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Catalytic ozonation process using MgO-PAC to degrade bisphenol A from aqueous solutions

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ABSTRACT

Endocrine-disrupting compounds are one of the most important pollutants around the environment which can have harmful effects on animals, humans, and the environment. Bisphenol A has been considered as a priority pollutant by the US Environmental Protection Agency and the National Pollutant Release Inventory. This compound, even at very low concentrations, has severe toxicity to human health. The general goal of the work was to evaluate the efficiency of the catalytic ozonation process to remove bisphenol A from aqueous solutions. In the study, accordingly, the capabilities of plain powder activated carbon (PAC) and PAC-MgO (impregnated with MgO as a catalyst) were studied on the removal of bisphenol A. In this study, three different methods were used to modify the catalyst and finally the best method was chosen. The variables considered effecting the process were initial bisphenol A concentration, contact time, pH, PAC dosage, and MgO catalyst. The amount of magnesium added in methods I, II, and III was 12.6%, 6.8%, and 1.1%, respectively. In addition, the field-emission scanning electron microscopy images indicate a better stabilization of magnesium oxide particles on the PAC. The MgO nanoparticles have been stabilized uniformly on the PAC surface, and the surface morphology of PAC has been substantially modified by the use of MgO nanoparticles. In the catalytic ozonation process with PAC and MgO-PAC, with increasing pH, the removal of bisphenol A increased. The findings of the use of the scavenger showed that the main mechanism involved in the decomposition of bisphenol A has been direct and indirect reactions. The GC-MS results showed that the highest mineralization rate in bisphenol A decomposition was related to O_3-MgO-PAC.

Keyword: Bisphenol A; Ozonation; Activated carbon; Mineralization; Magnesium oxide

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