Post-treatment of anaerobically-treated compost leachate by membrane systems: emphasis on molecular weight distribution

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ABSTRACT
Compost leachate contains high concentrations of organic matter, sulphate and ammonia which requires combined treatment systems. In case of the use of membrane containing combined systems, the effect of pretreatment on molecular weight distribution (MWD) is important in terms of appropriate membrane selection. In this study the leachate from Istanbul full-scale composting plant was firstly treated in an anaerobic fluidized bed reactor (AFBR). Performance of the reactor was low due to the inhibiton by high ammonia content while treatment efficiencies of COD and SO4 were around 41% with 50% ammonia removal. During the anaerobic treatment high molecular weight materials were mostly converted to low molecular fractions. However, changes in the distribution of molecular fractions differed in each pollutant parameters. Subsequent membrane treatment scheme was determined according to the molecular weight distribution analyses. Particular and colloidial materials from AFBR effluent was effectively treated by MF and UF membranes. Post-treatment studies were performed using four different NF and RO membranes and performance comparison was made based on removal efficiency and flux changes. BW30 membrane provided the lowest treatment efficiency while other TXN45, NF90 and XLE membranes had similar effluent quality. Effluent from all membrane systems met discharge limits and optimum treatment scheme has been suggested as AFBR+MF+UF+TXN45 based on operational flux values.

Keywords: Compost leachate; AFBR; Molecular weight distribution; NF; RO membrane

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