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# Kinetics of chlorobenzene biodegradation under reduced oxygen levels

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**Abstract:**

Focussing on the role of chlorocatechol 1,2-dioxygenase (CC120), an oxygen-dependent key enzyme in the aerobic catabolism of chlorobenzene (CB), *Pseudomonas veronii* strain UFZ B549, *Acidovorax facilis* strain UFZ B530, and a community of indigenous groundwater bacteria were amended with CB degradation under either oxic or hypoxic conditions. All cultures readily degraded CB at high oxygen availability, but had differing abilities to completely degrade CB when exposed to oxygen limitation. For the three cultures very distinct oxygen half-saturation constants (0.3–11.7 µM) for the respective CC120s were obtained and protein analysis showed that high affinity-type A. *facilis* and low affinity-type P. *veronii* express CC120s, which belong to different structural clusters. From this a functional relation between CC120 type and the ability to cope with efficient ring fission under oxygen limitation is anticipated. Extremely high oxygen affinities for CC120s support the assumption that truly oxic environments are not an essential requirement to degrade chloro(aromatic) compounds. Tiny quantities of oxygen permanently resupplied will sufficiently maintain the growth of microaerophilic specialists with the ability to transform chloro(aromatics) via catechol intermediates.

Key-words: Hypoxic, kinetics, chlorobenzene, optode, chlorocatechol 1,2-dioxygenase, oxygen affinity