Environ. Process. (2014) 1:447–457
DOI 10.1007/s40710-014-0029-3

ORIGINAL ARTICLE

Electrocoagulation/Flotation of Textile Wastewater with Simultaneous Application of Aluminum and Iron as Anode

Farshid Ghanbari · Mahsa Moradi · Akbar Eslami · Mohammad Mahdi Emamjomeh

Received: 9 May 2014 / Accepted: 7 August 2014 / Published online: 15 August 2014

Abstract Wastewater discharged from textile industry contains a variety of polluting substances including dyes. Amongst treatment processes, electrocoagulation/flotation is a promising method for color removal from textile wastewater. In this study, the performance of a new electrocoagulation/flotation with combined Fe-Al anodes and a copper made cell as cathode was investigated for the treatment of real textile wastewater. The optimal operational condition for decolorization was pH=7, 300 mA electrical current, 3 cm distance between the two anodes and 40 min reaction time using iron and aluminum as anode materials simultaneously. Under this condition, 98 % color (ADMI) removal was achieved. Furthermore, 87 % COD removal was obtained in similar optimal condition except in 400 mA. To investigate electrical current dependency on the COD removal rate, a kinetic study was carried out and data were in good agreement with the first order kinetic model. The rate constants (k) of COD removal were 0.0234, 0.0291, 0.0393 and 0.0519 min^{-1} for 100, 200, 300 and 400 mA, respectively.

Keywords Electrocoagulation/flotation · Textile wastewater · Decolorization · Combined Fe-Al anodes

1 Introduction

Electrocoagulation process has been successfully used for the treatment of textile wastewater being attractive for its versatility, safety, selectivity, amenability to automation, ease of control

F. Ghanbari
Department of Environmental Health Engineering, School of Public Health, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

M. Moradi (✉) · A. Eslami
Department of Environmental Health Engineering, School of Public Health, Shahid Beheshti University of Medical Sciences, Tehran, Iran
e-mail: moradi.env@gmail.com

M. M. Emamjomeh
Department of Environmental Health Engineering, School of Public Health, Qazvin University of Medical Sciences, Qazvin, Iran