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SUMMARY

The present study dealt with the photocatalytic decolorization and degradation of methylene blue (MB) using TiO₂ nanoparticles / UV system in a slurry type reactor sparged by air. The effect of various process parameters such as initial concentration of MB, contact time, catalyst loading, initial solution pH, and air superficial velocity on the photodegradation reaction was investigated to achieve maximum decolorization efficiency. The results showed that the percentage of color removal increases with increasing pH and the air superficial velocity while decrease with increasing the initial concentration of MB. Also the percentage color removal increases with increasing the catalyst loading up to 1 g/l then decrease with further increasing in the amount of catalyst. The maximum percentage of color removal was 99.9% at 10 ppm, pH 7, catalyst loading 1 g/l and air superficial velocity of 1.94 cm/s. Immobilization of TiO₂ on square glass chips of 1.5 cm was performed by dip coating technique using Previously Made Titania Powder. The performance of these coated glass chips is evaluated at the best conditions obtained from slurry type reactor and it was found that immobilized TiO₂ achieved a percentage colour removal of 90.2 % compared with 99.9 % of the slurry type. The order of the reaction was determined using Lagergren's rate equation and was found to be pseudo first order reaction. TiO₂ was analyzed by XRD and SEM before and after the experiments.