

## USE OF ADSORBENTS FOR ACCELERATED BIOREMEDIATION OF PETROLEUM-CONTAMINATED SOILS

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In spite of the evident privilege of bioremediation for petroleum-contaminated soils, application of this approach is restricted due to poor adaptation of indigenous or inoculated microorganisms and plants in those highly contaminated soils. The main goal of this presentation is to outline up-to-date knowledge on the use of adsorbents for bioremediation of petroleum-contaminated soils as well as to share our experience of investigations in that direction. Several long-year laboratory and out-door experiments were carried out with various types of mineral soils spiked with crude oil, diesel fuel, and spent motor oil at the initial concentrations from 5 to 15mass%. We studied the influence of soil amendment with biopreparations (based on petroleum degraders) and with natural adsorbents of various origination (mineral, organic, and carbonized) on soil properties and bioremediation rates. The experimental results indicate that the maintenance of optimal hydrothermal conditions, aeration, soil pH, ratio C:N:P:K are the most important factors for successful process of bioremediation. The soil amendment with BP was effective only in some cases: moderately high petroleum content (from 7 to 10%) or cold climate. Additional acceleration of bioremediation can be created through soil amendment with natural adsorbents of all classes. Their optimal doses deviated from 0.2 to 9% depending on the adsorbent and form or rate of contamination. Positive influence of the adsorbents is explained: 1) by the reduction of soil toxicity to microorganisms and plants due to mostly reversible adsorption of toxic petroleum components and especially their oxidized products; 2) - reduction of soil hydrophobicity followed by improving their water holding capacity; 3) - localizing water soluble components in the treated soil layer at presence of some adsorbents (e.g. activated carbon or biochar). Hereby no significant accumulation of toxic polycyclic aromatic hydrocarbons accumulated in soils and grasses grown after their recultivation

### Biography

Dr. Galina K. Vasilyeva graduated Chemistry Department of Moscow State University in 1972 and has completed her PhD from Russian Academy of Science and postdoctoral studies from University of Nebraska Lincoln (USA). She was a Fulbright scholar and visiting professor at Pennsylvania State University (USA) in 1995-1998. Now she is a head of scientific group at the IPBP RAS and docent at Pushchino State Institute of Natural Sciences. She has been studying biodegradation of various organic contaminants in soil, including petroleum and products, some pesticides, chloroanilines, chlorophenols, TNT, PCBs, and PAHs. She has about 70 publications in reputed journals.

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