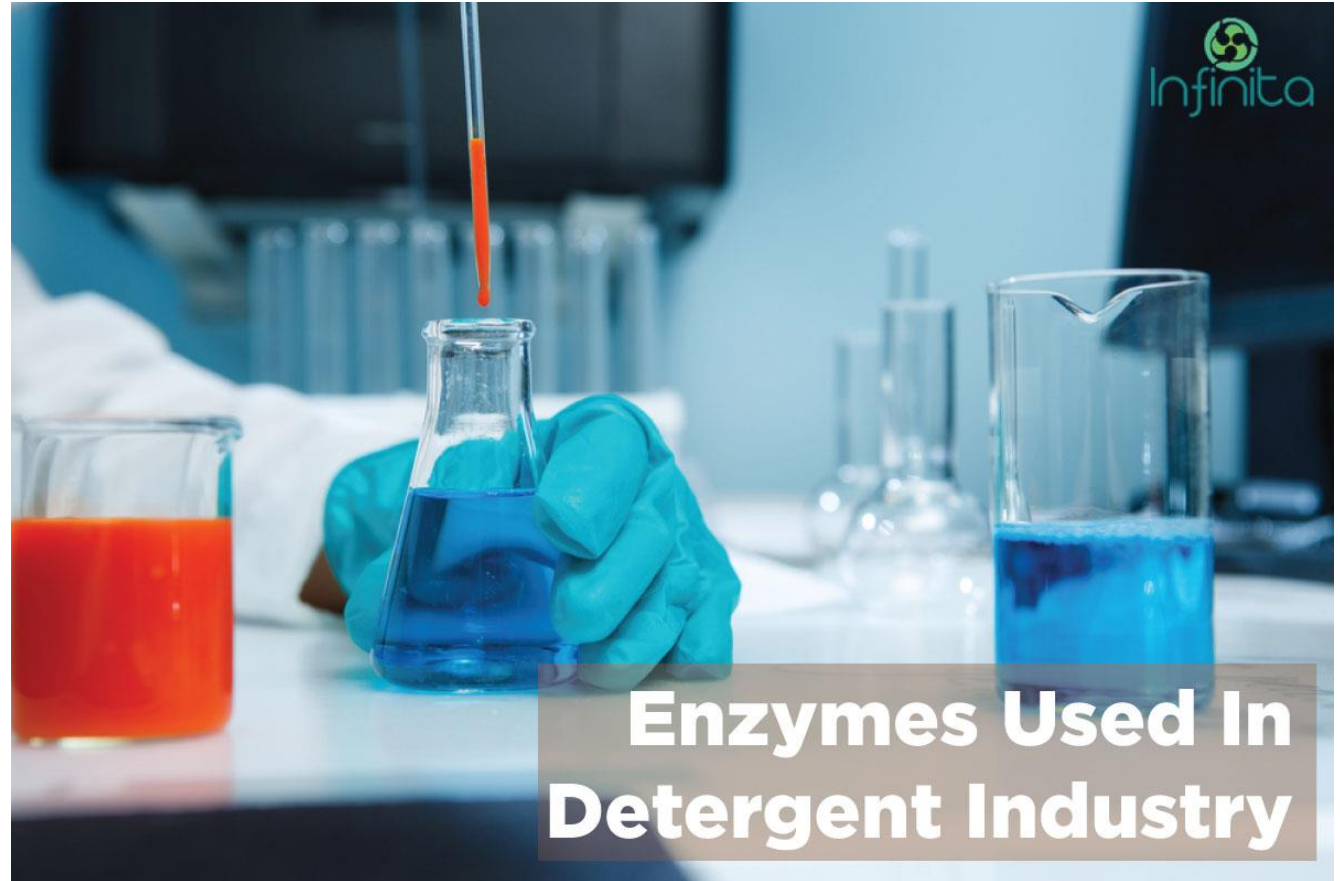


Enzyme Technology Bio-detergents

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Introduction

- Detergent enzymes are **biological enzymes** that are **used with detergents**.
- Biological washing powders or **Bio-detergents** contain **Protease and Amylases, Lipases & Cellulases** to remove protein stains and fat from clothes.
- The **enzymes break down proteins or fats on the fabric**, forming water-soluble substances that can be washed away.

Bio-detergents

- In Dairy and Food Industry, the maintenance of hygienic conditions is an essential to the production of quality products.
- This is achieved by the use of appropriate cleaning agents with or without sanitizers.



Bio-detergents

- The **surfactants** are the **surface-active-agents** which decrease the tension between molecules lying on the surface of a liquid.
- The **main use of detergents** is **cleansing or removal of soil, dirt or foreign matter** from a surface.
- For **efficient cleaning** of dairy and food equipment's **different types of detergents** are being **currently employed**.



Detergent mechanism based on enzymes

➤ Proteases:

- Proteases are the most **widely used enzymes**.
- In laundry detergents, protein stains such as, **blood, egg, and human sweat** are removed through proteolysis.
- **Serine proteases** are the **most important group** for detergent applications.
- Proteases **catalyze the hydrolytic cleavage** of the peptide chain.



Detergent mechanism based on enzymes

➤ Amylases:

- Amylases facilitate the removal of starch-containing stains, e.g., pasta, potato, gravy, chocolate, and baby food.
- Amylases also prevent swollen starch from adhering to the surface of laundry and dishes.



Detergent mechanism based on enzymes

➤ Cellulases:

- Cellulases are **applied in detergents** to **make cotton fabrics recover** and **maintain clear colors, a smooth surface, and softness.**
- Cellulases provide these effects by **shaving off the hair/ fur** and pills of cotton fibrils that are generated on the fabric by normal wear and washing.
- Cellulases are unique in providing these effects.



Detergent mechanism based on enzymes

➤ Lipases:

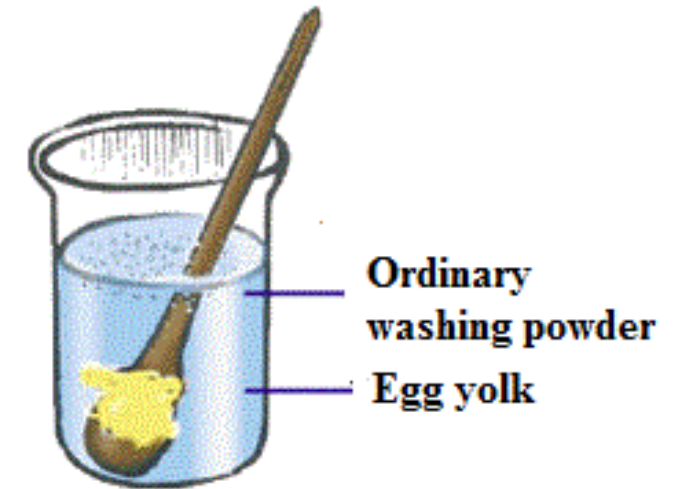
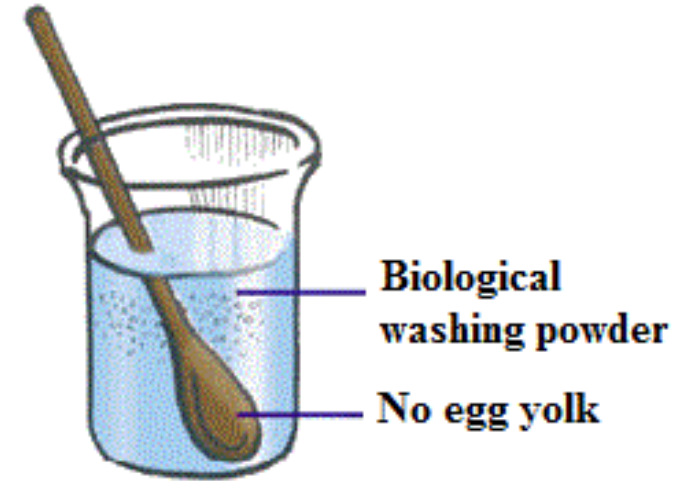
- It has strong hydrophobicity.
- Fats and oils are difficult to remove from laundry at low temperatures.
- Lipases hydrolyze triglyceride to more hydrophilic mono- and diglycerides, free fatty acids, and glycerol.
- These hydrolysis products are all soluble in alkaline conditions.



The differences between biological and regular washing powders

	Biological washing powder	Regular washing powder
Detergents Mix greasy dirt with H ₂ O so it can be washed away	(+)	(+)
Enzymes Braking down stains and dirt in fabrics	(+) Proteases → proteins (blood, egg, gravy*...) Amylases → starches Lipases → fats and grease Cellulase → micro fibrils on cotton, brightening color of washed clothes They work efficiently at 40°C.	(-)
Remove difficult stains (blood, gravy, egg yolk, sweat, fats and grease)	Easily by decomposing the stains.	Difficultly. Heat alone makes stains coagulate and attach more firmly to the clothing.

*Gravy: juices that drip from cooking meat.



Bio-detergents

- Some health hazards, primarily skin allergies were noticed due to enzymes.
- The environmental friendly detergents thus became popular as the use of enzymes in detergents also lowered the washing temperature.



Thank

You

