Conclusion:

The results of these studies indicate that TiO$_2$ can efficiently catalyse the degradation of variety of organic compounds in the presence of light. The results also indicate that degradation of the pollutant could be influenced by a number of parameters such as type of photocatalyst, pH, substrate and catalyst concentration and in the presence of electron acceptors beside molecular oxygen.

It could be demonstrated that photocatalytic properties of different TiO$_2$ materials may differ considerably for the degradation of different systems. The TiO$_2$ sample obtained from Degussa P25 was found to be more efficient photocatalyst for the degradation of all the compounds studied except picloram and acid red 17. For the degradation of picloram and acid red 17, the TiO$_2$ sample such as Hombikat UV100, a high surface anatase catalyst, seems to be the best photocatalyst as compared with other TiO$_2$ powders.

Our results suggest that the organic pollutant such as picloram, dicamba, floumeturon, dichlorvos, acephate, 2,4-dichlororbenzoic acid and acid red 17 can be degraded rapidly at lower pH while dimethyl terephthalate was found to degrade faster at pH 4.5, on the other hand acid orange 10 and acid yellow 36 were found to degrade faster under alkaline pH range.

Our results also suggest that the addition of electron acceptors such as bromate ions and hydrogen peroxide can enhance the decomposition and mineralization of different model system studied.
The observations of these investigations clearly demonstrate the importance of choosing the optimum degradation parameters to obtain high degradation rate, which is essential for any practical application of photocatalytic oxidation processes. The best degradation condition depends strongly on the specific kind of pollutant. The intermediate products formed during the process could also be responsible for the slow mineralization of the model pollutant. Identification of intermediate products formed during the photooxidation process using GC/MS analysis technique were useful source of information for the degradation pathways.