Bioreactor treatment of aromatic amines under denitrifying conditions

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A logical concept for the removal of azo dyes in biological wastewater treatment systems is based on anaerobic treatment, for the reductive cleavage of the azo linkages, in combination with aerobic treatment, for the degradation of the products from azo dyes cleavage, aromatic amines (Van der Zee & Villaverde, 2005). A drawback of aerobic treatment is that many aromatic amines from azo dye cleavage are prone to autoxidation, which mostly increases the size of the molecules, thereby reducing their biodegradability. Alternatively, denitrifying conditions present a situation where powerful electron acceptors are present whereas autoxidation does not occur. With the objective to investigate the fate of aromatic amines under denitrifying conditions, two upflow anoxic bioreactors were operated. The reactors were fed with synthetic wastewaters containing aniline and/or sulfanilic acid and a mixture of volatile fatty acids as the primary electron donors. The terminal electron acceptors were stoichiometric amounts of nitrate (reactor 1) and a mixture of nitrate and nitrite (reactor 2). Supporting batch denitrification experiments were conducted to monitor toxicity and ultimate biodegradability.The results demonstrated anoxic biodegradation of aniline and a chemical reaction between the aromatic amines and nitrite. Although some of the products of the nitrite reaction were found biodegradable, the nitrite reaction was also observed to cause inhibition of the denitrification activity.

1. Van der Zee, F. P. and Villaverde, S. (2005) *Water Research* **39(8)**:1425-1440.