MnO_2 MODIFIED CARBON PASTE ELECTRODE FOR THE DETERMINATION OF MCPA

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Metachlorophenoxyacetic acid (MCPA) is a commonly used herbicide, to control broad leaf weeds in many cultivations in Sri Lanka. MCPA, due to its sluggish kinetics, is electro inactive at bare glassy carbon electrodes according to cyclic voltammetric investigation, and hence its detection would not be feasible at bare electrodes. Use of catalytic chemistry of transition metals for the activation of organic molecules would therefore be an attractive approach that can be used to detect MCPA at relatively low levels. Selection of a suitable electro catalyst, and how it is incorporated on to bare electrodes would thus be crucial.

Carbon paste electrodes packed with 15% (w/w) MnO_2 was found to catalyze the reduction of MCPA at about +0.05 V based on cyclic voltammetric studies of $2x10^{-4}$ mol dm^{-3} MCPA in 0.1 mol dm^{-3} KCl medium, between +1.0 V and -1.0 V vs. saturated calomel electrode (SCE). No significant electrochemical features were observed in the absence of analyte. Although Fe_2O_3 modified carbon paste electrodes were also tested in a similar manner no catalytic activity was found on MCPA. Such electrodes showed the electrochemistry of the Fe^{2+}/Fe^{3+} couple only. Amperometric studies were conducted in 0.1 mol dm^{-3} KCl solution, which was observed to be the best medium, in order to explore the applicability of the method developed. The lower limit of detection of the method was determined to be $1.96x\ 10^{-6}$ mol dm^{-3}. Several other pesticides of this family such as Propanil (herbicide) and chloroacetic acid (herbicide), and other organochlorines such as and 4-chloro-*o*-cresol did not interfere with the detection of MCPA at MnO_2 modified carbon paste electrodes. Use of such electrodes for the detection of MCPA present in the real environment would be the next logical step of this research.

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