

嫌氣的脱塩素分解による VOCs 浄化評価を目指した

水素拡散試験用カラムの検討

吉川美穂¹・和田忠輔¹・竹内美緒²・駒井 武²・坂本靖英²・張 銘²

1: ケミカルグラウト (株) 〒105-0001 東京都港区虎ノ門 2-2-5 共同通信会館

E-mail: m-yoshikawa@chemicalgrout.co.jp

2: 産業技術総合研究所地圏資源環境研究部門 〒305-8569 茨城県つくば市小野川 16-1

Examination of the Column Suitable for Hydrogen Diffusion Test

towards Bioremediation of VOCs-Contaminated Sediments

Miho YOSHIKAWA¹, Tadasuke WADA¹, Mio TAKEUCHI², Takeshi KOMAI²,
Yasuhide SAKAMOTO² and Ming ZHANG²

1: Chemical Grouting Co., LTD., Kyodo News Bldg., 2-2-5, Toranomon, Minato-ku, Tokyo 105-0001, Japan

2: Institute for Geo-Resources and Environment, National Institute of Advanced Industrial Science and Technology, 16-1, Onogawa, Tsukuba, Ibaraki 305-8569, Japan

Abstract

The demand for on-site remediation of contaminated soil is expected to increase after the amendment of Soil Contamination Countermeasures Act. Tetrachloroethene (PCE) and Trichloroethene (TCE) are typical VOCs contaminants in Japan. They can be decomposed to harmless ethene through the reductive dechlorination reaction by anaerobic bacteria. The reaction is bacterial respiration using H_2 as an electron donor, and hydrogen release compounds are widely applied for bioremediation in practice. The reductive dechlorination reaction by bacteria is stimulated after a hydrogen release compound is injected into the contaminated subsurface and hydrogen is released. The success in the bioremediation partly depends on the contact between the bacteria and H_2 . The effective area would be predicted by understanding the diffusion of H_2 in subsurface environment.

However, only a few H_2 diffusion tests have been reported to date. In this study, as a preliminary study for the through-diffusion test, suitable column material for the H_2 diffusion test was examined. Since H_2 molecule is small and light, gas tightness is important for the test column. An acrylic container and a PFA container were used to determine the gas tightness. Unfortunately, these containers were not suitable for H_2 preservation. There is still room for improvement in material and structure of the column and the concepts of the improvement were also provided.

Key words: *bioremediation, VOCs, H_2 , diffusion test*

はじめに

土壌汚染と原位置浄化

土壌汚染の浄化措置には、掘削除去、バイオレメディエーション、地下水揚水、封じ込め、不溶化など様々な方法が存在する。しかし実際の土壌汚染サイトでは、汚染物質を除去するという確実性から掘削除去が最も多く用いられてきた（例えば、環境省水・大気環境局 2009）。掘削除去は、処理コストが高いことによる土地所有者の過剰負担およびブラウンフィールド問題の発生、除去した土壌による二次汚染の恐れ、また、運搬・処理による二酸化炭素の多量排出など、課題が多い。

さらに、2010 年 4 月 1 日を施行期日とした土壌汚染対策法の改正に伴い、行政による健康被害のリスクの判断、それに応じた汚染区域や浄化措置の指示が行われるようになる。浄化措置の掘削除去への偏重を減らし、汚染土壌搬出による二次汚染の拡大を防ぐため、汚染サイトで行う浄化措置、つまり原位置浄化の増加が予測され