

Immobilised Biocatalysts

Code: 100941
ECTS Credits: 6

Degree	Type	Year	Semester
2500253 Biotechnology	OT	4	0

Contact

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Use of languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Prerequisites

Fluent knowledge (spoken and written) of Catalan and / or Spanish

To achieve the objectives of the course it is recommended to have some solid basic knowledge in:

Biochemistry
Enzymatic kinetics
Microbial kinetics
Cell biology
Enzymology
Relationship structure / function of proteins
Bioreactors
Organic chemistry

Objectives and Contextualisation

Description and objectives:

The immobilization of biocatalysts can be understood as a whole series of techniques that allow to have the biocatalyst located in a limited space, while maintaining its activity. A biocatalyst is an enzyme, a cell or a cellular organelle. In the case of cells, the maintenance of its activity is usually linked to its viability. The process of biocatalyst immobilization opens up a whole range of possibilities in its use, mainly due to the fact that by means of immobilization it is passed from having a microscopic biocatalyst, normally dissolved or dispersed in a liquid medium, to a macroscopic biocatalyst, usually attached to a solid matrix. These possibilities range include: the development of continuous bioprocesses in a much more intensive and productive way, to obtain biosensors or biochips and the improvement of purification processes.

The first aim of the subject is to present the different techniques with which the process of immobilization of biocatalysts can be addressed, with particular emphasis on how to alter the design of the immobilized biocatalyst for a desired application. In a second block, the aspects associated with the physical processes derived from having the biocatalysts in a solid matrix are analyzed in greater detail. Finally, a series of specific applications are analyzed, which serve to see the impact of immobilization in the whole of a particular application in Biotechnology.

It is basically intended to establish the relationship between the nature of the biocatalyter employed, the different immobilization methods available and the final application that is intended to be developed, analyzing different alternatives and modifications in the design of the particles and the final system to be developed.

Content

Program:

Topic 1. Introduction

Topic 2. Immobilization of biocatalysts: definition and classification

Topic 3. Immobilization of biocatalysts. Advantages

Topic 4. Immobilization of biocatalysts. Disadvantages

Topic 5. Basic steps during the immobilization of Biocatalysts

Topic 6. Mass transfer limitations in immobilized biocatalysts: External and internal

Topic 7. Monitoring of the immobilization process

Topic 8. Immobilization by adsorption

Topic 9. Immobilization by covalent bond

Topic 10. Immobilization by crosslinking. Self-immobilization

Topic 11. Immobilization by entrapment

Topic 12. Immobilization by encapsulation in membranes

Topic 13 Biocatalyst and reaction medium. Engineering of the reaction medium.