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USE OF NEAR INFRARED CORRELATION SPECTROSCOPY  
FOR QUANTITATION OF SURFACE IRON, ABSORBED WATER  
AND STORED ELECTRONIC ENERGY IN A SUITE OF  
MARS SOIL ANALOG MATERIALS

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A number of questions concerning the surface mineralogy and the history of water on Mars remain unresolved using the Viking analyses and Earth-based telescopic data. Identification and quantitation of iron-bearing clays on Mars would elucidate these outstanding issues. Near infrared correlation analysis, a method typically applied to qualitative and quantitative analysis of individual constituents of multicomponent mixtures, is adapted here to selection of distinctive features of a small, highly homologous series of Fe/Ca-exchanged montmorillonites and several kaolinites. Independently determined measures of surface iron, relative humidity and stored electronic energy were used as "constituent" data for linear regression of the constituent vs. reflectance data throughout the spectral region 0.68-2.5  $\mu\text{m}$ . High correlations were found in appropriate regions for all three constituents, though that with stored energy is still considered tenuous. Quantitation was improved using 1st and 2nd derivative spectra. High resolution data over a broad spectral range would be required to quantitatively identify iron-bearing clays by remotely sensed reflectance.