

**The effect of single, binary and ternary anions of chloride, carbonate and phosphate on the release of 2,4-dichlorophenoxyacetate intercalated into the Zn-Al-layered double hydroxide nanohybrid**

ABSTRACT

Intercalation of beneficial anion into inorganic host has lead to an opportunity to synthesize various combinations of new organic–inorganic nanohybrids with various potential applications; especially, for the controlled release formulation and storage purposes. Investigation on the release behavior of 2,4-dichlorophenoxyacetate (2,4-D)intercalated into the interlayer of Zn–Al-layered double hydroxide (ZAN) have been carried out using single, binary and ternary aqueous systems of chloride, carbonate and phosphate. The release behavior of the active agent 2,4-D from its double-layered hydroxide nanohybrid ZANDI was found to be of controlled manner governed by pseudosecond order kinetics. It was found that carbonate medium yielded the highest accumulated release of 2,4-D, while phosphate in combination with carbonate and/or nitrate speeds up the release rate of 2,4-D. These results indicate that it is possible to design and develop new delivery system of latex stimulant compound with controlled release property based on 2,4-D that is known as a substance to increase latex production of rubber tree, *Hevea brasiliensis*.

**Keyword:** Layered double hydroxide, 2,4-Dichlorophenoxyacetic acid, Pseudo-second order kinetics, Intercalation, Controlled release