



## Entrapment of Mg-Al layered double hydroxide in calcium alginate beads for phosphate removal from aqueous solution

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### ABSTRACT

Mg-Al layered double hydroxide was entrapped in calcium alginate beads (LDH-alginate beads) for phosphate removal. A field emission scanning electron microscope (FESEM), combined with an energy dispersive X-ray spectrometer and an X-ray diffractometer, were used to analyze the properties of LDH-alginate beads. Batch and flow-through column experiments were performed to examine phosphate removal in LDH-alginate beads. FESEM images show that the cross-sectional surface of LDH-alginate beads was heterogeneous in surface topography, and LDH powders were intermingled with alginate polymers. Experimental results indicate that Mg-Al LDH-alginate beads are effective in the removal of phosphate. Batch experiments indicate that phosphate removal in 8% LDH-alginate beads was not sensitive to initial solution pHs between 4.9 and 8.9. Kinetic experiments demonstrate that phosphate removal reached equilibrium around 12 h of reaction time. Column experiments show that the removal capacity of 8% LDH-alginate beads was two orders of magnitude greater than that of pure alginate beads.

**Keywords:** Layered double hydroxides; Calcium alginate beads; Phosphate removal; Sorption; Batch experiment; Column experiment

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