

Author's Accepted Manuscript

Microfiltration of Cationic Dyes using Nano-clay Membranes

S. Foorginezhad, M.M. Zerafat



www.elsevier.com/locate/ceri

PII: S0272-8842(17)31742-X
DOI: <http://dx.doi.org/10.1016/j.ceramint.2017.08.045>
Reference: CER115999

To appear in: *Ceramics International*

Received date: 4 May 2017
Revised date: 29 July 2017
Accepted date: 6 August 2017

Cite this article as: S. Foorginezhad and M.M. Zerafat, Microfiltration of Cationic Dyes using Nano-clay Membranes, *Ceramics International*, <http://dx.doi.org/10.1016/j.ceramint.2017.08.045>

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 galley proof before it is published in its final citable 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.

Microfiltration of Cationic Dyes using Nano-clay Membranes

S. Foorginezhad, M.M. Zerafat*

Faculty of Advanced Technologies, NanoChemical Engineering Department, Shiraz University, Shiraz, Iran

* mmzerafat@shirazu.ac.ir

Abstract

Water resources cover 70% of earth surface with only 3% as fresh and the remaining frozen or unavailable. As a result, water and wastewater treatment have attracted a great deal of attention during last decades. Among various pollutants, dyes in textile wastewaters can have serious impacts on the environment. In the present study, low-cost ceramic nano-clay microfiltration membranes with low sintering temperature were fabricated via dry pressing, with natural zeolite as pore former. Flat disks were fabricated by sintering a mixture with various proportions of clay, zeolite and polyethylene glycol at 900 °C and characterized using FE-SEM, open porosity test, zeta potential, water permeability and acid-base treatment. Also, Membrane porosity was enhanced by increasing the zeolite content reaching 30.2% at 30 wt. % and then decreased. The 30% zeolite membrane was selected for microfiltration of methylene blue, crystal violet and methyl orange from aqueous solutions. Initial and time filtered solution concentrations for each dye were measured using a UV-Visible spectrophotometer. Methylene blue and crystal violet are cationic dyes due to the presence of $\text{NC}(\text{CH}_3)_3^+$ while SO_3^- makes methyl orange anionic. The membrane had negative charge at pH=6, suggesting adsorption of cationic dyes as the removal mechanism. 95.55% removal of crystal violet was obtained for the 54 mg. L⁻¹ solution at 1 bar and 90.23% removal of methylene blue was obtained at optimal conditions with a 35.76 mg. L⁻¹ concentration and 1.5 bar transmembrane pressure. However, less than 10% methyl orange removal was obtained, due to its negative charge. Membranes can be recovered completely by eliminating the adsorbed dyes via heat treatment at 300 °C for 1 h. The results approve the as-fabricated clay membranes cost-effective with high rejection of cationic dyes.

Keywords; NanoClay; Zeolite; Microfiltration; Cationic dyes; Wastewater treatment

Download English Version:

<https://daneshyari.com/en/article/5437407>

Download Persian Version:

<https://daneshyari.com/article/5437407>

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