



Electrochemical degradation of a chlorophenoxy propionic acid derivative used as an herbicide at boron-doped diamond

Amira Zaouak^a, Fatma Matoussi^{b*}, Mohamed Dachraoui^a

^aLaboratoire de Chimie Analytique et d'Electrochimie, Faculté des Sciences de Tunis, Département de Chimie, Université El Manar, Campus Universitaire, 2092 Tunis, Tunisia

^bDépartement de Génie Chimique et Biologique, Institut National des Sciences Appliquées et de Technologie, Université de Carthage, Centre Urbain Nord, BP 676, 1080 Tunis cedex, Tunisia
Tel. +216 71 703 829; email: fatma.matoussi@insat.rnu.tn

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ABSTRACT

The electrochemical degradation of *diclofop-methyl* (DM), an herbicide deriving from aryloxy propionic acid, was carried out by galvanostatic electrolysis at boron-doped diamond electrode. The oxidation process leads in an early step to the cleavage of the aryloxy propionic ester bond and the formation of 4-(2,4-dichlorophenoxy) phenol (P1). The subsequent oxidation of P1 resulted in a quantitative mineralization of DM. Measuring the reduction in chemical oxygen demand and total organic carbon during the electrolysis shows that the mineralization efficiency increases with decreasing current densities. As a result, two mechanistic pathways were proposed for DM electrochemical degradation. The first one is a direct electro-oxidation of the starting molecule leading to the breakdown of aromatic ether bonds. A second evidenced competitive pathway uses electrogenerated hydroxyl radicals as mediators in the mineralization process of DM.

Keywords: BDD; Diclofop-methyl; Electrochemical degradation; Hydroxyl radical

*Corresponding author.

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