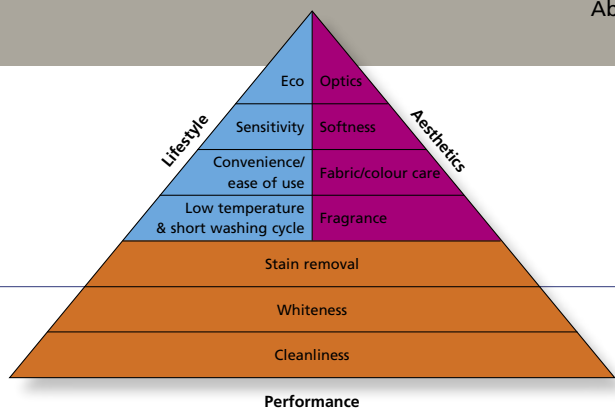


Novozymes is the biotech-based world leader in enzymes and microorganisms. Using nature's own technologies, we continuously expand the frontiers of biological solutions to improve industrial performance everywhere.

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JOIN THE INDUSTRIAL EVOLUTION

Washing cleaner and 'greener'

The third in a series of short articles about how biological solutions have driven the evolution of industry forwards.

Most people are familiar with the use of enzymes in detergents but are not aware that enzymes have revolutionised the formulation of detergents as well as wash habits over the last few decades.

It all began with the ability to break down stubborn protein stains that previously could only be removed by scrubbing, boiling and using harsh chemicals. Novozymes' intro-

duction of the efficient detergent protease Alcalase® in 1963 was the start of a revolution in cleaning. It enabled tough stains to be tackled without damaging the fabric. Today, clothes are often washed clean at temperatures as low as 30-40°C.

Since the introduction of Alcalase, there has been a steady stream of technological breakthroughs in enzymatic cleaning. New types of enzyme designed to remove different types of stain and to care for fabric have become widely used in the market.

And the use of enzymes has expanded far beyond stain removal. Specialised enzymes can make colours brighter, improve whitening, and make fabrics feel softer. These unique characteristics make enzymes one of the primary ingredients supporting many of the advertising claims for today's laundry detergents.

Furthermore, enzymes have helped to make detergents more environmentally friendly by reducing consumption of water and energy as well as the quantity of chemicals required to get clothes clean. The latest enzymes such as Novozymes' Polarzyme® and Stainzyme® have made it possible to wash effectively in cold water conditions, which is an increasingly common preference for consumers.

The most common classes of enzyme and their use in detergents are outlined in the table. Today, the majority of detergents worldwide contain enzymes, with some detergent brands containing up to five different types in order to obtain a broad spectrum of cleaning and fabric care benefits. The detergent industry is constantly looking to Novozymes for new developments in enzymes. ●

Proteases	Fight stubborn protein stains such as blood, grass, etc., and can operate at wash temperatures as low as 5°C.
Amylases	Remove residues of starchy foods such as mashed potatoes, baby food, ready-cooked meals and gravy.
Cellulases	Offer benefits such as colour brightening, whitening, softening and fabric care. Cellulases are capable of removing fuzz and pills from cotton fabrics, making them look new for longer.
Lipases	Capable of removing stains such as lipstick, frying fats, butter, salad oil, sauces, and the perspiration stains on collars and cuffs.

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