The Al Pillaring of Clays. Part II. Pillaring with $[Al_{13}O_4(OH)_{24}(H_2O)_{12}]^{7+}$

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Abstract: Hectorite and saponite are exchanged with $[Al_{13}O_4(OH)_{24}(H_2O)_{12}]^{7+}$ and the amount of Al^{3+} adsorbed and Na^+ released are followed as a function of the exchange conditions. On saponite the reaction is a pure ion exchange with $2-2.15$ mmol Al^{3+}/g adsorbed and release of 0.80 mmol Na^+/g. On hectorite the ion exchange is accompanied by supplementary hydrolysis-polymerization of Al_{13}. When excess Al is offered in the form of Al_{13}, ion exchange is incomplete and is accompanied by precipitation and polymerization of Al_{13} on the surface of both hectorite and saponite. The typical spacing of 1.8 nm is developed after washing, when at least $1.3-1.4$ mmol Al^{3+}/g is adsorbed. Above a loading of $2.2-2.5$ mmol/g the 1.8 nm spacing is obtained without washing. Only pillared saponite with a loading of at least 1.9 mmol Al^{3+}/g is thermally stable up to 550 ° C.

Key Wards: Aluminium • Hectorite • Keggin ion • Pillaring • Saponite

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