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Optimization and modeling of *p*-nitroaniline removal from aqueous solutions in heterogeneous catalytic ozonation process using MgAl-layered double hydroxides (MgAl-LDH COP)

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ABSTRACT

p-nitroaniline (PNA) is a well-known acute oral, dermal, and inhalation toxin that has been reported as a priority toxic pollutant by the Environmental Protection Agency (EPA). In this study, MgAl-layered double hydroxides (MgAl-LDH) nanoparticles were prepared by a simple and fast co-precipitation method and used as a catalyst in the ozonation process to remove PNA from aqueous solutions. Next, the structure of the synthesized MgAl-LDH was investigated by X-ray diffraction pattern and field emission scanning electron microscopy-energy dispersive spectroscopy. The response surface methodology was used to investigate the effects of different parameters including reaction time, initial PNA concentration, pH, and LDH loading on the removal of PNA by MgAl-LDH catalytic ozonation process (MgAl-LDH COP). The highest removal efficiency of 91.5% was observed in optimum conditions as follows: initial PNA concentration of 162.5 mg/L, pH of 8.25, LDH loading of 750 mg/L, and reaction time of 70 min. The quadratic model was obtained with a high degree of fit. The removal values of COD and TOC were 77% and 68%, respectively. As a result, MgAl-LDH COP, as an excellent practical alternative, has a high performance in removing persistent compounds such as PNA from aqueous solutions.

Keywords: MgAl-layered double hydroxides; Catalytic ozonation; *p*-nitroaniline; Response surface methodology; Process optimization

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