

Enzyme immobilization

Pharmaceutical biotechnology(605-T)

By-Sangeeta Thakur

Definition

- Enzyme immobilization may be defined as a process of confining the enzyme molecules to a distinct phase from the one where in the substrates and the products are present.
- Imprisonment of enzyme in a distinct support/matrix
- The support/matrix allows exchange of medium
- The medium contains substrates or effector or inhibitor molecule
- First immobilization technology: amino acylase by *aspergillus oryzae* for the production of L-amino acids in Japan
- Two main advantages of enzyme immobilization
 - 1) Increased functional efficiency
 - 2) Enhanced reproducibility

Advantages of immobilized enzymes

- Reuse
- Continuous use
- Less labor input
- Saving in capital cost/investment
- Minimum reaction time
- Less chance of contamination in products
- More stability
- Improved process control
- High enzyme substrate ratio

Disadvantages of immobilized techniques

- ❑ Uses in industrial application are limited
- ❑ Loss of catalytic properties in some enzymes
- ❑ Some enzymes become unstable
- ❑ Enzymes are inactivated by heat generated in the system
- ❑ High cost for isolation, purification and recovery of active enzyme.

Application of enzyme immobilization

- Industrial production- eg. Antibiotics, beverages, amino acid etc
- Biomedical application- treatment, diagnosis and drug delivery
- Food industry- production of jam, jellies and syrup
- Research-HRP in blotting experiment, proteases for cell lysis
- Production of biodiesel- from vegetable oils
- Waste water management-treatment of sewage and industrial effluents
- Textile industry-scouring, bio-polishing and designing of fabrics
- Detergent industry- immobilization of lipase for effective dirt removal