

REMOVAL OF HERBICIDE TEMBOTRIONE FROM WATER USING VARIOUS NEWLY SYNTHESIZED PHOTOCATALYSTS

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Abstract

Tembotrione [2-(2-chloro-4-methylsulfonyl-3-(2,2,2-trifluoroethoxy)methyl)benzoyl cyclohexane-1,3-dione] is the most recently commercialized triketone herbicide worldwide in 2007 with a purpose to control weeds in corn farming [1]. Because of their stability, many herbicides that are used in agriculture may be leached and thus contaminate surface and ground water [2]. Besides, their uptake by the plant root may cause herbicide accumulation in plants and through the food chain becomes a threat to the living beings. Research into the chemical treatment of wastewater and drinking water has focused on improving the efficiency of removal of harmful organic compounds, among which pesticides have an important role, using catalytic and photochemical methods [3]. Heterogeneous photocatalysis represents low-cost, versatile, environmentally friendly, and one of the most promising green chemistry method for removal of different contaminants [4]. The activity of various photocatalysts (TiO₂, ZnO, and MgO) in the case of tembotrione removal from ultrapure water was investigated in this paper using combined adsorption and photocatalytic degradation processes under simulated sunlight and UV irradiation. Effect of different concentration of ammonium persulfate has also been investigated in the presence of all mentioned photocatalysts. Kinetics of tembotrione removal were monitored using HPLC with UV/vis DAD detector.

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