THE USE OF BAUXITE RESIDUE AS A PROMISING FENTON CATALYST IN THE FLUIDIZED BED FENTON PROCESS FOR THE TEXTILE WASTEWATER TREATMENT

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Abstract - In the domain of Chemical Engineering, the synergistic interaction between the reactor and the catalysts has gained significant attention.Catalytic processes have evolved through time from commercial catalysts to low-cost natural catalysts with reduced environmental effects.This potential use of solid waste can significantly reduce wastewater treatment costs while also addressing solid waste challenges. Bauxite Residue (BR) is an alumina-based byproduct that has high catalytic characteristics.Fluidized bed technology enhances the hydrodynamics and mass transmission of the heterogeneous Fenton process substantially.This study describes the preparation of a catalyst with minimal processing effort.Subsequently, it was characterized, and parameters influencing the decolorization efficiency of synthetic dye wastewater were evaluated.The pH of 5, oxidant concentration of 30 mM, and catalyst dose of 4 g/L were found to be optimum for the eosin yellow dye degradation.At these optimum conditions, the removal efficiency was found to be 91%. Furthermore, to determine the behaviour of the reactor, the fluidized bed reactor's mean residence time, variance, and dispersion number were used in the residence time distribution (RTD) analysis.

Keywords - Bauxite Residue, Solid Waste Utilization, Fluidized-Bed Fenton, Dye-Based Wastewater Treatment