Microbial bioconversions of biologically active P-C compounds: Scope and limitations of scaling-up

Ewa Żymanczyk-Duda
Wroclaw University of Science and Technology, Poland

Chirality is a crucial feature in the world of living organisms. This is responsible for the specific interactions between biologically active compounds in nature; therefore, it is also fundamental for designing the novel compounds. Among P-C compounds, structures are phosphonate derivatives such as amino phosphonates, keto phosphonates, hydroxy phosphonates. These are analogues of physiological compounds, so they are applied as moderators of activity of particular enzymes involved in natural compounds metabolic pathways. For such purposes, it is necessary to receive them as defined optical isomers. Chemical synthesis of such phosphonates is of low-effectiveness, also for the economic reasons, so biocatalytical approach appeared to be a good alternative. Good results were achieved for the kinetic resolutions of the racemic mixtures of amino- and hydroxy-phosphonates. This was performed via selective oxidation and employing following fungal genera: *Penicillium, Beauveria, Cunninghamella, Verticillium, Cladosporium, Rhodotorula* and *Saccharomyces* (as whole-cells biocatalysts). The same fungal mycelia were able to selectively reduce (thermodynamic process) prochiral keto phosphonates. The above mentioned experiments succeeded based on the laboratory scale and the most effective ones were selected for scaling- up process. This was the hardest part, because it required the modifications of the biotransformation procedures and the biocatalyst form. Experiments were performed with the use of batch and continuous reactors, and the fungal mycelia were immobilized with the use of polyurethane foams.

Biography

Ewa Żymanczyk-Duda has done his MSc in Biotechnology (1990), PhD in Chemistry (1995) from Wroclaw University of Science and Technology, Poland. She has also worked as an Assistant Professor (2008) at the Wroclaw University of Science and Technology, Poland. She was the Vice Dean of Chemistry Department, Coordinator of Teaching Program in the area of Biotechnology. She has published more than 40 papers in reputed journals and has been serving as a reviewer for various journals.

ewa.zymanczyk-duda@pwr.edu.pl

Notes: