

Extracting Polyhydroxyalkanoates from Waste Sludge of Husbandry Industry Wastewater Treatment Plants

Authors : M. S. Lu, Y. P. Tsai, H. Shu, K. F. Chen, L. L. Lai

Abstract : This study used sodium hypochlorite/sodium dodecyl sulfate method to successfully extract polyhydroxyalkanoates (PHA) from the wasted sludge of a husbandry industry wastewater treatment plant. We investigated the optimum operational conditions of three key factors with respect to effectively extract PHAs from husbandry industry wastewater sludge, including the sodium hypochlorite concentration, liquid-solid ratio, and reaction time. The experimental results showed the optimum operational conditions for polyhydroxyalkanoate recovery as follows: (1) being digested by the sodium hypochlorite/sodium dodecyl sulfate solution with 15% (v/v) of hypochlorite concentration, (2) being operated at the condition of 1.25 mLmg⁻¹ of liquid-solid ratio, and (3) being reacted for more than 60 min. Under these conditions, the content of the recovered PHAs was about 53.2±0.66 mgPHAs/gVSS, and the purity of the recovered PHAs was about 78.5±6.91 wt%. The recovered PHAs were further used to produce biodegradable plastics for decomposition test buried in soils. The decomposition test showed 66.5% of the biodegradable plastics produced in the study remained after being buried in soils for 49 days. The cost for extracting PHAs is about 10.3 US\$/kgPHAs and is lower than those produced by pure culture methods (12-15 US\$/kgPHAs).

Keywords : biodegradable plastic, biopolymers, polyhydroxyalkanoates (PHAs), waste sludge

Conference Title : ICSWRM 2014 : International Conference on Sustainable Water Resources Management

Conference Location : Stockholm, Sweden

Conference Dates : July 14-15, 2014