## Application of a semiconductor oxide-based catalyst in heterogeneous wastewater treatment: A green technology approach

## Abstract

The use of chlorine bleaching in study and pulp industry has resulted in chlorinated phenol contaminated wastewater from that industry. A new wastewater treatment process, sonophotodegradation of 2,4,6-trichlorophenol (TCP) in a heterogeneous aqueous system was investigated and reported in this study. TCP was degraded with ultrasonic or ultraviolet irradiation or a combination of both, in the presence of titanium dioxide semiconductor catalyst (anatase and/or rutile), in order to study the effectiveness of sonocatalysis, photocatalysis and sonophotocatalysis oxidation in a batch sonophotoreactor system. Preliminary studies presented in this study suggested that rutile worked well under sonocatalysis, anatase was the preference for photocatalysis and sonophotocatalysis oxidation of TCP demonstrated a degradation that was higher than sonocatalysis or photocatalysis individually while the first-order kinetics rate constants indicated that sonophotocatalysis degradation of TCP was synergistic with a positive value of 0.0203 in the presence of the mixture catalyst.