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Comparative degradation studies of Malachite Green and Thiazole Yellow G and their binary mixture using UV/H_2O_2

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ABSTRACT

Wastewater effluents of many industries are usually composed of dye mixtures and their removal poses a significant challenge. The present study reports on the use of an advanced oxidation process namely UV/H_2O_2 to degrade Malachite Green (MG) (k = 0.0518 min^{-1}) and Thiazole Yellow G (TYG) (k = 0.0367 min^{-1}), and their binary mixture in aqueous solutions. Interestingly, it was seen that the photolytic degradation of dyes in binary solution was slower (by 10% for MG and by 46% for TYG) than that in neat solutions under comparable conditions. The total organic carbon analysis (TOC) was also carried out in both the neat dyes (38.5% decrease for MG and 13% decrease for TYG), and in mixture the TOC change was 40%. HPLC analyses confirmed the formation of intermediates in both individual dye solutions, which were however not seen in binary mixtures. The present work shows that dye mixtures behave very differently than neat dyes, and highlights the importance of studying complex dye mixtures and the possible deleterious interactions between dye intermediates during the remediation process.

Keywords: Dyes; Degradation; Advanced oxidation process; TOC; Wastewater

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