

Sensabac - anaerobic dechlorinating microbial culture for the bioaugmentation treatment of CHC-contaminated aquifers

Project description

Sensabac is a mixture of laboratory enriched microbial cultures containing *Dehalococcoides mccartyi* bacteria. These bacterial cultures demonstrate high CHC reductive degrading abilities.

Experience has shown that, under both natural and biostimulated conditions, a high accumulation of cDCE and VC occurs in ground water. Thanks to bioaugmentation, under anaerobic conditions; such products can be quickly degraded. Anaerobic inoculation requires a high level of experience. Regardless, it is considered cost effective and most often requires only a single application.

Application area

Bioaugmentation is suitable for sites where no natural CHC degradation is observed or where regardless of appropriate conditions and substrate supply, none or retarded CHC degradation occurs in ground water.

The application of bioaugmentation cultures have shown to be most effective under circumstances where optimum environmental conditions are sufficiently reduced or where there is an insufficient amount of auxiliary substrates present in the ground water.

The dechlorinating cultures used in bioaugmentation originate from sites which demonstrate intensive dechlorination. In addition, cultures are also taken from sites where substantially large numbers of gene copies, responsible to produce dechlorinating enzymes such as, TceA, VcrA and BvcA are found.

The procedure

The bioaugmentation mixture chosen for a specific project is determined by first assessing the amount of bacteria required. The outcome is then submitted to the laboratory, where after several weeks of incubation, several hundred liters of bacterial suspensions are prepared. During this phase, growth conditions and proliferation processes are continuously monitored. Importantly, qPCR analysis is performed to ensure sufficient amounts of TceA, VcrA and BvcA genes are present. This is done to ensure that the cultures demonstrate the desired degradation potential. Finally, cultures are introduced under anaerobic conditions into the contaminated circulating aquifer.

Preparation time: approx. 8 – 12 weeks



Requirements:

- The contaminant's distribution and local pattern of degradation process is known
- The site's pH is neutral and anaerobic conditions are at O₂ concentrations below 0,2 mg/L
- Ground water measuring points (minimum 1") for bioaugmentation are available

Estimated cost

Approx. 5,000 EUR per 100 liter of Sensabac culture suspension

Services rendered

- Analysis of the site's initial status by assessing the site's natural dechlorination processes
- Composition of proper nutrient medium and the production of sufficient amounts of bacterial culture
- Quality control of the process by monitoring the quantity of degradation-relevant TceA, VcrA and BvcA DNA fragments
- Delivery and inoculation of bacterial culture
- Providing the technology and materials necessary for bioaugmentation such as, N₂
- Bimolecular control using qPCR, to determine the presence of degradation genes in ground water necessary for bioaugmentation.

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