DECONTAMINATION OF PESTICIDE RESIDUES IN WATER SAMPLES USING COPPER AND ZINC CO-DOPED TITANIA NANOCATALYST

Tentu Nageswara Rao1*, Pulapalli Babji2, Botsa Parvatamma3, Tentu Manohra Naidu4

1School of Materials Science and Engineering, Changwon National University, Changwon, Gyeongnam, 641-773, Republic of Korea
2Department of Physical, Nuclear Chemistry & Chemical Oceanography, School of Chemistry, Andhra University, Visakhapatnam Andhra Pradesh, India
3Department of organic Chemistry, Gayathri P.G Courses, Gotlam, Vizianagaram, AP, India
4Department of nuclear physics, Andhra University, Visakhapatnam, Andhra Pradesh, India

Abstract

Copper and Zinc co-doped titania nano photocatalyst (Cu-Zn-TiO2 NPC) was fabricated and characterized using room temperature X-ray diffraction (XRD), field emission electron microscopy (FESEM) with high-resolution transmission electron microscopy (HRTEM) and energy dispersion X-ray (EDX). X-ray diffraction studies of the Cu2+-Zn2+/TiO2 show the presence of anatase phase TiO2 and in the sample prepared from 0.05, 0.10, 0.15 and 0.20 mmol have also shown the presence of anatase phase only. The photocatalytic efficiency of the synthesized catalysts was investigated by the photocatalytic degradation of aqueous bispyribac sodium under sun light irradiation, and it was found that the Cu and Zn co-doped TiO2 catalysts has better photocatalytic activity. It can be also showed that with the addition of dopants to titania hinders the growth of nanoparticles. This can be attributed of the fact that there is a more efficient electron-hole creation in Cu and Zn co-doped TiO2 in sunlight, contrary to un-doped TiO2 which can be excited only in UV irradiation. Photocatalytic studies of bispyribac sodium at various conditions such as acidic, basic and neutral reveals that the activity is enormously increased with co-doped TiO2 is proved to be effective for photocatalysis of bispyribac sodium and is more effective in basic medium.

Keywords: bispyribac sodium, Cu-Zn-TiO2 NPC, DT 50, FTIR, photocatalytic activity, XRD

Received: June, 2019; Revised final: October, 2019; Accepted: November, 2019; Published in final edited form: May, 2020

* Author to whom all correspondence should be addressed: e-mail: tnraochemistry@gmail.com