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Using one-step facile and solvent-free mechanochemical process to synthesize photoactive Fe<sub>2</sub>O<sub>3</sub>-TiO<sub>2</sub> for treating industrial wastewater

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1 **Using one-step facile and solvent-free mechanochemical process to synthesize photoactive**  
2 **Fe<sub>2</sub>O<sub>3</sub>-TiO<sub>2</sub> for treating industrial wastewater**

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14 **ABSTRACT**

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16 In this present study, Fe<sub>2</sub>O<sub>3</sub>-TiO<sub>2</sub> photocatalyst was synthesized and used to degrade real  
17 industrial wastewater, namely pulp and paper mill effluent (PPME). Fe<sub>2</sub>O<sub>3</sub>-TiO<sub>2</sub> was synthesized  
18 via ball milling at ambient conditions without incorporating any solvent. Comprehensive  
19 characterization studies and photocatalytic evaluations of the synthesized Fe<sub>2</sub>O<sub>3</sub>-TiO<sub>2</sub> were  
20 conducted in this study. It was verified that Fe<sub>2</sub>O<sub>3</sub>-TiO<sub>2</sub> possessed crystalline structures of  $\gamma$ -  
21 Fe<sub>2</sub>O<sub>3</sub>, anatase and rutile TiO<sub>2</sub>. Also, a good dispersion of Fe and O elements within the TiO<sub>2</sub>  
22 framework was attained. A detection of Fe-O-Ti bond elucidated a substitution of Ti<sup>4+</sup> by Fe<sup>3+</sup> in  
23 the TiO<sub>2</sub> lattice sites through mechanical milling, which ultimately enhanced the photocatalytic

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