Photoactive hybrid film photocatalyst of polyethersulfone-ZnO for the degradation of methyl orange dye: kinetic study and operational parameters

ABSTRACT

A facile and effective technique to immobilize photocatalyst nanoparticles by incorporating zinc oxide (ZnO) into polyethersulfone polymeric films by means of a phase inversion technique is reported. The degradation study of methyl orange (MO) dye was performed using a series of ZnO-embedded polymer hybrid systems. The photoactivity of the films increased in parallel with increased ZnO loading up to 17 wt%. The photodegradation process followed a pseudo first-order kinetics with an achievement of almost 100% MO removal in original conditions. The PZ-17 film demonstrated an excellent and comparable degradation performance up to five cycles, signifying the reliability of the film photocatalyst against ultraviolet irradiation and degradation.

Keyword: Zinc oxide; Polyethersulfone; Phase inversion; Film photocatalyst; Methyl orange