

Enhancing the TiO₂-Ag Photocatalytic Efficiency by Acetone in the Dye Removal from Wastewater

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The catalyst stability and recyclability

A series of catalyst reuses on a TiO₂-Ag sample were carried out in order to determine the possibility of catalyst recycling. This evaluation is a crucial matter for the practical use of a photocatalyst in the advanced oxidation process in the future. For this goal, four photocatalytic consecutive experiments were carried out using fresh MB solutions (initial concentration 4 ppm), 0.03 g L⁻¹ of catalyst and 0.2% acetone at room temperature. After experiment, the aqueous suspension was filtered for separate the TiO₂-Ag catalyst. The recovered material was washed with ultrapure water before being used in a fresh photocatalytic experiment. It was then dried for 24 hours at 100°C in an oven.

It should be noted that the same experimental protocol was used for each cycle, and the pollutant elimination efficiency was checked after 120 minutes of reaction. According to Figure S1 the photocatalytic activity of the TiO₂-Ag was mostly unchanged. Only a slight decrease of about 5% was observed at the end of the fourth photocatalytic run. This result confirms the reuse potential of TiO₂-Ag catalyst within its photocatalytic successive operation. A probable catalyst loss during the filtration or washing stages, or even the absorption of reaction intermediates at the catalyst surface or in its pore channels, may be the cause of the minor decrease in the amount of MB that was eliminated.

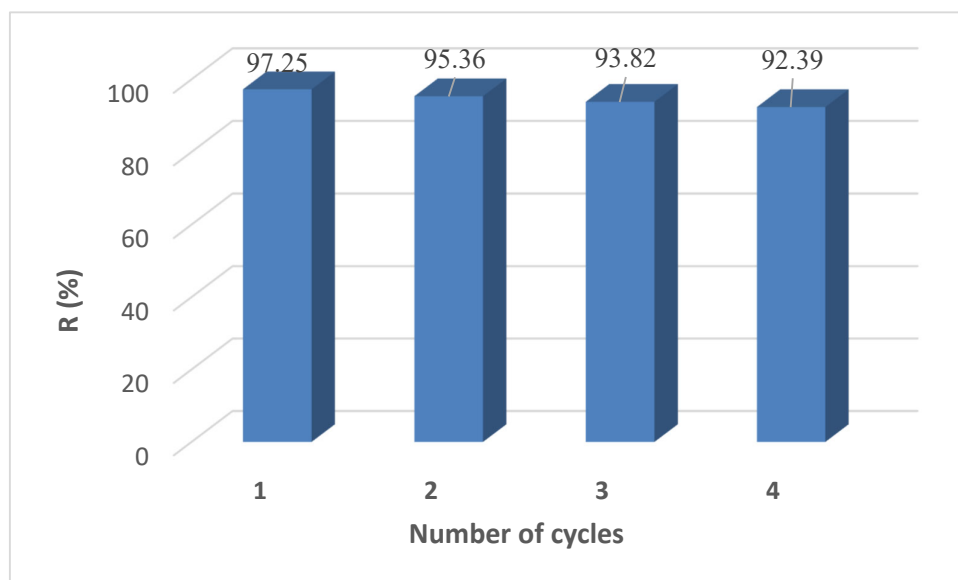


Figure S1. Variation of MB photodegradation efficiency within four consecutive reaction cycles.

The obtained results demonstrated the good physico-chemical stability of the TiO₂-Ag providing clear evidence about its potential for the practical photocatalytic applications.