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Treatment of Textile Dyeing Factory Wastewater by Electrocoagulation with low sludge settling time: optimization of operating parameters by RSM

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Highlights

- Studying of Industrial dyeing wastewater contains some additives, which are used for dyeing process such as sodium oxalate, starch, sodium chloride, sodium carbonate, sodium hydroxide, acetic acid, except for color. These additives are effective on EC process performance as decolorization, COD removal and sludge settling velocity.
- Discussing sludge settling velocity after EC process with Al electrodes and their difficulties.
- Separating sludge after EC process with low sludge settling time (30 minutes).
- Determination of sludge settling volume kinetics to identify the best time of sludge settling.

Abstract

Dyeing wastewater differs from textile wastewater because industrial dyeing wastewater except of color contains some dissolved additives such as sodium oxalate and acetic acid. This article deals with the treatment of industrial dyeing wastewater by electrocoagulation technique because the area needed for the treatment of industrial wastewater is a significant factor. In addition, effect of operational parameters such as initial pH (4-9), current density (15-35 mA/Cm^2) and EC time (20-60 minutes) was determined in low settling time of 30 minutes in comparison to other studies, which have settling time of 12 hours or more. Electrocoagulation includes three stages of oxidation reaction at the anode, break emulsion particles and settling. In this study, Box–Behnken design as a response surface methodology (RSM) was used to investigate the effects of major operating variables and optimization conditions of electrocoagulation method on aluminum electrodes. Results showed that initial pH was important more