

Enhanced photodegradation of o-cresol in aqueous Mn(1%)-doped ZnO suspensions

ABSTRACT

The effective removal of o-cresol is currently both an environmental and economic challenge. ZnO is not only an efficient photocatalyst but is also cost effective, as its photoabsorption can extend from the ultraviolet (UV) to the visible range thereby allowing the use of inexpensive visible light sources, such as sunlight. The principal objective of the present work is to investigate the visible light-driven removal of o-cresol from aqueous solution in the presence of 1.0 wt% Mn-doped ZnO. To measure the efficiency of photodegradation, the variables studied included the amount of photocatalyst, concentration of o-cresol, pH and irradiation time. The concentration of o-cresol and residual organic carbon was monitored using a UV-visible spectrophotometer, ultra high-pressure liquid chromatography and a total organic carbon analyser. The optimum conditions under which the photodegradation of o-cresol was most favourable corresponded to 1.5 g/l ZnO, 35 ppm o-cresol and pH 9. The ZnO-1wt%Mn photoprocess has demonstrated reusability for more than three times, which warrants its scale-up from laboratory- to industrial-scale application.

Keyword: photodegradation, doped ZnO, mineralization, visible