

Novozymes Saczyme® saccharification products

- The industry choice for glucoamylases

The Saczyme® product range offers a wide variety of possibilities for optimizing yields, and throughput, and ensuring process consistency. Saczyme® products maximize starch and dextrin conversion to sugars for yeast fermentation to ethanol.

Benefits

- High ethanol levels
- Increased alcohol yield
- Fast fermentation rates
- Low residual starch and sugars
- Efficient separation and DDGS processing
- Robust and consistent performance under varied conditions
- Concentrated formulations allowing low dosage levels and reduced storage and transportation costs
- Reliable saccharification with varying raw materials and conditions

Products

Saczyme® Go

Concentrated thermostable glucoamylase activity for plants whose primary goal is consistent performance and smooth operation at a low enzyme use cost.

Saczyme® Plus

Perfect for distilleries whose primary goal is consistent performance. Saczyme® Plus helps you achieve high ethanol yields and smooth operations with little investment.

Saczyme® Pro

Provides shorter fermentation times and consistently high ethanol yields. It is an efficient and robust glucoamylase, resulting in low levels of residuals.

Saczyme® Yield

This special premium blend of enzymes is designed to boost ethanol yield to the highest possible level. Cellulase activity degrades cell walls to release additional bound starch that cannot be accessed by any other glucoamylase product. It's a simple solution for distilleries striving for the lowest possible residual starch and superior ethanol yield. Saczyme® Yield is part of our yield-discovery solutions: Leaving no part of the corn unexplored. Saczyme® Yield also contains a trehalase activity to increase yield and reduce residual sugars.

Performance

Saczyme® glucoamylases are used on liquefied starch-containing substrates to produce sugars for fermentation. They work in dedicated saccharification stages as well as simultaneous saccharification and fermentation (SSF) operations. The glucoamylases hydrolyze both 1.4- and 1.6-alpha linkages to release glucose for subsequent fermentation by the yeast. Products differ in specificity and action pattern, allowing for customized use in specific distillery operations.

How Saczyme® products compare

Product features - saccharification					
Product name	Fast initial fermentation (increased speed of glucose production)	Hydrolyzes starch from poor liquefaction	Low residual starch/sugars	High thermostability	High ethanol yield
Saczyme® Go	++	+	+	+++++	+
Saczyme® Plus	++++	++	++	+++++	++
Saczyme® Pro	++++	+++	+++	+++	+++
Saczyme® Yield	++++	+++++	++++	++	+++++

Table 1. Product performance indication for various application parameters

There is more information about the products available at the Customer Center.

Performance on corn-based mashes

Fermentation performance (SSF)

Fermentation completion speed depends on enzyme dosage. The ability to achieve complete conversion of starch without causing yeast stress influences both ethanol yield and time to fermentation completion. Figure 1 shows the relative fermentation kinetics obtained when using the recommended dosage of Saczyme® Plus and Saczyme® Pro.

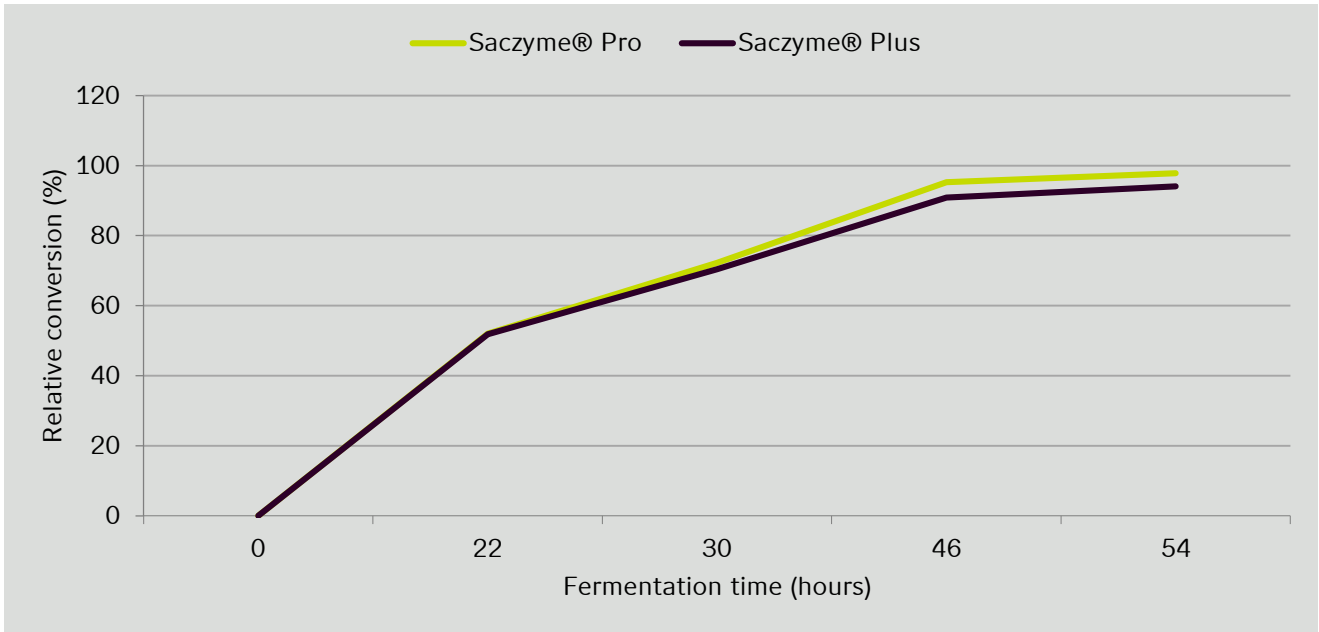


Fig. 1. Relative conversion vs. fermentation time of Saczyme® Pro and Saczyme® Plus

Figure 2 shows the relative ethanol yield performance of the three products when fermenting the same mash. The products provide a significant range in ethanol yield for this mash.

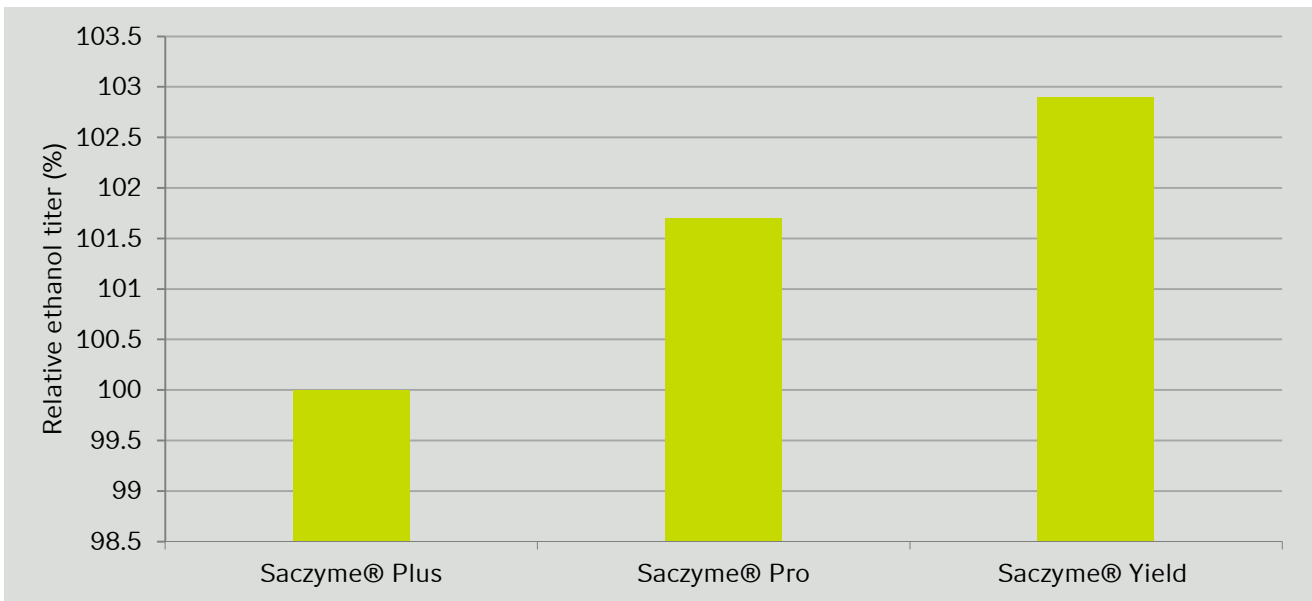


Fig. 2. Results from fermentations using different industrial liquefied corn mashes

Performance of glucoamylase products may vary according to conditions specific to each ethanol production distillery. The optimal product choice may vary according to distillery conditions and objectives. Please contact your global Novozymes technical Service for recommendations and trials.

Performance on other feed stocks

The optimal glucoamylase for other feed stocks, such as wheat, barley, cassava, and sorghum, will vary. Contact your Novozymes representative to find out what is the best choice for your feedstock.

Dosage

Product	Estimated dose*
Saczyme® Go	0.023-0.033%
Saczyme® Plus	0.023-0.033%
Saczyme® Pro	0.025-0.031%
Saczyme® Yield	0.045-0.055%

Table 2. Typical dosing scenarios for Saczyme® products. Optimal dosages must be determined under actual distillery operating conditions

* Dose on whole grain. Dose vary depending on grain, solid, fermentation time and equipment configuration

Activity and stability

The activity performance of Saczyme® products relative to pH conditions is shown in figure 3.

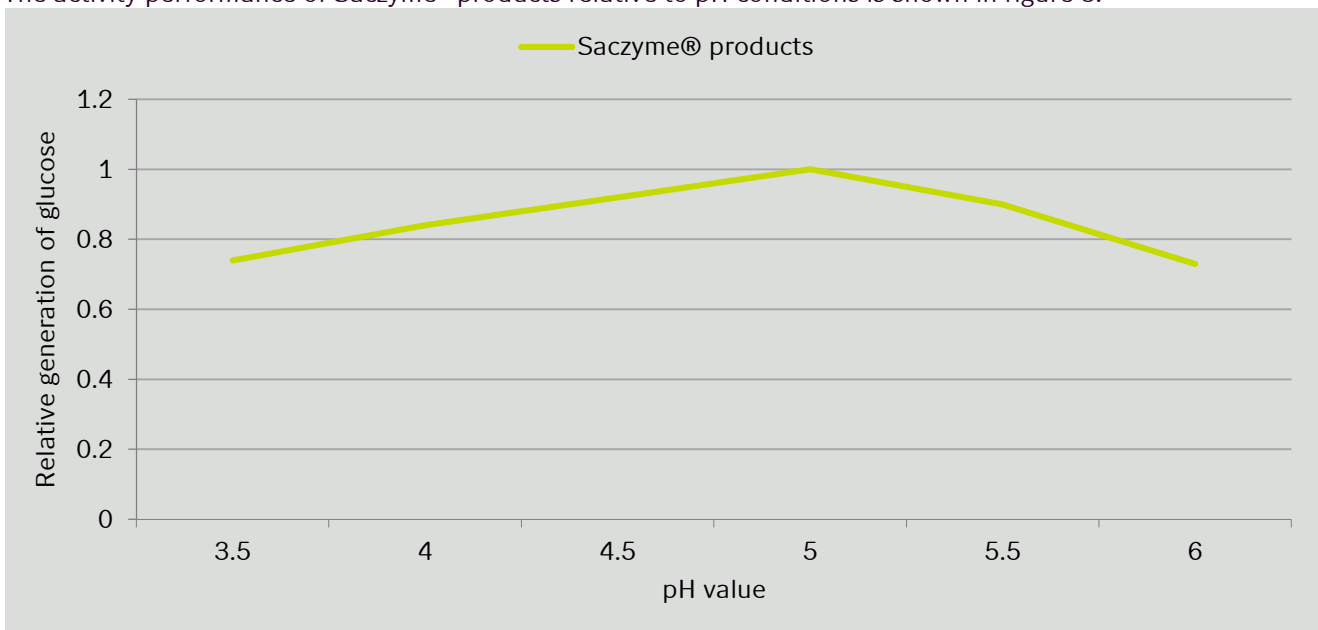


Fig. 3. Comparative glucose generation data from laboratory, 24 hours treatment using corn mash at 29% solids and 65°C (150°F)

Storage

Saczyme® products should be stored at cool temperatures in closed containers protected from sun-light.

Contact your Novozymes representative for detailed storage recommendations and cleaning procedures relevant to your facility.

Safety and handling

Safety and handling guidelines are provided with all products.

Get ahead

Staying ahead of the dynamic food and beverage market requires the best technology and expertise to become even more flexible, efficient and profitable. With Saczyme® and our knowhow, Novozymes can support you on that journey. Let's transform the quality and sustainability of your business together.

About Novozymes

Novozymes is the world leader in biological solutions. Together with customers, partners and the global community, we improve industrial performance while preserving the planet's resources and helping build better lives. As the world's largest provider of enzyme and microbial technologies, our bioinnovation enables higher agricultural yields, low-temperature washing, energy-efficient production, renewable fuel and many other benefits that we rely on today and in the future. We call it Rethink Tomorrow.

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