Optimization of TCE Degradation in Counter-Diffusional, Membrane-Attached, Methanotrophic Biofilms for Remediation of Contaminated Groundwater

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Abstrak

This study develops, evaluates, and optimizes the potential of a novel "counter-diffusional? membrane biofilm reactor to biologically treat and remove trichloroethylene (TCE) from contaminated soil and groundwater caused by industrial activities (industrial solvent). The objectives of the research are to investigate and evaluate design and operational factors reflecting the sustainability and degradation rates of TCE transformation in a counter-diffusional membrane-attached methanotrophic biofilm reactor system

As a first step attaining this objective, an overall mass transfer coeficient of the bioreactor was developed a 23 laboratory experimental design have already conducted, and the development of a mathematical model and computer simulation describing the concentration profile of substrates and TCE within the biofilm has been introduced

A maximum sustainable TCE removal j7|o: of 205 Elmo!/m7/day was successfully attained when the CH,¢ utilization rate was 11.67 mmoles/m2/hr, the TCE loading rate was approximately 400 mol/m2/day. Normal probability plot and pareto chart indicated that methane partial pressure (P) and hydraulic Reynolds 's numbers (Re) have important and significant positive effects on the TCE degradation rates. The average percentage of TCE removal eficiency falls between 78.6 and 94. 7%.