



SERUM-FREE CELL CULTURE

The use of animal sera as a supplement for sustaining cell cultures continues to be widespread primarily because of unquestioned adherence to cited methods, perceived economy and convenience, and observable growth. However, such factors do not exactly equate to proper cell growth and function. Sera is comprised of more than 200 known components and an indeterminant number of unknown complexes. Thus, it is a complex composition which varies depending on the age, gender, nutritional state, and overall health of the donor animal. Additionally, sera is a common source of detrimental factors such as mycoplasma, viruses, prions, bacterial mitogens, hormones, extraneous protein, growth factors and proteases. The presence of any factor can directly affect the cell's growth rate, characteristics, adherence and genetic stability.

Serum-free cell culture offers significant advantages over more commonly employed serum supplemented methods. Chemically controlled systems eliminate the risk of the aforementioned detrimental contaminants and will substantially reduce variation from lot-to-lot yielding improved growth and reproducibility. Consequently, such systems offer better economy over the long-term maintenance of a given cell line as fewer antibiotics are needed and regular sampling of sera is eliminated. In addition, serum-free conditions permit detailed investigation into unique processes such as receptor activation, growth factor and cytokine interactions, and apoptosis cascades. These type of studies are extremely difficult with serum supplemented systems. Finally, comparative studies of murine hybridomas demonstrate comparable growth rates and consistently up to 20% more antibody secretion under serum-free conditions.

Serum-Free Culture Media

The following defined CELLect™ liquid and powdered media are recommended for serum-free cell culture and are ideal for use with any of ICN's serum replacement or serum reduction products.

Basal Medium Eagle (BME)

	Catalog No.	Quantity
1X BME Liquid with Earle's salts; w/o L-glutamine	1200254	500 ml
1X BME Liquid with Earle's salts and L-glutamine	1200354	500 ml
BME Powder with Earle's salts and L-glutamine;	1000120	10x1 liter
w/o sodium bicarbonate	1000122	1x10 liter
BME Powder with Hanks' salts and L-glutamine;	1003120	10x1 liter
w/o sodium bicarbonate	1003122	1x10 liter

See page 5 for an entire list of available BME media.

DMEM/F-12 Media

	Catalog No.	Quantity
1X DMEM/F-12 Liquid with sodium pyruvate, phenol red and pyroxidine HCl; w/o HEPES buffer and L-glutamine	1246754	500 ml
DMEM/F-12 Powder with phenol red and pyroxidine HCl; w/o L-glutamine, sodium pyruvate and sodium bicarbonate	1046920 1046922	10x1 liter 1x10 liter
DMEM/F-12 Powder with phenol red, pyroxidine HCl and sodium pyruvate; w/o L-glutamine and sodium bicarbonate	1046820 1046822	10x1 liter 1x10 liter
BioRich 1™ Powder with L-glutamine	1047120 1047122	10x1 liter 1x10 liter

F-10 Nutrient Medium

	Catalog No.	Quantity
1X F-10 Liquid w/o L-glutamine	1240249 1240254	100 ml 500 ml
1X F-10 Liquid with L-glutamine	1240349 1240354	100 ml 500 ml
1X F-10 Liquid with 20 mM HEPES; w/o L-glutamine and sodium bicarbonate	1240449 1240454	100 ml 500 ml
10X F-10 Liquid w/o L-glutamine and sodium bicarbonate	1440049 1440054	100 ml 500 ml
F-10 Powder with L-glutamine; w/o sodium bicarbonate	1040120 1040122 1040124	10x1 liter 1x10 liter 1x50 liter
F-10 Powder with L-glutamine; w/o sodium bicarbonate and hypoxanthine	1040220 1040222	10x1 liter 1x10 liter

F-12 Nutrient Medium

	Catalog No.	Quantity
1X F-12 Liquid with L-glutamine	1242354	500 ml
1X F-12 Liquid w/o L-glutamine	1242249 1242254	100 ml 500 ml
1X F-12 Liquid, Kaighn's Modification with L-glutamine	1242454	500 ml
F-12 Powder with L-glutamine; w/o sodium bicarbonate	1042120 1042122	10x1 liter 1x10 liter

Iscove's Modification of Dulbecco's Medium (IMDM)

	Catalog No.	Quantity
1X IMDM Liquid with L-glutamine, BSA, transferrin and lecithin (soybean)	1235854	500 ml
1X IMDM Liquid with L-glutamine, 25 mM HEPES and 2.52 g/L sodium bicarbonate; w/o BSA, transferrin and lecithin (soybean)	1235954	500 ml
IMDM Powder with L-glutamine; w/o BSA, transferrin, lecithin and sodium bicarbonate	1035720 1035722	10x1 liter 1x10 liter
IMDM Powder with L-glutamine; BSA, transferrin and lecithin; w/o sodium bicarbonate	1035520 1035522	10x1 liter 1x10 liter

NCTC 135 Medium

	Catalog No.	Quantity
1X NCTC 135 Liquid with L-glutamine	1291354	500 ml

Serum-free Cell Culture

ICN

Serum-free Cell Culture

RPMI 1640 Medium

	Catalog No.	Quantity
1X RPMI 1640 Liquid w/o L-glutamine pH 6.9-7.2	1260249 1260254	100 ml 500 ml
1X RPMI 1640 Liquid w/o L-glutamine pH 7.2-7.4	1265249 1265254	100 ml 500 ml
1X RPMI 1640 Liquid with L-glutamine	1260349 1260354	100 ml 500 ml
1X RPMI 1640 Liquid with 20 mM HEPES; w/o sodium bicarbonate and L-glutamine	1260449 1260454	100 ml 500 ml
1X RPMI 1640 Liquid with 25 mM HEPES and 4.75 g/L NaCl; w/o L-glutamine	1260554	500 ml
1X RPMI 1640 Liquid with 25 mM HEPES, 4.75 g/L NaCl and L-glutamine	1260649 1260654	100 ml 500 ml
1X RPMI 1640 Liquid Dutch Modification w/o L-glutamine	1260954	500 ml
10X RPMI 1640 Liquid w/o L-glutamine and sodium bicarbonate	1460049 1460054	100 ml 500 ml
RPMI 1640 Powder with L-glutamine; w/o sodium bicarbonate	1060120 1060122 1060124	10x1 liter 1x10 liter 1x50 liter
RPMI 1640 Powder with L-glutamine and 25 mM HEPES; w/o sodium bicarbonate	1060520 1060522	10x1 liter 1x10 liter

Serum-free Insect Medium

	Catalog No.	Quantity
1X SFIM Liquid with L-glutamine	2720154	500 ml
SFIM Powder with glutamine	1127220 1127222	10x1 liter 1x10 liter

Serum-free Mammalian Medium

	Catalog No.	Quantity
1X SFMM Liquid with L-glutamine	2011054	500 ml
1X SFMM Liquid with L-glutamine; w/o phenol red	2012054	500 ml

Serum-free Virus Production Medium

	Catalog No.	Quantity
1X SFVM Liquid with L-glutamine	2730154	500 ml
SFVM Powder with glutamine	1127320 1127322	10x1 liter 1x10 liter

Waymouth's MB 752/1 Medium

	Catalog No.	Quantity
1X Liquid MB 752/1 w/o L-glutamine	1252254	500 ml
MB 752/1 Powder with L-glutamine; w/o sodium bicarbonate	1052120 1052122	10x1 liter 1x10 liter

Serum Replacements and Serum Extenders

ICN's serum replacements address the deficiencies, limitations and difficulties associated with the use of whole serum. Researchers worldwide agree that ICN's innovative products- TCH™, TCM™, TM-235™, and VaxMax™- are superior for maintaining the consistent, long-term culture of a vast range of cell types including Vero, CHO, SP2/O, HeLa, DU145, MCF-7, human and murine hybridomas, LNCap, and HepG2.

The use of serum in cell culture continues widespread primarily because of unquestioned adherence to cited methods and perceived economy and convenience. Additionally, observable growth is often misinterpreted as proper cell function. But, the fact is that the composition of serum varies depending on the age, gender and overall health of the animal. Likewise, the collection time and seasonal factors can affect the quality of serum. Hence, components such as steroid hormones, growth factors and bacterial mitogens will vary from lot-to-lot. Serum is also a potential source of contaminants like mycoplasma, prions, viruses, and toxins. Any of which may affect the growth rate, phenotype, adherence and genetic stability of *in vitro* cultured cells.

- **TCH™** - a defined serum replacement formulated for supporting a vast range of human and mammalian cell lines.
- **TCM™** - a defined serum replacement specially formulated for supporting mammalian cell lines.
- **TM-235™** - a defined serum replacement similar to TCM™ specially formulated for supporting fastidious cell lines.
- **VaxMax™** - a serum extender offering improved economy by reducing the total serum requirement for most cell cultures.
- **ITS™ Premix** - a convenient supplement that reduces the total serum requirement for many cell cultures.

ICN's serum replacements and extenders eliminate the detrimental factors and variation associated with serum. They are free of detectable hormones, growth factors, cytokines, glucocorticoids, cell adhesion molecules and phenol red. Additionally, they are completely free of proteases, extraneous protein and infectious agents. Moreover, ICN's serum-free products offer the advantage of investigating unique processes not possible with serum including the cell regulation and adaptation to surface matrices devoid of serum artifacts, signal transduction receptor studies, the detailed investigation of cytokines and growth factors, drug discovery studies, and apoptosis mechanisms.

TCH™ is specially formulated for the propagation of human cell cultures and for the production of high purity cell secreted proteins. In addition, it has proven effective for culturing many other mammalian cell types needing no serum or additional animal protein. Similarly, TCM™ is a universal serum substitute specially formulated for supporting a vast range of mammalian cells. An insulin-free formulation is also available. TM-235™ offers the same advantages as both TCH™ and TCM™ but is specially formulated for fastidious cell lines with higher nutrient requirements. All three formulations offer superior performance and growth for the long-term maintenance of anchorage-dependent and suspension cell types.



ICN offers two serum extenders, VaxMax™ and ITS™ Premix. VaxMax™ is a serum-free convenient formulation that reduces the total serum requirement for most cell cultures. Cells types such as MDBK, MDCK, vero, CRFK, and swine testicle have demonstrated remarkable yields when supplemented with VaxMax™. Furthermore, it enhances production yields of veterinary vaccines while simultaneously reducing expense. VaxMax™ is typically used with 0.5-1% serum. ITS™ Premix also reduces the total serum requirement while stimulating proliferation for many cell types including rat contractile heart cells and human colon mucosal epithelial cells. This convenient preparation contains insulin, transferrin and selenium, and it requires as little as 2% serum for supporting diploid and heteroploid proliferation at equivalent or better growth rates.

TCH™ - Total Serum Replacement

*A universal serum replacement that supports human and mammalian cells
Completely free of virus, mycoplasma and other infectious agents
Contains no growth factors, steroid hormones, extraneous proteins or phenol red
Endotoxin - < 0.5 EU/ml
Supplied as a 50X concentrate
Total protein (diluted to 1X) - 650 µg/ml
Protein origin - human
Recommended storage - 4 - 8°C; stable for at least 7 months
Drug Master on file with the FDA*

Product	Catalog No.	Quantity
TCH™	2010026	20 ml
	2010049	100 ml
	2010022	2x100 ml

TCM™ - Total Serum Replacement

*A universal serum replacement that supports mammalian cells
Completely free of virus, mycoplasma and other infectious agents
Contains no growth factors, steroid hormones, extraneous proteins or phenol red
Endotoxin - < 0.5 EU/ml
Supplied as a 50X concentrate
Total protein (diluted to 1X) - 650 µg/ml
Protein origin - bovine (U.S.)
Recommended storage - 4 - 8°C; stable for at least 7 months
Drug Master on file with the FDA*

Product	Catalog No.	Quantity
TCM™	2020026	20 ml
	2020049	100 ml
	2020022	2x100 ml
TCM™, Insulin-free	2060026	20 ml

TM-235™ - Total Serum Replacement

*A universal serum replacement that supports a broad range of fastidious cells
Completely free of virus, mycoplasma and other infectious agents
Contains no growth factors, steroid hormones, extraneous proteins or phenol red
Endotoxin - < 0.5 EU/ml
Supplied as a 50X concentrate
Total protein (diluted to 1X) - 820 µg/ml
Protein origin - bovine (U.S.)
Recommended storage - 4 - 8°C; stable for at least 7 months*

Product	Catalog No.	Quantity
TM-235™	2040026	20 ml
	2040049	100 ml
	2040022	2x100 ml

VaxMax™ - Serum Extender

*A defined serum extender that reduces the total serum requirement for most cell cultures
Completely free of virus, mycoplasma and other infectious agents
Contains no growth factors, steroid hormones, extraneous proteins or phenol red
Endotoxin - < 0.5 EU/ml
Supplied as a 50X concentrate
Total protein (diluted to 1X) - 310 µg/ml
Protein origin - bovine (U.S.)
Recommended storage - 4 - 8°C; stable for at least 7 months*

Product	Catalog No.	Quantity
VaxMax™	2050049	100 ml
	2050054	500 ml

ITS™ Premix- Serum Extender

*A serum extender that reduces the total serum requirement for many cells
Completely free of virus, mycoplasma and other infectious agents
Contains insulin, transferrin and selenium
Each vial supplements 5 liters of medium
Requires as little as 2% serum to yield equivalent or better growth rates
Recommended storage - 4 - 8°C*

Product	Catalog No.	Quantity
ITS™ Premix	2001227	1 vial