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Identifying the Constituents of and Transformations in Diatomaceous Earth and Polysiloxane Foams Through the Use of Electron Paramagnetic Resonance Spectroscopy MICHAEL BLAIR, ROSS MUENCHAUSEN, BRYAN BENNETT, JAMES SMITH, THOMAS STEPHENS, WAYNE COOKE, Los Alamos National Laboratory — The chemical aging of polymeric materials is largely governed by the characteristics of the storage environment. For polysiloxane foams, the diatomaceous earth (DE) filler is a small component of the foam, but it plays a large role in the handling of water in the system. The DE filler can act as either a "source" or a "sink" for water via both chemical hydroxylation/ dehydroxylation and physical adsorption/ desorption processes, depending on the processing history and storage conditions. We have used electron paramagnetic resonance (EPR) spectroscopy to examine composite foam material as well as the DE filler alone. Intense, broad (400 Gauss) resonances were recorded at room temperature as a function of the microwave power at X-band frequency. The observed spectra have been assigned to the iron oxide compounds goethite, lepidocrocite, hematite, and magnetite based upon the measured EPR spectra of these minerals. As the presence or absence of free H_2O and the temperature of processing and storage also affects the interconversion of these various iron oxides, we indicate how this process can be followed by monitoring changes in the EPR spectra.

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