THOMSON Solutions ™ At Work
INSTRUMENT COMPANY

KRISHGEN BioSystems
OUR REAGENTS, YOUR RESEARCH

Optimum Growth® Flasks

SCALABLE FROM 125ML UP TO 5L

Thomson Optimum Growth® Flasks (patented) for mammalian and insect cell culture come in multiple sizes of 125mL, 250mL, 500mL, 1.6L, 2.8L and our popular 5L.They are superior to traditional shake flasks due in part to the fact that they support a 50 -60% fill volume versus 33% fill volume making your shake cabinet a much more efficient space.

- Baffles designed for high aeration and low shear to maintain cell viability
- Same footprint as comparable Fernbach flask but with a 50-60% fill volume
- Less foaming than disposable Fernbach potentially eliminates additives
- 0.2µm Vented Cap simultaneously maintains high gas exchange and sterility
- Transfer cap option connects directly to cell bags or bioreactors with multiple connection options
- Scalability from 125mL up to 5L lets you mix and match different flask sizes in your shaker greatly improving space efficiency
- Individually packaged and sterilized for immediate use

Optimum Growth® 125mL Flask

PTFE 0.2µm Vent Cap for Increased Aeration | Sterile
Scale Consistently Across All Sizes

Optimum Growth® 250mL Flask

PTFE 0.2µm Vent Cap for Increased Aeration | Sterile
Scale Consistently Across All Sizes

Optimum Growth® 500mL Flask

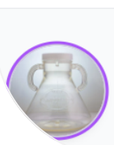
PTFE 0.2µm Vent Cap for Increased Aeration | Sterile
Scale Consistently Across All Sizes

Optimum Growth® 1.6L Flask

PTFE 0.2µm Vent Cap for Increased Aeration | Sterile
Scale Consistently Across All Sizes | Transfer Caps Available

Optimum Growth® 2.8L Flask

PTFE 0.2µm Vent Cap for Increased Aeration | Sterile
Scale Consistently Across All Sizes | Transfer Caps Available



Optimum Growth® 5L Flask

PTFE 0.2µm Vent Cap for Increased Aeration | Sterile
Scale Consistently Across All Sizes | Transfer Caps Availabl

All Sizes Shake At The SAME Optimal Shake Speed

MAXIMIZE SHAKER SPACE EFFICIENCY

Thomson Optimum Growth® Flasks in all sizes shaking at an optimal shake speed of 120 rpm on a 1" (2.54cm) throw shake platform.

Note: that virtually every square inch of platform space is utilized

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Cell Culture Solutions

Optimum Growth® System

Designed for mammalian and insect cell culture, superior to traditional shake flasks making shake cabinets a much more efficient space in the lab.

SHAKE FLASKS

Designed for mammalian and insect cell culture, superior to traditional shake flasks making shake cabinets a much more efficient space in the lab.

SPECIAL FLASKS

Thomson Optimum Growth® Special Flasks were designed with the unique needs of small-to-medium-scale bioprocessing applications

TRANSFER CAPS

Eliminates intermediate vessels for scale up & seed cultures

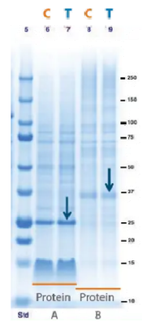
RAPID CLEAR® CAP

Quickly and efficiently clarify cell culture media directly from the Thomson 5L Optimum Growth® shaker flask without the need for centrifugation

See why Thomson Flasks are a better option than Corning Flasks.

- **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 Optimum Growth® flasks are equivalent to Corning® standard flasks in terms of expressed protein purity but with a 50-60% fill volume Optimum Growth® flasks generate a far greater total yield/flask.



Protein

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Space Saving More Volume

OPTIMUM GROWTH® FLASKS GIVE EXCELLENT GROWTH WITH SPACE SAVING CAPABILITY.

18x1.6L Optimum Growth Flasks
Total Volume

12x2.8L Optimum Growth Flasks
Total Volume

6x3L Corning Flasks
Total Volume

Optimum Growth® Special Flask

Thomson Optimum Growth® Special Flasks were designed with the unique needs of small-to-medium-scale bioprocessing applications

SAMPLING FLASKS

Optimum Growth® Sample Flasks with one-way sampling valves that help reduce viable cell count sampling times

- ✓ Eliminate the need to remove flask caps & allow aseptic sampling on the benchtop

MULTIPORT FLASKS

Optimum Growth® Multiport Flasks serve as closed systems with feed/transfer ports

- ✓ Feature feed/transfer ports for seeding larger bioreactors or for batch feeding medium sized cultures
- ✓ Both aseptic sampling valves & feed/transfer ports making the 1.6L and 5L flasks closed systems

Multiport Optimum Growth®

TRANSFER & FEED FLASKS

The Multiport Optimum Growth® Flask was born out of the need for biopharmaceutical companies to ensure the elimination of contamination risk. The multiport flasks allows for completely closed system aseptic processing.

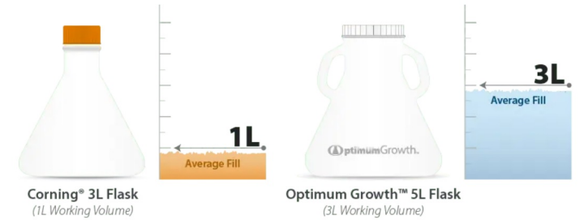
1. Addition of media to the flask
2. Inoculation
3. Feeding
4. Sampling

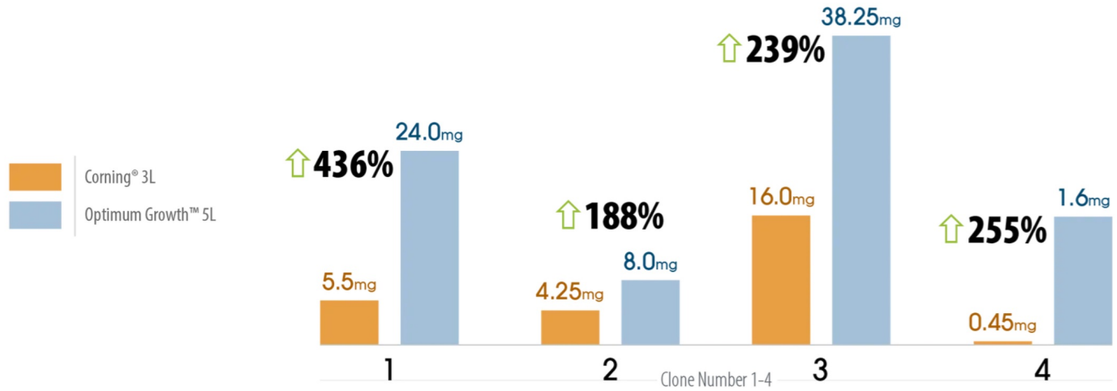
214% Yield Increase From Insect Cells

PROTEIN PRODUCTION/FLASK

Data supplied by New York Structural Genomics Research Consortium

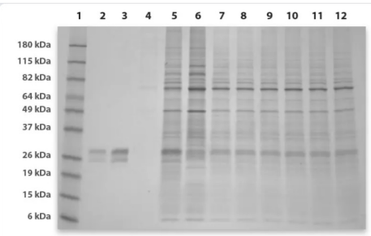
Four insect cell line clones cultured in Thomson 5L Optimum Growth® flasks and Corning 3L shake flasks. In the figure below note the consistently higher protein yield with Optimum Growth® flasks over Corning. Each flask has the same footprint but flasks operate with 3x higher fill volume (illustrated in the figure at right).





Consistent Expression From HEK293 Strains

THOMSON 5L FLASKS CONSISTENTLY MAXIMIZE PRODUCTION OF YOUR BEST EXPRESSERS



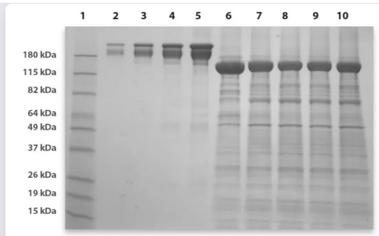
4-20% SDS-PAGE Quick Blue Stain Commassie Gel Expected MW of dimer 24.5 kDa Estimated expression level ~10-20 mg/L

LOW EXPRESSING GEL

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

GEL KEY

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 159.4 kDa Estimated expression level ~300 mg/L

HIGH EXPRESSING GEL

This gel shows equal bands from 3 replicates of a high expressing protein, producing approximately 300 mg/L.

GEL KEY

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:

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.