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Investigation of the treatability of paint industry wastewater using hybrid coagulant poly-aluminum-chloride-sulfate

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ABSTRACT

In this study, coagulation–flocculation method with poly-aluminum-chloride-sulfate (PACS) was used to pre-treat paint industry wastewater (PIWW). The pH, centrifugation time, revolutions per minute and PACS dose were selected as independent parameters for an experimental design employing Taguchi orthogonal arrays. These independent parameters were varied at four different levels (pH: 5, 6, 7 and 8; centrifugation time: 1, 2, 3 and 4 min; revolutions per minute: 1,000; 2,000; 3,000 and 4,000 rpm; and PACS doses: 1, 2, 3, and 4 mg/L) to determine their effects on the removal efficiencies of selected dependent parameters. Chemical oxygen demand (COD) and color were selected as the dependent parameters and analyzed at the beginning and end of each batch experiment. The maximum removal efficiencies of COD and color were found to be 37% (for 3-3-1-2 levels) and 89% (for 4-1-4-2 levels), respectively. According to the Taguchi method, the contributions to COD removal performance of PACS dose, pH, revolution per minute and centrifugation time to be 33.09%, 37.39%, 3.76% and 13.42%, respectively. On the other hand, the contributions to color removal performance of PACS dose, pH, revolution per minute and centrifugation time to be 3.75%, 86.97%, 3.75% and 4.25%, respectively. According to obtaining results, PACS can be used as a pre-treatment process for PIWW treatment.

Keywords: Chemical oxygen demand removal; Color removal; Paint industry wastewater; Poly-aluminum-chloride-sulfate; Taguchi method

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