Product Name

Name: DMEM, without D-Glucose, Sodium Pyruvate, L-Glutamine

Cat. No.: C3122-0500

Size: 500 mL

Product Description

DMEM, without D-Glucose, without Sodium Pyruvate, without L-Glutamine is a Dulbecco's modification of Eagle's medium (BME) that is considered one of the more common (e.g., MEM & RPMI) but less complex media in contrast to enriched media like Ham's F-12 or CMRL among others, which are utilized not only for more specialized cell types but also as the basis for some of the more unique serum-free media formulations. DMEM contains concentrations of amino acids (AA's) and vitamins in addition to other ancillary constituents. The original DMEM formulation contains 1000 mg/L of glucose and was first reported for culturing mouse embryonic cells (MEC). A higher glucose level (4500 mg/L) in some DMEM formulations has proven to be optimal for the cultivation of many other cell types. This medium contains no L-Glutamine, neither D-glucose nor sodium pyruvate that are usually part and parcel of many media formulations.

L-Glutamine

When used as a supplement, L-Glutamine, a precursor of glutamate, is one of the most readily available sources of energy for many rapidly dividing cell-types for use in vitro and a central and key participant in nitrogen metabolism. Although L-Glutamine supports the growth of cells with high energy demands and cells that synthesize large quantities of nucleic acids and proteins, it is relatively unstable. L-Glutamine is simply a readily available and viable alternative energy source for rapidly dividing cells as well as for cells that utilize glucose but in an inefficient manner. The resultant glucose-deficiency must offset this imbalance in order to meet the high energy demands of the cells. This is where the amino acid comes into play, and once deaminated, L-Glutamine is utilized as an essential energy source, segued into protein and lipids and participates in nucleic acid metabolism. If a longer shelf-life of the medium is needed, L-Alanyl-L-Glutamine (stable glutamine) is preferred over the regular L-Glutamine as L-Alanyl-L-Glutamine is a much more heat-stable dipeptide substitute for L-glutamine.

Glucose

Glucose is the main energy and carbon source (along with L-Glutamine) in 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 the metabolic rate of a cell line is directly proportional and thus correlates to the optimal glucose level. A cell line known to grow at a slow pace will grow well in low or high glucose levels. However, faster-growing cells requires higher glucose levels to maintain its metabolic rate, and exposure to lower-than-optimal glucose levels may induce them to enter a lag phase.

Pyruvate

Pyruvate can serve several masters. It, not only, can be further oxidized to produce energy and CO_2, but it may also be converted to lactate as it segues into the Krebs Citric Acid Cycle. However, in some cell lines, the Kreb's Cycle does not function normally, and therefore their dependence on an alternative energy

source, such as glutamine, may be very high. Supplementation, when needed, with sodium pyruvate serves as an additional and easily accessible carbohydrate energy source for cells in culture. Along with D-glucose, these balanced energy sources serve as the carbon skeletons for the anabolic processes in addition to nucleic acid metabolism and protein synthesis while limiting the potential accumulation of toxic ammonia.

Like glutamine and glucose, sodium pyruvate is considered to be an important constituent of many culture media and is now recognized as an easily accessible carbohydrate energy source. Pyruvate, an anion of pyruvic acid, is the end product of glycolysis in which organisms break down glucose into lactic acid in the absence of molecular oxygen for the purpose of obtaining chemical energy. In glycolysis, glucose is converted to pyruvate with the production of adenosine triphosphate (ATP). Glycolysis is just one of several pathways used by different species to degrade glucose anaerobically. In the mitochondria of aerobic organisms, pyruvate is converted to acetyl-CoA in mitochondria which in turn is completely oxidized to carbon dioxide (CO_2). Acetyl CoA is not only the initiator for the Krebs cycle, but it is formed during the metabolism of fats, certain amino acids and also is utilized in the biosynthesis of a variety of larger molecules. The Krebs cycle does not consume energy; it produces it very efficiently. The cycle is fed by pyruvic acid from the anaerobic glycolysis pathway. Glycolysis releases energy and part of that energy goes to the conversion of ATP where it is stored. ATP provides the energy which drives cellular metabolic reactions and is considered the most important high-energy compounds in cells. Approximately 70% of the energy in the ATP comes from carbohydrate metabolism.

Most common types of media consist 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 which mimics the in vivo environment including basic nutritional requirements, osmotic pressure, physiological pH, temperature, and 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.

DMEM, without D-Glucose, without Sodium Pyruvate, without L-Glutamine contains no growth-promoting factors or antimicrobials. Whether DMEM or other media should be used is dependent upon the type and character of the cells in culture. Supplementation is also needed when specific additions or supplements (e.g., growth factors, serum, fatty-acids, buffers, and hormones) complement a typical basal or balanced salt solution medium or more complex media, such as Iscove's modification of DMEM.

Sodium Bicarbonate

Culture media are often buffered to maintain the pH as the production of CO_2 and lactic acid are formed as the by-products of metabolism. Traditionally, basal cell culture media have been buffered by HCO_3- (the bicarbonate ions). As cells grow, CO_2 evolves; the dissolved CO_2 forms a buffering system with the bicarbonate ions. 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 the optimal pH, and to counter these potential problems, the bicarbonate-buffered media require the use of incubators with a 5-10% CO_2 atmosphere. Media with low levels of bicarbonate, on the one hand, such as MEM (1.5-2.2 g/L) require ~5% CO_2 and DMEM with higher levels of bicarbonate (i.e., 3.7 g/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 of CO_2 is based upon the medium's bicarbonate level to maintain physiological pH, which is not relevant to the cell type.

DMEM, without D-Glucose, without Sodium Pyruvate, without L-Glutamine contains numerous important basic constituents in a ready-to-use formulation that includes a typical and wide variety of constituents, among others:

- Amino acids
- Glucose
- Inorganic salts
- Vitamins
- Trace elements

Predominant Characteristics

- Liquid formulation
- Without D-glucose
- Without sodium pyruvate
- Without L-Glutamine
- With sodium bicarbonate ($NaHCO_3$)
- With phenol red($C_{19}H_{13}NaO_5S$) as a pH indicator
- More uniform & consistent media performance
- Sterile filtered (0.1 μm)
- Cell culture performance and endotoxin Tested

Storage and Stability

The product should be kept at **2 - 8°C.**
The product is **light-sensitive** and therefore should not be left in the light.
Shelf life: 12 months from date of manufacture.

Procedure

1. Take a bottle from the refrigerator at 2 - 8°C and read the label.
2. Wipe the outside of the bottle with a disinfectant solution such as 70% ethanol.
3. Pipette appropriate volume using aseptic/sterile technique under a laminar-flow culture hood.
4. Add antibiotics or other nutrients if desired.

Quality Control

DMEM, without D-Glucose, Sodium Pyruvate, L-Glutamine is tested for sterility, pH, osmolality, and endotoxin concentration. In addition, each batch is tested for cell growth performance.

Precaution and Disclaimer

For research use only, not for clinical diagnosis, and treatment.