

The impact of 3,3',5,5'-tetrabromobisphenol-A (TBBPA) solution pretreatment by ozonolysis and photocatalysis on the activated sludge respirometric activity

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ABSTRACT

Tetrabromobisphenol-A (TBBPA) is a flame retardant widely used in the production of plastics, textiles, electronics, or electrical equipment. This compound was identified in environmental samples and the sewage sludge, thus its impact on biological processes in wastewater treatment plants is interesting. This work investigates the impact of advanced oxidation processes pretreatment of TBBPA and bisphenol-A (BPA) solutions on its toxicity to activated sludge. The highest efficiency of these micro-pollutants' removals (expressed by chemical oxygen demand), was observed for ozonolysis of BPA (32.3%), and the lowest for photocatalysis on micro-Fe₃O₄ (TBBPA – 32.8%; BPA – 17.3%). The concentration of biodegradable compounds increased the most after a photocatalysis on the micro-Fe₃O₄ (184% for TBBPA and 62.5% for BPA) and quite less for ozonolysis (71.8% and 50.3% respectively). The influence of the catalyst particle size on the photocatalytic pretreatment efficiency was determined based on the biological oxygen demand value measurements. It was found that all analyzed solutions had an adverse (toxic) effect on activated sludge respirometric activity.

Keywords: Tetrabromobisphenol-A (TBBPA); Bisphenol-A (BPA); Advanced oxidation processes (AOPs); Activated sludge; Oxygen uptake rate (OUR)

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