

## MSW landfill leachate: formation, characterization and treatment

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### Abstract

The present article discusses the negative impact of municipal solid waste (MSW) landfills on the environment due to the migration of leachate formed during waste decomposition. The leachate contains an extensive list of pollutants that migrates in soils, surface and underground waters.

The article provides a review of literature regarding the main stages of leachate formation and changes in its chemical composition during the landfill's life cycle. Landfill waste undergo biogeochemical decomposition in aerobic and anaerobic conditions. At the initial stages of waste degradation, easily decomposable organic compounds oxidize leading to high values of chemical and biological oxygen demand (COD and BOD) in the formed leachate, lowering the pH of the medium to 4-5. This in turn leads to the transition of metal ions to the liquid phase due to an increase of their activity in acidic mediums. In anaerobic conditions, further waste degradation takes place producing carbon dioxide, methane, ammonia, mercaptans, hydrogen sulfide, organic acids and water. In the leachate formed after 10 years of landfill operation, the content of organic carbon decreases, the fraction of bioresistant components increases, the pH of the medium increases to 7.5-8.5, metal ions form hardly soluble compounds and sulfates are reduced to sulfides. The chemical composition of the leachate, presented in this article, demonstrates its changes depending on the stage of the landfill's life cycle.

Also, basic schemes of treatment plants for MSW leachate used in Russia and abroad are described based on a combination of traditional wastewater treatment methods (mechanical, biological and physicochemical methods).

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