

mPAGE® Lux Casting System

Make your gel casting workflow faster, simpler and safer with more reproducible results.

Product Sustainability Overview

The mPAGE® Lux Casting System has been designed to provide the flexibility of hand-cast protein gels and the reliability of precast gels, without the loss of quality, time, or the significantly higher costs that accompany the alternative options. This innovative solution eliminates the need for APS and TEMED by utilizing non-hazardous photoinitiators. The use of acrylamide, a known carcinogen is unavoidable in many applications of protein analysis and is still present in this system.

This one-step photopolymerization process eliminates multiple gel preparation steps and cures in just 90 seconds, compared to other fast hand cast kits that can take more than 30 minutes. The mPAGE® Lux quick casting workflow utilizes Bis-Tris chemistry for faster run times and reduces single-use plastic waste generation, providing our customers a more sustainable option for their protein resolution needs.



Product Sustainability Highlights

Compared to representative fast hand-casting kits, the mPAGE® Lux Casting System features:

Materials

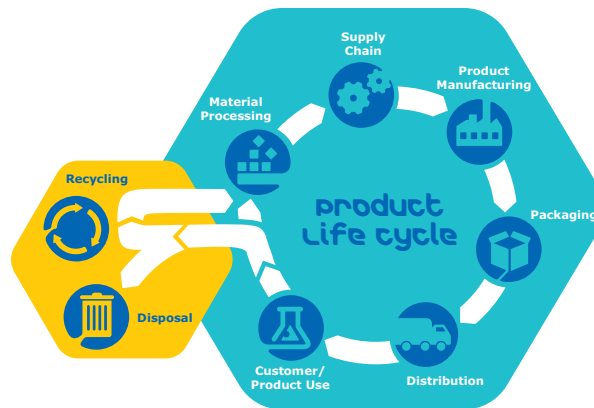
- Removal of the hazardous reagents APS & TEMED
- Reduction in cradle-to-grave total system mass by at least 20 %

Product Use

- One step photopolymerization process with ready-to-use gels in 3 minutes
- Single reagent kit capable of producing resolving gels with 8-13.5 % acrylamide

End-of-Life

- Reduced single-use plastic waste by at least 25 %
- Ambient light polymerizes residual acrylamide to reduce chemical hazards in waste streams



This product has demonstrated significant improvements over the baseline system throughout the entire product life cycle and has been designated as a Greener Alternative Product. For more information on our Design for Sustainability framework and our Greener Alternative Products visit SigmaAldrich.com/greener.

Designed with Sustainability in Mind

Baseline System

To quantify the sustainable impacts made by the mPAGE® Lux Casting System, calculations were performed against the use of a representative fast cast kit for hand-casting polyacrylamide gels for protein electrophoresis. Both systems require the use of reusable casting kits and hand-casting reagent kits. The mPAGE® Lux Casting System additionally requires the use of the mPAGE® Lux Gel Curing Station while the baseline system requires the use of APS & TEMED, which are sold separately from the hand-casting reagent kit.

Product Sustainability Attributes

Materials

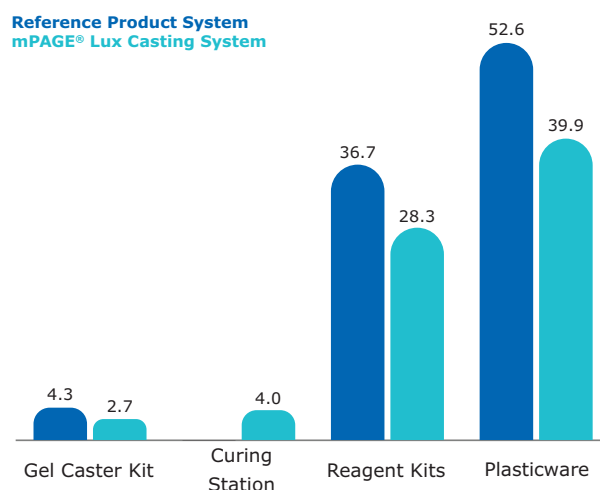
While being an innovative workflow solution for hand-casting polyacrylamide gels, the mPAGE® Lux Casting System still requires some use of plastic consumables and hazardous reagents. While no suitable replacement for acrylamide exists in this application, all remaining chemical hazards were eliminated from this system and the amount of plastic consumables required is significantly reduced over the baseline system.

The additional mass of the Gel Curing Station required by the mPAGE® Lux Casting System is offset by the reduction in products required in the gel casting workflow, as shown on the graph. Throughout the lifetime of the instrument, total system mass is reduced by at least 20 % compared to fast cast systems.

Functional Unit

All components required for casting electrophoresis gels over the minimum service lifetime of the mPAGE® Lux Curing Station, which is 5 years are considered in this evaluation. This includes the production, packaging, distribution, use and end-of-life impacts of the handcasting kit, the necessary reagents and all consumable labware required. Calculations were performed assuming 250, 500 or 1000 gels produced per year and the minimum difference over the baseline system was claimed.

Lifetime system mass (kg) for casting 500 gels/year



Packaging

This product adheres to the principles of SMASH Packaging, our strategy that drives packaging sustainability improvements through less packaging, more sustainable materials, and easier recycling.



Shrink:

Packaging for products and additional items required for functional unit reduced by 30 % over baseline system



Secure:

100 % of system fiber-based packaging have sustainable forestry certification



Switch:

All protective foam inserts made from 100 % recycled polyethylene



Save:

Packaging does not contain any materials which would inhibit recycling as defined by our SMASH guidelines

For more information on our SMASH Packaging initiative, visit sigmaaldrich.com/SMASH

Distribution

The reduction of required consumables and the elimination of certain reagents results in a significant decrease in impacts associated with shipping. The mass reduction in regularly shipped components and associated packaging is at least 24 % over the minimum service lifetime of the instrument.

Mass Savings over 5 years		
	Reagents	Labware
250 gels/year	4.7 kg	12.8 kg
500 gels/year	8.4 kg	12.8 kg
1000 gels/year	16.1 kg	22.1 kg

Product Use

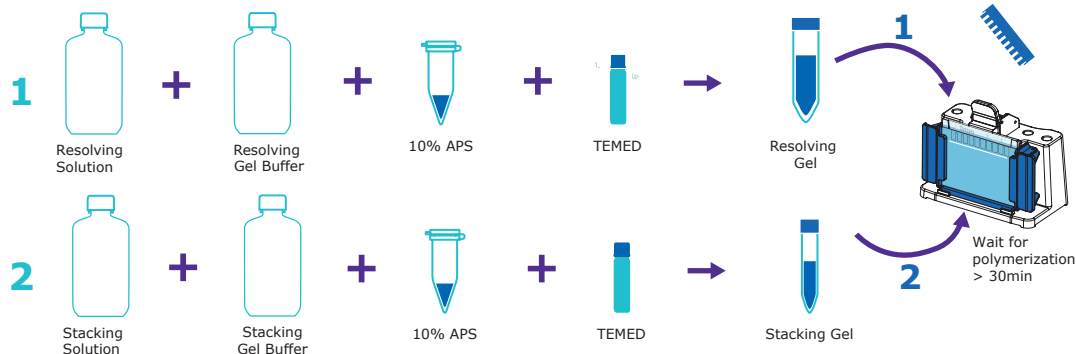
The mPAGE® Lux Casting System replaces alternative gel casting processes with an innovative faster, simpler and safer method while delivering more reproducible results. The mPAGE® Lux Casting System has fewer preparation steps, reduced polymerization time and utilizes Bis-Tris gel chemistry for shorter protein separation time.

The mPAGE® Lux Reagent kit allows formulation of single percentage acrylamide gels of 8-13.5 % from a single kit, maximizing flexibility while minimizing space required for storage. Precise system controls and reduction in preparation steps ensure consistent and reliable gel polymerization every time.

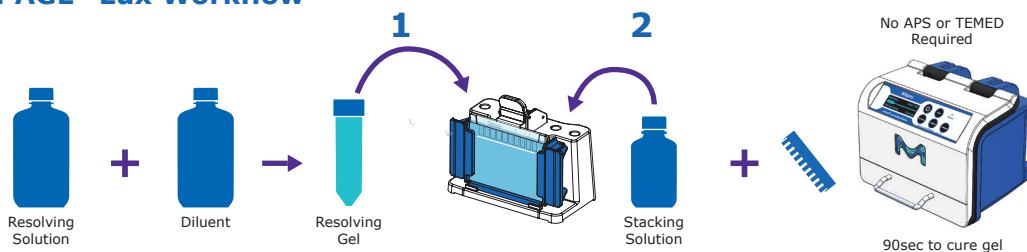
While the added instrument does require energy during operation, the mPAGE® Lux Casting Station was designed with energy efficiency in mind. By utilizing LED Lighting and a simple yet intuitive user interface, the overall energy consumption remains remarkably low. The cumulative energy consumption required to cure 1000 gels is only 1.65 kWh, equivalent to approximately 33 hours of laptop use.



Fast Handcast Kit Workflow



mPAGE® Lux Workflow



End-of-Life

The amount of single-use plastic waste generated throughout the gel casting workflow is reduced by at least 25 %. Additionally, the mPAGE® Lux Reagents will self-polymerize under exposure to ambient lighting, eliminating unpolymerized acrylamide residue in waste streams.

By casting fresh ready-to-use gels as needed, the risk of pre-preparing gels which will go unused is eliminated. The mPAGE® Lux System eliminates the

need to stock reagent kits or pre-cast gels in different percentages, which reduces the amount of waste generated due to component expiration.

The mPAGE® Lux Curing Station is electronic equipment, and as such must be disposed of in compliance with all applicable regulations. For more information on disposal of electronic waste, go to sigmaaldrich.com/weee.

Design for Sustainability Framework

Design for Sustainability (DfS) is our industry-first framework that keeps sustainability at the forefront of product development to minimize environmental and health impact across the entire product life cycle. This process is supported by our DfS scorecard, which

helps drive and assess quantifiable sustainability improvement in our products. Products with significant improvements are identified as Greener Alternative Products.

Design for Sustainability (DfS) Scorecard mPAGE® Lux Casting System

Impact Areas

Results



MATERIALS

Removal of hazardous reagents APS & TEMED (acrylamide is a known carcinogen and is still included in this product as no suitable replacements currently exist in this application).
Life cycle mass savings of at least 20 %, even with the addition of the curing station.



SUPPLIERS & MANUFACTURING

No change compared to baseline system in consideration of our DfS criteria.



PACKAGING

30 % reduction in life cycle packaging over baseline system.
All fiber-based packaging has sustainable forestry certifications and all protective foam inserts are made from 100 % recycled polyethylene foam.



ENERGY & EMISSIONS

Although energy is required for curing the gel, the energy required to cure 1000 gels/year is only 1.65 kWh, the equivalent of approximately 33 hours of laptop use.



WATER

No change compared to baseline system in consideration of our DfS criteria.



USABILITY & INNOVATION

The time required to prepare fresh gels has been reduced to just 3 minutes, compared to at least 30 minutes with representative fast hand-cast kits.



CIRCULAR ECONOMY

At least 25 % reduction in single-use plastic waste generated through gel preparation workflow.

Baseline product: Representative fast hand casting kit

Merck KGaA
Frankfurter Strasse 250
64293 Darmstadt, Germany

We have built a unique collection of life science brands with unrivalled experience in supporting your scientific advancements.

Millipore® **Sigma-Aldrich®** **Supelco®** **Milli-Q®** **SAFC®** **BioReliance®**

