

Efficacy of a photo-catalyst towards the degradation of a pharmaceutical compound, 4-aminopyridine by application of response surface methodology

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Received 24 August 2016; Accepted 13 February 2017

ABSTRACT

The present study demonstrates an intensive experimental study on the photo-degradation of pharmaceutical compound (4-Aminopyridine) in batch photo reactor with low energy ultraviolet light (125 nm) and using zinc oxide as catalyst. 4-Aminopyridine (4-AP) has been used for many years, prescribed for people with multiple sclerosis. This study aims to analyze the influence of operating parameters and their interactive effect on the overall removal efficiency of the targeted component in water by response surface methodology (RSM). Time (A, min), catalyst (B, gm/l), H₂O₂ (C, mg), and pH (D) were chosen as independent variables to optimize the percent removal of 4-Aminopyridine as response. The highest COD removal 97% was obtained at pH (5.3), ZnO (0.3 gm/l), H₂O₂ (3757 mg) within 49 min treatment time. Model predicted values were found in good agreement with the experimental values, and the behavior of the model equation has supported the experimental observation with minor deviation. Furthermore, the degradation of 4-AP was confirmed by the UV-V is spectrophotometer which showed continuous degradation after every 10 min time interval within an hour study and the FTIR (Fourier transform Infrared) spectrophotometer analysis reveals the modification of the functional groups present in the target compound after photo-catalytic treatment.

Keywords: Chemical oxygen demand (COD) removal; Degradation; Experimental value; pharmaceutical; Photo reactor; Response surface methodology (RSM)

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Presented at the 3rd International Congress on Water, Waste and Energy Management, Rome, Italy, 18–20 July 2016