

EMEC21

21st European Meeting on Environmental Chemistry
November 30 – December 3, 2021, Novi Sad, Serbia

www.emec21.rs

Scientific Committee

Jan Schwarzbauer, president

Organisational Committee

Branimir Jovančičević, president

Executive Committee

Vladimir Beškoski, president



Association of Chemistry
and the Environment



Serbian Chemical Society



Matica Srpska

BOOK OF ABSTRACTS





21st European Meeting
on Environmental Chemistry

BOOK OF ABSTRACTS

EMEC 21

November 30 – December 3, 2021

Novi Sad, Serbia



Book of Abstracts
21st European Meeting on Environmental Chemistry

Publisher

Serbian Chemical Society
Karnegijeva 4/III, Belgrade, Republic of Serbia

For the publisher

Dušan Sladić
President of the Serbian Chemical Society

Editors

Ivana Ivančev-Tumbas
Vladimir P. Bežkoski
Aleksandra Šajnović

Cover page photo

Branko Lučić

Design and prepress

Beoživković, Belgrade

Printed by

RIS Studio, Belgrade

Circulation

150

ISBN

978-86-7132-078-8

Year

2021

Scientific Committee

Jan Schwarzbauer, Germany, president

Ivana Ivančev-Tumbas, Serbia, vice president

Marijana Ačanski, Serbia	Đorđe Jovanović, Serbia
Vladimir P. Beškoski, Serbia	Albert T. Lebedev, Russia
Jelena Bošković, Serbia	Milan Matavulj, Serbia
Anne-Marie Delort, France	Milica Balaban, Bosnia and Herzegovina
Stuart Gibb, UK	Polonca Trebše, Slovenia
Branimir Jovančičević, Serbia	

Organisational Committee

Branimir Jovančičević, president

Maja Turk Sekulić, vice president

Mira Aničić-Urošević	Jovana Orlić
Mališa Antić	Kristijan Pastor
Jelena Avdalović	Ivana Perović
Tanja Brdarić	Petar Pfendt
Aleksandar Đorđević	Srđan Pokorni
Rada Đurović Pejčev	Bojan Radak
Gordana Gajica	Dubravka Relić
Ljubiša Ignjatović	Goran Roglić
Marko Ilić	Sanja Sakan
Konstantin Ilijević	Slađana Savić
Ivana Ivančev-Tumbas	Jelena Savović
Kristina Joksimović	Slavka Stanković
Vladan Joldžić	Vesna Stanković
Milica Kašanin-Grubin	Sanja Stojadinović
Branka Lončarević	Aleksandra Šajnović
Nikoleta Lugonja	Tatjana Šolević Knudsen
Marija Lješević	Anđelka Tomašević
Snežana Maletić	Aleksandra Tubić
Aleksandra J. Mihajlidi-Zelić	Gorica Veselinović
Maja Milanović	Nenad Zarić
Srđan Miletić	Vesna Zlatanović Tomašević
Tijana Miličević	Aleksandra Žerađanin
Dubravka Milovanović	Sanja Živković
Miloš Momčilović	

Executive Committee

Vladimir P. Beškoski, president

Jelena Radonić, vice president

Gordana Gajica

Kristina Joksimović

Milica Kašanin-Grubin

Srđan Milić

Gorica Veselinović

EMEC21 Secretariat

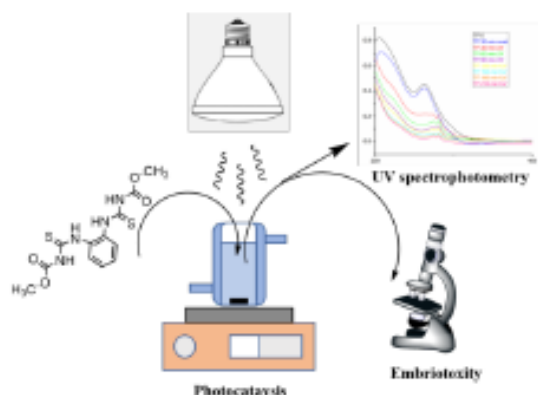
Aleksandra Šajnović

Aleksandra Tubić

Nevena Antić

The Embryotoxic Potential and Photocatalytic Degradation of Thiophanate-Methyl

M. Stevanović^{1*}, A. Jovanović², M. Đolić², Z. Veličković², N. Čutović², A. Tomašević², A. Marinković². (1) Institute of Pesticides and Environmental Protection, Banatska 31b, Belgrade, Serbia, (2) Faculty of Technology and Metallurgy, Karnegijeva 4, Belgrade, Serbia, (3) University of defence, Military Academy, Veljka Lukića Kurjaka, Belgrade, Serbia; *marija.stevanovic@pesting.org.rs.



Pesticides are substances designed to protect plants from various types of diseases and pests [1] under UV irradiation is studied using synthesized Zinc oxide (ZnO). Synthetic organic pesticides, in addition to the high efficiency, have led to frequent adverse environmental impact, as a consequence of their high accumulation and toxicity. Due to the increased pollution of water with mixture pesticides, it is necessary to use different processes for their removal and degradation. Therefore, oxidative processes have been developed, commonly named as Advanced Oxidation Processes (AOPs). Among them, special attention was attributed to photocatalysis, as a process that enables the degradation of difficult-to-decompose organic molecules under the action of UV radiation in the presence of catalysts [2].

In this study the photocatalytic degradation of thiophanate-methyl (TM) in the presence of the TiO₂ Degussa P-25 catalyst was investigated. Different experimental conditions were varied, such as the concentration of the pesticide solution, the mass of the catalyst and the influence of the anions (chloride, sulphate, nitrate, etc.). The pesticide concentration in the reaction system was monitored based on the decrease in system absorbance using a Shimadzu 1800 UV spectrophotometer. For optimized conditions of complete photodegradation, the environmental acceptability of the defined degradation process was examined. The toxic effect of the TM solution before and after degradation was examined using the embryotoxicity test with *Danio rerio*, in order to prove the reduction of toxicity and the success of the degradation process [3] which raises the issue of potential influence of different formulation types on herbicide toxicity. The present study evaluated the toxicity and

teratogenic effects of the active ingredient clomazone and its two formulations (Rampa® EC and GAT Cenit 36 CS, both containing 360 g a.i./l of clomazone).

Comparing the obtained results of the influence of ions on the processes of photocatalysis, it was noticed that all ions have catalytic effects on the kinetics of the degradation process of TM. The presence of sulphates and carbonates had the greatest catalytic effect, while hydrogen phosphates and bicarbonates showed the lowest catalytic capacity.

The optimal experimental conditions were obtained using 0,2 g/L of TiO₂ and 5 mg/L of TM solution. In addition, the embryotoxicity test followed the analytical examination. Comparison of results obtained in embryotoxicity assay testing of the initial solution, partly and completely degraded samples confirmed suitability of applied degradation method. Increase in toxicity, compared to the initial solution, was registered in partly degraded sample. This observation can be attributed to increase in concentration of carbendazim (TM metabolite) more toxic than parent substance. Finally, completely degraded sample caused no mortality or adverse effects in *D. rerio* embryos after 120 h exposure. Toxicity of samples, in decreasing order is half degraded > initial > completely degraded sample.

Based on the obtained results it can be concluded that used photocatalytic degradation process can be successfully applied in pesticide contaminated water management.

Acknowledgements

This investigation was funded by the Ministry of Education, Science and Technological Development of the Republic of Serbia (Grants Nos. 451-03-9/2021-14/200214 and 451-03-9/2021-14/200135).

References

- [1] A.K. Sharma, R.K. Tiwari, M.S. Gaur, Arab. J. Chem. 9 (2016) S1755–S1764.
- [2] H. Liu, C. Wang, G. Wang, Chem. - An Asian J. 15 (2020) 3239–3253.
- [3] M. Stevanovic, S. Gasic, M. Pipal, L. Blahova, D. Brkic, N. Neskovic, K. Hilscherova, Aquat. Toxicol. 188 (2017) 54–63.