



Viscoferm® reduces viscosity of mashes and liquids in all stages of the alcohol production process and opens the door for:

- Higher output by running at higher DS
- Energy savings
- Improved pumping and less local overheating
- Reduced fouling and costs for maintenance
- Dramatically higher plant throughput

Distilleries can now process any type of grains into alcohol without worrying about viscosity. Novozymes' unique viscosity reduction solution, Viscoferm,® increases yield, improves quality, saves energy – and is the perfect solution for High Gravity Fermentation (HGF).

MORE AND BETTER

– PRODUCING HIGH-QUALITY ALCOHOL THE COST-EFFECTIVE WAY

Viscoferm offers raw material flexibility to distilleries, making it possible for them to produce high-quality alcohol with a variety of raw materials, including rye, wheat, and barley, which in the past were difficult to process.

“Alcohol producers can maximize the value of their raw materials with Viscoferm. This remarkable solution can be used with any combination of raw materials. It offers great performance because of its unique enzyme activity and robustness,” says Elmar Janser, Global Marketing Manager for Beverage Alcohol at Novozymes.

Viscosity limits plant capacity

Alcohol production is an age-old industry with potable alcohol being produced for centuries. The choice of raw material differs from region to region, but generally, fermented alcoholic drinks are made from carbohydrate-containing agricultural produce like grains, potatoes, sugar cane, molasses, and fruit. Neutral alcohol, also known as white spirit (vodka, gin, aqua vitae, schnapps,

and others), has traditionally been made from potatoes and grains.

The recent increase in energy prices has forced the industry toward process optimizations with a focus on energy savings.

“In the Moldova territory the price of everything – energy, grains, and water – is going up and we, just like the other distillers, want to use the High Gravity Fermentation process with the highest gravity possible,” says Alexander Fedorenko, chief technologist at Zernoff, a British–Moldavian company and Moldovan market leader in alcohol and vodka production. “High Gravity Fermentation Technology was applied at the Zernoff distillery and we achieved perfect results in cost savings plus unexpected better quality when compared to standard technology.”

One of the obvious ways to save energy is to process and cook at higher dry substance (DS), since it takes only one third the energy to heat up 1 kg of grain compared to heating up 1 kg

of water; in other words, the higher the proportion of dry substance in the mash, the less water needs to be heated and the less overall energy is expended. Further energy savings can be realized by doing HGF as less water needs to be evaporated during distilling after fermentation (see Fig. 1).

“One of the drawbacks of running at higher dry substance is the almost exponential increase in viscosity with increased DS, especially when liquefying whole-ground wheat or rye, which many distillers use as raw material,” says Roman Chechnev, Account Manager for Russia at Novozymes.

The viscosity is caused by some of the non-starch cell wall components such as celluloses, pentosans, xylans, and beta-glucans in the milled grain, components mainly originating from the outer branny skin. The level of viscosity depends highly on the type of raw material used.

Enzyme technology is the solution

Modern enzyme technology makes energy-saving



FIG. 1. ENERGY CONSUMPTION DURING COOKING.

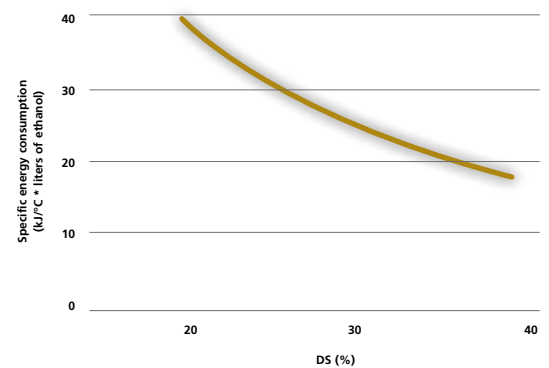
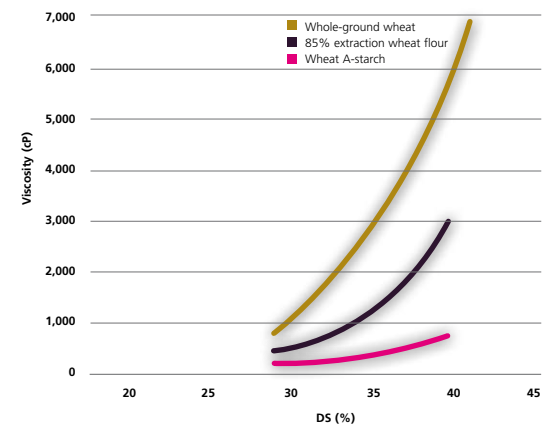


FIG. 2. MASH VISCOSITY AFTER LIQUEFACTION VERSUS DS (DRY SUBSTANCE) AT 84 °C SHOWS THAT VISCOSITY INCREASES WITH INCREASING DS.



processes like High Gravity Fermentation (HGF) possible. With HGF, distilleries can run mashes at higher dry substance, resulting in higher alcohol content in fermentation.

In order to process at a high DS level, viscosity-reducing enzymes are needed. The major cause for viscosity in liquid slurries is the water-soluble components, such as water-soluble beta-glucans and pentosans.

"In corn, these components are negligible, which is the reason that corn flour slurries can be run with up to 35% DS without viscosity problems if an alpha-amylase like Termamyl® SC is used for liquefaction," says Erik Anker Andersen, Customer Solutions Manager at Novozymes. "However, wheat and in particular rye contain large amounts of soluble pentosans causing viscosity, while the high viscosity of barley is due to its high content of water-soluble beta-glucans."

Enzymatic degradation of non-starch polysaccharides like pentosans can be done with a viscosity-reducing enzyme. Viscoferm is a balanced blend of

xylanase, beta-glucanase, alpha-amylase, and cellulase. Due to the balanced blend of enzyme activities, Viscoferm is a robust enzyme that works on a variety of raw materials and at various conditions.

"Due to the increase in raw material prices, distilleries in Russia, the Ukraine, Belarus, Moldova, and other countries want to use cheap raw materials, less water and energy, and they want a higher yield. I recommended Viscoferm to them and they are very happy," says Alexander Fedorenko.

Distilleries using Viscoferm increased fermentation capacity by 50–60% and produced a better-quality final product.

"Manufacturers are now able to do HGF with no viscosity problems and achieve higher concentrations of alcohol," says Roman Chechnev. "Viscoferm is a unique solution because it makes sure that a distillery can process any cereal containing starch into alcohol and have no problems with viscosity."

Viscoferm has been tested at a number of distilleries and on various raw materials. Using

Viscoferm, the dry substance in distilleries could be increased significantly compared to running the plant without viscosity-reducing enzymes; further, the alcohol content and the fermentation capacity increased by more than 90%.

"Novozymes has developed Viscoferm to make production of potable alcohol more profitable and to give distilleries the freedom to choose raw material, while maintaining a smooth operation," says Elmar Janser. ■

FOR MORE INFORMATION

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