UV AND SUNLIGHT-DRIVEN DEGRADATION OF CIPROFLOXACIN IN THE PRESENCE OF CATALYSTS TiO_2, ZnO AND MgO

Nina Finčur[1], Paula Sfîrloagă[2], Daniela Šojić Merkulov[1], Biljana Abramović[1]

[1]*University of Novi Sad Faculty of Sciences, Department of Chemistry, Biochemistry and Environmental Protection, Trg Dositeja Obradovića 3, 21000 Novi Sad, Serbia*
[2]*National Institute of Research and Development for Electrochemistry and Condensed Matter, Dr. Aurel Păunescu Podeanu 144, 300569, Timişoara, Romania*
e-mail: nina.fincur@dh.uns.ac.rs

Abstract

Advanced Oxidation Processes (AOPs) are used to remove a wide range of organic pollutants [1]. These processes are recommended for the removal of pollutants that are very stable because they allow the complete mineralization of pollutants or their partial degradation to less harmful compounds or compounds that are biodegradable [2]. AOPs are based on the formation of highly reactive chemical species that can break down even the most stable molecules to biodegradable compounds. The most important oxidizing agent is the non-selective hydroxyl radical, which can oxidize and mineralize organic molecules, producing CO_2, H_2O, and inorganic ions [3]. Heterogeneous photocatalysis has been recognized as a promising method for the removal of organic pollutants from water [4]. The presence of pharmaceutically active compounds in natural waters is a problem for the aquatic living world, since these compounds from the wastewater treatment plants can reach the environment in almost unchanged form [5]. Antibiotics have been widely used in human clinical, animal husbandry, and aquaculture for almost one hundred years, playing an important role in the treatment of infectious diseases [6]. Antibiotics have been detected in the effluent of sewage treatment plants, surface waters, and ground waters. Thus, it is necessary to remove antibiotic pollutants from the source of wastewater [7]. Ciprofloxacin belongs to fluoroquinolones class, which represents one of the most important class of synthetic antibiotics. In this paper, photodegradation of ciprofloxacin was studied using heterogeneous photocatalysis under UV and simulated sunlight. Newly synthesized nanopowders ZnO, TiO_2 and MgO were used as photocatalysts. Besides, the effect of $(NH_4)_2S_2O_8$ concentration on the efficiency of the ciprofloxacin removal, using TiO_2 and both type of radiation, was observed.

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