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Solutions At Work™

Mid-Scale Bioprocessing Workflow with Thomson's Optimum Growth 6-Well Plate

Abstract

Thomson's Optimum Growth® 6-Well Plate equipped with an integrated lid (sold separately) is an advancement towards optimized mid-scale capabilities in cell culture and protein expression workflows. Designed to enhance cell growth, and production yields, the plate has been meticulously tested for uniformity and reliability to ensure consistent experimental results. This application note highlights findings from studies conducted by a large pharma customer, a large biotech, and Pfizer® that showcase the plate's efficacy in various cell culture applications, including CHO transient expression of monoclonal antibodies as well as HEK and insect cell cultivation. With features such as enhanced gas exchange, nutrient flow, and contamination prevention, this product is pivotal for researchers aiming to optimize bioprocessing yields and scalability.

Introduction

The 6-Well Plate with integrated lid addresses the increasing demand for reliable cell culture systems by providing a comprehensive solution designed to optimize cell growth and productivity. This study examines the application of Thomson 6-well plates across diverse cell culture environments as demonstrated through research conducted by leading pharmaceutical and biotechnology organizations. The analysis evaluates the plate's design features, including its capacity to support larger working volumes, enhanced oxygenation, and precise control of cell culture conditions—all contributing to improved research outcomes.

Product Features

- **Integrated Lid (Patent Pending)**: Best use is 1-7 day growth. Minimizes evaporation and prevents cross-contamination.
- **Angled Surface:** Facilitates proper mixing and promotes oxygen transfer throughout cell cultures.
- **Compact Space:** Ensures efficient cell pellet compaction during centrifugation procedures.removal.

Infors™ Sticky Mat System
Can be used on all platforms
(Part# 78113)

Kuhner™ Spring Tray F system
(Part# 104825)

Methods:

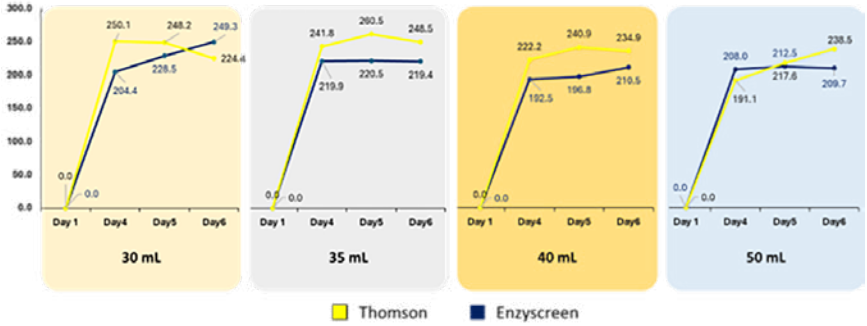
1. Cultivate CHO, HEK293, and insect cell lines in appropriate growth media.
2. Transfer cultures into Thomson 6-well plates, accommodating up to 50 mL.
3. Position integrative cap to minimize evaporation and contamination.
4. Conduct transient expression experiments for CHO cells at 37°C and 225RPM to assess mAb production.
5. Employ three replicates for Expi293F™ cells at 37°C and 225RPM to ensure result consistency.
6. Maintain Sf21 insect cells at 27°C and 225RPM to monitor growth profiles.
7. Measure cell density, viability, and doubling times periodically.
8. Analyze titer levels and IgG production efficiency.
9. Collect and analyze data for cell growth and production yields.

Materials:

1. Thomson 6-Well Plate with Integrated Cap.
2. CHO, HEK293, and Sf21 insect cell lines.
3. Specific growth media for each cell type.
4. Optimum Growth® Flasks for maintaining cell viability.
5. Incubators for controlled temperature and agitation.
6. Assays and instruments for measuring cell growth and IgG titers.
7. Automated systems for cell lysis and supernatant removal.

Study 1 | Large Pharma Customer

CHO Transient Expression of mAb Up to 50mL



Titer (µg/mL) over time

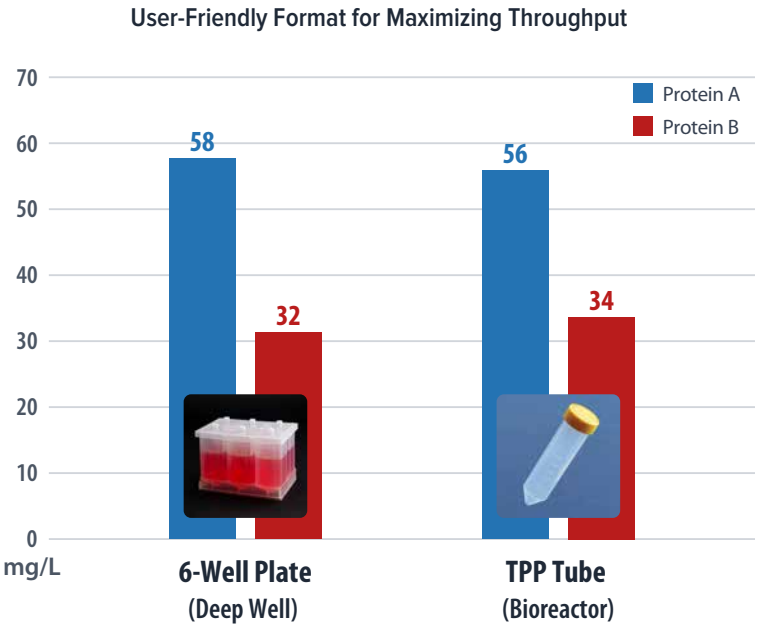
Consistent Titer Across All Volumes

The data demonstrate titer levels and efficiency of immunoglobulin G (IgG) production by CHO cells utilizing the Thomson 6-well plate system across all experimental volumes.

Summary

This investigation employed CHO cells for transient expression of monoclonal antibodies (mAb) in volumes ranging up to 50 mL, with systematic monitoring of immunoglobulin G (IgG) titer concentrations over time. The Thomson 6-well plate and Enzyscreen system were utilized throughout this process. A key advantage of the Thomson 6-well plate is its ability to maintain consistent titer levels across varied working volumes, thereby ensuring efficient and reliable production of IgG. This consistency is particularly valuable for scale-up operations while maintaining product quality and performance metrics in bioprocessing applications.

Study 2 | Biopharma Customer

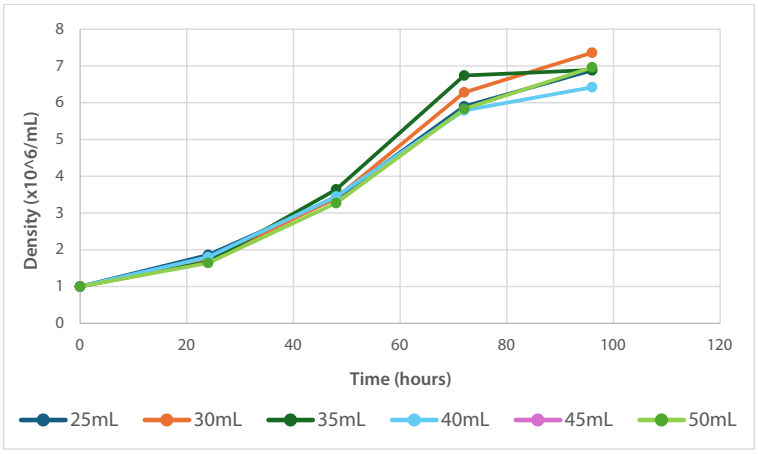


Expi293F™ cells were tested in triplicate for each experimental condition

Summary

This experiment evaluated the performance of different culture formats in protein expressions using Expi293F™ cells. The formats tested included Optimum Growth 6-well plates, and standard TPP® bioreactor tubes. The study revealed Thomson 6-well plate formats performed as well as or better than the TPP® bioreactor tubes, with respect to purified protein yield. This experiment underscores the Thomson 6-well plate as a valuable tool in protein expression, offering practical advantages in throughput, efficiency, and adaptability.

Study 3 | Pfizer®



Promotes uniform aeration and nutrient distribution

The plate design promotes uniform aeration and nutrient distribution, contributing to cell growth kinetics and viability.

Summary

The investigation conducted by Pfizer® demonstrates the utility of Thomson 6-well plates for scaling up experiments involving insect cells, specifically Sf21. These plates provide precise control over the growth microenvironment and accommodate a broad range of working volumes, making them ideally suited for optimization of experimental parameters. Thomson 6-well plates offer particular advantages for insect cell culture applications through their scalability, precise environmental control capabilities, and maintenance of consistent growth conditions, thereby enhancing experimental reproducibility and outcomes.

Results

These collective studies demonstrate the 6-Well Plate's capacity to enhance cell culture productivity across multiple applications. The large pharmaceutical company's research highlighted consistent titer levels in immunoglobulin G (IgG) production using CHO cells. The biotechnology company's experiments confirmed the effectiveness of the plate system in maximizing bioprocessing yields with Expi293F™ cells. Pfizer®'s study with Sf21 insect cells demonstrated reliable doubling times and consistent growth patterns attributable to the plate's design features that promote uniform aeration and nutrient distribution.

Universal Compatibility

Thomson 6-Well Plates demonstrate high compatibility with Infors™ Sticky Mats (Part# 78113), which can be universally implemented across any platform. The performance of Thomson 6-Well Plates is further enhanced by providing exceptional stability on shaking surfaces even at maximum 50 mL working volumes when operated at recommended agitation speeds. Alternatively, the Kuhner™ Spring Tray F system (Part# 104825) ensures secure positioning and efficient handling during experimental procedures. These validated accessory recommendations optimize operational stability and ensure reliable performance during high-throughput bioprocessing applications.

Conclusion

The Thomson 6-Well Plate with integrated lid represents a significant advancement in cell culture technology, offering enhanced features that facilitate higher cell densities, improved gas exchange kinetics, and consistent production yields. The system's versatility and reliability establish it as an invaluable tool for researchers seeking to optimize bioprocessing applications. The studies presented herein underscore the plate's potential to improve scalability and efficiency across various cell culture scenarios, marking a significant advancement in biopharmaceutical research and development methodologies.

Acknowledgment

We extend our sincere gratitude to the research teams for their contributions. Their dedication and expertise in exploring the capabilities of Thomson's 6-Well Plate have been instrumental in demonstrating its effectiveness and potential. We also acknowledge the commitment of the Thomson Instrument Company in developing innovative products that support and advance scientific research in cell culture technology.