

# Biotechnology

Biotechnology involves using biological processes for industrial purposes, such as producing antibiotics and hormones. Genetic engineering refers to the deliberate modification of an organism's genetic material. Examples include:

- Inserting human genes into bacteria to produce insulin.
- Engineering crops to resist herbicides, pests, or increase vitamins.

## Anaerobic Respiration of Yeast:

Yeast is used in biofuel production and bread-making. Without oxygen, yeast ferments sugars to produce ethanol (biofuel) or carbon dioxide (helps dough rise).

## Industrial Enzyme Use:

- Pectinase: Used in fruit juice production by breaking down cell walls for easier juice extraction.
- Biological washing powders: Contain proteases and lipases to break down organic stains, sourced from heat-resistant bacteria.
- Lactose-free milk: Produced by passing milk through lactase enzymes that break down lactose.

## Penicillin Production:

Penicillin is mass-produced in fermenters with sugars (for respiration), ammonium salts (for protein synthesis), and fungi (Penicillium). Fermenters control conditions like pH, temperature, and oxygen. from: <https://freeexamacademy.com>

## Bacterial Production of Human Proteins:

Insulin is produced by genetically modifying bacteria. The human insulin gene is inserted into bacterial plasmids, which reproduce to create large amounts of insulin for diabetes treatment.

## Benefits of enzyme immobilization

Benefits of enzyme immobilization (used in processes like lactose-free milk production) include ease of separation from products and enzyme conservation.



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