POLYDEXTROSE

Technical Bulletin

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DESCRIPTION

Polydextrose (trade name Litesse®) is normally utilized as a sucrose replacement in conjunction with high intensity sweeteners such as sucralose (Splenda®) or aspartame (Nurtisweet®). It is used effectively as a low calorie bulking agent in foods such as ice cream, hard and chewy candies, nutrition and supplement bars, and beverages. [Recently polydextrose has been formulated into many reduced carbohydrate products in as much as polydextrose is water soluble, resistant to digestion in the human small intestinal tract, but partially fermented in the large intestine leading to physiological effects consistent with soluble dietary fibers.] Polydextrose has 1 kcal/gram as opposed to normally digested carbohydrates which have 4 kcal/gram.

CHEMISTRY

Polydextrose is described in its Foods Chemicals Codex (FCC) Monograph as a randomly bonded (the 1,6-glycosidic linkage predominates) condensation polymer of D-glucose, sorbitol, and citric acid. Commercial polydextrose also contains small amounts of free glucose, sorbitol, citric acid, and 1,6-anhydro-D-glucose (levoglucosan). Polydextrose has a broad molecular weight range (162 to 20,000) with 90% of the molecules being between 504 and 5,000 mw. The average degree of polymerization is 12: average molecular weight of approximately 2000.

NUTRITION INFORMATION

Polydextrose resists digestion and absorption in the small intestine, is partially fermented in the large intestine, with a substantial remainder excreted in the feces as shown in several studies demonstrating physiologic effects consistent with those of dietary fiber. Partial fermentation in the large intestine, leads to increased fecal bulk, reduced transit time, softer stools, and lower fecal pH. Fermentation of polydextrose also leads to the increased growth of favorable microflora, diminished proportions of putrefactive microflora, enhanced production of short-chain fatty acids and suppressed production of carcinogenic metabolites (e.g. indole and *p*-cresol).

ASSAY PRINCIPLE AND APPLICABILITY

Because it is soluble in 80% ethanol, Polydextrose does not analyze as dietary fiber using standard AOAC enzyme-gravimetric methods (e.g. 985.29 or 943.41). Samples containing polydextrose are analyzed using AOAC Official Method of Analysis 2000.11, an alternative method that removes high molecular weight interferences and uses high-pressure anion exchange chromatography with electrochemical detection for quantitation. Although a definitive regulatory definition of fiber has not been published in the US, the AACC, NAS, and Codex have included polydextrose in the fiber definition. Commercial Polydextrose is considered to have 90% fiber content (i.e. MW 504-DP3 or greater), so the value obtained by AOAC 2000.11 should be multiplied by 0.9 if the results are going to be expressed as fiber. If Polydextrose is being declared as dietary fiber, the value obtained from AOAC 2000.11 can be added to the TDF value determined by enzyme-gravimetric methods without concern for double counting, since Polydextrose gives no significant total dietary fiber (TDF) value by AOAC 985.29 or 943.41.

Lower Detection Limit	0.2 g/100g (w/w)
Reporting Units	g/100 g (polydextrose per AOAC 2000.11)
Information required with sample	Estimate of concentraton
Special Notes	Indicate if sample contains other resistant maltodextrins or other dietary fibers. Indicate what type of polydextrose is present (e.g. hydrogenated or non-hydrogenated).

REFERENCES:

American Association of Cereal Chemists, Expert Committee on the Definition of Dietary Fiber, Cereal Foods World, July 2000, p 325, Cereal Foods World, March 2001, pp 112-129.
National Academies, Institute of Medicine, Panel on the Definition of Dietary Fiber, Dietary Reference Intake Report, 2003, Chapter 7.
Codex Committee on Nutrition and Foods for Special Dietary Uses, Draft Paper on Dietary Fiber Definition, 2004.

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