DALT Gel 12.5 and DALT Buffer Kit

Polyacrylamide gels and buffers for the second dimension of 2-dimensional electrophoresis

User Manual

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Table of Contents

1 Introduction

DALT Gel 12.5 is a precast polyacrylamide gel for the second dimension of 2-dimensional electrophoresis. The gel is cast onto a plastic support film. The gel size is 255 × 196 × 1 mm.

The gel is a homogeneous 12.5% polyacrylamide gel cross-linked with bisacrylamide. It is intended to be used in the Ettan™ DALTtwelve and Ettan DALTsix electrophoresis units and together with the DALT Buffer Kit. The gel is formulated for long shelf-life and, when used with the DALT Buffer Kit, generates a discontinuous buffer system offering rapid runs with sharp, reproducible results. The performance and capacity of this gel and buffer system are similar to the widely used Laemmli (Tris-glycine) buffer system.

These instructions describe how to use DALT Gel 12.5 together with the DALT Buffer Kit for the second dimension of 2-D electrophoresis.

Definitions

This user documentation contains safety notices (WARNING, CAUTION, and NOTICE) concerning the safe use of the product. See definitions below.

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury. It is important not to proceed until all stated conditions are met and clearly understood.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. It is important not to proceed until all stated conditions are met and clearly understood.

NOTICE

NOTICE indicates instructions that must be followed to avoid damage to the product or other equipment.

CE marking

The CE marking and the corresponding EU Declaration of Conformity is valid for the instrument when it is:

- used according to the *Operating Instructions* or user manuals, and
- used in the same state as it was delivered, except for alterations described in the *Operating Instructions* or user manuals.

2 Description of the system

DALT Gel 12.5 gel is a precast polyacrylamide gel for the second dimension of large-format 2-D electrophoresis. It is bound to a plastic support film which provides ease of handling and dimensional stability. The gel is intended for use in the Ettan DALTtwelve and Ettan DALTsix electrophoresis units. The gel is inserted into a cassette that allows it to be run in a vertical mode with liquid buffers. The gel is used together with the DALT Buffer Kit, which includes concentrated buffers for running the gel, Gel Buffer for seating the gel in the DALT Precast Gel Cassette, and Sealing Solution for attaching the IPG strip to the top of the slab gel.

DALTtwelve and Ettan DALTsix units are electrophoresis instruments designed for the second dimension of large-format 2-D electrophoresis using either 24 cm or 18 cm IPG strips. The electrophoresis units can accommodate up to 12 gels or up to six gels respectively, either precast or lab-cast. Precast Gel Cassette holds the Ettan DALT 12.5 gel vertically in the Ettan DALT electrophoresis units, (see the Figure below).

Figure 2.1: Precast Gel Cassette holds the gel vertically.

Precast Gel Cassette consists of a glass plate with spacers glued to the vertical edges and connected along one edge by a flexible hinge to a rigid plastic frame. The gel is placed against the glass plate between the spacers. When the cassette is closed and snapped together, the frame presses the gel evenly against the glass plate. The glass plate is 5 mm higher than the plastic frame at the cathodic (-) edge as a surface for sliding of the IPG strip into position.

The buffer system used in the gel gives longer shelf-life and shorter run times than the conventional Laemmli (Tris-glycine) system while retaining the capacity and robustness of that system. Separations performed using DALT Gel 12.5 are similar to those seen with a 12.5% Laemmli gel.

DALT Buffer Kit contains all the reagents necessary for a single run of up to 12 DALT Gel 12.5 gels in the Ettan DALTtwelve electrophoresis unit and up to six gels in the Ettan DALTsix electrophoresis unit, see *Fig. 2.2, on page 6*.

Figure 2.2: DALT Gel 12.5 and DALT Buffer Kit.

3 Instructions for use

Note: *Always wear gloves when handling polyacrylamide gels, IPG strips, gel cassettes or any other equipment these items will contact. Clean the cassettes with a detergent designed for glassware and rinse well with distilled or deionized water. Always use the highest quality reagents and the purest water available.*

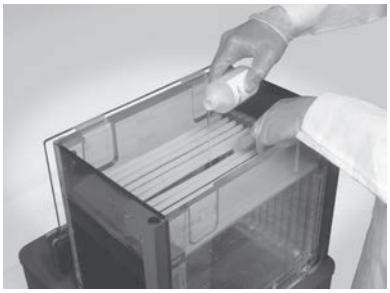
In this chapter

3.1 Preparing samples and first-dimension IEF

For instructions in preparing samples for 2-D electrophoresis and running first-dimension IEF, refer to 2-D Electrophoresis – Principles and Methods (Product code 80642960).

3.2 Preparing Ettan DALTtwelve electrophoresis unit

Instructions for using Ettan DALTtwelve Electrophoresis Unit can be found in the instrument's User Manual.

Step	Action
1	In a separate container dilute the cathode buffer included in the DALT Buffer Kit to working strength by adding both bottles of 10× cathode buffer (total volume 250 mL) to 2.25 L of distilled or deionized water.
2	Ensure that the valve on the separation unit is set to "circulate". Add the entire contents (75 mL) of the bottle of 100× anode solution included in the DALT Buffer Kit into the tank (see the Figure below). Rinse the bottle with distilled or deionized water and pour it into the tank. Fill the tank to the 7.5 L fill line with distilled or deionized water, in this way washing the 100× anode solution from the buffer seal.
	
	Figure 3.1: Add the anode buffer.
	Note: *Avoid pouring the 100× anode solution onto the tubing by spreading the tubing elements apart using one hand while pouring the solution with the other hand.*
3	Switch the separation unit on.
4	Turn the pump on to mix, set separation unit to desired temperature. A temperature of 25 °C is recommended.

3.3 Preparing Ettan DALTsix electrophoresis unit

Instructions for using Ettan DALTsix Electrophoresis Unit can be found in the instrument's User Manual. The unit should be placed close to a sink for easy rinsing and draining. The tubing leading to and from the heat exchanger should be connected to a circulating water bath such as the MultiTemp™ III; the heat exchanger should not be connected to a water tap or any other coolant supply that lacks pressure regulation. An EPS 601 Power Supply should be positioned conveniently close to the electrophoresis unit.

Step	Action
1	Insert the anode assembly into the tank so that the circulation ports are properly aligned. The anode assembly is keyed so that it can only be inserted in one orientation and the bottom edge of the assembly should fit into the slot in the bottom of the tank.
2	Add 37.5 mL of the bottle content 100x Anode Buffer included in the DALT Buffer Kit into the tank, see the Figure below. Fill the electrophoresis unit with 4.5 L of distilled deionized water and turn the pump on.

Figure 3.2: Fill the electrophoresis.

Note:
Only half of the 100× Anode (lower) Buffer is used for each run = 37.5; the slightly reduced buffer concentration should not affect the run conditions.

3	Switch on the MultiTemp III temperature controller and adjust the temperature to the desired setting.

3.4 Inserting DALT Gel 12.5 into Precast Gel Cassette

Step	Action
1	Open the gel package. Cut around the gel on two sides at about 1 cm from the edge to avoid cutting the gel or the support film. Remove the gel from the package. The gel is cast onto a plastic support film and does not cover the film entirely. The gel is covered with a protective plastic sheet. Markings on the protective sheet indicate the orientation of the gel and the direction of electrophoresis. The bottom (+ or anodic) edge of the gel is flush with the edge of the support film. The support film protrudes approximately 15 mm beyond the top (- or cathodic) edge of the gel and approximately 5 mm at either side. unit with anode buffer.
2	Open DALT Precast Gel Cassette and place it on the bench top with the hinge down, see the Figure below.

Figure 3.3: Open the gel cassette with the hinge downward.

3	Pipette 1 mL of gel buffer onto the glass plate as a line along the spacer on the right edge of the glass plate, see the Figure below.

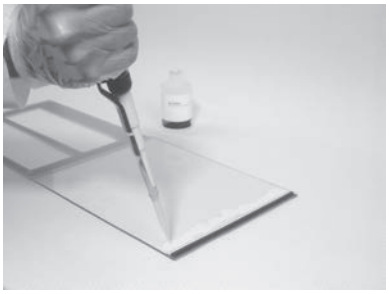


Figure 3.4: Pipette a line of gel buffer onto the glass plate.

Step	Action
4	Remove the protective plastic sheet from the gel (see Figure 3.5). Handling the gel only by the side support film margins, hold it, gel-side down, over the glass plate. Ensure that it is oriented with the cathodic (-) edge of the gel towards the cathodic (-) edge of the cassette. Align the right edge of the gel with the right edge of the side spacer of the glass plate side, flex the gel downward slightly and lower it slowly toward the glass plate from right to left (see Figure 3.6). Take care that the bottom (anodic) edge of the gel is flush (within 1 mm) of the bottom (anodic) edge of the glass plate. The protruding side support film margins (but not the gel) should rest on top of the side spacers.

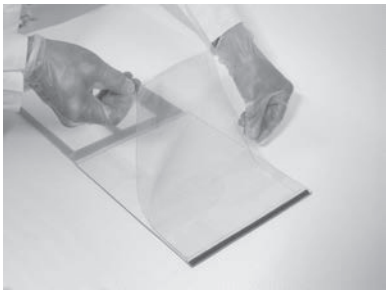


Figure 3.5: Align the right edge of the gel with the side spacer.

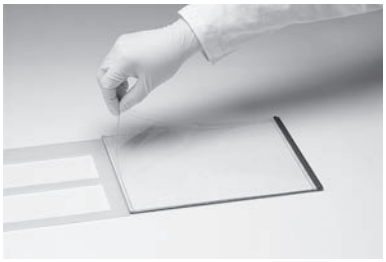


Figure 3.6: Lower the gel onto the glass plate.

Step	Action
5	Use the roller to press out any bubbles or liquid from between the gel and the glass (see the Figure below). Press firmly against the plastic support film with the roller and roll over the entire gel. After rolling, the gel should adhere firmly to the glass and resist further movement.

Figure 3.7: Use the roller to remove air bubbles.

6	Close the cassette (see Figure 3.8) and snap the plastic frame to the glass plate and press the edges tightly together (see Figure 3.9). Ensure that the cassette is closed completely; an incompletely closed cassette causes a strongly curved front.

Figure 3.8: Close the gel cassette.

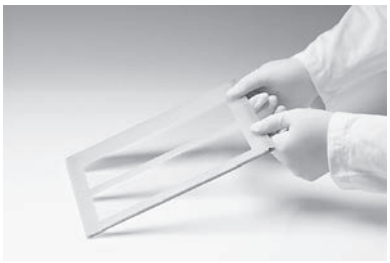


Figure 3.9: Snap the cassette shut.

7	Repeat the procedure for each second-dimension gel to be run.

3.5 Equilibrating Immobiline DryStrip gels

The equilibration step saturates the IPG strip with the SDS buffer system required for the second-dimension separation. To reduce vertical streaking in the second dimension it is necessary to apply two equilibration steps. The first step saturates the IPG strip with the SDS system and the second step blocks the protein thiol groups. The equilibration solution contains buffer, urea, glycerol, reductant, SDS and dye.

Prepare equilibration solution.

Prepare SDS equilibration buffer (see the Table below). This is a stock solution. Just prior to use, add 100 mg DTT per 10 mL SDS equilibration buffer (1% [w/v]).

Table 3.1: SDS equilibration buffer

	Final concentration	Amount
1.5 M Tris-Cl pH 8.8	50 mM	6.7 mL
Urea (FW 60.06)	6 M	72.07 g
Glycerol (87% v/v)	30% (v/v)	69 mL
SDS (FW 288.38)	2% (w/v)	4.0 g
Bromophenol blue	0.001% (w/v)	2 mg
Distilled or deionized water		to 200 mL

Store in 40 mL aliquots at –20 °C.

Equilibration.

Place the IPG strips in individual tubes with the support film toward the tube wall. Add 10 mL DTT-containing solution to each tube. Place the tubes on a rocker and equilibrate for 15 min.

Second equilibration.

A second equilibration is performed with an iodoacetamide solution (instead of DTT). Prepare a solution of 250 mg iodoacetamide per 10 mL of SDS equilibration buffer (2.5% [w/v]). Decant the first equilibration solution and add the same volume of iodoacetamidecontaining equilibration solution to each tube. Place the tubes on a rocker and equilibrate for an additional 15 min.

Note: *The subsequent steps of electrophoresis unit preparation, insertion of the gel into the Precast Gel Cassette and melting of the Sealing Solution can be performed as the IPG strips are equilibrating.*

3.6 Applying Immobiline DryStrip gels

Step	Action
1	Leave the loaded gel cassette lying flat on the bench top with the glass plate down and the plastic frame up.
2	Rinse the IPG strip. Pour some of the diluted cathodic buffer into a 100 mL graduated measuring cylinder or similar vessel. Using forceps, remove the equilibrated IPG strip from the equilibration solution and dip it into the cathodic buffer in the cylinder. (This step lubricates the IPG strip and washes off any particulate material that may be precipitated on the surface of the IPG strip).
3	Holding one end of the IPG strip, place it with the gel side up and with the cathodic end to the hinge side of the cassette. Carefully draw it across the shelf formed by the extension of the glass plate beyond the plastic frame until the strip is completely on the glass plate and centered, (see the Figure below).

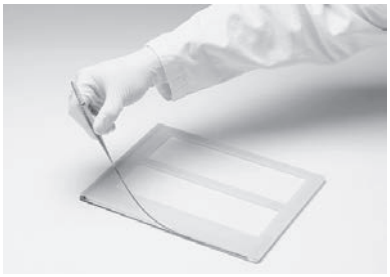


Figure 3.10: Place the IPG strip onto the glass lip.

Step	Action
4	**a.** Push the IPG strip into place (see the Figure below). Using a thin spatula or ruler, push against the plastic backing of the IPG strip to slide it a short distance into the gap between the glass plate and the support film and plastic frame. Be sure to push against the backing of the IPG strip, not the gel itself. Place the cassette upright in the cassette rack with the glass plate forward.

Figure 3.11: Push the strip into place.

b. Continue to slide the IPG strip down until it contacts the surface of the second-dimension gel. The strip should rest on the surface of the gel. Avoid trapping bubbles between strip and the slab gel, or piercing the seconddimension gel with the strip. The gel face of the strip should not touch the plastic support film.

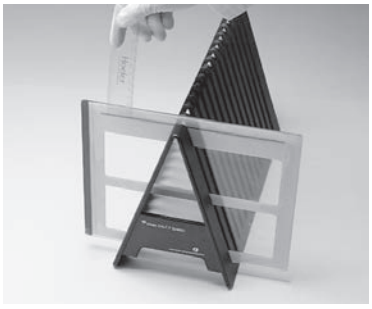


Figure 3.12: Place gel cassette in the rack and seal the strip.

Step	Action
5	Seal the IPG strip in place (*Fig. 3.12, on page 16*). For each IPG strip, melt an aliquot of Sealing Solution from the buffer kit in a 95 °C heating block or boiling water bath. (Tip: an ideal time to carry out this step is during IPG strip equilibration). Allow the solution to cool slightly, slowly pipette the solution across the length of the IPG strip taking care not to introduce bubbles. It will flow down between the glass plate and the support film and seal the IPG strip in place. There may be a gap of up to 2 mm between the edge of the gel and the side spacer. Any gap should be plugged by allowing some of the Sealing Solution to flow down the gap. Allow a minimum of 1 min for the agarose to cool and solidify.
6	Repeat the procedure for each seconddimension gel to be run.

3.7 Inserting gel cassettes into Ettan DALTtwelve electrophoresis unit

When the electrophoresis buffer has reached the desired temperature, insert the loaded gel cassettes with the IPG strips in place.

Note: *Gel Cassettes and Blank Cassette Inserts slide much more easily into the unit if they are wet. Wetting the cassette with some cathode buffer using a soaked kleenex or alternatively distilled or deionized water from a squirt bottle can be used to wet the cassettes and Blank Cassette Inserts as they are being loaded into the unit.*

Step	Action
1	Fit Blank Cassette Inserts into any unoccupied slots.
2	Load the unit from back to front (see the Figure below).

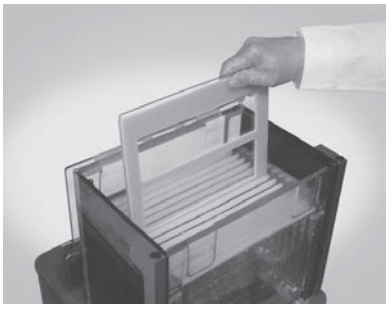


Figure 3.13: Load the gel cassettes.

3	When all 12 slots are occupied, the buffer level should be slightly below the level of the gaskets (if not, add distilled or deionozed water to the lower buffer chamber until desired volume is attained). Pour the diluted (1×) cathode buffer into the tank to the fill line (some of this buffer may drip through the gasket and mix with the anode buffer during the run, but this will not affect performance or results).

3.8 Inserting gel cassettes into Ettan DALTsix electrophoresis unit

When the electrophoresis buffer has reached the desired temperature, insert the loaded gel cassettes with the IPG strips in place.

Step	Action
1	Insert the cassettes into the cassette carrier (see the Figure below) and fill any empty slots with blanks.

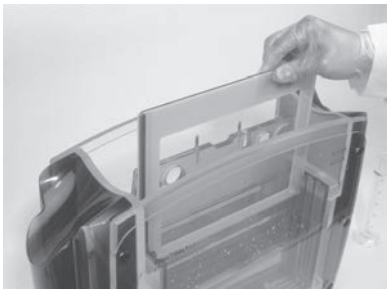


Figure 3.14: Insert the cassettes into the cassettes carrier.

2	When all six slots are occupied, the liquid level should be adjusted with water so that the level of the diluted anode buffer is at or just below the "LBC start fill" line marked on the unit.
3	Seat the upper buffer chamber over the gels (see the Figure below). ***Note:*** *The upper buffer chamber slide much more easily into place if it is wet. Wetting the unit and/or cassettes with some cathode buffer or alternatively distilled or deionized water may help.*

Figure 3.15: Seat the upper buffer chamber.

Step	Action
4	In a separate container, dilute the content of one bottle of the cathode (upper) buffer concentrate to 0.8 L, mix, and pour into the upper buffer chamber.
5	Using a small funnel, fill the narrow space between the upper and lower buffer chambers with diluted anode buffer or water to the same level as in the upper buffer chamber.

3.9 Recommended running conditions – Ettan DALTtwelve

Program the Ettan DALTtwelve electrophoresis unit to deliver the following protocol.

Constant power

Temperature: 25 °C

Phase	Power W/gel	Duration
1	5 W[1]	30 min
2	17 W (max 180 W)[1]	Until the bromophenol dye front reaches the bottom of the gel (approximately 5 h for a full set of 12 gels).

[1] For overnights run the power is set to 1 W/gel and the temperature to 30 °C.

3.10 Recommended running conditions – Ettan DALTsix

Maximum electrical input for the electrophoresis unit is 600 V, 400 mA, and 100 W with a maximum operating temperature of 40 °C. To remain below this temperature, the unit should be connected to a refrigerated water circulator. With MultiTemp III set at 10 °C, the electrophoresis tank temperature remains at about 25 °C.

Program the Ettan DALTsix electrophoresis unit to deliver the following protocol.

Constant power

Temperature: 25 °C

Phase	Power W/gel	Duration
1	2.5 W	30 min
2	17 W (max 100 W)[1]	Until the bromophenol dye front reaches the bottom of the gel (approximately 4.5–5 h for a six-gel run).

[1] For overnight runs, the total power should be set at 1–2 W per gel and the temperature to 30 °C.

3.11 Unloading gels from electrophoresis units

For information regarding unloading gels from the electrophoresis units, please refer to the respective instrument User Manuals.

3.12 Detection

DALT Gel 12.5 gels can be stained or visualized with a variety of commonly used techniques, including Coomassie™ Blue and silver staining.

When using the PlusOne Silver Staining Kit, Protein, a modified staining protocol should be used. Prepare the staining reagents (250 mL per gel) as indicated in the kit instructions with the following exceptions:

- Prepare twice the stated fixing solution (500 mL per gel rather than 250 mL).
- Prepare the developing solution with twice the stated volume of formaldehyde (100 µL per 250 mL of developing solution rather than 50 µL).

Stain the gels according to the following protocol.

Fixing	2 × 60 min[1]
Sensitization	60 min
Water wash	5 × 15 min
Silver	60 min
Wash	2 × 1 min
Developing	10 min[2]
Stop	60 min
Wash	2 × 30 min
Preserve	40 min

[1] The first fixing step may be prolonged up to three days if desired for the sake of convenience. Over night fixing may be advantageous when using alkaline strips in order to avoid background staining from residual ampholytes in the gel.

[2] Approximate time: this step may be visually monitored. The gels should be transferred to stop solution when the spots have reached the desired intensity and before the staining background becomes too dark.

4 Troubleshooting

This section concerns troubleshooting problems that have their origin in the second-dimension separations using DALT Gel 12.5. For a more comprehensive guide to troubleshooting problems with 2-D electrophoresis, refer to 2-D Electrophoresis Using Immobilized pH Gradients – Principles and Methods (80642960).

Symptom	Possible cause	Remedy
No current at start of run	Insufficient volume of buffer in upper reservoir.	Ensure that the upper reservoir contains enough buffer to contact the upper electrode.
Buffer not circulating (Ettan DALTsix only)	Pump is not primed.	Turn pump off and on to purge air bubbles.
	Pump is off.	Turn pump on.
	Pump is broken.	Call for service.
Second-dimension separation proceeds slowly with high current (Ettan DALTtwelve only)	All the slots in the sealing assembly are not occupied by either gel cassettes or Blank Cassette Inserts.	Ensure that all 12 slots in the sealing assembly are occupied.

	Anodic buffer has mixed with cathodic buffer from overfilling of either the cathodic reservoir or the anodic reservoir.	Do not pour more than the suggested volume (7.5 L) into the lower reservoir. Ensure that the level of the anode buffer does not come above the sealing assembly when the electrophoresis unit is fully loaded. If excess anode buffer is in the upper reservoir, it should be removed with a pipette. Ensure that the level of cathode buffer does not come above the air vents in the corners of the upper reservoir. Lack of mixing between upper and lower reservoirs can be verified by adding bromophenol blue dye to the lower reservoir prior to loading the unit with gels. Several drops of 1% (w/v) bromophenol blue will impart sufficient color to the anode buffer.
Second-dimension separation proceeds slowly with high current (Ettan DALTsix only)	One of the slots in the upper buffer chamber is open.	All six slots in the upper buffer chamber must be occupied by either a gel cassette or a blank cassette.
	Upper buffer chamber is damaged.	Change upper buffer chamber.
	Anodic buffer has mixed with cathodic buffer from overfilling of either the cathodic reservoir or the anodic reservoir.	Ensure that the level of the anode (lower) buffer does not come above the level of the buffer in the upper buffer chamber when the electrophoresis unit is fully loaded.
Dye front is irregular	The top surface of the gel has been damaged during application of the IPG strip.	Take care during application of the IPG strip that the gel is not damaged.

	Bubbles between the gel and the glass plate. Liquid between the gel and the glass plate.	Use the roller to remove any bubbles or excess liquid between the gel and the glass plate. Ensure that no visible bubbles remain and that the gel adheres firmly to the glass and resists movement.
	Interfering substances in the first dimension.	Contaminants in the sample can cause distortions or swollen regions in the IPG strip following IEF. These distortions can result in disturbances in the second dimension. Modify sample preparation to limit these contaminants. Refer to 2-D Electrophoresis Using Immobilized pH Gradients –Principles and Methods (Product code 80642960) for suggestions.
Pronounced downward curving of the dye front on one side of the gel	There is an unfilled gap between the gel and one of the spacers.	When sealing the IPG strip into place on top of the gel, ensure that some of the Sealing Solution flows down any gap that may exis between the gel and spacer.
Distortion in the 2-D pattern	Bubbles between the gel and the glass plate Liquid between the gel and the glass plate.	Use the roller to remove any bubbles or excess liquid between the gel and the glass plate. Ensure that no visible bubbles remain and that the gel adheres firmly to the glass and resists movement.

	Interfering substances in the first dimension.	Contaminants in the sample can cause distortions or swollen regions in the IPG strip following IEF. These distortions can result in turn in disturbances in the second dimension. Modify sample preparation to limit these contaminants. Refer to 2-D Electrophoresis Using Immobilized pH Gradients – Principles and Methods (Product code 80642960) for suggestions.
Vertical gap in the 2-D pattern	Bubble between IPG strip and top surface of second dimension gel.	Ensure that no bubbles are trapped between the IPG strip and the top surface of second-dimension gel.
Vertical streaking	Incorrectly prepared equilibration solution.	Prepare equilibration solution according to instructions.
	Poor transfer of protein from IPG strip to second gel.	Employ a low power or current sample entry phase in the second-dimension electrophoresis run. Prolong entry phase if necessary.
	Insufficient equilibration.	Prolong equilibration time.
	Liquid between the gel and the glass plate.	Use the roller to remove any excess liquid between the gel and the glass plate. Ensure that the gel adheres firmly to the glass and resists movement.
	IPG strip was not equilibrated with iodoacetamide in a second equilibration step.	Equilibrate IPG strip in two steps. 1st step with DTT (1%) and 2nd step with iodoacetamide (2.5%).

Spots are vertically doubled, or "twinned"	IPG strip is not placed properly.	Ensure that the plastic backing of the IPG strip is against the glass plate of the second dimension cassette.
Poor representation of higher molecular weight proteins	Incorrectly prepared equilibration solution.	Prepare equilibration solution according to instructions.
	Poor transfer of protein from IPG strip to second-dimension gel.	Employ a low power or current sample entry phase in the second-dimension electrophoresis run. Prolong entry phase if necessary.

5 Technical information

In this chapter

5.1 Package contents

DALT Gel 12.5

Each gel package contains six gels and instructions.

Designation	Product code	No. per pack
DALT Gel 12.5	17600236	6

DALT Buffer Kit

Each kit contains four bottles of buffer and 12 tubes of sealing solution. The solutions are sufficient for a single run of up to 12 gels.

Designation	Product code	No. per pack
DALT Buffer Kit	17600250	Sufficient to run 12 gels
Contains:		
Anode Buffer		1 bottle (75 mL)
Cathode Buffer		2 bottles (2 x 125 mL)
Gel Buffer		1 bottle (60 mL)
Sealing Solution		12 tubes (12 x 1 mL)

5.2 Technical specifications

DALT Gel 12.5

Gel composition	T = 12.5%, C = 3% (12.125% acrylamide, 0.375% bisacrylamide)
Separation range	12–120 kDa
Gel dimensions	255 × 196 × 1 mm
Buffer in gel	Special buffer based on piperidinopropionamide (PPA)[1]
Gel backing	Polyester film, 265 × 211 mm
Shelf life	18 months
Storage	+4 to +8 °C

[1] The buffer system in this gel and buffer kit is covered by pending patent applications covering the US, EPO and Japan, which correspond to WO 9616724.

DALT Buffer Kit

100x Anode Buffer	5 M diethanolamine (DEA), 5 M acetic acid
10x Cathode Buffer	0.25 M Tris, 1.92 M glycine, 1% (w/v) SDS
Gel Buffer	Special buffer based on piperidinopropionamide (PPA)[1]
Sealing Solution	Gel Buffer with 0.5% agarose and 0.002% bromophenol blue
Shelf life	18 months
Storage	+4 to 8 °C

5.3 Recommended equipment, accessories, and reagents

Designation	Product code
Ettan DALTtwelve Separation Unit and Power Supply/ Control Unit, 230 VAC	80646627
Ettan DALTtwelve Separation Unit and Power Supply/ Control Unit, 115 VAC	80646646
Ettan DALTsix Electrophoresis Unit including buffer circulation pump and Peltier cooling, 230 VAC	80648527
Ettan DALTsix Electrophoresis Unit including buffer circulation pump and Peltier cooling, 115 VAC	80648508
DALT Precast Gel Cassette	80646665
DALT Blank Cassette Insert	80646703
Cassette Rack	80646798
Roller	80110679
PlusOne Urea	17131901
PlusOne Tris	17132101
PlusOne Glycerol	17132501
PlusOne Dithiothreitol	17131801
PlusOne Sodium Dodecylsulfate	17131301
PlusOne Bromophenol Blue	17132901
PlusOne Silver Staining Kit	17115001
Fluorescent rulers, 24 cm, set of two	80622383
Equilibration Tube Set (12/pk)	80646779
Coomassie tablets, PhastGel Blue R-350	17051801
Coomassie Brilliant Blue G-250	US32812
Staining Tray Set	80646817

Immobiline DryStrip

Dry polyacrylamide gels (0.5 mm, T = 4%, C = 3%, after rehydration) cast on plastic backing. 12/pk

pH interval	Product code / 18 cm strip	Product code / 24 cm strip
3.5–4.5	17600183	17600238

4.0–5.0	17600184	17600239
4.5–5.5	17600185	17600240
5.0–6.0	17600186	17600241
5.5–6.7	17600187	17600242
3–7 NL		17600243
4–7	17123301	17600246
6–9	17600188	17600247
6–11	17600197	
3–10	17123401	17600244
3–10 NL	17123501	17600245
3–5.6 NL	17600356	17600357
5.3–6.5	17600361	17600362
6.2–7.5	17600366	17600367
7–11 NL	17600371	17600372
3-11 NL	17600376	17600377

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