

## **Synchrotron Studies of the Structures of Hydrous Phyllosilicates at High Pressures and Temperatures.**

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Hydrous phyllosilicates such as talc and chlorite are important in the Earth for their high water storage capacity and their relative weakness. Synchrotron X-ray diffraction has been used to measure the compressibility of selected samples to pressures of up to 11 GPa and temperatures of up to 500 °C. Experiments were conducted at the Synchrotron Radiation Source (SRS), Daresbury Laboratory, using a diamond-anvil cell or multi-anvil apparatus. Comparisons of axial compressibilities within a single phase, and volume compressibilities between phases, have provided insights into compression mechanisms and high-pressure structures. In the case of one sample, the 10-Å phase, formed from the reaction of talc + H<sub>2</sub>O at high pressures and temperatures, the experiments have also helped to constrain the ambient structure, which is still undetermined.

Complementary to the XRD experiments, infrared spectroscopy has been conducted at high pressures and temperatures on some of the samples using the SRS and diamond-anvil cells. These experiments have provided information about the location and bonding characteristics of the H<sub>2</sub>O in the structures. For example, a positive pressure dependence of the O-H stretching frequency in talc up to 25 GPa indicated little hydrogen bonding in its structure.