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Universal Rapid Clear® 96-Well Filter Plate: 15-Minute Clarification Solution for Secreted Proteins

Data provided by Leash Bio

Abstract

Thomson's new method provides a fast, efficient approach for clarifying cell supernatants prior to protein purification. The Thomson Universal Rapid Clear® 96-Well Filter Plate offers a fast, standardized solution for processing up to 96 samples (1.5mL each) in as little as 15 minutes. Using a non-binding depth-filter matrix, it removes debris while preserving protein integrity across diverse hosts including insect cells, E. coli and mammalian expression systems. Optimized protocols for insect cells and E. coli demonstrate up to 2 hours of time savings and improved reliability, establishing the Universal Rapid Clear® Plate as a robust, automation-friendly tool for accelerated protein screening and downstream process development.

Introduction

Traditional clarification approaches - centrifugation alone and sequential depth-filter steps - can be slow, variable, and difficult to automate at scale. The Universal Rapid Clear® 96-Well Filter Plate solves these issues with a standard ANSI/SLAS footprint that integrates into existing automation platforms and plate handlers. Its depth-filter design efficiently removes cells and debris while preserving protein integrity, making it well-suited for both cell supernatant and lysate clarification for secreted and intracellular proteins respectively to support protein-expression studies and early downstream process development. As biopharma teams rely more heavily on robotic screening to shorten timelines, this format provides consistent, reproducible results across multiple samples with minimal method changes.

Product Features

- Works with all cell culture supernatants: Insect cells (Sf9, T.ni), E. coli, CHO, & HEK293
- Filtered supernatants ready for purification
- Clarifies up to 2 mL each well: Supporting screening without the bottleneck of manually processing samples.
- Depth- filtration technology: Effectively removes cells and particulates - no sequential filter steps, no risk of clogging, and minimal protein loss due to non-binding filter matrix
- Automation-friendly: Standardized (ANSI/SLAS format) footprint

Materials

Intracellular Protein Methods Centrifugation Method

1. Collect cells from expression system (E. coli, insect, mammalian, etc.)
2. Evaluate cell density – transfer appropriate number of cells or volume.
3. Optional Step - Set centrifuge settings to RCF and spin at 1500 x g RCF for 2 minutes to preclear.
4. Remove supernatant.
5. Place filter plate (PN 921747) on top of collection plate (PN 931133)
6. Transfer up to 2 ml of cell culture supernatant to empty filter wells.
7. Set centrifuge settings to RCF and spin at 1500 x g RCF for 5 minutes.
8. Remove filter plate and collect clarified samples.
9. Measure protein concentration in clarified samples (Octet® (Sartorius), SDS-PAGE, HPLC/FPLC, etc.)
10. Purify via PhyTip® (Biotage), IMCStips® (IMCS) or other purification system.

Case Study: Leash Bio

Purification of Proteins Directly from Cell Culture

Materials

- Thomson 96-well Universal Rapid Clear® Filter Plate (PN 9251547)
- Thomson 96 well plate (PN 931568)
- Thomson Optimum Growth® 6-well plate (PN 931133)

Procedure

1. 30mL cultures of T.ni cells (2 x 106 cells/mL at 98% viability; 30mL per well in Thomson Optimum Growth® 125 ml Flasks; Cell culture was conducted for 72 hours to allow for some lytic release of fluorescent proteins.
2. Cell culture was either precleared by a 1500 x g spin for 2 minutes or applied directly to the filter plate.
3. Either 400 µL or 800 µL of cell culture media/cells were applied to the filter plate.
4. Set centrifuge settings to RCF and spin at 1500 x g spin for 5 minutes.
5. Remove filter plate and collect clarified samples.
6. Optical Clarity was successfully achieved after Universal Rapid Clear filtration of T.ni cell culture supernatants.
7. Direct application of cell culture supernatant to filter plates leads to excellent performance.

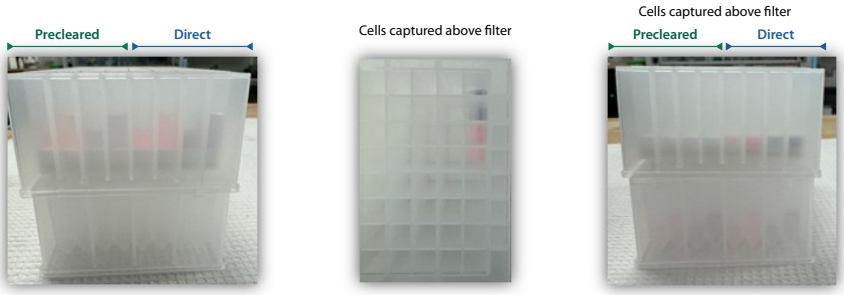

Figure 1 – Cell culture was either precleared by a 1500 x g spin for two minutes or applied directly to the filter plate. Plates were centrifuged at 1500 x g for five minutes to clarify.

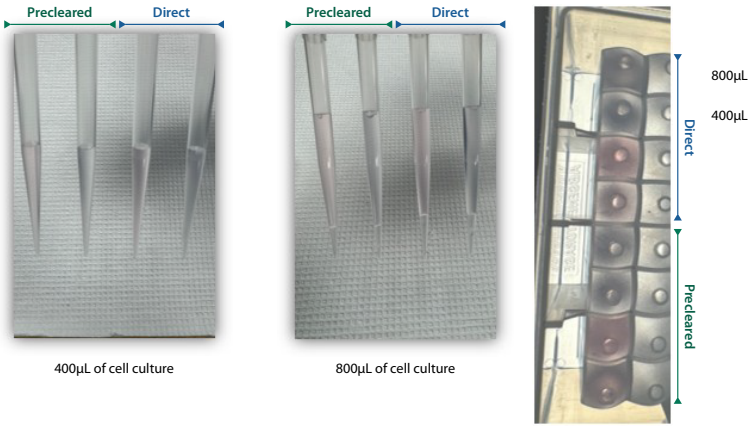

Figure 2 – Cell culture was either precleared by a 1500 x g spin for two minutes or applied directly to the filter plate. Either 400ul or 800ul of cell culture supernatant was applied to the filter plate. Plates were centrifuged at 1500 x g for five minutes to clarify.

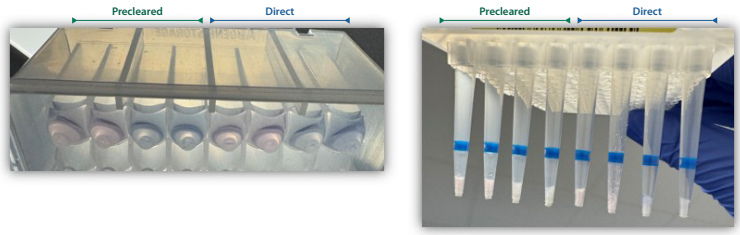

Figure 3 – Single-step purification from insect cell media using IMCS affinity capture tips. No major carryover of volumes in tips and consistent elution profiles was observed.

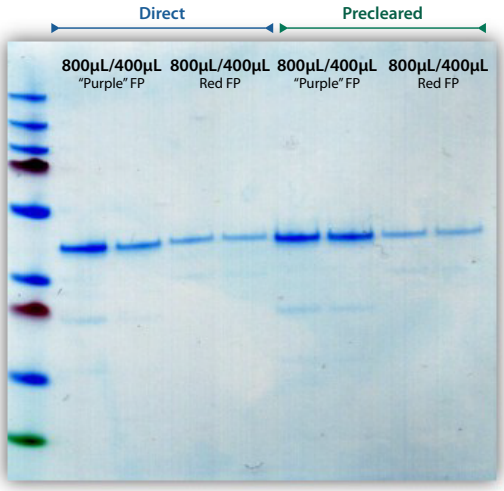

Figure 4 – Single-step purification from insect cell media using IMCS affinity capture tips. One percent of purified protein was run on a 4-12% gel /MES buffer to illustrate purification quality.

Summary of Case Study

A common failure mode in tip-purification is poorly clarified/polished lysates being applied to affinity resins in tips.

This can lead to dirty purifications upon later evaluation and inconsistent volume recovery. As shown in Figures 1-4 (gel images from Leash Bio), SDS-PAGE resolved purified proteins were abundant and all yields were as expected. Protein titer and yield benefited from Universal Rapid Clear® Clarification. This quick and reliable method was reproducible for multiple secreted and intracellular proteins, illustrating its universal benefits.

Discussion

- Universal Rapid Clear® 96-well filter plates remove cellular debris and particulates.
- Complete clarification of cell supernatants for multiple different secreted proteins from insect cells (Sf9 or T.ni) in only 15 minutes. This is a 2-hour savings over the standard processing time.
- Non-binding depth filter matrix for 90-95% recovery.
- Minimal variation between different lots of plates.
- Seamless integration with liquid handling systems – able to be used on deck to be later manually transferred to a collection plate and centrifuged.

Conclusion

The Thomson Universal Rapid Clear® 96-Well Filter Plate provides a faster procedure (5 minutes spin) solution for high-throughput clarification of cell supernatants containing secreted proteins expressed in E. coli, insect cells, and mammalian cells, commonly used in biopharmaceutical development environments.

The plate's proven compatibility with standard antibodies, bi-specific, multi-specific, fusion proteins, and antigens enables seamless integration into existing workflows, significantly reducing processing time. The Thomson Universal Rapid Clear® system supports accelerated development timelines while ensuring protein integrity and maintaining the quality standards required for biopharmaceutical applications.

For laboratories seeking to optimize their clarification workflow by two hours, reduce processing time, and improve throughput capacity, the Thomson Universal Rapid Clear® 96-Well Filter Plate represents a valuable advancement in sample preparation technology.

Acknowledgements

Thomson would like to thank the following contributor: Dr. Edward Kraft from Leash Bio, for their conclusive data and general feedback included in this application note.

Notes

RCF: RCF (relative centrifugal force) also known as g-force (x g) is the force applied in relation to the sample. The radius of the centrifuge will determine the force which is dependent on radial length from axis to sample.

$$RCF = 1.18 \times R \times 1000/RPM$$

1. RPM is the number of revolutions per minute. This application note focuses on RCF rather than RPM. Machine-to-Machine, RCF is a more accurate measurement of force.

2. To avoid spilling it is recommended to apply a foil seal to the plates during centrifugation (Thomson PN 899405-1).

It is recommended to avoid clogging by testing optimal dilution and conditions for your specific sample. Please contact your Thomson representative for any assistance (info@htslabs.com).

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Thomson Part Numbers

Well Plate	Part Number
96-Well Universal Rapid Clear® Filter Plate	921747
96-Well Plate	Square Well Round Bottom	931130-S
96-Well Plate	Square Well Pyramid Bottom	931133
Adhesive Foil Seal	899405-1