

## Serpentinization and redox in various geologic environments

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In this study, serpentinization and simultaneous redox reactions in various geologic environments are described from a petrologic viewpoint with thermodynamic calculations for minerals and fluids. Serpentinization occurs at where geofluid and ultramafic rock interact. Sites of serpentinization spatially and temporally range and have physical, chemical, and biologic implications for the Earth's process.

Serpentinization in the present seafloor and deeper part of the oceanic plate is an entrance of water to deep mantle via subduction zone. Serpentinite has been found from the Mars surface suggesting that the existence of water and hydrothermal system in the early stage of the Mars history. It is known that the serpentinization of ultramafic rock simultaneously produces hydrogen by reduction of H<sub>2</sub>O during the serpentinization. Hydrogen is one of the key elements to control the metabolism of the ecosystem, therefore the importance of serpentinization in biologic process has also been raised. Forearc mantle wedge is also the site of serpentinization in the present Earth.

Regarding the various site of serpentinization described above, phase diagrams for serpentinite in the model system CaO-MgO-FeO-Al<sub>2</sub>O<sub>3</sub>-SiO<sub>2</sub>-O-H are calculated using internally consistent thermodynamic-dataset for the rock forming minerals and fluid. Using the diagrams, we discuss how the serpentinization and redox reactions depend on temperature, pressure, and bulk composition of the host rock and effect to redox of the geofluids.

Keywords: serpentinite, phase diagram, redox reaction, serpentinization