

A cyclic voltammetry study on detection of
2,4-dichlorophenol and degradation intermediates
using an enzyme electrode

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Chlorinated phenols are used for herbicides and hazardous chemicals polluting water and soil environments. As a preliminary study for the development of the chemical detecting sensor based on immobilized enzyme, cyclic voltammetric measurements were made for 2,4-dichlorophenol (DCP) and its potential intermediates using an enzyme electrode. The enzyme electrode was prepared using an electrode body with horseradish peroxidase enzyme, graphite powder, ferrocene-ormosil, and paraffin oil. The enzyme electrode performed reasonably to obtain the cyclic voltammograms of the chemicals. Most of peak currents were linearly correlated with the (scan rate)^{1/2} implying diffusion controlled phenomena occurred. Also the reaction between DCP and H₂O₂ was examined based on voltammograms. The redox potential values show that DCP was dechlorinated initially and further degraded by ring cleavage. During the degradation, colored compounds were generated and the reaction mixture was analyzed by a UV-VIS spectrophotometer. Accordingly the degradation routes of DCP were proposed, one of them being oxidation to hydroquinone through phenoxy radicals.