POST MIKROBIOL,
2005, 44, 1, 63-70
http://www.pm.microbiology.pl

DIOKSYGENAZY - KLUCZOWE ENZYMY ROZKŁADU ZWIĄZKÓW AROMATYCZNYCH PRZEZ DROBNOUSTROJE

Danuta Wojcieszyńska, Izabela Greń, Sylwia Łabużek

Uniwersytet Śląski, Wydział Biologii i Ochrony Środowiska, Katedra Biochemii
ul. Jagiellońska 28, 40-032 Katowice, tel. (32) 2009 576, fax 032 2009 361, e-mail: dmanka@us.edu.pl

Wpłynęło w *grudniu 2003*

Dioxygenases-key enzymes for degradation of aromatic compounds by microorganisms

Abstract: Oxygen-activating enzymes with mononuclear non-heme active participate in many important metabolic pathways of the environmental significance. The ring dihydroxylation is non-specific preliminary step in the catabolic pathway and plays an important role in the activation of resonance-stabilized aromatic compounds before the subsequent catabolism. Dihydroxylate intermediates such as catechol, hydroxyquinol or protocatechuate are cleavaged between their two hydroxyl groups *(prtho* cleavage) by catechol 1,2-dioxygenase, hydroxyquinol 1,2-dioxygenase or protocatechuate 3,4-dioxygenase. The iron atom in the pentacoordinate active centre of these enzymes remains in the high-spin Fe (III) state during catalysis.

Extradiol dioxygenases catalyze the ring-cleavage at the C-C bond adjacent to the vicinal hydroxyl groups. These dioxygenases typically contain non-heme iron Fe (II) in their active site but have been also shown to be active with Mn (II). The catechol 2,3-dioxygenase catalytic cycle is supposed to comprise a complexion of iron ion by monoanionic catecholate as a bidentate ligand. The ring cleavage reaction is proposed to proceed via an attack of the iron-bound activated oxygen on the nonhydroxylated position vicinal to the carbon atom bearing the phenolate anion. When extradiol dioxygenases cleave 3-chlorocatechol, they usually become inactivated. This inactivation might be caused by the strong chelating activity of 3-chlorocatechol or by suicide inactivation of the enzyme due to the formation of reactive intermediate.

Słowa kluczowe dioksygenazy intra- i ekstradiolowe, *meta*-rozszczepienia
Key words: intra- and extradiol dioxygenases, *meta*-cleavage