

Production of eight different hydride complexes and nitrite release from 2,4,6-trinitrotoluene by *Yarrowia lipolytica*

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Abstract

2,4,6-Trinitrotoluene (TNT) transformation by the yeast strain *Yarrowia lipolytica* AN-L15 was shown to occur via two different pathways. Direct aromatic ring reduction was the predominant mechanism of TNT transformation, while nitro group reduction was observed to be a minor pathway. Although growth of *Y. lipolytica* AN-L15 was inhibited initially in the presence of TNT, TNT transformation was observed, indicating that the enzymes necessary for TNT reduction were present initially. Aromatic ring reduction resulted in the transient accumulation of eight different TNT-hydride complexes, which were characterized using high-performance liquid chromatography, UV-visible diode array detection, and negative-mode atmospheric pressure chemical ionization mass spectrometry (APCI-MS). APCI-MS analysis revealed three different groups of TNT-hydride complexes with molecular ions at m/z 227, 228, and 230, which correspond to TNT-mono- and dihydride complexes and protonated dihydride isomers, respectively. One of the three protonated dihydride complex isomers detected appears to release nitrite in the presence of strain AN-L15. This release of nitrite is of particular interest since it can provide a pathway towards complete degradation and detoxification of TNT. Copyright © 2007, American Society for Microbiology. All Rights Reserved.

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