

SELECTIVE ADSORPTION OF TRACE COMPONENTS IN SEAWATER WITH SYNTHETIC INORGANIC ION EXCHANGERS

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Summary

The pH titration curves of monoclinic antimonite acid (M-SbA) showed apparently monobasic acid for the systems of alkali metal ions/H⁺. The uptake order of the metal ions was K⁺ < Rb⁺ < Cs⁺ < Na⁺ < Li⁺ throughout the pH range studied. The low uptakes of K⁺, Rb⁺, Na⁺, and Cs⁺ at high pH might be due to steric or ion sieve effects for large unhydrated cations on M-SbA. Thermodynamic data were derived for Li⁺/H⁺ exchange on M-SbA from pH titration curve.

M-SbA shows high ion-exchange capacity and selectivity for lithium ions. NMR and X-ray studies were carried out for lithium-exchanged M-SbA with different lithium ion uptakes. The results indicated that the lithium positions exchanged were located at regular octahedral to those having 3-fold symmetry with increasing lithium uptake. Two possible positions for the 3-fold symmetry are thought of: one is the tetrahedral hole of oxygen and the other is a distorted octahedral hole. The structural invariance of M-SbA during the ion-exchange process and the small size of the ion-exchange position were found to account for the high selectivity of the lithium ions.