



Biosorption of lead by indigenous bacterium isolated from soil contaminated with lead and oil

S.H. Kim (1), J.-U. Lee (2), J.S. Lee (3) and H.T. Chon (1)

(1) School of Civil, Urban and Geosystem Engineering, Seoul National University, Seoul 151-744, Korea, E-mail: chon@snu.ac.kr, (2) Department of Civil, Geosystem and Environmental Engineering, Chonnam National University, Gwangju 500-757, Korea, (3) Korea Mine Reclamation Corporation, Seoul 110-727, Korea.

Indigenous bacterium which showed a tolerance to high Pb toxicity (1000 mg/L) was isolated from soil concomitantly contaminated with Pb and TPH (Total Petroleum Hydrocarbons). The capacity of the bacterium for Pb biosorption was investigated under various experimental conditions such as bacterial growth phase, the initial Pb concentration, the input biomass amount, temperature and pH. Leaching of heavy metals (Cd, Cu, Pb and Zn) from the soil was first characterized using SPLP, TCLP and KSTSTM (Korean Soil Toxicity Standard Test Methods) which employs 0.1 N HCl for Cd, Cu and Pb and aqua regia for Zn as leaching agents. The SPLP showed similar amounts of leached Cd, Cu and Pb with those by KSTSTM. The TCLP leached less concentrations of Cd, Cu and Pb than the extraction by KSTSTM. However, KSTSTM extracted much higher amount of Zn than SPLP and TCLP. As a result of batch-type biosorption experiments, the indigenous bacterium removed aqueous Pb from solution with the highest efficiency of 90 % when the initial Pb concentration was less than 100 mg/L or biomass amount was more than 2 g/L. The removal efficiency was reduced to 75 % when the initial Pb concentration was 800 mg/L or biomass amount was 0.5 g/L. The optimal conditions of Pb biosorption onto the bacterial cells were pH 5 - 9, 25 degree C and culture age of over 16 hours to stationary growth phase.