Glico

Product Description for Highly Branched Cyclic Dextrin (Cluster Dextrin®)

Cluster Dextrin® is GRAS

Cluster Dextrin® is produced from amylopectin by using a cyclization reaction with a branching enzyme as shown in the Figure 1. The branching enzyme catalyzes formation of alpha-1,6-glucosidic linkages of starch or glycogen *in vivo*. Amylopectin, which is the major component of starch, is a highly-branched glucan and is composed of a number of cluster units. The branching enzyme mainly cleaves the connecting chain of the cluster units of amylopectin *in vitro*.

Because of high specificity of the branching enzyme, Cluster Dextrin® has a narrow molecular-size distribution compared with other commercially available dextrins (Fig. 2).

The major component of Cluster Dextrin® is a highly-branched cyclic dextrin, for which the weight-average degree of polymerization is 2,500. The cyclic portion of the highly-branched cyclic dextrin is composed of 16-100 glucosyl units.

Cluster Dextrin® (CCD®) has the following properties.

1) CCD is highly soluble in water, and the solution is highly stable during storage (Fig. 3).
2) CCD has relatively long side chains, and these chains are considered to adopt a helical conformation. Such helix structures can form inclusion complexes with guest molecules such as organic acids (Fig. 4).
3) CCD absorbs very little moisture (Fig. 5). Furthermore, CCD hardly causes a browning reaction. These properties make CCD excellent as a spray-drying aid.
4) CCD is completely degraded to glucose by rat intestine homogenate (including digestive enzymes) at a comparable rate to conventional dextrin.
5) The sweetness of CCD is low compared with those of dextrins with relatively high DE.
6) CCD has low unfavorable taste derived from starch compared with other dextrins.

Cluster Dextrin® has been on the market in Japan since 2002 as a food material, and is used for improvement of taste or physical properties of food. Cluster Dextrin has also been used as component of sports drink, as a spray-drying aid, and so on.

Figure 1
Schematic Representation of the Action of Branching Enzyme on Amylopectin

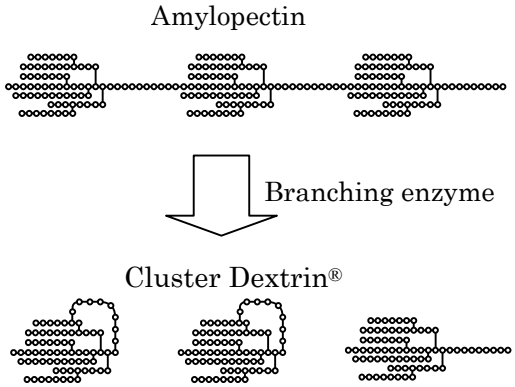


Figure 2
Molecular Weight Distributions of Various Dextrins

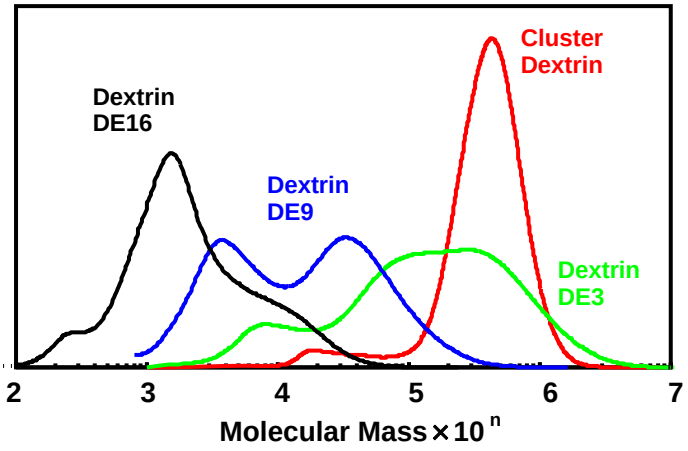
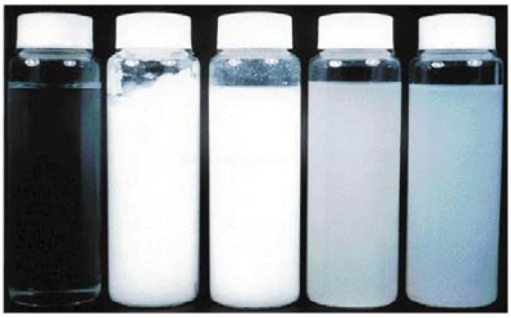


Figure 3
Stability of Various Dextrin Solutions



Appearance of 5% w/v solutions after multiple freeze-thaw cycles

Figure 4
Model of the helix structure of glucosyl chains and its inclusion complex

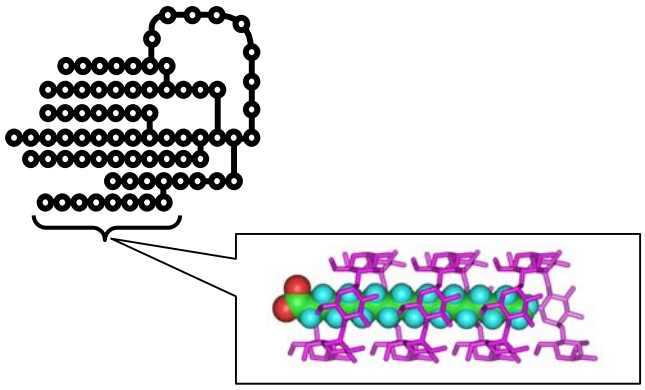
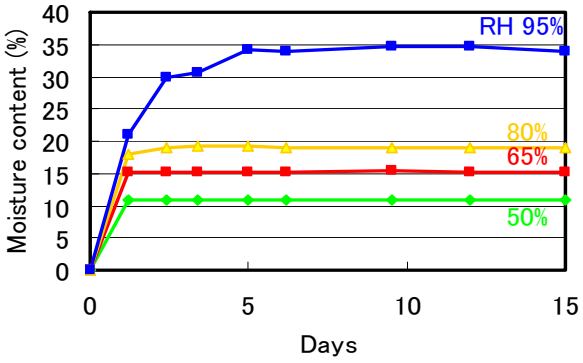


Figure 5
Moisture content of CCD after storage at various relative humidities at 25°C



Product Specifications

Physical form	White powder
Loss on drying	max. 5.5%
Residue on ignition	max. 0.05%
Dextrose equivalent	max. 5
Micro-organisms	max. 300/g
Coliforms	Negative
Molds	max. 50/g
Yeast	max. 50/g

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