

## Biological Treatment of Leachate Using Sequencing Batch Reactor

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### Abstract

In Sri Lanka municipal solid waste is generally disposed in poorly managed open dumps which lack liner systems and leachate collection systems. Rain water percolates through the waste layers to produce leachate which drains in to ground water and finally to nearby water bodies, degrading the quality of water. Leachate thus has become a major environmental concern in municipal waste management and treatment of leachate is a major challenge for the existing and proposed landfill sites.

The study was conducted to assess the feasibility of the usage of the Sequencing Batch Reactor in the treatment of the landfill leachate up to the proposed levels in the draft report of "Proposed Sri Lankan standard for landfill leachate to be disposed to the inland waters". Leachate collected from the open dumpsite at Meethotamulla, Western Province, Sri Lanka was used for leachate characterization.

SBR was constructed with a 10-liter working volume operated in an 18 hour (h) cycle mode and each cycle consists of 15 h of aerobic, 2 h settle and 0.5 h of fill/decant stages. The Dissolved Oxygen level within the SBR was maintained at 2 mg/l through the aerobic stage. Infeed was diluted with water during the acclimatization period and a leachate to water ratio of 55:45 was maintained. The removal efficiencies for different parameters were; COD (90.5%), BOD (92.6%), TS (92.1%), Conductivity (83.9%), Alkalinity (97.4%), Hardness (82.2%), Mg (80.5%), Fe (94.2%), Zn (63.4%), Cr (31.69%), Pb (99.6%), Sulphate (98.9%), and Phosphorus (71.4%) respectively. In addition Ni and Cd were removed completely during a single SBR cycle.

Thus the dilution of leachate in the dumpsites using municipal wastewater, groundwater or rainwater was identified as the most cost effective dilution methods. The effluent from the Sequencing batch reactor is proposed to be further treated using a constructed wetland before releasing to surface water.

**Keywords:** Sequencing Batch Reactor (SBR), Leachate, Conceptual design, Landfill