



Cell Culture Media
and Buffers

Simplifying Progress

SARTORIUS

4Cell® XtraCHO Media System

Large Scale: Media System
for Protein Production
Using CHO Systems

Benefits

Use of production media and feeding supplements helps satisfying cell culture requirement using different approaches conditions. Recommended protocols facilitate easy and efficient identification of a feeding strategy.

- **Production Efficacy:** Ideal from bench scale to manufacturing
- **Compliance with Regulatory Guidelines:** Eliminate process variability and contamination risks
- **Consistency and Traceability:** Fully chemically defined medium
- **Reduce Process Complexity:** Simplified purification



Product Information

The Starting Kit of the 4Cell® XtraCHO Media System includes all the necessary media components from adapting the cells to fed-batch production at a cultivation volume of 3L. For larger volumes all individual system components are available in different formats, in liquid and powder.

Stock & Adaptation Medium: It allows the cultivation or media adaptation of cells. Lacking certain metabolites, the cultivation media exerts a strong selection pressure on cells and shortens the time consuming adaptation to fed batch culture.

Production Medium: It is a non-selective production medium for batch or for batch culture. It can be used for effective cultivation of recombinant CHO DG44 cells, this media helps produce high yield of the active protein.

Feed Medium A and Feed Medium B: Both feed additives are especially matched to the production medium. Combining those increases fed-batch productivity 3- to 5-fold compared to batch culture conditions.

Applications

Protein and mAb production in DHFR deficient CHO DG44 cell lines and other CHO cell lines.

Features of the Standard Product



Technical Data

Specifications

Media Type	Chemically-defined medium: does not contain serum or undefined components
Easy-to-use	Adaptation, production and feeds all designed to work together
Cell Line	Developed for CHO DG44 cells and works also with other CHO-Systems
Storage Condition	2–8°C, protect from light
Shelf Life	15 months from date of manufacture

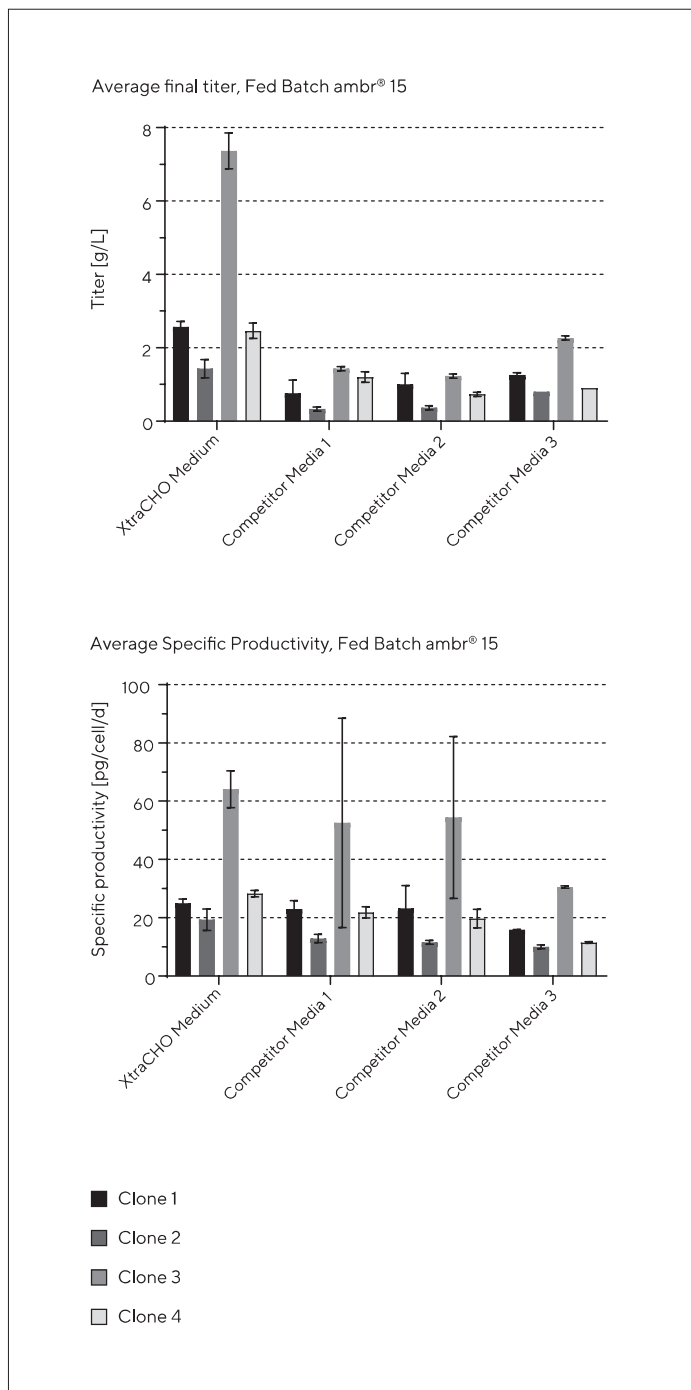
Features of the Standard Product

- CD Chemically Defined:** The exact concentration and size of every component is known
- NAO Non-Animal Origin:** the formulation is entirely made from non-animal | -human origin components
- PF Protein-free:** the formulation does not contain any protein
- FFM For research or for further manufacturing use**
- Product available in powder format
- Product available in liquid format

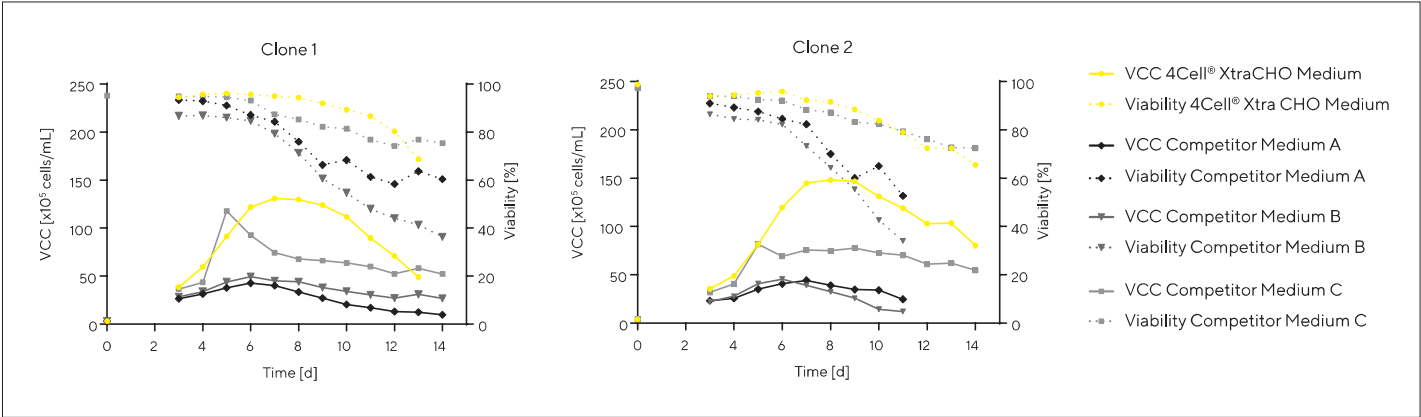
Performance

High product titer processes by maintaining high cell viability and high cell density throughout 14 days cultivation

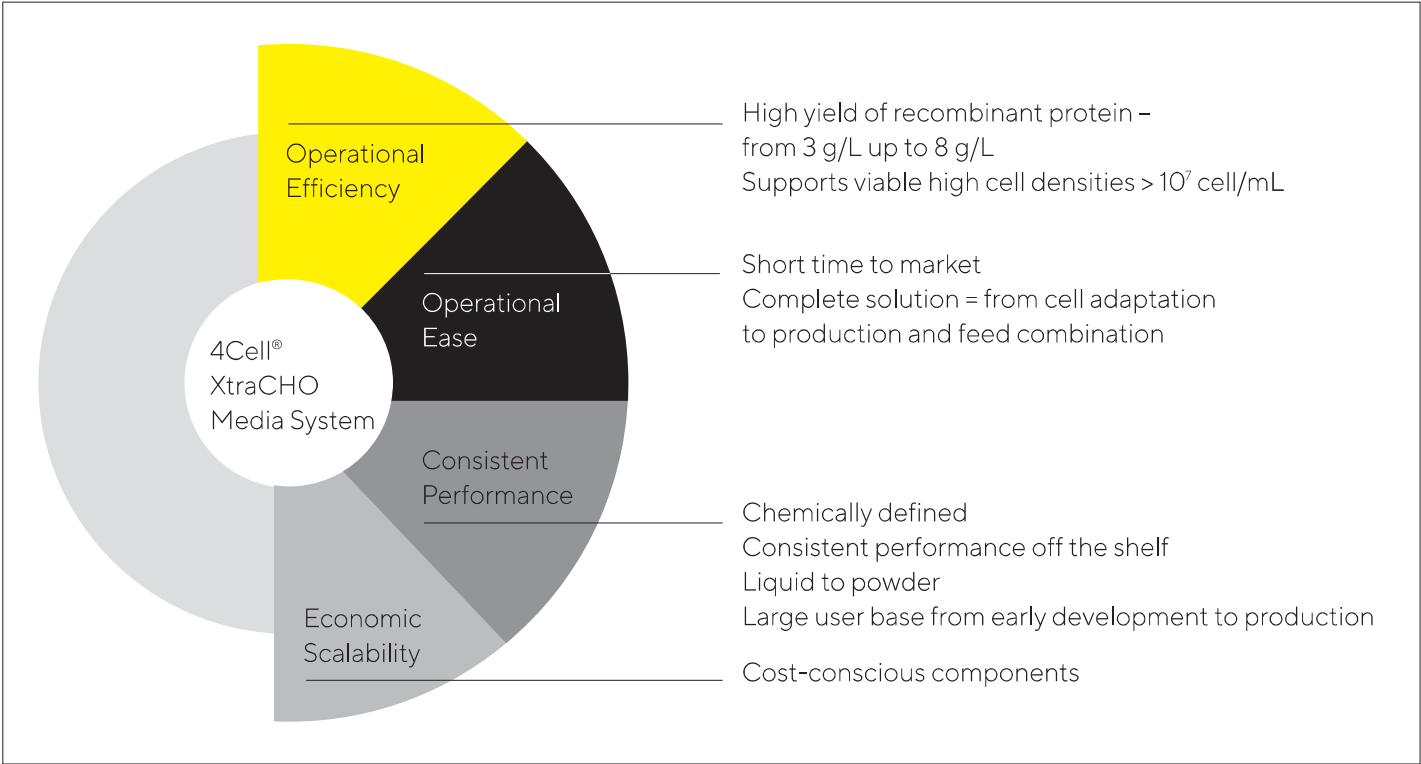
ambr® 15 Titer and specific productivity of 4 CHO DG44 Clones in XtraCHO Media System and 3 media of competitors in fed-batch mode



ambr[®] 250 Viable cell Concentration and Viability of 2 CHO DG44 Clones in 4Cell[®] XtraCHO Media System and 3 media of competitors in fed-batch mode



Your Benefits at a Glance



Ordering Information*

Description	Form	Package	Volume Size	Order Code
4Cell® XtraCHO Media System Starting Kit	Liquid	Bottle	125–1000 mL Kit (up to 3 L fed-batch)	CFP3FA0200
4Cell® XtraCHO Stock & Adaptation Medium (SAM)	Liquid	Bottle	1000 mL 2 units	CFP3FA1201
	Liquid	Bottle	1000 mL 6 units	CFP3FA1206
	Liquid	Bag	5 L 2 units	CFP3FA1101
	Powder	Bucket	3 L [60g] 1 unit	CQP3FA1114
	Powder	Bucket	15 L [300g] 1 unit	CQP3FA1113
	Powder	Bucket	25L [510g] 1 unit	CQP3FA1135
	Powder	Bucket	250L [5050g] 1 unit	CQP3FA1136
4Cell® XtraCHO Production Medium (PM)	Liquid	Bottle	1000 mL 2 units	CFP3FA2202
	Liquid	Bottle	1000 mL 6 units	CFP3FA2207
	Liquid	Bag	5 L 2 units	CFP3FA2104
	Liquid	Bag	20 L 1 unit	CFP3FA2105
	Powder	Bucket	6 L [135g] 1 unit	CQP3FA2115
	Powder	Bucket	30 L [670g] 1 unit	CQP3FA2116
	Powder	Bucket	200 L [4500g] 1 unit	CQP3FA2138
4Cell® XtraCHO Feed Medium A (FMA)	Liquid	Bottle	1000 mL 2 units	CFP3FA3203
	Liquid	Bottle	1000 mL 6 units	CFP3FA3208
	Liquid	Bag	5 L 2 units	CFP3FA3110
	Powder	Bucket	3 L [465g] 1 unit	CQP3FA3120
	Powder	Bucket	15 L [2310g] 1 unit	CQP3FA3121
	Powder	Bucket	30 L [4700g] 1 unit	CQP3FA3140
4Cell® XtraCHO Feed Medium B (FMB)	Liquid	Bottle	125 mL 2 units	CFP3FA4204
	Liquid	Bottle	500 mL 2 units	CFP3FA4205
	Liquid	Bottle	500 mL 6 units	CFP3FA4210
	Powder	Bucket	1 L [95g] 1 unit	CQP3FA4119
	Powder	Bucket	2 L [190g] 1 unit	CQP3FA4118
	Powder	Bucket	5L [480g] 1 unit	CQP3FA4142

* Other product formats available. For more information please contact:
 Europe | Asia: CellCultureMedia.EU@sartorius.com
 Americas: CellCultureMedia.NA@sartorius.com

4Cell® NutriVero™ Flex 10 Medium

Next generation chemically defined medium designed to support the growth of Vero cells and virus production



Benefits

Developed together with Intravacc, an R&D organization for translational vaccinology, this chemically defined, serum-free, animal component-free medium will give you consistent results and maximum control over your virus production process:

- **Production Efficacy:** High cell growth and virus titer in a chemically defined format
- **Operational Efficiency:** Simplify your downstream purification and filtration processes while increasing virus productivity
- **Safety & Regulatory-friendly:** Reduced process variability and contamination risks for optimal safety

Product Information

4Cell® NutriVero™ Flex 10 is a chemically defined, serum-free, animal component-free medium, newly developed to support Vero cell growth in 2D monolayers as well as in 3D microcarriers suspension culture systems and optimized for the production of viruses.

The chemically defined 4Cell® NutriVero™ Flex 10 is a robust medium which contains solely recombinant components and does not contain any plant extract (hydrolysates), therefore providing consistent results.


Applications

Isolated from the kidney of the African green monkey by Yasumura and Kawakita in Japan (1962), the Vero cell line is used for various purposes, most importantly for the production of cell culture-based viral vaccines. Reasons for the extensive use of the Vero cell line are the consistent high viral yields and relatively easy adaptation for growth in bioreactors on microcarriers, thus allowing greater vaccine purity as well as quantity.

Features of the Standard Product



Features of the Standard Product

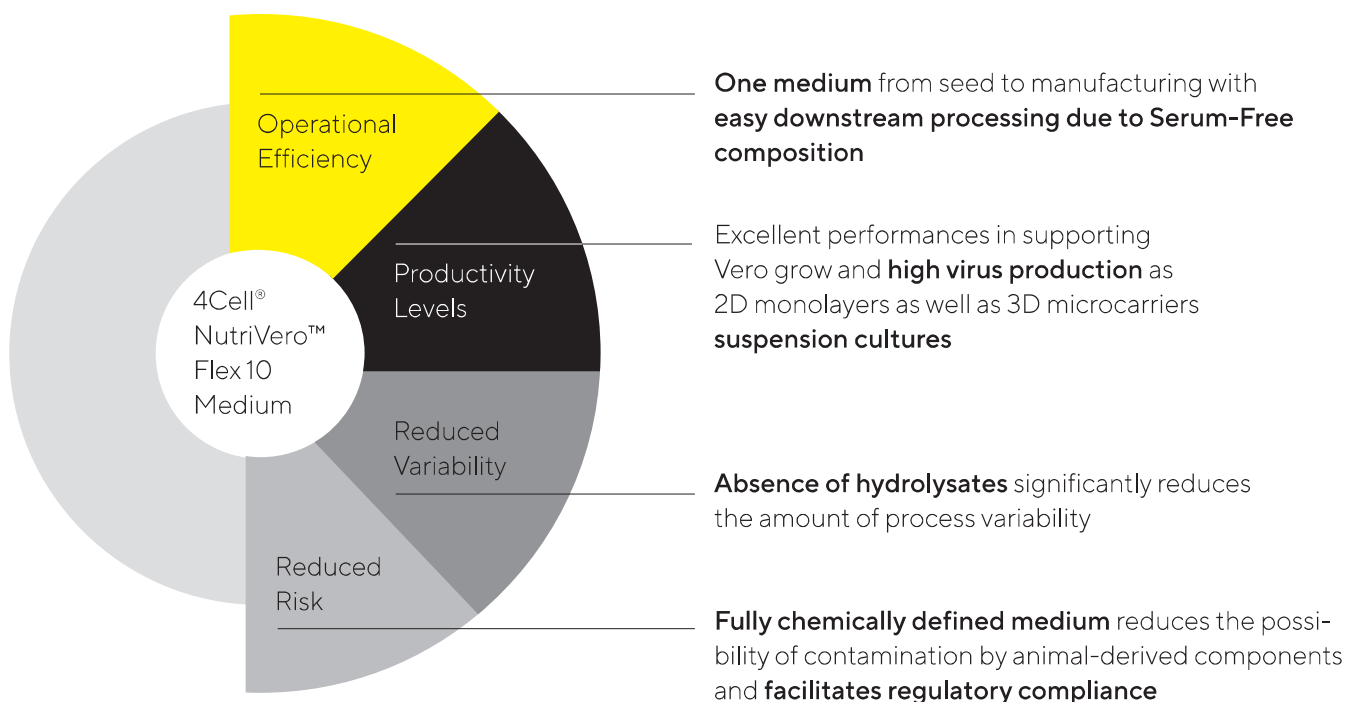
- CD** **Chemically Defined:** The exact concentration and size of every component is known
- NAO** **Non-Animal Origin:** The formulation is entirely made from non-animal -human origin components
- RP** **Recombinant Protein:** The formulation contains very low concentration of recombinant factors
- FFM** For research or for further manufacturing use
-  Product available in liquid format

Technical Data

Specifications

Media Type	Chemically defined medium: does not contain serum or animal origin components
Easy-to-use	Available in liquid or as powder with supplement
Cell Line	Developed for adherent Vero cells in monolayers and microcarriers
Storage Condition	2 – 8°C, protect from light

Your Benefits at a Glance



4Cell® NutriVero™ Flex 10 Medium performance have been evaluated on Vero cells' growth in adherent 2D monolayers (Fig. 1A) and 3D microcarriers beads (Fig. 1B). In both systems 4Cell® NutriVero™ Flex 10 Medium showed equivalent performance as reference medium containing undefined extracts (hydrolysates).

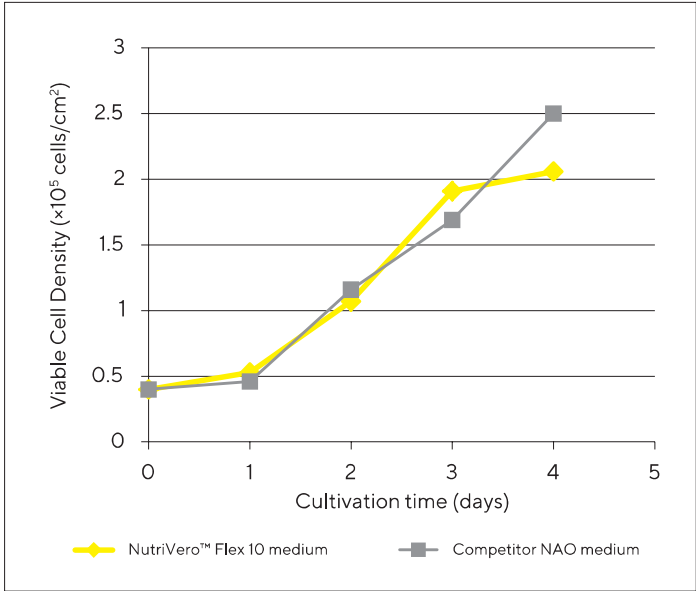


Figure 1A. 4Cell® NutriVero™ Flex 10 performance in Vero cell 2D culturing system.
Vero cells were seeded in T25 flasks at a cell density of 40,000 cells/cm² and incubated at 37°C in a humidified atmosphere and 5% CO₂ with 4Cell® NutriVero™ Flex 10 or reference medium.

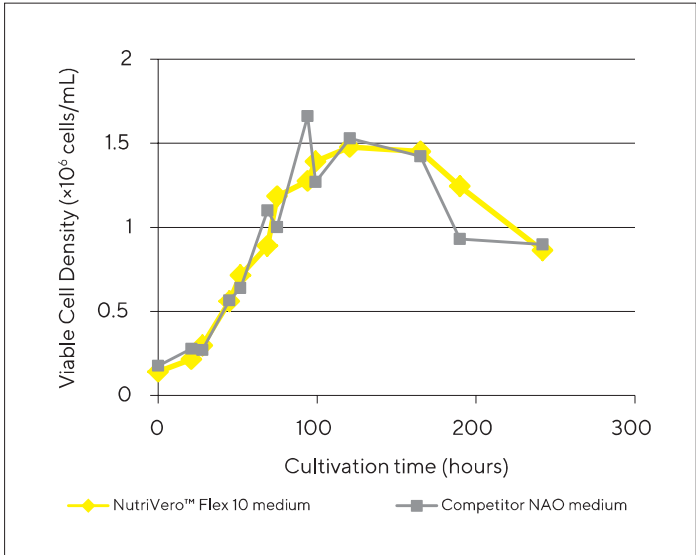


Figure 1B. Vero cell growth density in a 3D culture system.
Two parallel bioreactors were filled up to 2 L of working volume of chemically defined 4Cell® NutriVero™ Flex 10 and undefined reference medium. Stirring speed was set between 70 and 130 rpm, temperature set to 37°C and pH controlled to 7.2. The bioreactors were seeded with 0.15 × 10⁶ cells/L and 3 g/L of microcarriers

Virus quantification was performed by calculating the TCID₅₀ (50% Tissue Culture Infective Dose) index. 4Cell® NutriVero™ Flex 10 Medium showed high abilities in supporting Vero infection and virus productivity in 2D monolayers (Fig. 2A) and suspension in microcarriers beads (Fig. 2B) compared to reference medium containing undefined extracts (hydrolysates).

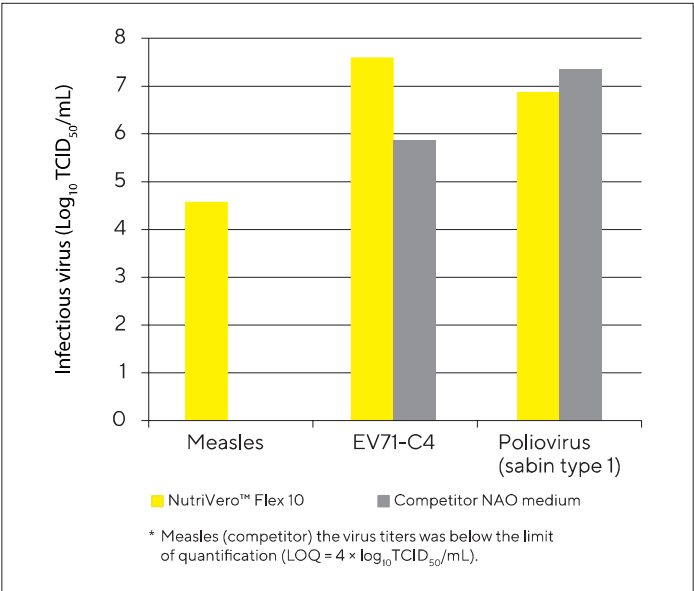


Figure 2A. Initial assessment of defined 4Cell® NutriVero™ Flex 10 Medium viral production capacity.
Vero cells were seeded in 6-well plates at a cell density of 30,000 cells/cm² of culture, the cultures were infected with various viruses: Measles, Sabin poliovirus type 1 and EV71-C4. Following 7 days the cultures showed a positive CPE and the supernatant was harvested and analyzed for the amount of infectious particles by means of a virus titration procedure.

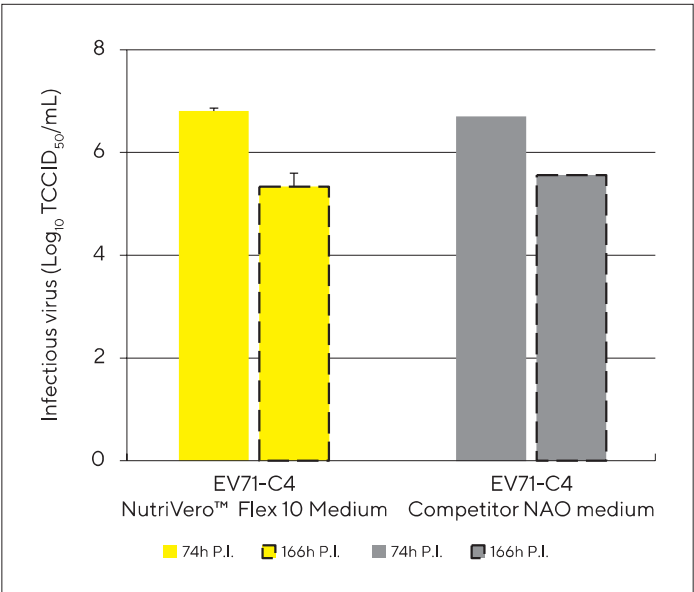


Figure 2B. Enterovirus 71-C4 virus production in a 3D microcarriers culture system.
Vero cells were cultured in 1L bioreactors at 0.12 ± 0.03 × 10⁶ cells/ml for 3 days, up to a concentration of 0.9 ± 0.2 × 10⁶ cells/ml. At 66 hours post seeding, the cells were infected with EV71-C4 at a titer of 7.55 log₁₀ TCID₅₀/ml. Samples were taken at indicated time points post infection, and analyzed for virus titer.

Ordering Information

Description	Form	Package	Volume*	Order Code
4Cell® NutriVero™ Flex 10 Medium	Liquid	Bottle	0.5 L	CFV3FA4009
4Cell® NutriVero™ Flex 10 Medium	Liquid	Bottle	1 L	CFV3FA4010
4Cell® NutriVero™ Flex 10 Medium P-Red Medium	Liquid	Bottle	0.5 L	CFV3FA4000
4Cell® NutriVero™ Flex 10 Medium P-Red Medium	Liquid	Bottle	1 L	CFV3FA4001

* Other sizes are available on request

For more information please contact:

Europe | Asia: CellCultureMedia.EU@sartorius.com

Americas: CellCultureMedia.NA@sartorius.com

Or contact your Sartorius sales representative.

4Cell® MDCK CD Medium

Chemically Defined (CD)
medium for MDCK cell
growth and virus infection
in suspension cultures

Benefits

Developed for quick and robust MDCK cell growth for vaccine manufacturing, this chemically defined medium provides a suitable environment for MDCK cells for all upstream steps and manufacturing scales and offers:

- **Easy-to-use:** One medium for seeding, growth, infection and easy adaptation from bench scale to manufacturing
- **Operational Efficiency:** Simplify your downstream purification and filtration processes while increasing virus productivity
- **Regulatory-friendly:** Chemically defined; eliminate process variability and contamination risks for optimal safety



Product Information

4Cell® MDCK CD Medium is a chemically defined, serum-free, protein-free, animal component-free, hydrolysate-free medium designed to the growth and infection of Madin-Darby Canine Kidney (MDCK) cells in suspension conditions, either for research use or for further manufacturing purposes. 4Cell® MDCK CD Medium has been optimized for both expansion and virus infection of MDCK cells from bench scale to manufacturing.

This formulation is ready-to-use and suitable for suspension cultures. It supports MDCK cell growth and Influenza virus (H1N1, H3N2) expansion allowing all upstream bioprocessing steps with one single medium.



Applications

In Bioprocessing, MDCK cells have been classically used for Cell-based viral vaccine manufacturing processes. While MDCK cells have been strongly recommended by the World Health Organization (WHO) in the isolation of influenza A and influenza B viruses (mainly for diagnosis purpose), they are actually a major cell line of choice for producing seasonal or pandemic Influenza vaccines on cells instead of traditional cultivation on eggs.

Features of the Standard Product



Features of the Standard Product

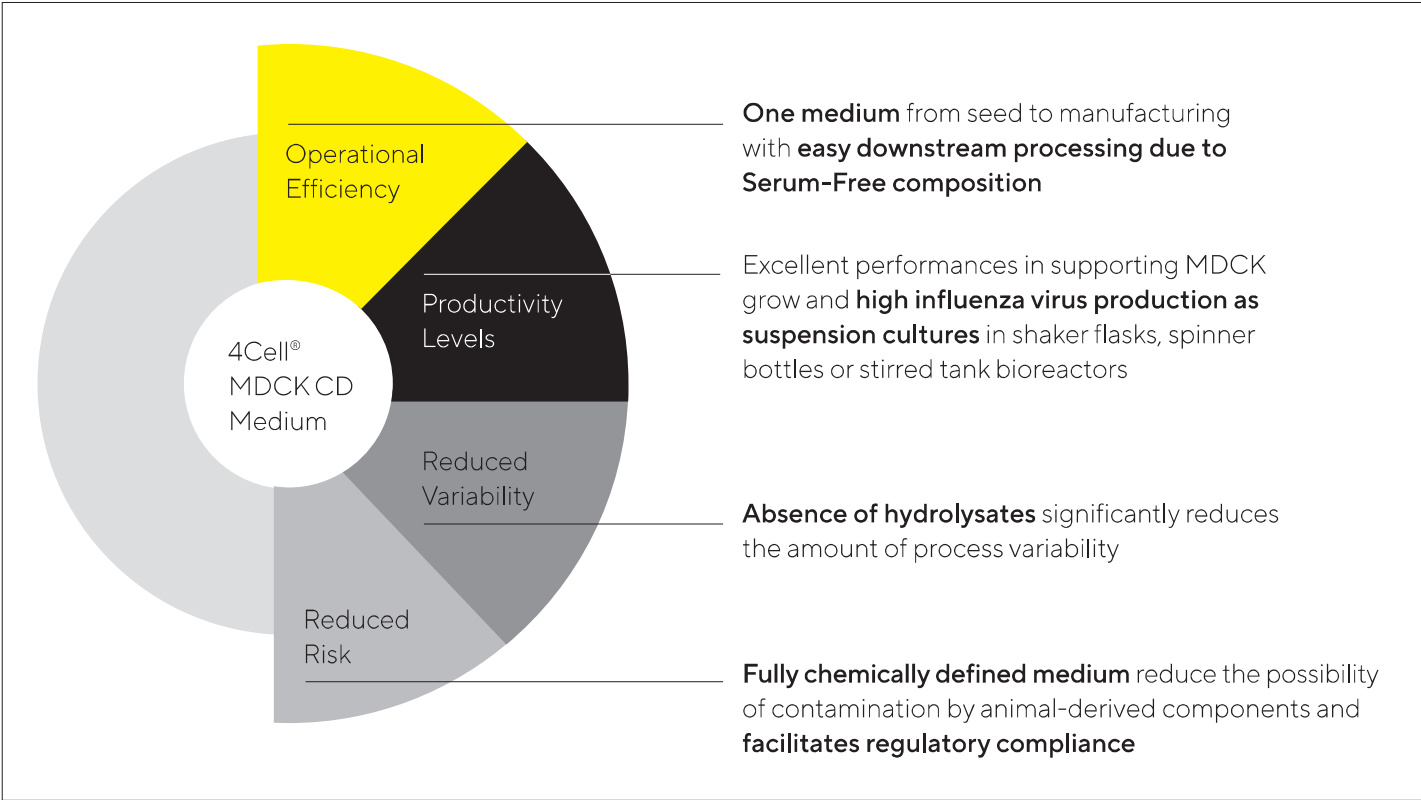
- CD** **Chemically Defined:** The exact concentration and size of every component is known
- NAO** **Non-Animal Origin:** The formulation is entirely made from non-animal | -human origin components
- PF** **Protein-Free:** The formulation does not contain any protein
- FFM** For research or for further manufacturing use
-  Product available in powder format
-  Product available in liquid format

Technical Data

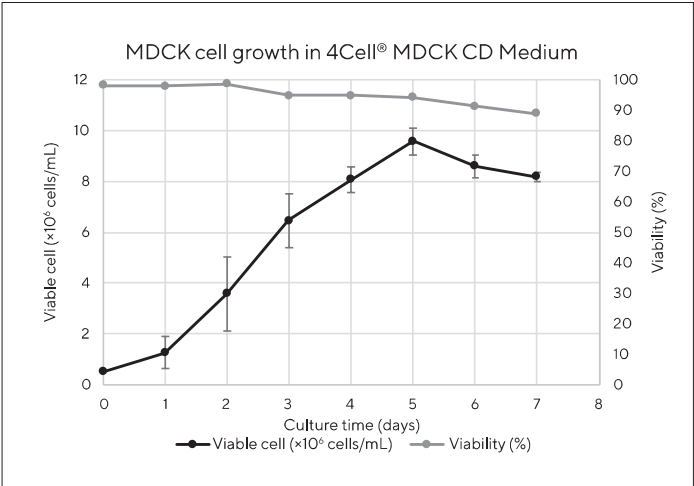
Specifications

Media Type	Chemically-defined medium: does not contain serum or undefined components
Easy-to-use	Available in liquid or complete powder
Cell Line	Developed for suspension MDCK (Madin-Darby Canine Kidney) cells
Storage Condition	2–8°C, protect from light

Your Benefits at a Glance



4Cell® MDCK CD Medium performance have been evaluated on MDCK cells’ growth in suspension.



Virus quantification was performed by calculating the TCID₅₀ (50% Tissue Culture Infective Dose) index. 4Cell® MDCK CD Medium showed high abilities in supporting MDCK infection and virus productivity. Additionally to the TCID₅₀ assay, ddPCR was performed for the samples A/Puerto Rico/8/34 (72 hours post-infection) to detect the total viral genome.

Total viral genome detection

4Cell® MDCK CD Medium = 2.57E+07 copies/mL

4Cell® MDCK CD Medium performance have been also evaluated on MDCK cells propensity to produce Influenza viruses. Two common vaccine strains were tested.

Influenza Virus	Infectious Titer (TCID ₅₀ /mL)	Positive Control Infectious Titer (TCID ₅₀ /mL)
A/Puerto Rico/8/34 H1N1	1.33E+07	6.31E+07
A/Hong Kong/8/36 H3N2	8.32E+05	2.83E+06

Ordering Information

Description	Form*	Package	Volume Size*	Order Code
4Cell® MDCK CD Medium	Liquid	Bottle	1 L Box of 2 × 1 L	CFV3FA2001**
4Cell® MDCK CD Medium	Liquid	Bottle	1 L Box of 6 × 1 L	CFV3FA2002**

* Other sizes are available on request
** CFV3FA2001 and CFV3FA2002 are RUO

For more information please contact:
Europe | Asia: CellCultureMedia.EU@sartorius.com
Americas: CellCultureMedia.NA@sartorius.com

Or contact your Sartorius sales representative.

4Cell[®] Insect CD Medium

Chemically Defined (CD) Medium for Insect Cells for fast cell growth and excellent productivity



Benefits

Developed to meet the needs of biotechnology and vaccine manufacturing, this chemically defined medium supports rapid initial insect cell growth, increased productivity and offers:

- **Production Efficacy:** High cell growth & high virus titer
- **Operational Efficiency:** Accelerated manufacturing process & simplification of filterability and downstream purification
- **Safety & Regulatory-friendly:** Reduced process variability and contamination risks
- **Enhanced consistency and reproducibility:** Completely chemically defined medium & consistent performance

Product Information

The 4Cell[®] Insect CD Medium is a complete, chemically-defined, serum-free, protein-free, animal component-free, hydrolysate-free medium designed to support the growth of insect cell lines derived from *Spodoptera frugiperda*. In cultures of Sf9 cells it routinely supports cell growth to densities of 1×10^7 cells/mL with greater than 95% viability. Sf9 cells have been carried for more than 100 generations (30 passages) in 4Cell[®] Insect CD Medium with no loss of viability.

This formulation is ready-to-use and suitable for suspension cultures. It supports superior production of virus like particles (VLPs) and recombinant proteins when using the Baculovirus Expression Vector System (BEVS).

Applications

4Cell® Insect CD Medium is a chemically defined medium formulation to optimize cell growth and to maximize virus and protein expression. Ideally suitable for:

- Baculovirus propagation
- Recombinant protein expression
- Scale-up manufacturing

Features of the Standard Product



Features of the Standard Product

- CD** **Chemically Defined:** The exact concentration and size of every component is known
- NAO** **Non-Animal Origin:** the formulation is entirely made from non-animal | -human origin components
- PF** **Protein-free*:** the formulation does not contain any protein
- FFM** For research or for further manufacturing use
- Product available in powder format on request
- Product available in liquid format

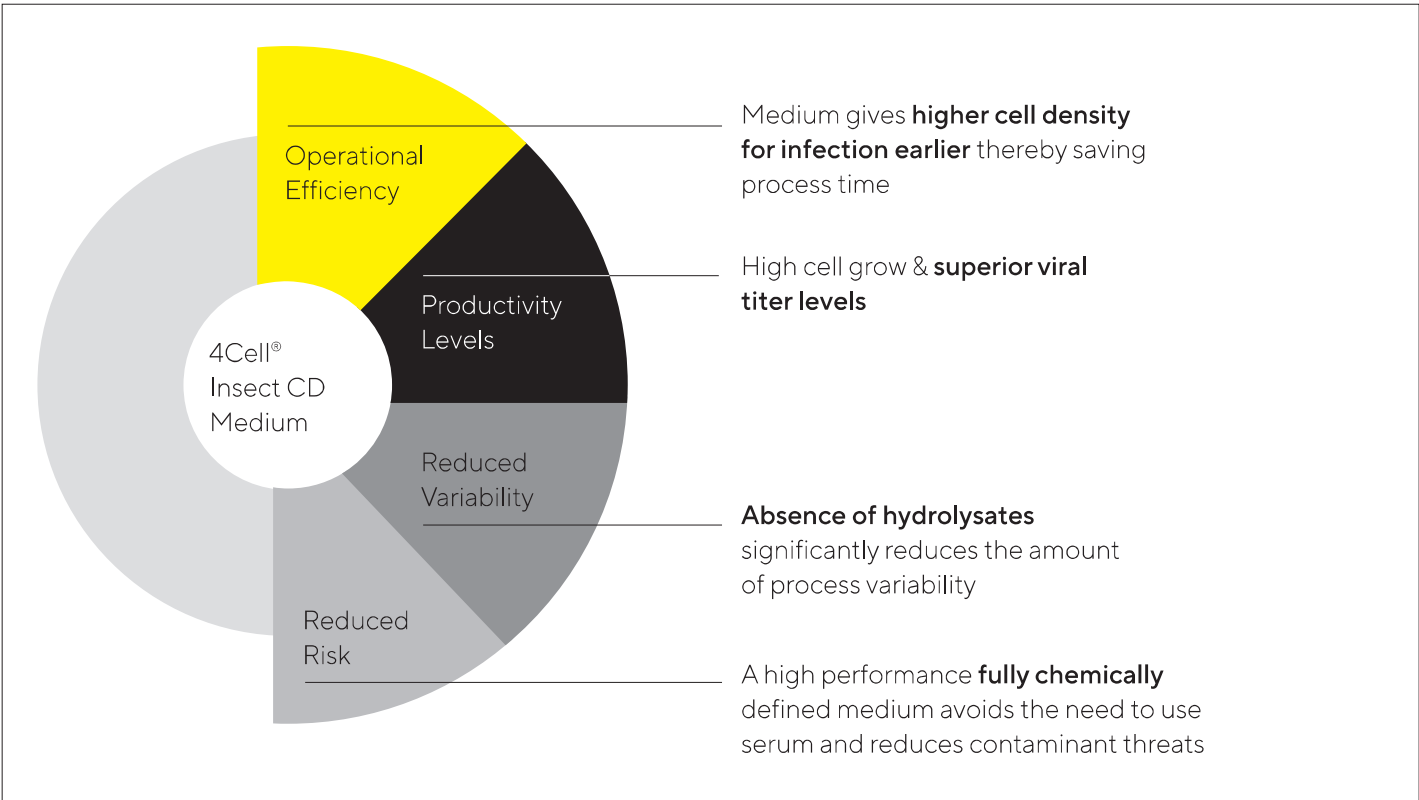
* fully characterized peptides <5 kDa are not considered a protein

Technical Data

Specifications

Media Type	Chemically-defined medium: does not contain serum or undefined components
Easy-to-use	With L-glutamine and Pluronic F-68 (membrane shearing protector)
Cell Line	Developed for suspension <i>Spodoptera frugiperda</i> Sf9 cells, but suitable for other insect cells
Storage Condition	2–8°C, protect from light

Your Benefits at a Glance



Comparison of Peak Cell Density, Infection Period and Baculovirus Production

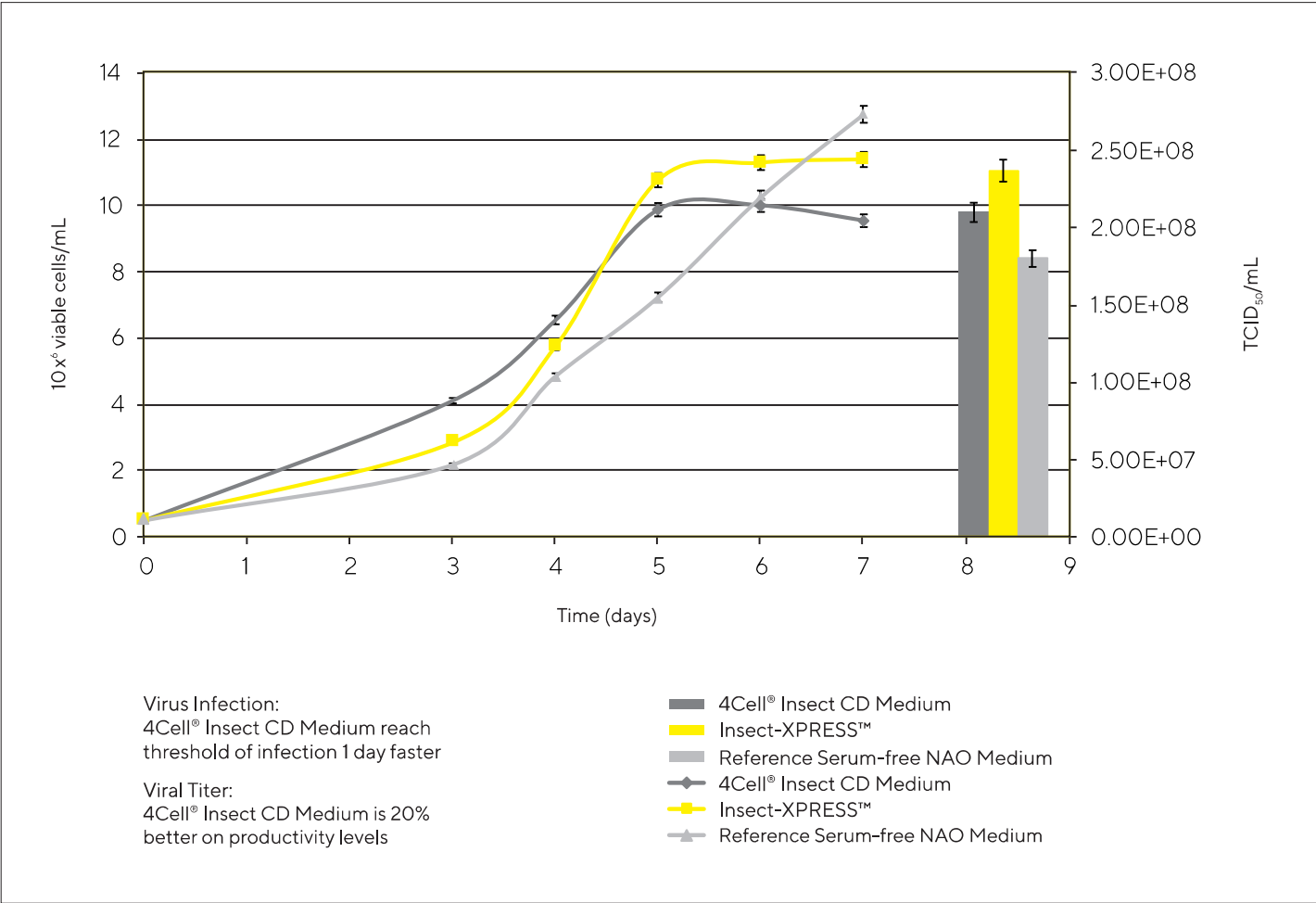


Figure 1: Sf9 cell growth and baculovirus production in 4Cell® Insect CD Medium compared to other insect cell culture media (Insect-Xpress™ and Reference Serum-free NAO Medium). Sf9 cells were sequentially adapted to all tested animal origin-free media. Once the cells were adapted to each test medium (a total of 5 passages post-recovery), growth curves were determined by seeding 25 mL of medium in 125 mL shake flasks at a seeding density of 5 × 10⁵ viable cells/mL. When cells reached 3 × 10⁶ (day 2 using 4Cell® Insect CD Medium) an infection with a MOI of 0.1 was performed using Baculovirus. Each test condition represents the average of 3 replicates per test condition.

Abbreviations: TCID50: 50% Tissue Culture Infective Dose; MOI: Multiplicity of Infection; NAO: Non-Animal Origin.

Ordering Information

Description	Form	Package	Volume Size	Order Code
4Cell® Insect CD Medium	Liquid*	Bottle	1 L Box of 2 × 1 L	CFV3FA1001
4Cell® Insect CD Medium	Liquid*	Bottle	1 L Box of 6 × 1 L	CFV3FA1002

* Others sizes and formats are available on request

For more information please contact:
Europe | Asia: CellCultureMedia.EU@sartorius.com
Americas: CellCultureMedia.NA@sartorius.com

Or your Sartorius sales representative.

4Cell® BHK-21 CD Medium

Chemically Defined (CD)
medium for BHK-21 cells
for maximum cell growth
and virus production

Benefits

Developed to maximize BHK-21 cell growth for virus and vaccine manufacturing, the chemically defined medium provides equivalent or higher growth of BHK-21 cells when compared to serum-supplemented conditions and offers:

- **Production Efficacy:** Ideal from bench scale to manufacturing
- **Serum-Free and Protein-Free:** Simplify your downstream purification and filtration processes
- **Non-Animal Origin and Chemically Defined:** Eliminate process variability and contamination risks
- **Antibiotic-free:** Eliminate risk of antibiotic traces



Product Information

The 4Cell® BHK-21 CD Medium is a chemically defined, serum-free, protein-free, animal component-free, hydrolysate-free medium designed to maximize the growth of BHK-21 cells in suspension culture. The 4Cell® BHK-21 CD Medium supports cell growth up to 7×10^6 cells/mL with greater than 90% viability. BHK-21 cells have been carried for more than 90 generations (30 passages) in 4Cell® BHK-21 CD Medium with no loss of viability.

This formulation is easy-to-use and is suitable for suspension cultures. It supports the superior production of both virus and recombinant proteins and requires only minimal adaptation from other serum-free media.

Applications

4Cell® BHK-21 CD Medium is a chemically-defined medium dedicated to cell growth, maximum virus propagation and protein expression. The medium is ideally suitable for production of a wide range of viruses using BHK-21 suspension cells:

- Foot & mouth
- Rabies for veterinary use
- Blue tongue
- Aujeszky's virus
- New castle and Polio vaccines

Features of the Standard Product



Features of the Standard Product

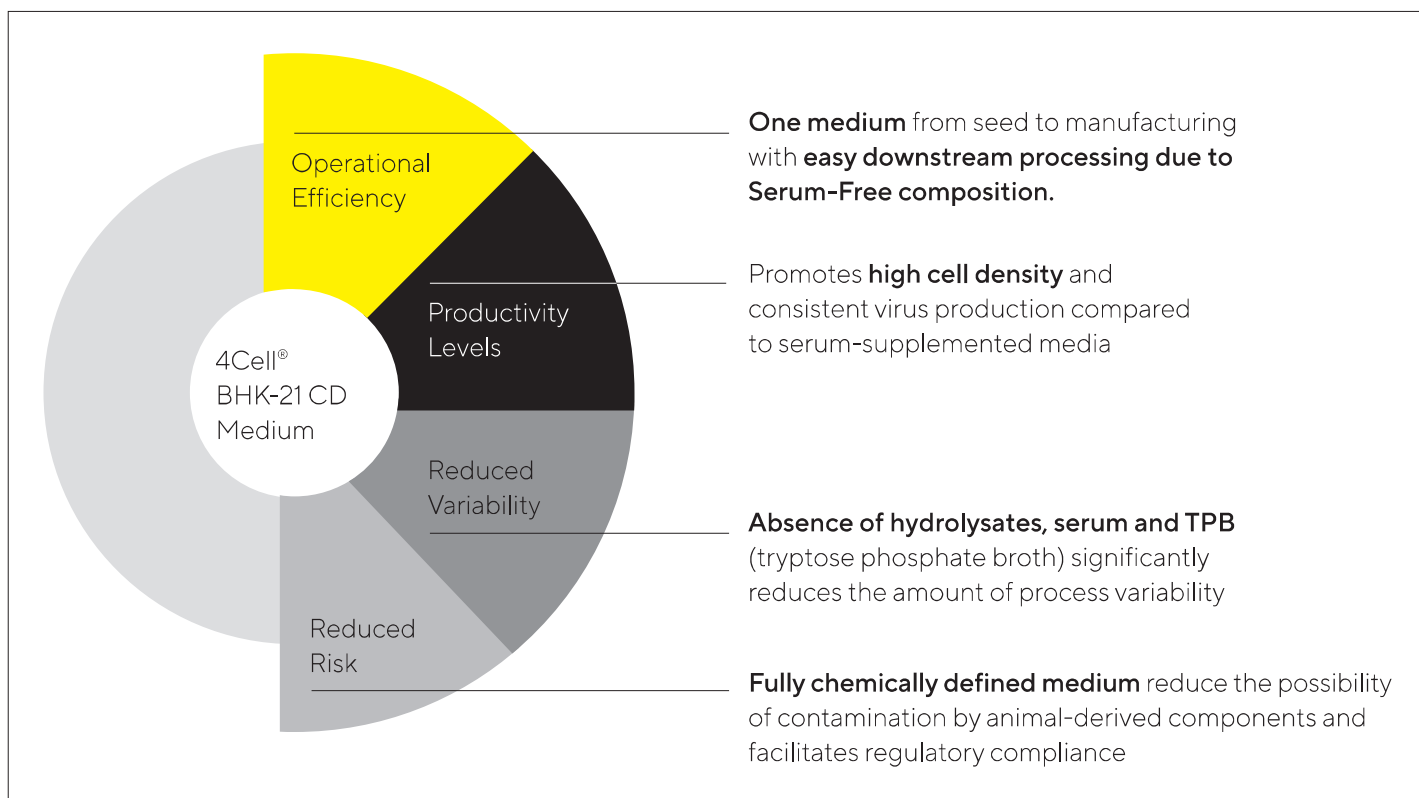
- CD** **Chemically Defined:** The exact concentration and size of every component is known
- NAO** **Non-Animal Origin:** The formulation is entirely made from non-animal | -human origin components
- PF** **Protein-Free:** The formulation does not contain any protein
- FFM** For research or further manufacturing use
- Product available in powder format
- Product available in liquid format
- AF** **Antibiotic-free:** The formulation does not contains any antibiotics

Technical Data

Specifications

Media Type	Chemically-defined medium: does not contain serum or undefined components
Easy-to-use	Available in liquid or complete powder
Cell Line	Developed for suspension BHK-21 (Baby Hamster Kidney) cells
Storage Condition	2–8°C, protect from light

Your Benefits at a Glance



Comparison of Peak Cell Density, Infection Period, and Baculovirus Production

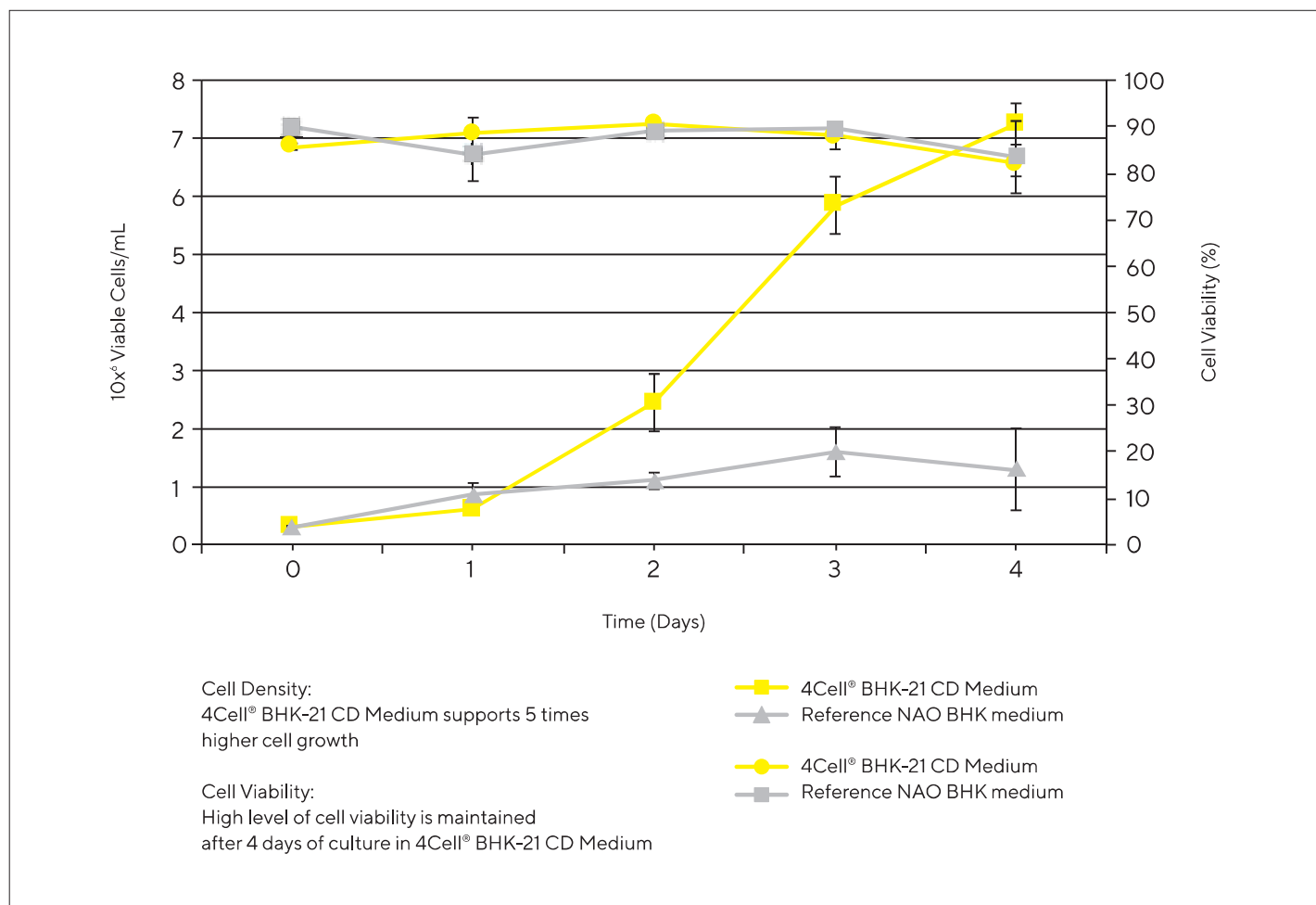


Figure 1: BHK-21 cell growth and viability in BHK-21 CD, serum-free, non-animal origin media compared to reference BHK-21 serum-free, non-animal origin medium. BHK-21 cells were sequentially adapted to 4Cell® BHK-21 CD Medium, as well as to serum-free, non-animal origin medium. Once the cells were adapted to each test medium, growth curves were determined by seeding 3×10^5 viable cells/mL in 4 L (working volume) STR bioreactors. Each test condition represents the average of 2 replicates.

Ordering Information

Description	Form	Package	Volume Size*	Order Code
4Cell® BHK-21 CD Medium	Liquid	Bottle	500 mL 6 × 500 mL Bottle	CFV3FA0001
4Cell® BHK-21 CD Medium	Liquid	Bottle	500 mL 2 × 500 mL Bottle	CFV3FA0002
4Cell® BHK-21 CD Medium	Powder	Bucket	10 L 1 Bucket	CQV3FA0010
4Cell® BHK-21 CD Medium	Powder	Bucket	50 L 1 Bucket	CQV3FA0011
4Cell® BHK-21 CD Medium	Powder	Bucket	100 L 1 Bucket	CQV3FA0014

* Other sizes are available on request

For more information please contact:
Europe | Asia: CellCultureMedia.EU@sartorius.com
Americas: CellCultureMedia.NA@sartorius.com

Or your Sartorius sales representative.

Ready-to-Hydrate Buffers

Pre-Weighed Powder Buffers in Flexel® Tank Liners & Powder Transfer Bags for Downstream Processing Applications.

Benefits

Reducing time & contamination risks

Powder Bags are connectable to any mixing systems via their tri-clamp connector.

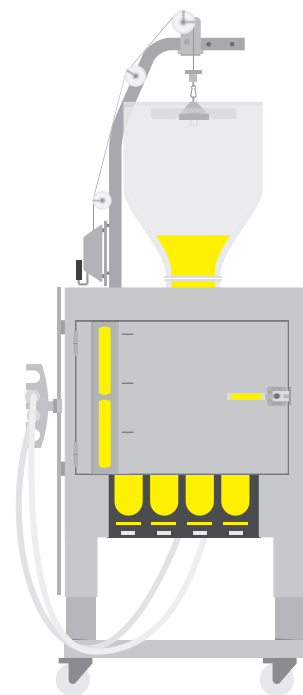
Powder buffers are manufactured according to the highest quality standards from qualified, compendial grade raw materials.

Consistency from batch to batch

Powder buffers are manufactured in ISO8 clean-rooms following cGMP referentials according to users' unique specifications.

Ready-to-Hydrate Buffers

Once hydrated, only sterile filtration is left to do. If required, pH adjustment can be easily achieved with our off-the-shelf sterile NaOH 1M in Flexsafe® bag.



Product Information

Powder Buffers Prefilled Bags are pre-weighed and designed to fit with any downstream processing application up to manufacturing scale. Flexel® Tank Liners & Powder bags will respectively match open and closed mixing solutions.

As buffers composition varies from a process to another, our Technical Sales team will provide support for the evaluation of any customized request.

Applications

Our powder buffer manufacturing capabilities cover the entire downstream process steps from flush buffers to depth filtration to chromatography. Two primary packaging options are available in order to match with any mixing systems.

Powder Buffers Prefilled Bags are single-use primary packaging solutions which allow for faster implementation and reduce risks of contamination by avoiding dusting when preparing large buffer volumes.

Powder Buffers Prefilled Bags set a new benchmark in convenience and reliability for downstream buffer prep.

In Bioprocessing, **the safety of the operators** is a critical aspect increasingly outlined by regulatory agencies. This is where **Ready-to-Hydrate Buffers help improve environment conditions** (including ATEX) as it offers a dust-free contained powder handling for mixing.

All powder buffer formulations are available in any preferred format and primary packaging; from regular buckets to drums to pre-weighed bags.

Technical Data

Specifications

Features	Benefits	Comment
Dust-free	Reduce risks of contamination	4" or 8" Tri-Clamp connection for Powder Transfer Bags
Non-Animal Origin	Yes	Certificate available on request*
Precise Filling	One bag, one prep	Precision of ± 1%
Storage conditions	No need of refrigeration	Ambient in the dark
Shelf-life	Can be determined on demand	
Consistency	High quality	EP USP raw materials
Robust packaging	Suitable for GMP operations	Each Prefilled bag is double-wrapped in vacuum-sealed pouches

* Powder Buffers are non-animal origin certified.
Powder Buffers are manufactured according to cGMP referentials in ISO-certified facilities.

Characteristics

Our extensive experience in buffer manufacturing and our strong presence in the downstream processing field have led to high quality and reliable product design as well as a broad coverage of DSP applications.

We recommend our range of WFI-Quality Water in Flexsafe® bags for the powder buffer hydration step which can be achieved quickly and easily even in worse-case conditions with Flexsafe® Pro Mixer high mixing performances.

Ready-to-Hydrate Powder Buffers require minimal setup and reduce footprint for the buffer preparation. The hydration process is achieved in a few minutes only; the milling process for the powder manufacturing ensures a homogeneous particle size distribution.

The joined knowledge and expertise in buffer & film manufacturing ensures the supply of a reliable and convenient solution.

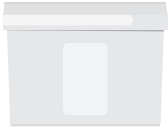



Sartopore® 2 filters are recommended for the sterilization-grade filtration step.

Product types

	Nominal Size	Max Load	Eq. Max Volume*	Application
Flexel® Tank Liners	50 L	2 kg	50 L	Open Mixing
	100 L	5 kg	100 L	Open Mixing
	200 L	10 kg	200 L	Open Mixing
Powder Transfer Bags	15 L	10 kg	1,000 L	Closed Mixing
	30 L	20 kg	2,000 L	Closed Mixing

* Based on a regular PBS formulation ~10 g/L

Complete Range of Packaging Solutions for Powder Buffers

		10 g to 2 kg	5 kg to 20 kg	500 g to 10kg	2 kg to 20 kg
Bucket		✓			
Drum			✓		
Flexel® Tankliner				✓	Suitable for Open Mixing Systems
Powder Transfer Bag					✓ Suitable for closed mixing systems including Flexsafe® ProMixer
				Up to 200 L	Up to 2,000 L*

* Based on a regular PBS formulation ~10 g/L

Ordering Information*

Powder Buffers Prefilled Bags are also available as custom products. They will be manufactured to the exact specifications requested and delivered with the appropriate documentation. Contact your local Sales Representative and CMTS Technical Sales Specialist for more information and get started with Buffers.

Below are product information for our standard powder buffer references.

Product Description	Product	Packaging	Volume	Order Number
Ready-to-Hydrate Buffer	PBS	Flexel® Liner	50 L	CQB3FA0001
Ready-to-Hydrate Buffer	PBS	Flexel® Liner	100 L	CQB3FA0002
Ready-to-Hydrate Buffer	PBS	Flexel® Liner	200 L	CQB3FA0003
Ready-to-Hydrate Buffer	PBS	Powder Transfer Bag	100 L – in 15 L bag size	CQB3FA0004
Ready-to-Hydrate Buffer	PBS	Powder Transfer Bag	200 L – in 15 L bag size	CQB3FA0005

Additional product information

- Shelf life: 2 years
- Shipping & storage temperature: 2°C to 30°C
- Documentation:
Certificate of Analysis, Safety Datasheet

Standard PBS pH 7.4

Component	g/L	CAS #	Grade
KH2PO4	0.283	7778-77-0	EP USP
Na2HPO4	1.124	7558-79-4	EP USP
NaCl	9.000	7647-14-5	EP USP

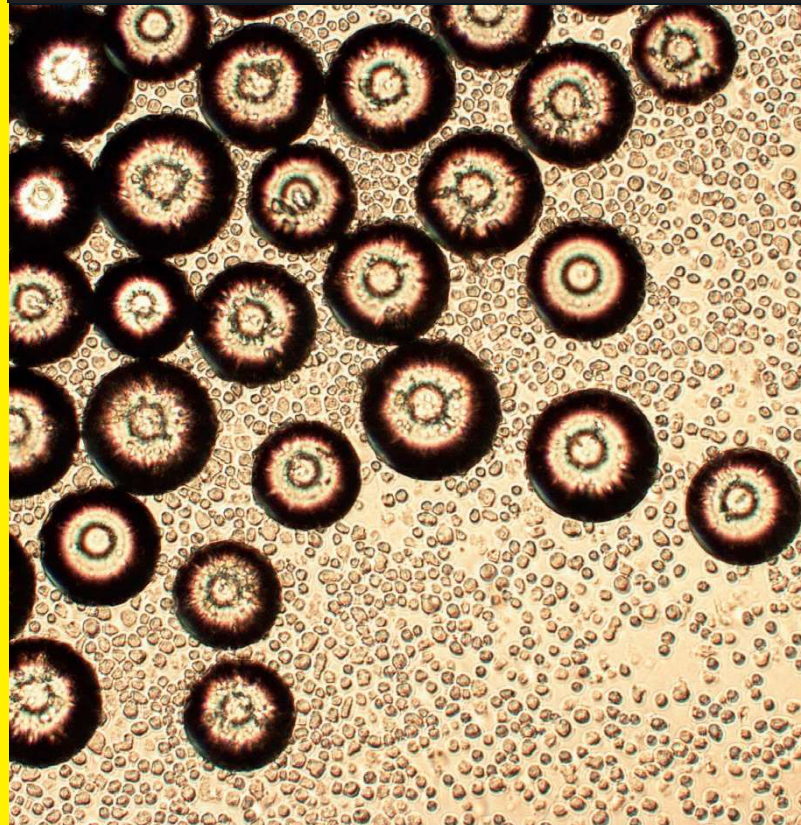
Complementary Products

Product Description	Product	Packaging	Volume	Order Number
WFI-Quality Water	WFI	Flexsafe®	20L (EMEA & Asia)	CFB3FA3006
WFI-Quality Water	WFI	Flexsafe®	20L (Americas)	CFB3FA3106
WFI-Quality Water	WFI	Flexsafe®	200L (EMEA & Asia)	CFB3FA3009
WFI-Quality Water	WFI	Flexsafe®	20L (Americas)	CFB3FA3109
NaOH 1M	Sodium Hydroxide	Flexsafe®	20L	CFB3FA7006

* Other product formats and formulation available. For more information please contact: Europe | Asia: CellCultureMedia.EU@sartorius.com, Americas: CellCultureMedia.NA@sartorius.com

Microcarrier Products

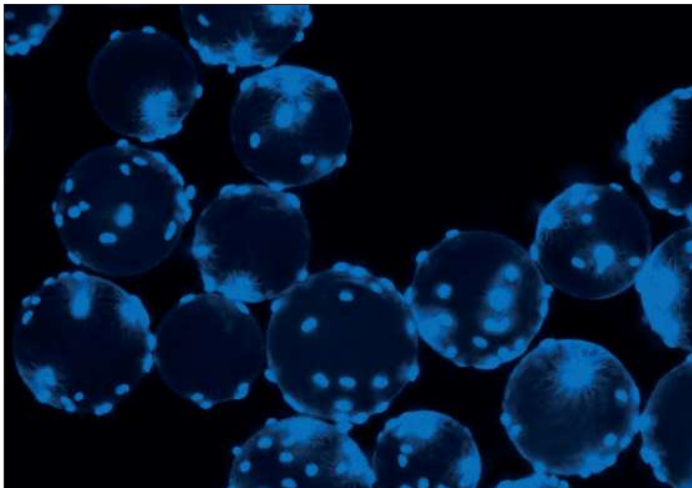
Simplifying adherent, cell-based research and manufacturing



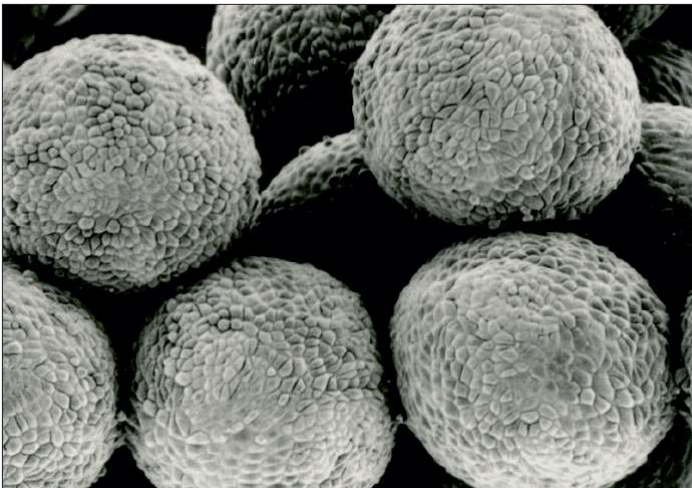
Product Information

Since its inception in 1984, SoloHill® has developed an extensive range of commercially available microcarrier products. By successfully combining cutting-edge research with high-quality manufacturing, SoloHill® not only offers excellent products but also provides valuable technical expertise to ensure optimal results. Our talented scientists are available to assist with product selection, process optimization, and technology transfer to end-user laboratories.

Microcarriers are tiny spheres that normally range from 90 to 300 microns in diameter. The relative density of microcarriers is close to water, which facilitates easy suspension in a cell culture medium. Their core material, surface chemistry, and coating promote attachment and growth of anchorage-dependent cells and influences the production of biologics in cell culture processes. A fundamental benefit of microcarriers is that they provide a large effective surface area with a relatively small footprint, allowing large-scale manufacturing of biologics for lower capital investment.



Human mesenchymal stromal/stem cells (hMSCs) growing on SoloHill® Microcarriers

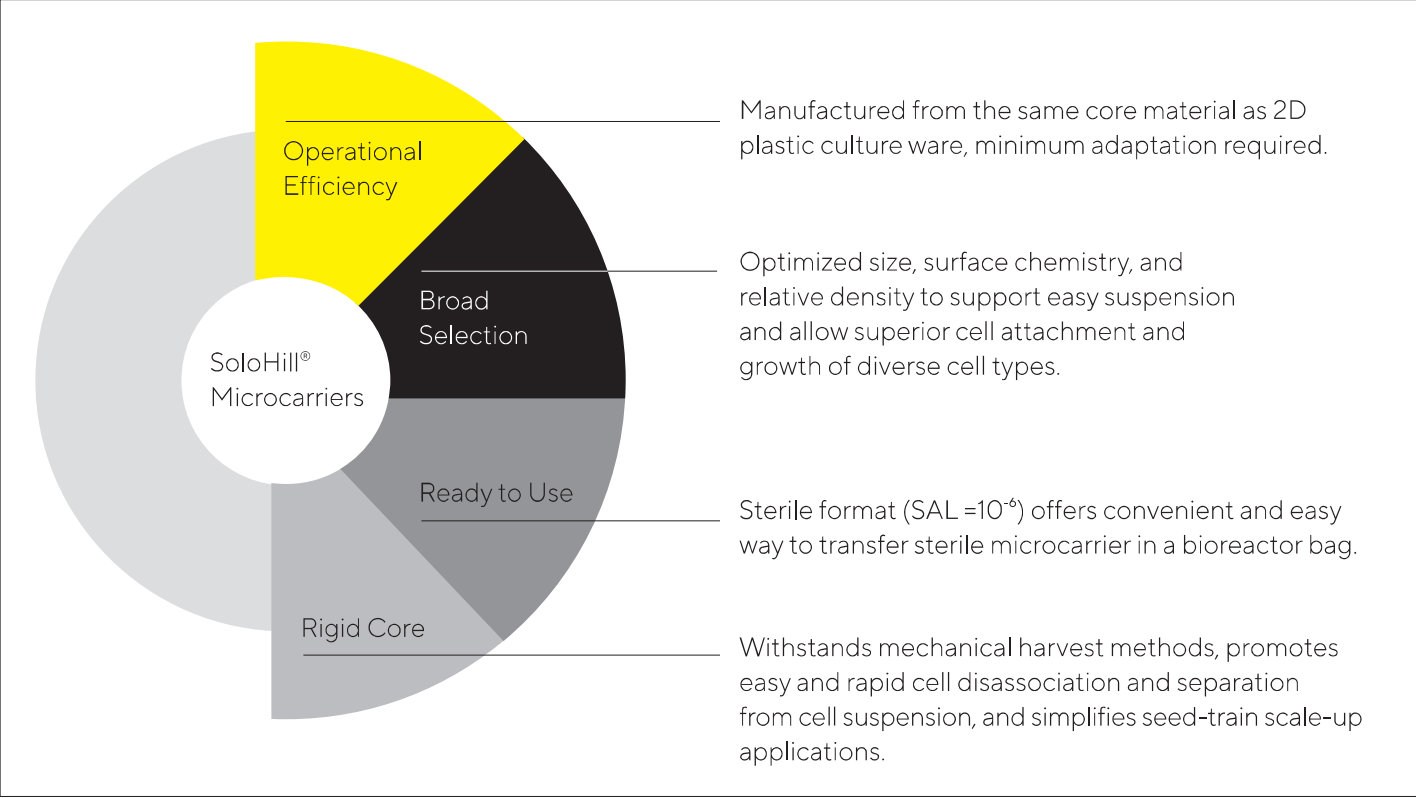


Scanning electron micrograph of Vero cells on SoloHill® Microcarriers

Benefits

Sartorius SoloHill® Microcarrier technology has many advantages for the large-scale production of high-quality, anchorage-dependent cells.

- **Proven Track Record:** Used by the animal and human health industry for over 30 years.
- **Streamlined Solution:** Simply sterilize and use; hydration and pre-swelling steps are not required.
- **Ready-to-Use:** Sterile format with sterility assurance level (SAL) 10^{-6} eliminates sterilization validation and shortens manufacturing process.



Applications

Microcarrier technology provides an efficient, cost-effective tool to scale up various adherent, cell-based biopharmaceutical applications such as advanced cell and gene therapy, vaccines, and biologics production. Historically, microcarrier and stirred-tank bioreactor technologies have been used successfully by the biopharmaceutical industry, and this platform is accepted by regulatory agencies for both animal and human health product manufacturing.

A wide range of commercially available, traditional stainless steel, and single-use stirred-tank bioreactors are used to scale processes up to 3000 m² surface area or greater using microcarrier technology. Additionally, microcarrier-based scale-up performed in controlled bioreactor systems facilitates automated closed system operations, thereby diminishing contamination risks and providing a regulated manufacturing environment for consistent product manufacturing.

Product Specification

SoloHill's diverse microcarrier products are manufactured and handled under ISO 9001 standards. All microcarrier types are offered in standard non-sterile and sterile (gamma-irradiated), ready-to-use formats that facilitate ease of use. Specific cell types have different requirements for attachment, growth, and biologic production, hence the optimal microcarrier should be selected experimentally.

Microcarriers are offered in a convenient starter kit format to accelerate this initial screening and evaluation. Selecting the optimal microcarrier type is key to a successful culture. Sartorius offers a variety of microcarrier types in multiple size formats ranging from 10 grams to 1000 grams, allowing user flexibility during the selection and optimization of manufacturing processes.

Microcarrier Types and Their Properties

Microcarrier type, core material, and surface chemistry	Relative density range	Size (microns)	Surface area (cm ² /g)	Surface charge	Protein-coated	Number of MC per gram
Plastic Cross-linked polystyrene	1.022–1.030	125–212	360	No	No	4.6 × 10 ⁵
	1.022–1.030	90–150	480	No	No	1.0 × 10 ⁶
Plastic Plus Cross-linked polystyrene, cationic-charged	1.022–1.030	125–212	360	Yes	No	4.6 × 10 ⁵
Star-Plus Cross-linked modified polystyrene, cationic-charged	1.022–1.030	125–212	360	Yes	No	4.6 × 10 ⁵
Hillex II® Modified polystyrene, cationic-charged	1.090–1.150	160–200	515	Yes	No	5.5 × 10 ⁵
Collagen Cross-linked polystyrene coated with Type 1 porcine collagen (gelatin)	1.022–1.030	125–212	360	No	Yes	4.6 × 10 ⁵
	1.034–1.046	125–212	360	No	Yes	4.6 × 10 ⁵
	1.022–1.030	90–150	480	No	Yes	1.0 × 10 ⁶
Fact III Cross-linked polystyrene coated with Type 1 porcine collagen (gelatin), cationic-charged	1.022–1.030	125–212	360	Yes	Yes	4.6 × 10 ⁵

Ordering Information

Microcarrier type	Part number	Weight (gram)	Ready to use (Sterile)
Plastic Cross-linked polystyrene	P-221-020	10	No
	P-221-050	100	No
	P-221-070	500	No
	P-221-080	1000	No
	PIR-221-020	10	Yes
	AMDS05PS100	100	Yes
Plastic Plus Cross-linked polystyrene, cationic-charged	PP-221-020	10	No
	PP-221-050	100	No
	PP-221-070	500	No
	PP-221-080	1000	No
	PPIR-221-020	10	Yes
	AMDS05PPS100	100	Yes
Star-Plus Cross-linked modified polystyrene, cationic-charged	SP-221-020	10	No
	SP-221-050	100	No
	SP-221-070	500	No
	SP-221-080	1000	No
	SPIR-221-020	10	Yes
	AMDS05SPS100	100	Yes
Hillex II® Modified polystyrene, cationic-charged	H-170-020	10	No
	H-170-050	100	No
	H-170-070	500	No
	H-170-080	1000	No
	HIR-170-020	10	Yes
	AMDS05HS100	100	Yes
Collagen-coated Cross-linked polystyrene coated with Type 1 porcine collagen (gelatin)	C-221-020	10	No
	C-221-050	100	No
	C-221-070	500	No
	C-221-080	1000	No
	CIR-221-020	10	Yes
	AMDS05CS100	100	Yes
FACT III Cross-linked polystyrene coated with Type 1 porcine collagen (gelatin), cationic-charged	F-221-020	10	No
	F-221-050	100	No
	F-221-070	500	No
	F-221-080	1000	No
	FIR-221-020	10	Yes
	AMDS05FS100	100	Yes
Microcarrier Starter Kit (Plastic, Plastic Plus, Star-Plus, Hillex® II, Collagen-coated, Fact III)	SK102-1521B	10g of each	No

Custom size options are available upon request, contact at microcarriers@sartorius.com.

Cell Culture Media and Buffers

Customization, Optimization & Creation

The Sartorius media portfolio is a comprehensive collection of products supporting many bioprocessing applications. 50 years of culture media experience backed by 150 years of pharma industry innovations have led to long-term relationships with dual sourced raw material suppliers which guarantees supply and quality as well as excellent regulatory support for all of your projects.

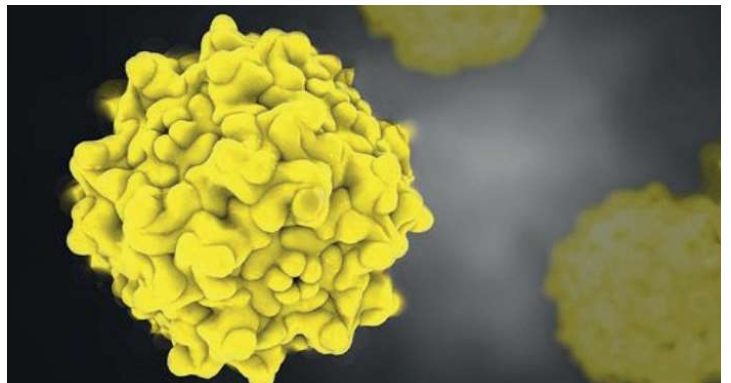


Antibody & Recombinant Protein Media

Non-animal origin media for high titer production of proteins and antibodies: Recombinant protein production processes use dedicated animal cell...

Antibody & Recombinant Protein Media

Specialty media designed to allow maximum cell growth and infection rate: Viral vaccines are produced by viral infection of susceptible animal...

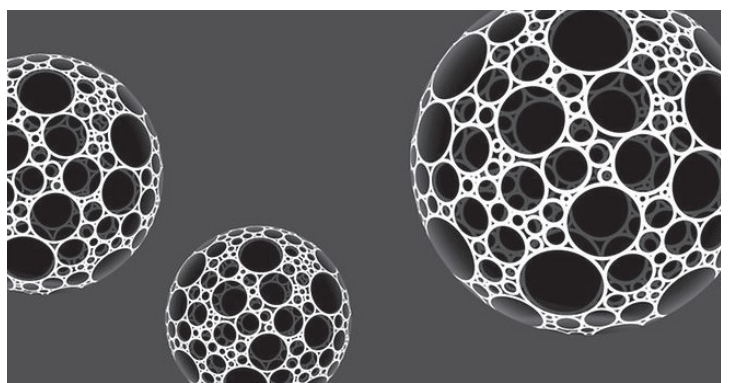


Strong Acids, Bases, Alcohols & Detergents for Bioprocessing

Sartorius has the capabilities to produce all the bioprocessing formulations required for a wide variety of applications in downstream processing.

Microcarriers

Our protein-coated & animal product free microcarriers promote excellent cell attachment and growth for a broad range of anchorage-dependent...



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