

## Analysis and Application of Water-Rock-CO<sub>2</sub> Reaction Using Basalt

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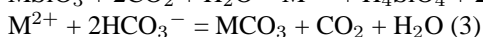
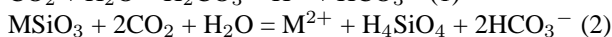
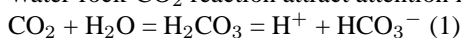
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Carbon dioxide underground sequestration is able to reduce enormous quantities of CO<sub>2</sub> emission. It has been attracted and researched.

But, there are several unclear mechanism of CO<sub>2</sub> behavior in underground. Therefore, it is difficult to estimate exact time for CO<sub>2</sub> storage.

For estimating time of CO<sub>2</sub> sequestration, we consider water-rock-CO<sub>2</sub> reaction.

Water-rock-CO<sub>2</sub> reaction attract attention in many parts of science. It consists of three following reactions:



where M is bivalent metal ion.

There are two steps. First, CO<sub>2</sub> dissolves in the water by (1) or mineral and water react CO<sub>2</sub> by (2). Next, bivalent metal ion and hydrogen carbonate ion generate and carbonate minerals (MCO<sub>3</sub>) precipitate by (3).

If CO<sub>2</sub> is fixed as MCO<sub>3</sub> by (3), it is very safety. But, this reaction mechanism is very complex. And calculation method of dissolution rate constant is not clear. Furthermore, water-rock-CO<sub>2</sub> reaction is useful for estimating ancient CO<sub>2</sub> concentration and considering carbon flux in the global circulation, too.

In this study, the purposes are

- 1)To consider dissolution mechanism in water-rock-CO<sub>2</sub> reaction.
- 2)To compare many calculation method of dissolution rate constant.
- 3)To estimate time of CO<sub>2</sub> storage by precipitation of carbonate minerals.

We used basalt samples for the dissolution experiment. Because,

- 1) It contains metals which can become divalent cation.
- 2) It is widely distributed in the world.
- 3) Oceanic ridge is almost composed of basalt.

The basalt samples were obtained nearby Mt. Fuji.

Keywords: Basalt, Water-Rock Reaction, CO<sub>2</sub> Sequestration