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Removal of Ciprofloxacin from Aqueous Solution Using Graphene Oxide and Reduced Graphene Oxide

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ABSTRACT

The antibiotics consumption has been increased rapidly and their unmetabolized form discharged directly or indirectly in water bodies. Increasing concentration of antibiotics in water bodies create the serious environmental risks. Ciprofloxacin is an important antibiotic, has been used widely to treat bacterial infections in human. The concentration of ciprofloxacin in water bodies present in range of ng/L to µg/L. In this study graphene oxide and reduced graphene oxide were used to remove the ciprofloxacin from aqueous solution. Graphene oxide was synthesized by modified hummer methods and reduced graphene oxide was obtained by thermal reduction of graphene oxide. The concentration of 10ppm ciprofloxacin was investigated. The result showed that 95% ciprofloxacin removal was achieved with graphene oxide in 120 minutes. Whereas only 62% removal was observed with reduced graphene oxide in 120 minutes. The removal was investigated without pH adjustment. The synthesized graphene oxide and reduced graphene oxide were characterized by Fourier transform infrared (FTIR) spectroscopy, powder X-ray diffraction (XRD), thermogravimetric analysis (TGA), scanning electron microscopy (SEM) and X-ray photoelectron spectroscopy. Toxicity evaluation was also carried out by ECOSAR software. Overall this work could provide an environmentally friendly technique to eliminate ciprofloxacin from aqueous solution without using any external energy

Keywords: Wastewater, Ciprofloxacin, Graphene oxide, Reduced graphene oxide

