

Treatment Process of Sludge from Leachate with an Activated Sludge System and Extended Aeration System

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Abstract : Society is concerned about measures of environmental, economic and social impacts generated in the solid waste disposal. These places of confinement, also known as landfills, are locations where problems of pollution and damage to human health are reduced. They are technically designed and operated, using engineering principles, storing the residue in a small area, compact it to reduce volume and covering them with soil layers. Problems preventing liquid (leachate) and gases produced by the decomposition of organic matter. Despite planning and site selection for disposal, monitoring and control of selected processes, remains the dilemma of the leachate as extreme concentration of pollutants, devastating soil, flora and fauna; aggressive processes requiring priority attention. A biological technology is the activated sludge system, used for tributaries with high pollutant loads. Since transforms biodegradable dissolved and particulate matter into CO₂, H₂O and sludge; transform suspended and no settleable solids; change nutrients as nitrogen and phosphorous; and degrades heavy metals. The microorganisms that remove organic matter in the processes are in generally facultative heterotrophic bacteria, forming heterogeneous populations. Is possible to find unicellular fungi, algae, protozoa and rotifers, that process the organic carbon source and oxygen, as well as the nitrogen and phosphorus because are vital for cell synthesis. The mixture of the substrate, in this case sludge leachate, molasses and wastewater is maintained ventilated by mechanical aeration diffusers. Considering as the biological processes work to remove dissolved material (< 45 microns), generating biomass, easily obtained by decantation processes. The design consists of an artificial support and aeration pumps, favoring develop microorganisms (denitrifying) using oxygen (O) with nitrate, resulting in nitrogen (N) in the gas phase. Thus, avoiding negative effects of the presence of ammonia or phosphorus. Overall the activated sludge system includes about 8 hours of hydraulic retention time, which does not prevent the demand for nitrification, which occurs on average in a value of MLSS 3,000 mg/L. The extended aeration works with times greater than 24 hours detention; with ratio of organic load/biomass inventory under 0.1; and average stay time (sludge age) more than 8 days. This project developed a pilot system with sludge leachate from Doña Juana landfill - RSDJ -, located in Bogota, Colombia, where they will be subjected to a process of activated sludge and extended aeration through a sequential Batch reactor - SBR, to be dump in hydric sources, avoiding ecological collapse. The system worked with a dwell time of 8 days, 30 L capacity, mainly by removing values of BOD and COD above 90%, with initial data of 1720 mg/L and 6500 mg/L respectively. Motivating the deliberate nitrification is expected to be possible commercial use diffused aeration systems for sludge leachate from landfills.

Keywords : sludge, landfill, leachate, SBR

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