Beverage Alcohol

Application Sheet

Content:

Efficient and quick saccharification

In the production of alcohol and spirits, the saccharification enzymes degrade gelatinised starch and dextrins into fermentable sugars. These sugars are then converted or fermented by the yeast cells into alcohol.

Benefits

The application of saccharification enzymes has made it possible for dextrins to be efficiently and quickly converted into fermentable sugars. The characteristics and design of most modern saccharification enzymes ensure the following benefits:

- Efficient degradation of dextrins
- High alcohol yields
- Reduced risk of infection due to high operating temperature (65°C)
- Reduced risk of infection due to low operating pH
- Reduced starch losses
- Low treatment costs and dosages

Products

SAN Extra L is an extremely heat-stable and acid-stable saccharification enzyme that contains both glucoamylase and acid-alpha-amylase activities. The main component of SAN Extra is an amyloglucosidase that hydrolyses 1,4- as well as 1,6-alpha-linkages in gelatinised starch and dextrins. SAN Extra also contains large quantities of an acid alpha-amylase (AFAU) that hydrolyses the 1,4-alpha-glucosidic linkages in amylose and amylopectin.

AMG 300 L is an exo-1,4-alpha-D-glucosidase (glucoamylase) obtained from *Aspergillus niger*. The systematic name is 1,4-alpha-D-glucan glucohydrolase (EC 3.2.1.3).

SAN Super 240 and **SAN Super 360 L** are optimised enzyme preparations that contain mainly amyloglucosidases, alpha-amylases, proteases and glucanases.

The fungal and acid-stable alpha-amylases hydrolyse the 1,4-alpha-glucosidic linkages in amylose and amylopectin. The amyloglucosidase hydrolyses 1,4- as well as 1,6-alpha-linkages in gelatinised starch and dextrins. The protease activity hydrolyses proteins into substances that are easily assimilable by the yeast. The general working conditions for SAN Super 240/360 L are temperatures of 30-65°C (85-150°F) and pH 4.0-6.0. The optimum general conditions are 55-65°C and pH 4.5-5.5.

Performance

The temperature and heat-stability performance with fermentable sugar production of SAN Extra L compared to AMG 300 L is shown in the following:

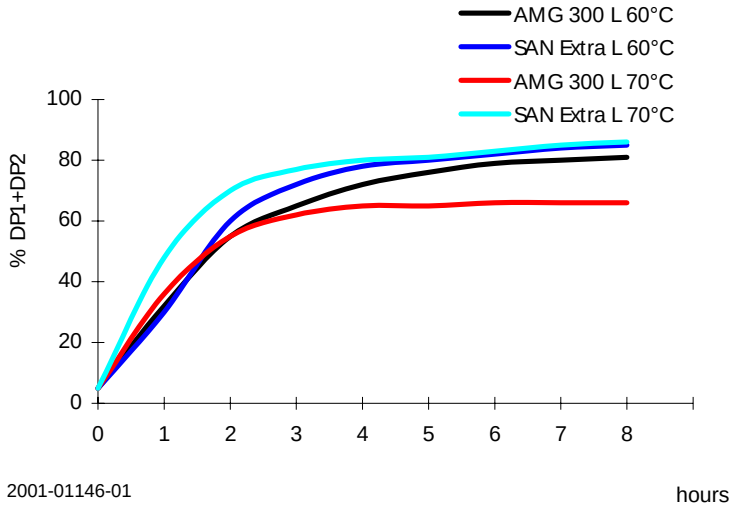

Fig. 1. Production of fermentable sugars (DP1+DP2) over time with AMG 300 L and SAN Extra.

The pH performance of SAN Extra L and its AGU and AFAU activities is shown below:

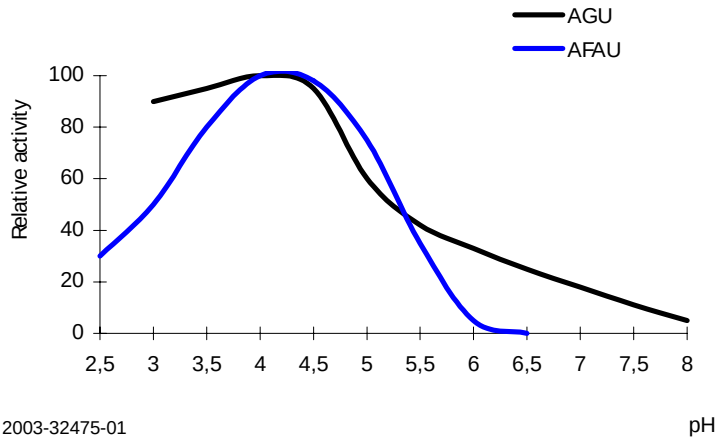

Fig. 2. Relative activity of AGU and AFAU of SAN Extra L.

Usage

For optimum results, saccharification enzymes are added just after liquefaction to the pre-tank or saccharification tank when the temperature has cooled to 65°C.

Application/process type
The above-mentioned saccharification enzymes can be used either in pre-saccharification or in the simultaneous saccharification and fermentation process (SSF).

Dosage
SAN Extra L ..... 0.5-0.7 kg (0.425-0.60 l) per t starch
AMG 300 L ..... 1.0-1.2 l per t starch
SAN Super 240 L ..... 1.0-1.2 l per t starch
SAN Super 360 L ..... 0.6-0.75 l per t starch

Activity and stability
pH and temperatures for optimum activity are as follows:

	Opt. pH	Opt. temp.
SAN Extra L:	4.0	65°C
AMG 300 L:	4.5	60°C
SAN Super 240 L:	5.0	60°C
SAN Super 360 L:	5.0	65°C

Storage in application
Ideal storage conditions are 0-10°C (32-50°F) in sealed packaging in a dry environment protected from the sun. The products have been manufactured for optimum stability. However, enzymes gradually lose activity over time. Extended storage and/or adverse conditions such as higher temperatures or increased humidity may lead to a higher dosage requirement.

Safety, handling and storage
Safety, handling and storage guidelines are provided with all products.

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