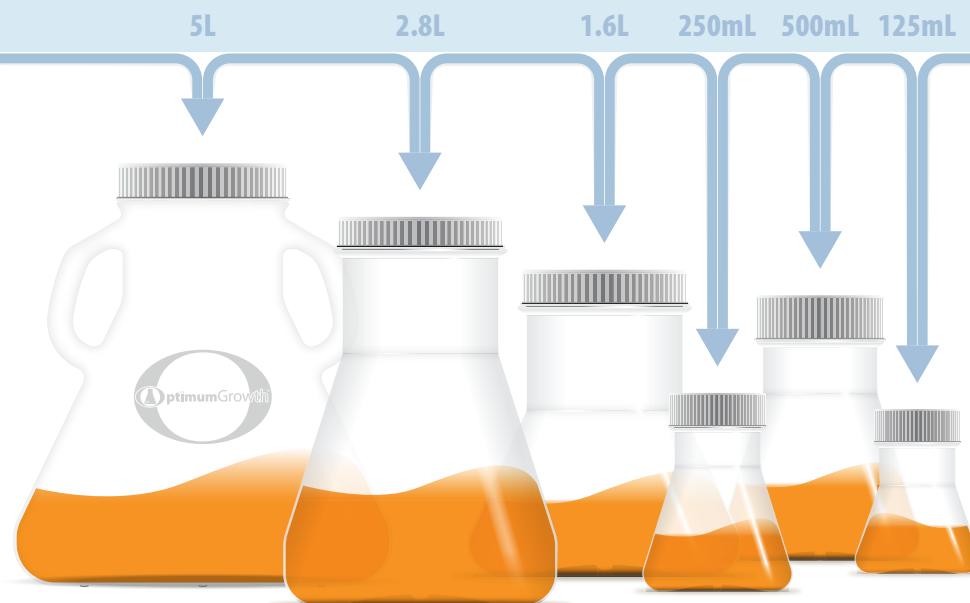


OptimumGrowth™

GENERAL INFORMATION





Key Features

- Baffles designed for High Aeration & Low Shear
- Same Footprint as Comparable Fernbach Flask
- Less Foaming than Disposable Fernbach
- Transfer Cap option connects directly to cell bags™ & bioreactors with quick connect, luer lock or tube fusing
- .2µm Vented Cap
- Individually Packaged and Sterilized



Scalability

Thomson Optimum Growth™ Flasks are designed in a way that protein production will scale consistently across all sizes, unlike any other shake flasks on the market. Additionally, these flask features allow for consistent shake speeds from the 125mL up to 5L flasks.

Optimum Growth™ Flask Specifications						
Flask Size	125mL	250mL	500mL	1.6L	2.8L	5L
Part #	931110	931111	931112	931113	931114	931116
Image						
Description	Optimum Growth™ 125mL Flask w/ Vent Cap - Sterile	Optimum Growth™ 250mL Flask w/ Vent Cap - Sterile	Optimum Growth™ 500mL Flask w/ Vent Cap - Sterile	Optimum Growth™ 1.6L Flask w/ Vent Cap - Sterile	Optimum Growth™ 2.8L Flask w/ Vent Cap - Sterile	Optimum Growth™ 5L Flask w/ Vent Cap - Sterile
Qty/Case	50	50	25	12	6	4

Space Saving More Volume

Optimum Growth™ Flasks Give Excellent Growth with Space Saving Capability



**6 x Corning® 3L Total
Volume 6L/Shaker**



**18 x 1.6L Optimum
Growth™ Flasks for
Total Volume
16.2L/shaker**



**12 x Optimum Growth™
2.8L Flasks Total
Volume 16.8L/Shaker**



**8 Position Carrier
available for 125mL &
250mL Flasks**





Fill Volumes & Shake Speeds

For all tables | 1" = 25mm | 2" = 50mm

CHO Stable Cells, CHO Transient, HEK 293 Transient

Flask Size	Best Fill Volume	*RPM in 1"/2"
125mL	63mL	150 / 110
250mL	150 mL	150 / 110
500mL	250mL	150 / 110
1.6L	900mL	150 / 110
2.8L	1.4L	150 / 110
5L	2.0L-3.0L	120 / 90

Initial ExpiCHO™ Fill Volume CHO Transient

Flask Size	Best Fill Volume	*RPM in 1"/2"
125mL	50mL	150 / 110
250mL	100mL	150 / 110
500mL	150mL	150 / 110
1.6L	400mL-750mL	150 / 110
2.8L	900mL-1.2L	150 / 110
5L	1.2L-1.6L	150 / 110

Insect Cells

Flask Size	Best Fill Volume	*RPM in 1"/2"
125mL	63mLs-75mL	150 / 110
250mL	150 mL	150 / 110
500mL	250mL	150 / 110
1.6L	900mL	150 / 110
2.8L	1.4L	150 / 110
5L	2.0L - 3.0L	135 / 90

Hybridoma Cells

Flask Size	Best Fill Volume	*RPM in 1"/2"
125mL	36mL	70 / 50
250mL	75mL	70 / 50
500mL	150mL	70 / 50
1.6L	480mL	70 / 50
2.8L	1.4L	120 / 90
5L	2L	120 / 90

Minimum Fill Volume

CHO Stable Cells, CHO Transient, HEK 293 Transient

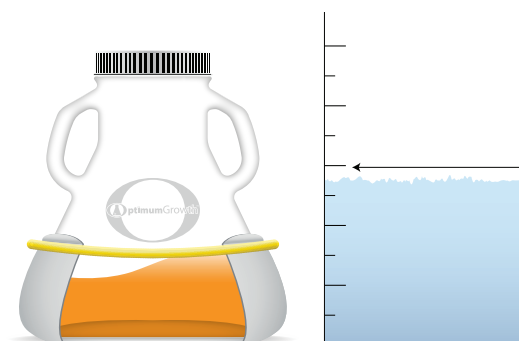
Flask Size	Best Fill Volume	*RPM in 1"/2"
125mL	24mL	120 / 90
250mL	50 mL	120 / 90
500mL	100mL	120 / 90
1.6L	400mL	100 / 80
2.8L	900mL	100 / 80
5L	1.2L	90 / 70

Final Volumes after ExpiCHO™ feeds CHO Transient

Flask Size	Best Fill Volume	*RPM in 1"/2"
125mL	63mL (6.5mL feed)	150 / 110
250mL	120mL (10mL feed)	150 / 110
500mL	180mL (15mL feed)	150 / 110
1.6L	700mL-900mL (100mL feed)	150 / 110
2.8L	1.1L-1.4L (150mL feed)	150 / 110
5L	1.4L-2.0L (200mL feed)	150 / 110

Microbes/E. coli

Flask Size	Best Fill Volume	*RPM in 1"/2"
125mL	63mL	250 / 150
250mL	125 mL	250 / 150
500mL	250mL	250 / 150
1.6L	900mL	250 / 150
2.8L	1.4L	250 / 150
5L	2.0L-3.0L	250 / 150



Optimum Growth™ Flask FAQs

<http://htslabs.com/techcenter/cellculture/optimum-growth/faq.php>

What have people done successfully to change vessels from Spinner flasks & Roller bottles to Optimum Growth™ Flasks (patented)?

Cells adapted to spinner flasks and roller bottles can be easily transitioned to Optimum Growth™ Flasks by reducing the shake speeds of the first 1-2 passages (See chart with Minimum Fill Volume Speeds) because spinner flasks and roller bottles have lower shear than shake flasks. Once the cells have adjusted to the flasks, recommended speeds will work well. Additionally, up to 1% of surfactant to the media may be needed.

Why do Optimum Growth™ Flasks work better than other disposable flasks (non-baffled or baffled) for mammalian cell lines (CHO, HEK293, etc.) & insect cell lines (SF-9, SF-21, High Fives, Trichoplusia ni)?

Optimum Growth™ Flasks are disposable shake flasks designed for high aeration and low shear. Optimum Growth™ Flasks achieve high aeration due to a unique baffle design that has been optimized for mammalian and insect cell lines. They provide good gas exchange with low shear mixing, and can increase yields significantly when combined with both nutrient enriched media and proper pH balance.

What clamps and shakers work best with the Optimum Growth™ Flasks?

Optimum Growth™ Flasks are designed to shake in 1" or 2" orbit shakers. Sticky tape or rug gripper pad is recommended for under 170 rpm. Our 125mL, 250mL and 500mL flasks will work with standard shake flask clamps. The 1.6L and 2.8L flasks will need special clamps. The 5L flask will fit a standard 2.8L or 3L Fernbach shake flask clamp.

Are the Optimum Growth™ Flasks single use?

Yes, the Optimum Growth™ Flasks are designed for single use. They are competitively priced compared to disposable bioreactors or shake flasks from other manufacturers. They are NOT autoclavable.

What are the Transfer Caps that go along with the Optimum Growth™ Flasks?

Inversion & Bidirectional Optimum Growth™ Transfer Caps (patented) allow for a quick stress free cell transfer between flask and downstream vessel (Optimum Growth™ Flasks, cell culture bags, bioreactors, etc.). Inversion Transfer Caps simply use the power of gravity to facilitate transfer, thus maintaining higher culture viability than pumping methods. Bidirectional Transfer Caps simply use a standard pump to transfer culture and/or media and come in a wide variety of tubing sizes.

How can you best use media from ThermoFisher such as F17 and its derivatives?

FreeStyle™ F17 Expression Medium contains lower amounts of pluronic than other comparable medium. Cells grown in this media may experience more shear stress due to the lower amount of surfactant. To avoid this, add in additional pluronic (ThermoFisher PN 24040032). The recommended range of pluronic to add is 0.05 gm/L to 0.2 gm/L. Up to 1% simethicone from MilliporeSigma (PN 59920C) can also be used. Either of these methods can work to reduce foaming and restore high culture viability.



Optimum Growth™ 2.8L Flasks fit 12 per shaker



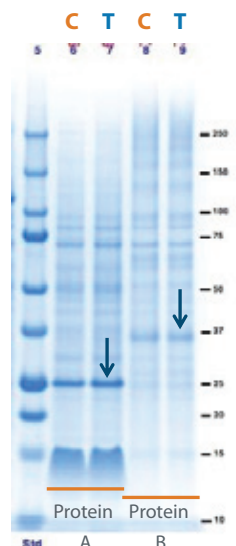
Optimum Growth™ 250mL Flasks with XPICHO & HEK293 Cells in shaker

Thomson Instrument Company is not affiliated with ThermoFisher, MilliporeSigma or their products

Corning® vs Optimum Growth™ Flasks

2 Membrane Proteins Expressed

Data provided by Genentech part of the Roche Group



Corning® – 500mL flask, 200mL culture

Thomson – 250mL flask, 150mL culture

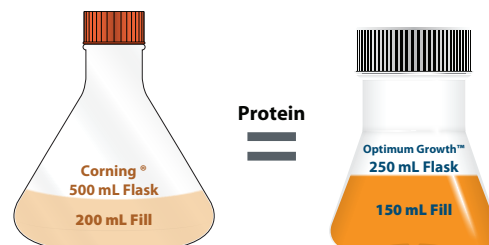
4mL samples purified over Ni NTA

Protein A – Membrane protein of moderate expression, 34kDa

Protein B – Membrane protein of low expression, 45kDa

12µL of elution resolved on a coomassie gel

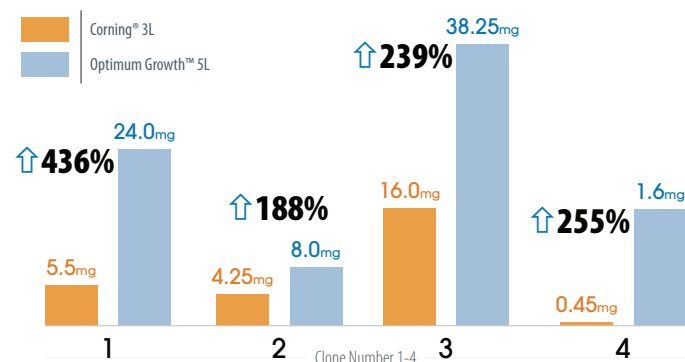
Conclusion: Thomson flasks work at least as good as Corning® standard.
Improved working volume / flask volume ratio when using Thomson.



214% Yield Increase From Insect Cells

Protein Production/Flask

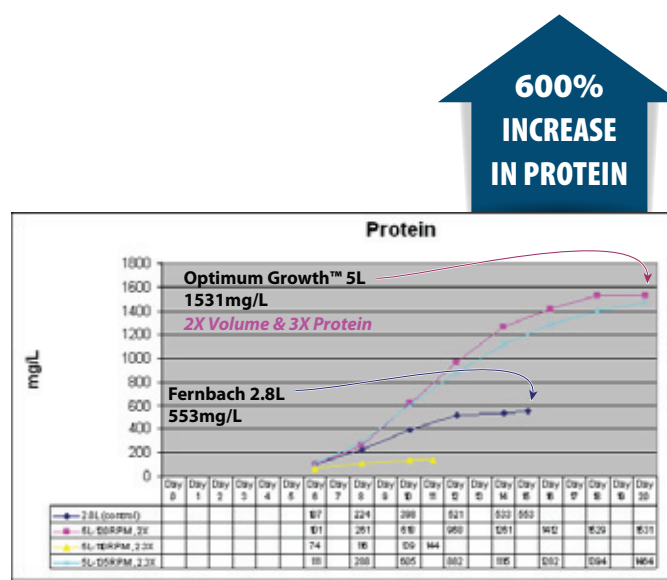
Data supplied by New York Structural Genomics Research Consortium



Same Footprint-Double Volume

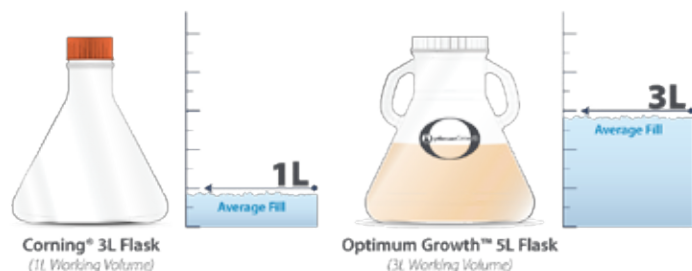
Optimum Growth™ 5L (3L Media)

vs Nalgene® Nunc 2.8L (1.5L Media)



Thomson Instrument Company is not affiliated with Corning Life Sciences®, Nalgene Nunc®, Genentech, NYSGR or their products.

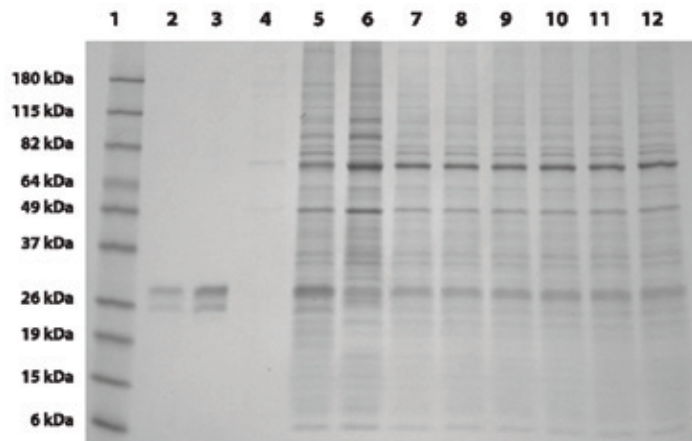
High & Low Expressing Proteins in HEK293 Cells



Low Expressing Gel

This gel shows equal bands from 5 replicates of a low expressing protein, producing roughly 10 to 20 mg/L.

1. Benchmark Pre-Stained Protein Ladder
2. Purified protein, 100 ng control
3. Purified protein, 200ng control
4. Untransfected cells, -ve control
5. +ve control
6. +ve control
7. Protein of interest, 5L Combined Flasks #1-5
8. Protein of interest, 5L Flask #1
9. Protein of interest, 5L Flask #2
10. Protein of interest, 5L Flask #3
11. Protein of interest, 5L Flask #4
12. Protein of interest, 5L Flask #5

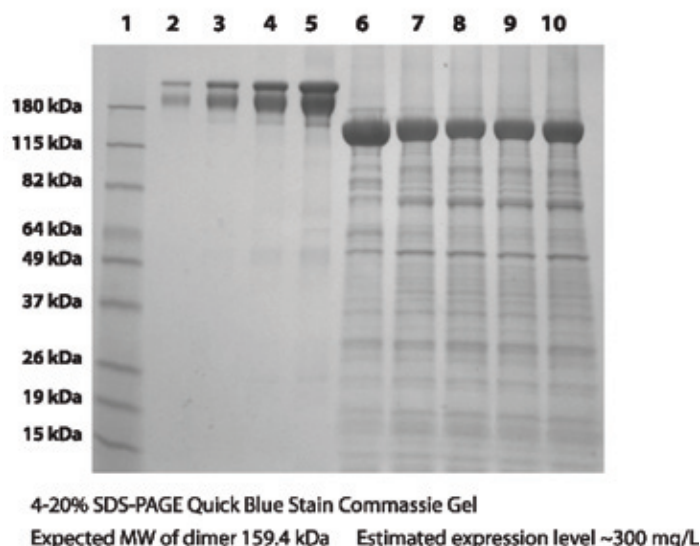


4-20% SDS-PAGE Quick Blue Stain Commassie Gel
Expected MW of dimer 24.5 kDa Estimated expression level ~10-20 mg/L

High Expressing Gel

Thomson 5L flasks are consistently able to maximize production of your best expressers. This gel shows equal bands from 3 replicates of a high expressing protein, producing approximately 300 mg/L.

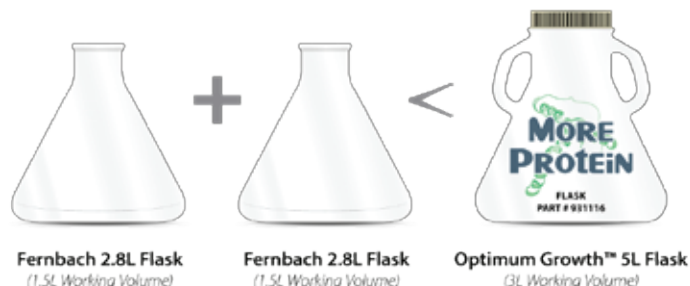
1. Benchmark Pre-Stained Protein Ladder
2. Purified mAb 100 ng control
3. Purified mAb 250 ng control
4. Purified mAb 500 ng control
5. Purified mAb 1000 ng control
6. +ve control
7. Protein of interest, 5L Flask #1
8. Protein of interest, 5L Flask #2
9. Protein of interest, 5L Flask #3
10. Protein of interest, 5L Combined Flasks #1-3



Conclusion

Thomson Optimum Growth™ Flasks not only ensure consistent expression from Hek293 strains, they can also increase shaker capacity. With the same footprint as a typical Corning® 3L flask and a culture volume of up to 3L, the Optimum Growth™ 5L Flask may increase production 200%, if not more, in the same space (this is construct dependent).

Most constructs express at higher levels in the Optimum Growth™ 5L flasks. This makes one Optimum Growth™ 5L equivalent to, if not greater than, two 3L flasks.



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