DIRECT PHOTOLYSIS OF FUMONISIN B_1 IN AQUEOUS MEDIUM

Ivana Jevtić[1], Sandra Jakšić[2], Maria Uzelac[3], Biljana Abramović[3]✉

[1]Higher Medical and Business-Technological School of Applied Studies, Šabac, Hajduk Veljkova 10, Šabac, Serbia
[2]Scientific Veterinary Institute „Novi Sad", Rumenački put 20, Novi Sad, Serbia
[3]University of Novi Sad Faculty of Sciences, Department of Chemistry, Biochemistry and Environmental Protection, Trg Dositeja Obradovića 3, 21000 Novi Sad, Serbia
✉ *biljana.abramovic@dh.uns.ac.rs*

Abstract

Fumonisins (FBs), secondary metabolites produced by fungi of the genus *Fusarium* [1], represent a major threat as potential organic pollutants. The FBs have been detected in different types of water [2], as well as produced them by fungi in untreated surface water [3]. Advanced Oxidation Processes (AOPs), have a high potential for water purification, including the removal of hazardous substances and pathogens from different types of water. AOPs are based on physicochemical processes that produce mainly hydroxyl radicals ($^{\bullet}$OH), representing primary oxidants, which can lead to complete mineralization of pollutants. These processes can be initiated by UV or solar radiation. The photocatalytic degradation has become a powerful method for degradation and transformation of aflatoxin B_1 [4], zearalenone [5], and deoxynivalenol [6] into harmless substances. In this paper, we have investigated optimization of high performance liquid chromatography with fluorescence detector method for monitoring the stability of fumonisins B_1 (FB_1), B_2 (FB_2), and B_3 (FB_3) solutions as well as the efficiency of FB_1 degradation using direct photolysis under UV and solar radiation in ultrapure water. It was found that the sensitivity and separation of the FB_1 peak from *o*-phthalialdehyde–2-mercaptoethanol (used for derivatization) was optimally at isocratic elution using the MeOH–NaH_2PO_4 mobile phase, at a ratio of 75 : 25 (v/v). When studying the efficiency of direct photolysis of 1.47×10^{-6} mol/dm^3 solution of FB_1 it was found that after 180 min of irradiation degradation efficiency was 88% using UV and 76% using solar radiation at pH 8.2. Also, the effect of pH in the range from 4.0 to 10.0 on the efficiency of direct photolysis of FB_1 was examined.

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