

# MODERN TECHNIQUES FOR PURIFICATION OF LANDFILL LEACHATES USING BIOLOGICAL FILTERS

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## ABSTRACT

Increased environmental demands and increased costs for leachate treatment at sewage plants have stimulated the development of new "in-site" techniques for treatment of leachates. Such new biologically based techniques include irrigation of leachates in soil/vegetation systems, root-zone infiltration, treatment in vegetated ponds or wetlands, and filtration through different types of organic filters.

A major part of the nutrients from landfilled waste will sooner or later turn up in the leachates. If optimised biological treatment techniques, like e.g. bioreactor cell fermentation, is used the nutrient fractions will appear in the leachates within a relatively limited time and in high concentrations. Thus, in order to close the eco-cycle of nutrients, it is highly desirable that these nutrients extracted from the waste can be re-circulated back to forestry or agriculture. This can either be as a liquid or as trapped in composted organic filters or biomass.

Stabilised anaerobic conditions in the landfill result in an effective immobilisation of heavy metals and other pollutants. In a strict anaerobic environment most heavy metals, in contrast to nutrients like magnesium, potassium, sodium and calcium, form insoluble sulphides. Due to these different chemical characteristics most of the nutrients will appear in the leachates, while most of the heavy metals will be bound up in the fermentation residue which is left in the landfill. Thus, e.g. the reactor cell or an advanced landfill with stabilised anaerobic conditions, acts as an anaerobic filter, enabling a separation of the nutrients from mixed municipal and light commercial and industrial wastes. If the leachates are used as fertiliser in e.g. energy plantations, forestry, a.s.o., the nutrients can be brought back to an ecological cycling. This possibility will not be offered after incineration, where the resulting ashes, due to the high amounts of easily available heavy metals, are recommended to be landfilled in sealed monofills.

The presentation will include examples from different Swedish leachate treatment facilities, representing different biological techniques used to catch and use the main flow of nutrients from the decaying waste in a landfill or biocell.