Review

New perspectives for the design of sustainable bioprocesses for phosphorus recovery from waste

Cédric Tarayre, Lies De Clercq, Raphaëlle Charlier, Evi Michels, Erik Meers, Miller Camargo-Valero, Frank Delvigne

PII: S0960-8524(16)30067-0
DOI: http://dx.doi.org/10.1016/j.biortech.2016.01.091
Reference: BITE 16002

To appear in: *Bioresource Technology*

Received Date: 6 November 2015
Revised Date: 22 January 2016
Accepted Date: 25 January 2016

Please cite this article as: Tarayre, C., Clercq, L.D., Charlier, R., Michels, E., Meers, E., Camargo-Valero, M., Delvigne, F., New perspectives for the design of sustainable bioprocesses for phosphorus recovery from waste, *Bioresource Technology* (2016), doi: http://dx.doi.org/10.1016/j.biortech.2016.01.091

New perspectives for the design of sustainable bioprocesses for phosphorus recovery from waste

Cédric Tarayre[1+], Lies De Clercq[2+], Raphaëlle Charlier[1], Evi Michels[2], Erik Meers[2], Miller Camargo-Valero[3,4], , Frank Delvigne[1*]

1. Microbial Processes and Interactions, Gembloux Agro-Bio Tech, University of Liège, Passage des Déportés 2, B-5030 Gembloux, Belgium
2. Department of Applied Analytical and Physical Chemistry, Laboratory of Analytical Chemistry and Applied Ecochemistry, Ghent University, Coupure Links 653, B-9000 Ghent, Belgium
3. Faculty of Engineering, University of Leeds, Leeds LS2 9JT, Leeds, United Kingdom
4. Departamento de Ingeniería Química, Universidad Nacional de Colombia, Campus La Nubia, Manizales, Colombia

+ Contributed equally

Abstract

Phosphate rock has long been used for the production of phosphorus based chemicals. However, considering the depletion of the reservoirs and the decrease of the quality of phosphate rocks, a potential market is now emerging for the recovery of phosphate from waste and its reuse for different applications. Notably, phosphate recovery from wastewater could be included in a circular economy approach. This review focuses on the use of microbial systems for phosphorus accumulation and recovery, by considering the actual range of analytical techniques available for the monitoring of phosphorus accumulating organisms, as well as the actual biochemical and metabolic engineering toolbox available for the optimization of bioprocesses. In this context, knowledge gathered from process, system and synthetic biology could potentially lead to innovative process design.

Keywords: Phosphorus recovery, PAOs, wastewater, biological processes

* Corresponding author : f.delvigne@ulg.ac.be