The Importance of Trehalose Sugar

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ARTICLE INFO

Received: September 16, 2019
Published: September 20, 2019

Citation: Kahraman H, Budak Zk. The Importance of Trehalose Sugar. Biomed J Sci & Tech Res 21(3)-2019. BJSTR. MS.ID.003608.

ABSTRACT

Keywords: Trehalose; Effect; Microorganisms

Introduction

Trehaloz was first discovered in 1832 by Wiggers in the ergoda bit plant. In 1859, Berhelot was able to isolate trehalose from trehala, a substance produced by wheat plants. The enzyme responsible for the hydrolysis of trehalose was first detected in yeast. Trehalose is a sugar molecule consisting of the binding two glucose by the α-1-1 bond. Trehalose is non-reducing because it is formed by the coupling of two reducing groups. This bond also ensures that trehalose is not affected by acid hydrolysis. Therefore, it can maintain its stability even in acidic environments and high temperatures. Because of this bond; aldehydes and ketones do not bind to protein ends such as arginine and lysine. Until recently, only a few plants species - drought tolerant plants - were thought to synthesize trehalose. However, it was later found that trehalose was found in animals, plants and microorganisms (including Arechaea) in nature. Plants and animals are able to produce trehalose when they are in dry conditions and in dry conditions for a long time. Moisture retention is very high. Therefore, it is widely used in cosmetics and food industry.

When the cell is dehydrated, the sugar in the cell forms the gel phase. As a result, intracellular organelles are protected from adverse conditions. Stoplasmic membranes have a protective role against drying, freezing and heat stress. During the rehydration, the cells can return again without disturbing their normal activity that constitutes the dehydration/rehydration cycle. At this stage, trehalose may also serve as an antioxidant [1-10]. Trehalose can accumulate in the cell at high concentrations without disrupting the biological functions of proteins, lipids and DNA. Such a compatible solute is trehalose; dehydration, osmotic shock, extreme temperature, oxidative damage and even radioactive damage. Trehalose also exerts its effects on living organisms by preventing protein denaturation. In addition, trehalose protects DNA and prevents stress breakage of membranes [8]. Trehalose may be used as a “non-toxic cryoprotective agent with long-term biocompatibility and bioavailability” [11]. It has a taste characteristic corresponding to 45% of sucrose. It has much less dissolution property than sucrose at temperatures below 80°C.

In addition, the anhydrate trehalose form has the property of retaining moisture by forming dihydrate. Isolation of trehalose: both complex and expensive. Today however, it can easily be isolated from starch by the extraction method. It also acts as an energy storage component. Trehalose is the most important energy source for flying insects. Trehalose is a major constituent of the circulatory fluid, especially of shrimp and insects. This is because when trehalose is broken down by trehalase, it converts to two glucose molecules and provides the high amounts of energy required. When the tadrigates are left in an anhydrous environment, the glucose molecule turns into trehalose in the cryoprotosis stage (a stage in which it appears lifeless). Trehalose enzyme; it is also found in the human body, although not in high amounts. Enzymes in the stomach break down trehalose into two glucose molecules [12]. Trehalose is recognized as a new food additive in the US and...
Trehalose has many applications in foods, beverages, and pharmaceutical manufacturing processes. Three metabolic pathways for biosynthesis have been reported in microorganisms. Water retention is known to be high. This characteristic feature are used; food, cosmetics and pharmaceutical industry. Trehalose; fermentation plays an important role in acid resistance, ethanol resistance and cold resistance in different microorganisms [14]. It plays an important role in stress conditions as a protective agent and as a structural component of the cell wall. The best-known example is trehalose dimicolate, which is important in the virulence process of Mycobacterium tuberculosis. Trehalose has many applications in the pharmaceutical, food and cosmetic industries due to its special properties [4]. In some cases, particularly in yeasts and plants, it also functions as a molecule that induces or suppresses certain metabolic pathways. Trehalose accumulates in many bacteria as a compatible soluble substance at high osmolarities and is synthesized in a number of biosynthetic ways [6]. Water retention is known to be high.

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