

Structural deformation mechanisms of zeolites under pressure

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ABSTRACT

The HP behavior of the natural zeolite yugawaralite and of the synthetic zeolite Na-A was studied by in situ synchrotron X-ray powder diffraction, using a non-penetrating *P*-transmitting medium. The unit-cell parameters of yugawaralite were refined up to the pressure of 10 GPa, at which reductions were found of about 7, 2.4, 7, 1.3, and 15% for *a*, *b*, *c*, β , and *V*, respectively. Contractions of 6.5 and 18.4% were found for *a* and *V*, respectively, for zeolite Na-A in the range 10⁻⁴ to 6.8 GPa. Diffraction patterns collected during decompression show that the effects induced by high pressure on both samples are almost completely reversible. These results are compared with those obtained under similar experimental conditions for other natural zeolites, with the aim of rationalizing the deformation mechanisms of these porous materials and comparing their flexibility under high-pressure and high-temperature conditions.