CONCLUSION

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

It is obvious from these studies that photocatalytic properties of different TiO$_2$ powders differ considerably for the degradation of different systems. The photocatalyst, Degussa P25 was found to be more efficient for the degradation of all compounds studied in this thesis except for the dye derivative Phloxine B. For the decolorization of dye derivative Phloxine B, the TiO$_2$ sample such as Hombikat UV100, a high surface anatase catalyst, was found to be better as compared with other TiO$_2$ powders. The addition of electron acceptors were found to enhance the degradation rate/decolorization rate except in case of Dye derivatives Phloxine B and Reactive Blue 160 low concentration of H$_2$O$_2$ had a negative effect on the decolorization which is opposite of the trend for UV/H$_2$O$_2$/TiO$_2$ process. The degradation/decolorization rate of the organic pollutants studied in this thesis was found to be most efficient in acidic medium than in alkaline solution.

The photo decolorization kinetics of the three dye derivatives studies in this thesis was discussed in terms of Langmuir-Hinshelwood kinetic model. The adsorption of all three dye derivatives on TiO$_2$ was found favorable by the Langmuir approach. The values of adsorption constant on TiO$_2$ for all three dyes determined during photocatalytic experiment were found to be smaller than that measured in the dark which is a rarely reported situation in photocatalytic studies.
The observations of these investigations clearly demonstrate the importance of choosing the optimum degradation parameters to obtain a high degradation rate, which is essential for any practical application of photocatalytic oxidation process. The best degradation condition depends strongly on the specific kind of pollutant. The mineralization rate has been found to be slower than the degradation rate due to the formation of intermediate products formed during the degradation process.

Phototransformation of pesticides is a key factor in their environmental behavior. Each of the twelve pesticide derivatives examined in this study under photocatalytic degradation, and detailed mechanisms of photocatalytic transformation were established by identification of intermediate products. The GC-MS technique was effective for the detection and identification of the formed degradation products. The photocatalytic degradation of pesticides of different chemical structures exhibited markedly different degradation mechanism. The major routes for the degradation of pesticide derivatives were found to be: (a) Dealkylation, dehalogation, decarboxylation, denitration, if present (b) Hydroxylation (c) Oxidation of side chain, if present (d) Isomerization and cyclization (e) Cleavage of alkoxy, amide, alkoxy and ester bonds (f) Reduction of triple bond to double bond and nitro and amino was also observed.
LIST OF RESEARCH PUBLICATIONS


ABSTRACTS IN CONFERENCES


2] N.A. Mir, M. M. Haque and M. Muneer, Photocatalysed degradation of a pesticide derivative Thiamethoxam in aqueous suspension of semiconductor, National Symposium on Recent Trends in Chemical Sciences, Department of Chemistry, Aligarh Muslim University, Aligarh, February, 24-25 (2010)


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