

Assess the efficiency of Sonofenton Degradation in removal of Sulfacetamide from Aqueous Solutions using Nanoscale Zero-valent Iron Particals

Background: In recent years, the accurence of antibiotics in the aquatic environment is receiving increasing attention. This compounds remain in the environment, because of their incomplete elimination in conventional wastewater treatment processes. Advanced oxidation processes are used to remove many pollutants. The aim of this study was to evaluate the efficiency of sonofenton degradation in removal of sulfacetamide in presence of Zero valent iron nanoparticles.

Methods: The present study was an experimental-laboratory scale study. In this regards, NZVI was synthesized through reducing Iron sulfate by sodium borohydride. First of all, the effect of variables such as pH (3-9), NZVI concentration (1-8g/L), H₂O₂ concentration (0/05-2 M) and contact time (5-90 min) were investigated on process efficiency. Concentration of residual antibiotic analyzed by HPLC-UV equipped with a C18 column Toxicity test was performed to determine the toxicity of sulfacetamide after the Sonofenton process. LC / MS analysis was also performed to determine the combinations of the decomposition process.

Finding: It was found that maximum removal efficiency was observed at pH=3, 60 min contact time, 5 g/L NZVI concentration and H₂O₂ concentration of 1 M. In these optimal conditions, the removal efficiency was 91% and COD removal degree was 27%. A microtoxicity study of bacterial growth prevention revealed a reduction in the toxicity of sulfacetamide after the Sonofenton process.

Conclusion: The experiments showed that the sonocatalytic process using NZVI nanoparticales and along with adding H₂O₂ as an oxidant is an efficient method to remove sulfacetamide and other biological resistant compounds.

Keywords: Sonocatalytic, Sulfacetamide, Zero valent iron nanoparticle, advanced oxidation process