COMETABOLIC BIODEGRADATION OF TCE

BY BENZENE UTILIZING CONSORTIUM

Hyun-sook Kim, Department of Biological Engineering, Kyonggi University, Suwon, Republic of Korea, minsyung1117@hanmail.net

Sang-Seob Lee, Department of Life Science, College of Natural Science, Kyonggi University, Suwon, Republic of Korea, sslee9903@kyonggi.ac.kr

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Introduction. Chlorinated pollutants including TCE are used in many industrial clean systems. TCE cause environmental pollution and a potent carcinogen. Aerobic degradation of TCE occurs through a process termed co-metabolism. Consortium B1 can degrade TCE by utilizing benzene as a substrate. Benzene was degraded, using benzene oxygenase (*Bed*), which catalyzes the oxidation of benzene to catechol. *Bed* gene consisted with *Bed*A, *Bed*B, *Bed*C1 and *Bed*C2. In this study, we want know interrelation of TCE degradation rate and gene expression. Induced overexpression of *Bed* gene, expected more high efficiency for benzene and TCE degradation rate.

Methods. Benzene and TCE degradation rate was analyzed using headspace method on GC-FID (Gas Chromatography-Flame Ionization Detector). Injected TCE and benzene, initial concentration of TCE was 1, 10 and 20 mg/L, benzene was 30 mg/L as substrate. And analyzed for gene expression, used Real-Time PCR method. For checking location of *Bed* gene which secreted enzyme and endo-enzyme. According to TCE and benzene degradation rate, checked expression of gene.

Results. In this study, consortium B1 degraded 1, 10 and 20 mg/L of TCE within 6, 74 and 111 hours, respectively.

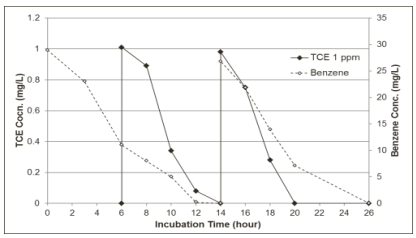

Fig. 1. 1 mg/L of TCE degraded within 6 hours by B1.

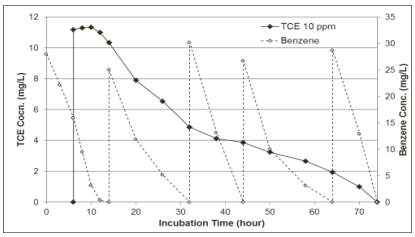

Fig. 2. 10 mg/L of TCE degraded within 74 hours by B1.

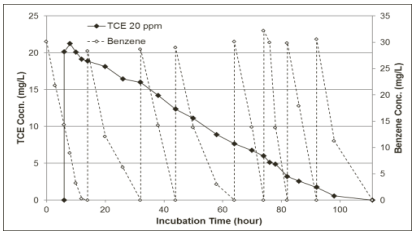

Fig.3. 20 mg/L of TCE degraded within 111 hours by B1.

Injected benzene after 6 hours, *Bed* gene was expressed maximum. At D.O value lower than 0.5 mg/L inside the media, gene expression decreased.

Conclusions. *Bed* gene expression was increased on aerobic condition actively, and secreted to media. *Bed* gene was degraded benzene to catechol, catechol form detached from chloride of TCE, easily. Thus, according to overexpression of *Bed* gene, expected more efficiency for TCE degradation rate.

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References.

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