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Novel mechanism of ferrite-induced photodegradation of dinitrophenols into non-hazardous products

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Organic compounds with a 2,4-dinitrophenolic moiety in their structure are widely used as herbicides and insecticides in spite of their toxicity to the environment [1]. Among various treatment methods employed to remove refractory pollutants from contaminated water, photocatalytic processes have generated a great interest in the last decade [2]. Zinc ferrites may induce the photodegradation of many organic pollutants.

Hazardous compounds in the contamination of the food supply from agricultural waste are an increasing concern worldwide. Since dinitrophenols may appear as residues in the environment, herein we have investigated the UV photocatalytic degradation of 2,4-dinitrophenol (2,4-DNP) as parent compound by using zinc ferrite $ZnFe_2O_4$ as catalyst. Nevertheless, the application of such material as photocatalyst for 2,4-dinitrophenol was not a systematic study, but rather a letter on some mechanistic aspects [3]. Hence, we had to explain why the concentration of 2,4-dinitrophenol significantly increases from 0 to 5 minutes during photocatalytic experiments. Moreover, the study should investigate the effect of catalyst amount on the degradation of 2,4-dinitrophenol. We have also analyzed our results in the light of similar works already published on this matter [4]. Therefore, the photocatalytic process of 2,4-dinitrophenol was followed by UV-Vis and infrared spectroscopy, mass spectrometric analysis, and germination experiments using the supernatant containing photodegraded 2,4-DNP. Indeed, the germination experiments performed according to previously reported procedures [5] have confirmed the total lack toxicity of decontaminated solutions on wheat seeds and seedlings.

Biography

Marius Zaharia is a 2015 graduate of Alexandru Ioan Cuza University of Iasi, Romania, From department of chemistry in the field of environmental chemistry, as a doctoral study in doctoral school "chemistry and life and earth sciences". The scientific experience is confirmed by the scientific results obtained in the field of environmental chemistry, results included in the 14 scientific ISI papers (6-first author, 5-corresponding author), 8 papers in Journals accredited by CNCSIS (category B and C) and a patent application at OSIM Bucharest. Consequently, he is researcher in 2 projects Meticon pH PN-III-P4-ID-PCE-2016-0376, Contract IDEI 56/12.07.2017 and Procorn PN-III-P2-2.1-PED-2016-0869, Contract 182/2017.

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