BOOK of ABSTRACTS

27th Congress of Chemists and Technologists of Macedonia

20-23 9 2024 OHRID, RN MACEDONIA

СХТМ

Сојуз на хемичарите и технолозите на Македонија

Society of Chemists and Technologists of Macedonia

27th Congress of SCTM

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25–28 September 2024

Metropol Lake Resort

Ohrid, N. Macedonia

Skopje, 2024

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AEC P-7

Electroanalytical Approach for Quantification of Pesticide Maneb in River Water Sample Using Biochar-Modified Carbon Paste Electrode

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Manganese derivative fungicide, maneb (MAN) has a potentially toxic effect on living organisms such as aquatic species and humans.[1] Biochar (BC) has good electrical conductivity with a characteristic catalytic effect and could be used as an electrode modifier for sensing pollutants in river water samples.[2]

An optimal differential pulse adsorptive stripping voltammetric (DP-AdSV) parameters includes accumulation potential (E_{acc}) of -0.2 V and accumulation time (t_{acc}) of 90 s, Britton-Robinson buffer pH 7.0. The good linearity of the calibration curve was obtained in the concentration range from 0.049 to 1.84 μg mL^{-1} of MAN with a limit of detection of 0.015 μg mL^{-1} MAN and a relative standard deviation (RSD) of 3.2% at carbon paste electrode (CPE) bulk modified by 10% BC. Investigated interferences did not affect significantly the MAN signal intensity. The developed DP-AdSV method was successfully applied for the determination of MAN in spiked river water sample with the recovery of 99.49% and RSD of 1.02%.

Keywords: biochar, carbon paste electrode, voltammetry, maneb, river water sample

Acknowledgements: This research was supported by the Science Fund of the Republic of Serbia, #10810, Sustainable solutions in environmental chemistry: exploring biochar potential–EnviroChar.

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AEC P-8

Use of Hardwood Biochar for the Development of a Sensitive Electrochemical Sensor for the Determination of Pesticide Mancozeb in Wastewater Sample

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The levels of pesticides in water have increased due to their excessive use in the modern agricultural domain indicating the need for the development of simple and contemporary methods for their removal and determination.[1]

The electrochemical evaluation of fungicide mancozeb (MCZ) using a low-cost carbon paste electrode modified with biochar (BC-CPE) is a novel strategy to provide a sensitive response to water pollution. Biochar from a hardwood source was synthesized *via* pyrolysis process at 400 °C and 700 °C, and the resulting electrodes (unmodified CPE, BC400-CPE and BC700-CPE) were compared for MCZ sensing. BC700-CPE showed the best analytical performance and under optimized conditions of differential pulse adsorptive stripping voltammetric (DPAdSV) method (pH 7.0, E_{acc} = -0.2 V, t_{acc} = 30 s) the obtained linear range was from 0.025 to 2.78 μg mL^{-1} MCZ with detection limit of 7.5 ng mL^{-1}. The developed sensor was successfully applied as a sensitive electrochemical platform for the determination of MCZ in wastewater sample with a recovery of 101.7% and a relative standard deviation of 1.25%.

Keywords: biochar, carbon paste electrode, voltammetry, mancozeb, wastewater

Acknowledgement: This research was supported by the Science Fund of the Republic of Serbia, #10810, Sustainable solutions in environmental chemistry: exploring biochar potential–EnviroChar.

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AEC P-16

Removal of Organic Pollutants from Water Using Wood-Derived Biochar

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Use of herbicides in agriculture is critical for ensuring high crop yields and supporting the global food supply. Despite their undeniable agricultural benefits, these chemicals pose significant environmental risks. Triazine herbicides such as atrazine and simazine were commonly used for weed control. The latest Joint Danube Survey[1] showed that these substances are still frequently detected throughout the Danube River Basin, even though the approval of atrazine at the EU level expired in 2004. The aim of this study was to assess the efficiency of wood-derived biochar produced at two temperatures in removing atrazine and simazine from water. Water samples with an initial concentration of 100 µg/L of each herbicide were treated with biochar at three doses (0.1, 0.2, and 0.4 g/L) for 48 h, then analyzed for residual concentrations using a gas chromatography/mass spectrometry system. Biochar produced at 400 ºC removed up to 25% of both substances, even at the highest dose. On the other hand, biochar produced at 700 ºC showed a significantly higher removal efficiency: 66.3% and 68.7% for atrazine and simazine, respectively, at the low dose, and >97% of both herbicides at higher biochar doses. Results indicate a high potential of wood-derived biochar produced at high temperatures for triazine herbicide removal from water.

Keywords: wood-derived biochar, triazine herbicides, water contamination

Acknowledgment: This research was supported by the Science Fund of the Republic of Serbia, #10810, Sustainable Solutions in Environmental Chemistry: exploring biochar potential -EnviroChar.

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n.b.: Manuscripts submitted to this Congress were not subjected to language or other corrections, except in some extreme cases. Authors are fully responsible for the content of their Abstracts.

ISBN:
978-9989-760-20-4
Publisher:
Society of Chemists and Technologists of Macedonia, Arhimedova 5, Skopje, North Macedonia
https://sctm.mk/
Email:
sctmacedonia@gmail.com
Editor:
Zoran Zdravkovski
Prepared and assembled:
Jadranka Blaževska Gilev; Biljana Angjuševa
Title:
Book of Abstracts, 27th Congress of the SCTM, 25–28 September 2024, Metropol Lake Resort, Ohrid, North Macedonia
Cover:
Ladislav Cvetkovski
Technical Editor:
Marija Prosheva
Online publication:
https://sctm.mk/conferences/2024-27th-Congress-Book-of-abstracts.pdf

CIP - Каталогизација во публикација
Национална и универзитетска библиотека „Св. Климент Охридски“, Скопје

54(062)(048.3)
66(062)(048.3)

CONGRESS of SCTM (27 ; 2024 ; Ohrid)
Book of abstracts [Електронски извор] / 27th Congress of SCTM, 25–28 September 2024 Metropol Lake Resort Ohrid, N. Macedonia ; [editor Zoran Zdravkovski]. - Skopje : Society of chemists and technologists of Macedonia, 2024. - 231 стр. : граф.прикази ; 21 см

Начин на пристапување (URL):
https://sctm.mk/conferences/2024-27th-Congress-Book-of-abstracts.pdf. -
Текст во PDF формат, содржи 211, [17] стр. - Наслов преземен од екранот.
- Опис на изворот на ден 13.09.2024. - Регистар

ISBN 978-9989-760-20-4

а) Хемија -- Собири -- Апстракти б) Технологија -- Собири -- Апстракти

COBISS.MK-ID 64425477

Skopje, 2024