

Hybrid Treatment Method for Decolorization of Mixed Dyes: Rhodamine-B, Brilliant Green and Congo Red

Authors : D. Naresh Yadav, K. Anand Kishore, Bhaskar Bethi, Shirish H. Sonawane, D. Bhagawan

Abstract : The untreated industrial wastewater discharged into the environment causes the contamination of soil, water and air. Advanced treatment methods for enhanced wastewater treatment are attracting substantial interest among the currently employed unit processes in wastewater treatment. The textile industry is one of the predominant in wastewater production at current industrialized situation. The refused dyes at textile industry need to be treated in proper manner before its discharge into water bodies. In the present investigation, hybrid treatment process has been developed for the treatment of synthetic mixed dye wastewater. Photocatalysis and ceramic nanoporous membrane are mainly used for process integration to minimize the fouling and increase the flux. Commercial semiconducting powders (TiO₂ and ZnO) has used as a nano photocatalyst for the degradation of mixed dye in the hybrid system. Commercial ceramic nanoporous tubular membranes have been used for the rejection of dye and suspended catalysts. Photocatalysis with catalyst has shown the average of 34% of decolorization (RB-32%, BG-34% and CR-36%), whereas ceramic nanofiltration has shown the 56% (RB-54%, BG-56% and CR-58%) of decolorization. Integration of photocatalysis and ceramic nanofiltration has shown 96% (RB-94%, BG-96% and CR-98%) of dye decolorization over 90 min of operation.

Keywords : photocatalysis, ceramic nanoporous membrane, wastewater treatment, advanced oxidation process, process integration

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