B321 Biodegradation of Nitrobenzene and Its Application to Biofiltration

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Nitroaromatic compounds occur as intermediates or by-products in the synthesis of solvents, dyes, and explosives. Their widespread uses in industry cause deleterious consequences for an environment. A bacterial strain NB01, isolated from a wastewater, utilized nitrobenzene (NB) as the sole source of nitrogen, carbon, and energy. It grew on NB with the concomitant release of about 63% of the total available nitrogen as ammonia. The optimal pH and temperature for degradation were in the range of 7.0 to 8.0 and 30℃, respectively. Cell growth was inhibited above 1.8 mM NB, but NB utilization followed Michaelis-Menten kinetics within the tolerance range and the K_m and a maximum specific removal rate for NB were 0.33 mM and 11.04 h^{-1}, respectively. Biodegradation of NB was studied in a biofilter using peat moss, perlite, and vermiculite (4:3:3, v/v) as supporting material for the bacterium. From the decreases in concentration determined by gas chromatography, removal rates were in the range of 0.048 to 3.5 g per m^3 filter volume per hour. Microbial activity could be maintained for a period of several months with occasional addition of diluted nitrogen-free broth. Consequently, biofilter favor its use in industrial-scale air pollution control.

B322 Microbial Degradation of *p*-Nitrotoluene by a *Mycobacterium* sp. Strain NT04

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Nitro-substituted aromatics occur as intermediates or by-products in the synthesis of solvents, dyes, and explosives, etc. Their widespread use in industry has resulted in their emergence as environmental contaminants. *Mycobacterium* sp. strain NT04 isolated from a leachate, utilized *p*-nitrotoluene (*p*-NT) as the sole source of nitrogen, carbon, and energy. The microorganism was identified into a strain with high affinity(S_{ab}=0.956, sequence similarity = 98.8%) to *M. alvei* by 16S rDNA sequence(1,449 bases). It grew on *p*-NT with the concomitant release of about 37.5% of the total available nitrogen as ammonia and conversion of residues to biomass. The optimal pH and temperature were in the range of 6.0 to 7.2 and 30℃, respectively. Although cell growth was inhibited when *p*-NT concentration was higher than 1.4 mM, *p*-NT utilization followed Michaelis-Menten kinetics within the tolerance range and the K_m and a maximum specific removal rate for *p*-NT were 0.65 mM and 9.07 h^{-1}, respectively. No growth was observed with nitroarenes other than *p*-NT as the sole carbon source. From the operation of a continuous culture reactor, *p*-NT was removed with rates ranging from 2.6 to 7.0 g per m^3 reactor volume per hour. An increase of pH due to the released ammonia was marginal, thus the *p*-NT removal in the bioreactor did not require pH control. Consequently, bioreactors favor their use in industrial-scale pollution control especially for the *p*-NT containing wastewater.