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Volume 63, Issue 3, 15 May 2019, Pages 438-447

## Performance of ultrafiltration-ozone combined system for produced water treatment (Article) [\(Open Access\)](#)

Aryanti, N.<sup>a,b</sup> ✉, Kusworo, T.D.<sup>a,b</sup>, Oktiawan, W.<sup>c</sup>, Wardhani, D.H.<sup>a</sup> 👤

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### Abstract

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Oil exploration waste, also called produced water, contains hazardous pollutants, such as benzene; benzene, toluene, and xylene (BTX); naphthalene, phenanthrene, and dibenzothiophene (NDP); polyaromatic hydrocarbons (PAHs); and phenol. Produced water is characterized by high chemical oxygen demand (COD) and oil content, which exceed the standard limits of regulation. In this study, the combination of ultrafiltration (UF) and ozone pre-treatment and post-treatment were applied for treatment of produced water to minimize its environmental impact. Produced water and membrane were characterized, and their ultrafiltration performance for removal of oil content, benzene, toluene, xylene, and COD. Two commercial Polyethersulfone membranes, with molecular-weight cut-off values of 10 and 20 kDa, were used. The membrane flux profile illustrated that ozone pre-treatment had higher normalized flux than UF only. Separation performance was evaluated based on flux profile and removal of COD, oil and grease content, toluene, and xylene. Significant finding was found where the combination of UF with ozone pre-treatment and post-treatment could significantly eliminate COD, oil content, toluene, and xylene. The rejection of these components was found higher than conventional process, which was in the range of 80% to 99%. In addition, almost oil and grease can be removed by using this combined system. Permeate quality of this system confirmed the acceptable level as water discharge. © 2019, Budapest University of Technology and Economics. All rights reserved.

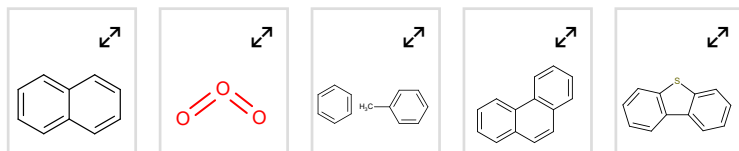
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Molecular weight cutoff Polyaromatic hydrocarbons Polyethersulfone membrane  
Separation performance Water discharges

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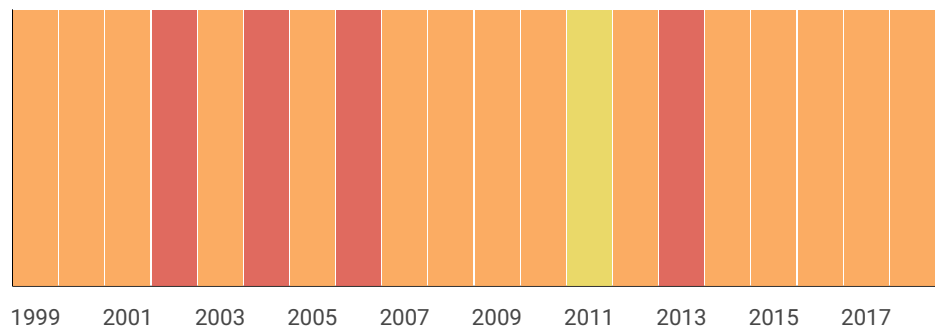
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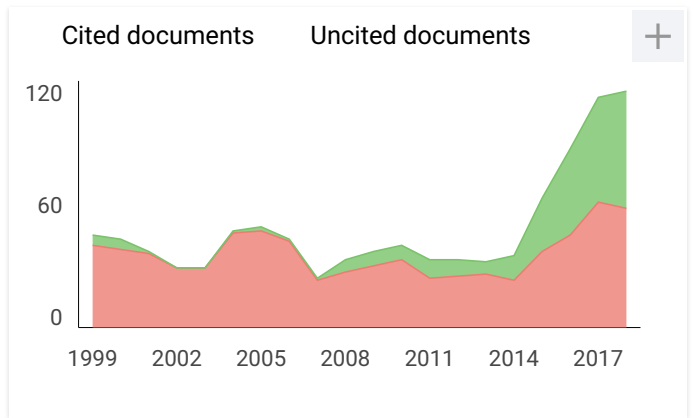
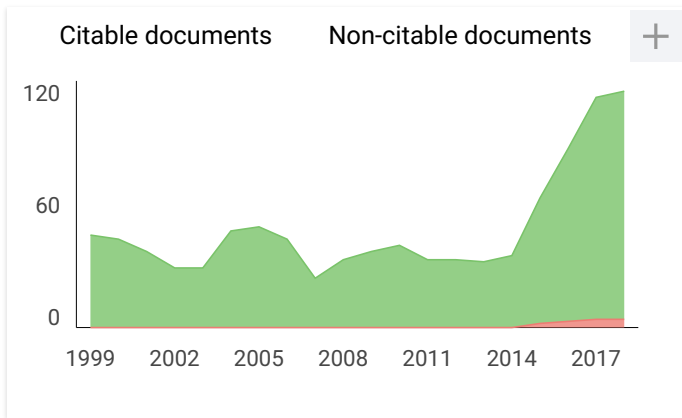
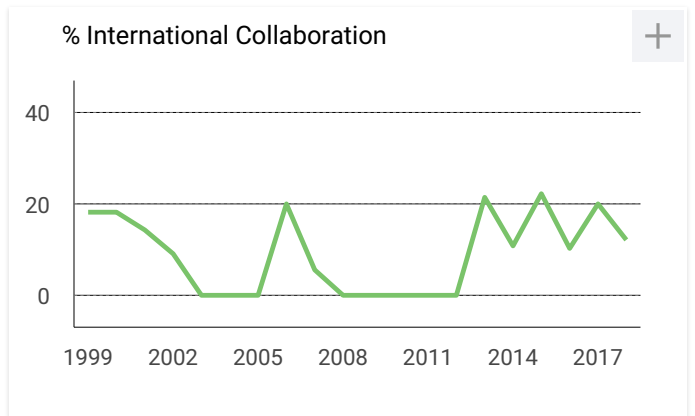
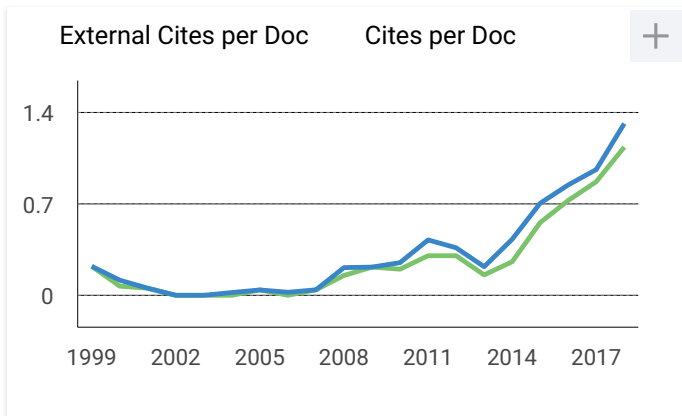
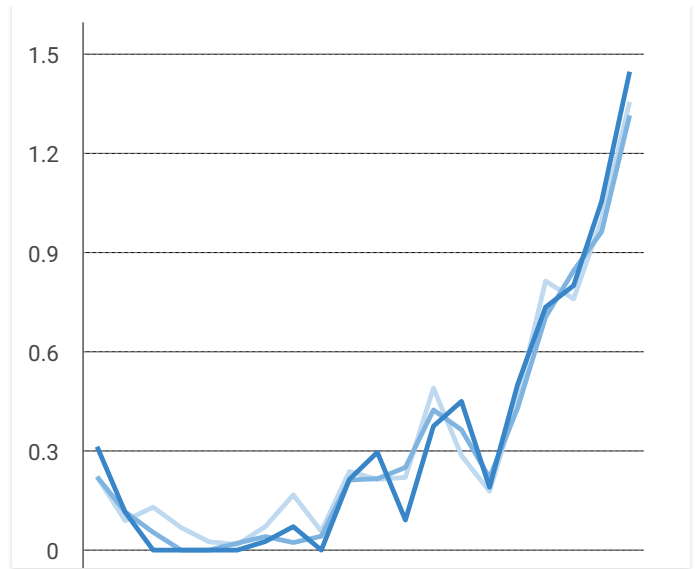
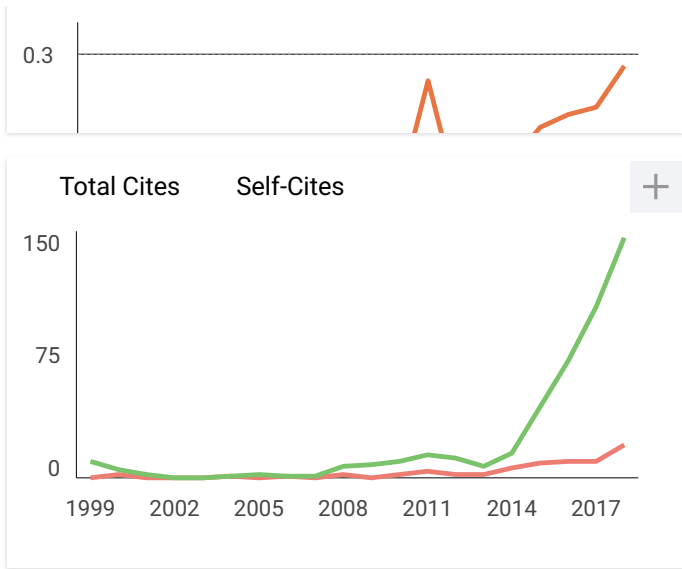
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