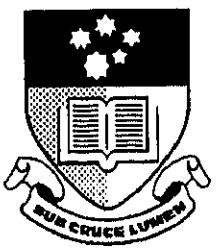
Radiolytic Degradation of Organic Pesticides: A Pulse Radiolysis and Steady State Study.



The University of Adelaide

Department of Chemistry

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Karl Cornelius

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ABSTRACT

Developing an understanding of the degradation of organic pesticides, herbicides and fungicides in natural systems is an essential component in the environmental management of our agricultural activities. Free radicals are being increasingly recognised as having importance in environmental chemistry, particularly of aqueous systems. For example the hydroxyl radical and the superoxide radical anion are believed to be relevant to the degradation of organic molecules in the environment. This thesis reports the results of a comprehensive study into the reactions of radicals commonly formed in aqueous systems with a variety of commercially available pesticides.

Gamma and pulse radiolysis techniques have been used to initiate reactions and determine relevant kinetic data such as rate constants. Products generated have been characterised by HPLC and mass spectrometric techniques. *Ab initio* calculations have been employed to gain insight into the transient species formed.

Nine pesticides currently in use in Australia were studied and include Aciflurofen, Chlorsulfuron, Cyromazine, Dichlorophen, Dimethrimiol, Hexazinone, Ioxynil, MCPA and Napropamide.