

Spectroscopic Study of Hectorite Dissolution in HCl

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Abstract – The dissolution of < 2 μm fraction of hectorite in 0.25-1.0 M HCl at 20 °C was characterised using quantitative chemical analysis, ²⁹Si MAS NMR, and IR spectroscopies. The rate of dissolution increased with acid concentration. Li was dissolved slightly faster than Mg in 0.25 M HCl, revealing that protons preferentially attacked Li octahedra. Analysis of ²⁹Si MAS NMR relative intensities with dissolution time of HCl concentration provided direct dissolution rate data of tetrahedral Si. The gradual changes of Si–O stretching bands in the IR spectra reflect the extent of dissolution. After acid dissolution, Si was predominantly bound in a three-dimensional framework in Si(OSi)₄ sites, but a substantial part occurred in the Si(OSi)₃OH and Si(OSi)₂(OH)₂ environments. These three sites occurred in a hydrous silica phase.