

Product Description

Distizym® BA-TS is a special enzyme which is applied in alcohol production for the liquefaction and dextrinisation of starch containing distilling mash from farinaceous raw materials. The enzyme is produced from a specially selected strain of *Bacillus licheniformis*. The main activity of the enzyme is based on a thermostable α -amylase (1,4- α -D-glucan-glucanohydrolase: EC.3.2.1.1). Distizym® BA-TS is tested by specialized laboratories for purity and quality.

Aim of Treatment

Liquefaction and dextrinisation of the gelatinised, digested starch in distilling mash within a temperature range between 30-100 °C. Under ideal pH conditions (pH 6.5-6.8) Distizym® BA-TS tolerates temperatures up to 105 °C for a short time.

Product and Effect

As endo enzyme Distizym® BA-TS hydrolyses 1,4- α -D-glycosidic bonds within the starch molecule. Products formed hereby are α -limit dextrans and oligosaccharides.

Dosage

The following standard dosages are recommended:

110 mL Distizym® BA-TS/tonne grain starch

150 mL Distizym® BA-TS/tonne potato starch or starch from other farinaceous raw materials

In case of a deviation from standard conditions a higher or lower dosage might be required.

Application

Traditional digestion of starch without pressure

Distizym® BA-TS is dosed into the mash tank after doughing or milling in the raw material. Before addition of the enzyme it is diluted with cold water in the ratio of 1:1. The enzyme dilution is added before or at the start of the heating phase. Dependent on the heating rate, a more or less long liquefaction rest is kept at a mash temperature of 90-95 °C before reaching the final temperature. The calcium content should amount to 50-100 ppm related to pure calcium, otherwise it is recommended to add calcium (in form of Ca(OH)_2 , CaCl_2 , etc.). This, at first activates the enzyme and, at temperatures above 60 °C, it has an additionally stabilizing effect. In case of mashes with a pH-value below 6.0 an adjustment to pH 6.5-6.8 is recommended. When calcium hydroxide is applied to raise the pH-value, then, at the same time, higher calcium concentrations result.

Special digestion methods of starch without pressure (Hohenheim dispersion mashing method, etc.):

The whole required amount of Distizym® BA-TS is added – diluted with cold water – into the mash dispersion tank before the mash is transferred in, or it is added to the decanted thin spent wash from the distillers' wash recycling. The thin spent wash should have a pH-value of at least 6.0, otherwise the pH-value must be raised to pH 6.5-6.8. For the activation and stabilisation of the enzyme a calcium content of 50-100 ppm, related to pure calcium, is recommended. If the calcium content is below that value, then calcium should be added in form of Ca(OH)_2 , CaCl_2 , etc. During the transfer of the coarsely milled raw materials into the mash dispersion tank the gelatinisation of starch is done by continuous injection of steam while, at the same time, the mash is disintegrated by a dispersing machine for optimal starch release. The time for mashing in to obtain the desired degree of disintegration – controlled by hydrosizer – depends on the sizing of the dispersing machine, the degree of milling and the digestion method of the mash. The enzymatic liquefaction already starts at a temperature of 30 °C, the final temperature of the process is at 90-95 °C. At that temperature also the liquefaction rest takes place. After reaching the desired degree of liquefaction the further dextrinisation and saccharification of the starch is conducted by Distizym® AG or Distizym® AG ALPHA, the protein hydrolysis and the mash viscosity reduction is performed by Distizym® PROTACID, resp. Distizym® GL as of 65 °C after cooling down.

Traditional High Pressure Cooking Methods (Henze-cooker, low-temperature methods etc.):

After blowing out Distizym® BA-TS is added – diluted with cold water – directly into the hot, gelatinised and digested mash. The liquefaction rest is recommended at a temperature range of 90-95 °C. It is furthermore recommended to add 50-100 ppm calcium, related to pure calcium, to activate and stabilize the enzyme. A pH correction to pH 6.5-6.8 is advisable for mashes with a pH below 6.0. When using calcium hydroxide to raise the pH-value, then, at the same time, higher calcium concentrations are obtained.

Special pressure/thermo-processes (Jet-Cooker method, High Pressure Cooking Process according to Michurin etc.):

Distizym® BA-TS is diluted with cold water and added continuously. In case of the Jet-Cooker process the addition of the diluted enzyme is added in two portions: at the beginning of the heating phase and at the exit of the Jet-Cooker. When the High Pressure Cooking Process (at 5-6 bar respectively 150-160 °C) is used, the diluted enzyme is added after the pressure release in the steam separator during the cooling phase, dependent on the method already as of temperatures of 105 °C, in case of HPCP by dosing into the saccharification vat before the mash is transferred in. For every process, temperature and pH-value of the mash have to be adjusted accordingly (see also „Aim of Treatment“). For the activation and stabilisation of the enzyme a calcium content of 50-100 ppm, related to pure calcium, is recommended.

Storage

Optimum storage conditions at 0-10 °C. Higher storage temperatures result in a shorter shelf life. Temperatures above 25 °C must be avoided. Reseal opened packagings tightly and use up as soon as possible.

General Characteristics

Enzyme characteristics: the activity range of the enzyme is between pH 5.0 and 9.0, the optimum is at pH 6.5 in the presence of substrate and calcium. The temperature ranges between 30 °C and 100 °C (max. 105 °C), the optimal temperature is within the range of 90-95 °C in the presence of substrate, calcium and at an optimal pH-value. The diagrammes 1 and 2 show the influence of temperature and pH-value on the enzyme activity of Distizym® BA-TS.

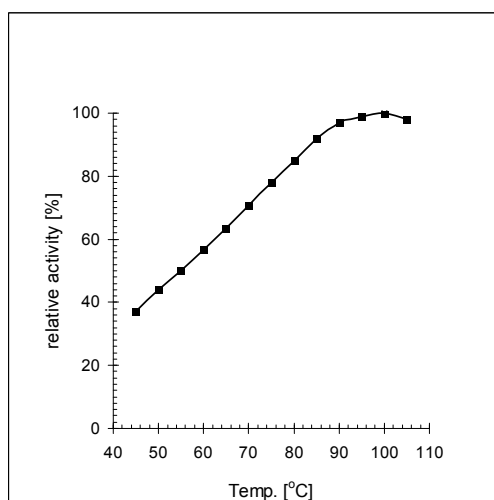


Fig 1: Influence of temperature on activity
 (10 % soluble starch; pH 6.5).

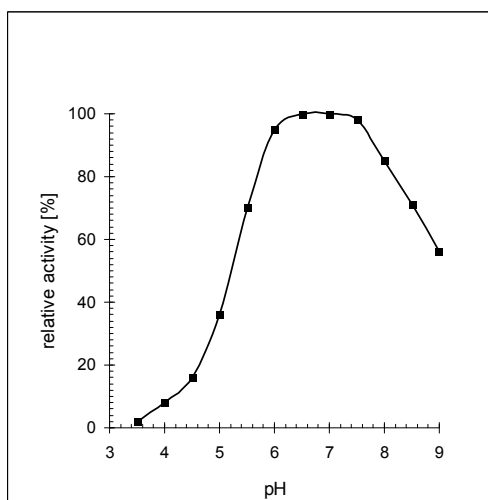


Fig 2: Influence of pH-value on activity
 (10 % soluble starch; 90 °C).