Título: BACTERIAL COMMUNITY ASSOCIATED WITH BIOREMEDIATION OF CONTAMINATED GROUNDWATER WITH GASOLINE AND ETHANOL: A FIELD EXPERIMENT

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Resumo:

Contamination of soils and groundwater with compounds derived from petroleum has been increasing, as a result of extraction, refining, distribution and storage of these products. Among the compounds found in gasoline BTEX (benzene, toluene, ethylbenzene and xylene) stand out by for its toxicity which represents potential danger to the environment in case of spill. In cases of groundwater contamination with petroleum derivates, microorganisms have been shown to play a prominent role in governing the fate of hydrocarbons in subsurface aquatic and soil systems because they obtain energy by transferring electrons from electron donors to electron acceptors. Bioremediation is a process that uses naturally occurring microorganisms to degrade substances, representing an alternative for cleaning oil spills and treating contaminated environments. Biostimulation strategies are used to improve the effectiveness of bioremediation processes by injection of nutrients of other supplementary components to the native microbial population. The current work aimed to evaluate the influence of ethanol and sulfate in gasoline E10 (blend of 10% ethanol in volume) biodegradation from field experiment. In order to meet these goals, after a controlled release of the E10 fuel, an anaerobic biostimulation with sulfate injection (BSI) was done followed by continuous monitoring of migration and degradation of the compounds in the mixture studied through hydrogeochemical and bacterial analyzes during three years. Molecular biology tools were used to identify microorganisms which are associated with redox degradation process. The presence of specific bacterial communities (nitrite reductase (nirS), Geobacter and Delta-Proteobacteria) in groundwater and metabolic by-products (nitrite, iron (II) and sulfide) support the concomitance of anaerobic degradation of E10 fuel by nitrate-, iron- and sulfate-reducing processes, using the corresponding electron acceptor. Moreover, the absence of methane and methanogenics archea demonstrated that methanogenic did not act in the ethanol and BTEX degradation in the BSI experiment.

Palavras-chave: Groundwater contamination, E10 fuel, BTEX, Bioremediation, Biostimulation with Sulfate Addition.

Agência Fomento: CNPq