



Slovak Society of Chemical Engineering
Institute of Chemical and Environmental Engineering
Slovak University of Technology in Bratislava

PROCEEDINGS

52nd International Conference of the Slovak Society of Chemical Engineering SSCHE 2026

Hotel SOREA TRIGAN
Štrbské Pleso, Slovakia
May 26 - 29, 2026

Editors: Assoc. prof. Mário Mihaľ

ISBN: 978-80-8208-177-3, EAN: 9788082081773

Published by the Faculty of Chemical and Food Technology, Slovak University of Technology in Bratislava in Slovak Chemistry Library for the Institute of Chemical and Environmental Engineering; Radlinského 9, 812 37 Bratislava, 2026

Lukáč, T.: Biochar as an Effective Adsorbent for the Removal of Heavy Metals from Water, Editors: Mihaľ, M., In *52nd International Conference of the Slovak Society of Chemical Engineering SSCHE 2026*, Štrbské Pleso, Slovakia, 2026.

Biochar as an Effective Adsorbent for the Removal of Heavy Metals from Water

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Key words: heavy metals, biochar, wastewater, adsorption, temperature

Heavy metals in aquatic environments pose a significant environmental and health risk even at low concentrations. Lead (Pb), originating mainly from industrial sources, is particularly associated with neurological disorders. Among the effective removal methods, adsorption is considered especially efficient at low contaminant concentrations.

This study focuses on the use of biochar as an adsorbent for lead removal. Biochar was produced from plum pits via pyrolysis at temperatures ranging from 300 to 800 °C and subsequently characterized using BET analysis. Adsorption experiments were conducted at pH 5, where lead predominantly exists in the Pb²⁺ form.

The results confirmed that increasing pyrolysis temperature leads to a higher specific surface area of biochar, resulting in improved adsorption efficiency. Biochar produced at 300 °C achieved an efficiency of approximately 43%, while materials prepared at 700–800 °C reached efficiencies of up to 80%. Pyrolysis temperature was thus identified as a key factor influencing the adsorption properties of biochar.