Optimizing A Mixed Microbial Community For Biodegradation Of Halogenated Solvents And 1,4-Dioxane

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SUMMARY

UCLA researchers in the Department of Civil and Environmental Engineering have formulated a microbial community that degrades halogenated solvents and their stabilizers in water resources.

BACKGROUND

Improper storage, discharges, and accidental spills of halogenated solvents and dioxane have led to widespread groundwater contamination. Anaerobic biological reduction is a common remediation strategy for halogenated solvents. However, intermediate products, including known human carcinogens, can accumulate under some conditions. Anaerobic microorganisms capable of biodegrading dioxane have not been isolated. Simultaneous bioremediation of halogenated solvents and dioxane is a challenge because they favor opposing redox conditions. Multiple injections of microorganisms and physical alterations to subsurface oxygen levels increase costs and energy needed to clean up sites contaminated with dioxane and halogenated solvents.

INNOVATION

UCLA researchers have formulated a microbial community that simultaneously degrades chlorinated ethenes and dioxane. The mixed microbial culture biodegrades dioxane twice as fast as the pure aerobic culture at higher concentrations of dioxane (15 mg/L) and 20% faster at lower concentrations of dioxane (3 mg/L). Moreover, the microbial community can withstand changing redox conditions and biodegrade both chlorinated ethenes and dioxane. This approach could reduce the cost, energy, and substrates required for *in situ* bioremediation of chlorinated ethenes and dioxane.

APPLICATIONS

- Groundwater remediation
- Bioremediation of industrial and military wastes containing halogenated solvents and dioxane

ADVANTAGES

- Degrades chlorinated ethenes and dioxane
- Degrades dioxane 20%-200% faster than the pure aerobic culture depending upon the starting dioxane concentration
- Reduces the accumulation of suspect or known carcinogenic intermediates
- Reduced cost, energy, and substrates required

PATENT STATUS

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OTHER INFORMATION

KEYWORDS

Bioremediation, groundwater contamination, chlorinated ethenes, dioxane, microbial community

CATEGORIZED AS

- **Environment**
  - Remediation

RELATED CASES

2018-340-0

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