



OptimumGrowth™

FLASKS

PATENTED

Capacity:

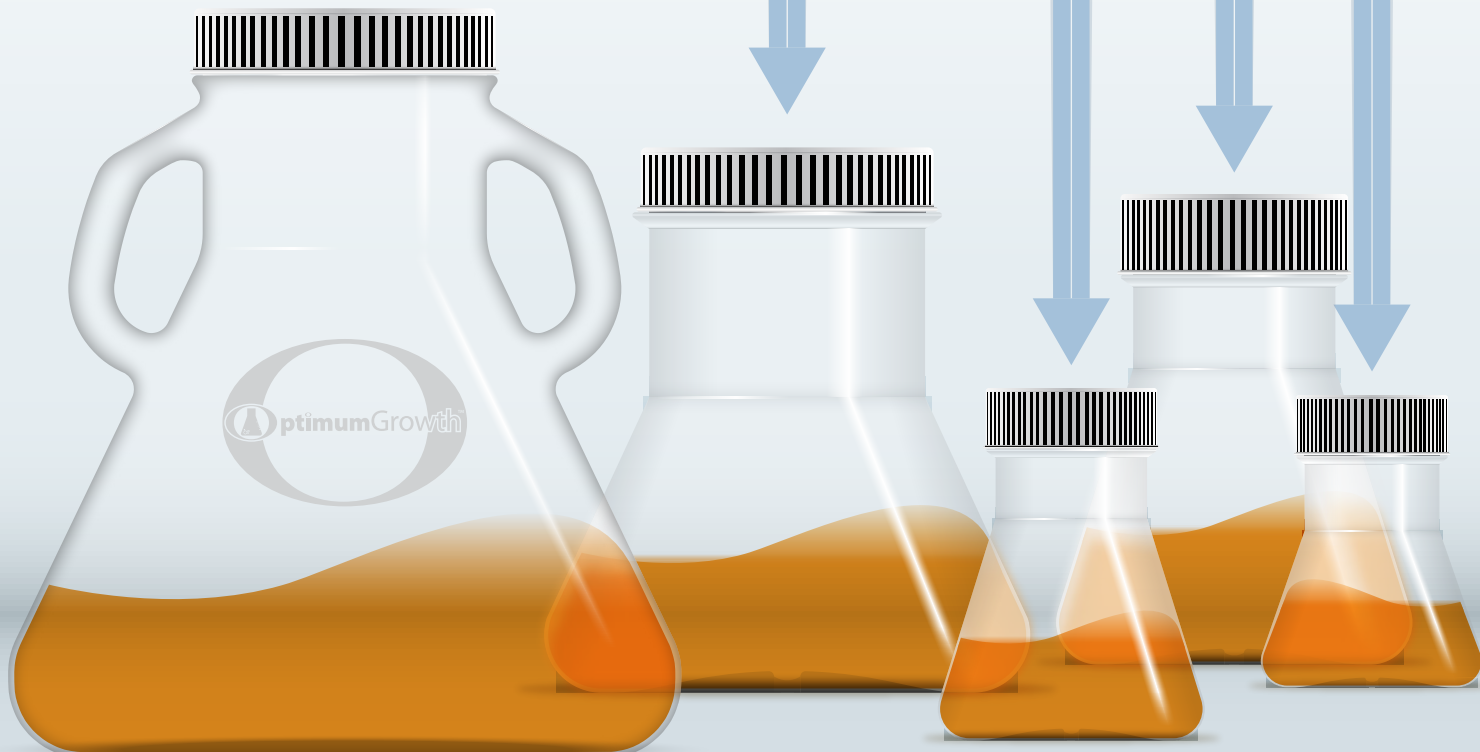
5L

1.6L

250mL

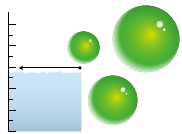
500mL

125mL



KEY FEATURES

- Baffles designed for High Aeration & Low Shear
- Same Footprint as Comparable Fernbach Flask
- Less Foaming than Disposable Fernbach
- Transfer Cap connects directly to Wave Bags™ & bioreactors with Quick Connect or tube fusing
- .2 µm Vented Cap
- Individually Packaged and Sterilized



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
5L	2.0L-3.0L	120 / 90

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
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
5L	1.5L	80 / 60

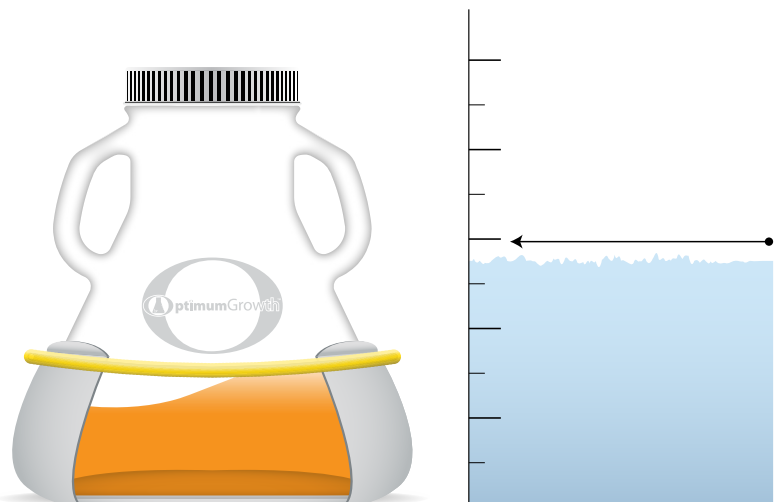
Microbes/E.coli

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
5L	2.0L-3.0L	250 / 150

Minimum Fill Volume (CHO Stable Cells, CHO Transient, HEK 293 Transient)

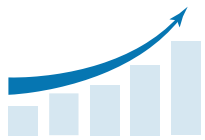
Flask Size	Minimum Fill Volume	*RPM in 1"/2"
125mL	24mL	120 / 90
250mL	50 mL	120 / 90
500mL	100mL	120 / 90
1.6L	400mL	100 / 80
5L	1.2L	90 / 70

* Shake speed for 1" orbit / 2" orbit (RPM)



OPTIMUM GROWTH™ FLASKS

Thomson's Optimum Growth™ Flasks (patented) give excellent growth and expression for both mammalian and insect cell lines. The Optimum Growth™ Flasks give high viability cultures in a range of flask sizes. The unique low shear baffles provide excellent aeration, allowing for increased fill volumes (up to 60%) compared to the standard 30% in other flasks. The flasks also support healthier cells, leading to an increase in secreted and membrane proteins, antibodies, etc. Optimum Growth Flasks increase protein production generated from insect cells by 200%. We have also seen a 300% increase in some stable and transient cell lines. The increased fill volume coupled with the increased production per volume can drastically decrease flask numbers and media needs. The Optimum Growth™ Flasks also have great reproducibility, showing consistent growth and production from run to run.



Scalability

Scalable for Insect & Mammalian Cells

5L
↑
1.6L
↑
500mL
↑
250mL
↑
125mL

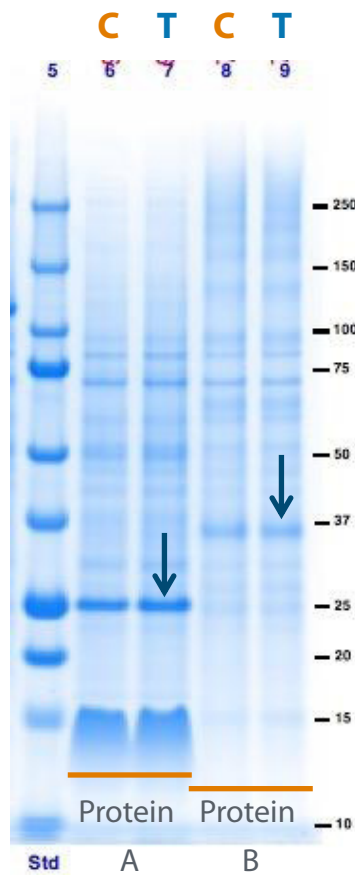


Data Provided by:

Genentech
A Member of the Roche Group

Data for 125-500 mL Flasks

2 Membrane Proteins Expressed in Corning® & Thomson Optimum Growth™ Flasks



Corning® – 500ml flask, 200ml culture

Thomson – 250ml flask, 150ml culture

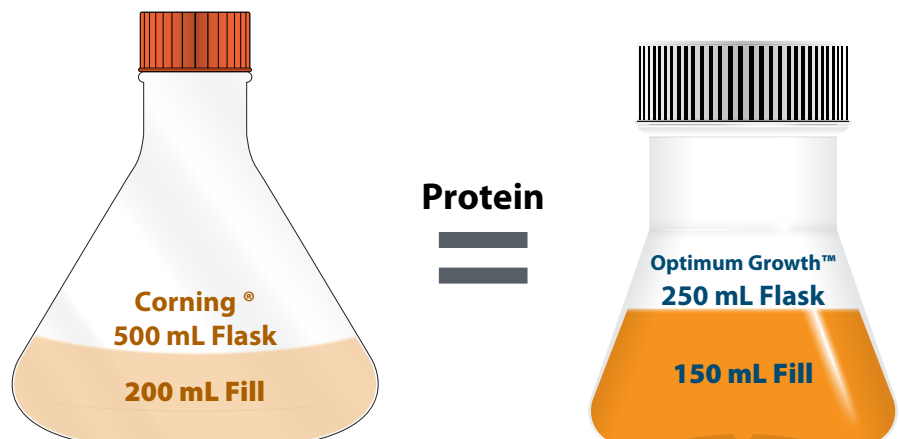
4ml samples purified over Ni NTA

Protein A – Membrane protein of moderate expression, 34kd

Protein B – Membrane protein of low expression, 45kd

12ul of elution resolved on a coomassie gel

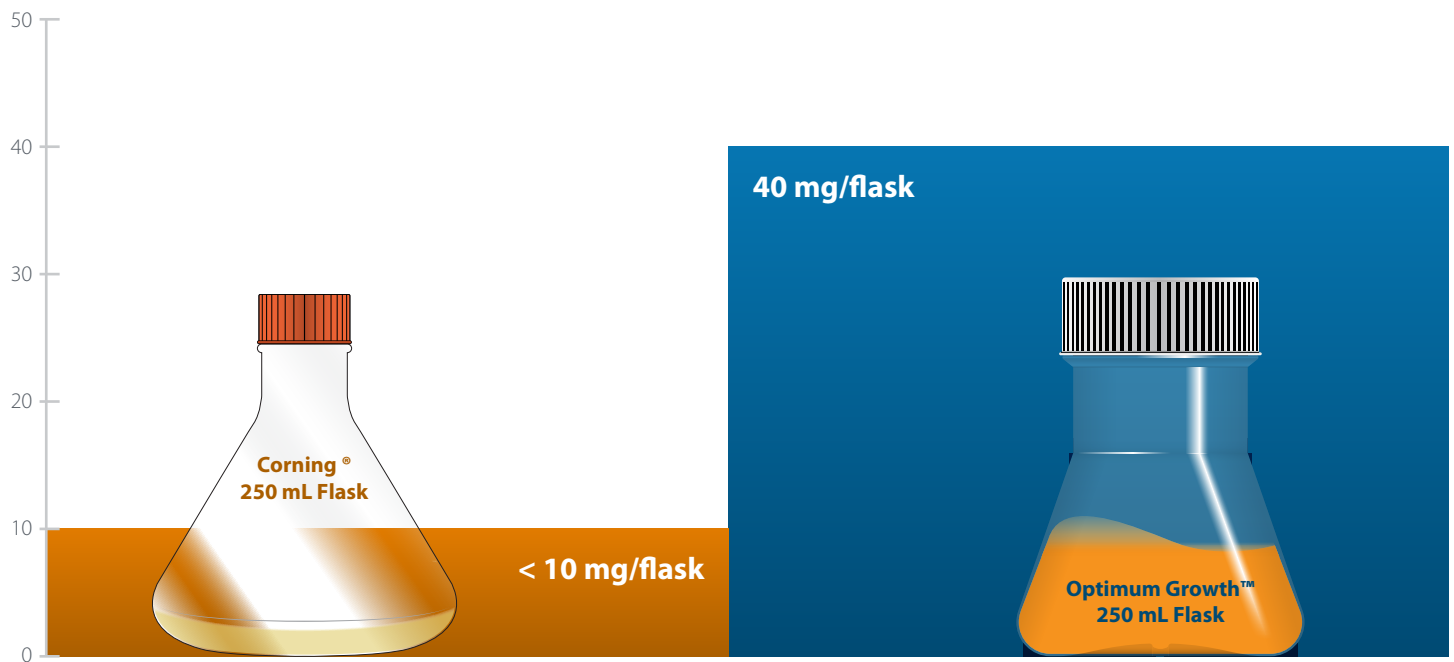
Conclusion: Thomson flasks work at least as good as Corning® standard.
Improved working volume / flask volume ratio when using Thomson.



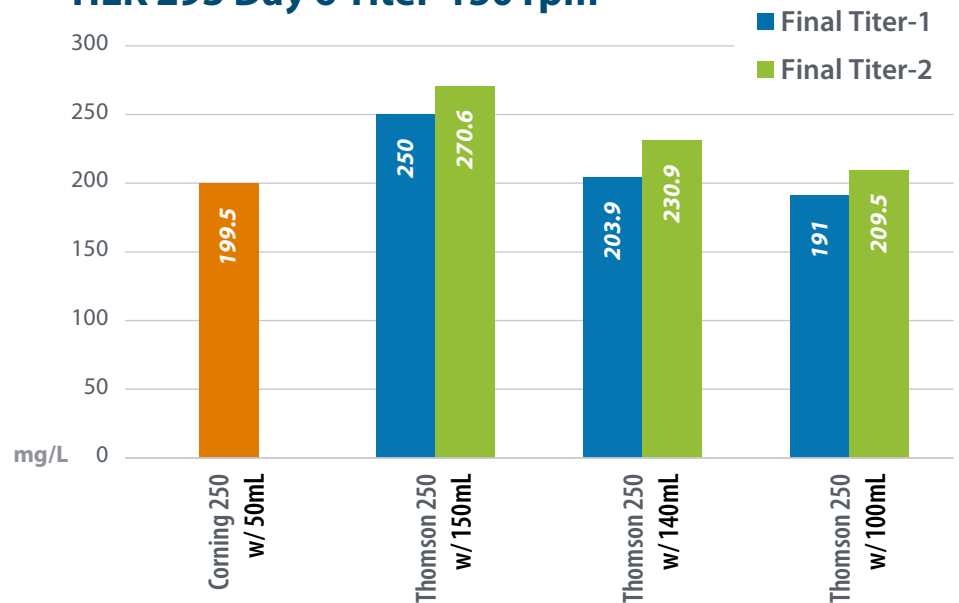
Media: Gibco/Life Technologies

Transfection Agent: Transfection complex was F17 no additives

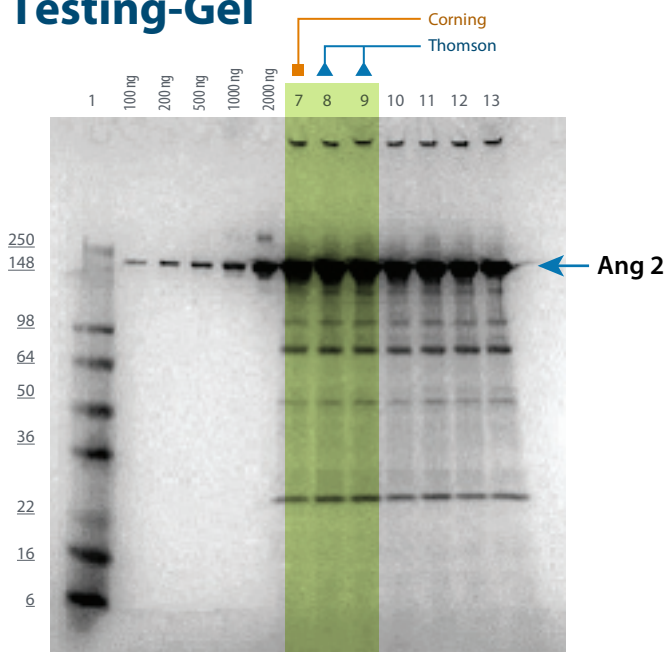
PEI Max. Feed Schedule: Glucose feed on day 3



HEK 293 Day 6 Titer-150 rpm



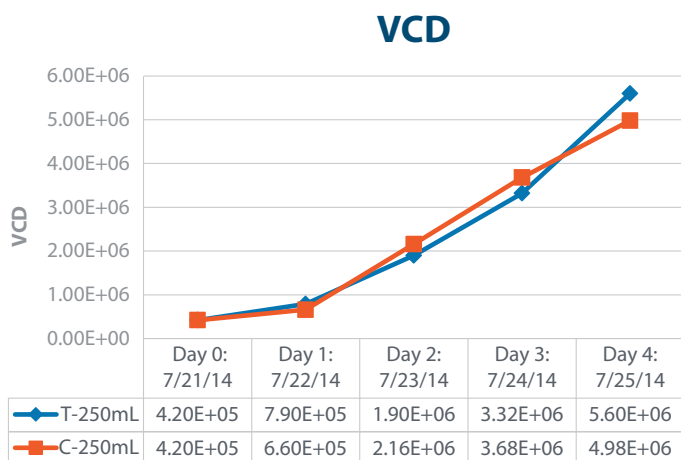
HEK 293 Thomson 250mL Flask Testing-Gel



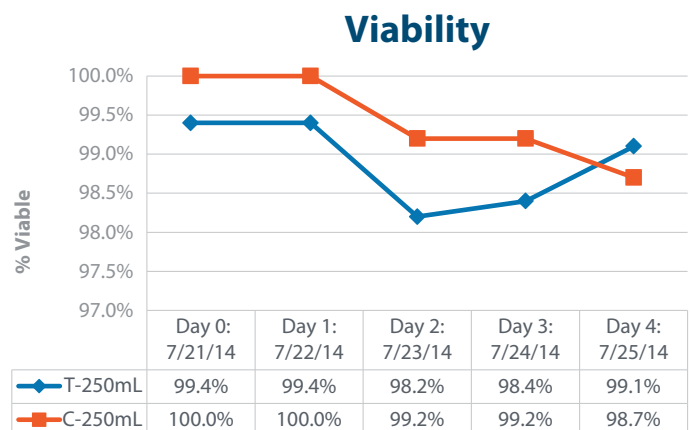
Samples 5 µl:

1. SeeBlue Plus2
2. aDNP; 100 ng
3. aDNP; 250 ng
4. aDNP; 500 ng
5. aDNP; 1000 ng
6. aDNP; 2000 ng
7. ■ Control-50 mL Ang2 (Corning 250 mL flask)
8. ▲ Thomson 250 mL (150 mL volume #1)
9. ▲ Thomson 250 mL (150 mL volume #2)
10. Thomson 250 mL (140 mL volume #1)
11. Thomson 250 mL (140 mL volume #2)
12. Thomson 250 mL (100 mL volume #1)
13. Thomson 250 mL (100 mL volume #2)

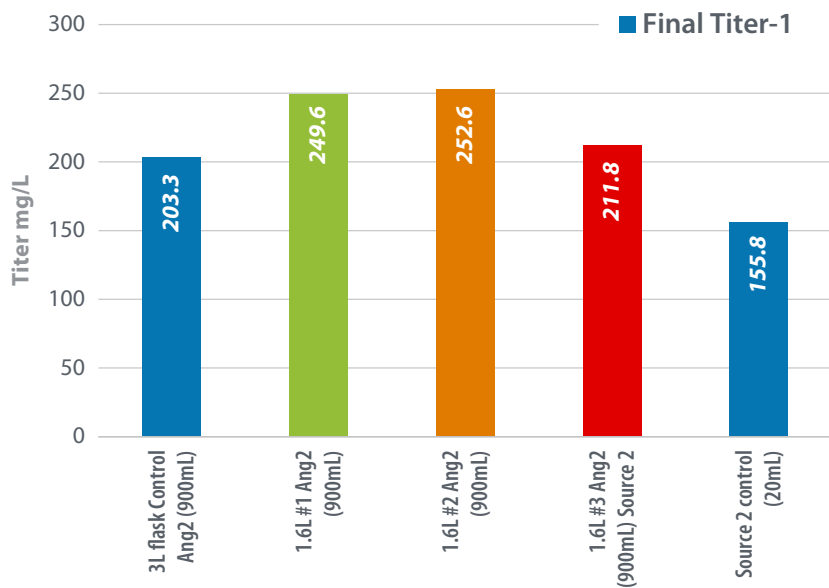
HEK 293 Thomson 250mL Flask Testing-Growth Test



Thompson 250mL flask = 140mL | Corning 250mL=50mL



Data for 1.6 L Flasks

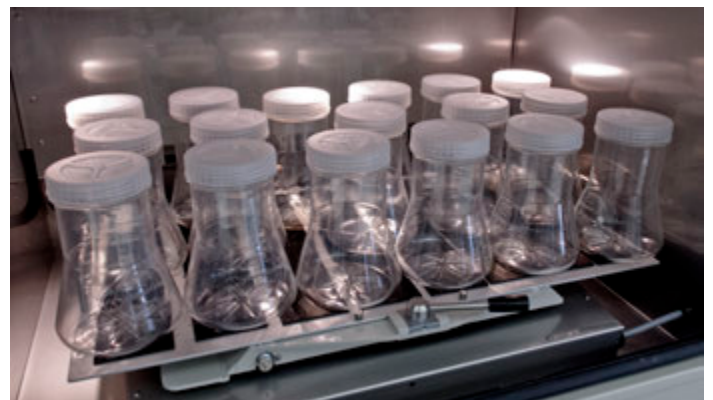


1.6L Thomson Flask Final Titer Analysis-HEK 293

*HEK-293 cells for the 1.6L#1 and #2 flask came from source flask #1. Cells from 1.6L#3 came from source flask #2.

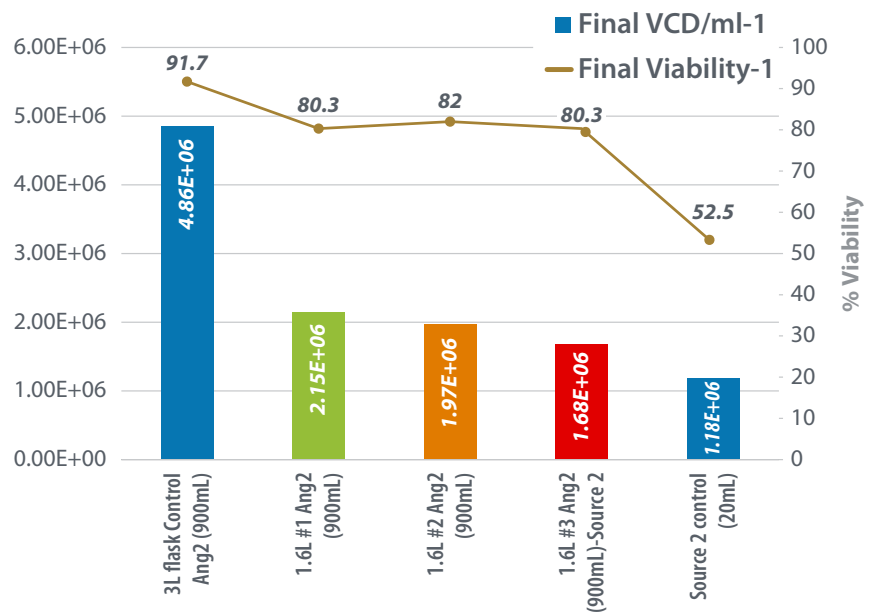


6 x Corning[®] 3L
Total Volume 6L/Shaker

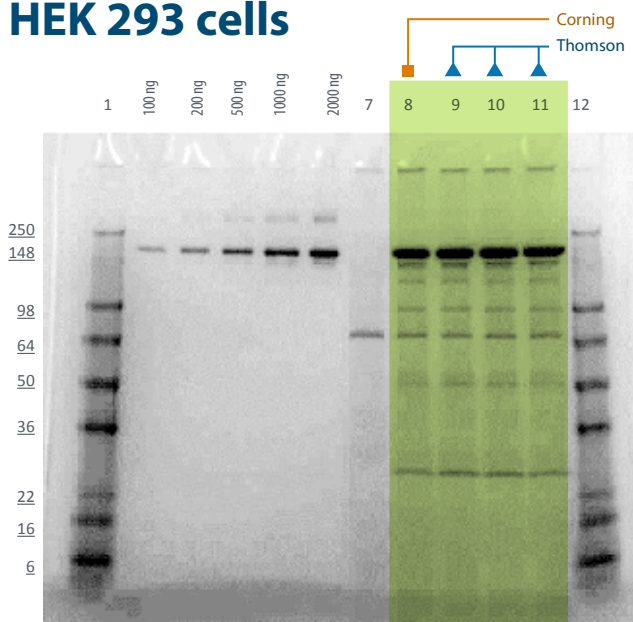


17 x Optimum Growth[™] 1.6L
Total Volume 15L/Shaker

1.6L Thomson Flask Day 6 Final Growth Characteristics-HEK 293



Thomson 1.6L Flask D6-Gel HEK 293 cells



Samples 5µl:

1. SeeBlue Plus2
2. aDNP; 100ng
3. aDNP; 250ng
4. aDNP; 500ng
5. aDNP; 1000ng
6. aDNP; 2000ng
7. Mock 293-6E-pTT5
8. ■ Control- 900mL in 3L Corning shake flask
9. ▲ 1.6L Thomson #1-900mL
10. ▲ 1.6L Thomson #2-900mL
11. ▲ 1.6L Thomson #3-900mL
12. SeeBlue Plus2

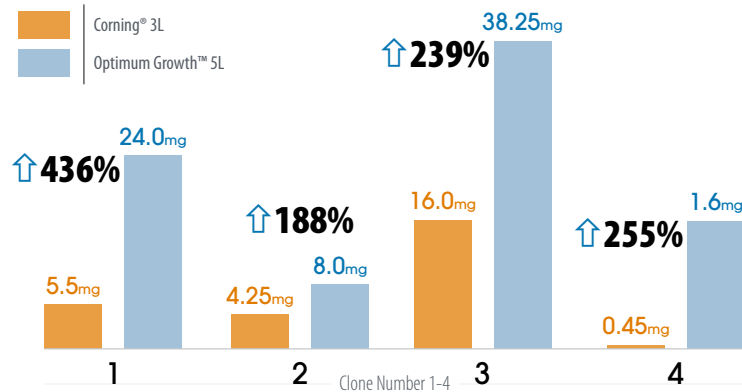
OPTIMUM GROWTH™ FLASKS

Thomson's Optimum Growth™ Flasks (patented) allow enhanced growth and use a smaller footprint. Optimum Growth™ 5L Flask users are able to grow 3L of Cell Culture compared to previous methods which had a capacity of 1L.

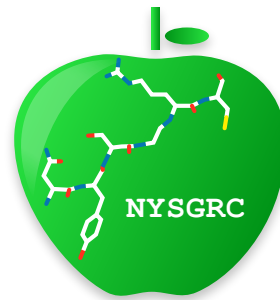
The Optimum Growth™ Flasks have replaced expensive, disposable, Fernbach flasks and also small Wave Bags™ (5L & 10L). The Optimum Growth™ Flasks give high viability cultures with a minimal footprint. The Transfer Caps (patented) allow scientists to inoculate larger cultures directly from the Optimum Growth™ Flasks.

Data for 5 L Flasks

214% Yield Increase From Insect Cells Protein Production/Flask

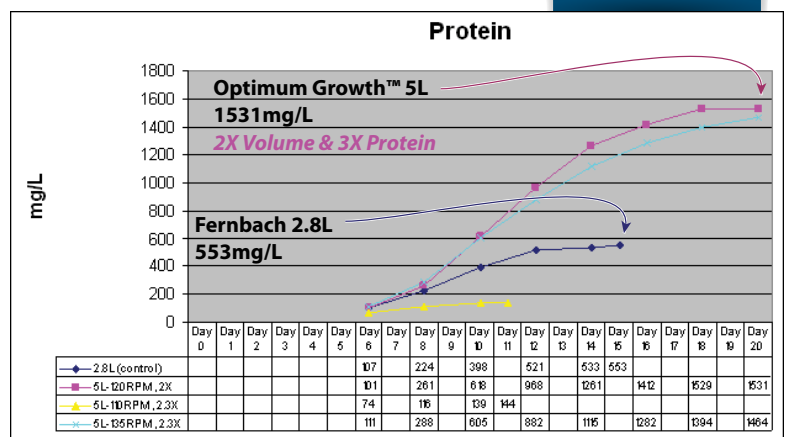
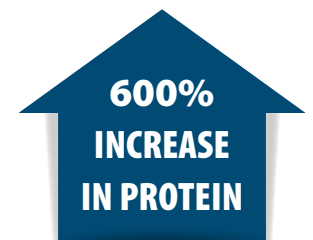


Data Provided by:



New York
Structural Genomics
Research Consortium

Same Footprint Double Volume Optimum Growth™ 5L (3L Media) vs Nalgene Nunc® 2.8L (1.5L Media)



Optimum Growth™ Flask | FAQs

What have people done successfully to change vessels from Spinner flasks, Roller bottles to Optimum Growth™ Flasks?

Optimum Growth™ Flasks (patented) will be a new vessel for cells adapted to Spinner Flasks and Roller Bottles. Adjusting from Spinner Flasks and Roller Bottles may take lower speeds (See chart with Minimum Fill Volume Speeds on page 2) for the first 1-2 passages (cell dependent), and may need up to 1% addition of surfactant (pluronic (Life Technologies PN 24040032) or Sigma Simethicone (PN 59920C)) to the media. Spinner Flasks and Roller Bottles have a lower shear than shake flasks. Once the cells have adjusted to the flasks normal speeds will work.

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, ti.ni*)?

Optimum Growth™ Flasks (patented) are disposable, high aeration shake flasks designed for low shear. Optimum Growth™ Flasks achieve high aeration with a special baffle design that has been optimized for fermentation of mammalian and insect cell lines. They provide good airlift with low shear mixing, and when combined with both nutrient enriched media and proper pH balance yield can increase significantly.

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

Optimum Growth™ Flasks are designed to shake in 1 inch or 2" orbit shakers. Sticky tape is recommended for under 170 RPM. Our 125mL, 250mL and 500mL will work with standard shake flask clamps. The 5L can take a standard 2.8L or 3L fernbach shake flask clamp. **Make sure your shaker has CO₂ and humidity for best results.**

Are the Optimum Growth™ Flasks single use?

Yes, the Optimum Growth™ Flasks are single use. They are competitively priced to a disposable bioreactor or disposable shake flask. They are NOT able to be autoclaved. With labor being around \$100.00/per hour, does really make sense to reuse a product?

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

Optimum Growth Transfer Caps (patented) allow for a quick stress free cell transfer between flask and downstream vessel (cell bag, Wave bag®, Celligen® bioreactor, Applikon® bioreactor, etc.). Transfer caps simply use the power of gravity to facilitate transfer, thus maintaining higher culture viability than pumping methods. Transfer caps come in a quick connect or tube fusing options. Please see the website htslabs.com for more details.

When seeing high cell death and a large amount of foam, what is causing this? High cell clumping issues?

Cell death and foaming in the Optimum Growth flasks is most frequently due to cell shearing. This is caused by a lack of surfactant or anti-foam in the media.

Are you using F17™, EXPI™ Media from Invitrogen-Life Technologies®?

F17™ & EXPI™ medium contain lower amount of pluronic than other comparable medias, for example FreeStyle 293 expression media™. The cells may experience more shear stress. Alternatively, you can add in more pluronic (Life Technologies PN 24040032). Range of Pluronic to add would be between 0.05 gm/L to 0.2 gm/L. 1% simethicone from Sigma (PN 59920C) can also be used. Either of these methods can work to reduce foaming and restore high culture viability.

What can I do if the doubling time for my cell culture is longer than expected when using the Optimum Growth™ Flasks?

This varies between cell types and strains, as well as with environmental conditions. If the doubling time for your culture is taking longer than expected or desired in the Thomson Optimum Growth™ Flasks we recommend increasing your shake speed beyond our recommended speeds by 10 to 20 rpms/minute with 1" or 2" orbit shakers. The reason is the OTR transfer rate maybe lower with the higher amount of media per flask, and the increase in speed will compensate for this.

Sticky Pad is hard to get off the flasks, what do we do?

The sticky pads from Infors/Kuhner are known for sticking too well for the flasks. Some suggestions from people who find it too sticky:

1. Spray ethanol on the sticky pad or spray down the sticky pad with ethanol until you reach the stickiness you would like. Ethanol will lower the bonding strength, as will any alcohol.
2. Some people use rug pads on top of the sticky tape: See: Sears, Bed Bath and Beyond, or rug store.

NOTES:

Solutions At Work™

THOMSON
INSTRUMENT COMPANY

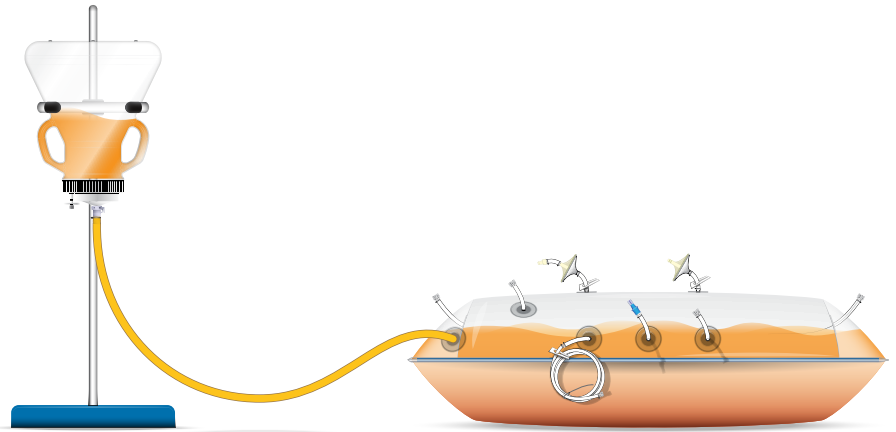
TRANSFER CAP

The Optimum Growth™ Transfer Caps (*patented*) Sterile, allow for a simple aseptic transfer of media or cells to cell bags, bioreactors, and flasks of all makes. Optimum Growth™ Transfer Caps (*patented*) come in two different styles; Inversion (*Quick Transfer*) and the Bidirectional pump cap with downstem (*metered transfer and requires a peristaltic pump*).

The Optimum Growth Flasks come in our popular 5L size and now 125ml, 250ml, 500ml (coming soon) and 1.6L. Transfer Caps will be available for all flask sizes.

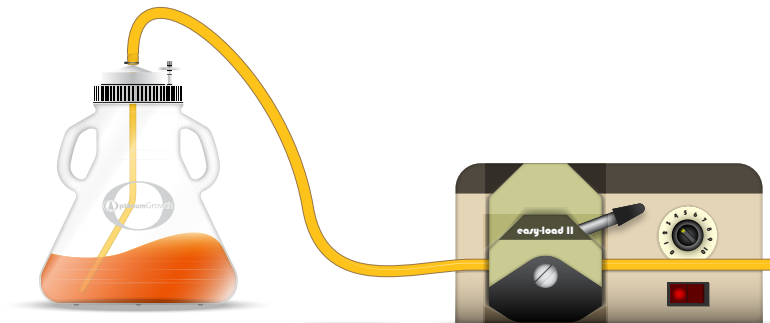
Transfer by Inversion Transfer Cap:

The Inversion Transfer Cap works with the Thomson Optimum Growth™ Flask (*patented*) product line. Simply, replace the culture cap with the Transfer Cap and connect to your vessel of choice. To begin transfer, just invert the Optimum Growth™ flask and let gravity do the rest.



Transfer by Bidirectional Transfer Cap with downstem:

The Bidirectional Transfer Cap with downstem works with the Thomson Optimum Growth™ Flask (*patented*) product line. Simply, replace the culture cap with the Transfer Cap and connect to your vessel of choice and place peristaltic pump between.



Part #	Description	Qty/Case
931110	Optimum Growth™ 125mL Flask Sterile Patented	50
931111	Optimum Growth™ 250mL Flask Sterile Patented	50
931112	Optimum Growth™ 500mL Flask Sterile Patented	25
931113	Optimum Growth™ 1.6 L Flask Sterile Patented	12
931116	Optimum Growth™ 5L Flask Sterile Use with Transfer Cap Patented	4
931116-Port	Optimum Growth™ 5L Flask Sterile w/Port Patented	4



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