Water diffusion in forsterite revisited

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Protons influence strongly the diffusion of atomic species in olivine and affect its deformation properties at high temperature [1, 2, 3]. But, even for pure forsterite, the nature of hydrogen defects is still a mater of debate; two main defects have been proposed: one involves metal vacancies in octahedral sites and is linked to OH infrared bands appearing in the range of 3100-3200 cm^{-1} and the other involves silicon vacancies in tetrahedral sites with OH infrared bands around 3600 cm^{-1}. Their mobility depends on the diffusivity of hydrogen atoms and the diffusivity of octahedral and tetrahedral vacancies, respectively. We measured the mobility of these two defects from chemical hydrogen diffusion experiments performed in synthetic forsterite between 800 and 1000°C [4]. We used forsterite single crystals, synthesized by Lemaire *et al.* [5] at different silica activities, containing the two types of OH defects. We compare our results with hydrogen "self-diffusion" data and we discuss their implication in term of transport properties in forsterite.

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Redox condition *in situ* survey around the underground rock cavern

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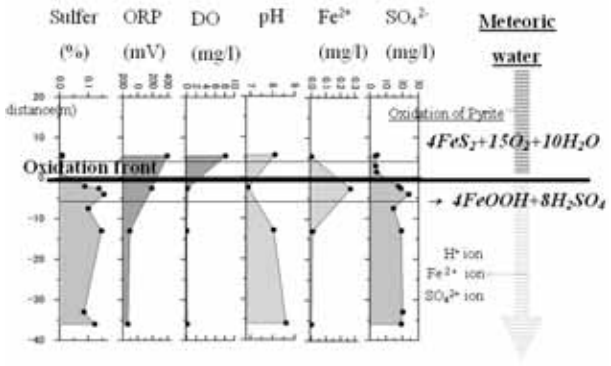
Introduction

The investigation and the evaluation of the redox condition around the underground rock cavern are considered an important item in the safety assessment to the sub-surface geological disposal of the radioactive wastes. In this report, some redox condition *in situ* surveys are carried out around the investigation cavern excavated in the Neogene pyroclastic rocks.

Consequence

The chemical analysis of the rock [1, 2], the chemical analysis of the pore water [3] discharging into a small hole bored by the portable rock drill, and the microbial community analysis [4] around the oxidation front distributing above the cavern are conducted. Pyrite included in rocks is thought to oxidize by the oxygen dissolved in the groundwater infiltrating from the surface.



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