Polyacrylamide gel stained with RUBEO™.

FEATURES

- Fluorescent: Red emission at 605nm.
- High Sensitivity: Easily detect ng levels of protein.
- Minimal protein protein variation: Allows quantitative comparison of proteins.
- Compatible: Ideal for subsequent analysis, including mass spectroscopy, microsequencing and immunostaining.
- Versatile: Stain native, denaturing, IEF and 2D gels.
- Suitability: Visualize with the simplest UV transilluminators to the complex laser scanners.

APPLICATIONS

- For staining of protein electrophoresis gels
- Mass spectrometry analysis

CITED REFERENCES

1. Harris, L.R. et al (2007) J. Proteome. Res. 6:1418

Cat. No.	Description	Size
786-644	RUBEO™	200ml
786-645	RUBEO™	1L

REVERSIBLE STAINS

Reversible Copper Stain™

The *Reversible Copper Stain*™ is a single step stain for rapid detection of proteins resolved on SDS-PAGE. No destaining is necessary.

The stain is based on the interaction of copper ions with polyacrylamide and proteins. The stain works by depositing a copper metal precipitate in the gel, resulting in an opaque blue/green gel, while the SDS coating on the proteins inhibits copper ions from binding to the proteins. A negative image of the gel is produced; consisting of clear protein bands visualized against a semi-opaque blue/green polyacrylamide background.

Protein bands are visualized in as little as 5 minutes. The sensitivity of the *Reversible Copper Stain*™ is 0.1-0.5ng BSA protein. Staining does not interfere with the electroelution of proteins or alter their biological properties. Gels stained with the *Reversible Copper Stain*™ can be destained in 20-25 minutes before the transfer or electroelution of proteins. Not suitable for native gels or gels containing Tricine or Glycine.

The kit contains ready to use reagents for 25 mini gels and is supplied with a destainer. A larger size of the destain for the *Reversible Copper Stain*™ is offered for your convenience.

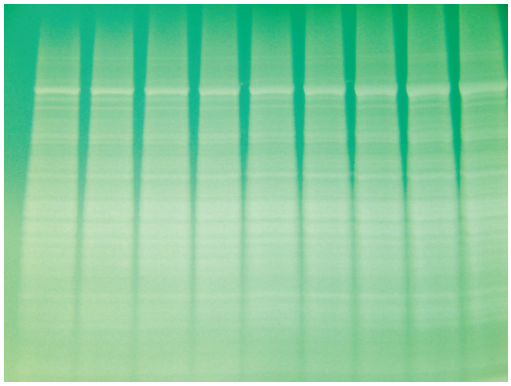


Figure 13: Polyacrylamide gel stained with Reversible Copper Stain™.

FEATURES

- Stains gels within 5 minutes
- Reversible, simple and fast stain
- Allows subsequent elution, blotting, or other types of staining

APPLICATIONS

- Suitable for staining of protein gels prior to transfer or electroelution of proteins

Cat. No.	Description	Size
786-32CU	*Reversible Copper Stain*™	25 mini gels
786-32DSCU	Destaining Solution- Copper [10X]	500ml

Reversible Zinc Stain™

Stains hard to stain proteins, including glycoproteins & phosphoproteins

The Reversible Zinc Stain™ is a single step stain for the rapid detection of proteins resolved by SDS-PAGE. No destaining is necessary.

The stain is based on the interaction of Zinc ions with polyacrylamide and proteins. The stain works by depositing a zinc metal precipitate in the gel which turns the gel opaque white, while the SDS coating on the proteins prevents the stains from binding to the proteins. A negative image of the gel is produced; clear protein bands are detected against a semi-opaque white polyacrylamide background. Protein bands are visualized in as little as 10-15 minutes.

The sensitivity of the Reversible Zinc Stain™ is 0.1-0.5ng BSA protein and does not interfere with electroelution of proteins or alter their biological properties. Gels stained with *Reversible Zinc Stain™* can be destained in 5 minutes before the transfer or electroelution of proteins.

This stain works SDS denatured gels and gels containing glycine, tricine and a variety of primary amine containing buffers.

Reversible Zinc Stain™ has a unique property that in some situations makes it far superior than the highly sensitive silver stains. Silver staining, although very sensitive, is known not to detect certain types of proteins, including glycoproteins. *Reversible Zinc Stain™*, having comparable sensitivity, is able to stain glycoproteins (see figure). Phosvitin, a phosphoglycoprotein, was resolved on two gels and stained either with a silver stain or *Reversible Zinc Stain™*. The phosvitin was only detected with the *Reversible Zinc Stain™*.

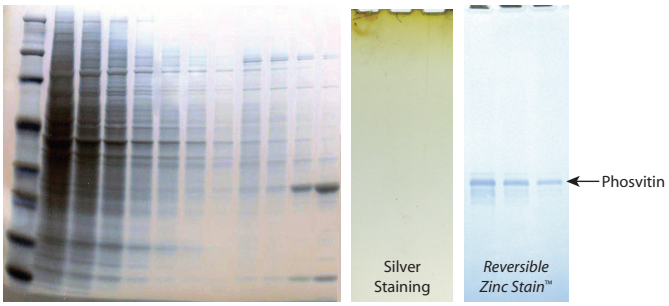


Figure 14: Left: The use of Reversible Zinc Stain™ to follow glycoprotein extraction. The samples were prepared using the FOCUS™ Glycoprotein kit and the purified glycoproteins were easily visualized with the Reversible Zinc Stain™. Low levels of glycoproteins are notoriously difficult to stain with other stains. Right: When phosvitin was separated by SDS-PAGE and developed by a silver staining method and by Reversible Zinc Stain™, it was only visualized with the Reversible Zinc Stain™.

FEATURES

- Reversible, simple, fast, and sensitive
- High contrast protein bands
- For proteins difficult to detect with silver stains, i.e. glycoproteins

APPLICATION

- Suitable for staining of protein gels including native and SDS denatured gels and gels containing Glycine and Tricine
- Staining suitable for subsequent protein elution, blotting, sequencing and mass spectroscopy

CITED REFERENCES

1. Becks, L. et al (2010) BMC Cancer. 10:540

Cat. No.	Description	Size
786-32ZN	*Reversible Zinc Stain™*	25 mini gels
786-32DSZN	Destaining Solution-Zinc [10X]	500ml

GLYCOPROTEIN STAINING

Glycoprotein Staining Kit™

For staining protein gels for glycoproteins

For the highly sensitive detection of glycoproteins following gel electrophoresis or protein transfer to nitrocellulose membranes.

The kit uses an enhanced Periodic Acid-Schiff (PAS) method for detection of glycoprotein sugars. The supplied oxidizing agent first oxidizes the cis-diol sugar groups to aldehydes. The aldehyde groups react with the sensitive Glyco-Stain Solution forming Schiff bonds and producing strong magenta color bands.

In addition to glycoprotein staining, the kit is supplied with RAPIDstain™, an enhanced Coomassie stain. RAPIDstain™ can be used after glycoprotein staining to detect non-glycosylated proteins and the use of the stain enhances glycoprotein staining.

The Glycoprotein Staining kit is highly convenient as all the key reagents required for staining are supplied and a unique positive & negative control is included. In addition, the kit allows for the detection of glycosylated and non-glycosylated proteins on a single gel or membrane.

The kit is sufficient for 10 mini gels (8 x 8cm) or 20 nitrocellulose membrane (8 x 8cm).

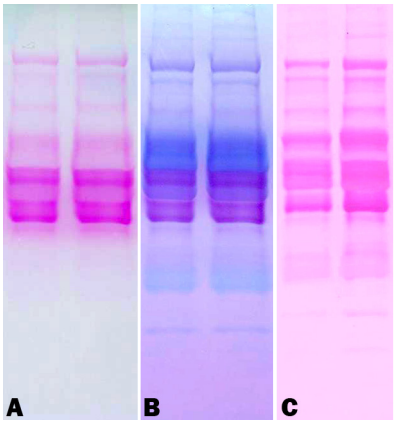


Figure 15: Glycoprotein Staining Kit positive control was resolved on a 4-20% SDS polyacrylamide gel. A. The gel was stained with by the Glycoprotein Staining kit and then with the included RAPIDstain™ (B). A separate gel was transfered to a nitrocelluole membrane and the membrane then stained with the Glycoprotein Staining kit (C).

FEATURES

- Specific glycosylated protein staining with optional non-glycosylated protein staining
- Two stains in one kit
- Improved detection of glycoproteins
- Nanogram level sensitivity
- Stable periodate/ Schiff staining

APPLICATIONS

- Detection of glycoproteins in polyacrylamide gels or on nitrocellulose membranes

CITED REFERENCES

1. Saha, B. et al (2015) J. Proteome. Res. DOI: 10.1021/acs.jproteome.5b00657
2. Wang, L. et al (2014) RSC Adv. DOI: 10.1039/C4RA05413J
3. Gruzdys, V. et al (2014) J Carbohyd Chem. DOI:10.1080/07328303.2014.922189
4. Kumari, A. and Gupta, R. (2013) J. Proteins Proteomics. 4:5

Cat. No.	Description	Size
786-254	Glycoprotein Staining Kit	10 mini gels

Gel Drying Solution

For drying gels following protein gel staining

G-Biosciences' Gel Drying Solution effectively and evenly dries protein electrophoresis gels by the mechanism of passive evaporation and is suitable for permanent gel storage and densitometry etc. The Gel Drying Solution regulates the rate of drying and prevents the cracking of the gel. It is supplied in three convenient sizes.

FEATURES

- Ensures even drying of protein gels
- Reduces chance of gel cracking
- Ideal for gel storage
- Ready-to-use

APPLICATIONS

- For drying gels following protein electrophoresis

Cat. No.	Description	Size
786-684	Gel Drying Solution	500ml
786-685	Gel Drying Solution	1 L
786-686	Gel Drying Solution	1gal

SDS-PAGE Gel Fixing Solution

The fixing of proteins in polyacrylamide gels prevents the diffusion of the proteins, thus keeping protein bands sharp and correctly resolved, and washes away running buffer components that may interfere with other downstream applications, such as staining. A major interfering agent is the SDS detergent used in SDS PAGE.

Protein fixation in polyacrylamide gels involves the denaturation and precipitation of the proteins into large insoluble aggregates within the gel matrix.

G-Biosciences SDS-PAGE Gel Fixing Solution is a relatively fast and convenient solution for fixing proteins in polyacrylamide gels and remove the SDS to prevent downstream interference..

FEATURES

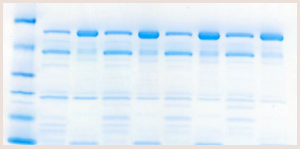
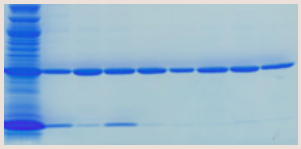
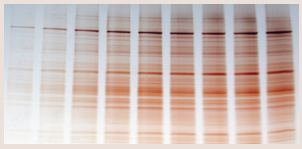
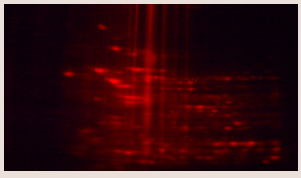
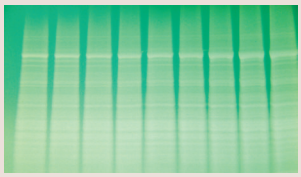
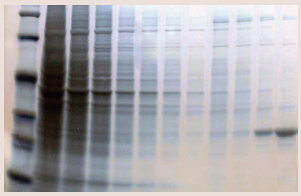
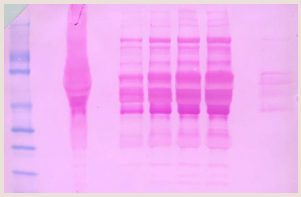
- Fix proteins in protein gel
- Wash away interfering agents (i.e. SDS)
- Convenient sizes (0.5L, 1L and 1 gal cubitainer)

APPLICATIONS

- Fix proteins in polyacrylamide gels for further downstream applications

Cat. No.	Description	Size
786-235	SDS-PAGE Gel Fixing Solution	500ml
786-236	SDS-PAGE Gel Fixing Solution	1 L
786-237	SDS-PAGE Gel Fixing Solution	1gal

GEL STAIN SELECTION GUIDE

Product Name		Sensitivity [BSA] (ng)	Staining Time (min)	Application Comments	Cat. No.	Size
LabSafe GEL Blue™		4-8	3-60	• Improved Coomassie based stain • Sensitive and rapid • Mass spectrometry compatible • No destaining required • Native, denaturing, IEF & 2D gels	786-35 786-35G	1 liter 1 gallon
RAPIDstain™		4-8	5-60	• Improved Coomassie based stain • No destaining required • Native, denaturing, IEF & 2D gels	786-31 786-31G	1 liter 1 gallon
Colloidal Blue Stain		<10ng	60-90	• For mass spectrometry analysis of proteins • Staining proteins in polyacrylamide and agarose gels • Staining of proteins in isoelectric focusing gels (IEF)	786-500	1 liter
FASTsilver™		0.5-1.0	60-90	• Stains proteins and nucleic acids • Native, denaturing, IEF & 2D gels	786-30	25 mini gels
FOCUS FASTsilver™		0.5-1.0	60-90	• Mass Spectrometry compatible • Allows proteolytic digestion • For complete peptide extraction • Native, denaturing, IEF & 2D gels	786-240 786-240T	25 mini gels 5 mini gels
RUBEO™		0.1-0.5	3600	• Fluorescent: Red emission at 605nm. • Minimal protein protein variation • Compatible with mass spectroscopy, microsequencing and immunostaining. • Stain native, denaturing, IEF and 2D gels.	786-644 786-645	200ml 1L
Reversible Copper Stain™		0.1-0.5	5-10	• Reversible • Compatible with subsequent applications, including elution and transfers. • Not compatible with native gels or gels containing tricine or glycine	786-32CU	25 mini gels
Reversible Zinc Stain™		0.1-0.5	10-20	• Reversible • Stains glycoproteins, phosphoproteins & other problematic proteins • Compatible with subsequent applications, including elution and transfers • Native and SDS denatured gels and gels containing glycine and tricine	786-32ZN	25 mini gels
Glycoprotein Staining Kit		0.5-1.0	180	• Specific glycosylated protein staining with optional non-glycosylated protein staining • Two stains in one kit • Improved detection of glycoproteins • Nanogram level sensitivity • Stable periodate/ Schiff staining	786-254	10 mini gels

MILD EXTRACTION BUFFERS

Protein Extraction & Lysis Buffer (PE LB™) Systems

Lysis and extraction of biologically active proteins from cellular and tissue samples is the first critical step for biochemical analysis. The correct selection of lysis and extraction buffers requires knowledge of the proteins of interest and the stability of their biological activities.

The Protein Extraction & Lysis Buffer (PE LB™) systems ensure good protein recovery, while maintaining the biological activity of the proteins. The solubilized proteins are suitable for enzyme assays, electrophoresis, folding studies, chromatographic studies and many other downstream applications.

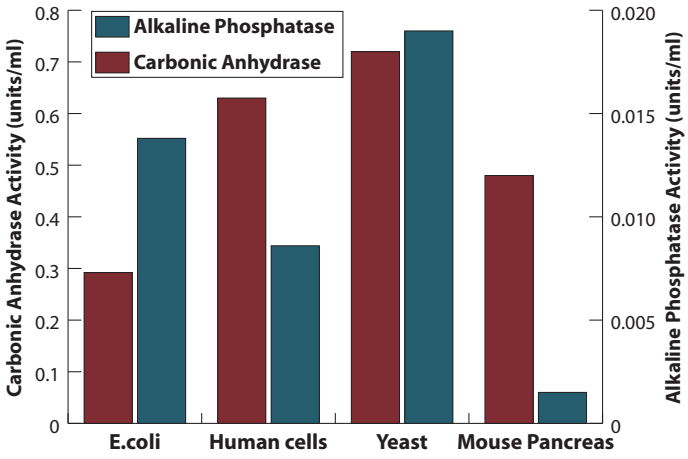


Figure 16: PE LB™ System maintains the biological activity of proteins. Extraction of carbonic anhydrase or alkaline phosphatase from E.coli, human cells, yeast and mouse pancreas with Bacterial, Mammalian Cell, Yeast and Tissue PE LB™ respectively. The resulting lysates were submitted to enzyme assays and both enzymes retain their biological activity.

The PE LB™ systems are based on a proprietary combination of organic buffering agents, mild non-ionic detergents, and a combination of various salts to enhance extraction of proteins and maintain stability of biological activities of the proteins.

Depending on application, additional agents such as chelating agents, reducing agents and protease and phosphatase inhibitors may be added to the PE LB™ buffer system.

The PE LB™ systems are compatible with most downstream applications including enzyme assays, running various chromatographic applications, gel electrophoresis applications, and protein folding procedures.

Bacterial PE LB™

Extraction of bacterial and recombinant proteins

For the extraction of biologically active soluble proteins, including recombinant proteins, and inclusion bodies from bacterial cells. A proprietary improvement on the lysozyme based lysis method, which allows for the extraction of soluble proteins and concurrent removal of nucleic acids (DNA & RNA) released during cell lysis. The Bacterial PE LB™ lysis eliminates viscosity build-up, allowing effective clarification with lower centrifugal forces.

Based on organic buffering agents, the solution utilizes a mild non-ionic detergent, chelating agent, and a proprietary combination of various salts and agents to enhance extraction and stability of proteins. Depending on the required downstream application, additional agents such as reducing agents and protease inhibitors may be added. Bacterial PE LB™ has been tested for use with several widely used bacterial strains.

Supplied as a kit, which includes PE LB™ Lysozyme, a modified lysozyme preparation that contains nucleases and results in optimal lysis and minimal contamination. Bacterial PE LB™ buffer is also available separately for further downstream applications.

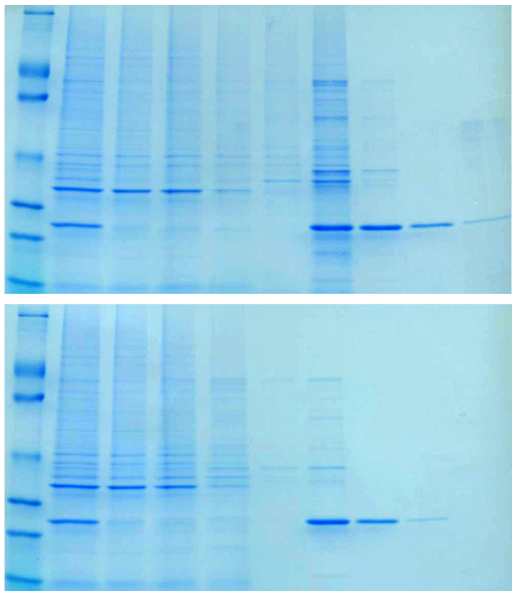


Figure 17: Bacteria expressing a His-tagged protein were lysed with Bacterial PE-LB™ and the recombinant protein was purified with HOOK™ 6X His Protein Purification kits (Top: Nickel resin; Bottom: Cobalt resin). Lane 1: PAGEmark™ protein ladder; 2: Cleared lysate; 3: Flow through; 4-6: Washes; 7-9: Elutions.

FEATURES

- Eliminates mechanical lysis and viscosity build-up
- Suitable for processing 100 x 50µl bacterial cell pellets

APPLICATIONS

- Lysis and extraction of proteins from bacterial cells
- For the isolation of biologically active proteins

CITED REFERENCES

1. Batchu, R.B. (2014) JAMA Surgery. doi:10.1001/jamasurg.2013.4113

Cat. No.	Description	Size
786-176	Bacterial PE LB™ Kit including PE LB™ Lysozyme	100 preps
786-177	Bacterial PE LB™ buffer only	500ml
786-185	Bacterial PE LB™ buffer only	100ml
786-186	Bacterial PE LB™ buffer only	250ml
786-187	Bacterial PE LB™ with PE LB™ Lysozyme	250 preps
786-188	Bacterial PE LB™ with PE LB™ Lysozyme	500 preps
786-189	Bacterial PE LB™ (2x)	250ml
786-191	Bacterial PE LB™ in Phosphate Buffer	500ml

Mammalian Cell PE LB™

Mammalian Cell PE LB™ has been developed for extraction of total biologically active, soluble proteins from mammalian cultured cells. The Mammalian Cell PE LB™ is based on organic buffering agents and utilizes a mild non-ionic detergent, chelating agent, and a proprietary combination of various salts and agents to enhance extraction and stability of proteins. Depending on the required downstream application, additional agents such as reducing agents, phosphatase and protease inhibitors may be added into Mammalian Cell PE LB™. Mammalian Cell PE LB™ has been tested on a wide variety of mammalian cells and can be used for both suspension and adherent cells.

FEATURES

- Compatible with most enzyme assays including reporter gene assays (β-galactosidase, luciferase, chloramphenicol acetyltransferase), kinases (protein kinase C, protein kinase A, tyrosine kinase) & immunoassays (ELISA, Western blots, RIA)

APPLICATIONS

- For extraction of soluble proteins from adherent and suspension animal cultured cells
- Suitable for most applications including enzyme and protein purification applications, electrophoresis, Western blotting and 2D-gel analysis

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2. *Lee, C. M. et al (2016) Int. J. Mol. Med.DOI: 10.3892/ijmm.2016.2667*
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17. *Zhu, G. et al (2013) Anal. Chem. 85:7221*
18. *Sun, L. et al (2013) Analyst. 138:3181*
19. *Yu, B. et al (2013) Life Sciences. 92:282*
20. *Eto, I. (2013) Metabolism. 62:873*
21. *Vidal, C. et al (2013) Biochimie. 95:793*
22. *Lee, W. et al (2013) Int. Immunopharmacol. 17:721*

Cat. No.	Description	Size
786-180	Mammalian Cell PE LB™	500ml

Insect PE LB™

Developed for extraction of total biologically active, soluble proteins from adherent or suspension cultured insect cells, including Sf9 and Sf21. Utilizes a mild non-ionic detergent and a proprietary combination of various salts and agents to enhance extraction and stability of proteins. Fully compatible with downstream processes, such as electrophoresis and chromatography. Depending on the required downstream application, additional agents such as reducing agents and protease inhibitors may be added into Insect PE LB™.

FEATURES

- Provides a simple and versatile method for protein extraction from adherent or suspended Sf9 and Sf21 insect cells
- Compatible with electrophoresis and chromatographic applications

APPLICATIONS

- For extraction of soluble proteins from cultured insect cells

Cat. No.	Description	Size
786-411	Insect PE LB™	250ml

Tissue PE LB™

Developed for extraction of total biologically active, soluble proteins from animal tissues. Tissue PE LB™ is based on an organic buffer and utilizes a mild non-ionic detergent, chelating agent, and a proprietary combination of various salts and agents to enhance extraction and stability of proteins. Depending on the required downstream application, additional agents such as reducing agents and protease inhibitors may be added. Suitable for a wide variety of fresh and frozen animal tissues.

FEATURES

- Compatible with most enzyme assays including reporter gene assays (β-galactosidase, luciferase, chloramphenicol acetyltransferase), kinases (protein kinase C, protein kinase A, tyrosine kinase) & immunoassays (ELISA, Western blots, RIA)

APPLICATIONS

- Soluble protein extraction from fresh and frozen animal tissue
- Suitable for most applications including enzyme and protein purification applications, electrophoresis, Western blotting and 2D-gel analysis

CITED REFERENCES

1. *Ravaschiere, A. et al (2017) Ecotoxicol Environ Saf. 142:222*
2. *Boutilier, J. and Moulton, H.M. (2017) Methods Mol Biol. 1565:251*
3. *Potter, R. et al (2016) Am J Physiol Regul Integr Comp Physiol. DOI: 10.1152/ajp-regu.00439.2016*
4. *Hsu, D. et al (2016) Sci. Rep. doi:10.1038/srep32854*
5. *Mishra, S.R. et al (2016) Agri Gene 1:53*
6. *Fu, W. et al (2016) J Biol Chem. Doi: 10.1074/jbc.M115.692756*
7. *Mishra, S.R. et al (2015) Asian J Anim Vet Adv. 10:433*
8. *Gupta, M. et al (2014) Gen Comp Endocrinol. 210:87*
9. *Uniyal, S. et al (2014) Theriogenology. 83:58*
10. *Stojadinovic, O. et al (2014) Wound Rep. Regen. 22:220*
11. *Rekhadevi, P.V. et al (2014) Hum. Exp. Toxicol. 33:196*
12. *Mantley, J.A. et al (2014) Tumor Biology*

Yeast PE LB™

Developed for the extraction of biologically active, soluble proteins from yeast cells. Yeast PE LB™ is a proprietary improvement on the lyticase (Zymolyase®) based spheroplast preparation and extraction of soluble proteins from yeast cell method. Based on organic buffering agents and utilizes a mild non-ionic detergent, chelating agent, and a proprietary combination of various salts and agents to enhance extraction and stability of proteins.

A ready-to-use Zymolyase® preparation is also provided. Depending on the required downstream application, additional agents such as reducing agents and protease inhibitors may be added into Yeast PE LB™. Yeast PE LB™ has been tested on several widely used yeast strains. Suitable for processing 100 x 50µl yeast cell pellets. Yeast PE LB™ buffer is also available separately.

FEATURES

- Eliminates the need for glass bead lysis
- Supplied as a kit, containing Zymolyase®

APPLICATIONS

- Lysis and extraction of proteins from yeast cells
- Isolation of spheroplasts

CITED REFERENCES

1. *Yun, S. et al (2014) Osong Public Health Res Perspect. 5:274*
2. *Saribas, A.S., et al (2004) Glycobiology 14: 1217*

Cat. No.	Description	Size
786-178	Yeast PE LB™ Kit including Zymolyase®	100 preps
786-179	Yeast PE LB™, buffer only	500ml

DENATURING CHAOTROPIC BUFFERS

FOCUS™ Extraction Buffers

Chaotropic extraction buffers that preserve the native charge of proteins

One of the most important considerations before running 2D gel electrophoresis is the choice of protein solubilization buffers. The suitable buffer must solubilize proteins effectively, without disturbing the native charge of the proteins. Urea, a common chaotrope, is widely used for solubilization and denaturation of proteins. One of the disadvantages of using urea is carbamylation. Urea in water exists in equilibrium with ammonium cyanate, the level of which increases with increasing temperature and pH. Cyanate reacts with α-amino and ε-amino groups of proteins and induces a change in the isoelectric point of proteins. This leads to artifactual results and therefore carbamylation must be avoided.

One way to minimize the risk of carbamylation is to prepare the urea based reagents fresh before each use. G-Biosciences has developed a series of dry urea based pre-mixed and ready-to-use solubilization buffers. Simply add an appropriate volume of the supplied rehydration buffer to the dry buffer and then use to solubilize proteins, saving time and improving the quality of IEF/2D gel electrophoresis.

FOCUS™ Extraction Buffers are also designed to be used as rehydration buffers for IPG strips.

FOCUS™ Extraction Buffers are experimentally optimized concentrations of critical agents, buffering and stabilizing agents, including urea, thiourea, Nonidet® P-40, CHAPS, and sulfobetaines (SB). The FOCUS™ Extraction Buffers are designed to produce optimal protein extraction and improved spot resolution for 2D gel analysis.

A range of FOCUS™ Extraction Buffers, listed with their major components, are shown (see table). FOCUS™ Extraction Buffer-I is suitable for most applications; however, for stronger solubilization effects, we recommend FOCUS™ Extraction Buffer-II, -III, -IV, -V or -VI.

For analysis of a proteome, a single buffer may not be suitable and sequential solubilization using different FOCUS™ Extraction Buffers will help in identifying new proteins.

FEATURES

- Convenient and simple: simply hydrate and use
- Prevents urea induced protein carbamylation
- Prevents waste of unused reagents
- No artifactual protein bands due to dust and human skin contamination

APPLICATIONS

- Suitable for sample extraction and solubilization for 2D gel electrophoresis and other applications
- Suitable for IPG strip rehydration

FOCUS™ Extraction Buffer I	Urea & Nonidet® P-40
FOCUS™ Extraction Buffer II	Urea & CHAPS
FOCUS™ Extraction Buffer III	Urea, thiourea, CHAPS & ASB-16
FOCUS™ Extraction Buffer IV	Urea, thiourea, CHAPS & SB 3-10
FOCUS™ Extraction Buffer V	Urea, thiourea & CHAPS
FOCUS™ Extraction Buffer VI	Urea, thiourea, CHAPS & NDSB 201

Table 1: The major components of the FOCUS™ Extraction Buffers.

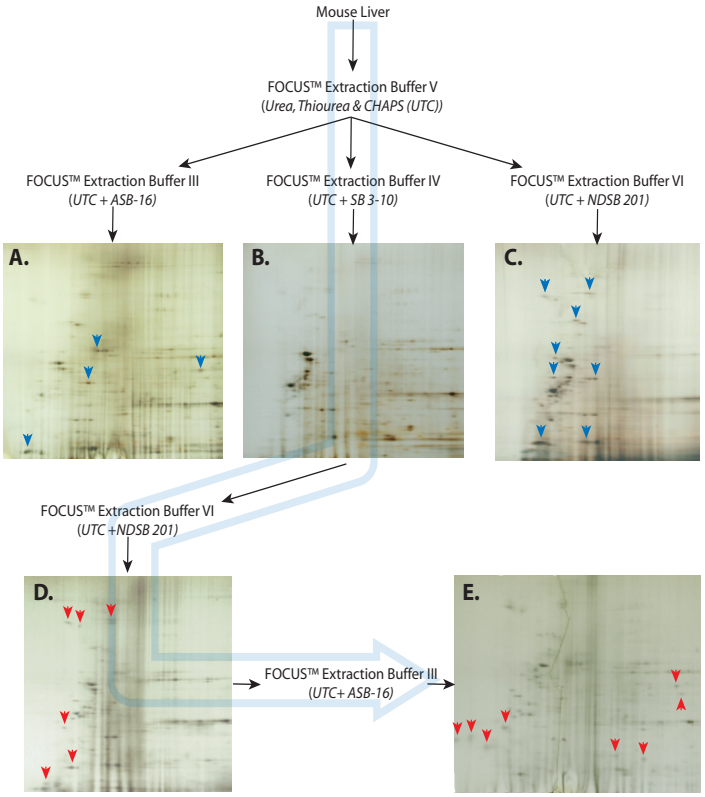

Figure 18: Serial Solubilization of Mouse Liver. Mouse liver was solubilized in FOCUS Extraction Buffer V and the insoluble material was further solubilized. The insoluble pellet was solubilized in either FOCUS™ Extraction Buffer III (A), IV (B) or VI (C) and the proteins were resolved by 2D electrophoresis. The blue arrowheads highlight a selection of different proteins compared to gel B. In a second analysis, the insoluble pellet from FOCUS™ Extraction Buffer V was serially extracted in FOCUS™ Extraction Buffer IV (B), then VI (D) and finally III (E). These were resolved by 2D electrophoresis. New proteins appearing at each stage are indicated with red arrows. UTC= Urea, thiourea & CHAPS.

Cat. No.	Description	Size
786-220	FOCUS™ Extraction Buffer I	For 50ml
786-221	FOCUS™ Extraction Buffer II	For 50ml
786-222	FOCUS™ Extraction Buffer III	For 50ml
786-223	FOCUS™ Extraction Buffer IV	For 50ml
786-219	FOCUS™ Extraction Buffer V	For 50ml
786-233	FOCUS™ Extraction Buffer VI	For 50ml
786-234	FOCUS™ Extraction Buffers I-VI Trial kit	For 10ml each buffer

2D-Xtract™

A protein solubilization buffer for 2D analysis must solubilize proteins effectively, without disturbing the native charge of the proteins. Urea based solubilization buffers solubilize proteins effectively, however can modify the native charge of the proteins, due to carbamylation. Urea exists in equilibrium with ammonium cyanate that modifies α- and ε-amino groups, inducing changes in the isoelectric point of proteins leading to artifactual results.

One way to minimize the risk of carbamylation is to prepare the urea based reagents fresh before each use. G-Biosciences developed 2D-Xtract™, a dry urea based pre-mixed and ready-to-use solubilization buffer. Simply add an appropriate volume of the supplied rehydration buffer to the dry buffer and then use to solubilize proteins, saving time and improving the quality of IEF/2D gel electrophoresis. 2D-Xtract™ has optimized concentrations of urea, thiourea, CHAPS and non detergent sulfobetaine (ND SB) 201. 2D-Xtract™ is also designed to be used as a rehydration buffer for IPG strips.

FEATURES

- Convenient and simple to use extraction buffer
- No preparation required, simply hydrate and use
- Prevents urea induced protein carbamylation
- Prevents waste of unused reagents

APPLICATIONS

- Suitable for sample extraction and solubilization for 2D gel electrophoresis and other applications
- Suitable for rehydration of IPG Strips

CITED REFERENCES

1. *Powell, M.D. et al (2010) Proteomics. 4:337*

Cat. No.	Description	Size
786-501	2D-Xtract™	For 50ml

FOCUS™ Proteome Kits

Isolate total proteomes from various species

An effective proteome analysis requires the preparation of a sample to bring the wide range of protein species into the dynamic range of detection. The absence of any standardized procedures for sample preparation has made proteome analysis extremely complicated, requiring a multitude of complicated skills, expensive equipment, and resources.

FOCUS™ Proteome Kits are for the preparation of total protein, including soluble, insoluble, membrane, cytoplasmic, nuclear, signal, phospho- and glyco-proteins. The FOCUS™ Proteome Kits are suitable for biological samples from tissues, cells, plants, yeast, bacteria and insects. These kits are simple to use, save time, improve the quality of protein analysis and enhance the chances of discovery of novel proteins. The kits are suitable for the analysis of proteins using electrophoresis and other biochemical techniques.

CITED REFERENCES

1. *Raza, W. et al (2016) Microbiol. Res. 192:103*
2. *Raza, W. et al (2016) Sci Rep. doi:10.1038/srep24856.*
3. *Ye, Y. et al (2015) Int. J. Food Microbiol. doi:10.1016/j.ijfoodmicro.2015.08.025*
4. *Chen, J. et al (2013) J. Proteome Res. 12:1151*

Cat. No.	Description	Size
786-246	FOCUS™ Mammalian Proteome	50 preps
786-360	FOCUS™ Insect Proteome	50 preps
786-257	FOCUS™ Yeast Proteome	50 preps
786-258	FOCUS™ Bacterial Proteome	50 preps
786-259	FOCUS™ Plant Proteome	25 preps

OTHER LYSIS KITS & BUFFERS

Total Protein Extraction (TPE™)

Universal lysis system for the solubilization of total proteins from animal, plant, yeast, bacteria, and other biological samples. Samples are ground in the buffer provided and then heated to solubilize the total protein.

A two component protocol eliminates clump formation, protein loss, and other problems associated with total protein extraction procedures. Based on optimized concentration of Tris and SDS and is suitable for running denaturing electrophoresis and other downstream applications

CITED REFERENCES

1. Zhu, Guang-Fa et al (2015) Exp Ther Med. 1899:0
2. Padaria, J.C. et al (2014) BMC Research Notes. 7:713
3. Mina, U. et al (2014) Emerging Issues and Challenges. 3:299
4. Liu, Y. et al (2011) Lipids Health Dis. 10:117
5. Prathyumnan, S. et al Int. J. Cur. Sci. Res. 3:120

Cat. No.	Description	Size
786-225	Total Protein Extraction (TPE™) Kit	50 preps

RIPA Lysis & Extraction Buffer

A complete lysis buffer for the release of cytoplasmic, membrane and nuclear proteins from adherent and suspension cultured mammalian cells. The RIPA lysis buffer is fully compatible with many applications, including reporter assays, protein assays, immunoassays and other protein purification techniques.

CITED REFERENCES

1. *Sharma, S. S. and Mujumdar, S.S. (2017) Mol Cell Endocrinol. https://doi.org/10.1016/j.mce.2017.04.017*
2. *Mandal, K. et al (2017) DOI: https://doi.org/10.1093/dnares/dsw057*
3. *Carbrera, A.P. et al (2016) IOVS doi:10.1167/iovs.16-19727*

More citations available at www.GBiosciences. com

Cat. No.	Description	Size
786-489	RIPA Lysis & Extraction Buffer	100ml
786-490	RIPA Lysis & Extraction Buffer	500ml
786-723	RIPA Lysis & Extraction Buffer	1L
786-746	RIPA Lysis & Extraction Buffer	1gal

Inclusion Body Solubilization Buffers

The IBS™ buffer is specifically developed for solubilization of inclusion bodies and IBS-HP™ Buffer for the solubilization of inclusion bodies containing highly hydrophobic proteins.

Simple to use protocol as inclusion bodies are suspended in IBS™ Buffer, where they readily dissolve releasing the proteins of interest. Once the inclusion bodies are solubilized, the sample is ready for further analysis. Supplied with optional DTT.

CITED REFERENCES

1. *Sheikh, A.H. et al (2013) BMC Plant Biol. 13:121*
2. *Schwendt, M. et al (2009) J Pharmacol Exp Ther 331:555*
3. *Zhang, H. amd Lin, S. (2003) J. Phycol. 39:1160*

Cat. No.	Description	Size
786-183	IBS™ Buffer Kit	100ml
786-183HP	IBS-HP™ Buffer Kit	100ml

RAB Buffer (Reassembly Buffer)

A high salt RAB (Reassembly) buffer for the lysis of mammalian cells, including CHO1,2, COS3, NT2N4,5 and HEK29310; C. elegans6,10 and brain tissue7-9.

Cat. No.	Description	Size
786-91	RAB Buffer	250ml

DETERGENTS

Proteomic Grade Detergent Solutions (10%)

Ultra low carbonyl & peroxide contaminants

Many commercial grade detergents contain elevated levels of sulfhydryl oxidizing agents, peroxides, salts and carbonyl compounds. The proteins that are isolated with these detergents are highly susceptible to contaminating peroxides and carbonyls. The peroxides will oxidize proteins and the carbonyl groups will form Schiff's bases with the proteins that will interfere with a protein's structure.

G-Biosciences' Proteomic Grade Detergent Solutions contain reduced peroxides and carbonyl compounds. In addition, the detergents have less than 50µS conductivity. These detergents are offered as 10% aqueous solutions, sealed under inert gas and are suitable for protein applications. These non-ionic detergents are suitable for isolating membrane-protein complexes.

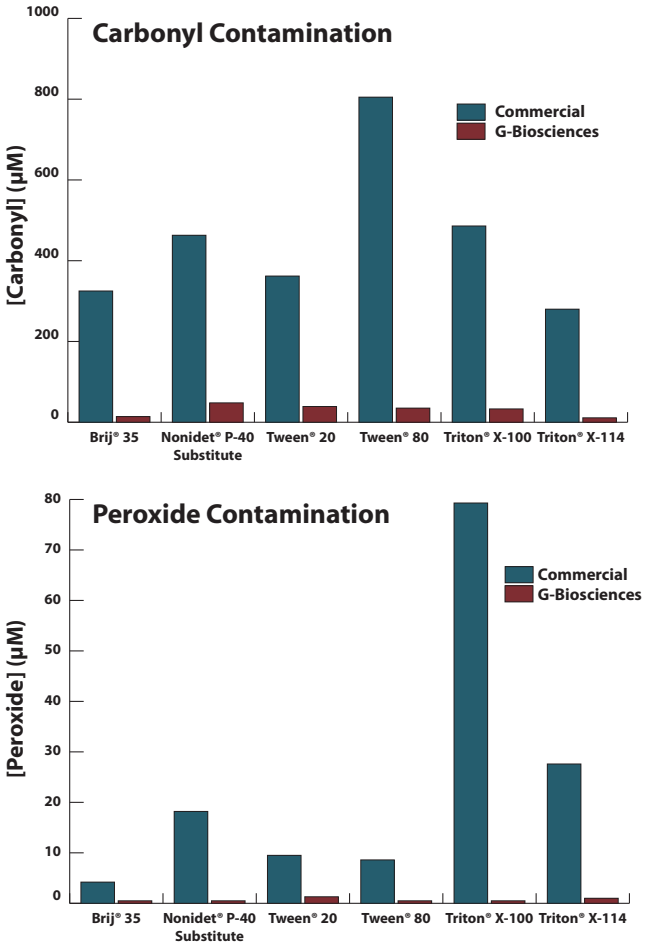

Figure 19: Comparison of aldehyde (top) and peroxide (bottom) concentration in G-Biosciences Proteomic Grade Detergent Solutions and non-proteomic grade commercially available detergents.

FEATURES

- Low peroxide contamination
- Low carbonyl contamination
- Low conductivity
- Reduced metal ions
- 10% aqueous solutions
- Sealed under inert gas to prevent oxidation

For a complete selection of G-Biosciences' detergents, download the ***"Detergent Handbook & Selection Guide."***

PROTEASE INHIBITOR COCKTAILS

For our complete range of protease inhibitors, view our **"Protease & Phosphatase Inhibitors, Enzymes & Assays"** Handbook

ProteaseArrest™

A broad range protease inhibitor cocktail with wide species specificity

ProteaseArrest™ is a general protease inhibitor cocktail solution that is provided as a 100X concentrated, ready-to-use solution. The ProteaseArrest™ 100X solution format is suitable for small, analytical sample applications, as >95% inhibition is achieved by adding 10µl ProteaseArrest™ per ml sample. For samples with higher than normal protease levels, the volume of ProteaseArrest™ added can be increased for greater inhibition levels.

The cocktail contains reversible and irreversible inhibitors of serine, cysteine, calpain and metallo-proteases.

An optional EDTA solution is provided for enhanced metalloprotease inhibition. It is not present in the actual ProteaseArrest™ cocktail as it would inhibit the activity of proteins that require divalent cations (Ca^{2+}, Mg^{2+} or Mn^{2+}) for their biological activity. In addition, EDTA will inhibit the purification of proteins using immobilized metal affinity chromatography (IMAC), including 6X His tagged recombinant proteins.

Due to the optimized concentration of the various inhibitors, ProteaseArrest™ shows excellent inhibition of protease activities and is therefore suitable for the protection of proteins during preparation of samples and protein purification from animal tissues, plants, yeast and bacteria.

ProteaseArrest™ is also available as single use aliquots that are suitable for >95% protease inhibition in 10ml solutions. These *OneQuant*™ ProteaseArrest™ are provided for additional protease inhibitor cocktail convenience.

ProteaseArrest™ Outperforms Tablet Cocktails

The ProteaseArrest™ format allows delivery of optimized concentrations of protease inhibitor, for example 2X or higher concentrations can be added for tissues with higher than normal protease concentrations; a feature not possible with tablet format protease inhibitor cocktails.

In our study, a 1X concentration of ProteaseArrest™ inhibits over 95% of protease activities (e.g. 0.5mg/ml mouse pancreas extract). The ProteaseArrest™ protease inhibitor cocktail demonstrated greater inhibition levels compared to similar protease inhibitor cocktails, including tablet formats (see figure). In independent studies, researchers have found that ProteaseArrest™ outperforms several leading manufacturer's protease inhibitor cocktails, including tablet formats, in the purification of plant proteins.

FEATURES

- Broad spectrum protease inhibitor cocktail
- 100X concentrated, ready-to-use solution
- High inhibition levels: 1X ProteaseArrest™ inhibits >95% of protease activities (i.e. 0.5 mg/ml mouse pancreas extract)

APPLICATIONS

- Inhibition of protease activity in protein preparations of mammalian, bacteria, plant, yeast and fungal lysates
- Protection of proteins from proteolysis in such applications as electrophoresis, purification, storage, assays, and other applications

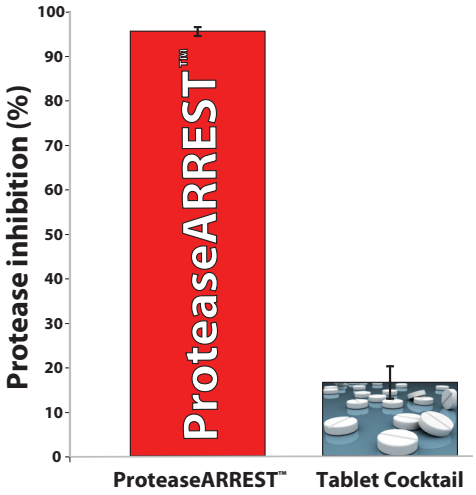

Figure 20: ProteaseArrest™ outperforms tablet format protease inhibitor cocktails. Protease inhibition in mouse pancreas lysate with ProteaseArrest™ (EDTA-free) and a commercially available EDTA-free tablet protease cocktail was compared, using Protease Screening™ Kit. The assay used 0.5mg/ml pancreas lysate and incubation conditions of 37°C for 2.5 hours. ProteaseArrest™ inhibited over 95% of total proteases, 80% more compared to tablet inhibition.

CITED REFERENCES

1. *Abebayehu D. et al (2017) J Biomed Mater Res A. DOI: 10.1002/jbm.a.36113*
2. *Fletcher, N. et al (2017) Fertility and Sterility. DOI: http://dx.doi.org/10.1016/j.fertnstert.2017.04.015*

More citations available at www.GBiosciences. com

Cat. No.	Description	Size
786-108	ProteaseArrest™ [100X]	2ml
786-437	ProteaseArrest™ [100X]	5ml
786-711	ProteaseArrest™ [100X]	10ml
786-712	ProteaseArrest™ [100X]	5 x 10ml
786-329	*OneQuant*™ ProteaseArrest™ [100X]	24 x 100µl

FOCUS™ ProteaseArrest™

2D electrophoresis & mass spectrometry compatible protease inhibitor cocktail

A ready-to-use, 100X concentrated, broad range protease inhibitor cocktail that is fully compatible with 2D electrophoresis and subsequent mass spectrometry.

The protease inhibitor cocktail contains reversible and irreversible inhibitors of serine, cysteine, calpain and metallo- proteases. Due to the optimized concentration of the various inhibitors, the FOCUS™ ProteaseArrest™ shows excellent inhibition of protease activities and is therefore suitable for the protection of protein samples from animal tissues, plants, yeast and bacteria.

FOCUS™ ProteaseArrest™ is compatible with 2D electrophoresis as it uses an alternative to EDTA as an inhibitor of metalloproteases. The absence of EDTA allows for optimal action of nucleases for removing nucleic acids from the samples. In addition, FOCUS™ ProteaseArrest™ uses PMSF as its primary serine protease inhibitor as opposed to the commonly used Pefabloc®. Pefabloc® has been reported to modify proteins at high concentrations and result in artifacts in subsequent 2D electrophoresis and mass spectrometry.

CITED REFERENCES

1. *Pier, B. et al (2013) Fertil. Steril. 99:199*

More citations available at www.GBiosciences. com

Cat. No.	Description	Size
786-108F	FOCUS™ ProteaseArrest™ [100X]	1ml

PHOSPHATASE INHIBITOR COCKTAILS

The PhosphataseArrest™ phosphatase inhibitor cocktails are ready-to-use 100X solutions that are simply added to your extraction buffers or samples.

FEATURES

- Single 100X solution
- Ready-to-use
- Compatible with most phosphatase assays
- No resuspension required

CITED REFERENCES

1. *Bergan-Roller, H.E., et al (2017) IGen Comp Endocrinol. http://doi.org/10.1016/j.ygcen.2017.04.005*

More citations available at www.GBiosciences. com

PhosphataseArrest™ I

A broad spectrum phosphatase inhibitor cocktail consisting of five phosphatase inhibitors that target serine/threonine specific, tyrosine specific and dual specificity phosphatases.

PhosphataseArrest™ I is a stablized solution of sodium fluoride, sodium orthovanadate, sodium pyrophosphate, β-glycerophosphate & sodium molybdate.

PhosphataseArrest™ II

A phosphatase inhibitor cocktail consisting of five phosphatase inhibitors that target acid, alkaline and tyrosine phosphatases.

PhosphataseArrest™ II contains optimized concentrations of sodium fluoride, sodium tartrate, sodium orthovanadate, imidazole & sodium molybdate.

PhosphataseArrest™ III

A phosphatase inhibitor cocktail consisting of three phosphatase inhibitors, that target alkaline and serine/threonine phosphatases.

PhosphataseArrest™ III is a stable, convenient solution of cantharidin, *p*-bromotetramisole oxalate and calyculin.

Cat. No.	Description	Size
786-450	PhosphataseArrest™ I [100X]	1ml
786-647	PhosphataseArrest™ I [100X]	24 x 100 ul
786-782	PhosphataseArrest™ I [100X]	2ml
786-783	PhosphataseArrest™ I [100X]	5ml
786-784	PhosphataseArrest™ I [100X]	10ml
786-451	PhosphataseArrest™ II [100X]	1ml
786-452	PhosphataseArrest™ III [100X]	1ml

Protease-PhosphataseArrest™ [100X]

Protease-PhosphataseArrest™ provides full protection of protein samples from proteases and phosphatases released during the preparation of cell and tissue lysates.

Cat. No.	Description	Size
786-870	Protease-PhosphataseArrest™ [100X]	For 100ml
786-871	Protease-PhosphataseArrest™ [100X]	For 200ml
786-872	Protease-PhosphataseArrest™ [100X]	For 500ml
786-889	Protease-PhosphataseArrest™ [100X]	For 240ml

ALBUMIN REMOVAL

AlbuminOUT™

Samples that contain a large abundance of albumin, such as plasma and cerebrospinal fluid, tend to mask identification and discovery of other less abundant proteins in two dimensional gel electrophoresis and other studies. AlbuminOUT™ has been specifically developed for substantial removal of albumin from such samples.

The albumin removal method is based on binding of albumin with Cibachron™ Blue dye. AlbuminOUT™ has been optimized for removal of human albumin from samples. AlbuminOUT™ uses a rapid spin column method, where each column contains 0.2ml dye bound resins with capacity of >2mg human albumin per column. AlbuminOUT™ will remove >98% albumin from 5-50µl human plasma.

Spin column format allows removal of albumin within 10 minutes. High capacity blue-dye binding resin allows instantaneous binding and removal of albumin from human, pig, sheep, dog, rabbit, rat, and bovine samples. AlbuminOUT™ may also be used for removal of albumin from other species. AlbuminOUT™ is suitable for processing 25 or 50 samples.

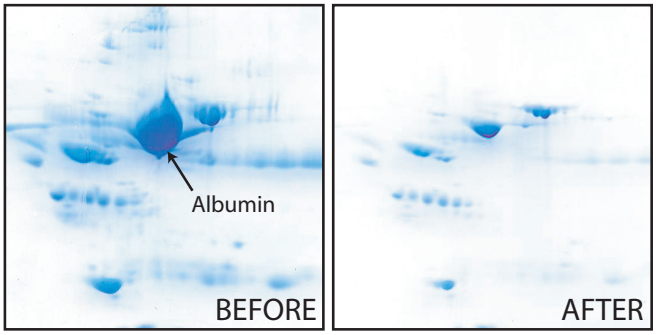

Figure 21: 2D analysis of whole human serum before (left) and after (right) treatment with AlbuminOUT™.

FEATURES

- Removal of albumin from samples in less than 10 minutes
- Based on binding of albumin with Cibachron™ Blue dye
- Column capacity >2mg human albumin per column
- Removes >98% albumin from 5-50µl human plasma

APPLICATIONS

- Removal of albumin from biological samples such as plasma and cerebrospinal fluid

CITED REFERENCES

1. Shekar, S. et al (2017) Mol Neurobiol. DOI: 10.1007/s12035-017-0527-1
2. Sahu, V. Et al (2016) Clin. Chim. Acta 460: 231

Cat. No.	Description	Size
786-251	AlbuminOUT™	25 preps
786-252	AlbuminOUT™	50 preps
786-251T	AlbuminOUT™	4 preps

IMMUNOGLOBULIN G REMOVAL

Immobilized Protein A

For binding the constant domains of immunoglobulin (Ig) molecules. Protein A is coupled to agarose beads by a reductive amination method that provides high coupling efficiency and minimal protein A leaching (<5ng protein A/ml). Immobilized Protein A Resin is available as resin alone, prepacked columns or supplied in 10 x 0.2ml column or 5 x 1ml column kit formats containing columns, wash and elution buffers. Available in multiple formats, including gravity-flow and spin format columns, 96-well plates, FPLC columns and magnetic beads.

FEATURES

- High binding capacity: >40mg human IgG/ml resin
- Ligand: Recombinant Staphylococcal Protein A lacking the albumin-binding domain produced in E. coli
- Bead size: 45-165µm
- Bead Structure: 4% highly cross-linked agarose

CITED REFERENCES

1. *Kumar, N. et al (2017) FEBS Open Bio. DOI: 10.1002/2211-5463.12225*
2. *Izawa, T. et al (2016) J Immunol doi:10.4049/jimmunol.1600822*

Cat. No.	Description	Size
786-283	Immobilized Protein A Resin	5ml resin
786-824	Immobilized Protein A Resin	25ml resin
786-825	Immobilized Protein A Resin	5 x 1ml columns
786-826	Immobilized Protein A Resin	5 column kit
786-827	Immobilized Protein A Resin	10 x 0.2ml columns
786-828	Immobilized Protein A Resin Kit	10 column kit
786-996	Immobilized Protein A Resin Spin Plate	1 plate
786-1031	G-Trap™ rProtein A FF FPLC Column	2 x 1ml columns
786-1029	G-Trap™ rProtein A FF FPLC Column	5 x 1ml columns
786-1030	G-Trap™ rProtein A FF FPLC Column	1 x 5ml columns
786-1032	G-Trap™ rProtein A FF FPLC Column	5 x 5ml columns
786-902	Immobilized Protein A Magnetic Beads	1 ml resin
786-903	Immobilized Protein A Magnetic Beads	5ml resin

Immobilized Protein G

For binding the constant domains of immunoglobulin (Ig) molecules. Protein G, a bacterial cell wall protein isolated from group G Streptococci, binds to mammalian IgGs mainly through Fc regions. Native protein G has 3 IgG binding domains and also sites for albumin and cell-surface binding. The latter have been eliminated from our recombinant protein G to reduce nonspecific binding. Although protein G has very similar tertiary structures to protein A, their amino acid compositions differ significantly, resulting in different binding characteristics. Immobilized Protein G Resin is available as resin alone prepacked columns or supplied in kit formats containing columns, wash and elution buffers. Available in multiple formats, including gravity-flow and spin format columns, 96-well plates, FPLC columns and magnetic beads.

FEATURES

- High binding capacity: 38mg human IgG/ml resin; >20mg sheep IgG/ml resin
- Ligand: Recombinant Streptococcal Protein G lacking the albumin-binding domain produced in E. coli
- Bead size: 50-165µm
- Bead Structure: 4% highly cross-linked agarose

CITED REFERENCES

1. *Ahmed, S. et al (2017) J Biol Chem.doi: 10.1074/jbc.M117.776419*
2. *Izawa, T. et al (2016) T J Immunol doi:10.4049/jimmunol.1600822*

Cat. No.	Description	Size
786-829	Immobilized Protein G Resin	2ml resin
786-284	Immobilized Protein G Resin	5ml resin
786-830	Immobilized Protein G Resin	10ml resin
786-831	Immobilized Protein G Resin	25ml resin
786-832	Immobilized Protein G Resin	5 x 1ml columns
786-833	Immobilized Protein G Resin Kit	5 column kit
786-834	Immobilized Protein G Resin	10 x 0.2ml columns
786-835	Immobilized Protein G Resin Kit	10 column kit
786-997	Immobilized Protein G Resin Spin Plate	1 plate
786-1034	G-Trap™ Protein G FPLC Column	1 x 1ml column
786-1036	G-Trap™ Protein G FPLC Column	2 x 1ml column
786-1033	G-Trap™ Protein G FPLC Column	5 x 1ml column
786-1035	G-Trap™ Protein G FPLC Column	1 x 5ml column
786-1037	G-Trap™ Protein G FPLC Column	5 x 5ml columns
786-904	Immobilized Protein G Magnetic Beads	1ml resin
786-905	Immobilized Protein G Magnetic Beads	5ml resin

The analysis of a proteome is often inhibited by the vast amount of proteins, with large abundant proteins inhibiting the signal of lower abundance and often more interesting proteins. Researchers overcome this problem by using fractionation, however inconsistencies in techniques and buffers often result in a lack of reproducibility.

G-Biosciences offers a wide selection of fractionation kits for processing samples from cells, tissues, bacteria, yeast, plants, and other types of samples. A selection of sample preparation accessories and supplies are also included. The following kits, accessories, and supplies are suitable for analysis of proteins using electrophoresis and other biochemical techniques.

The fractionation line of products allow for the fractionation of a large selection of biological samples into a multitude of different fractions and these fractions are compatible with a wide range of downstream applications, including 1D & 2D electrophoresis, Western blotting and mass spectrometry.

SPECIFIC PROTEIN ENRICHMENT

Phosphoproteins

FOCUS™ PhosphoRich™ is a ready-to-use kit that enriches phosphorylated proteins and phosphopeptides from complex biological samples. The kit contains spin columns that have a phosphoprotein binding resin with a binding capacity of ~20mg phosphorylated ovalbumin per column. The resin columns supplied with the kit can be reused, if regenerated and stored properly.

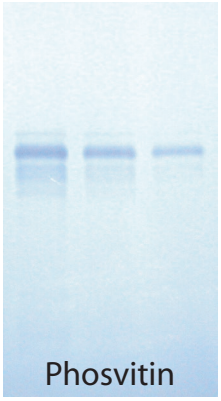

Figure 22: Various concentrations of phosphoprotein were loaded onto the FOCUS™ PhosphoRich™ columns and were washed extensively. The protein was rapidly eluted and the eluted proteins were resolved by SDS-PAGE. The phosvitin was visualized with the Reversible Zinc Stain™.

FEATURES

- Uses a phosphorylated protein binding spin column
- Rapid binding and elution of phosphoproteins

APPLICATIONS

- Enrichment of phosphorylated proteins and peptides
- Suitable for wide range of downstream applications, including 1D & 2D electrophoresis, Western blotting and mass spectrometry
- Suitable for proteomics and cell signaling studies

Cat. No.	Description	Size
786-255	FOCUS™ PhosphoRich™	5 Preps

Glycoproteins

FOCUS™ Glycoprotein kit is based on lectin binding of specific glycoproteins with terminal α-D mannosyl and α-D glycosyl proteins.

FOCUS™ Glycoprotein kit isolates glycoproteins from complex biological solutions using spin columns that contain lectin (Concanavalin A) bound resin with the capacity to bind and immobilize ~5mg glycoproteins. Column bound glycoproteins are eluted with a set of three rapid elution buffers. The proprietary serial elution allows for faster elution compared to other glycoprotein purification systems.

The eluted proteins are suitable for 2D electrophoresis and isoelectric focusing.

FOCUS™ Glycoprotein is designed for 10 x 1.5mg protein samples.

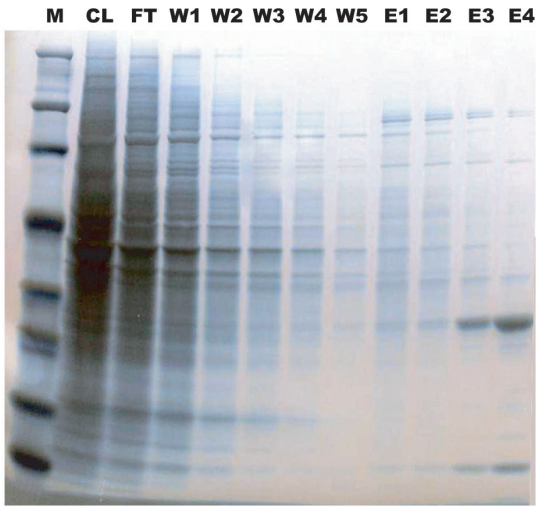

Figure 23: FOCUS™ Glycoprotein isolates multiple glycoproteins. Jurkat cells were lysed by sonication, centrifuged and the supernatant (CL) loaded onto a FOCUS™ Glycoprotein column. The column was centrifuged and the flow through (FT) collected. The column was washed (W1-5) and the glycoproteins were eluted with Glyco Elution Buffer I (E1-2), Glyco Elution Buffer II (E3) and then Glyco Elution Buffer III (E4). 10µl was loaded onto a SDS-PAGE gel, the proteins were resolved and visualized with Reversible Zinc Stain™.

FEATURES

- Spin column protocol
- Uses a high capacity lectin binding resin (10-20mg/ml resin)
- Elution of glycoproteins within 90 minutes with a set of three rapid elution buffers

APPLICATIONS

- Fractionation and enrichment of glycoprotein
- Suitable for wide range of downstream applications, including 1D & 2D electrophoresis, Western blotting and mass spectrometry

CITED REFERENCES

1. Bhat, R. et al (2015) J. Agric. Food Chem. DOI: 10.1021/acs.jafc.5b04468

Cat. No.	Description	Size
786-253	FOCUS™ Glycoprotein	10 Preps

Membrane Proteins

For the fractionation of highly enriched membrane proteins

FOCUS™ Membrane Proteins is a rapid and highly reproducible method for preparation of membrane or hydrophobic proteins from biological samples for 2D-gel analysis or other applications. Membrane proteins are extracted with a single step phase partition, with an efficiency greater than 90% with minimal cross-contamination from hydrophilic proteins.

The kit is provided with reagents necessary for extraction of membrane proteins and their subsequent preparation for isoelectric focusing or 2D gel resolution for improved spot resolution.

FOCUS™ Membrane Proteins kit is designed for >50 preps, where 1 prep is either 100mg mammalian tissue, 50µl wet animal cell pellet, 50µl wet yeast pellet, 50µl wet bacteria pellet or 250mg plant tissue.

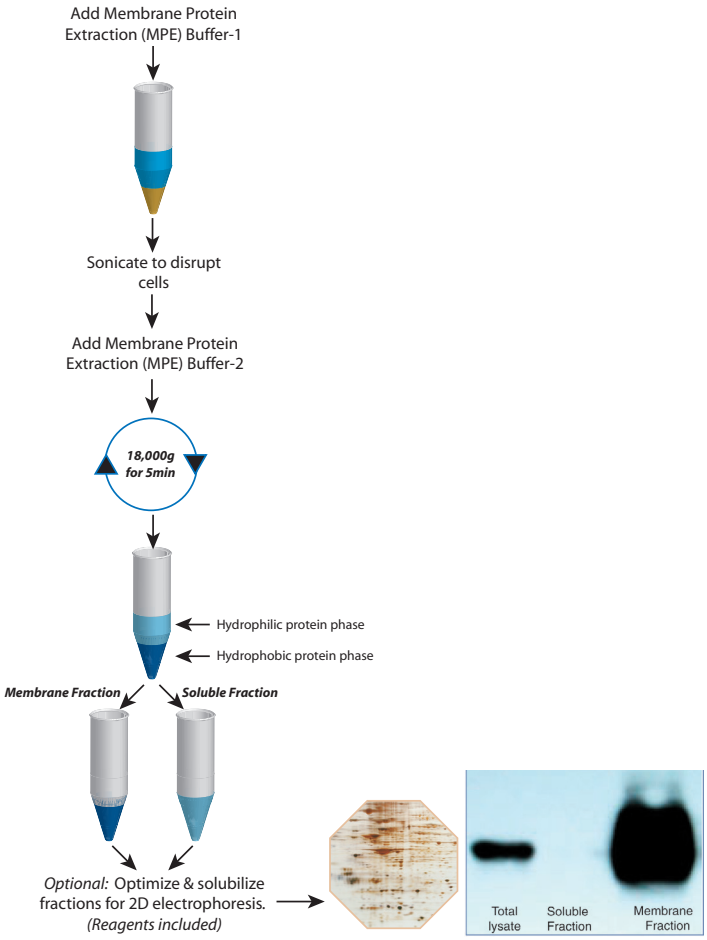

Figure 24: (Left) FOCUS™ Membrane Protein scheme. (Right) Mouse liver was processed with FOCUS™ Membrane Proteins kit. The enriched membrane and soluble fractions were resolved by SDS-PAGE, transferred and probed with antibodies against caveolin, a membrane protein.

FEATURES

- Phase partition based extraction of membrane proteins

APPLICATIONS

- Selective fractionation of membrane proteins from tissues, cells, plants, yeast, bacteria, insects, and other sources
- Suitable for membrane protein preparation for a wide range of downstream applications, including 1D & 2D electrophoresis, Western blotting and mass spectrometry

Cat. No.	Description	Size
786-249	FOCUS™ Membrane Proteins	50 Preps

Cell Surface Protein Isolation

For the biotin labeling and subsequent isolation of cell surface proteins

HOOK™ Cell Surface Protein Isolation kit uses G-Biosciences HOOK™ biotin labeling and purification technology in conjunction with our Mammalian Cell PE LB™ lysis buffer to conveniently label cell surface proteins and isolate them for further analysis, including Western blotting.

Mammalian cells, adherent or non-adherent, are first labeled with HOOK™ Sulfo-NHS-SS-Biotin. HOOK™ Sulfo-NHS-SS-Biotin is a water-soluble, amine reactive biotinylation reagent that has a N-hydroxysulfosuccinimide (sulfo-NHS) ester. The addition of a charged sulfonate (SO^{3-}) on the N-hydroxysuccinimide ring of the sulfo-NHS esters results in its solubility in water, but prevents it permeating plasma membranes. The solubility and impermeability to plasma membranes makes HOOK™ Sulfo-NHS-SS-Biotin ideal for studying cell surface proteins as it will only react with the protein molecules on the outer surface of plasma membranes. An additional advantage of HOOK™ Sulfo-NHS-SS-Biotin is the presence of a disulfide bond in the spacer arm. Disulfide bond permits the cleavage of the biotin from the protein, making its interaction with streptavidin reversible.

Following labeling, cells are lysed with Mammalian Cell PE LB™, a buffered lysis solution that employs a mild non-ionic detergent for enhanced extraction and stability of proteins, and the cell lysate is applied to a Streptavidin agarose column. Unlabeled intracellular proteins are washed away and the biotin labeled cell surface proteins are then released by reduction with DTT.

The kit is supplied with all the necessary reagents and buffers for convenience and improved reproducibility. The kit is compatible with a wide variety of mammalian cells and can be used to compare treated and untreated cells and differences between different cell lines. This kit is supplied with sufficient reagents for five experiments, with each experiment consisting of four 90-95% confluent T-75cm^2 flasks.

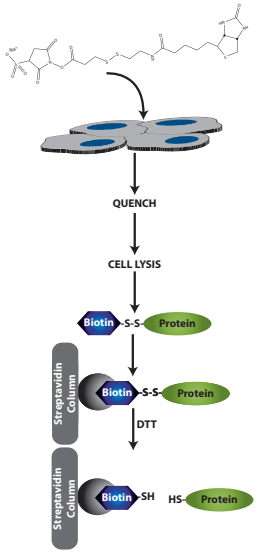

Figure 25: HOOK™ Cell Surface Protein Isolation scheme.

FEATURES

- Complete cell surface biotin labeling and isolation
- Suitable for a wide selection of mammalian cells

APPLICATIONS

- For cell surface trafficking and receptor:ligand interactions

CITED REFERENCES

1. Hartz, et al (2011) J. Euk. Microbio. 58:171
2. Bizet, A.A. et al (2011) BBA-Mol. Cell. Res. 1813:742

Cat. No.	Description	Size
786-316	HOOK™ Cell Surface Protein Isolation	5 Expts

Signal Proteins

Enrichment of signal proteins in lipid rafts

Lipid rafts are membrane microdomains that are enriched in caveolin, cholesterol, glycolipids, sphingolipids and glycosyl-phosphatidylinositol. Lipid rafts are also known as detergent-insoluble glycolipid-enriched complexes (GEMs) or DIGs. Many signaling proteins, including glycosylphosphatidylinositol (GPI)-anchored proteins, doubly-acylated tyrosine kinases of the Src family, and transmembrane proteins, are located in lipid rafts. Lipid raft localized proteins have been shown to be involved in intracellular membrane trafficking and signaling.

FOCUS™ Signal Protein fractionates lipid raft localized proteins from other cellular proteins by employing non ionic detergents. Our extraction buffer is a proprietary formulation of non-ionic detergents designed to efficiently extract and remove soluble proteins, leaving lipid rafts containing signal proteins as a detergent insoluble fraction. The resulting rafts are then solubilized in FOCUS™ Protein Solubilization Buffer (supplied), a 2D electrophoresis compatible buffer, or a different buffer of choice.

FOCUS™ Signal Proteins kit is designed for >50 preps, where one prep is either 100mg mammalian tissue, 50µl wet animal cell pellet, 50µl wet yeast pellet, 50µl wet bacteria pellet or 250mg plant tissue.

APPLICATIONS

- Isolate signal proteins that are localized to lipid rafts
- Study movement of activated proteins to and from lipid rafts
- Suitable for wide range of downstream applications, including 1D & 2D electrophoresis, Western blotting and mass spectrometry

CITED REFERENCES

1. Hsu, E. et al (2015) Neoplasia. 17:497
2. Bodas, M. et al (2011) J. Immunol. 186:602

Cat. No.	Description	Size
786-250	FOCUS™ Signal Protein	50 Preps

Soluble & Insoluble Proteins

A complete kit for the selective preparation of soluble (hydrophilic) and insoluble (hydrophobic) proteins from mammalian tissues and cells, plants, yeast, bacteria, and other biological samples. Supplied with reagents necessary for fractionation of soluble and insoluble fractions, including a strong chaotropic extraction buffer to solubilize difficult proteins.

Also supplied with a specific clean-up kit for the preparation of each fraction for isoelectric focusing and 2D electrophoresis for improved spot resolution.

FOCUS™ Soluble & Insoluble kit is designed for >50 preps, where a prep is either 100mg mammalian tissue, 50µl wet animal cell pellet, 50µl wet yeast pellet, 50µl wet bacteria pellet or 250mg plant tissue.

FEATURES

- Generates soluble and insoluble fractions
- Fractions fully compatible with 2D electrophoresis

APPLICATIONS

- Extraction of soluble and insoluble proteins from tissues, cells, plants, yeast, bacteria and other sources
- Suitable for wide range of downstream applications, including 1D & 2D electrophoresis, Western blotting and mass spectrometry

Cat. No.	Description	Size
786-247	FOCUS™ Soluble & Insoluble Kit	50 Preps

FOCUS™ Global Fractionation

Enrichment of cytosolic and membrane signal, peripheral or integral proteins

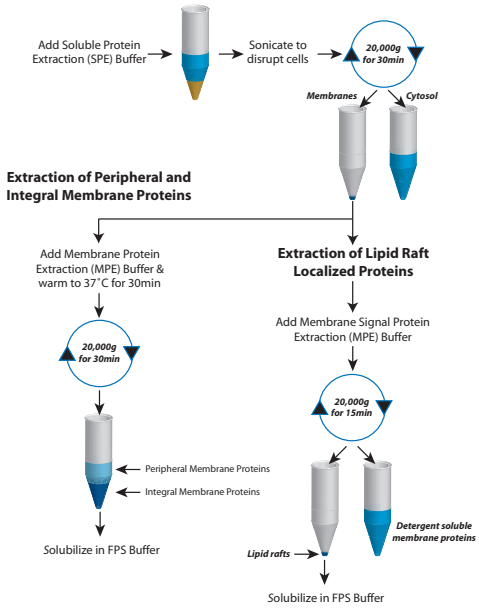

Figure 26: FOCUS™ Global Fractionation scheme.

Designed to fractionate complex biological samples into cytosolic and membrane fractions. The resulting membrane fractions are subsequently fractionated into either peripheral and integral membrane proteins or lipid raft associated proteins and detergent soluble membrane proteins.

Lipid rafts are membrane microdomains that are enriched in caveolin, cholesterol, glycolipids, sphingolipids and glycosyl-phosphatidylinositol. Lipid rafts are also known as detergent-insoluble glycolipid-enriched complexes (GEMs) or DIGs. Many signaling proteins, including glycosylphosphatidylinositol (GPI)-anchored proteins, doubly-acylated tyrosine kinases of the Src family, and transmembrane proteins, are located in lipid rafts. Lipid raft localized proteins have been shown to be involved in intracellular membrane trafficking and signaling.

FOCUS™ Global Fractionation kit is designed for >50 preps, where one prep is either 100mg mammalian tissue, 50µl wet animal cell pellet, 50µl wet yeast pellet, 50µl wet bacteria pellet or 250mg plant tissue.

FEATURES

- For integral, peripheral & lipid raft associated protein fractions
- Fractionation of complex proteomes into multiple fractions

APPLICATIONS

- Membrane proteins from tissues, cells, plants, yeast, bacteria, insects and other sources
- Fractionation of membrane proteins from lipid rafts
- For downstream applications, including 1D & 2D electrophoresis, Western blotting and mass spectrometry
- Suitable for proteomics and cell signaling studies

CITED REFERENCES

1. Wan H. et al (2016) Front Chem Sci Eng. doi:10.1007/s11705-016-1580-4
2. Liu, P.D. et al (2016) J. Exp. Bot. published 18 May 2016, 10.1093/jxb/erw190
3. Harada, K. et al (2016) Biochem Biophys Res Commun.469:993
4. Hu, Y. et al (2015) J Ind Microbiol Biotechnol 10.1007/s10295-015-1624-7
5. Zhou, J. et al (2014) J Proteomics. DOI: 10.1016/j.jprot.2014.09.012
6. Liu, C. et al (2014) J. Biol. Chem. DOI: 10.1074/jbc.M113.533927
7. Moylan, J. S. et al (2014) Redox Biol. DOI: 10.1016/j.redox.2014.07.006
8. Zhao, S. et al (2014) J. Proteomicss. 101:102
9. Wang, J. et al (2013) Appl. Microniol. Biotech. 97:2077

Cat. No.	Description	Size
786-018	FOCUS™ Global Fractionation Kit	50 preps

ORGANELLE FRACTIONATION

Nuclear & Cytoplasmic Proteins

Supplied with a strong chaotropic extraction buffer to solubilize both cytoplasmic and nuclear proteins, which is fully compatible with 2D gel electrophoresis. FOCUS™ Cytoplasmic & Nuclear proteins fractionation kit is fully compatible with 2D electrophoresis and subsequent downstream processes.

The kit is provided with reagents necessary for fractionation of cytoplasmic and nuclear proteins as well as solubilization buffer suitable for IEF/2D gels for better spot resolution.

Designed for >50 preps, depending on the tissue used, where one prep is $20x10^6$ mammalian cells or 100mg mammalian tissue.

FEATURES

- Includes chaotropic extraction buffer for solubilization of nuclear and cytoplasmic proteins

APPLICATIONS

- Nuclear & cytoplasmic protein fractionation from cells and tissues
- Suitable for wide range of downstream applications, including 1D & 2D electrophoresis, Western blotting and mass spectrometry

CITED REFERENCES

1. Riviere, L. et al (2015) J Hepatol. DOI: http://dx.doi.org/10.1016/j.jhep.2015.06.023
2. Kim, Y.H. et al (2007) Neurobiol. Dis. 26:569
3. Wang, T. et al (2007) Biochem. Bioph. Res. Co. 352:203
4. Kim, Y.H. et al (2007) Life Sciences. 81:1167
5. Rehman, A. et al (2005) Breast cancer Res. 7:R765

Cat. No.	Description	Size
786-248	FOCUS™ Cytoplasmic & Nuclear Proteins Kit	50 Preps

Subcellular Fractionation

For the fractionation of mitochondrial, nuclear, and cytosolic soluble and membrane proteins

FOCUS™ SubCell is for the total subcellular fractionation of cells and mammalian tissue into enriched fractions of nuclear, mitochondrial, cytosolic and membrane proteins.

The resulting mitochondrial fraction can be subsequently separated into heavy and light fractions by gradient centrifugation and the resulting mitochondria are >90% active and have intact inner and outer membranes.

The kit includes reagents for optional steps that minimize contaminations of the nuclear fraction by cytoplasmic elements. Suitable for cultured animal cells and adaptable for animal tissues.

FOCUS™ SubCell kit is designed for 50 preps, where one prep is equivalent to $2x10^7$ mammalian cells or 100mg mammalian tissue.

FEATURES

- Fractions suitable for wide range of downstream applications, including 1D & 2D electrophoresis and Western blotting
- Isolated mitochondria are ≥90% active

APPLICATIONS

- For mitochondrial, nuclear, cytosolic and membrane fractions

CITED REFERENCES

1. *Shiheido, Y. et al (2016) J Mol Cell Cardiol. DOI: http://dx.doi.org/10.1016/j.yjmcc.2016.03.017*
   Das, S. et al (2015) Sci Rep doi:10.1038/srep09759
1. *Capel, F. et al (2015) J. Nutr. Biochem. doi:10.1016/j.jnutbio.2015.04.003*
1. *Dagda, R.K. et al (2014) J. Neurochem. 128:864*
1. *Dodmane, P.R. et al (2014) Toxicol. Sci. 137:36*
1. *Stallings, N.R. et al (2013) PLOS. DOI: 10.1371/journal.pone.0071793*
1. *Melendez, J. et al (2013) Gastroenterology. 145:808*
1. *Zhu, J.H. et al (2012) Cell Death Dis. 3:e312*
1. *Losel, R.M. et al (2010) PLOS. DOI: 10.1371/journal.pone.0009713*
1. *Stallings, N.R. et al (2010) Neurobiol. Diss 40:404*
1. *Titsworth, W. et al (2009) Glia. 57:1521*
1. *Upreti, M. et al (2008) Mol. Cancer Ther. 7: 2224*

Cat. No.	Description	Size
786-260	FOCUS™ SubCell Kit	50 Preps

Mitochondrial Proteins

For enrichment of intact, active mitochondria

Specifically designed for the isolation of intact mitochondria from cultured mammalian cells. This kit allows for the fast and efficient fractionation of the cytoplasm of cultured mammalian cells into an enriched fraction of mitochondria. The majority (>90%) of the mitochondria have intact inner and outer membranes and therefore retain their functionality.

Highly adaptable kit for use with animal tissues and other sources of mitochondria. FOCUS™ Mitochondria kit is designed for 50 preps, where one prep is equivalent to $2x10^7$ mammalian cells or 100mg mammalian tissue.

CITED REFERENCES

1. Dagda, R.K. et al (2014) J. Neurochem. 128:864
2. Rigobello, M.P. et al (2009) Free Rad. Biol. Med. 47:710
3. Wang, T. et al (2007) Biochem. Bioph. Res. Co. 352:203

Cat. No.	Description	Size
786-022	FOCUS™ Mitochondria Kit	50 Preps

GENERAL FRACTIONATION

Fraction-FOCUS™

Fractionation for cleaner 2D gel maps

2D electrophoresis and mass spectrometry is routinely used for identification of novel proteins, however the greatest challenge in protein identification is achieving suitable resolution of proteins. The high dynamic range of a species' proteome means that the more abundant proteins mask the less abundant and often more interesting proteins.

Fractionation simplifies the protein composition and allows for improved resolution and simplified 2D maps, which in turn allows for improved analysis and interpretation and greatly increases the chances of identifying novel and less abundant proteins.

Fraction-FOCUS™ utilizes proven technology to fractionate and concentrate all proteomes into multiple fractions, simplifying 2D maps and enhancing detection of low abundant proteins. It is fully compatible with all downstream protein identification techniques.

There is no detectable loss of total protein during the Fraction-FOCUS™ procedure. At the end of the fractionation, cellular proteins are in one of many fractions.

Fraction-FOCUS™ is designed for 10 preparations, where one preparation is either 100mg mammalian tissue, 50µl wet animal cell pellet, 50µl wet yeast pellet, 50µl wet bacteria pellet or 250mg plant tissue.

FEATURES

- Serial fractionation of protein samples into multiple protein fractions
- Resulting fractions are fully compatible with 2D electrophoresis or isoelectric focusing and other applications

Cat. No.	Description	Size
786-168	*Fraction*-FOCUS™	10 Preps

DETERGENT REMOVAL SYSTEMS

G-Biosciences offers a range of detergent removal systems that use either a rapid column based system or a precipitation system.

Our products are designed to remove a wide variety of detergents, including SDS, Tween® 20, Triton® X-100, Triton® X-114, Nonidet® P-40, CTAB, CHAPS, deoxycholate and Lubrol®.

The Detergent-OUT™ products are suitable for removing detergent from all types of protein solutions, including hydrophobic protein solutions.

DetergentOUT™ GBS10

The presence of high concentrations of detergents in protein samples can impair ELISA, IEF, protease digestion of proteins and suppress peptide ionization when analyzed by mass spectrometry.

DetergentOUT™ GBS10 resin removes free, unbound anionic, nonionic or zwitterionic detergents (e.g. SDS, Triton® X-100 or CHAPS) from aqueous protein and peptide samples with minimal sample loss for downstream analysis by mass spectrometry and other techniques.

In independent studies DetergentOUT™ GBS10 was shown to be fully compatible with DI-QTOF and LC-MS/MS (see references). The use of the DetergentOUT™ GBS10 columns significantly increased the number of peptide spectra detected. In addition, the DetergentOUT™ GBS10 columns have a high binding capacity for detergents, i.e. 6mg SDS and 14mg Triton® X-100 by every ml settled resin.

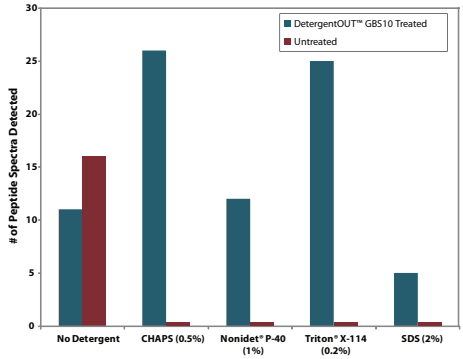

Figure 27: DetergentOUT™ GBS10 removes detergent and allows detection of peptide fragments by Mass spectrometry. 500µg phosphorylase B was digested in solution and then the indicated amount of detergent was added. Samples were treated with DetergentOUT™ GBS10. Number of peptide spectra were determined as per the protocol of Alvarez, S. et al.

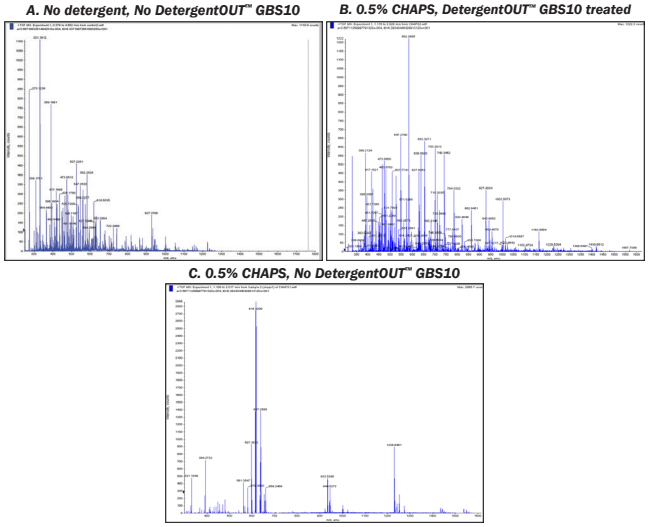

Figure 28: DetergentOUT™ GBS10 enhances Mass spectrometry Spectra. 5µg/µl protein mixture (BSA, cyctochrome C and phosphorylase B) in water (Panel A) was supplemented with 0.5% CHAPS (Panel B and C). The CHAPS containing sample was treated with DetergentOUT™ GBS10 and compared to an untreated sample (Panel C). Spectra were generated per Alvarez et al.

Detergent	% Removed	BSA	Phosphorylase B	Cytochrome C	E.coli Lysate
Triton X-100, 2%	>99	>90	>91	>92	>93
Triton X-114, 2%	>96	>99	>98	>97	>91
Nonidet P-40, 1%	>96	>93	>95	>91	>91
Brij 35, 1%	>99	>98	>99	>97	>91
SDS, 2.5%	>99	>96	>97	>92	>90
Sodium deoxycholate, 5%	>99	>99	>99	>98	>95
CHAPS, 3%	>99	>92	>95	>92	>91
Octyl glucoside, 5%	>99	>93	>95	>96	>91
Lauryl maltoside, 1%	>97	>99	>99	>99	>91

Table 2: Detergent removal rates & percentage protein recovery.

CITED REFERENCES

1. *Haddock, E. et al (2016) Emerg Infect Dis. Vol 22:7.*
2. *Srivastasva, O.P. et al (2017) Biochemistry and Biophysics Report. http://dx.doi.org/10.1016/j.bbrep.2017.01.011*
3. *Min, L. et al (2015) Electrophoresis. DOI: 10.1002/elps.201400579*
4. *Valente, K. N. et al (2014) Biotechnol Bioeng. DOI: 10.1002/bit.25515*
5. *Hou, S. et al (2013) Methods. 61:269*
6. *Higgins, D. et al (2005) Anitmicrob. Agents Chemother. 49:1127*
7. *Hashii, N. et al (2005) Proteomics. 5:4665*

Cat. No.	Description	Sample Size (µl)	Resin (µl)	Size
786-154	DetergentOUT™ GBS10-125	10-30	125	10 columns
786-155	DetergentOUT™ GBS10-800	30-200	800	10 columns
786-156	DetergentOUT™ GBS10-3000	200-750	3,000	10 columns
786-157	DetergentOUT™ GBS10-5000	500-1,250	5,000	10 columns
786-159	DetergentOUT™ GBS10 Resin	-	-	10ml resin

OrgoSol DetergentOUT™

Suitable for hydrophobic proteins

OrgoSol DetergentOUT™ is suitable for removal of detergents from protein solutions, including hydrophobic protein solutions and is compatible with all detergent types. Its performance is not dependent on detergent concentration in the solution, is highly flexible and can process small and large sample volumes.

OrgoSol DetergentOUT™ first concentrates the protein solution through precipitation and then the detergent is extracted and removed with the supplied OrgoSol™ buffer. The proprietary precipitation agent ensures >99% protein recovery, however precipitation may result in some loss of a protein's biological activity.

Two sizes are offered: Micro Kit for processing up to a total of 10ml protein solution and Medi Kit for processing up to a total of 30ml protein solution, either in a single or multiple experiments.

CITED REFERENCES

1. *Cortes, D.F. et al (2012) Electrophoresis. 33:3712*
2. *Orr, S.J. et al (012) Molecular Sys Biol. 8:573*
3. *Troese, M.J. et al (2011) Infect Immunol. 79:4696*

Cat. No.	Description	Size
786-127	OrgoSol DetergentOUT™, Micro	For 10ml
786-128	OrgoSol DetergentOUT™, Medi	For 30ml

DetergentOUT™ Tween®

Removal of Tween® (polysorbate) detergents

A spin column format detergent removal resin for polysorbate or Tween® detergents or surfactants. DetergentOUT™ Tween® removes polysorbate detergents without significant loss of proteins, dilution of the protein solution, or change to the buffer composition of the protein solution.

Cat. No.	Description	Size
786-214	DetergentOUT™ Tween®, Micro	10 columns
786-215	DetergentOUT™ Tween®, Medi	10 columns

DIALYSIS SYSTEMS

Dialysis is a popular technique used for the exchange of buffer medium across semi-permeable membranes. Dialysis devices are available in many configurations for research applications. We offer innovative dialysis devices and accessories for processing small samples.

Tube-O-DIALYZER™

Efficient dialysis with 100% sample recovery

Small sample dialysis has become a routine and popular technique in life science research. Today's major concern with dialysis devices is the loss of precious samples, due either to leaking or precipitation of samples during dialysis. A second concern is the efficiency and rate of dialysis. We manufacture a unique dialysis device that allows efficient dialysis and 100% sample recovery, even if your sample precipitates.

The unique tube format of Tube-O-DIALYZER™ allows for easy handling and manipulation. For sample recovery, just place the Tube-O-DIALYZER™ in a centrifuge and spin your sample to the bottom of the tube, ensuring 100% sample recovery, even if precipitation occurs.

The unique tube format also allows for easy sample loading, as simple as transferring your sample to a microcentrifuge tube. Tube-O-DIALYZER™ does not require the use of specialized loading devices or costly syringes and hazardous needles.

Tube-O-DIALYZER™ comes in two ideal sizes; the Micro unit allows efficient dialysis of 20-250µl samples and the Medi unit is optimized for 200µl-2.5ml samples. Both sizes are available with membranes with molecular weight cutoff (MWCO) of 1kDa, 4kDa, 8kDa, 15kDa and 50kDa. Tube-O-DIALYZER™ are available in packs of 20. Each Tube-O-DIALYZER™ is supplied with 6 floats and Tube-O-DIALYZER™ storage caps to allow storage of dialyzed samples. For added convenience, Tube-O-DIALYZER™ is also supplied as a mixed kit containing 10 Micro and 10 Medi Tube-O-DIALYZER™, along with the required floats and storage caps.

A graph representing the fast and highly efficient dialysis rate of the micro Tube-O-DIALYZER™ is shown. 100µl 5M NaCl was dialyzed against one liter deionized water. Samples were taken at specific times and the conductivity was measured. The graph demonstrates the fast efficiency of Tube-O-DIALYZER™, with 50% NaCl removed within 10 minutes.

APPLICATIONS

- Dialysis of small sample volumes
- Equilibrium dialysis for buffer exchange
- Concentration of samples
- Dialysis for single use applications, such as radioactive samples

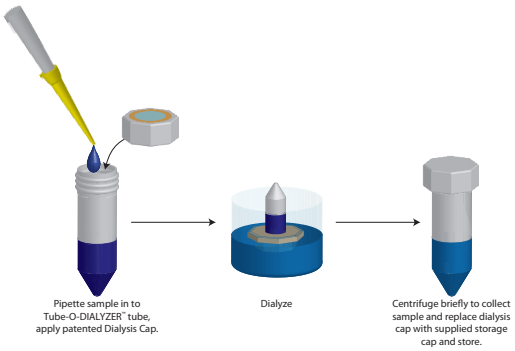

Figure 29: A summary of the Tube-O-DIALYZER™ system.

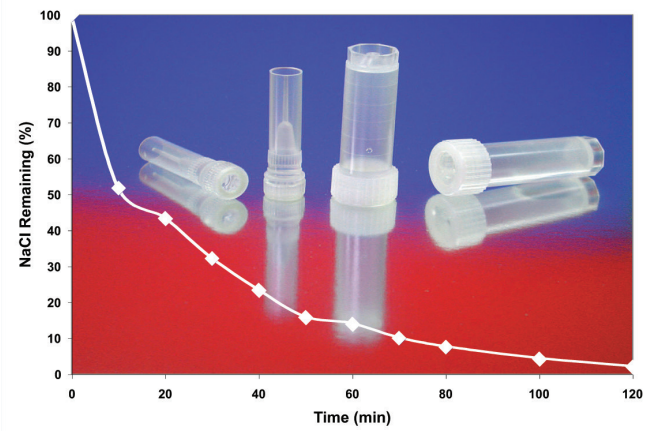

Figure 30: Tube-O-DIALYZER™ micro (8K MWCO) Dialysis Rate. 100µl 5M sodium chloride was dialyzed against 1 liter deionized water. 50% sodium chloride is removed in the first 10 minutes.

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Cat. No.	Description	Size
786-610	Tube-O-DIALYZER™, Micro, 1k MWCO	20
786-610T	Tube-O-DIALYZER™, Micro, 1k MWCO	5
786-611	Tube-O-DIALYZER™, Micro, 4k MWCO	20
786-611T	Tube-O-DIALYZER™, Micro, 4k MWCO	5
786-612	Tube-O-DIALYZER™, Micro, 8k MWCO	20
786-612T	Tube-O-DIALYZER™, Micro, 8k MWCO	5
786-613	Tube-O-DIALYZER™, Micro, 15k MWCO	20
786-613T	Tube-O-DIALYZER™, Micro, 15k MWCO	5
786-614	Tube-O-DIALYZER™, Micro, 50k MWCO	20
786-614T	Tube-O-DIALYZER™, Micro, 50k MWCO	5
786-615	Tube-O-DIALYZER™, Medi, 1k MWCO	20
786-615T	Tube-O-DIALYZER™, Medi, 1k MWCO	5
786-616	Tube-O-DIALYZER™, Medi, 4k MWCO	20
786-616T	Tube-O-DIALYZER™, Medi, 4k MWCO	5
786-617	Tube-O-DIALYZER™, Medi, 8k MWCO	20
786-617T	Tube-O-DIALYZER™, Medi, 8k MWCO	5
786-618	Tube-O-DIALYZER™, Medi, 15k MWCO	20
786-618T	Tube-O-DIALYZER™, Medi, 15k MWCO	5
786-619	Tube-O-DIALYZER™, Medi, 50k MWCO	20
786-619T	Tube-O-DIALYZER™, Medi, 50k MWCO	5
786-620	Tube-O-DIALYZER™, Mixed, 1k MWCO	20
786-621	Tube-O-DIALYZER™, Mixed, 4k MWCO	20
786-622	Tube-O-DIALYZER™, Mixed, 8k MWCO	20
786-623	Tube-O-DIALYZER™, Mixed, 15k MWCO	20
786-624	Tube-O-DIALYZER™, Mixed, 50k MWCO	20

CONTAMINATION REMOVAL

Spin-OUT™ Desalting Columns

For desalting and buffer exchange

The SpinOUT™ GT-100, GT-600 and GT-1200 columns are versatile, spin-format columns for the desalting and buffer exchange of peptide, protein and nucleic acid solutions ranging from 5µl to 4ml sample volumes. Also available in 96-well spin plate formats for processing up to 96 samples.

The SpinOUT™ columns are available in three MWCO sizes for >700, >6,000 or >30,000 Dalton peptides or proteins and are suitable for samples containing as little as 20µg protein/ml.

The SpinOUT™ columns are easy to use; simply apply the protein sample and centrifuge to recover proteins and nucleic acids with the column retaining more than 95% of the salts and small molecules (<100Da for SpinOUT™ GT-100, <1,000Da for SpinOUT™ GT-600 and <1,500Da for SpinOUT™ GT-1200).

Spin-OUT™ GT-100 is for the purification of peptides and proteins >700Da.

Spin-OUT™ GT-600 is for the purification of proteins >6kDa and nucleic acids larger than 10bp.

Spin-OUT™ GT-1200 is for the purification of proteins >30kDa and removal of molecules >1,500Da. The columns are ideal for separating proteins from peptides.

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Cat. No.	Description	Size	Resin Bed (ml)	Sample Load (ml)
786-865	SpinOUT™ GT-100, 0.1ml	25 columns	0.1	0.005-0.02
786-866	SpinOUT™ GT-100, 1ml	10 columns	1	0.05-0.1
786-867	SpinOUT™ GT-100, 3ml	10 columns	3	0.1-0.5
786-897	SpinOUT™ GT-100, 3ml	5 x 10/bag	3	0.1-0.5
786-868	SpinOUT™ GT-100, 5ml	5 columns	5	0.5-2
786-898	SpinOUT™ GT-100, 5ml	50 columns	5	0.5-2
786-869	SpinOUT™ GT-100, 10ml	5 columns	10	0.5-4
786-703	SpinOUT™ GT-600, 0.1ml	25 columns	0.1	0.005-0.02
786-170	SpinOUT™ GT-600, 1ml	10 Columns	1	0.02-0.13
786-720	SpinOUT™ GT-600, 1ml	5 x 10/bag	1	0.02-0.13
786-171	SpinOUT™ GT-600, 3ml	10 Columns	3	0.1-0.5
786-721	SpinOUT™ GT-600, 3ml	5 x 10/bag	3	0.1-0.5
786-704	SpinOUT™ GT-600, 5ml	5 columns	5	0.5-2
786-722	SpinOUT™ GT-600, 5ml	50 columns	5	0.5-2
786-705	SpinOUT™ GT-600, 10ml	5 columns	10	0.5-4
786-989	SpinOut™ GT-600 Spin Plate	2 plates	1	0.02-0.13
786-990	SpinOut™ GT-600 Spin Plate	4 plates	1	0.02-0.13
786-706	SpinOUT™ GT-1200, 0.1ml	25 columns	0.1	0.005-0.02
786-172	SpinOUT™ GT-1200, 1ml	10 Columns	1	0.05-0.1
786-173	SpinOUT™ GT-1200, 3ml	10 Columns	3	0.1-0.5
786-707	SpinOUT™ GT-1200, 5ml	5 columns	5	0.5-2
786-708	SpinOUT™ GT-1200, 10ml	5 columns	10	0.5-4
786-991	SpinOut™ GT-1200 Spin Plate	2 plates	1	0.02-0.13
786-992	SpinOut™ GT-1200 Spin Plate	4 plates	1	0.02-0.13

CONCENTRATION SYSTEMS

UPPA-PROTEIN-Concentrate™

Uses a proprietary reagent, UPPA™ (Universal Protein Precipitation Agent), to quantitatively concentrate dilute protein samples as low as 1ng/ml. Concentration is not affected by the presence of common laboratory agents, including detergents and chaotropes. After precipitation, the sample is washed to remove salts and other interfering agents; complete recovery of sample is produced. Protein samples have conductivity of ~50µS and ~100% recovery.

Available for concentrating up to 10ml or 30ml of protein solutions. UPPA™ (Universal Protein Precipitation Agent) is offered separately for the concentration of dilute (>1ng/ml) protein solutions.

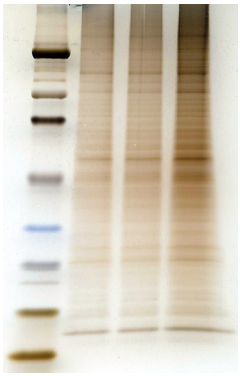

Figure 31: Concentration of dilute mouse liver lysate. Lane 1: Protein Marker; Lane 2: 20µl dilute protein (0.05µg/µl). Lane 3: 20µl original sample treated with UPPA-PROTEIN-Concentrate™ and resuspended in 20µl. Lane 4: 40µl original sample treated with UPPA-PROTEIN-Concentrate™ and resuspended in 20µl. Comparing lanes 2 and 3 shows that there is 100% protein recovery and lane 4 shows the actual concentration of a sample.

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Cat. No.	Description	Size
786-120	UPPA-PROTEIN-Concentrate™ (Micro)	For 10ml sample
786-121	UPPA-PROTEIN-Concentrate™ (Medi)	For 30ml sample
786-122	UPPA™-I & II Pack	For >80ml

OrgoSol-PROTEIN-Concentrate™

Preserve biological activity during concentration

Precipitates protein with a proprietary solvent buffer, OrgoSol™. The OrgoSol™ buffer has been specifically developed for efficient precipitation of protein solutions with minimal disruption to the protein structure and therefore maintains the biological activity of most proteins.

The kit has been extensively tested for the concentration of a wide selection of enzymatic proteins without the loss of their biological activity and for ~100% protein recovery. The kit is designed to precipitate up to 5ml protein solution.

CITED REFERENCES

1. Shah, R.N. et al (2012) Adv. Hematol. http://dx.doi.org/10.1155/2012/596925
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Cat. No.	Description	Size
786-125	OrgoSol-PROTEIN-Concentrate™	For 5ml protein

Column-PROTEIN-Concentrate™

For larger volumes of dilute protein solutions

Specifically developed for concentration of those proteins that cannot be concentrated by precipitation. The kit is based on a proprietary Protein Binding Resin that binds and immobilizes any protein in a low salt buffer between pH 2-12. The binding capacity is ~0.5mg protein/ml Protein Binding Resin. Protein is spin-eluted in a small volume of specifically formulated elution buffer, giving several fold effective concentration. The method is gentle and protects protein from denaturation.

CITED REFERENCES

1. Taggart, C et al (2005) J. Exp. Med. 202:1659

Cat. No.	Description	Size
786-126	Column-PROTEIN-Concentrate™	For 4mg protein

Tube-O-CONCENTRATOR™

Rapid concentration without protein precipitation

Tube-O-CONCENTRATOR™ is a versatile concentration device that utilizes a novel, water absorbing, liquid polymer and our patented Tube-O-DIALYZER™ for the rapid concentration of dilute protein solutions with zero protein loss. The unique tube design of Tube-O-DIALYZER™ ensures that 100% sample is recovered; simple place the entire device in a bench top centrifuge and spin for a few seconds.

Tube-O-CONCENTRATOR™ solution is a liquid polymer that rapidly absorbs water through the dialysis membrane in the Tube-O-DIALYZER™ cap, which retains molecules with>1kDa molecular weight .

Tube-O-CONCENTRATOR™ is available in two sizes for concentrating sample volumes of up to 250µl (Micro) or 2.5ml (Medi).

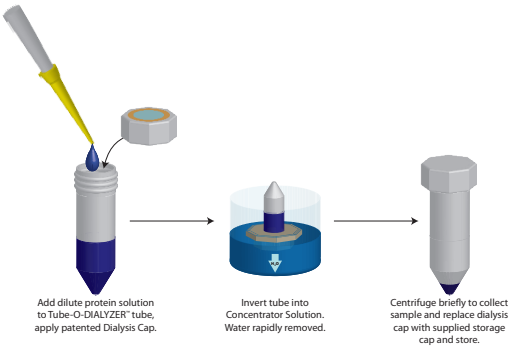

Figure 32: Tube-O-CONCENTRATOR™ scheme.

CITED REFERENCES

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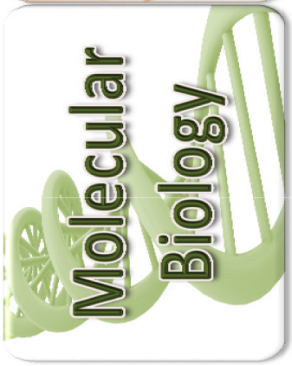
Cat. No.	Description	Size
786-625	Tube-O-CONCENTRATOR™ for 20-250µl	5 concentrations
786-626	Tube-O-CONCENTRATOR™ for 0.2-2.5ml	5 concentrations

G-Biosciences Product Line Overview



Estimation	7 Assays	CB-X Non Interfering SPN RED 660 dotMETRIC BCA CB	
Isolation	Extraction & Lysis	Sample Grinding Lysis Buffers	Mild Denaturing Strong Chaotropic Specialized
	Fractionation & Enrichment	12 Fractionation Kits Dialysis (Micro) Concentration	
	Sample Preparation	Contamination Removal	Desalting Detergent Removal
	Reagents	Protease Inhibitors	General Cocktails Species Specific Individual Inhibitors
		Detergents Chaotropes	
Detection	Electrophoresis	1D & 2D Reagents	2D Specific Kits Buffers & Reagents
		Gel Stains	Coomassie Silver Reversible
	Western Blotting	1 Hour System Blocking Agents	Non-Animal Animal Non-Protein
		Secondary Antibodies Chemiluminescence Detection	
	Mass Spectrometry	Trypsin, Mass Spec Grade InGel Kits	
	Assays (ELISA)	Coated Plates Blocking Agents	Non-Animal Animal Non-Protein
		Secondary Antibodies Detection Reagents	
Purification	Affinity Resins	6X His Tag	Nickel resin Cobalt resin Copper resin Zinc Resin
		GST Tag Biotin Tag CBP Tag	Glutathione Resin Streptavidin Resin Calmodulin Resin
	Activated Resins	Sulfhydryl reactive Amine reactive Carboxyl reactive Drug/ Steroid reactive	
	Antibody Purification	Protein A or G Pearl Resin	
Modification	Labeling	Biotin Fluorescent Dye Enzyme (HRP/AP)	
	Crosslinkers Reducing Agents Alkylating Agents Protein Cleavage Iodination Amino Acid Side Chain Modifiers		
Antibody	Production	Carrier Proteins	BSA KLH HyperCarrier
	Purification	Peptide Coupling Protein A or G Resin Activated Resins Pearl Resin Thiophilic Resin	
	Fragmentation	Ficin Pepsin Papain	
SAM Methyltransferase	Continuous, Enzymatic Assays Lactate Dehydrogenase (LDH)		
Cell Toxicity & Proliferation	SRB WST-1		
Apoptosis	Caspase	Assays Substrates Inhibitors	
	Inducers		
Protease	Assays Inhibitors		
Phosphatase **Peroxide**			
B-Galactosidase	CPRG Fluorescent (MUG)		
Genomic DNA	Isolation	Tissue Blood Plant Yeast Bacteria Fungi Mouse Tail	
Plasmid DNA	Isolation Colony Screening Transformation		
Electrophoresis	Apparatus Loading Dyes DNA Ladders Gel Extraction		
PCR	Taq dNTPs		
RNA	Extraction RNase Decontamination		
Yeast	Transformation Plasmid Isolation		

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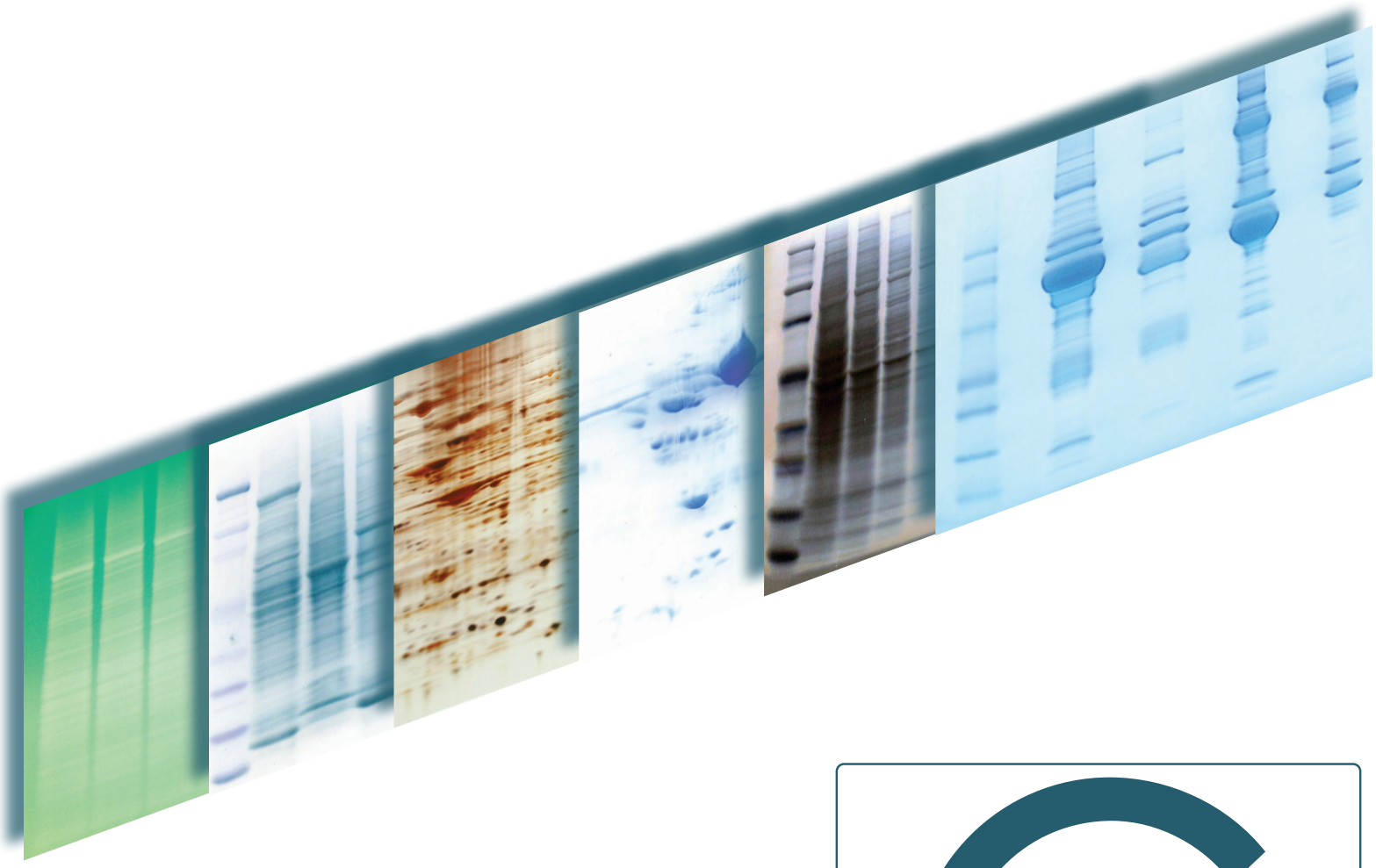

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