

Synthesis of dichlorprop-Zn/Al-hydrotalcite nanohybrid and its controlled release property

ABSTRACT

New phase-pure nanohybrids of dichlorprop[2(2,4-dichlorophenoxy)propionate]-intercalated Zn/Al-LDH were successfully prepared using either co-precipitation or ion exchange methods. The basal spacing expansion from 8.9 Å in the layered double hydroxide (LDH) to 18.7 and 21.7 Å of the nanohybrids was observed. This together with FTIR, DTG/TGA and compositional studies show that dichlorprop was successfully intercalated into the Zn/Al-layered double hydroxides interlayer. Release study of dichlorprop showed that it is dependent on the concentration of the incoming ionic species and governed by the pseudo-second order kinetic. This study suggests that the layered double hydroxide might be used as a matrix for controlled release formulation for a herbicide, dichlorprop and the release of the herbicide can be tuned using parameters such as method of synthesis and the concentration of the incoming ionic species to be ion exchange with. This is towards new generation of agrochemicals which are safer as well as user- and environmentally-friendly.

Keyword: Dichlorprop; Layered double hydroxide; Nanohybrids; Pseudo-second order kinetic