

## DIRECT AND INDIRECT PHOTOLYSIS OF TRICYCLIC ANTIDEPRESSIVE DRUG

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### **Abstract**

Conventional systems for water purification cannot completely remove organic pollutants from wastewater and for this reason, it is necessary to find more efficient processes for their removal. Advanced oxidation processes (AOPs) are very important methods for the oxidation and removal of a wide range of organic pollutants from natural and wastewater [1]. AOPs are characterized by various radical reactions involving a combination of chemical agents ( $O_3$ ,  $H_2O_2$ , transition metals, and metals oxides) and energy sources (UV-Vis irradiation, electricity,  $\gamma$ -irradiation, and ultrasound). In these processes, hydroxyl radicals represent primary oxidants [2]. Photolysis can be performed by a direct and indirect mechanism. Direct photolysis is a consequence of irradiation absorption, whereby the breakdown of chemical bonds in the molecule of the pollutant occurs in the case of overlapping of the absorption spectrum of pollutants with a wavelength of irradiation. On the other hand, indirect photolysis is performed in the presence of oxidants, resulting in a large number of reactive radicals, which then react with pollutants [3]. In recent years, great attention has been paid to drugs as potential bioactive substances in the environment. The high usage of antidepressants in the treatment of depression and anxiety disorders has led to the accumulation of active compounds of these drugs in the environment [4]. Amitriptyline is one of the most commonly used tricyclic antidepressant and since amitriptyline appears in the environment, it is necessary to well examine its stability and the possibility of elimination. In this paper, photodegradation of amitriptyline was studied using direct and indirect photolysis of amitriptyline under UV and simulated solar irradiation. Indirect photolysis was tested in the presence of  $H_2O_2$ ,  $KBrO_3$ , and  $(NH_4)_2S_2O_8$ . Besides, the effect of  $H_2O_2$  concentration on the efficiency of the amitriptyline removal process was also observed.

### **Acknowledgments**

The authors acknowledge financial support of the Ministry of Education, Science and Technological Development of the Republic of Serbia (Project No. 172042).

### **References**

- [1] A.B.C. Alvares, C. Diaper, S.A. Parsons, *Environ. Technol.* 22 (2000) 409.
- [2] P.R. Gogate, A.B. Pandit, *Adv. Environ. Res.* 8 (2004) 501.
- [3] K. Sornalingam, A. McDonagh, J.L. Zhou, *Sci. Total Environ.* 550 (2016) 209.
- [4] L. Giebułtowicz, G. Nałęcz-Jawecki, *Ecotox. Environ. Safe.* 104 (2014) 103.