

Factor Affecting Activated Sludge Acclimation to Xenobiotics

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ABSTRACT

2,4-dichlorophenoxyacetic acid (2,4-D) is a widely applied herbicide introduced to the environment and becomes a pollutant. This organic pollutant is toxic and persistent, and called xenobiotic cause of its non-nature characteristic but can be degraded by activated sludge after an acclimation period. Several experiments were conducted in this study to determine the effects of factors on 2,4-D acclimation period and also the degradation time. Factors considered here include the initial concentration of 2,4-D and activated sludge, starved activated sludge, a biogenic substrate and similar substrate added prior to 2,4-D. The length of acclimation time is directly proportional to the increasing of initial activated sludge concentration and inversely proportional to the increasing of initial 2,4-D concentration. However it also depends on the combination of them in one. A combination of 100 mg/1 of initial 2,4-D concentration and 20 mg/1 of initial activated sludge was chosen as the most appropriate to conduct all experiments to explore the effects of starved sludge, of sucrose and phenol on lag period of 2,4-D degradation. Lacking of nutrient for 5 to 10 days is an advantage for shorten length of acclimation period and increasing rate of degradation. The presence of sucrose and phenol in solution before adding 2,4-D also have significant effect on lag phase. Activated sludge added with 100 mg/1 or 200 mg/1 of sucrose 3 days prior to adding 2,4-D can sharply accumulated degradation capacity so that the acclimation phase under this condition is the shortest. With phenol, the reduction in lag time of activated sludge to 2,4-D was directly related to the concentration of phenol added. 100 mg/1 phenol added and degraded before adding 2,4-D can reduce acclimation time from 72 hours to 14 hours.

Keywords : acclimation, 2,4-dichlorophenoxyacetic acid, activated sludge

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