

Mikrobiologiya 2003 vol.72 N5, pages 699-706

Distribution and physiological state of microorganisms in petrochemical oily sludge

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Abstract

The occurrence, vertical distribution, and the physiological state of microorganisms in a petrochemical oily sludge deposit were studied. The total number and the number of viable microbial cells at depths of 0.2 and 3 m were about 10 and 108 cells/g dry wt. sludge. Most microbial cells taken from the middle (1 m deep) and the bottom (3 m deep) sludge horizons showed a delayed colony-forming ability, which suggested that the cells occurred in a hypometabolic state. The relative number of microaerobic denitrifying microorganisms steeply increased with depth. The amount of microorganisms tolerant to 3, 5, and 10% NaCl and capable of growing at 7 and 40°C varied from 102 to 108 CFU/g dry wt. sludge. Petrochemical oily sludge was found to maintain the growth of heterotrophs, among which the degraders of oily sludge and ten different individual polycyclic aromatic hydrocarbons were detected. The occurrence of highly adaptable microorganisms with an adequate metabolic potential in the petrochemical oily sludge deposit implies that its bioremediation is possible without introducing special microorganisms.

Keywords

Bioremediation, By-products, Microflora, Oily sludge, Petrochemistry, Physiological state, Tolerance