



"Gheorghe Asachi" Technical University of Iasi, Romania



SYNTHETIC TEXTILE WASTEWATERS TREATMENT BY COAGULATION/FLOCCULATION USING FERRIC SALT AS COAGULANT

Carmen S.D. Rodrigues^{1,2}, Luis M. Madeira², Rui A.R. Boaventura^{1*}

¹LSRE - Laboratório de Processos de Separação e Reação, Laboratório Associado LSRE-LCM, Departamento de Engenharia Química, Faculdade de Engenharia, Universidade do Porto, R. Dr. Roberto Frias, 4200-465 Porto, Portugal

²LEPABE – Laboratório de Engenharia de Processos, Ambiente, Biotecnologia e Energia, Departamento de Engenharia Química, Faculdade de Engenharia, Universidade do Porto, R. Dr. Roberto Frias, 4200-465 Porto, Portugal

Abstract

Three different synthetic textile dyeing wastewaters were treated by a chemical coagulation/flocculation process, using ferric sulphate as coagulant. Polyacrylamide (Magnafloc 155) and polyamine (Superfloc C-573) based flocculants were applied. The influence of pH (between 3.5 and 10.4) and Fe³⁺ concentration (from 15 to 4000 mg/L) in both color and dissolved organic carbon (DOC) removal of polyester, cotton and acrylic dyeing wastewaters was assessed in the coagulation stage. As far as flocculation stage concerns, the effect of the flocculant dose (from 0.25 to 5 mg/L) and its nature was evaluated in pre-treated effluents from coagulation, carried out at the better operating conditions. The results obtained permit concluding that the optimum pH and the better coagulant and flocculant doses depend on the characteristics of the effluents. Operating at the best experimentally obtained operating conditions, DOC removals of 40.2, 43.0 and 16.5% were found for polyester, cotton and acrylic synthetic wastewaters, respectively. The color removal efficiency for the acrylic dyeing effluent (44.7%) was slightly higher than that for the cotton one (33.2%); the polyester effluent is already practically colorless. These performances, namely in terms of color reduction, can be considerably increased using a Fe II salt as coagulant. In spite of the relatively low DOC and color removals obtained by coagulation/flocculation with the Fe III salt, the remaining dissolved iron can be used for a downstream Fenton's oxidation process, which means an economic benefit for the integrated treatment of textile dyeing effluents.

Keywords: anionic flocculant, cationic flocculant, coagulation, ferric sulphate, flocculation, textile effluent treatment

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* Author to whom all correspondence should be addressed: e-mail: bventura@fe.up.pt; Phone: + 351-22-5081683; Fax: + 351-22-5081449