

## Accepted Manuscript

Oilfield Produced Water Treatment to Clean Water Using Integrated Activated Carbon-Bentonite Adsorbent and Double Stages Membrane Process

Tutuk Djoko Kusworo, Nita Aryanti, Qudratun, Dani Puji Utomo

PII: S1385-8947(18)30709-5  
DOI: <https://doi.org/10.1016/j.cej.2018.04.136>  
Reference: CEJ 18936

To appear in: *Chemical Engineering Journal*

Received Date: 3 February 2018  
Revised Date: 19 April 2018  
Accepted Date: 20 April 2018

Please cite this article as: T.D. Kusworo, N. Aryanti, Qudratun, D.P. Utomo, Oilfield Produced Water Treatment to Clean Water Using Integrated Activated Carbon-Bentonite Adsorbent and Double Stages Membrane Process, *Chemical Engineering Journal* (2018), doi: <https://doi.org/10.1016/j.cej.2018.04.136>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



## Oilfield Produced Water Treatment to Clean Water Using Integrated Activated Carbon-Bentonite Adsorbent and Double Stages Membrane Process

Tutuk Djoko Kusworo<sup>a\*</sup>, Nita Aryanti<sup>a</sup>, Qudratun<sup>b</sup> and Dani Puji Utomo<sup>a</sup>

<sup>a</sup>Chemical Engineering Department, Faculty of Engineering, Diponegoro University, Jl. Prof. Soedarto, SH, Kampus Undip Tembalang, Semarang, Indonesia 50275

<sup>b</sup>Nano Center Indonesia, Jl. Witanaharja, West Pamulang, Pamulang, South Tangerang City, Indonesia 15417

### HIGHLIGHTS

- A novel integrated membrane process system for produced water treatment is presented
- Double stages membrane proses significantly enhanced the separation performance
- The additional pre-treatment diminished the fouling formation on the membrane surface
- The integrated membrane system could improve membrane stability and lifetime

### ABSTRACT

Large quantities of produced water are generated during the oil and gas production, with a global estimation of three times larger than the products of oil and gas. Water obtained from produced water treatment is potential as an alternative source of clean water for the surrounding community. Integration of physical adsorption as pretreatment and double stages membrane separation as main treatment was confirmed to enhance the performance in term of membrane separation efficiency for produced water treatment. The nanohybrid membrane of PES-nano silica was fabricated by preparing stable and homogeneous polymer dope solution composed of 18 wt% Polyethersulfone, 2 wt % polyethylene glycol, 1.5 wt% nano silica, and N-methyl Pyrrolidone as a solvent. The double stages system was proven significantly enhanced the flux of 26.4-30.6%. In addition, this system increased rejection of TDS, turbidity, and salinity to 72%, 6%, and 90%, respectively. The integrated adsorber - double stages system also performed excellent stability in term of permeate water flux and rejection efficiency. It is verified that the proposed concept can achieve a higher membrane performance and extends the membrane lifetime in produced water treatment.

**Keywords:** Activated carbon, Adsorber, Bentonite, Double stages, Nanohybrid membrane, Nanosilica, Polyethersulfone, Produced water.

## 1. Introduction

---

\* Corresponding Author: tdkusworo@che.undip.ac.id

Download English Version:

<https://daneshyari.com/en/article/6579078>

Download Persian Version:

<https://daneshyari.com/article/6579078>

[Daneshyari.com](https://daneshyari.com)