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DEGRADATION OF A TEXTILE DYE MIXTURE VIA HETEROGENEOUS PHOTO-FENTON PROCESS USING MAGNETITE AS A CATALYST

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Abstract

The textile effluents have high levels of coloration, in addition to the presence of recalcitrant chemical species, which have carcinogenic and allergenic effects. Faced with the need to reduce the impacts of wastewater discharge into water bodies, advanced oxidation processes (AOP) have been applied to degrade compounds that are difficult to biodegrade such as textile dyes. In this work, the effectiveness of the heterogeneous Photo-Fenton (PF) process with UV-C radiation was investigated to treat an aqueous solution (AS) and a synthetic effluent (SE) containing a mixture of textile dyes direct black 22 (DB22), acid black 172 (AB172) and reactive black 5 (RB5), using magnetite as catalyst. Tests have shown that the best result was obtained when using $[H_2O_2] = 40 \text{ mg} \cdot L^{-1}$; %m/V of catalyst = 0.05% and pH = 3, obtaining up to 90.1% degradation for AS and 80.2% for SE. Finally, it was found that the degradation kinetics follows a first-order nonlinear model, with adequacy to the kinetic model proposed by Chan and Chu.

Key words: acid black 172, advanced oxidative processes, direct black 22, kinetic, reactive black 5, toxicity

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