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Methods and Systems for Continuous Production of *Dehalococcoides*

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Invention Description

Organic contaminants, such as chlorinated ethenes, are pervasive worldwide, and *in situ* bioaugmentation is one of the most widely employed methods for remediation. Specialized bacteria of the genus *Dehalococcoides* are routinely used for *in situ* bioremediation of chlorinated ethenes and other organic contaminants. For effective remediation it is recommended to have 10^7 *Dehalococcoides* cells per liter of groundwater. However, these microbes are slow-growing and difficult to culture in high density. There is only one report where a density of 10^{12} cells/L of *Dehalococcoides* was achieved, and it took 35 days to reach that density.

Researchers at the Biodesign Institute of Arizona State University have developed a method and system for continuous production of Dehalococcoides in continuous flow stirred-tank reactors (CSTRs). Through optimization of growth conditions, growth medium, and reactor construction materials, a density of 10^{12} cells/L of Dehalococcoides was achieved in just three days, which is a tenfold improvement over the best reported culture process.

This method provides the fastest production rate of high-cell density *Dehalococcoides* cultures and has the potential to revolutionize production of bioaugmentation cultures for treatment of chlorinated ethenes.

Potential Applications

- High density production of *Dehalococcoides* in continuous flow stirred-tank reactors

Benefits and Advantages

- Rapid, higher density production – only three days to reach a cell density of 10^{12} cells/L
- Cultures can be stored for longer durations – helps streamline production
- The novel growth medium minimizes proliferation of competing microorganisms and enhances growth of beneficial microbes
- These *Dehalococcoides* cultures convert trichloroethene (TCE) to mostly ethene at a 3-d HRT
- The reactor construction materials minimize possible inhibition of anaerobic microorganisms in the CSTR