

Formation of zinc aluminium layered double hydroxides: 4-(2,4-dichlorophenoxy) butyrate nanocomposites by direct and indirect methods

ABSTRACT

4-(2,4-dichlorophenoxy) butyric acid (DPBA) was intercalated between the interlamellae of Zn/Al layered double hydroxides (LDHs). Two methods of intercalation were adopted, (a) direct synthesis by co-precipitation of metal nitrates and DPBA and (b) ion exchange of LDH nitrate with the organic anion. The resulting materials were characterized by x-ray diffraction and infrared spectroscopy. Both methods afford well ordered nanocomposite materials at the same pH and ratio but at different concentrations. The x-ray diffraction patterns showed that the interlayer spacing distances increased from 8.9 Å to 28.7 Å and 29.4 Å for DPBA-LDH synthesized by ion exchange method and by direct method, respectively. The optimum conditions were obtained at DPBA concentration of 0.2 M by direct co-precipitation method compared to 0.025 M by ion exchange method.

Keyword: 4-(2,4-dichlorophenoxy)butyric acid; Layered double hydroxides; Co-precipitation; Ion exchange; Nanocomposite