Cation-Exchange Reactions of Siliceous and Aluminous Phillipsites

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Abstract: Exchange isotherms for the pairs Na-K and Na-Ca were measured by use of 0.1 N solutions at 5 ° , 35 ° , and 70 ° C in phillipsite from Tecopa, California (3.63 Al/32 oxygen unit cell), and Oki Islands, Shimane Prefecture, Japan (6.31 Al/32 oxygen unit cell). All isotherms except those for Na-Ca at 5 ° C were reversible. Free energy was evaluated for all reversible exchanges. The thermodynamic affinity sequences were K > Na > Ca in both phillipsites. The selectivity for K in competition with Na and that for Na competing with Ca became larger at the lower temperatures. The siliceous phillipsite preferred the larger cation more strongly for the Na-K system, and Na more strongly for the Na-Ca system than the aluminous phillipsite.

Key Words: Cation exchange • Cation selectivity • Chemical composition • Phillipsite • Zeolite

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