primers. PCR products were cloned and 50 randomly selected clones were sequenced. Comparative sequence analysis indicated that dioxygenase clones from strain KK1 were divided into 6 groups. Radiospirometric analysis for the substrates anthrancene, naphthalene, phenanthrene, pyrene, and benzo(a)pyrene revealed that strain KK1 has the catabolic potential for anthracene, naphthalene, and phenanthrene.

B309

자외선 광촉매 장치를 이용한 미생물 살균효과 측정

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두 가지 형태의 UV-TiO_2 반응기를 이용하여 *Escherichia coli*와 *Saccharomyces cerevisiae*의 살균효과를 측정하였다. 첫 번째 형태는 반응기를 한 개 사용했을 때의 경우이며 또 다른 형태는 반응기를 하나 더 설치하여 두 개의 반응기를 이용할 경우이다. 254 nm에 최대 39 watt의 자외선 방출량을 내는 램프를 원형 Pyrex 유리관 중앙에 설치하였고 TiO_2는 석영관에 박막증착된 형태, Glass bead에 박막증착된 형태와 Alginate bead에 박막증착된 형태로 나누어 회분식으로 살균정도를 측정하였다. 반응기를 하나만 사용했을 때 *E. coli*에 대한 1분 동안의 살균력은 TiO_2로 박막증착된 석영관을 사용했을 경우 33.5%의 살균효과를 나타냈으며 Glass bead에 박막증착하였을 경우에는 89.9 %의 살균효과를 나타내었다. Glass bead를 이용한 반응기에 기포를 주입하였을 경우 초기 균의 개수가 7.1×10^3 cells/mL에서 시작하여 1분 동안 95%의 살균효과를 보인 반면 기포를 주입하지 않을 경우 90.6%의 살균효과를 나타내었다. TiO_2로 박막증착된 Alginate bead에 기포를 주입하였을 때 1분 동안 86%의 살균 효과를 보여 Glass bead를 사용하였을 때보다 살균효과가 떨어지는 것으로 관찰되었다. 살균제인 과산화수소를 첨가하였을 경우 1분 동안에 99.9%의 살균효과를 보였으며 이때 과산화수소의 농도는 25 mg/L, 50 mg/L, 75 mg/L, 100 mg/L, 500 mg/L 이였다. Glass bead를 이용하고 폭기를 시켜면서 반응기를 하나 더 설치하였을 경우의 살균효과는 96.4%로 반응기가 하나일 때보다 조금 더 높은 살균효과를 나타내었다. *S. cerevisiae*와의 비교실험에서는 *E. coli*에 대한 살균력이 1분 동안에 좀 더 높게 나타났다. 살균제인 NaClO를 첨가하였을 경우 유효염소 농도로서 0.5 mg/L, 1 mg/L, 1.5 mg/L의 저농도 주입시 두 개의 반응기를 이용하여 Glass bead에 폭기를 시켰을 경우와 비교했을 때 살균효과가 없었으며 10 mg/L, 30 mg/L, 50 mg/L의 농도로 주입하였을 경우 1분 동안에 최고 99.6%의 살균효과를 나타내었고 살균 후 균체들의 재활성은 거의 없었다.

B310

Aerobic Reduction Mechanism of Manganese Oxide by a Bacterial Strain MR4

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Aerobic reduction mechanism of manganese oxide was investigated with a soil bacterium designated as strain MR4. Based on the examination with either dialysis bag or spent medium, organic acid production was found to be the most probable mechanism for Mn (IV) reduction by this strain. Using HPLC and other specific determination methods available, organic acids generated by glucose oxidation were positively identified as pyruvate and oxalate in the spent medium of MR4 cultures grown on AMR medium supplemented with 100 μg MnO_2/ml. In AMR medium, an evolution of pyruvate was maximal at 4 hr (0.2 mM) of incubation. An oxalate concentration was gradually increased to 12 hr (0.2 M) and maintained this concentration to 48 hr. Time versus oxalate production curve corresponded to the pattern of MnO_2

reduction. Moreover, Mn (II) was not attributed to physical adsorption at the cell surface for 48 hr of incubation. Nevertheless other mechanisms might be involved in MnO_2 reduction since chemical reduction in a sterile distilled water with oxalate (0.2 M) was only about 20% of the amount of MnO_2 reduced by MR4. We conclude that the MnO_2 was efficiently reduced by organic acids such as oxalate and pyruvate produced by MR4.

B311

Characterization of Iron-Reducing Bacterium, *Shewanella putrefaciens* DK-1 ; Utilization of Electron Acceptors and Donors

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Shewanella putrefaciens DK-1 was a gram-negative, facultative anaerobic Fe(III) reducer and use ferric iron as a terminal electron acceptor for the oxidation of organic compounds to carbon dioxide or other oxidized metabolites. The ability of reducing activity and utilization of various electron acceptors and donors for *S. putrefaciens* DK-1 were investigated. *S. putrefaciens* DK-1 was capable of using a wide variety of electron acceptor, including nitrate, Fe(III), AQDS, and Mn(IV), however it's ability to utilize electron donors was limited. Lactate and formate were used as electron donors but acetate and toluene were not. Fe(III) reduction of *S. · putrefaciens* DK-1 was inhibited by the presence of either nitrate or nitrite. Also, *S. putrefaciens* DK-1 used humic acid as an electron acceptor and humic acid was reoxidation by nitrate. Environmental sample showing the Fe(III)-reducing activity was used to investigate the effects of limiting factors such as carbon, nitrogen and phosphorus on the Fe(III) reducing bacteria. Fe(III) reducing activity was measured the highest value, when added lactate as carbon source and *S. putrefaciens* DK-1 as Fe(III) reducer, in untreated sediment samples of Cheon ho and Dae ho reservoir.

B312

Isolation of Acidotolerant Naphthalene-Oxidizing Bacteria from Soils Contaminated with Alkyl Benzenes

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The potential for biodegradation of aromatic hydrocarbons was evaluated in contaminated soils near alkyl benzene storage tanks in Ulsan petrochemical industrial complex. The pH values of 6 samples ranged from 3.8 to 6.9, and the organic matter content was between 2.3 and 4.8% (w/w). Enumeration of heterotrophs and naphthalene-oxidizers was performed using the most probable number(MPN) technique. The numbers of heterotrophs growing at pH 7 ranged from 9.5×10^2 to 1.1×10^5 cells/g of soil, while those growing at pH 4 were between 4.7×10 to 3.6×10^4 cells/g of soil. In the soil samples, the numbers of heterotrophs growing at pH 7 were higher than those growing at pH 4. Estimates of naphthalene-oxidizers were less than 2.0×10 cells/g of soil regardless of the medium's pH. From the positive MPN tubes for naphthalene-oxidizers, we could isolate 12 strains that could grow using naphthalene as a sole carbon/energy source. Eight of the isolates showed naphthalene-degrading activities at pH 4, although they grew faster at the medium of pH 7 than pH 4. Bioaugmentation of these isolates can be considered for the remediation of the contaminated soils.