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Use of metallurgical waste as a catalyst in electro-Fenton process for degradation of dyes from aqueous solution

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ABSTRACT

As the exploitation of industrial waste has regained interest in recent years for economic and environmental reasons, the valorization of by-products is now part of the sustainable development. This makes it possible to enhance the ethical image of companies and establish commitment towards nature and society. Replacing some chemicals by recovered waste can help in solving the problem partially. Thus, the present work studies the use of metallurgical waste $FeSO_4{\cdot}7H_2O$ as a catalyst in the degradation of the black azo dye eriochrome T (EBT) by the electro-Fenton process. The powder of the $FeSO_4{\cdot}7H_2O$ waste was characterized by X-ray diffraction and scanning electron microscopy. The study of the effect of operating parameters on the efficiency of the EF revealed optimal values for catalyst dose (0.038 $g{\cdot}L^{-1}$), supporting electrolyte concentration (8×10^{-3} M) and current density (15 $mA{\cdot}cm^{-2}$). The 60 min treatment of 50 $mg{\cdot}L^{-1}$ EBT solution under optimal operating conditions led to a color and COD removal efficiency of 86.79% and 83.01%, respectively. The results obtained were promising and are of great interest for the use of $FeSO_4{\cdot}7H_2O$ metallurgical waste as a catalyst in the electro-Fenton process.

Keywords: Electro-Fenton; Wastewater treatment; Electrochemical advanced oxidation process; Organic persistent pollutants

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