



# Beerzym® Penta

Fungal pentosanase and  $\beta$ -glucanase for the degradation of  $\beta$ -glucan and pentosan in the production of malt and top fermented beer

## Product description

Beerzym® Penta is a special liquid enzyme for the degradation of pentosan and glucan in malting, wort, and in green and finished beer. The main activities of the enzyme are based on different hemicellulases (hemicellulase: endo-1,4- $\beta$ -D-mannanase: EC.3.2.1.78, endo-1,4- $\beta$ -D-xylanase: EC 3.2.1.8, endo-1,3- $\beta$ -D-xylanase: EC 3.2.1.32 and exo-1,4- $\beta$ -D-xylosidase: EC 3.2.1.37) and  $\beta$ -glucanases (endo-1,3(4)- $\beta$ -D-glucanase: EC 3.2.1.6 and endo-1,4- $\beta$ -glucanase: EC 3.2.1.4).

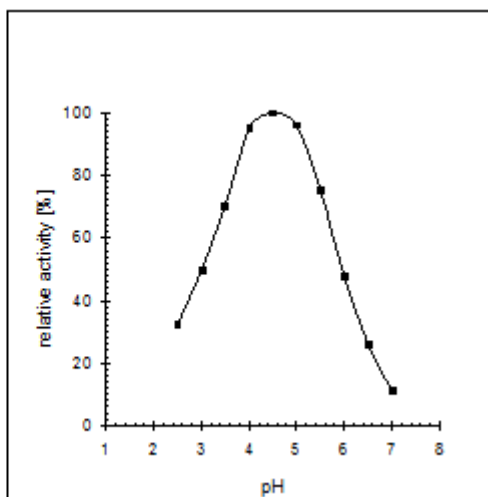
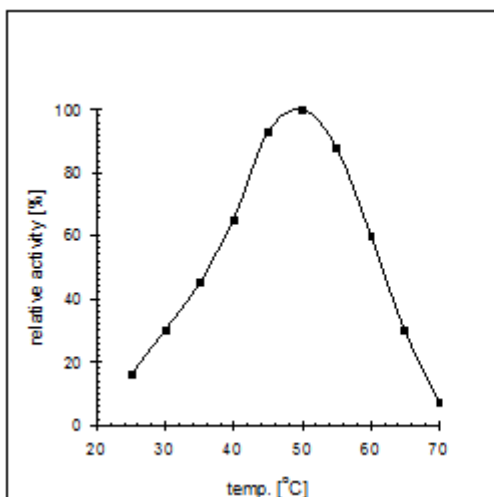
The degradation of pentosan and  $\beta$ -glucan leads to shortened germination times, and lower  $\beta$ -glucan amounts in malt. In beer it lowers viscosity improving filterability, particularly in beers using raw grains, or malted wheat, rye, oat, or corn.

As an endo-enzyme Beerzym® Penta hydrolyzes 1,4- $\beta$ -glycosidic bonds in hemicelluloses and pentosans (arabinoxylan), as well as in cellulose, lichenins and other glucans. 1,4- $\beta$ -glycosidic bonds occur especially in barley, wheat, and rye. Their hydrolyzation cleaves them into pentoses and hexoses.

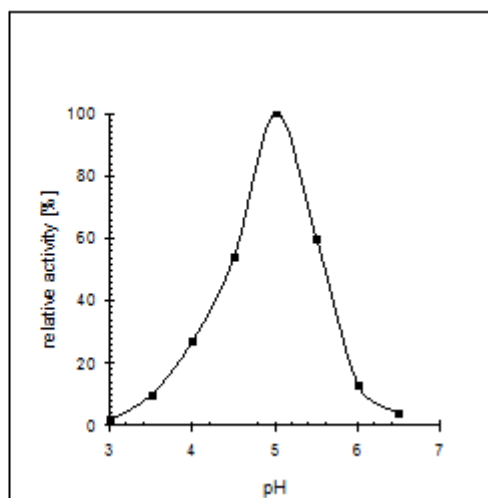
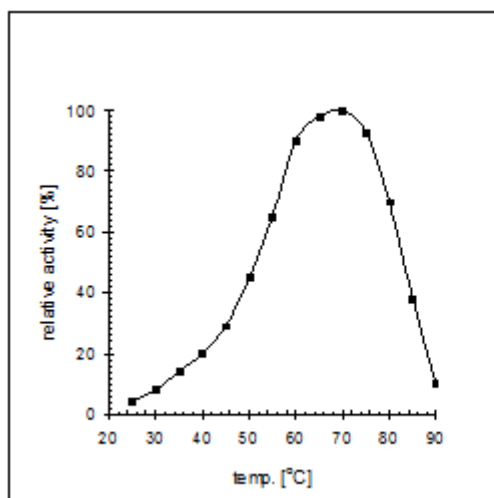
Please follow all federal, state, and local rules, and regulations when applying Beerzym® Penta.

Enzyme characteristics: the activity range of the enzyme is between pH 2.5 and pH 6.5, with the optimum at pH 4.5. The temperature range is between 4 °C (39.2 °F) and 65 °C (149 °F) for pentosanase (xylanase) and between 15 °C (59 °F) and 75 °C (167 °F) for  $\beta$ -glucanase, with a temperature optimum of 50 °C (122 °F) for pentosanase (xylanase) and 70 °C (158 °F) for  $\beta$ -glucanase.

Diagrams 1 and 2 show the influence of temperature and pH-value on the enzymatic activity of the pentosanase (xylanase).



Diagrams 3 and 4 show the influence of temperature and pH value on the enzymatic activity of the  $\beta$ -glucanase.





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## Dosage

Beerzym® Penta can be used in malting to degrade  $\beta$ -glucans, shorten germination times, and increase malt quality. Beerzym® Penta is used in the brewing process when the use of wheat, rye, or undermodified malts will lead to unsatisfactory results in lautering or filtration. The dosage of the enzyme varies with the quality of the raw material, the temperature, and the overall contact time.

### Recommend Dosage:

80 - 100 mL/MT added to the spray water during germination

100 - 250 mL/MT added in brewhouse in the mash-in-water

2 - 5 mL/hL (2.5 - 6 mL/Bbl) cold wort prior to fermentation

3 - 10 mL/hL (3.5 - 12 mL/Bbl) green beer prior to storage

8 - 20 mL/hL (9 - 23 mL/Bbl) finished beer prior to filtration

Dilute the dose of Beerzym® Penta with cold water. During germination the enzyme dilution is ideally dosed into the spray water in the first or second spray. In the brewing process add it into the mash-in-water in brewhouse by start mashing, or in the cooled wort before fermentation, into the green beer during lagering, or into the finished beer in the storage tank before filtration. At standard temperatures, Beerzym® Penta activity is slowed in wort, green and finished beer. The lowered activity caused by the lower temperature is taken into account by increasing the recommended dosages above.

## Storage

Optimal storage is 0 - 10 °C/32 - 50 °F. Higher storage temperatures lead to reduced shelf life. Avoid temperatures above 25 °C (77 °F). Tightly reseal opened packages and use up as soon as possible.