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# **<sup>39</sup>K Solid-State NMR Studies of Potassium Tecto- and Phyllosilicates: The *In Situ* Detection of Hydratable K<sup>+</sup> in Smectites**

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**Abstract:** We report the first application of <sup>39</sup>K solid-state NMR to the study of tecto- and phyllosilicates. Under high field (11.7 Tesla) and with the application of a spin-echo sequence, informative <sup>39</sup>K spectra can be obtained for several compounds of interest to the geologist and the agronomist. Tectosilicates and phyllosilicates can be distinguished from the uncorrected frequency ( $\delta_{CG}$ ) of the observed NMR peak. A series of montmorillonites submitted to increasing numbers of wetting and drying cycles was studied in order to discriminate between mobile and "fixed" forms of K<sup>+</sup>: when the spectra are run on hydrated samples, two different signals are observed corresponding to K<sup>+</sup> in different hydration states, and NMR data can be correlated with the amount of exchangeable K<sup>+</sup> measured by ion exchange. Thus, it appears that NMR can provide useful information on K fixation complementary to classical chemical methods.

**Key Words:** Potassium • Solid-state NMR • Phyllosilicates • Vermiculite • Montmorillonite (potassium, wetting-drying of)

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