EFFECT OF SELECTED ABIOTIC ADDITIVES ON BIOREMEDIATION OF CRUDE OIL CONTAMINATION IN SOIL

VLIV VYBRANÝCH ABIOTICKÝCH ADITIV NA BIOREMEDIACI ROPNÉHO ZNEČIŠTĚNÍ V PŮDĚ

Pavel Kuráň[1,2)], Josef Trögl[2)], Jana Nováková[1)], Věra Pilařová[2)], Kateřina Pilařová[2)], Jakub Ederer[2)], Petra Dáňová[2)], Jana Pavlorková[2)] Roman Fryčák[2)], Simona Bošková[2)], Josef Kozler[3)] František Novák[4)]

11) Research Institute of Inorganic Chemistry, a. s., Revoluční 84, 400 01 Ústí nad Labem, Czech Republic, e-mail:pavel.kuran@vuanch.cz

2) Jan Evangelista Purkyně University in Ústí nad Labem, Faculty of the Environment, Králova Výšina 3132/7, 400 96 Ústí nad Labem, Czech Republic, e-mail: josef.trogl@ujep.cz

3) MikroChem LKT, spol. s r. o., Přeseka 52, 379 01 Třeboň, Czech Republic, e-mail: josef.kozler@mikrochem.cz

4) Biological centre AV ČR, v. v .i., Institute of Soil Biology, Na Sádkách 7, 370 05 České Budějovice, Czech Republic, e-mail: novak@upb.cas.cz

Abstract:

The effect of addition of selected abiotic additives (humic substances, zeolites) on the biodegradation of crude oil in polluted soil by joint action of autochthonic micro flora as well as by crude-oil-degrading bacterial strain was tested in the set of pot experiments. The process was followed by means of analytical parameters (hydrocarbon index, ratios pristane/C_{17}, phytane/C_{18}, total organic carbon content) and characterization of activity and structure of soil microbial community within one-year-experiment. Addition of humic substances did not affect biodegradation rate significantly, however it improved the evolution of soil microbial community biomass. Addition of zeolites (10% w/w) resulted in slower increase of microbial biomass compared to modules lacking zeolites, however it improved the operation with soil. In contrast, augmentation of degrading bacterial strain increased the biodegradation rate significantly and proved to be the most effective treatment.

Keywords:

Abiotic additives, humic substances, zeolites, bioremediation, crude oil contamination, hydrocarbon index, ratio pristane/C_{17}, ratio phytane/C_{18}, total organic carbon content