REMOVAL OF CIPROFLOXACIN AND SULFAMETHOXAZOLE USING THE MICROALGAE *SCENEDESMUS OBLIQUUS* AND *CHLORELLA VULGARIS*

P. Seridou[1], E. Syranidou[1,2], N. Kalogerakis[1,3,*]

[1]School of Chemical and Environmental Engineering, Technical University of Crete, Chania, Greece

[2]Department of Chemical Engineering, Cyprus University of Technology, Limassol, Cyprus

[3]Institute of Geoenergy, Foundation for Research and Technology-Hellas (FORTH), Chania, Greece

(*nkalogerakis@tuc.gr)

ABSTRACT

Emerging contaminants have received much attention in recent years due to their detrimental effects on the environment and the human health[1]. Among them, antibiotics are mainly discharged into sewage plants in active forms after administration[2] and since conventional wastewater treatments are not designed to efficiently eliminate them, the antibiotic contamination level in secondary effluents has reached values within the range of 0.12–10 μg/L[3]. Microalgae-based technology has been widely reported as a promising alternative to traditional sewage treatment, since it is a solar-power driven and sustainable reclamation strategy[4]. Antibiotics in these systems can be removed via a series of biotic and abiotic processes, with biodegradation being considered the main removal pathway [5]. In this study, the variations of cell density, photosynthesis activity, biomass, lipid productivity of two microalgal species, *Scenedesmus obliquus* and *Chlorella vulgaris*, during the degradation of two frequently detected antibiotics, ciprofloxacin (CIP) and sulfamethoxazole (SMX), were investigated through a 14-day exposure test at antibiotic exposure doses of 0.1 and 0.5 mg/L. A previous study reported that the microalga *S. obliquus* was able to remove 28, 29, 35, 41, and 47% at 0.025, 0.075, 0.125, 0.175, and 0.25 mg/L SMX concentration, respectively after 12 days of cultivation[6]. The removal of CIP by *Chlorella sorokiniana* was investigated and was found to be 83.30% at CIP concentration of 20 mg/L, in contrast with lower CIP concentrations where the removal efficiencies were substantially decreased[7]. In this research, *S. obliquus* initially was tested and no severe growth inhibition was observed compared to control microalgae tests. The concentration of CIP was reduced by 62% after 8 days of cultivation at initial CIP concentration of 0.1 mg/L and by 72% after 9 days at 0.5 mg/L. Remarkably, at initial SMX concentration of 0.1 mg/L, 100% removal efficiency from the medium was observed after 4 days of cultivation. When the SMX concentration was increased to 0.5 mg/L, *S. obliquus* could completely remove the antibiotic from the medium at day 5. Collectively, the preliminary results show that the *S. obliquus* can be identified as a promising candidate for removing CIP and SMX in wastewater remediation.

KEYWORDS: microalgae, antibiotics, biodegradation

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