



New enzyme offers better wash performance at lower cost

Polarzyme® is a new protease from Novozymes that offers laundry detergent manufacturers and formulators an improvement in performance as well as cost advantages. In particular, it is more efficient at lower temperatures than traditional proteases, which often suffer a significant drop-off in performance at these temperatures.

In March 2005 Novozymes embarked on the global launch of a new enzyme called Polarzyme for use in detergents for household washing machines. As the name implies, the enzyme - a protease - works particularly efficiently at lower temperatures and brings with it a number of customer benefits when washing at lower temperatures, for example enhanced stain removal.

The rationale for the development of Polarzyme is the trend towards washing clothes at lower temperatures, which is happening around the globe. This development is driven by both environmental and cost considerations, as more than 80% of the energy consumption of a washing machine comes from heating up the water.

However, Polarzyme does not only work at lower temperatures. It also shows solid performance across a broad range of temperatures, while innovations in protein design and expression as well as improvements in manufacturing processes mean

that the enzyme also offers customers real cost advantages.

These cost advantages could translate into a number of real benefits. For example, with the money saved, the manufacturers of premium-brand detergents could improve the performance of their formulations, perhaps by adding a high-performing enzyme such as Stainzyme®. Alternatively, other manufacturers and formulators may wish to optimise formulation costs.

Polarzyme and Stainzyme

The introduction of Polarzyme complements Stainzyme, an amylase that was successfully launched last year. Novozymes now offers two enzymes that have great performance at lower temperatures: Stainzyme for starch-based stains such as rice or spaghetti, and Polarzyme for protein-based stains such as meat-containing products, blood, grass, etc.

Anders Lund, Novozymes' launch manager for Polarzyme, says to *BioTimes*:

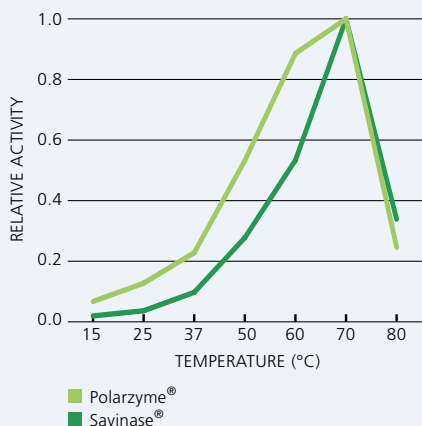


Fig. 1. Activity/temperature profile of Polarzyme® versus Savinase® at pH 9.

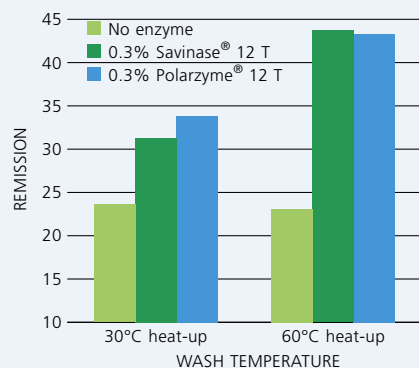


Fig. 2. Polarzyme® shows better performance than Savinase® and a non-protease control as part of a heavy-duty powder detergent at 30°C and similar performance to Savinase at 60°C.



“Novozymes provides its customers with the most value by combining the broadest range of performance solutions with a support package that includes trials, formulation support and supply chain assistance,” says Anders Lund, Novozymes’ launch manager for Polarzyme®.



“Novozymes is very excited about combining Polarzyme and Stainzyme. The use of these two enzymes in detergent products will offer consumers a much improved laundry experience.

“Protein-based stains are very difficult to remove for detergents that only contain chemicals, and the problem is that a very large number of food stains contain proteins. A protease-containing detergent is therefore a must for most detergent producers. Although effective at higher temperatures (50-60°C), the majority of proteases are less effective at lower temperatures (10-30°C). Polarzyme, however, performs relatively better across the whole temperature range.”

In-house tests carried out by Novozymes have shown that, in comparison with another protease (Savinase®), Polarzyme has more than twice the activity at 20-50°C and similar activity at 70°C (see Fig. 1).

Anders Lund explains to *BioTimes* that,

in combination with Novozymes’ other enzymes, Polarzyme offers different customer groups different sets of benefits. For example, Polarzyme gives formulators the opportunity to develop an optimum formulation for each market. And in particular Polarzyme allows manufacturers to develop low-temperature claims for their products to give them an advantage in the marketplace.

“In terms of our enzyme portfolio, it is true to say that Novozymes provides the most value by combining the broadest range of performance solutions with a support package that includes trials, formulation support and supply chain assistance,” he says.

Going cold

The driving force behind the introduction of Polarzyme is customer demand for detergents that are more efficient at lower temperatures. More and more customers are buying appliances that rate an A grade for energy efficiency and want to wash their clothes at lower temperatures in order to protect them from wear and tear, save money on heating water and have less of an impact on the environment.

The wash temperature in laundry has been decreasing over the last decade. In the USA in particular, wash temperatures are lower than in Europe due to the absence of heater elements in washing machines. This trend, where wash temperatures have declined from 60°C to 30°C and 20°C, is being followed in Europe too.

Polarzyme is formulated as a T-granulate with enhanced protection against peroxide bleaches. T-granulates consist of a core that contains the enzyme, surrounded by a coating layer that reduces the risk of enzyme dust release. Polarzyme granulate

is highly robust and ideal for both powders and tablets. Research proves that the storage stability of Polarzyme is equal to that of other commercially available proteases.

The science

Polarzyme originates from an alkali-loving *Bacillus* bacterium. The original molecule was modified by the protein design laboratories at Novozymes to boost its performance at low temperatures, as science manager Vibeke Skovgaard Nielsen explains: “The effect of the modifications in Polarzyme is that there is higher wash performance at lower wash temperatures when compared with Savinase.

“This means that, for example, when washing at 30°C there is a visible difference in stain removal on protease-sensitive stains such as blood, grass, spinach and cocoa when you compare the same amount of Polarzyme 12 T with Savinase 12 T. Whereas at higher wash temperatures, the performance of the two products is similar.”

So as the world moves onto the next generation of automated washing machines with ever lower-temperature wash cycles, Novozymes’ launch of Polarzyme has ensured that detergent manufacturers and formulators have the vital ingredient to facilitate this move: the next-generation protease. ●

NOTE: Polarzyme® is available globally, with the exception of Japan.

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