



Wastewater treatment for reuse employing industrial by-products as alternative coagulants

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ABSTRACT

In the current research, three industrial by-products containing useful iron and aluminum chemical components were introduced as potential alternative coagulants in marble processing wastewater treatment for possible water reuse. Specifically, the coagulation performance of lignite highly calcareous fly ash, siliceous fly ash (FAs) and electric arc furnace dust (EAFD) was compared with that of two commercial coagulants ($\text{Al}_2(\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$ and $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$). The kinetic studies were conducted at times up to 60 min by using coagulant dosages up to 4 mg/L. Turbidity (NTU), pH and conductivity were recorded during the kinetic studies. FAs and EAFD revealed enhanced coagulation performance, having similar turbidity removal efficiencies (% Δ NTU) to those of commercial coagulants, with short sedimentation times (~5 min). The pH values recorded for the three industrial by-products/coagulants were in the basic range of 7–9.7. Only the pH values for EAFD, at high dosages, were found to be close to neutral, while, for all commercial coagulants, neutral pH values were recorded at intermediate dosages. The experimental results presented may contribute to the formation of integrated and cost-effective strategies for marble wastewater management with low environmental footprint.

Keywords: Marble wastewater; Treatment; Coagulation; Lignite fly ash; Calcareous; Siliceous; Steelmaking dust

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