Stormwater treatment using ultrafiltration – Effect of cleaning chemical and backwash time on membrane efficiency

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Abstract

Stormwater runoff is known as one of the main contributors of pollutants which is often discharged untreated to the water bodies and causes environmental risk [1]. Membrane treatment may be a good option for treatment of heavily polluted stormwater as it can also remove small particles and colloids that are not normally captured in typical stormwater facilities such as ponds, wetlands, etc. However, fouling in membranes is challenging to control. Application of a pre-treatment prior to the membrane process might help to postpone fouling [2]. In addition, a proper combination of backwash and chemical cleaning for the membrane is essential but this has not yet been studied specifically for stormwater runoff treatment with membranes. In this study, a combination of ultrafiltration PVP/PES membrane with pulsatile fluid flow was used for separation of pollutants from stormwater. Sieving was considered as pre-treatment. In addition, a combination of backwash and chemical cleaning was used to assess reversibility, flux recovery and productivity of the membrane. The results showed that by increasing backwash time from 30 to 60 s, the reversibility and flux recovery increased from 26% to 75% and 55% to 87%, on average and also resulted in 20% increase in productivity. Cleaning chemically with alkaline solution (NaOH, pH=12), followed by acidic solution (HCl, pH=2), had a good impact on removing foulants from membrane surface. According to the experiments, addition of NaOCl to the alkaline solution did not have significant effect on pure water flux recovery. From environmental point of view, using NaOCl is not recommended [3].

References


