Incorporation and Drug Delivery of Sodium Indomethacin into Nanoclays

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Layered double hydroxides (LDH) nanoclays have many applications as matrices in pharmaceutical fields as support for controlled release systems of drugs, vitamins, biomolecules, etc. γ-Indomethacin is a nonsteroidal anti-inflammatory drug (NSAID) used to reduce pain involved in osteoarthritis, rheumatoid arthritis, bursitis, gout, etc.
This work reported studies of intercalation and release of nanoclay MgAl LDH-type material containing the anionic form of indomethacin in the interlayer region, starting from sodium indomethacin (IndoNa). Sodium Indomethacin hydrate was obtained by co-precipitation of Na_2CO_3 and the polymorph of indomethacin was observed. Intercalated compound was prepared via ion exchange, with different incorporation time. The host laminar solid was prepared by coprecipitation of Mg-Al salts at pH 10±0.2; on N_2 atmosphere [1], and different aging time. By X-ray diffraction was observed the drug incorporation into nanoclay. The basal spacing obtained suggests that the drugs molecules are arranged in partially interdigitated bilayers and multiple arrangements were observed. The amount of intercalated IndoNa was determined by UV-visible spectroscopy. The host with less aging and ion exchange time presented a greater incorporation. Drug release studies were performed at 37.0±0.5 °C in dissolution media simulated, intestinal fluids at pH 7.4±0.05. The maximum release was 72 % for LDH-S, but none guest solid does not release more than 85% due to the strong interaction with the brucite layer. LHD-L has a longer aging and better layer structure resulting in reduced incorporation. This behavior determines the release time. This work provides significant in-sight into the important area of storage, transport, and delivering of anionic drug over time using MgAl-LDH as a drug delivery.

Keywords: nanoclay, sodium indomethacin, drug delivery.

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LDH-IndoNa	Host Aging time [min]	Ion exchange time	Incorporated [%] ± D.S.	Max. Release [%]	$t_{50\%}$ [min]	$t_{85\%}$ [min]
S	30	40 h.	27 ± 4	72 ± 3	180	---
L	240	72 h.	14 ± 4	71± 1	210	---