

## E2-46 Degradation of persistent organophosphorous pesticides by using $\text{TiO}_2$ as a photocatalyst

R A Maithreepala, Hema M K K Pathirana  
*Dept of Chemistry, University of Ruhuna, Matara*

Photocatalytic degradation of organochloro weedicide 3,4 DPA to non-toxic  $\text{Cl}^-$ ,  $\text{NO}_3^-$  and  $\text{H}^+$  and to  $\text{CO}_2$  by irradiating in the presence of  $\text{TiO}_2$  has been reported. Present work investigates the possibility of degrading persistent organophosphorous insecticide, methamidophos by  $\text{TiO}_2$ .

Photodegradation was done in a photochemical reactor by irradiating ( $\lambda = 365\text{-}366$ ) methamidophos (93 ppm) and  $\text{TiO}_2$  (anatase,  $100\text{mg dm}^{-3}$ ) in the presence of dioxygen. Samples were withdrawn at different time intervals,  $\text{TiO}_2$  was removed and the solution analysed for  $\text{PO}_4^{3-}$  and  $\text{NO}_3^-$ . A pyrex thimble was used to cut off the UV region. Same experiment was repeated under the following conditions: without the glass thimble while irradiating or in dark, in the presence of a mixture of  $\text{TiO}_2$  and  $\text{H}_2\text{O}_2$ , in the presence of  $\text{H}_2\text{O}_2$  while irradiating or in dark and also in the presence of  $\text{TiO}_2$  coated polyethylene film and  $\text{H}_2\text{O}_2$ .

Experiment conducted in the presence of  $\text{TiO}_2$  powder, without the pyrex thimble increased the formation of  $\text{PO}_4^{3-}$  to 45% which was only 5% in the presence of pyrex thimble. pH decreased from 6.3 to 2.7 due to the formation of  $\text{H}^+$ . Formation of  $\text{NO}_3^-$  was ~10%. Above reaction did not occur in the dark.

Application of a mixture of  $\text{TiO}_2$  powder and  $\text{H}_2\text{O}_2$  instead of  $\text{TiO}_2$  powder, increased the formation of  $\text{PO}_4^{3-}$  and  $\text{NO}_3^-$  to ~95%. Application of  $\text{TiO}_2$  coated polyethylene film and  $\text{H}_2\text{O}_2$  instead of  $\text{TiO}_2$  powder and  $\text{H}_2\text{O}_2$  formed 85% of  $\text{PO}_4^{3-}$  and 70% of  $\text{NO}_3^-$ .

Organophosphorous and organonitrogen groups of methamidophos could be converted to  $\text{PO}_4^{3-}$  and  $\text{NO}_3^-$  by using  $\text{TiO}_2$  as a photocatalyst. The use of  $\text{TiO}_2$  and  $\text{H}_2\text{O}_2$  enhances this reaction.

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