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**Investigation of the effect of two nanocomposite preparation methods on enhancing Rhodamine B degradation via the photo-Fenton process**

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**A B S T R A C T**

In this study, a nanocomposite consisting of iron-doped titanium dioxide (FeTiO<sub>2</sub>) and spinel NiFe<sub>2</sub>O<sub>4</sub> was employed to enhance dye removal using the advanced oxidation process H<sub>2</sub>O<sub>2</sub>/UV. The co-precipitation method was used to synthesise both FeTiO<sub>2</sub> and spinel, followed by characterisation using X-ray diffraction (XRD) and Fourier transform infrared spectroscopy (FTIR). To evaluate their efficiency as photocatalysts, the materials were tested under UV light irradiation for the degradation of Rhodamine B in water. Kinetic studies revealed that the reaction followed pseudo-first-order kinetics, with a rate constant of  $6.95 \times 10^{-3} \text{ min}^{-1}$  and degradation efficiencies of 68.57%, 67.21%, and 74.18% for NiFe<sub>2</sub>O<sub>4</sub>, FeTiO<sub>2</sub>-Im, and FeTiO<sub>2</sub>-SG, respectively. FeTiO<sub>2</sub>-SG exhibited superior photocatalytic performance compared to spinel for the degradation of Rhodamine B, suggesting that FeTiO<sub>2</sub> is an efficient photocatalyst for the decolourisation of Rhodamine B.

*Keywords:* Rhodamine B; Photo-Fenton process; Dye; Photodegradation

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