



Application of nano aluminum oxide and multi-walled carbon nanotube in fluoride removal

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ABSTRACT

The problem of environmental pollution by nanoparticles, which have recently entered the industrial processes around the world, is very important. This study aimed to determine the optimum condition (pH, initial concentration, and sorbent dosage) for removal of fluoride using multi-walled carbon nanotubes (MWCNTs) and nano aluminum oxide (Al_2O_3). Then, the mortality rate of *Daphnia magna* using Al_2O_3 laden with fluoride and MWCNTs laden with fluoride was investigated under the acquired optimum conditions. The obtained results showed that the highest removal rate of fluoride was 96.9% for Al_2O_3 at pH = 6 and 60.1% for MWCNTs at pH = 5. The lethal concentration-50 (LC_{50} -24 h) was 0.501 g/L for MWCNTs laden with fluoride and 0.475 g/L for Al_2O_3 laden with fluoride. Besides, the LC_{50} -48 h was 1.188 and 1.101 g/L for Al_2O_3 laden with fluoride and MWCNTs laden with fluoride, respectively. The study findings demonstrated that Al_2O_3 laden with fluoride and MWCNTs laden with fluoride had the lowest toxicity and mortality effects on *Daphnia magna*.

Keywords: Nano aluminum oxide; Multi-walled carbon nanotubes; Fluoride; Toxicity; *Daphnia magna*

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