

Singapore Stanford Partnership Programme

MS Project MS08-18

Layered Double Hydroxide as a Mineral Ion Exchanger for Anions Removal in Water Treatment

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Layered double hydroxides (LDHs) are lamellar mixed hydroxides containing positively-charged main layers and undergoing anion exchange chemistry. In recent years, many studies have been devoted to investigating the ability of LDHs to remove harmful oxyanions such as arsenate, chromate, phosphate, etc. from contaminated waters by both surface adsorption and anion exchange of the oxyanions for interlayer anions in the LDHs structure. In this project, the objective is to evaluate its ability to remove bromide and iodide, which are precursors to formation of toxic disinfection by-products (DBPs) during ozonation, such as bromate, iodate, and halogenated organics. Bromide and iodide are found at elevated levels in seawater than in fresh water, and thus the formation of harmful DBPs is a major concern to water utilities supplying water through desalination of seawater or coastal reservoir water. The scope of work in this project is to (1) critically review the related articles on fluoride, bromide and iodide removal in water treatment, (2) to synthesize a new breed of LDH that could probably outperform the commercial ones, and (3) to conduct simple experiment to evaluate the adsorption of bromide and iodide by the LDH. This is an ongoing project currently undertaken by a PhD student, who will provide support and guidance on tasks (2) and (3). Thus far, a nano-LDH which has been successfully synthesized has the following features: large surface area, high anion exchange capacity, high pore volume, and good thermal stability. The structure of a typical LDH can be found in many websites, such as:

<http://www.ntu.edu.sg/home/cttlim/>

<http://users.ox.ac.uk/~dohgroup/ldh2.jpg>

http://www.funmat.uio.no/Uorganisk/research_topics/layered_c.html

http://www.nims.go.jp/opal/ii/iyihomepage_003.htm

