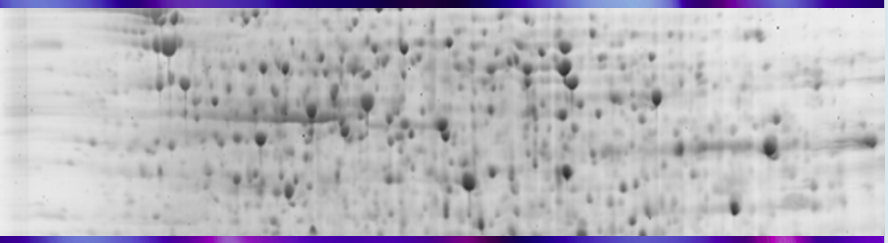
2D Electrophoresis

SERVA

Crescent Chemical Company

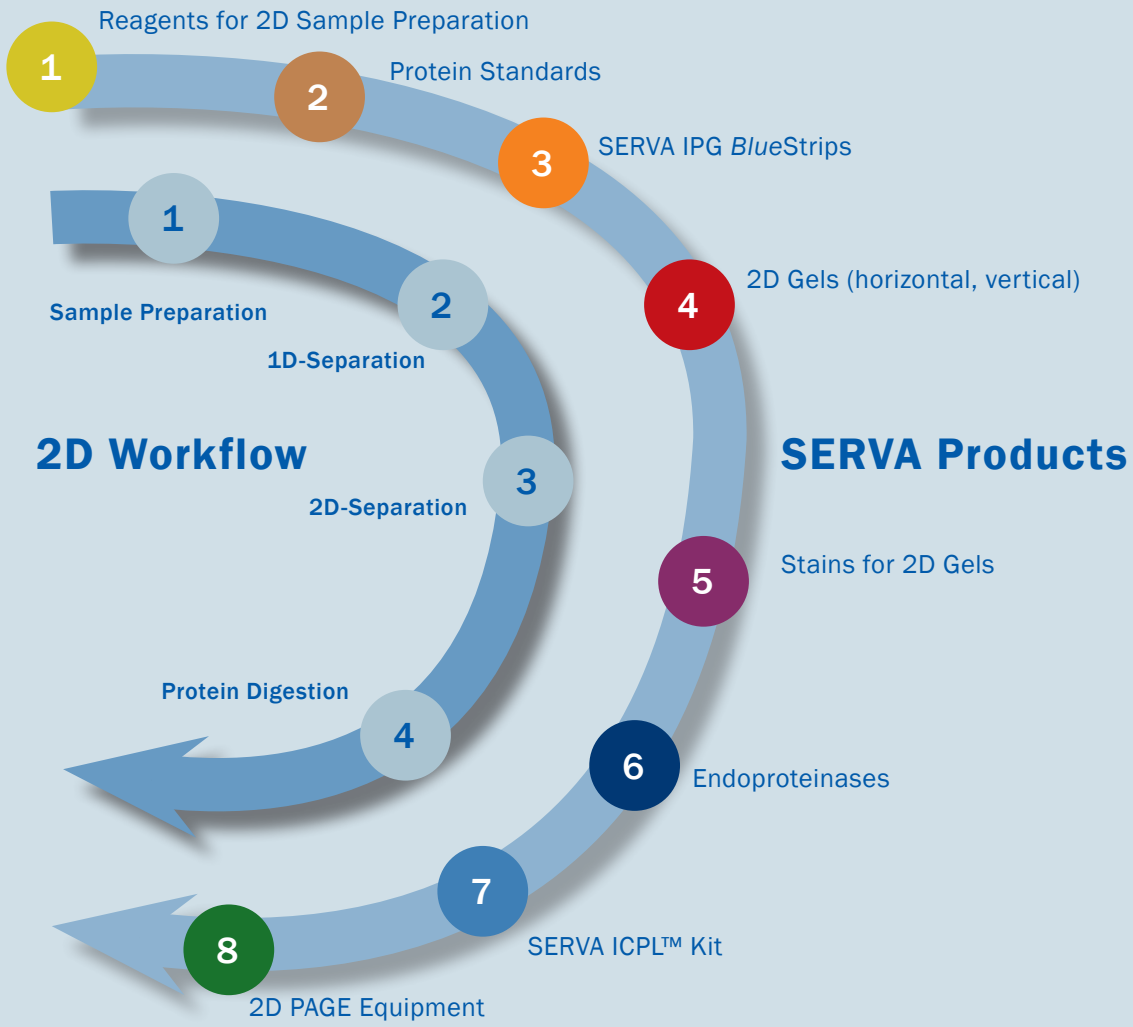


Reagents and Equipment

- Reagents for 2D Sample Preparation
- SERVA Protein Standards
- SERVA IPG *Blue*Strips
- SERVA 2D Gels
- SERVA Stains for 2D gels
- Endoproteinases
- SERVA ICPL™ Kit
- 2D PAGE Equipment

All you need for... 2D Electrophoresis

SERVA offers a complete range of products for 2D gel electrophoresis. Starting with sample preparation and isoelectric focusing of proteins by applying SERVA IPG *Blue*Strips in the presence of urea, the focused proteins will be further processed on a PAA gel for second dimension electrophoresis applying separation by molecular weight in the presence of SDS. After staining the protein spots, or immediately if pre-labelling by SERVA Lightning Red has been done, the spots will be identified and further analyzed by spot picking and mass spectrometry or by Western blotting analysis.



SERVA produces gels for more than 30 years – hard to find a place with more experience in manufacturing, developing and supporting the use of electrophoresis gels!

1 Reagents for 2D Sample Preparation

For lysis of cells and tissues by membrane disintegration, for release of proteins and protein complexes as well as for solubilization of proteins to be separated by 2D PAGE, SERVA offers a broad range of detergents. As a special tool in sample preparation the **SERVA 2D PAGE Detergent Sampler** is optimized for protein solubilization in proteomics applications. It contains 1 g each of CHAPS, Sulfobetaine SB 12, Sulfobetaine 3–10, ASB-14, ASB 16 and ASB-C7BzO. Find more details in the SERVA brochure "Sample Preparation", covering a broad range of detergents, inhibitors, enzymes and dialysis tubings often used in sample preparation of proteins.

Product	Size	Cat. No.
Octyl-ß-D-glucopyranoside	250 mg	31055.02
	1 g	31055.03
	5 g	31055.01
Triton® X-100	500 g	37240.01
	5 kg	37240.02
16-BAC Benzyldimethyl-n-hexadecyl ammonium chloride	25 g	14836.01
	100 g	14836.02
CHAPS (3-[(3-Cholamidopropyl) dimethylammonio]-1-propane-sulfonate)	1 g	17038.01
	5 g	17038.02
	25 g	17038.03
	100 g	17038.04
Sulfobetaine SB 12 (N-Dodecyl-N,N-dimethylammonio-3-propane sulfonate)	10 g	20761.02
	50 g	20761.03
Sulfobetaine SB 3-10 (N-Decyl-N,N-dimethyl-3-ammonio-1-propane sulfonate)	5 g	20756.01
	25 g	20756.02
ASB-14 (3-[N,N-Dimethyl-(3-myristoylaminopropyl)-ammonio]-propanesulfonate	1 g	20757.01
	5 g	20757.02
ASB-16 (3-[N,N-Dimethyl-N-(3-palmitamidopropyl)-ammonio]-propane-1-sulfonate)	1 g	20758.01
	5 g	20758.02
ASB-C7BzO (3-(4-Heptyl)phenyl-3-hydroxypropyl-dimetylammonio-propane sulfonate)	1 g	20759.01
	5 g	20759.02
NDSB-201 1-(3-Sulfopropyl)pyridinium betain	50 g	20762.01
	250 g	20762.02
SERVA 2D PAGE Detergent Sampler	1 kit	20784.01

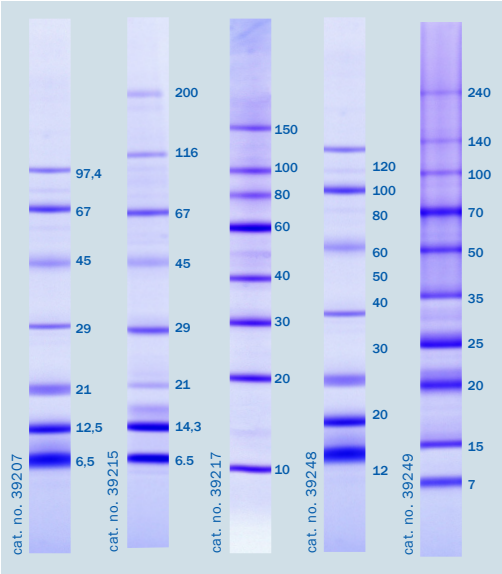
High quality detergents in convenient pack sizes

2 Protein Standards

For 2D electrophoresis SERVA offers different protein standards for molecular weight determination as well as a set of proteome standards for pI and molecular weight identification.

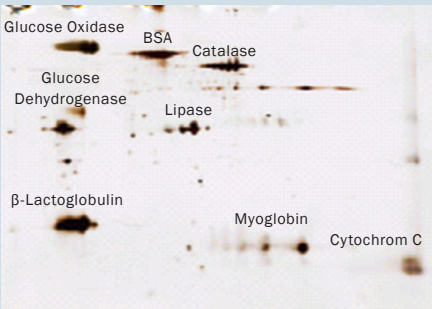
Protein Markers

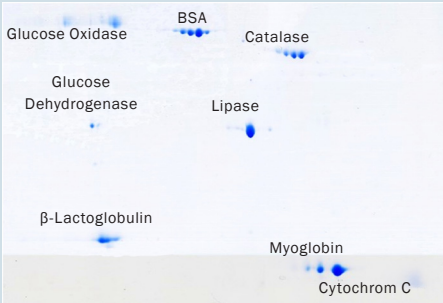
To determine the molecular weight of proteins separated by a 2D gel in the presence of SDS SERVA offers various protein markers of natural and recombinant origin. Protein markers are either lyophilized (cat. no. 39207) or ready-to-use.



Proteome Standard

SERVA offers a unique set of proteome markers containing 8 proteins, spanning the entire pI region and ranging from 11.7 to 77.0 kDa. The marker proteins are characterized carefully by 2D electrophoresis and also by LC/MS, identity of each protein is verified by protein sequence analysis. The kit contains 5 vials of marker proteins (lyophilized) for 5 to 10 gels in 2D electrophoresis.





Product	Size	Cat. No.
Protein Test Mixture 6 for SDS PAGE	10 mg	39207.01
SERVA Unstained SDS PAGE Protein Marker 6.5 – 200 kDa, liquid mix	500 µl	39215.01
SERVA Recombinant SDS PAGE Protein Marker 10 – 150 kDa, liquid mix	500 µl	39217.01
SERVA Unstained Protein Standard II	500 µl	39248.01
SERVA Unstained Protein Standard III	500 µl	39249.01
SERVA Proteome Markers	1 kit	39220.01

- **Protein Marker: Precise determination of molecular weight**
- **Proteome Standard: Unique tool to calibrate 2D gels**

3

SERVA IPG *Blue*Strips

SERVA IPG *Blue*Strips are dried gel strips with immobilized pH gradient used in high resolution 2D gel electrophoresis of proteins. The homogeneous polyacrylamide gel matrix is covalently bound to GEL-FIX™ to stabilize the gel. Additionally, a nonbinding cover film (GEL-FIX™ for Covers) protects the gel from damage and contamination.

SERVA IPG *Blue*Strips (12 strips each)	7 cm	11 cm	17 cm	18 cm	24 cm
3 – 10	43001.01	43031.01	43041.01	43011.01	43021.01
3 – 10 NL	43002.01	43032.01	43042.01	43012.01	43022.01
3 – 6	43005.01	43035.01	43045.01	43015.01	43025.01
4 – 7	43003.01	43033.01	43043.01	43013.01	43023.01
5 – 8	43006.01	43036.01	43046.01	43016.01	43026.01
6 – 10	43004.01	43034.01	43044.01	43014.01	43024.01

For IPG strip rehydration and sample preparation SERVA offers the SERVA HPE™ IPG strip buffer, a 40 % (w/v) SERVALYT mixture. It works for all pH gradients. Due to the low molecular weight of the ampholyte buffer molecules there is no background staining in the 2D gels. To run SERVA IPG strip we recommend to cover the strips with the SERVA HPE™ IPG overlay. This helps to sharp protein spots in high resolution 2D gel electrophoresis. For easy applying the oil a separate dropping bottle is included.

Product	Size	Cat. No.	Price
SERVA HPE™ IPG Strip Buffer	1 ml	43368.01	39,00 €
SERVA HPE™ IPG Overlay	1 L	43397.01	51,00 €

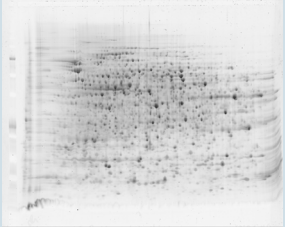
- **Consistent performance – 12 strips per package, all derived from the same production lot**
- **Reliability – accurate casting procedures ensures lot-to-lot reproducibility of pH profile**
- **GMP/GLP conformity – each strip has its individual lot number**

4 SERVA Gels for Horizontal and Vertical 2D PAGE

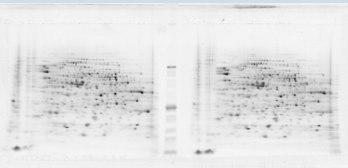
The HPE™ gels for horizontal 2D PAGE are film-backed gels. A pre-formed trench in the gel for applying the focused IPG strip guarantees high efficient sample transfer from 1st to 2nd dimension. Each kit contains 4 gels, equilibration and running buffers, wicks and cooling contact fluid.

Product	Size	Cat. No.
2D HPE™ Triple Gel NF 12.5% Kit	1 KIT	43300.01
2D HPE™ Triple Gel NF 10 - 15% Kit	1 KIT	43301.01
2D HPE™ Double Gel NF 12.5% Kit	1 KIT	43302.01
2D HPE™ Double Gel NF 10 - 15% Kit	1 KIT	43303.01
2D HPE™ Large Gel NF 12.5% Kit	1 KIT	43304.01
2D HPE™ Large Gel NF 10 - 15% Kit	1 KIT	43305.01
2D HPE™ Triple Gel 12.5% Kit	1 KIT	43306.01
2D HPE™ Triple Gel 10 - 15% Kit	1 KIT	43307.01
2D HPE™ Double Gel 12.5% Kit	1 KIT	43308.01
2D HPE™ Double Gel 10 - 15% Kit	1 KIT	43309.01
2D HPE™ Large Gel 12.5% Kit	1 KIT	43310.01
2D HPE™ Large Gel 10 - 15% Kit	1 KIT	43311.01

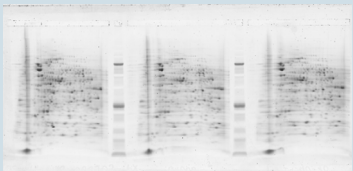
NF = non-fluorescent film backing



2D HPE™ Large Gel NF 12.5 %, stained with SERVA Purple



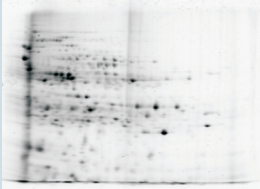
2D HPE™ Double Gel NF 12.5 %, stained with SERVA Purple



2D HPE™ Triple Gel NF 12.5 %, stained with SERVA Purple

For 2D in mini vertical systems use the SERVA*Gel*™ PRiME for 2D PAGE. Gels are cast into stable cassettes (10 cm x 10 cm x 0.7 cm) with one very planar 2D slot for optimum transfer from a 7 cm IPG strip to gel.

Product	Size	Cat. No.
SERVA*Gel*™ TG PRiME 12 %, 2D well	10 Gels	43268.01
SERVA*Gel*™ TG PRiME 14 %, 2D well	10 Gels	43271.01
SERVA*Gel*™ TG PRiME 8 - 16 %, 2D sample well	10 Gels	43281.01
SERVA*Gel*™ Neutral HSE, 2D well	10 Gels	43247.01



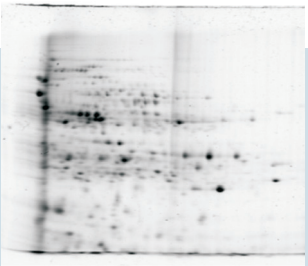
2D electrophoresis on SERVA*Gel*™ TG PRiME™ 14 % vertical mini gel stained with SERVA HPE™ Lightning Red

- **2D HPE™ Large Format Gel (gel size 260 x 205 mm) accommodating one 24 cm IPG strip**
- **2D HPE™ Double Gel and 2D HPE™ Triple Gel (gel size 250 x 115 mm) accommodating two 11 cm IPG strips and three 7 cm IPG strip, respectively**
- **SERVA*Gels*™ 2D Gels accomodating one 7 cm IPG Strip**

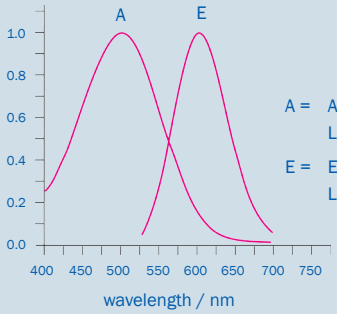
5 SERVA Stains for 2D Gels

To detect separated proteins as spots in the gel proteins have to been stained, either before or after electrophoresis. There are versatile staining methods available. You may pre-label the proteins before loading on the IPG strip or you may process the 2D gel after electrophoresis. Here is a selection of different stains available from SERVA for 2D gel staining.

	Pre-Staining	Post Staining	Fluorescent	Silver	Coomassie
HPE™ Lightning Red	✓		✓		
SERVA Purple		✓	✓		
HPE™ Silver Staining Kit		✓		✓	
HPE™ Coomassie Staining Kit		✓			✓

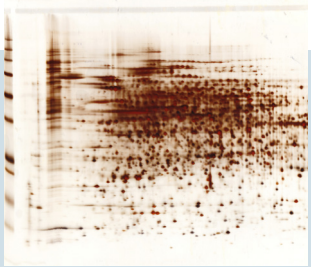


SERVAGel™ TG PRiME™ 14 % 2D vertical mini gel stained with SERVA HPE™ Lightning Red

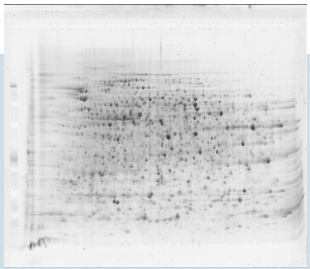


A = Absorption spectrum of conjugated form of SERVA Lightning Red

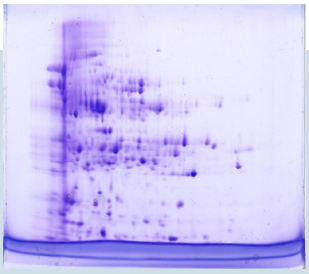
E = Emission spectrum of conjugated form SERVA Lightning Red



2D HPE™ Large Gel 12.5 % stained with HPE Silver Staining Kit



2D HPE™ Large Gel NF 12.5 %, stained with SERVA Purple



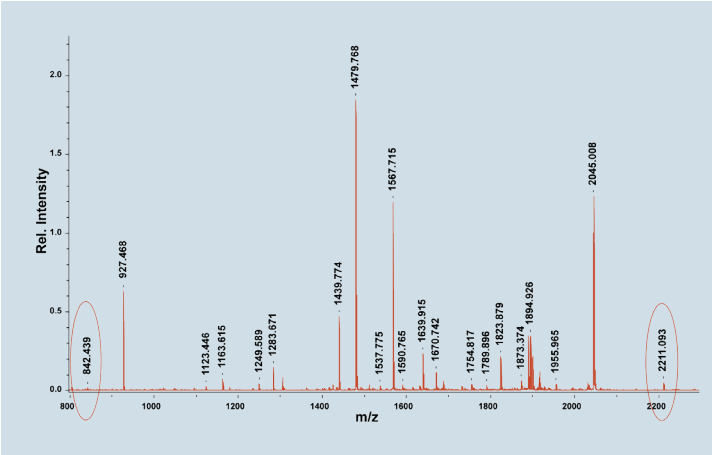
SERVAGel™ TG PRiME™ 14 % 2D vertical mini gel stained with SERVA HPE™ Coomassie Staining Kit

Product	Size	Cat. No.
SERVA HPE™ Lightning Red	1 kit	43400.01
SERVA Purple	5 ml	43386.03
SERVA Purple	25 ml	43386.01
SERVA Purple	4 x 25 ml	43386.02
SERVA HPE™ Silver Staining Kit	1 kit	43395.01
SERVA HPE™ Coomassie Staining Kit	1 kit	43396.01

Pre-labeling of protein samples with SERVA HPE™ Lightning Red allows direct spot detection without staining and washing steps after the run.

6 Endoproteinases

Trypsin MS approved is suitable for digestion of proteins for mass spectrometry analysis. Reductive methylation of the lysine residues of trypsin results in a stable product that is extremely resistant to autolytic degradation. The enzyme is purified by chromatography. No chymotryptic activity is detectable. Every lot is approved for use in in-gel digestion and mass spectrometry analysis. A Trypsin Peptide (TP) Standard allowing internal calibration for enhancing mass accuracy is available separately. The TP standard provides tryptic activity to generate masses m/z 842 and 2211.



Spectrogram of BSA digested with Trypsin MS approved.

Endoproteinase Glu-C (V8), MS approved is tested for in-gel digestion and mass spectrometry analysis. It is a serine endoproteinase isolated from *Staphylococcus aureus V8*. The specificity of Glu-C is primarily determined by the buffer pH and composition. Using phosphate buffers (pH 7.8), Glu-C will cleave at both glutamyl and aspartyl bonds. Ammonium bicarbonate buffer (pH 7.8) will lead to a preferential cleavage of glutamyl bonds. The presence of proline residues on the carboxy side of the peptide bond inhibits the cleavage.

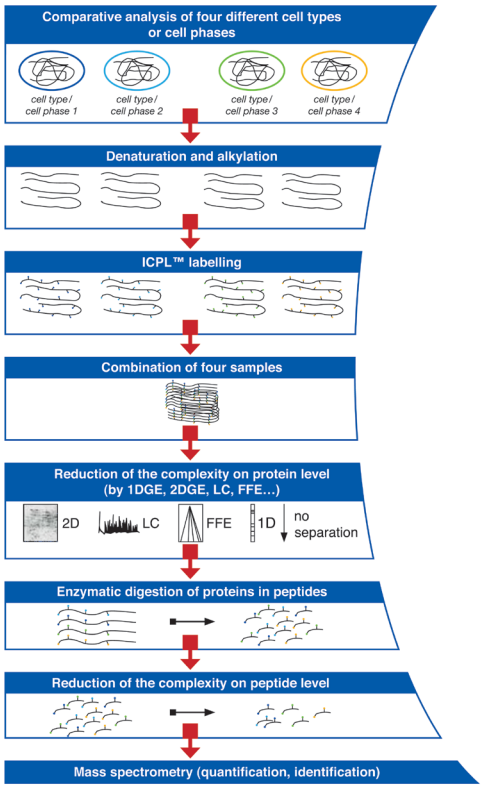
Product	Size	Cat. No.
Trypsin MS approved, from porcine pancreas	100 µg	37286.01
Trypsin Peptide (TP) Standard	25 µg	37285.01
Endoproteinase Glu-C (V8 proteinase), MS approved from *S. aureus*	2 x 25 µg	20986.01

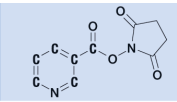
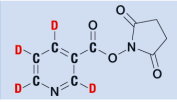
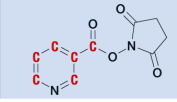
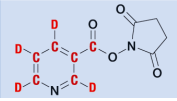
- Each lot MS approved
- High purity & specificity
- Approved quality for use with in-gel digestion and mass spectrometric analysis
- For peptide mapping and protein sequence work

7 SERVA ICPL™ Kit

The ICPL™ technology combines the power of Isotope Coded Protein Labeling with an unmatched dynamic range for protein identification and quantification due to its potential combination with intact protein fractionation steps. Whereas by other methods the labeling step is only performed after the proteolytic digestion, that is on the peptide level, with the ICPL™ kit the labeling step is made already on the protein level and includes all free amino acid groups. Therefore the analytical depth of a proteome analysis is improved significantly. While the ICPL™ kit, the ICPL™ Triplex and Quadruplex kit is designed to analyse two, three or four proteomes (2 x 6, 3 x 6 and 4 x 6 reactions, respectively), the ICPL Quadruplex Plus kit includes MS approved endoproteinase Trypsin NB as well as Glu-C for achieving the highest sequence coverage (4 x 6 reactions). A software to analyse MS data generated by ICPL-based technique, is available free of charge.

ICPL™ Quadruplex Kit: Workflow



1-($^{12}C_6{}^1H_4$)-Nicotinoyloxy-succinimide (^{12}C-Nic-Reagent): M_r = 105.0215 Da	
1-($^{12}C_6{}^2D_4$)-Nicotinoyloxy-succinimide (^{2}D-Nic-Reagent): M_r = 109.0715 Da	
1-($^{13}C_6{}^1H_4$)-Nicotinoyloxy-succinimide (^{13}C-Nic-Reagent): M_r = 111.0419 Da	
1-($^{13}C_6{}^2D_4$)-Nicotinoyloxy-succinimide ($^{13}C^2$D-Nic-Reagent): M_r = 115.0919 Da	

For the stable labeling of intact proteins 1-($^{12}C_6{}^1H_4$)-nicotinoyloxy-succinimide, 1-($^{13}C_6{}^1H_4$)-nicotinoyloxy-succinimide, 1-($^{12}C_6{}^2D^4$)-nicotinoyloxy-succinimide and 1-($^{13}C_6{}^2D_4$)-nicotinoyloxy-succinimide is used.

References:

1. *Schmidt, A., Kellermann, J. and Lottspeich, F. (2005), Proteomics **5**, 4-15*
2. *Brunner, A., Keidel, E., Dosch, D., Kellermann, J. and Lottspeich, F. (2010) Proteomics **10**, 315-326*

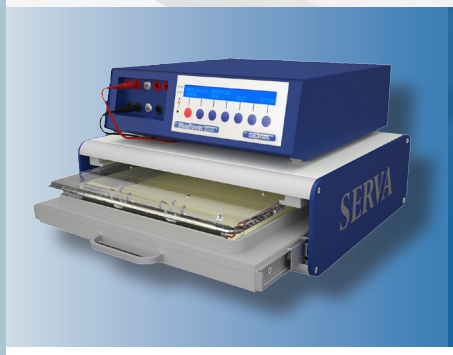
Product	Size	Cat. No.
SERVA ICPL™ Kit	1 kit	39230.01
SERVA ICPL™ Triplex Kit	1 kit	39231.01
SERVA ICPL™ Quadruplex Kit	1 kit	39232.02
SERVA ICPL™ Quadruplex Plus Kit	1 kit	39233.01

- **Quantitative analysis of two, three or four proteomes in mass spectrometry**
- **Quadruplex Plus version for highest sequence coverage**
- **Analysis of posttranslational modifications and of isoforms**

8 2D PAGE Equipment

In 2D PAGE analysis of proteins there are many crucial steps, namely sample preparation, the quality of the reagents used, but also some physically parameters like temperature, formation of the electric field applied to the gel and so on. These physical parameters are mostly influenced by the equipment used in 2D PAGE. The HPE™ BlueHorizon™ System and the HPE™ BlueTower System - the first true „High Performance Electrophoresis (HPE™)“ systems for horizontal 2D PAGE analysis outperforming any conventional 2D PAGE system. Both systems are delivered with the following system components: HPE™ BlueHorizon™ or HPE™ BlueTower, respectively, power supply with monitoring software to log the electrical parameters during gel electrophoresis and one external cooling unit.

SERVA developed the 2D core equipment HPE ™ BlueHorizon™, HPE™ BlueTower, BlueVertical PRiME™, BluePower™ Power Supply and BlueShake 3D in close cooperation with researchers throughout the world. Devices are manufactured in Germany according to the specifications determined by SERVA.



HPE™ BlueHorizon™

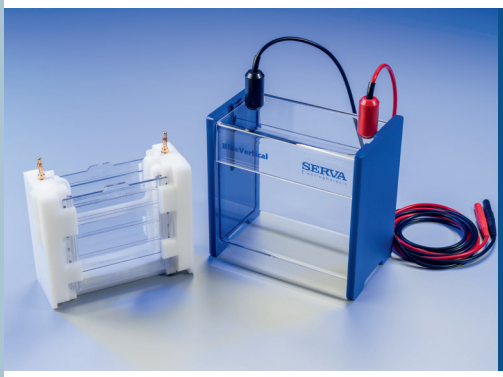
The HPE™ BlueHorizon™ is a flatbed system for optimized performance in cooled flatbed gel electrophoresis using precast 2D HPE™ gels. Main applications are 2D PAGE but also other flatbed techniques like 1D SDS PAGE, native PAGE or isoelectric focusing.

HPE™ Blue Horizon™ Multi Deck

The HPE™ BlueHorizon™ modular deck combinations of 2, 3 or 4 flat bed systems into one space and budget saving unit temperature controlled by one chiller and driven by one single power supply. The Multi Decks offer high throughput capacity for 1D applications like SDS PAGE or IEF and 2D PAGE.

HPE™ BlueTower

The SERVA HPE™ Tower System is a multilevel flatbed electrophoresis device providing unmatched resolution, reproducibility and sensitivity. Up to four polyacrylamide gels can be operated simultaneously to conduct either 1- and 2-dimensional separations.

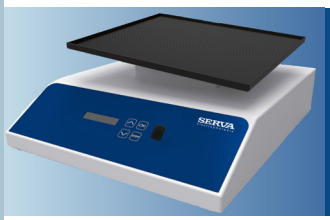


BlueVertical™ PRiME™

The BlueVertical™ PRiME™ electrophoresis mini tank system has been developed to run precast gels in 2D PAGE, but also in 1D SDS PAGE, native PAGE, IEF or nucleic acid PAGE applications. The unique innovative clamp system keeps the gel cassettes in their correct position at the inner core running module, leak-free and ready to start within seconds.

BluePower™ Power Supplies

The BluePower™ Power Supplies are easy to operate and fully programmable. Change parameters without interrupting the run. They have a stable metal housing and a large LC display. Complemented by the BluePower™ Control kit you may monitor V, mA and W over time as well as loading and storing of program settings.



BlueShake 3D

The large platform of the instrument (350 x 350 mm) and the chosen angel of the platform with 4° makes this shaker perfect for staining large format gels like the 2D HPE™ gels.

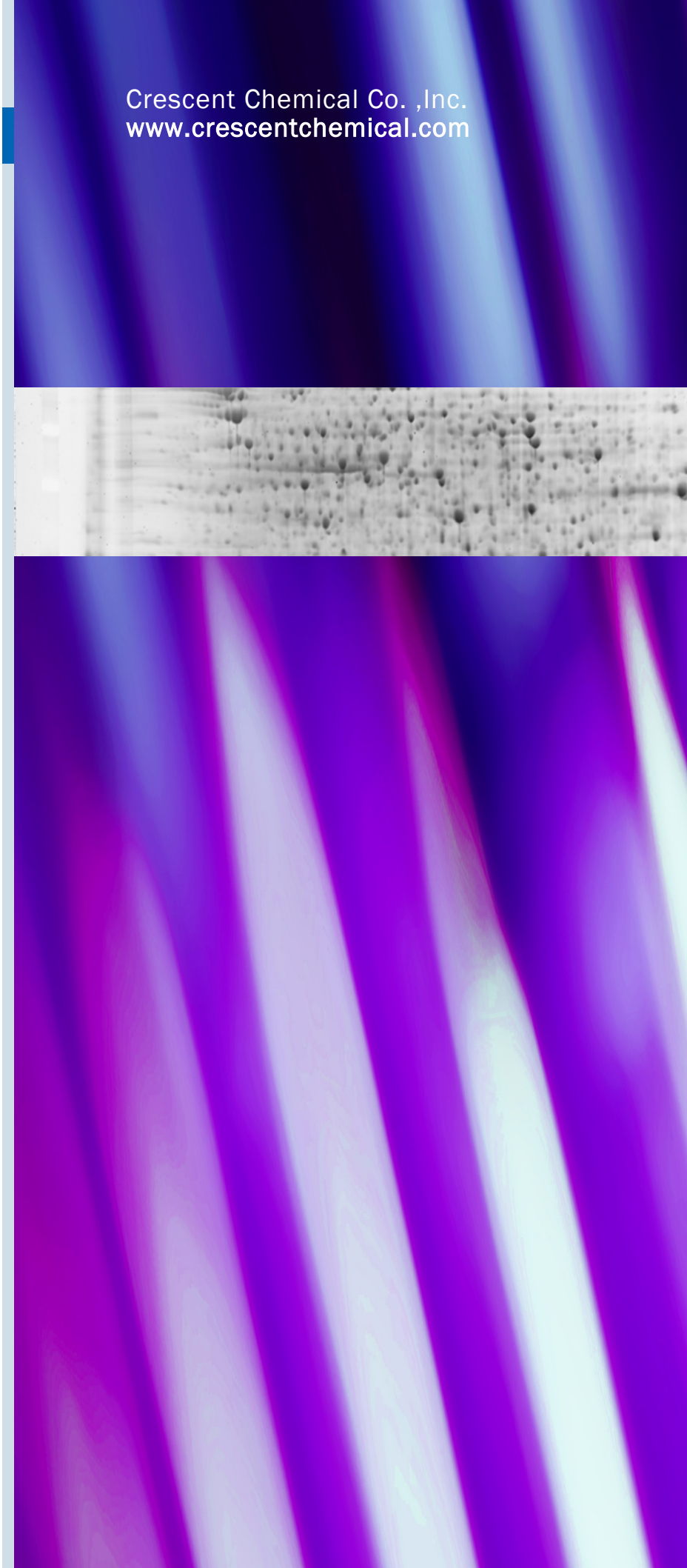
HPE™ ScreenPicker

For downstream analysis the 2D core equipment is complemented by the SERVA HPE™ ScreenPicker for semi-automated spot picking from fluorescent stained 2D gels for mass spectrometry analysis.

Product	Size	Cat. No.
HPE™ BlueHorizon™	1 unit	HPE-BH
HPE™ BlueHorizon™ PS	1 system	HPE-BHP
HPE™ BlueHorizon™ C	1 system	HPE-BHC
HPE™ BlueHorizon™ System	1 system	HPE-BHS
HPE™ BlueHorizon™ Double Deck	1 unit	HPE- BHD
HPE™ BlueHorizon™ Triple Deck	1 unit	HPE-BHT
HPE™ BlueHorizon™ Quadra Deck	1 unit	HPE-BHQ
HPE™ BlueTower	1 unit	HPE-T02
HPE™ BlueTower System	1 system	HPE-TS2
BlueVertical PRiME™	1 unit	BV 104
HPE™ Power Supply	1 unit	HPE-PS1
HPE™ Power Supply Package	1 system	HPE-PSP
MP 300 V Power Supply	1 unit	MP-300V
BluePower™ Control Kit	1 kit	BP-PCSV01
HPE™ Cooling Unit	1 unit	HPE-CU1
SERVA BlueShake 3D	1 unit	BS-3D
SERVA HPE™ ScreenPicker	1 unit	HPE-SP1

SERVA

Crescent Chemical Co. ,Inc.
www.crescentchemical.com



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