

Synthesis and characterization of hippurate-layered double hydroxide nanohybrid and investigation of its release property

ABSTRACT

The anion of hippuric acid, hippurate (A⁻), as an organic guest was intercalated into the interlayers of anionic clay, Zn/Al hydrotalcite-like or layered double hydroxides (LDH) host by direct co-precipitation method from aqueous solution for the formation of new nanohybrid compounds, Zn/Al-hippurate nanohybrids (ZAHs). Various Zn/Al molar ratios (R) = 3-5 and concentrations of HA (0.06-0.15 M) were used for the synthesis. ZAHs synthesized, using 0.15 M HA, was found to give wellordered layered nanohybrid materials with an increase of the basal spacing to 19.6-21.0 Å compared to 8.8-9.0 Å in the LDHs. The increase in the basal spacing is due to the insertion of A⁻ organic moiety into the LDH interlayers. Formation of the host-guest type of material was confirmed by XRD, FTIR, TGA/DTG and compositional analysis. The release of the intercalated guest was found to be tunable in a controlled manner by Zn/Al molar ratio and is governed by pseudo-second order kinetics. Thus, by varying the experimental conditions, the release property of the guest anion can be tailored as required.

Keyword: Anionic clay; Hippuric acid; Intercalation; Layered double hydroxides; Hydrotalcite; Nanohybrid