Barbusinski, K., Pieczykolan, B., Koscielniak, H., Amalio-Kosel, M. Effect of Landfill Leachate on the Efficiency of Municipal Sewage Treatment and on the Properties of Activated Sludge. ***Ochrona Srodowiska*** **2010, Vol. 32, No. 3, pp. 33–38.**

Abstract: Leachate samples were collected at an out-of-use municipal landfill, and sewage samples were taken after passage of the wastewater stream through the mechanical treatment unit. The volume percent of landfill leachate in mixture with municipal sewage varied from 2 to 60%. The extent of reduction in the COD of the sewage was adopted as a measure of the treatment efficiency achieved, whereas the changes in the properties of the activated sludge were expressed by the measured values of the following parameters: respiration activity, sludge volume index, average size and shape factor of the flocs, and specific surface of the sludge. The study has substantiated the marked influence of landfill leachates both on the efficiency of sewage treatment and the characteristics of activated sludge. With a leachate proportion of up to 18% in the mixture, the extent of COD reduction ranged between 70 and 92%. Further increase in the proportion of the leachate reduced the efficiency of the sewage treatment process to 60%, and periodically even to 0%. The experiments have also revealed that the landfill leachates sharply deteriorated the settleability of the sludge. The sludge volume index varied predominantly from 150 to 200 cm^3/g, which was attributable to the growth of filamentous bacteria. When the proportion of leachate in the sewage was in the range of between 2% and 10%, the size of the sludge flocs averaged 100 μm. Further increase in the volume percent of the leachate accounted for a gradual reduction in the floc size, which reached approx. 40 μm when the proportion of leachate in the mixture exceeded 30%. With a leachate proportion higher than 26%, a decrease was also observed in the specific surface of the activated sludge, which failed to exceed 80 m^2/g. The landfill leachate was also found to produce significant changes in the populations of ciliates, rotifers and filamentous bacteria in the activated sludge. Of these, crawling ciliates were found to be the least immune to the pollutants occurring in the leachates, and were killed when the leachate proportion exceeded 26%. The study has demonstrated that the limit value for the volume percent of leachate in the mixture feeding the activated sludge reactor was 18%, which did not markedly deteriorate the efficiency of sewage treatment or the properties of the activated sludge.

Keywords: Landfill leachate, activated sludge, sludge volume index, specific surface, average floc size, biocenosis.