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Pretreatment of micro-polluted surface water with a biologically enhanced PAC–diatomite dynamic membrane reactor to produce drinking water

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ABSTRACT

This study developed a biologically enhanced powder activated carbon (PAC) diatomite dynamic membrane reactor (BPDDMR) to pretreat micro-polluted surface water for drinking water production at lab-scale in continuous mode. In the start-up operation period, the BPDDMR required approximately 26 and 31 d to achieve stable removal efficiency of COD_{Mn} and NH_3–N, respectively. Turbidity was always below 0.5 NTU throughout the operation experiment in the permeate flux range of 21–54 l m^{-2} h^{-1}. The BPDDMR could effectively remove the hydrophilic portion of dissolved organic materials (DOM) present in the raw water. The temperature affected pollutant removal (especially COD_{Mn}), which was mainly ascribed to microbial degradation and was also enhanced by PAC and diatomite adsorption. During the precoating period, the stainless steel support mesh (aperture 74 μm) first intercepted the large PAC (50–100 μm), and then diatomite particles (5–20 μm) were intercepted to form a two-layer structure of the biologically enhanced PAC diatomite dynamic membrane (BPDDM). It was found that as the air pressure increased, the backwash efficiency improved and had less residual in the cake layer. Air backwash with a pressure of 200–250 kPa completely cleaned the BPDDM surface.

Keywords: Biologically enhanced PAC–diatomite dynamic membrane reactor; Micropolluted surface water; Filtration; Biodegradation; Air backwash; Drinking water treatment

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