

The effect of pH on the formation of host-guest type material: zinc-aluminium-layered double hydroxide-4-chlorophenoxy acetate nanocomposite

ABSTRACT

Layered organic-inorganic hybrid nanocomposite material containing 4-chlorophenoxy acetate (4-CPA) in an inorganic interlayer was prepared using 4-CPA as guest anion in Zn-Al layered double hydroxide inorganic host by direct precipitation method at various pHs. A well-ordered nanolayered organic-inorganic hybrid nanocomposite, with the expansion of the basal spacing from 8.9 Å in the layered double hydroxide to 19.5-20.1 Å were obtained. The nanocomposites show that they are of mesoporous-type with the percentage of 4-CPA intercalated of around 35-39% (w/w) and the Zn to Al molar ratio of 3.5-4.0. Generally, as the pH of the mother liquor increased, the Zn to Al molar ratio in the resulting nanocomposites is also increased, but the percentage of 4-CPA intercalated and the BET surface area, decreased. This shows that the pH of the mother liquor plays an important role in determining the resulting physicochemical properties of the synthesized materials.

Keyword: Layered organic-inorganic, 4-chlorophenoxy acetate (4-CPA)