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Universal Rapid Clear® 24-Well Filter Plate (7mL); A 5-Minute Spin for Clarification Solution for all Molecule Types

Genentech, Leash Bio, Lundbeck, & Pharma Company

Abstract

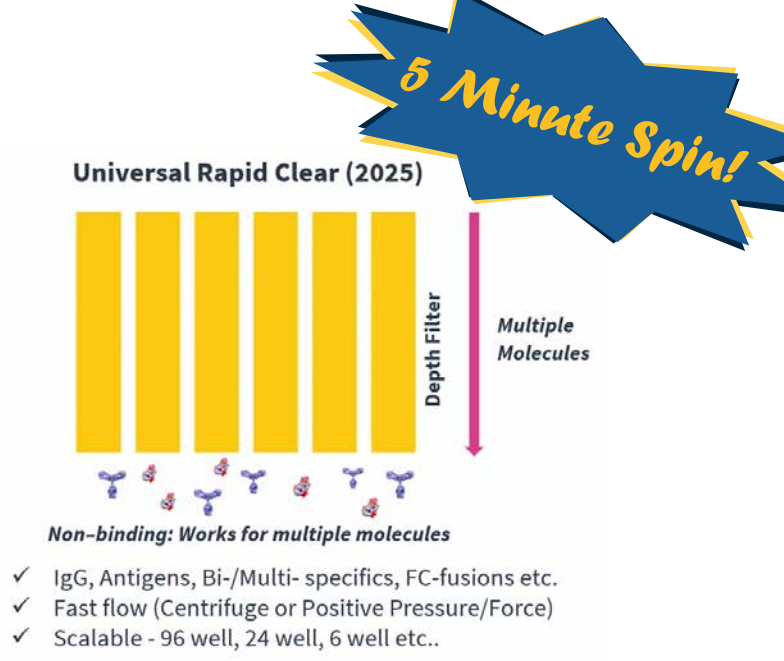
Efficient (5 minute spin) for clarification of cell-culture supernatants containing proteins and antibodies is essential for downstream processing. The Universal Rapid Clear® 24-Well Filter Plate enables simultaneous processing of 24 samples (up to 7mL per well), removing cellular debris and particulates without binding larger proteins of interest. Designed to meet diverse customer needs, it supports high-throughput workflows and is compatible with standard IgG antibodies, bispecifics, multispecifics, fusion proteins, and antigens—addressing the growing demand in complex biologics.

Introduction

Traditional clarification approaches—centrifugation alone, sequential depth-filter steps, or many individual syringe filters—can be slow, variable, and difficult to automate at scale. The Universal Rapid Clear® 24-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 to antibody production screening, protein-expression studies, lysate clarification for intracellular proteins, 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.

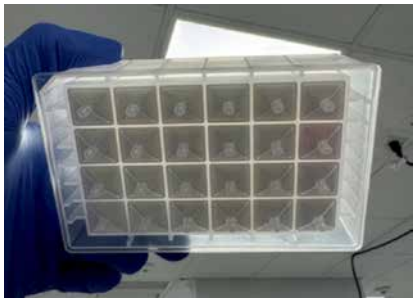
Product Features

- **Rapid Clear® depth-filtration technology** - streamlines clarification by eliminating multi-step/sequential filtration and replacing up to 24 individual syringe-filter operations per plate. Non-binding surface chemistry minimizes protein loss during clarification.
  - **Broad molecule compatibility** - validated for standard antibodies (IgG), bispecifics, multispecifics, fusion proteins, antigens, and lysate clarification for intracellular targets.
- **24-well depth-filter plate (ANSI/SLAS format)** - standardized footprint for easy adoption on liquid handlers and plate centrifuges; 7mL working volume per well are designed to efficiently clarify cell-culture samples for both antibody and non-antibody proteins.
  - **Centrifuge compatible** - designed for swing-bucket centrifugation to deliver fast, uniform clarification across all wells.



Applications

- Ambr® 15 / 250 System
- Transient CHO
- Stable CHO
- Transient HEK293
- Intracellular lysates
- Insect / *E.coli*



Secreted Protein Methods

Cell Culture Harvest

1. Collect cell culture supernatants from expression systems (CHO, HEK293, *E. coli*, SF21, SF9, *T.ni* etc.)
2. Evaluate sample (VCD) and cell density

Centrifugation Method

1. Place filter plate (PN 921547) on top of collection plate (PN 931569-G-1X)
2. Aspirate and dispense up to 7mL cell culture supernatant to empty filter wells
3. Set centrifuge settings to RCF and spin at 336 RCF[1] (340 RPM) for 5 minutes
4. Remove filter plate and collect clarified samples
5. Confirm complete clarification and ensure absence of visible particulates
6. Measure protein concentration in clarified samples (Octet, SDS-PAGE, HPLC/FPLC etc.)
7. Assess biological activity, if applicable.

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STUDY 1: Lundbeck

Utilizing Ambr® 15/250

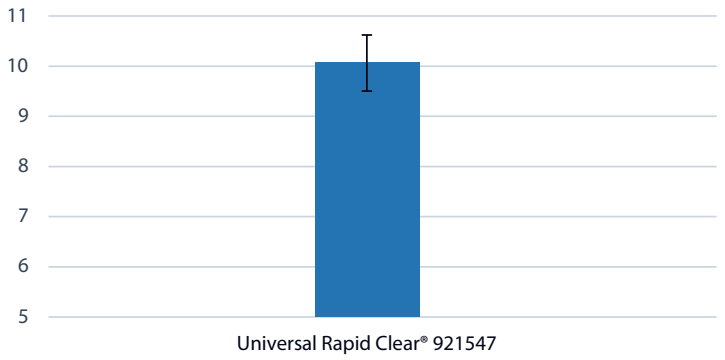
Materials

- Thomson 24-Well Universal Rapid Clear (921547)
- Thomson 24-Well Plate (931569-G-1X)
- Beckman Coulter Allegra 6R Centrifuge
- GH-3.8 Rotor
- Plate Carrier SX4750
- Ambr® 15 / 250 System

Procedure

1. The filter (PN: 921547) and receiving plates (PN: 931569-G-1X) were opened in a biosafety cabinet, aligned at position A1, and secured together with lab tape.
2. Samples are applied by placing the plate in an auto-sampling device and loading 3–5mL of cell culture per well, ensuring correct orientation.
3. The filter plate was sealed with a protective seal to prevent contamination.
4. The plate assembly was balanced and centrifuge settings were set to RCF and spin at 336 RCF[1] (340 RPM) for 5 minutes.
5. For long-term storage, a new plate seal (PN: 899405-1) was applied and the plate was stored at either -80°C or between 2–8°C.

Average, BioHT Total Protein Concentration (g/L)



This graph depicts the averages of 24 replicates. Showing consistency in protein concentration across the plate.

Summary Study 1

The Thomson 24-Well Universal Rapid Clear filter plate streamlines cell culture clarification by enabling consistent, high-throughput processing directly in a centrifuge. With efficient recovery of proteins across all wells, it ensures reproducible results for downstream applications.

STUDY 2: Pharma Company

Utilizing Ambr® 15/250

Materials

- Thomson 24-Well Universal Rapid Clear® Filter Plate (PN 921547)
- Thomson 24-Well Plate (PN 931568)
- Ambr® 15 / 250 System
- Sorvall X Pro Series
- Tecan with Prisma tips
- IMCS resin tips

Bioreactor	Filter Method	Titer (g/L)
1	Syringe	control
	Universal Rapid Clear® **1**	+1.1%
	Universal Rapid Clear® **2**	+2.5%
2	Syringe	control
	Universal Rapid Clear® **1**	+2.7%
	Universal Rapid Clear® **2**	+2.7%
3	Syringe	control
	Universal Rapid Clear® **1**	+2.3%
	Universal Rapid Clear® **2**	+2.9%

Comparison of Thomson Universal Rapid Clear® 24-Well Filter Plate to Standard Syringe Clarification in Payload Binding Selectivity Enhancer biologic workflow
**Titer is comparable between syringe and plate filtering methods across 3 bioreactors*

	Filter Method	Titer (% diff)	Acidics (% diff)	Main (% diff)	Basics (% diff)	HMW (% diff)
1 Bioreactor	Syringe	baseline	baseline	baseline	baseline	baseline
	Universal Rapid Clear® **1**	4.63	-5.49	3.33	50.00	2.02
	Universal Rapid Clear® **2**	4.03	-5.97	4.20	10.00	-13.07
	Universal Rapid Clear® **3**	2.08	-5.97	3.33	60.00	-7.95
2 Bioreactor	Syringe	baseline	baseline	baseline	baseline	baseline
	Universal Rapid Clear® **1**	1.28	-9.76	6.58	-23.08	3.67
	Universal Rapid Clear® **2**	2.33	-8.71	5.26	15.38	21.91
	Universal Rapid Clear® **3**	2.66	-7.65	4.77	7.69	2.7

Comparison of Thomson Universal Rapid Clear® 24-Well Filter Plate to Standard Syringe Clarification in bispecific biologic therapeutic fed-batch workflow.

Summary Study 2

Data & Testing

- Feeds from a 2L fed-batch bioreactor (Day 14, with amino acid, glucose, antifoam).
- Viability ranged from 65-85% across all wells and peak VCD was 10-20 e[6] cells/mL.

RCF Observations

- Clarity increased at lower RCF (336 x G), especially with high cell density

and low viability samples.

Timing

- Filtration time remained consistent at 5 minutes across different RCFs

STUDY 3: Vilya

VILYA

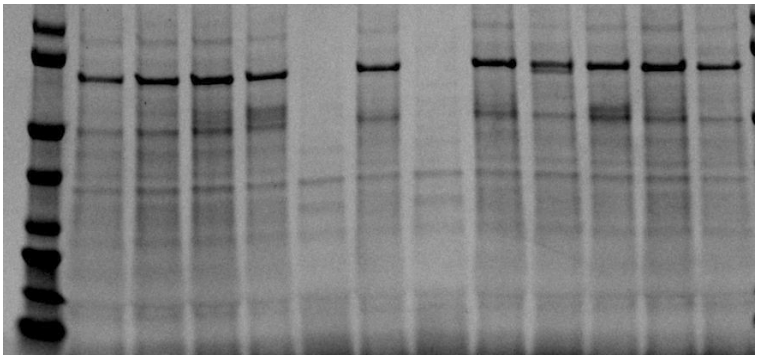
Quick clarification for secreted protein purification

Transfected HEK293 cells were allowed to grow for 4 days. Then whole cell culture 7mL/well was spun at 336 RCF. Final purification gave expected yield and purity.

Materials

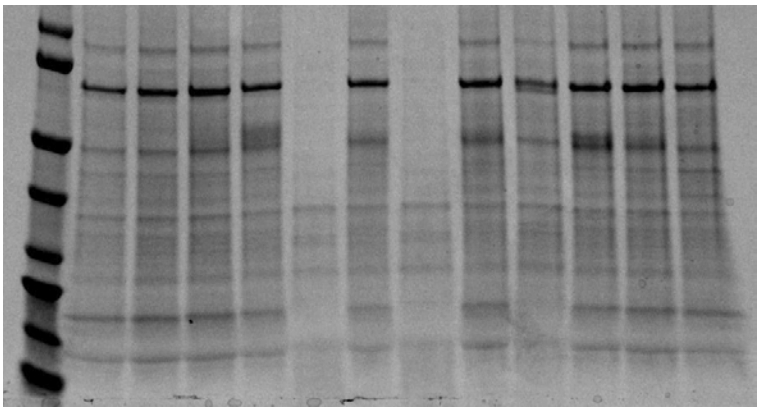
- Thomson 24-Well Universal Rapid Clear® Filter Plate (PN 921547)
- Thomson 24-Well Plate (PN 931568)
- Swinging bucket centrifuge (i.e.. Sorvall X Pro Series)

Before Filtration



SDS-PAGE of secreted protein in media

After Filtration



SDS-PAGE of secreted protein in media

STUDY 4: Leash Bio

Leash

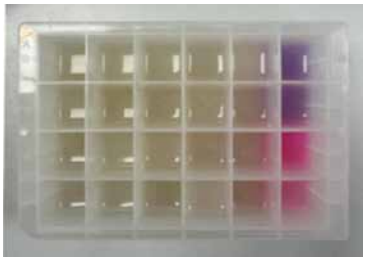
Mid-Scale Cell Culture & Purification-Intracellular Protein Method

Materials

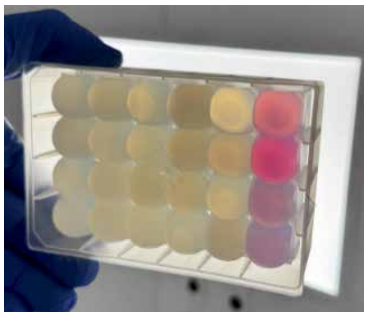
- Thomson 24-Well Universal Rapid Clear® Filter Plate (PN 921547)
- Thomson Optimum Growth 6-Well Plate (PN 931167)
- Thomson 24-Well Plate (PN 931568)
- Beckman Coulter Avanti® J Series

Insect Cell Lysis Clarification

1. 30mL cultures of *T.ni* cells were pelleted and resuspended in 4mL of lysis buffer, transferred to Thomson 24-well collection plates and sonicated.
2. Plates were spun until large debris pelleted out at 4°C for 30 minutes at 4000 RCF in JS5.3 rotor using the Beckman Coulter Avanti® J Series.
3. Crude, clarified lysates were applied to the Thomson 24-Well Universal Rapid Clear® Filter Plate and spun at 800 RCF for 5 minutes.
4. An optional initial enrichment was performed by applying NiNTA resin to bottom of 24-well collection plate.
5. Optical clarity successfully achieved after Universal Rapid Clear® Clarification.



30mL cell pellet lysed in 4mL of buffer



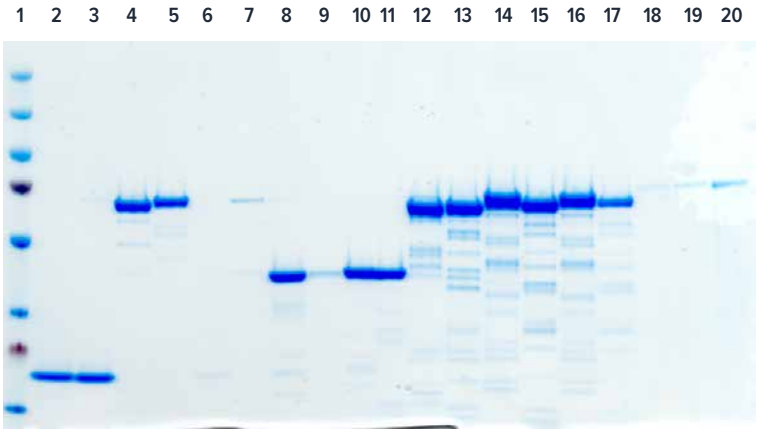
Clarified Lysate with NiNTa resin in bottom of wells

Summary Study 4

SDS-PAGE gel image from Leash Bio. All yields were as expected. Protein titer and yield benefitted from Rapid Clear Clarification.

- 98% viability
- Cell density of $2x10^6$ cells/mL at the initial setup
- 30mL of media/cells per well
- 6-well plates (200RPM, 27°C)
- The MOI is estimated at ~2 VP/cell
- Harvested 64-66hrs post-infection for T.ni cells

Results



4-12% BisTris SDS-PAGE gel in 1x MOPS buffer run for 45 minutes stained overnight with InstantBlue stain. Each lane has 5ul of ~240ul of the elution from Streptactin XT purification loaded. PageRuler plus protein ladder loaded for sizing – 5ul.

The Thomson Universal Rapid Clear® 24 Well Filter Plate demonstrated excellent performance across various cell culture systems and protein types:

- Removal of cellular debris and particulates
- Complete clarification in 5-15 minutes
- Achieved optical clarity suitable for downstream analysis
- Non-binding depth filter matrix for 90-95% recovery

Discussion

- Sample CV is <5% across wells within the same plate.
- Minimal variation between different plate lots.
- 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® 24-Well Filter Plate provides a faster (5 minutes spin) solution for high-throughput clarification of cell supernatants in biopharmaceutical development environments.

The plate's proven compatibility with standard antibodies, bi-specifics, multi-specifics, 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 maintaining the quality standards required for biopharmaceutical applications.

For laboratories seeking to optimize their clarification workflow, reduce processing time, and improve throughput capacity, the Thomson Universal Rapid Clear® 24-Well Filter Plate represents a valuable advancement in sample preparation technology.

Acknowledgement

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Notes

[1]**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.

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

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.

Thomson Part Numbers

Well Plate	Part Number
24-Well Universal Rapid Clear® Filter Plate	921547
24-Well Plate I Square Well Round Bottom	931565-G-1X
24-Well Plate I Square Well Round Bottom	931568
24-Well Plate I Square Well Pyramid Bottom	931569-G-1X
24-Well Plate I Square Well Pyramid Bottom	931571
Adhesive Foil Seal	899405-1

Appendix

Lane	Mw	Construct Name and Boundaries
1	-	PageRuler Plus Protein Ladder
2	20.05	SMARCA4_A1447-D1569_pBAC-1-N-tags
3	19.92	SMARCA4_A1447-D1569_pBAC-1-C-tags
4	62.70	SOS1_E564-T1049_pBAC-1-N-tags
5	62.57	SOS1_E564-T1049_pBAC-1-C-tags
6	30.86	PARP7_S445-I657_pBAC-1-N-tags
7	30.73	PARP7_S445-I657_pBAC-1-C-tags
8	40.28	PTPN1_E2-D298_pBAC-1-N-tags
9	40.14	PTPN1_E2-D298_pBAC-1-C-tags
10	40.77	PTPN2_P2-D302_pBAC-1-N-tags
11	40.64	PTPN2_P2-D302_pBAC-1-C-tags
12	65.44	PTPN6_V2-S528_pBAC-1-N-tags
13	65.31	PTPN6_V2-S528_pBAC-1-C-tags
14	66.44	PTPN11_T2-E530_pBAC-1-N-tags
15	66.31	PTPN11_T2-E530_pBAC-1-C-tags
16	66.44	PTPN11_T2-E530_E76K_pBAC-1-N-tags
17	66.31	PTPN11_T2-E530_E76K_pBAC-1-C-tags
18	66,463	BSA 100ng
19	66,463	BSA 250ng
20	66,463	BSA 500ng