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The features of the electrochemical cleaning of different types of oil-contaminated soil

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Abstract

The constant development of the technosphere leads to negative consequences, such as environment pollution by components with toxic properties and violation of natural biosphere processes. The most significant negative effect of the functioning of the oil and gas production and processing complex is the pollution of the soil. Removing petroleum hydrocarbons from the pedosphere remains one of the most significant and complex environmental problems that need to be solved. Electrochemical cleaning of soils allows to remove oil products both from surface soil horizons and from deep-lying layers. These makes the method universal. This work is devoted to the study of the features of the course of the process of electrochemical purification of hydrocarbons from of various types of soils. The mechanisms of the hydrocarbons amount decrease are described. The greatest contribution is made by electrokinetic processes as well as by direct and indirect oxidation. Experiments have been carried out on the transmission of electric current through samples of contaminated soil. The dependence of the content of petroleum hydrocarbons on the amount of transmitted electricity in several types of soil (clay, loam, chernozem and sand) is established. The experiments were carried out with the model soil containing a predetermined amount of oil and reservoir waters of high salinity. Studies have shown that it is expediently to increase the electric charge transmitted through the soil as long as the hydrocarbons concentration decreases – until the value of the limiting specific charge of electrical processing. This parameter primarily depends on the soil characteristics. It was revealed that at a high soil moisture the voltage differences are insignificant.The efficiency of cleaning for each type of soil is calculated. The clay soil has optimal conditions for electrical treatment (cleaning efficiency is 84.5%). The cleaning efficiency of sand soil was 69%. The results helps to make recommendations about the using electrochemical cleaning of soils polluted by hydrocarbons in the practice.

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