



SUGAR ALCOHOLS

Sugar alcohols belong to the group of polyhydric alcohols and are produced by a catalytic hydrogenation of natural carbohydrates. They are naturally present in smaller quantities in fruits as well as in certain kinds of vegetables.

**DHW sugar alcohols comprise the products Sorbitol, Xylitol and Maltitol.**

**Sorbitol** is a hexavalent sugar alcohol and is derived from the catalytic reduction of glucose. **Xylitol** is produced by catalytic hydrogenation of the pentahydric alcohol xylose. **Maltitol** is obtained of natural disaccharide maltose after catalytic hydrogenation. DHW offers tailor-made Sorbitols and Xylitol as spray dried products with unique advantages in their usage for a number of applications.

## Properties of Sorbitol, Maltitol and Xylitol

### Physical and chemical properties

- High thermal stability  
Sorbitol, Maltitol and Xylitol are very stable up to temperatures of 180 °C and do not change colour
- High chemical stability  
Sorbitol, Maltitol and Xylitol solutions as well as melts do not undergo any Maillard reaction (browning reaction). They are relatively stable at low and high pH.
- Anti-oxidative-synergistic effect in fats, oils and mixtures containing fat, by complex formation with metal ions
- Hygroscopicity  
Sorbitol and Maltitol solutions have an excellent moisture-stabilizing effect
- Preserving effect at higher concentrations
- Higher viscosities of the aqueous solutions of Sorbitol and Maltitol when compared to glycerol and saccharose solutions
- Good solubility in water
- High microbial stability

### Functional properties

- Sweetening power  
Xylitol has the same sweetening power as sugar. Sorbitol and Maltitol solutions are slightly less sweet
- Cooling effect  
Sorbitol and Xylitol have – caused by their negative solution heat and their good solubility in water – a pleasantly sweet and cooling taste. Maltitol is pleasantly sweet only
- Cariogenicity  
Non-cariogenic effect when compared to sugar. Sorbitol and Maltitol are significantly slower degraded to acids. Xylitol is not fermented by most of the micro-organisms in the oral cavity
- Dietetics  
Sorbitol, Maltitol and Xylitol are excellent dietetics for diabetics because of their insulin-independent processing in the human body and their toxicological harmlessness

- Metabolism  
Sugar alcohols are metabolized and assimilated partially only. Large quantities reach the large intestine, and are fermented there by the existing micro-flora. When consuming large quantities, possible side effects like flatulence or a laxative effect may occur
- Caloric value  
Because of their slower absorption, sugar alcohols have a lower caloric value. In the EU, 2.4 kcal/g are fixed for all sugar alcohols

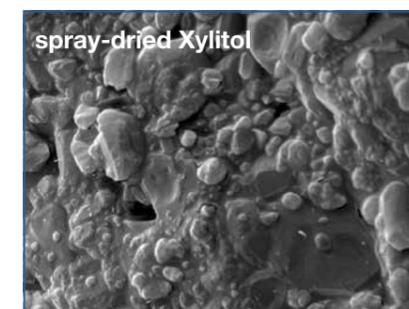
## Specific Properties of DHW Sorbitol and Xylitol Spray-Dried

### Unique benefits for your applications by specific particle structures

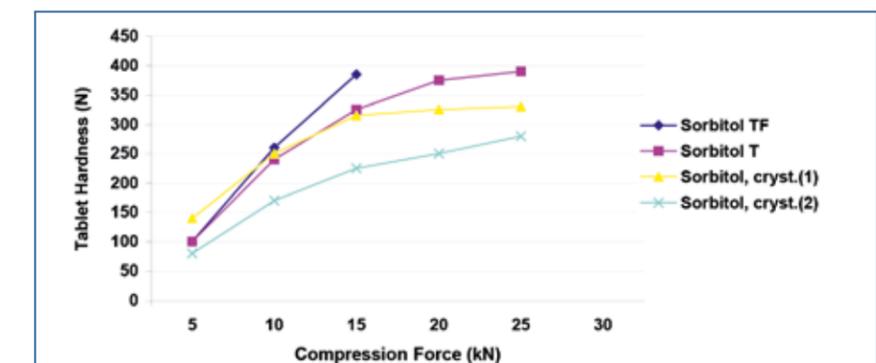
By means of the specifically developed spraying technology, unique application benefits can be achieved by the formation of a specific particle structure.

### Application advantages

- Excellent compressibility and tablet formation
  - » **Sorbitol**
    - » Harder tablets under comparable conditions
    - » Comparable tablet hardnesses at lower pressing pressures
    - » Reduced stress on the tableting machines
    - » Less dust, less cleaning
  - » **Xylitol**
    - » Direct compression without the addition of binders possible
- Fabrication of tablets can be carried out without additional granulating processes
- Improved appearance of the tablets by smoother surfaces and a more uniform colour distribution of coloured products
- Lower sensibility to moisture by harder tablet surfaces – longer shelf life
- Low friability of tablets
- Improved dissolution behaviour of tablets
- Excellent sensory properties of the tablets and chewing gum formulations by
  - » Improved mouth feeling
  - » Longer aroma perception
- Improved binding capacity for additives, as e.g. active substances, vitamins, pigments, flavours
- Non-separable inclusion of admixed active agents
- Extraordinary dissolution capacity because of instant character
- Low bulk density
- High flexibility to meet customers requirements with regard to special particle size distribution



### Compression profile of sorbitol tablets



Sorbitol tablets with 1% magnesium stearate

## DHW Sugar Alcohols

### Sugar Alcohols for Food

#### Sorbitols Spray-Dried

Product Name	Sorbitol Content	Characteristics	Regulatory Status	Function	Application
Sorbitol TFF	min. 98 %	Extremely fine-grained	E / INS 420; GRAS <sup>1)</sup>	Sweetener, dietary sugar substitute, bulking agent	Mints, tablets, lozenges, chewing gum, sugar-free candies, cakes, dietetics
Sorbitol TF	min. 98 %	Fine grained			
Sorbitol T	min. 98 %	Standard quality			
Sorbitol T80	min. 98 %	Large-grained			
Sorbitol TS	min. 98 % with 0.1 % saccharin	Standard quality with saccharin			

#### Sorbitol Liquid

Product Name	Sorbitol Content	Characteristics	Regulatory Status	Function	Application
Sorbitol LGK	min. 80 % (DS) <sup>3)</sup>	Lower tendency to crystallise	E / INS 420; GRAS <sup>1)</sup>	Sweetener, consistency promoter, humectant	Confectioneries as candies, toffees, cakes/ pies, ice cream, chewing gum

#### Xylitol Spray-Dried

Product Name	Xylitol Content	Characteristics	Regulatory Status	Function	Application
Xylitol T	min. 98.5 %	Standard quality	E / INS 967 21 CFR 172.395 <sup>2)</sup>	Sweetener, dietary sugar substitute, bulking agent	Mints, tablets, lozenges, chewing gum, sugar-free candies, chocolate, dietetics

#### Maltitol Liquid

Product Name	Maltitol Content	Characteristics	Regulatory Status	Function	Application
Maltitol 72/75	approx. 75 % (DS) <sup>3)</sup>	Viscous syrup	E / INS 965 GRAS <sup>1)</sup>	Sweetener, consistency promoter, humectant	Confectioneries such as candies, toffees, chocolates, cakes/pies, chewing gum, ice cream

<sup>1)</sup> These products are "Generally Recognised As Safe" (GRAS) / FDA; <sup>2)</sup> These products are FDA regulated; <sup>3)</sup> Based on dry substance

### Sugar Alcohols as Personal Care Ingredients

Product Name	INCI Name	Form	Function	Applications	Regulatory Status
Sorbitol LGK	Hydrogenated starch hydrolysate	Liquid	Consistency promoter, moisture regulator, texture enhancer	Creams and lotions, clear shampoo and shower formulations (free of preserva- tives), alcoholic lotions, gels, tooth-friendly dental hygiene	Ph.Eur.; USP / NF
Sorbitol T	Sorbitol	Spray-dried powder			
Xylitol T	Xylitol	Spray-dried powder			

### Sugar Alcohols for Pharmaceutical Applications

Product Name	Name	Form	Function	Applications	Regulatory Status
Sorbitol T	Sorbitol	Spray-dried powder	Excipient, bulking agent	Tablet formulations	Ph.Eur.; USP / NF
Sorbitol TF	Sorbitol	Spray-dried powder			
Xylitol T	Xylitol	Spray-dried powder	Consistency promoter, moisture regulator, texture enhancer	Pharmaceutical creams and lotions	Ph.Eur.; USP / NF
Sorbitol LGK	Sorbitol, liquid (non-crystallising)	Liquid			
Maltitol 72/75	Maltitol, liquid	Liquid			

## SORBITOL, XYLITOL, MALTITOL – one of our sugar alcohol is right for your application

### Liquid sugar alcohols in food, cosmetics, pharmaceuticals and industrial applications

- Food
  - » Confectionaries (tooth-friendly, low calorie)
  - » Bread, cakes and pastries (sweetener, consistency)
  - » Special food (stabilising, consistency, anti-oxidizing)
- Tobacco (prevents drying out)
- Cosmetics/pharmaceuticals (consistency-lending, texture)
- Industrial applications (intermediate, consistency)



### Spray-dried sugar alcohols as valuable aids in sugar-free, tooth-friendly sweets, dietetics, medicine, pharmaceuticals and cosmetic dental care products

- Sugar-free sweets
  - » Lozenges, pastilles, mints (particle structure, surfaces, smoothness)
  - » Chewing gum (sensory, flavours)
- Dietetics (low calorie)
- Pharmaceuticals (moisture stabilizing, particle structure)
- Cosmetic dental care products (less plaque)

### Legal requirements

We offer our products on the quality level that is requested and necessary for your respective applications. All products are available in pharmaceutical and food quality as well as for technical use. They comply with the following legal requirements:

- EC purity specifications – specific criteria of purity concerning sweeteners for use in foodstuffs - E 420 - Sorbitol, E 965 - Maltitol, E 967 - Xylitol
- FAO / WHO purity specifications – JECFA specifications - INS 420 - Sorbitol, INS 965 - Maltitol, INS 967 - Xylitol
- European Pharmacopoeia and other national pharmacopoeias



## MARKETING OFFICES

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