

Biodegradation of 1,4-Dioxane by Three Enriched Consortia

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Background/Objectives. 1,4-Dioxane is a groundwater contaminant of emerging concern because of its recently discovered widespread occurrence and potential carcinogenicity. Furthermore, its recalcitrant cyclic ether structure and high mobility make it harder to be removed by conventional wastewater treatment methods. In recent years, several microbes have been isolated that can degrade and use dioxane as the sole carbon and energy source. However, because of the diverse and complex conditions of different sites, bioaugmentation of consortia is better than pure culture. In this presentation, the performance and community composition of three enriched consortia will be shown. Furthermore, the functional genes and susceptible enzymes involved will be discussed too. These studies will broaden our understanding of the 1,4-dioxane degraders.

Approach/Activities. This project is a laboratory study. Dilution enrichment method is used to get the three consortia. 16S rRNA Illumina pyrosequencing is used to get the community composition of the consortia. PCR is used to get the information of genes involved in the degradation. GCMS is used to measure 1,4-dioxane concentration.

Results/Lessons Learned. In the presentation, the degradation capability of the three consortia will be compared with known 1,4-dioxane degraders. The community composition of the three consortia will be shown in a pie chart. The enzymes or genes involved will be shown and compared with known soluble di-iron monooxygenases (SDIMO) genes. The potential of using the three consortium into field study will be given.