Studies on Bioremediation of Waste Water Containing Lead by using Biosurfactant from *Pseudomonas Putida*.

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The biosurfactant reported in the present study was obtained from the used vegetable oil (a domestic and the restaurant waste) under technically simple batch culture using *Pseudomonas putida*. Two different oils viz- palm oil and sunflower oil were used to obtain the biosurfactant. The biosurfactant was used to study its role in the precipitation of lead using experimentally designed waste waters with known concentration of lead, to evaluate the potential of bioremediation of waste waters polluted with heavy metals. The present study showed that the rhamnolipid obtained from used sunflower oil was more effective in precipitation of metals than the one obtained from used palm oil.

**Key words**: Biosurfactant, Bioremediation, Vegetable oil, Pseudomonas putida

**Introduction**

Metals are unique environmental and industrial pollutants in that they are neither created nor destroyed. Since our civilisation is heavily dependent on the use of heavy metals, particular attention must be paid to control the contamination caused as the result of large dispersal of metal in the land and environment. If these metals are allowed to contaminate the soil, on a long term basis they will get biomagnified and get concentrated in the food chain. Increasing accumulation of toxic metals in soil and fresh water environment present a health hazard for humans.\(^3\)

Solidification/stabilization for heavy metals is commonly carried out for industrial hazardous waste management. Different matrices used for the fixation and removal of metals are cement for arsenic, fly ash, lime and kiln dust for barium, cement hydration process for lead, solidification stabilization matrix for zinc.\(^4\)

Biological methods for removal or recovery of heavy metals, radionuclides and oxyanions, have been developed during the last three decades as polishing stage in a wastewater treatment scheme. Main advantages of these methods are: environmentally friendly concerning energy and material consumption, possibility of metal recycling and recovery, reduced amount of sludge production for disposal.

Bioremediation technologies are being looked upon as a natural process for the removal of metals from soil. Biosurfactant property of microbial products are receiving increasing attention as alternative technologies for immobilisation or removal of metals from soil!

In the present investigation, *Pseudomonas putida* was used for the production of biosurfactant using used vegetable oils. The aim of this study was to investigate the role of biosurfactant in the precipitation of lead. This method can then be used in the treatment of industrial effluents to bring down the levels of lead considerably so that it can then be discharged into the open water bodies.

**Materials and Methods**

1) Microorganisms- *Pseirdontonas putida* was obtained from NCL and the culture was maintained on Nutrient agar slant under refrigeration condition and transferred every month.

2) Biosurfactant production medium-Production was carried out in 100 ml of the Modified Basal Salt Medium (g/l)- K211PO4-4.8, K112PO4-1.54N114)2SO4-1.0, Na3 (C611507). 21120-0.5, MgSO4.71120-0.2, Yeast extract-0.1, Trace element solution and Used vegetable oils-1%

3) Development of an inoculums-1 8 hrs old culture of *Pseudomonas putida* from Nutrient agar slant was inoculated in 100ml of Modified Basal medium with 1% Glucose in 250 ml of Erlenmeyer flask and incubated it on shaker at room temperature for 24 hrs.

4) Production of 13iosurfactant- Production medium used was the basal salt medium with trace element solution and 1% of used vegetable oils viz- the sunflower and palm oil. 5.0 ml of 24 hrs old culture of *Pseudomonas putida* with OD adjusted to 0.1 was used as inoculums for the production of biosurfactant, The flasks were incubated on shaker for 72hrs. After every 24 hrs, the aliquots were removed and surface tension determined.

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