Mannitol

1 Nonproprietary Names

BP: Mannitol

JP: D-Mannitol

PhEur: Mannitol

USP–NF: Mannitol

2 Synonyms

Cordycepic acid; *C*PharmMannidex*; E421; manita; manitol; manna sugar; mannit; D-mannite; mannite; mannitolum; *Mannogem*; *Parteck*; *Pearlitol*.

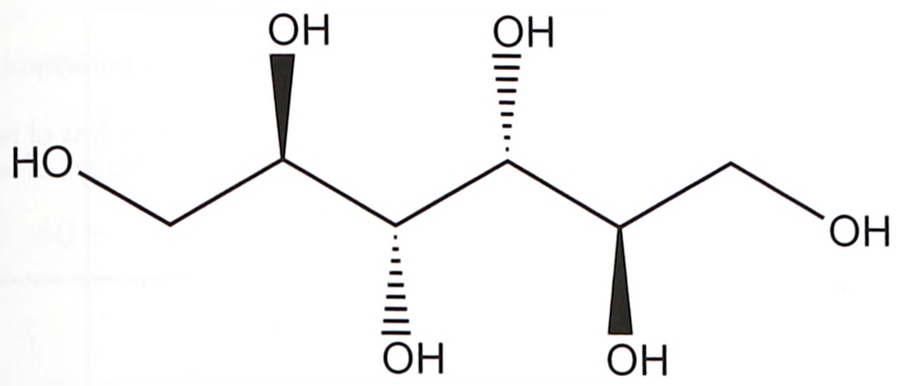
3 Chemical Name and CAS Registry Number

D-Mannitol [69-65-8]

4 Empirical Formula and Molecular Weight

$C_6H_{14}O_6$ 182.17

5 Structural Formula



6 Functional Category

Lyophilization aid; plasticizing agent; sweetening agent; tablet and capsule diluent; tonicity agent.

7 Applications in Pharmaceutical Formulation or Technology

Mannitol is widely used in pharmaceutical formulations and food products. In pharmaceutical preparations it is primarily used as a diluent (10–90% w/w) in tablet formulations, where it is of particular value since it is not hygroscopic and may thus be used with moisture-sensitive active ingredients.[1,2]

Mannitol may be used in direct-compression tablet applications,[3,4] for which the granular and spray-dried forms are available,[5] or in wet granulations.[6,7] Granulations containing mannitol have the advantage of being easily dried. Specific tablet applications include antacid preparations, glyceryl trinitrate tablets, and vitamin preparations. Mannitol is commonly used as an excipient in the manufacture of chewable tablet formulations because of its negative heat of solution, sweetness, and 'mouth feel'.[7–9] It is also used as a diluent in rapidly dispersing oral dosage forms.[10]

Mannitol has been used to prevent thickening in aqueous antacid suspensions of aluminum hydroxide (<7% w/v). It has also been used as a plasticizer in soft-gelatin capsules, as a component of sustained-release tablet formulations,[11] as a carrier in dry powder inhalers,[12–14] and in the formulation of pellets for colon drug delivery.[15] Mannitol has also been studied as a promising hydrophilic carrier for solid dispersion preparation to improve the solubility and dissolution of poorly soluble drugs.[16]

In lyophilized preparations, mannitol (20–90% w/w) has been used as a carrier to produce a stiff, homogeneous cake that improves the appearance of the lyophilized plug in a vial.[17,18] A pyrogen-free form is available specifically for this use.

8 Description

Mannitol is D-mannitol. It is a hexahydric alcohol related to mannose and is isomeric with sorbitol.

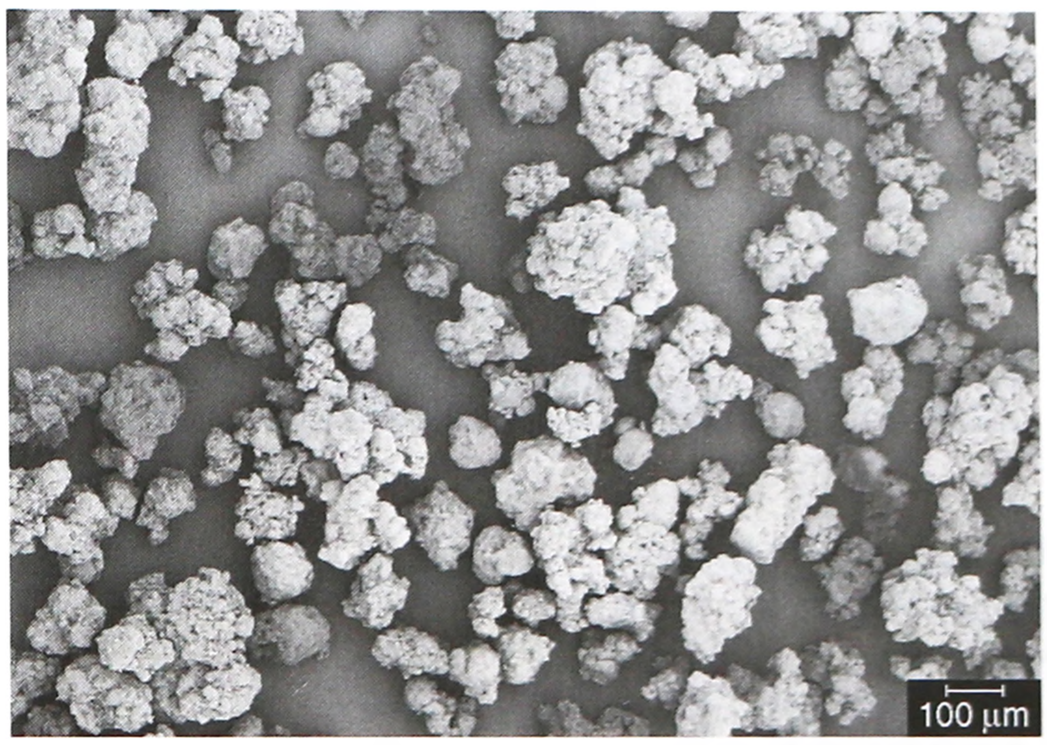
Mannitol occurs as a white, odorless, crystalline powder, or free-flowing granules. It has a sweet taste, approximately as sweet as glucose and half as sweet as sucrose, and imparts a cooling sensation in the mouth. Microscopically, it appears as orthorhombic needles when crystallized from alcohol. Mannitol shows polymorphism.[19]

9 Pharmacopeial Specifications

The pharmacopeial specifications for mannitol have undergone harmonization of many attributes for JP, PhEur, and USP–NF.

See Table I. *See also* Section 18.

SEM 1: Excipient: mannitol; manufacturer: Merck; magnification: 50×; voltage: 3.5 kV.



SEM 2: Excipient: mannitol; manufacturer: Merck; magnification: 500×; voltage: 3.5 kV.