

ENZYMES

- Complex organic compounds made up of amino acids and used to catalyze the reactions inside the cell/outside the cell when secreted extracellularly.
- Most important enzymes are those which are produced extracellularly by the MO (Industrial point of view)
- Initially they are produced from solid state fermentation but now by submerged fermentation (growth product occurs on solid substrate) using liquid media.
- Presently a large no. of microorganisms has been employed for the commercial production of enzyme.
- Most imp MO include Bacteria and Fungi.

→ List of enzymes:-

	<u>MO</u>	<u>Function</u>
α -Amylase	<u>Bacillus licheniformis</u>	Hydrolysis of starch
Pectinase	<u>A. niger</u> , <u>B. subtilis</u>	Pectin hydrolysis in fruit juices "
Gelucanase	<u>A. niger</u> , <u>B. subtilis</u>	on fruit juices "
Cellulase	<u>A. niger</u> , <u>Rhizopus</u> sp	cellulose hydrolysis in fruit juice "
Lipase	<u>A. niger</u>	Detergent, Lipid hydrolysis "

→ eg. Production of Invertase or Sucrase.

This enzyme splits sucrose into glucose and fructose.

in industry produced from baker's yeast i.e. S. cerevisiae

Production → Industrially this enzyme is produced from improved strain of above yeast which grows at bottom of fermentative media.

Medium contains sucrose, an ammonium salt, phosphate buffer and other minerals. pH = 4.5. Temp 26-30°C for 8hr.

Recovery → After fermentation is over yeast cells are filtered off.

The extract is dried and held in sucrose syrup.

Uses - used in making ice creams.

- chocolate coated candy

→ Artificial honey can also be prepared.

→ Proteases - This enzyme catalyze the hydrolysis of protein which is actually a mixture of proteinases and peptidases.

MO involved - *Bacillus*, *Pseudomonas*, *Clostridium*
Aspergillus niger, *A. flavus* etc

Production → A high yielding strain is selected and inoculated in media containing 2-6% carbohydrate, proteins and minerals.

Allow to incubate at 37°C for 3-5 days, with aeration.

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Filter the media through specialized filter paper

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Filtrate is concentrated and used as source of enzyme.

Uses → Tenderization of meat

→ used in beverages and industries in clarification etc

→ used in production of Soy sauce (Fungal)