D(+)- Trehalose dihydrate

Cell Culture Tested

Product Code: TC177

Product Description :

Molecular Weight: 378.33
Molecular Formula: $C_{12}H_{22}O_{11}\cdot 2H_2O$
CAS No.: 6138-23-4
Synonym: α,α-Trehalose, α-D-Glucopyranosyl-α-D-glucopyranoside

Trehalose is a disaccharide composed of two glucose molecules bound by an alpha, alpha-1, 1 linkage. Since the reducing end of a glucosyl residue is connected with the other, trehalose has no reducing power. Trehalose is widely distributed in nature. It is known to be one of the sources of energy in most living organisms and can be found in many organisms, including bacteria, fungi, insects, plants, and invertebrates.

In cell culture, trehalose is used as a cryoprotectant. Commonly employed cryoprotectant for mammalian and insect cells is DMSO, which has low molecular weight and penetrates the cells, protecting them at intracellular level. In contrast to DMSO, disaccharides such as trehalose have high molecular weight and do not penetrate the cells, protecting them at extracellular level.

Trehalose is superior to other disaccharides like sucrose as a cryoprotectant. It interacts more strongly with water than does sucrose. Moreover, at the phospholipid bilayer of cell membranes trehalose is able to displace water molecules bound to carbonyls, but sucrose is not.

Trehalose is stable, highly resistant to hydrolysis and chemically inert in its interaction with proteins. It has ability to stabilize phospholipids and proteins due to direct interaction between sugar and polar groups during freeze-drying or air-drying.

It is majorly useful in cryopreservation of sperms, oocytes, platelets, macrophages and other blood cells, fibroblasts, retroviruses and most importantly embryonic stem cells. Studies on cryoprotection of fish ES cells have shown that when trehalose is used for cryopreservation of fish ES cells, pluripotency (undifferentiated state) of the cells is retained after recovery. This property would be highly useful for future in vitro differentiation and manipulation of ES cells.

In addition to its usage in cryopreservation of cells, trehalose is also used in preservation of macromolecular assemblies such as bioactive proteins, antibodies, liposomes and enzymes. It protects enzymes from heat inactivation *in vitro* and reduces formation of protein aggregates.

Trehalose is a non-reducing sugar and does not react chemically with amino acids or proteins during processing and storage. Owing to its unique chemical structure, trehalose remains stable under low pH conditions, even at elevated temperatures. Unlike other disaccharides, including sucrose, it does not readily hydrolyze to its component parts and subsequently take part in Maillard reactions with amino acids and proteins.

Directions :

Preparation instructions:
Trehalose is soluble in water (50mg/ml). Trehalose solutions are sterilized by filtering through a sterile membrane filter with porosity of 0.22 microns or less.

Quality Control:

Appearance
White powder.

Solubility
Clear colorless solution at 5gm in 100ml of water.

pH of 5% solution in water
5.00 -7.00

Assay
NLT 98%

Cell Culture Test
Passes

Insect Cell Culture Test
Passes

Storage and Shelf Life:

Store at 10-30°C away from bright light.
Shelf life is 48 months.
Use before expiry date given on the product label.
Store trehalose solutions at 2-8°C.

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