Product Profile

Product Name:	*MEM Eagle Glasgow Modification with Tryptose Phosphate Broth and Sodium Bicarbonate*
Product Catalog Number	*01-060-1*
Unit Size Availability:	(A)500ml ;(B)100ml
Concentration:	*1X*
Formulation:	Red-Colored Solution
Specified Storage Conditions:	2-8°C
Stability: (Under Specified Handling & Storage)	*Please Refer to the Product Label*

Important Note! Please read the *MSDS* and *Product Profile* carefully in their entirety *before* using this material for possible safety precautions and potential hazards.

Product Description:

MEM Eagle Glasgow Modification with Tryptose Phosphate Broth and Sodium Bicarbonate is a defined basal medium originally developed as a modification of Eagle's Medium (BME) with the addition of 10% tryptose phosphate and twice the normal concentrations of Amino Acids and Vitamins. It is a medium not only utilized to promote the growth of baby hamster kidney cells (BHK-21) but also to study the genetic factors impacting cell competence. Glasgow's Modification MEM was uniquely designed and formulated not only quantitatively but also qualitatively to provide a defined and optimally balanced cell culture milieu that selectively promotes the growth of specific cell types.

Tryptose Phosphate Broth

Tryptose Phosphate Broth (TPB) is a versatile, nutritionally rich buffered glucose broth invaluable in specific cell and tissue culture procedures as an adjuvant. It is a mixed enzymatic hydrolysate with unusual nutritional properties. Ginsberg, *et..al*., maintained tissue cultures of HeLa cells for at least 10 days in TPB with other maintenance solutions and serum. The peptone content of TPB is considered to be stimulatory for cells. Litwin not only found that Tryptose is well-suited as a supplementary factor in serum-free media for growing human diploid fibroblasts but also Vaughn and Fan provided free amino acids necessary for the growth of some insect cell lines(e.g. *Spodoptera frugiperda*) TPB is purported to be an appropriate supplement for the growth of not only Porcine kidney cells but also for the growth of baby hamster kidney cells.TPB is well-known in the field of Microbiology utilized for the cultivation of fastidious microorganisms (e.g. meningococci, pneumococci, streptococci). Whereas peptone provides carbon and nitrogen, Dextrose serves an additional carbon source. NaCl functions in maintaining osmotic balance and disodium phosphate in a buffering capacity.

Sodium Bicarbonate

Culture media are often buffered to compensate for the cellular production of CO_2 and Lactic Acid as by-products of metabolism. Traditionally, Basal Cell Culture media have been buffered by HCO_3^- (Bicarbonate). As cells grow, CO_2 evolves; the dissolved CO_2 forms a buffering system with the bicarbonate. However, if cell density is low or the cells have entered into the so-called "Lag Phase," they may not produce sufficient CO_2 to maintain optimal pH and to counter these potential problems, Bicarbonate-Buffered media require the use of incubators with a 5-10% CO_2 atmosphere. Media with low levels of bicarbonate (HCO_3^-) on the one hand, such as MEM(@1.5-2.2g/l) require ~5% CO_2;DMEM with higher levels of bicarbonate (i.e., 3.7g/L) on the other, require 10% CO_2 in order to maintain the correct pH level. The most important factor in utilizing the correct percent CO_2 is based upon the medium's bicarbonate level to maintain physiological pH, which is irrespective of cell type.

Amino Acids

Amino acids are the building blocks (i.e. linear chains of amino acids) of proteins and proteins have a variety of functions in metabolism, may be precursors for the biosynthesis of other biological molecules, function with coenzymes, are critical to life and are therefore needed by every living organism. An amino acid is a molecule containing both amine and carboxyl functional groups. Proteins are chains of amino acids linked together by peptide bonds. Chemically speaking, they are carboxylic acids which have an amine group attached to it. Next to water, protein makes up the largest portion of our body weight as it is contained in all the muscles, body organs, hair, nails and other body systems. There are more than 500 amino acids which occur in nature of which humans can produce 10 of 20 amino acids; the others must be supplied by the diet. Unlike fat and complex carbohydrates, the human body does not store excess amino acids as a reserve; they must be supplied in the diet every day.

Amino acids are incorporated into proteins. At a minimum, basal medium must contain the essential amino acids-those amino acids that cannot be synthesized at a rate to meet the metabolic requirements of the cells in culture. Some more specialized media often have non-essential amino acids (NEAA's) added to ensure that amino acids do not limit the maximum cell concentration attainable.

Vitamins

Vitamin supplementation of cell culture media not only stimulates the growth and prolongs cell viability but is also essential for cell multiplication. The concentration of vitamins is essential in terms of cell survival and growth rate rather than directly affecting maximum cell density. Not only and most commonly is the B-group of vitamins added for cell growth and proliferation especially Vitamin B_{12} (Cyanocobalamin) but also in certain media, ascorbic acid (Vitamin C) and α-tocopherol (Vitamin E) are included. Many media are enriched with vitamins making them consistently more suitable for a wider range of cell lines and are generally included in all formulations and function as catalysts or substrates to facilitate or control certain metabolic functions. Some media also have increased levels of vitamins A & E. The Water-Soluble Group (WSG) of vitamins most commonly utilized in cell culture media include Thiamine (B_1) ,Riboflavin(B_2), and Biotin(Vitamin H).

Serum As A Vitamin Source

Although serum is an important source of vitamins with a medium, when serum is reduced or eliminated, an increased or novel requirement often becomes apparent. Low vitamin levels can impact not only cell survival but also the growth rate dynamic as their absence becomes limiting from the perspective of metabolism as vitamins are the precursors of enzymatic cofactors. Organic cofactors are known as coenzymes and many coenzymes are vitamin B derivatives.

Vitamins are defined as a group of complex low-molecular weight organic compounds present in minute amounts that are essential to normal metabolism of which an absence or lack thereof leads to deficiency diseases. Vitamins consist of a mixed group of chemical compounds and are not related to each other as proteins, carbohydrates and fats. Their classification together depends not on their chemical characteristics but on function. The vitamins are differentiated from the trace elements by their organic nature.

Vitamins are required in trace amounts in the diet for health, growth and maintenance. Omission of a single vitamin from a particular species that requires it will produce deficiency signs or symptoms. While many vitamins function as coenzymes (i.e. as metabolic catalysts) others have no such role *per se* but perform unique and particular essential functions.

There are two groups of vitamins: the Water-Soluble which are referred to as the Vitamin B Complex Group and the Fat-Soluble Group designated by the letters A, D, E and K.

Glucose

Glucose is an energy source (usually with L-Glutamine supplementation) for most media. Traditional glucose levels in culture media usually range from 1-4..5 g/l. From a general perspective, it may be said that cell line metabolic rate is directly proportional and thus correlates to the optimal glucose level. A cell line known to grow at a slow pace will grow in low or high glucose levels. However, a cell line with faster-growing cells requires higher glucose levels to maintain its metabolic rate and exposure to lower-than-optimal glucose levels in such characteristically fast-growing milieu may induce these types of cell lines to enter a lag phase. When utilized as supplements, Sodium Pyruvate like Glutamine and Glucose are considered to be important constituent s of most media and are now recognized as an easily accessible additional carbohydrate energy source.

Most common types of media consists of an isotonic, buffered basal nutrient enriched environment which provides an energy source, inorganic salts, vitamins, amino acids as well as additional constituents(e.g. supplements) according to the demands of a particular cell line. This relatively more complex medium formulation provides the optimal cell-culture environment in which *in vitro* culture conditions mimic those of the *in vivo* environment including basic nutritional requirements, osmotic pressure, physiological pH, temperature among other considerations. At a minimum, it consists of the foundation medium components that are all part and parcel of a pre-tested complete media to assist the cells in meeting their metabolic demands.

MEM Eagle Glasgow Modification contains numerous important basic constituents in a ready-to-use formulation that includes a typical and wide variety of elements, among others:

- 2X Amino Acids & Vitamins
- Glucose
- Inorganic Salts
- Trace Elements
- 10% Tryptose Phosphate Buffer

Some Predominant Characteristics of *MEM Eagle Glasgow Modification include*:

- Liquid Formulation
- With D- Glucose
- With Tryptose Phosphate Buffer(TPB)
- With Sodium Bicarbonate($NaHCO_3$)
- With Phenol Red($C_{19}H_{13}NaO_5S$) as a pH indicator
- Without L-Glutamine
- More Uniform & Consistent Media Performance
- Sterile-Filtered(0.1µ),Cell-Culture and Endotoxin-Tested

Storage, Handling, Stability Precautions and Disclaimer:

For *in vitro* diagnostic use only.

MEM Eagle Glasgow Modification is stable when stored under defined conditions at 2-8°C. The product is light-sensitive and therefore should not be left in the light. When stored in the dark under ideal conditions, the product is stable until the expiry date.

As with any other liquid media formulations, *deterioration of liquid media* may be recognized by any of the following characteristics, among others including: (a). Color Change, (b). Presence of clumping/flocculent debris/ granulation/ particulates\ precipitates or sediments (c). Insolubility, (d). And/or decrease in expected performance parameters. Any material described above should not be used and therefore discarded.

Instructions/Procedure:

1) Take a bottle from the defined storage conditions at 2-8°C and read the label. Allow to warm to room temperature (15-30°C) prior to use.

2) Ensure that the bottle cap is tight. and gently swirl the bottle for homogeneity.

3) Wipe the outside of the bottle with a disinfectant solution such as 70% ethanol.

4) Using aseptic/sterile technique under a laminar-flow culture hood, work according to established protocols.

Quality Control:

Test	Specification
Appearance:	Clear Solution
Cell Culture:	Test & Record
Cell-Line:	A-549
Osmolality:	325-349 mOsm/kg
pH :	7.0-7.5
Sterility:	Sterile

Auxiliary Products

Product Name	Catalog Number	Storage Temperature
DMEM Low Glucose 5X, without L-Glutamine, without Sodium Bicarbonate	01-050-4	15-30°C
DMEM with D- Glucose 4500mg/L,without Sodium Pyruvate, without L-Glutamine, without Phenol Red	01-053-1	2-8°C
DMEM with D- Glucose 4500mg/L,without Sodium Pyruvate, without L-Glutamine, without L-Methionine	01-054-1	2-8°C
DMEM with D- Glucose 4500mg/L,without Sodium Pyruvate, without L-Glutamine	01-055-1	2-8°C
DMEM 5X Conc.,with D- Glucose 4500mg/L, without L-Glutamine, without Sodium Pyruvate,	01-055-4	Room Temperature(15-30°C)
DMEM High Glucose 2X, without L-Glutamine, with Sodium Bicarbonate	01-055-9	2-8°C
DMEM with D- Glucose 4500mg/L,without Sodium Pyruvate, with Stable Glutamine	01-056-1	2-8°C
DMEM without D- Glucose ,without Sodium Pyruvate, without L-Glutamine	01-057-1	2-8°C
Iscove's Modified Dulbecco's medium(IMDM),with L-Glutamine, without Alpha-Thioglycerol, without Beta-Mercaptoethanol	01-058-1	2-8°C
MCDB-153(Modified)	01-059-1	2-8°C
L-Glutamine Solution 29.2mg/ml in Saline	03-020-1	-20°C
L-Alanyl-L-Glutamine Solution(A Dipeptide Substitute)	03-022-1	-20°C
Penicillin-Streptomycin Solution	03-031-1	-20°C
Sodium Pyruvate	03-042-1	-20°C
Water, Cell Culture Grade	03-055-1	Room Temperature (15-30°C)
Fetal Bovine Serum	04-001-1	-20°C
Fetal Bovine Serum(Qualified for Human Embryonic Stem Cells)	04-002-1	-20°C
Adult Bovine Serum	04-003-1	-20°C
DMEM with D- Glucose 1000mg/L, with Sodium Pyruvate 110mg/L, with Hepes(20mM)	06-1050-18-1	2-8°C
Note: For a list of Antibiotics, Serum or other Reagents and Supplements, please refer to our Product Catalog/Product Profiles/ Product Guides and Internet Site.		

References:

1) Biological Industries (BI) Specifications
2) Darling, D.C. and Morgan S.J. Animal Cells: Culture and Media, John Wiley & Sons, New York, 1994
3) O'Neil Maryadele *et. al*., The Merck Index, 14th Edition, Whitehouse Station, New Jersey, 2006
4) Lackie, J. M. The Dictionary of Cell & Molecular Biology, Academic Press: London, 2007
5) Ginsberg, Gold, and Jordan. *Proceedings Soc. Exp. Biol. Med.* 89:66(1955)
6) Litwin. "Further Studies on a Tryptose Based Serum-Free Medium for Human Diploid Fibroblasts" *Dev. Biol. Stand.* 60:25-33(1985)
7) Vaughn and Fan. "Differential Requirements of Two Insect Cell Lines for Growth in Serum-Free Medium." *In Vitro Cell. Dev. Biol. Anim.* 33: 479-482.(1997)