

4/2016

**environment
protection
engineering**

published quarterly

Wrocław 2016

Founding Editor

TOMASZ WINNICKI

Editor-in-Chief

KATARZYNA MAJEWSKA-NOWAK

Vice-Editors

JERZY ZWOŹDZIAK, LUCJAN PAWŁOWSKI

Assistant Editor

IZABELA KOWALSKA

Editorial Office

Faculty of Environmental Engineering
Wrocław University of Science and Technology
Wybrzeże Wyspiańskiego 27, 50-370 Wrocław, Poland

Publisher

Wrocław University of Science and Technology,
Wybrzeże Wyspiańskiego 27, 50-370 Wrocław

Oficyna Wydawnicza Politechniki Wrocławskiej
Wybrzeże Wyspiańskiego 27, 50-370 Wrocław
<http://www.oficyna.pwr.wroc.pl>, e-mail: oficwyd@pwr.edu.pl

© Copyright by Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2016

CONTENTS

E. MALINOWSKA, Zinc speciation in soil under various rates of sewage sludge and liming	5
P. GIERYCZ, S. K. MALANOWSKI, M. WSZELAKA-RYLIK, W. T. KACPERSKI, D. KOWALCZYK, R. ŚWIETLIK, Wind rose and modelling of the fate of polynuclear aromatic hydrocarbons in the Central Poland	17
Y. ZHANG, X. JIN, W. LUO, Influence of spreading cultivation with food waste culture medium on the degradation of organophosphorus pesticides by a microbial consortium OP-1	37
A. ZIEMBÍNSKA-BUCZYŃSKA, G. CEMA, A. MERESTA, L. PŁONKA, Influence of the duration of feeding phase on the genotypic structure of bacterial communities in two sequencing batch reactors treating reject water by partial nitritation and anammox	49
D. MOHSEN, N. SAEID, S. HAJER, N. PYRASTEH, Quality assessment of 30 various brands of bottled drinking waters in Iran	65
P. E. NAMIN, Adsorption of copper, cobalt, and manganese ions from aqueous solutions using oxidized multi-walled carbon nanotubes	75
E. ÖZBAŞ, H. K. ÖZCAN, A. ONGEN, Efficiency of MSW compost for reducing uptake of heavy metals by plant	87
Z. MUCHA, A. GENEROWICZ, W. WÓJCIK, K. JÓZWIAKOWSKI, S. BARAN, Application of multi-criterial analysis to evaluate the method of utilization of sludge from small wastewater treatment plants with sustainable development of rural areas	97
A. M. O. KHAIRALLA, L. XIWU, J. L. LADU, Z. WENBO, Performance analysis of the horizontal sub- surface flow constructed wetland under different hydraulic loading rates for rural domestic wastewater treatment	107
T. SUPONIK, Study of precipitates formed on iron reactors following the removal of copper from water	123
S. WOLCOTT, P. MARTIN, J. GOLDOWITZ, S. SADEGHİ, Performance of green wall treatment of brewery wastewater	137
J. FISKARI, A. KAKKONEN, H. PAKKANEN, R. ALÉN, A comparative study of advanced oxidative processes. Degradation of chlorinated organic compounds in ultrafiltration fractions of kraft pulp bleaching effluent	151
G. KAMIŃSKA, J. BOHDZIEWICZ, Potential of various materials for adsorption of micropollutants from wastewater	161
A. CZAPLICKA, S. BAZAN, E. SZAREK-GWIAZDA, Z. ŚLUSARCZYK, Spatial distribution of manganese and iron in sediments of the Czorsztyn Reservoir	179