

Application of layered double hydroxides for water purification

Frederick Theiss¹, Sara J. Palmer¹, Godwin A. Ayoko¹ and Ray L. Frost^{1*}

¹Chemistry Discipline, Faculty of Science and Technology, Queensland University of Technology, Brisbane, Australia. [*r.frost@qut.edu.au](mailto:r.frost@qut.edu.au)

Layered double hydroxides (LDHs), also known as hydrotalcite or anionic clays have received increasing attention in recent years due to their wide range of applications as anion exchangers, adsorbents, ionic conductors, catalyst precursors and catalyst supports (Mitchell and Wass, 2002; Miyata, 1983; Scavetta et al., 2005). The presence of selenite or selenate in potable water is a health hazard especially when consumed over a long period of time. Therefore, this investigation reports on the application of thermally activated layered double hydroxides in the removal of selenite from water. X-ray diffraction (XRD) and Raman spectroscopy techniques have been used to monitor the effectiveness of thermally activated LDHs and have shown the incorporation of the selenite anion into the hydrotalcite interlayer as a counter anion. Selenite solutions were treated with thermally activated Mg/Al hydrotalcites at different times from 0.5 to 20 hours. The intercalation of selenite in the Mg/Al hydrotalcite occurs quickly and most is adsorbed in the first 30 minutes. The increase in d(003) spacing (XRD) (Fig. 1) and the presence of bands between 850 and 800 cm⁻¹ (Raman spectra) confirms the intercalation of the selenite anion. Thermally activated hydrotalcites has been shown to be a promising mechanism for the removal of selenite anions from aqueous solutions.

References

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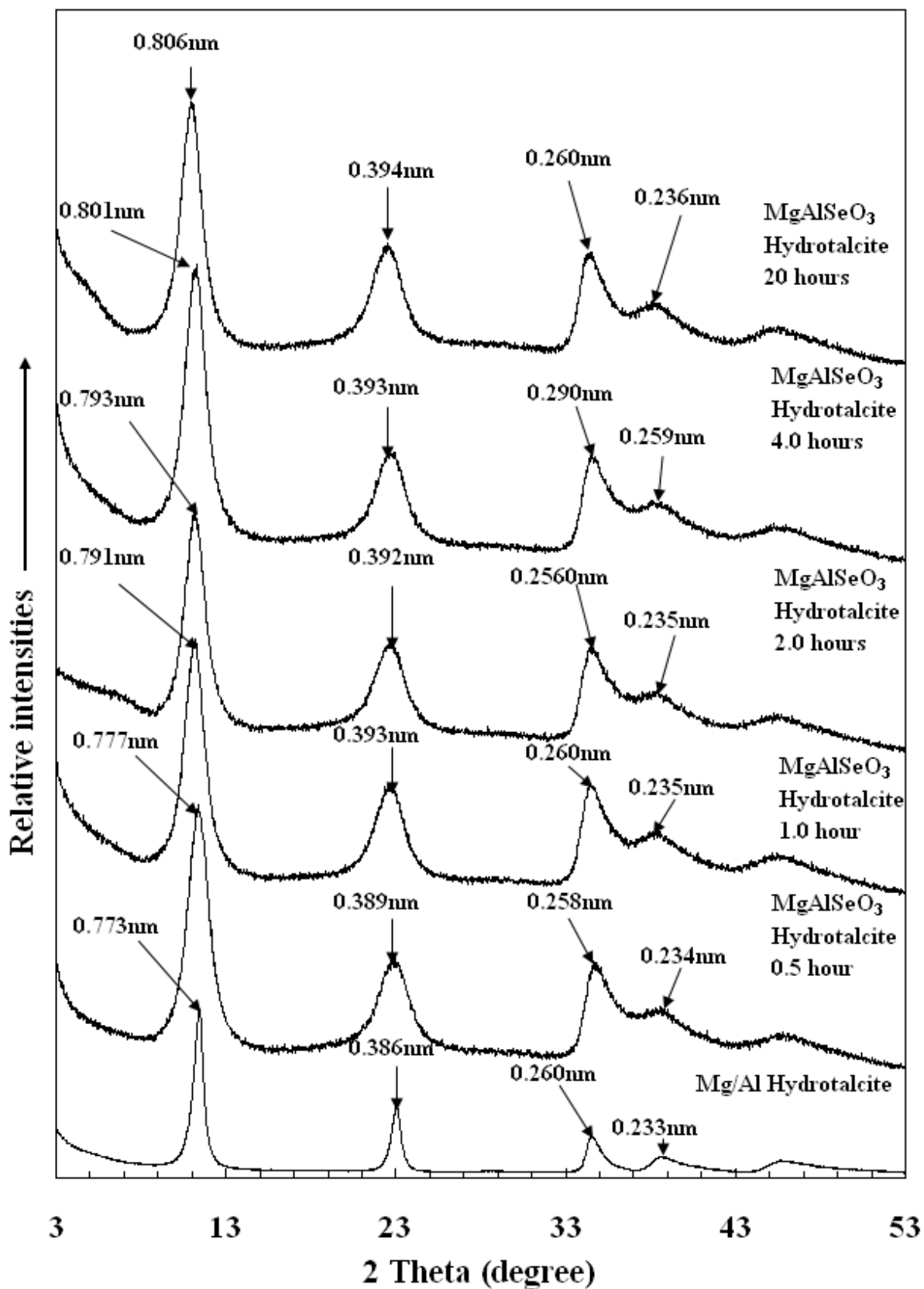


Fig. 1. X-ray diffraction patterns of Mg/Al hydrotalcite and hydrotalcites exposed to selenite solutions from 0.5 to 20 hours.