Contribution ID : **139**   Type : **Oral**

Lysimeter experiment on municipal landfill waste

Monday, 23 September 2019 11:45 (15)

Many landfills do not have ground seals, so that pollutants leached from waste migrate to the ground and water environment. In most cases, the exploitation of unsealed landfills has ended; however, their impact on the groundwater environment still occurs. Lysimeter studies allow us to determine the size and chemical composition of leachates as well as the leachate water balance.

The lysimeter experiment was carried out from November 2016 until May 2017 on a 230-litre municipal waste sample. During the experiment, the lysimeter was precipitated with distilled water. In each month of the experiment, the total volume of the obtained effluents was measured and the values of specific electrolytic conductivity, temperature, pH and Eh were determined. In addition, the characteristic indicators of groundwater pollution in the area of municipal waste landfills (Na, K, Ca, Mg, Fe, Al, Mn, Ni, Cu, Sr, S, Cl, SO4, HCO3, NO3, NO2, NH4, PO4, N Kjeldahl, TOC) were monitored. Microbiological analysis and profiling of physiological population level using EcoPlateTM microarrays - were also performed in collected leachate samples.

The maximum EC value from leachate from the lysimeter was 33 mS/cm. High concentrations of ammonium ion (up to approx. 1400 mg dm-3), chlorides (up to approx. 6800 mg dm-3) and iron (up to approx. 31 mg dm-3) were observed in the effluents. Microbiological analyses showed strong contamination of leachates with bacteria, including potential human pathogens.

Community-level physiological profiling indicates that the activity and functional diversity of microorganisms were higher in the samples obtained in winter compared to leachates collected from lysimeters in spring.

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Session Classification : Parallel

Track Classification : Topic 5 - Tools, methods and models to study groundwater