

Development of Closed System for Bacterial CO₂ Mitigation

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Abstract : Increasing concentration of green house gases (GHG's), such as CO₂ is of major concern and start showing its impact nowadays. The recent studies are focused on developing the continuous system using photoautotrophs for CO₂ mitigation and simultaneous production of primary and secondary metabolites as a value addition. The advent of carbon concentrating mechanism had blurred the distinction between autotrophs and heterotrophs and now the paradigm has shifted towards the carbon capture and utilization (CCU) rather than carbon capture and sequestration (CCS). In the present work, a bioreactor was developed utilizing the chemolithotrophic bacterial species using CO₂ mitigation and simultaneous value addition. The kinetic modeling was done and the biokinetic parameters are obtained for developing the bioreactor. The bioreactor was developed and studied for its operation and performance in terms of volumetric loading rate, mass loading rate, elimination capacity and removal efficiency. The characterization of effluent from the bioreactor was carried out for the products obtained using the analyzing techniques such as FTIR, GC-MS, and NMR. The developed bioreactor promised an economic, efficient and effective solution for CO₂ mitigation and simultaneous value addition.

Keywords : CO₂ mitigation, bio-reactor, chemolithotrophic bacterial species, FTIR, GC-MS, NMR

Conference Title : ICCME 2015 : International Conference on Chemical and Molecular Engineering

Conference Location : Paris, France

Conference Dates : April 27-28, 2015