البحث الثاني

Optimisation study for photocatalytic degradation of methylene blue using TiO2 supported on Agar-Agar and doped with silver

دراسة الأمثل للتحلل الضوئي
أزرق الميثيلين باستخدام TiO2 المدعوم على Agar-Agar و
مطعم بالفضة

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ABSTRACT

Water pollution emerges from different sources such as industry, domestic uses, use of pesticides and fertilisers and other daily uses of organic materials. Wastewater treatment has received great interest especially in the last few years and different techniques have been used for that object. The most recents are the advanced oxidation processes; where photocatalytic reactions represent a sounding technique. In the present work Methylene Blue dye (MB) is used as a model pollutant and the dye-polluted water is photocatalytically treated using TiO2 as nanoparticles and nanofiber in different dosages. The catalyst is supported on Agar-Agar before being used. Another set of experiments is run with silverdoped catalyst where the catalyst is doped with different concentrations of silver (Ag). Results showed that TiO2 nanoparticles have better performance as a photocatalyst than TiO2 nanofiber. It is clear that the highest performance is given by the catalyst doped with 2% silver (51.679% degradation). This is followed by doping with 3% silver (37.367% degradation) while doping with 1% silver gave results very close to the results of un-doped TiO2 (24.026% degradation for 1% silver-doped catalyst as compared to 24.393% degradation for the undoped catalyst). The Response Surface Methodology (RSM) is used for predicting the optimum values for the operating parameters which lead to the highest percentage dye degradation. The optimum values were found to be as follows: 40 ppm, 10 ppm and 5 for catalyst conc., dye conc. and pH, respectively. The maximum percent degradation achieved at these conditions was 49.45%.

Validation of the model with experimental results showed that the model fits well this type of processes.