

Removal of Heavy Metals Pb, Zn and Cu from Sludge Waste of Paper Industries Using Biosurfactant

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Abstract : Increasing public awareness of environmental pollution influences the search and development of technologies that help in clean up of organic and inorganic contaminants such as metals. Sludge waste of paper industries as toxic and hazardous material from specific source contains Pb, Zn, and Cu metal from waste soluble ink. An alternative and eco-friendly method of remediation technology is the use of biosurfactants and biosurfactant-producing microorganisms. Soil washing is among the methods available to remove heavy metal from sediments. The purpose of this research is to study effectiveness of biosurfactant with concentration = CMC for the removal of heavy metals, lead, zinc and copper in batch washing test under four different biosurfactant production by microbial origin. *Pseudomonas putida* T1(8), *Bacillus subtilis* 3K, *Acinetobacter* sp, and *Actinobacillus* sp was grown on mineral salt medium that had been already added with 2% concentration of molasses that it is a low cost application. The samples were kept in a shaker 120 rpm at room temperature for 3 days. Supernatants and sediments of sludge were separated by using a centrifuge and samples from supernatants were measured by atomic absorption spectrophotometer. The highest removal of Pb was up to 14,04% by *Acinetobacter* sp. Biosurfactant of *Pseudomonas putida* T1(8) have the highest removal for Zn and Cu up to 6,5% and 2,01% respectively. Biosurfactants have a role for removal process of the metals, including wetting, contact of biosurfactant to the surface of the sediments and detachment of the metals from the sediment. Biosurfactant has proven its ability as a washing agent in heavy metals removal from sediments, but more research is needed to optimize the process of removal heavy metals.

Keywords : biosurfactant, removal of heavy metals, sludge waste, paper industries

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