



## Enhanced photocatalytic decolorization of reactive red by sonocatalysis using TiO<sub>2</sub> catalyst: factorial design of experiments

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### ABSTRACT

The sonocatalysis, photocatalysis, and sonocatalysis followed by photocatalytic process has been studied to treat the decolorization of reactive red dye using heterogeneous TiO<sub>2</sub> catalysts. Effects of various operating parameters such as reactor system, reaction time, amount of catalyst, and pH on sonocatalysis and photocatalytic treatment were investigated. The ultrasonication of dye was enhanced by the addition of catalyst, which results an increase in the color removal of the photocatalytic process. The results of sonocatalysis followed by photocatalytic color removal of reactive dye showed 98.23% that it could be used as an efficient and environmentally friendly technique for the wastewater treatment. Factorial design has been used for the experiment to optimize the process variables and to study the interaction of variables for the color removal. The color removal has been modeled and it follows the pseudo-second-order adsorption kinetics for the sonocatalysis followed by photocatalytic process.

*Keywords:* Sonocatalysis; Photocatalysis; TiO<sub>2</sub> catalyst; Factorial design; Adsorption model

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