

Silica adsorption and post adsorption properties of NO₃-hydrotalcite

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The anionic exchange capacity of hydrotalcite (HT: Mg₆Al₂(OH)₁₆CO₃·mH₂O) has been applied in various fields. In this study, dissolved silica sorption onto HT has been investigated due to the reported occurrence of a silica-bearing HT in a natural alkaline spring. Nitrate-type HT (HT-NO₃) has been synthesized in the laboratory under a N₂ atmosphere. Silica sorption experiments were also conducted under a N₂ atmosphere. These were done to prevent CO₂ which has a high affinity towards HT from competing with the dissolved silica. Presence or absence of carbonate in the synthesized HT-NO₃ was confirmed by thermal analysis and infrared spectroscopy. The concentration of dissolved silica taken up by HT-NO₃ is derived from the dissolved silica left in the solution as determined by visible-ultraviolet spectroscopy and ICP-MS. Sorption isotherms describe the behavior and affinity of silica towards HT-NO₃. Changes in the HT-NO₃ after the sorption reaction are detected by XRD and IR spectroscopy. Further ageing of the HT-NO₃ after the sorption experiments were also performed at relatively high temperatures.