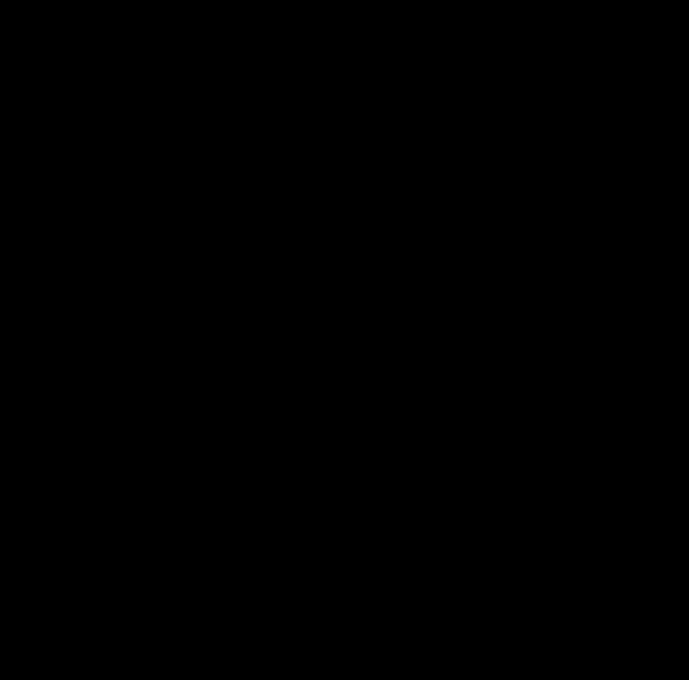


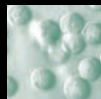


Thermo Scientific HyClone Serum-Free Media Maximize Cell Culture Production and Performance

Developed through Metabolic Pathway Design™
to Support Maximum Cell Growth and Productivity



CHO Cell Culture



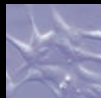
Hybridoma and Myeloma Cell Culture



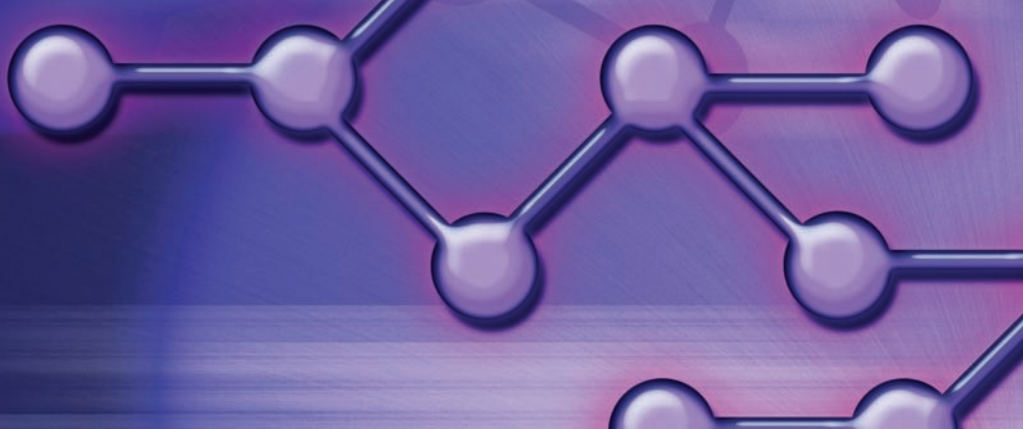
HEK 293 and PER.C6® Cell Culture



Insect Cell Culture



Viral Vaccine Cell Culture



Research and Product Development

Many biologically active products, including monoclonal antibodies, recombinant proteins and viruses for vaccines, are produced using animal cell culture. The quantity and performance of these biologicals directly correspond to the quality of cell culture reagents used in the manufacturing process.

The Thermo Scientific Research and Product Development team leads the industry in characterizing sera, identifying critical cell culture components and developing a premier line of serum-free media. Using the latest culture and analytical equipment to determine the needs of cells, this research team has developed media for a variety of applications. By applying its core competence in the nutrition of eukaryotic cells, our research team has developed media that enables clients to meet cell culture objectives.

By applying an understanding of the metabolism and characteristics of major cell platforms employed in modern manufacturing processes, our research and development team is able to provide media optimization services. In addition, we are able to offer a wide variety of options for development collaboration meeting client specific needs for most cell types, culture configurations and selection/amplification systems.

Metabolic Pathway Design™

High performance with Thermo Scientific HyClone Serum-Free Media for specific cell culture platforms is achieved through our Metabolic Pathway Design technology. This approach to media formulation development ensures cell productivity during growth and production phases of cell life. This extensive work in media development has resulted in products that provide a consistent nutrient supply in a form acceptable to cultured cells.

The Metabolic Pathway Design Approach:

- Balances nutrient supply against metabolic waste accumulation
- Determines the effective dose of nutrients critical to the production of recombinant proteins
- Provides complex lipids and phospholipids that facilitate delivery through the cell membrane

The objective for developing serum-free media through Metabolic Pathway Design is to provide the intended cell line with the nutrients needed to promote cell growth and stimulate productivity.

Serum-Free Media

Applications for HyClone Serum-Free Media can be found in many biotechnology fields, including the production of human and animal biopharmaceuticals, diagnostic reagents and bioagricultural products. Due to increased attention on producing biologicals representative of their native form, HyClone Serum-Free Media focuses on supporting mammalian and invertebrate cell culture platforms. Some of the critical cell culture applications of these platforms include the expression of recombinant proteins, monoclonal antibodies, viral vectors for gene therapy, and viral vaccines. These applications constitute the majority of biopharmaceutical research, development and manufacturing employing eukaryotic cell culture.

Developed through the Metabolic Pathway Design™ approach, HyClone Serum-Free Media support superior performance in multiple cell culture platforms. This development process produces SFM targeted to increase process yields for each respective cell platform.

Current HyClone SFM applications include hybridoma, NS0, insect, Chinese Hamster Ovary (CHO), PER.C6®, HEK 293, MDCK, MDBK, COS-7 and Vero cell cultures. The use of serum-free media provides many time- and cost-saving advantages, including:

- Eliminating the need to pre-screen serum lots
- Simplified regulatory documentation
- Consistent media performance
- Reduced downstream purification challenges

Media Optimization

HyClone Serum-Free Media is developed to support the growth of major cell platforms used in eukaryotic cell-based manufacturing. A key to improved performance in biopharmaceutical development and manufacturing is identifying the optimal medium. Our optimization program ensures that the medium selection process is a success.

We offers standard serum-free media formulations suitable for key cell culture platforms. While standard serum-free media will offer superior performance, many cases have unique cell line or process specific criteria requiring further optimization to achieve the highest level of success.

By combining our knowledge of cell culture requirements with state-of-the-art analytical and development equipment, we have the ability to assess and meet the specific needs of customer cell culture processes. Our optimization program has the ability to thoroughly evaluate the nutrient demands of customer cell culture systems, potential key component toxicities, necessary process specific supplementation and many other critical cell culture elements.

Throughout the optimization program, recommended changes in medium composition are carefully evaluated for manufacturing suitability. This assessment ensures that the finished, optimized medium can be manufactured according to customer requirements.

Rapid Response Production™

Customized and optimized prototypes for industrial applications must be evaluated quickly to facilitate final product selection and implementation. In research settings, minor modifications of existing media and reagent formulations are necessary to accommodate specific goals and objectives.

The Rapid Response Production facility is a short-turnaround media manufacturing service designed for the production of client-specific media and reagents. Requests are typically manufactured within seven days. The Rapid Response Production facility is a non-cGMP media and reagents manufacturing suite capable of preparing up to 200 L liquid lot sizes and up to 20 kg dry powdered lot sizes. Liquid lots are packaged in 100, 500 and 1000 mL bottles, or in Thermo Scientific HyClone BioProcess Container™ (200 L maximum) systems. Dry powdered lots are packaged in volume-specific bottles or in bulk containers.

Process Supplements

A successful process supplements platform has been developed to support demand in the area of fed-batch cell culture. Each supplement is developed through the Metabolic Pathway Design™ approach to provide specific nutrient combinations for a variety of applications, and successfully tested in CHO, hybridoma, NS0, HEK 293, PER.C6® and other cell lines. For convenient evaluation of these supplements, the HyClone Cell Boost Process Supplement Kit is available (SH30890). This kit contains all six Cell Boost supplements and has demonstrated an ability to improve culture productivity by more than 10 times what is currently achieved.



Thermo Scientific HyClone 1000 L Single-Use Bioreactor

CHO Cell Culture

The CHO cell culture platform has led the biopharmaceutical industry in its use of serum-free media. As an industry leader we continue to develop a selection of superior media to meet the unique needs of CHO cells. Each Thermo Scientific HyClone serum-free CHO medium has been developed through the Metabolic Pathway Design approach to ensure the highest level of productivity and ease of use.



HyClone CDM4CHO™

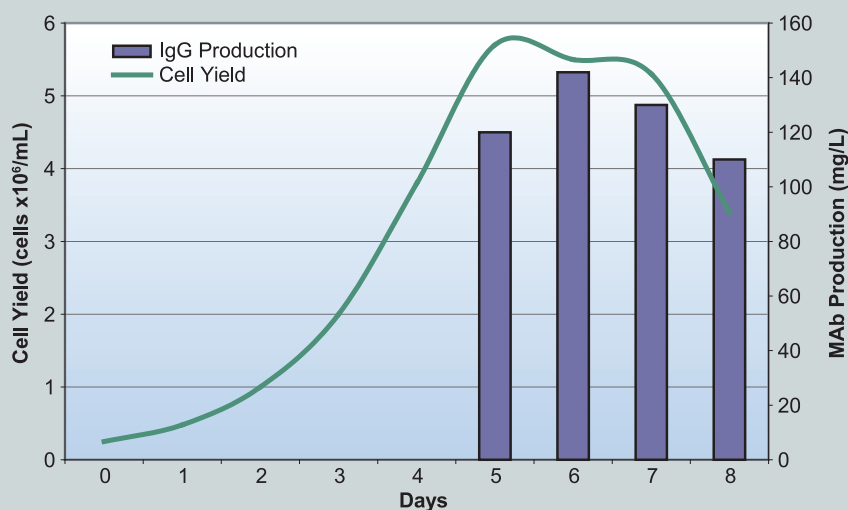
HyClone CDM4CHO is a chemically-defined medium containing no animal derived components. This regulatory-friendly medium is developed to increase process yields in the manufacture of recombinant proteins using a variety of CHO cell clones. HyClone CDM4CHO has been successfully tested in a variety of culture systems, including T-flasks, shaker flasks and bioreactors including fed-batch and perfusion.

HyClone SFM4CHO™

HyClone SFM4CHO is a protein-free formulation that contains no components of bovine origin and has been designed for high performance in a variety of culture vessels, including bioreactors. It is formulated using our proprietary lipid complexing process for enhanced stability and growth promotion of various CHO cell lines.

HyClone SFM4CHO™-Utility

This versatile protein-free cell culture medium is developed to support the growth of multiple CHO cell clones with minimal adaptation. HyClone SFM4CHO-Utility is ideally suited for the cost-effective manufacturing of recombinant proteins for academic and industrial research, genomics and proteomics, drug target screening and validation, and manufacturing of pre-clinical lots.



Production of MAb using a CHO cell line cultured in HyClone CDM4CHO during a shaker flask culture

Hybridoma and Myeloma Cell Culture

The application of serum-free media in the production of monoclonal antibodies from hybridoma and recombinant myeloma cell lines for research, therapeutic and diagnostic purposes is rapidly growing. Since each hybridoma or recombinant myeloma cell line is unique, it is necessary that the serum-free medium of choice offer nutrients for a variety of applications. This becomes more critical when dealing with cell lines having specific nutrient needs (e.g., the cholesterol auxotrophic cell line, NS0). These Thermo Scientific HyClone serum-free media have been developed through the Metabolic Pathway Design approach to ensure that the unique aspects of hybridoma and myeloma cell culture are addressed.



HyClone CDM4MAB™

HyClone CDM4MAB is a chemically-defined medium containing no animal derived components. This regulatory-friendly medium is developed to increase process yields for the manufacture of monoclonal antibodies for therapeutic use in a variety of engineered hybridoma and recombinant myeloma cell lines. HyClone CDM4MAB has been successfully tested in small-scale cultures and large-scale bioreactors to ensure full scalability of production.

HyClone SFM4MAB™

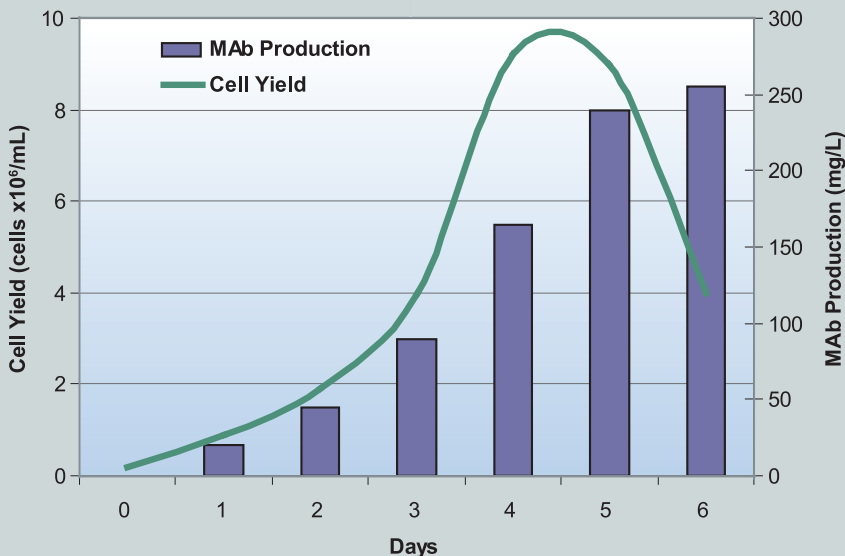
HyClone SFM4MAB has been designed to increase the process yields for the manufacture of MABs in a variety of engineered hybridoma and myeloma cell lines. It is a low protein formulation and is optimized for downstream purification using Protein A, Protein G and other matrices to facilitate product recovery.

HyClone SFM4MAB™-Utility

HyClone SFM4MAB-Utility is a versatile serum-free cell culture medium, developed to support the growth of multiple hybridoma cell types and production of a variety of immunoglobulins. It enables superior growth of many hybridomas and recombinant myelomas with minimal adaptation.

HyClone CDM4NS0™

HyClone CDM4NS0 is a chemically-defined medium containing no animal derived components. This regulatory-friendly medium is developed to increase process yields in the manufacture of MABs using a variety of NS0 cell clones. HyClone CDM4NS0 requires no cholesterol supplementation, with sufficient amounts already in the formulation. It has been successfully tested in a variety of culture systems, including T-flasks, shaker flasks and bioreactors.



Production of MAb using an SP2/0-derived hybridoma cell line cultured in HyClone CDM4MAB

HEK 293 and PER.C6® Cell Culture

As biotherapeutics are desired more closely representative of their native form, the application of human-derived cell lines for recombinant protein, monoclonal antibodies and gene therapy viral vectors has rapidly emerged. Thermo Scientific products include high performing serum-free media capable of providing optimal cell culture conditions for HEK 293 and PER.C6® cells in these applications. These media have been developed through the Metabolic Pathway Design approach to ensure that the needs of human-derived cell lines are met to enable the highest level of productivity.



HyClone CDM4PERMAb™

HyClone CDM4PERMAb is a chemically-defined medium containing no animal derived components. This high performance cell culture medium has been developed to increase process yields in the production of human antibodies and recombinant proteins using PER.C6® technology. It has been successfully tested in a variety of applications, including fed-batch bioreactors.

HyClone CDM4HEK293™

HyClone CDM4HEK293 is a chemically-defined, animal derived component free and protein-free cell culture medium designed to support the growth of HEK 293 cultures, and promote adenovirus and recombinant protein production. This regulatory-friendly medium was developed to support high cell density and specific cell productivity in suspension cultures.

HyClone SFM4Transfx-293™

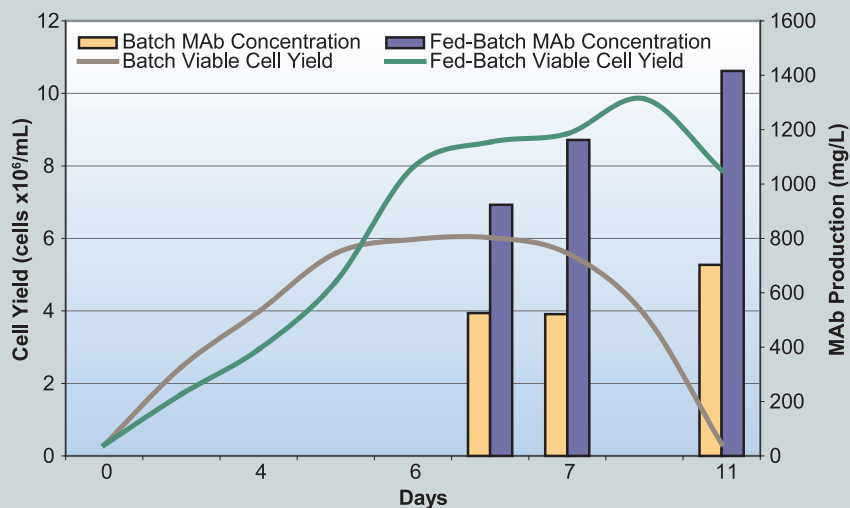
HyClone SFMTransfx-293 is a serum-free, animal derived component free medium designed to support the growth of HEK 293 cultures and promote transfection using lipofection or similar methods. This regulatory-friendly medium was developed to support high transfection efficiency, productivity and cell density in suspension cultures.

HyClone SFM4HEK293™

This versatile cell culture medium was developed to support the production of adenoviral vectors and recombinant proteins in HEK 293 cultures. HyClone SFM4HEK293 is a protein-free medium containing no animal derived components. It has been formulated for superior yields, and has been tested in a variety of culture systems including T-flasks, shaker flasks and bioreactors.

HyClone CDM4Retino™

HyClone CDM4Retino is a chemically-defined medium containing no animal derived components. This high performance cell culture medium has been developed to increase process yields in the production of adenoviral vectors and recombinant proteins using PER.C6® cells. It has been successfully tested in a variety of applications, including perfusion bioreactors.



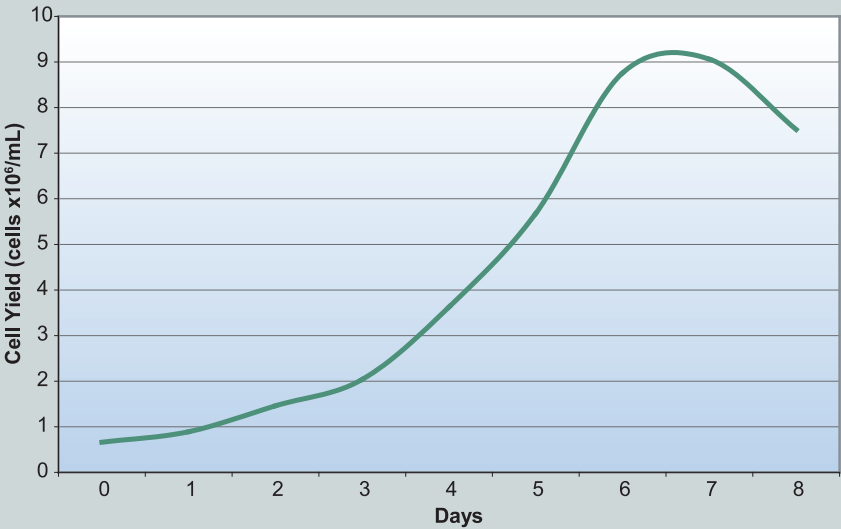
Production of CD46 antibody in PER.C6® cultured in HyClone CDM4PERMAb (Fed-batch culture employed on days 4, 6, and 8 using Cell Boost™ 5)

Insect Cell Culture

Many different insect cell lines have been developed for use with the baculovirus expression vector system (BEVS) for recombinant protein expression in a non-mammalian culture environment. Additionally, the development of stable transfected *Drosophila* and *Lepidopteran* cell lines has offered a non-lytic culture for the production of recombinant proteins from insect cells.

HyClone SFX-Insect™

This versatile protein-free cell culture medium is developed through the Metabolic Pathway Design™ approach to support the growth of multiple insect cell lines, and the production of a variety of recombinant proteins. It has been successfully tested in a variety of cell culture systems using Sf9, Sf21, T.ni, and D.mel(2) cell lines, requiring minimal adaptation.



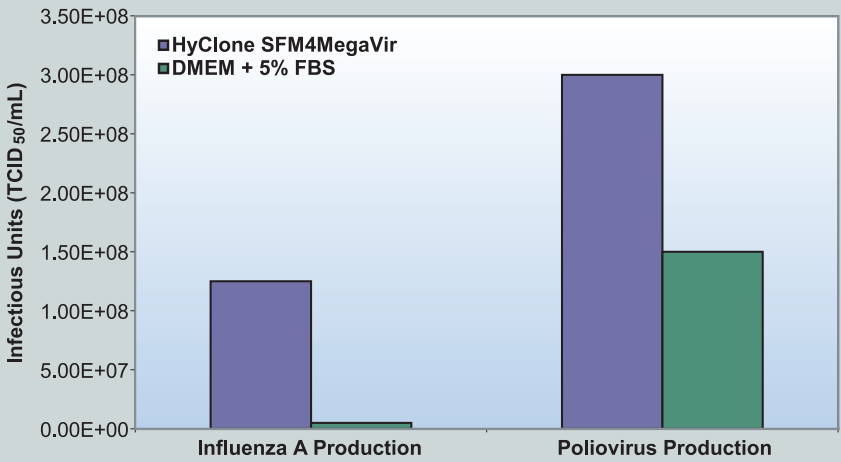
Growth kinetics of Sf9 cells cultured in HyClone SFX-Insect during a 1 L batch Wave bioreactor culture.

Viral Vaccine Cell Culture

The application of mammalian cell culture in the production of viral vaccines has been largely driven by concerns over egg-based manufacturing. The use of SFM for these applications has greatly increased as scale-up performance, consistency and lead times are considered. Key cell lines in this industry are the African green monkey kidney cell lines, Vero and COS-7, and the epithelial cell lines, MDCK and MDBK.

HyClone SFM4MegaVir™

HyClone SFM4MegaVir is a protein-free medium containing no animal derived components. It has been developed through the Metabolic Pathway Design approach to increase the process yields in the manufacture of viral vaccines in a variety of cell lines, including Vero, COS-7, MDCK and MDBK. It has been successfully tested in a variety of culture systems including cell factories and microcarrier bioreactor cultures.



Influenza A production using MDCK cells (MOI:10) and Poliovirus production using Vero cells (MOI:0.1) cultured in HyClone SFM4MegaVir and DMEM + 5% FBS.

Ordering Information

Description	Part #	Packaging														L-Gln	Storage Temp.	
		500 mL PETE	1000 mL PETE	5 L BPC	10 L BPC	20 L BPC	50 L BPC	100 L BPC	200 L BPC	500 L BPC	1 x 5 L	1 x 10 L	1 x 50 L	1 x 100 L	1 x 500 L			1 x 1000 L
CHO Cell Culture																		
HyClone CDM4CHO (Liquid)	SH30557	●	●	○	○	○	○	○	○	○						4 mM	2-8°C	
HyClone CDM4CHO (Liquid)	SH30558	●	●	○	○	○	○	○	○	○						No	2-8°C	
HyClone CDM4CHO (Powder)	SH30556										●	●	●	●	●	●	No	2-8°C
HyClone SFM4CHO (Liquid)	SH30549	●	●	○	○	○	○	○	○	○						4 mM	2-8°C	
HyClone SFM4CHO (Liquid)	SH30548	●	●	○	○	○	○	○	○	○						No	2-8°C	
HyClone SFM4CHO (Powder)	SH30518										●	●	●	●	●	●	No	2-8°C
HyClone SFM4CHO-Utility (Liquid)	SH30516	●	●	○	○	○	○	○	○	○						4 mM	2-8°C	
HyClone SFM4CHO-Utility (Powder)	SH30517										●	●	●	●	●	●	No	2-8°C
Hybridoma and Myeloma Cell Culture																		
HyClone CDM4MAb (Liquid)	SH30801	●	●	○	○	○	○	○	○	○							6 mM	2-8°C
HyClone CDM4MAb (Liquid)	SH30802	●	●	○	○	○	○	○	○	○						No	2-8°C	
HyClone CDM4MAb (Powder)	SH30800										●	●	●	●	●	●	No	2-8°C
HyClone CDM4NS0 (Liquid)	SH30579	●	●	○	○	○	○	○	○	○						No	2-8°C	
HyClone CDM4NS0 (Powder)	SH30578										●	●	●	●	●	●	No	2-8°C
HyClone SFM4MAb (Liquid)	SH30513	●	●	○	○	○	○	○	○	○						6 mM	2-8°C	
HyClone SFM4MAb (Liquid)	SH30391	●	●	○	○	○	○	○	○	○						No	2-8°C	
HyClone SFM4MAb (Powder)	SH30535										●	●	●	●	●	●	No	2-8°C
HyClone SFM4MAb-Utility (Liquid)	SH30382	●	●	○	○	○	○	○	○	○						6 mM	2-8°C	
HyClone SFM4MAb-Utility (Powder)	SH30550										●	●	●	●	●	●	No	2-8°C
HyClone ADCF-MAb (Liquid)	SH30349	●	●	○	○	○	○	○	○	○						4.5 mM	2-8°C	
HyClone ADCF-MAb (Liquid)	SH30547	●	●	○	○	○	○	○	○	○						No	2-8°C	
HEK293 and PER.C6® Cell Culture																		
HyClone SFM4Transfx-293 (Liquid)	SH30860	●	●	○	○	○	○	○	○	○						No	2-8°C	
HyClone SFM4Transfx-293 (Powder)	SH30861										●	●	●	●	●	●	No	2-8°C
HyClone CDM4HEK293 (Liquid)	SH30858	●	●	○	○	○	○	○	○	○						No	2-8°C	
HyClone CDM4HEK293 (Powder)	SH30859										●	●	●	●	●	●	No	2-8°C
HyClone CDM4PERMAb (Liquid)	SH30871	●	●	○	○	○	○	○	○	○						No	2-8°C	
HyClone CDM4PERMAb (Powder)	SH30872										●	●	●	●	●	●	No	2-8°C
HyClone SFM4HEK293 (Liquid)	SH30521	●	●	○	○	○	○	○	○	○						4 mM	2-8°C	
HyClone SFM4HEK293 (Powder)	SH30522										●	●	●	●	●	●	No	2-8°C
HyClone CDM4Retino (Liquid)	SH30520	●	●	○	○	○	○	○	○	○						4 mM	2-8°C	
HyClone CDM4Retino (Powder)	SH30519										●	●	●	●	●	●	No	2-8°C
Insect Cell Culture																		
HyClone SFX-Insect (Liquid)	SH30278	●	●	○	●	○	○	○	○	○						10 mM	2-8°C	
HyClone SFX-Insect (Powder)	SH30350										●	●	●	●	●	●	10 mM	2-8°C
Viral Vaccine Cell Culture																		
HyClone SFM4MegaVir (Liquid)	SH30552	●	●	○	○	○	○	○	○	○						No	2-8°C	
HyClone SFM4MegaVir (Powder)	SH30587										●	●	●	●	●	●	No	2-8°C

● Item in stock; ○ Item is made to order. Lead times and minimum order quantities apply.

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