Accommodation Mechanism of Kr trapped in Terrestrial and Planetary Materials

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The trapping or adsorption of noble gases in minerals has great interest in solving the "missing Xe" problem. We focus on Kr slightly trapped in terrestrial and planetary materials in a *ppb* level. In this study we have examined the solubility and local structures of Kr trapped in (1) minerals such as quartz, olivine, coesite, stishovite, olivine and wadsleyite and (2) synthetic model-samples of carbon fine powder, silica gel and zeolite.

Samples were synthesized in Kr-atmosphere at high pressure and high temperature, by using the Kawai-type high-pressure apparatus. Kr-doped silica gels, and partly MgO, were used as starting materials and sealed in Pt-capsule to prevent Kr-escape under high pressure. Degassing of Kr for all samples were measured as a function of temperature up to 1850°C by the mass spectrometer. The results showed that the degassing of silica gel causes at temperatures between 500°C and 800°C. On the other hand, Kr-doped natural olivine has the degassing, giving two peaks observed at 800°C and 1800°C. It is notable that small amount of Kr still remains in olivine even at 1800°C. XAFS measurements in the fluorescence mode were made to determine the atomic distances between Kr and the neighboring atoms and the local structures around Kr atoms. There are structural differences in the Kr coordination between terrestrial materials and model samples.

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