

Dynamics of Biodegradation of Xenobiotic and Its Metabolites

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ABSTRACT

Persistent organic substances (xenobiotic) are hard to degrade by microorganisms. Mixed culture microorganisms in activated sludge can successfully degrade many xenobiotic substrates after the sludge is acclimated to the xenobiotic.. Successive acclimation could shorten lag time for xenobiotic degradation. Therefore, acclimation is a means to improve the treatment of xenobiotic pollutants. The purpose of this study was to investigate the dynamics of biodegradation of a xenobiotic and its metabolites. The xenobiotic used in this study were 2, 4-dichlorophenoxyacetic acid (2, 4-D) and its metabolite 2, 4-dichlorophenol (2, 4-DCP). Degradation of 2,4-DCP, which is a metabolite of 2,4-D, was studied with activated sludge acclimated to 2, 4-D and vice-versa. The advantages of metabolite degradation by sludge acclimated to the parent shall prevent accumulation of downstream pollutants. 2,4-D and 2,4-DCP were subjected independently to acclimation and degradation tests by activated sludge. Results show that activated sludge acclimated to 2, 4-D effectively degraded 2, 4-D and the lower metabolites of 2, 4-D, typically 2, 4-DCP. During the degradation of 2, 4-D, accumulations of the lower metabolites of 2, 4-D were not found. However, pathways acquired from acclimation to 2, 4-DCP are not effective in the degradation of the parent 2, 4-D.

Keywords : activated sludge、2,4-dichlorophenoxyacetic acid、2,4-Dichlorophenol , xenobiotics、 xenobiotic、 acclimation

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