Simulation of tridecane degradation under different soil water contents

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Abstract

A mathematical model for the degradation of n-tridecane in a leached chernozem with different water contents was developed on the basis of budget ratios and the Mono kinetic equations. In the course of the verification, the model equations were simplified and solved numerically. The cases of uniform and step-wise initial pollutant distributions in a soil-filled co lumn were considered. The model was refined in accordance with the experimental data on the decrease in the tridecane concentration during three months. A statistically significant positive effect of the moisture and the uncontaminated upper soil layer on the rate of the tridecane decrease was shown. It was found that the degradation of the tridecane stopped and then recommenced again. The tridecane concentration in the soil at which its decrease almost stopped was determined. It was supposed that the hydrocarbon-oxidizing microorganisms, in the course of their life activity, excrete products that are accumulated and inhibit the degradation of the hydrocarbon. The parameters of the microbial activity in the soil were determined in a numerical experiment. © 2010 Pleiades Publishing, Ltd.