Desalination and Water Treatment
www.deswater.com

46 (2012) 139–148
August

1944-3994/1944-3986
doi: 10.1080/19443994.2012.677495

Taylor & Francis
Taylor & Francis Group

Removal of humic substances with different apparent molecular sizes using Fenton's reagent

Marcelo De Julio[a,*], Luiz Di Bernardo[b], Tatiane Sakamoto De Julio[c], Sandro Xavier de Campos[d], Eny Maria Vieira[e]

[a]*Civil Engineering Division, Aeronautic Institute of Technology (ITA), Praça Marechal Eduardo Gomes, n° 50, Vila das Acácias, São José dos Campos, SP 12.228-900, Brazil*
Tel. +55 12 3947 6805; Fax: +55 12 3947 6801; email: dejulio@ita.br
[b]*Department of Hydraulics and Sanitation, São Carlos School of Engineering, University of São Paulo (EESC-USP), Av. Trabalhador Sãocarlense, n°400, Centro, São Carlos, SP 13.566-590, Brazil*
[c]*Department of Civil Engineering, University of Taubaté (UNITAU), Rua Exped. Ernesto Pereira, n° 99, Centro, Taubaté, SP 12.020-330, Brazil*
[d]*Department of Chemistry, Ponta Grossa State University (UEPG), Av. Carlos Cavalcanti, n° 4748, Campus Uvaranas, Ponta Grossa, PR 84.030-900, Brazil*
[e]*São Carlos Chemistry Institute, University of São Paulo (IQSC-USP), Av. Trabalhador Sãocarlense, n° 400, Centro, São Carlos, SP 13.566-590, Brazil*

Received 8 August 2011; Accepted 20 February 2012

ABSTRACT

Fenton's reagent was used as a coagulating agent in the treatment of water samples with high true color caused by humic substances (HS) extracted from peat. The effects of the apparent molecular size of HS on coagulation, flocculation, and flotation were studied. Four distinct water samples having the same true colors were prepared using HS with different molecular sizes obtained through ultrafiltration fractioning. Through optimization of the coagulant dosage and coagulation pH and the construction of coagulation diagrams for each water sample, it was verified that the sample with the smallest apparent molecular size of HS was the most difficult to treat, requiring higher coagulant (Fenton's reagent) dosages than samples prepared with larger HS molecular sizes. Furthermore, filtration experiments after dissolved air flotation were carried out to simulate conventional treatment. The most representative results in filtered water were: absorbance at 254 nm $\leqslant 0.016\,cm^{-1}$; apparent color $\leqslant 3$ HU; and residual iron concentration $< 0.005\,mg\,L^{-1}$. The total organic carbon values of filtered water samples were also very low, always $< 1.0\,mg\,L^{-1}$.

Keywords: Coagulation; DAF; Drinking water; Fenton's reagent; Humic substances; Molecular size

*Corresponding author.