Integrated ecotechnology approach towards treatment of complex wastewater with simultaneous Bioenergy production

Manupati Hemalatha, J. Shanthi Sravan, Dileep Kumar Yeruva, S. Venkata Mohan

PII: S0960-8524(17)30399-1
DOI: http://dx.doi.org/10.1016/j.biortech.2017.03.118
Reference: BITE 17822

To appear in: *Bioresource Technology*

Received Date: 2 February 2017
Revised Date: 19 March 2017
Accepted Date: 20 March 2017

Please cite this article as: Hemalatha, M., Sravan, J.S., Yeruva, D.K., Mohan, S.V., Integrated ecotechnology approach towards treatment of complex wastewater with simultaneous Bioenergy production, *Bioresource Technology* (2017), doi: http://dx.doi.org/10.1016/j.biortech.2017.03.118

Integrated ecotechnology approach towards treatment of complex wastewater with simultaneous Bioenergy production

Manupati Hemalatha, J Shanthi Sravan, Dileep Kumar Yeruva, S Venkata Mohan*

Bioengineering and Environmental Science lab, EEFF Department,
CSIR-Indian Institute of Chemical Technology (CSIR-IICT), Hyderabad, 500 007, India.
*E-mail: vmohan_s@yahoo.com; Tel/Fax: 040-27191765.

Abstract

Sequential integration of three stage diverse biological processes was studied by exploiting the individual process advantage towards enhanced treatment of complex wastewater. A successful attempt to integrate sequence batch reactor (SBR) with bioelectrochemical treatment (BET) and finally with microalgae treatment was studied. The sequential integration has showed individual bioprocess substrate degradation (COD) of 55% in SBR, 49% in BET and 56% in microalgae, accounting for a consolidated treatment efficiency of 90%. Nitrates showed a removal efficiency of 25% in SBR, 31% in BET and 44% in microalgae, with a total efficiency of 72%. The SBR treated effluents further fed to BET with the electrode interventions also showed TDS removal. BET exhibited higher process performance than SBR. The integration of these bioprocesses significantly overcame the individual process limitations along with value addition as biomass (1.75 g/L), carbohydrates (640 mg/g), lipids (15%) and bioelectricity. The study resulted in providing a strategy of combining SBR as pretreatment step to BET process and finally polishing with microalgae achieving the benefits of enhanced wastewater treatment along with value addition.

Keywords: *Sustainable wastewater treatment; Closed loop; Bioenergy; Bioremediation; Biorefinery.*