Comparative study on photocatalytic degradation of monoazo dye acid orange 7 and methyl orange under solar light irradiation

Abstract

The objective of this study was to investigate and compare the kinetic photocatalyticdegradation of mono azo dyes Acid Orange 7 (AO7) and Methyl Orange (MO) under solar light irradiation with titanium dioxide (TiO_2) as a photocatalyst. Several operational parameters affecting the photocatalytic degradation of dye were evaluated such as different azo dyes, initial dye concentration, TiO_2 dosage, with and without aeration and sunlight irradiation. The data obtained was well fitted with the Langmuir- Hinshelwood kinetic model. It was observed that the pseudo-first-order rate constants for AO7 were higher than MO in all cases, indicating that the photocatalytic degradation of AO7 was easier and more rapid than MO. The analysis of chemical oxygen demand and UV-Vis spectra shows the AO7 and MO not only being decolorized due to the breakdown of azo bond but also being mineralized if the azo dye solutions were continually exposed to solar light irradiation after the decolorization process.