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CAPRYLATE INTERCALATED LAYERED DOUBLE HYDROXIDE AS ADSORBENT OF PESTICIDES FROM AQUEOUS SOLUTION

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Layered double hydroxides (LDHs) are anionic clays with high anion exchange capacities which could act as adsorbents for removal of anionic pollutants from waters. The replacement of original inorganic interlayer anions with organic species yields modified organo-LDHs with hydrophobic surface properties, which have higher affinity for the adsorption of low polar and non ionic contaminants. This study was carried out to elucidate the synthesis of organo-layer double hydroxide and its capacity to adsorb the widely applied pesticides Linuron, 2,4-DB and Metamitron from waters.

The adsorbent (LDH-Cap) was synthesized by incorporating organic anion caprylate into magnesium aluminum layered double hydroxide with chloride as interlayer anion (LDH-Cl) via ion exchange.

Characterization of the LDH-Cap adsorbent was carried out using powder X-ray diffraction (PXRD), infrared spectroscopy (FT-IR) and thermic analyses (TG and DTA). PXRD patterns indicate that caprylate anion was successfully intercalated in LDH according to the basal spacing $d_{003}=19.3$ Å. Adsorption results indicated that these three pesticides could be adsorbed on LDH-Cap. The amounts of pesticides removed were reveal was a rapid process that reached quasi-equilibrium within 30 min while it was more gradual for Metamitron. PXRD results suggest that adsorbed 2,4-DB and Metamitron were intercalated in the LDH interlayers probably forming monolayers between caprylate chains and the brucite layers. Linuron was probably adsorbed on the external particles surface of LDH. Adsorption kinetic study revealed that the adsorption process followed pseudo-second-order equation. Adsorption data were well fitted to the Freundlich isotherm. Adsorbed pesticides could be desorbed partially, with the release rate dependent upon the dissolvent used.

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