Heterogeneous photocatalytic degradation of organic contaminants over titanium dioxide: A review of fundamentals, progress and problems

Abstract

Even though heterogeneous photocatalysis appeared in many forms, photodegradation of organic pollutants has recently been the most widely investigated. By far, titania has played a much larger role in this scenario compared to other semiconductor photocatalysts due to its cost effectiveness, inert nature and photostability. Extensive literature analysis has shown many possibilities of improving the efficiency of photodecomposition over titania by combining the photoprocess with either physical or chemical operations. The resulting combined processes revealed a flexible line of action for wastewater treatment technologies. The choice of treatment method usually depends upon the composition of the wastewater. However, a lot more is needed from engineering design and modelling for successful application of the laboratory scale techniques to large-scale operation. The present review paper seeks to offer an overview of the dramatic trend in the use of the TiO2 photocatalyst for remediation and decontamination of wastewater, report the recent work done, important achievements and problems.

Keyword: Semiconductor, Titania, Degradation, Photocatalysis, Ecotoxicity