

Effects of pre-ozonation in case of microfiltration of oil contaminated waters using polyethersulfone membrane at various filtration conditions

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ABSTRACT

In the present study membrane filtration was applied for the purification of crude oil containing stable oil in water emulsions ($c_{oil} = 100$ ppm; $d_{oil\ droplets} < 1.5$ μm) with and without pre-ozonation using polyethersulfone (PES) microfiltration membrane ($d_{pore} = 0.2$ μm). The effect of ozonation on the size of oil droplets and on Zeta-potential was determined by dynamic light scattering measurements. The effects of applied transmembrane pressure, stirring speed and duration of ozonation were investigated in detail. Removal efficiency was determined by measuring turbidity, chemical oxygen demand (COD), total organic carbon content (TOC) and extractable oil content (TOG/TPH). Results pointed out, that short pre-ozonation (absorbed ozone was 30 ± 5 mg L^{-1}) causes increased fluxes and decreased resistance without notable change in the purification efficiency in case of low transmembrane pressure (0.1 MPa). However longer pre-ozonation or higher transmembrane pressure results in increased irreversible resistance, lower permeate fluxes or even lower purification efficiency.

Keywords: Ozonation; Microfiltration; Polyethersulfone; Crude oil; Pressure

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