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FIELD SCALE ANALYSIS ON STRUCTURAL CHANGES OF MICROBIAL COMMUNITY AND ITS RELATIONSHIPS WITH ENVIRONMENTAL FACTORS IN NITROBENZENE-CONTAMINATED GROUNDWATER DURING AIR SPARGING REMEDIATION

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Abstract

As an effective technique for remediation of volatile organic compounds contaminated groundwater, air sparging (AS) can complement oxygen to groundwater and lead to changes of microbial community structure and function. To date, the structural features and ecological functions of microbial community in contanminated groundwater are still a black-box. In this research, denaturing gradient gel electrophoresis (DGGE) technique was used to investigate the changes of the microbial community structure and composition before and after AS remediation at an actual groundwater site contaminated mainly by nitrobenzene (NB), and canonical correspondence analysis (CCA) was used to investigate the relationship between microbial community and environmental factors. The results showed that the number of dominant microbial species, biodiversity and evenness index increased evidently and the microbial dominance index took the adverse results after AS remediation. The dominant microorganisms in groundwater had been changed dramatically after AS. These results suggested that AS actually activated the indigenous microbes and made the microbial communities steadier. However, the influence of AS on microbial community had a certain range and the effective influence radius was approximately 5-6 m. The results of CCA showed that the microbial community composition before AS was primarily correlated with the variables of total nitrogen (TN) and NB, whereas, it was mainly correlated with the variables of TN, total organic carbon (TOC), Cr, Se, and Cu after AS. This analysis on the changes of microbial community in groundwater during AS remediation would provide more comprehensive references and bases for the optimal control of AS remediation or bioremediation process.

Key words: air sparging; DGGE; groundwater; microbial community structure; nitrobenzene

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