Photodegradation of Water Organic Contaminates Under Solar Simulator Light

Ahed H. Zyoud, Nidal Zater, Iyad Saadeddin, Moath Helal, Ghazi Noor and Hikmat S. Hilal
SSERL, Department of Chemistry, Najah N. University, Nablus, West Bank, Palestine,
ahedzyoud@yahoo.com

Abstract

Surfaces of Rutile TiO$_2$ particles have been modified with CdS nano-particles. The TiO$_2$/CdS system has been used as catalyst in water purification by photo-degrading organic contaminants such as methyl orange (a commonly encountered contaminant dye) and phenazopyridine (a medically active compound). Both UV and visible regions have been investigated. CdS sensitization of TiO$_2$ to visible region has been observed, as the TiO$_2$/CdS system showed higher catalytic efficiency than the naked TiO$_2$ system in the visible region. However, the TiO$_2$/CdS system was unstable under neutral, acidic conditions and basic conditions. Leaching out of CdS into hazardous aqueous Cd$^{2+}$ ions occurred. This imposes limitations on future usage of CdS-sensitized TiO$_2$ photo-catalytic systems in water purification processes. In basic media, leaching out was less pronounced than in acidic media.

Alternative natural dye (anthocyanin) was used as a sensitizer for the rutile TiO$_2$ system. The TiO$_2$/anthocyanin catalyst was used in photo-degradation of MO and PhPY. Higher efficiency was noted when using AC/TiO$_2$/Anthocyanin at low pH in photo-degradation of MO.

ZnO-based catalyst systems, both naked and AC/ZnO were also examined. The ZnO systems were highly efficient in degrading contaminants, reaching complete removal in reasonable time, with AC/ZnO having a higher edge.

Effects of catalyst concentration, catalyst recovery, contaminant concentration, temperature and pH, on catalyst efficiency, have also been studied. Results and discussions will be presented.

Key words: TiO$_2$, ZnO, anthocyanin, photodegradation, solar light
References:


5- **Ahed H. Zyoud** and Hikmat S. Hilal, Natural dyes sensitizing TiO2 for Photo-degradation of Methyl Orange in visible light, accepted at Solid State Sciences Journal