Enzymatic Production Of D-Tagatose

CROSS-REFERENCE TO RELATED APPLICATIONS

[1] This application claims priority to U.S. Application Ser. No. 62/236,226, filed on October 2, 2015, which is incorporated herein by reference.

FIELD OF THE INVENTION

[2] The invention relates to preparation of the sugar D-tagatose. More specifically, the invention relates to methods of preparing D-tagatose by enzymatically converting saccharides (e.g., polysaccharides, oligosaccharides, disaccharides, sucrose, D-glucose, and D-fructose) into D-tagatose.

BACKGROUND OF THE INVENTION

[3] D-tagatose (tagatose hereafter) is a low-calorie, natural sweetener that has 92% the sweetness of sucrose, but only 38% of the calories. It is a naturally occurring monosaccharide hexose that is present in only small amounts in fruits, cacao, and dairy products. Tagatose was approved as a food additive by the Food and Drug Administration (FDA) in 2003, which designated it as generally recognized as safe (GRAS). However, due to tagatose's high selling prices, its use as a sweetener has been limited. Tagatose boasts a myriad of health benefits: it is non-cariogenic; it is low-calorie; it has a very low glycemic index of 3; it attenuates the glycemic index of glucose by 20%; it can lower average blood glucose levels; it helps prevent cardiovascular disease, strokes, and other vascular diseases by raising high-density lipoprotein (HDL) cholesterol; and it is a verified prebiotic and antioxidant. Lu et al., Tagatose, a New Antidiabetic and Obesity Control Drug, Diabetes Obes. Metab. 10(2): 109-34 (2008). As such, tagatose clearly has a variety of applications in the pharmaceutical, biotechnological, academic, food, beverage, dietary supplement, and grocer industries.

[4] Currently tagatose is produced predominantly through the hydrolysis of lactose by lactase or acid hydrolysis to form D-glucose and D-galactose (WO 2011150556, CN 103025894, US 5002612, US 6057135, and US 8802843). The D-galactose is then isomerized to D-tagatose