



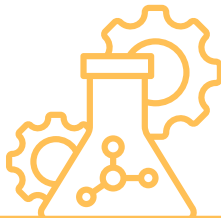
FOOD ENZYMES



01 What are food enzymes?

Enzymes are **proteins** naturally produced by fermentation. They can be used as **digestive help** in food supplements or as effective tools (so called **processing aids**) for food ingredients processing.

The 3 main families of enzymes used in food processing are **hydrolases**, **oxidoreductases** and **transferases**.



⇒ **Hydrolases** are the most widely used. Acting like **molecular scissors**, they break down large natural molecules to provide technical benefits.

⇒ **Oxidoreductases** trigger oxidation-reduction reactions that play a major role in improving food quality.

⇒ **Transferases** are used to link molecules together to improve mostly texture in foods.

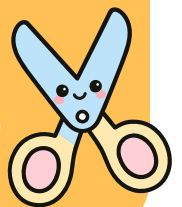
02 Main food enzymes and functions

- ⇒ **Amylases:** Break down starch into oligosaccharides and sugars
- ⇒ **Proteases:** Hydrolyze proteins into peptides and amino acids
- ⇒ **Lipases:** Split fats into fatty acids and glycerol
- ⇒ **Cellulases:** Break down cellulose in plant cell walls
- ⇒ **Pectinases:** Degrade pectin and associated colloids in fruits and vegetables
- ⇒ Others: **Nucleases, Lactases, Phytases**, etc...



03 Molecular scissor

- ⇒ **Hydrolases** act like "molecular scissors" to break down large natural molecules





KOJI FERMENTATION

01 How are TAKABIO enzymes produced?

- **TAKABIO enzymes** are produced in Japan by our partner **Shin Nihon Chemical**.
- The enzymes are produced by **KOJI Solid State Fermentation (SSF)** from highly selected strains of **non-genetically modified microorganisms**.
- Finally, **SSF**, allows the production of **very specific enzymes**.



02 What is koji?

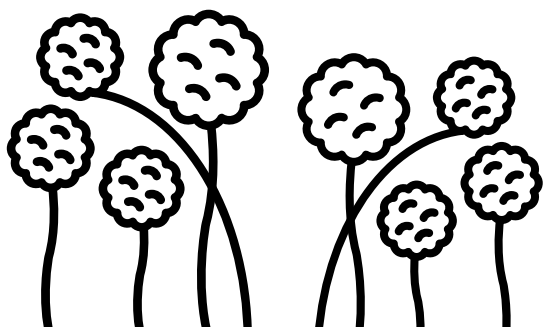
- **Koji** is a cooked grain inoculated with **specific microorganisms** (generally *Aspergillus*, *Rhizopus*)
- **Koji** is traditionally used in Japan to make **sake, miso and soy sauce**
- **Koji** enables the production of **powerful enzymes** with multiple and unique properties for **food industry**

03 Dr. Jokichi Takamine: an enzyme pioneer

Based on **traditional Japanese expertise** (koji fermentation), **SSF** is used to produce enzymes.

In the 19th century, **Dr. Jokichi Takamine** was the first to apply the traditional technique of soybean fermentation to new areas of application.

It is thanks to him that **food enzymes** are now used in **food processing**.



Shin Nihon
Chemical

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