Kinetic study on reaction of olivine with scCO2 by using Mg isotope ratio method

XINTING JI [1],LIANG ZHAO *

[1]School of Earth Sciences and Engineering, Nanjing University, Nanjing, 210093, P .R. China (jxt@smail.nju.edu.cn, correspondence: * zhaoliang@nju.edu.cn)

Capture and storage of carbon dioxide in deep geologic formations is one of the most promising approaches to reduce the influence of CO2 on global warming. CO2 is injected into geological formations, as a supercritical fluid (scCO2) at depths that maintain its supercritical state. In this case, mineral–scCO2 interactions are of prime importance for reservoir permanence. To unravel the interactions in mineral– scCO2 systems at conditions relevant to GCS, olivine was chosen as a model silicate mineral for this study.

A lot of experiments which simulate the reaction of olivine and CO2 have been done to study the reaction of olivine and CO2 ,but few studies focused on scCO2 and for convenience ,in most experiments ,carbonates are not allowed to precipitate because its appearance will make it difficult to calculate the rate of dissolution. That makes us know little about the later period after injection of CO2 into ground,during which the dissolution of olivine and the precipitation of carbonatation happen at the same time .In this case ,we apply a new method called isotope ratio method by which we use Mg isotope to accurately calculate the rate of dissolution and precipitation at the same time and make a further study about factors that affect the reaction of olivine and scCO2. Our experiments show that the dissolution rate of olivine is about 2.7×10^{-13}mol cm^{-2} s^{-1} and the precipitation of carbonate is about 4.1×10^{-16} mol cm^{-2} s^{-1} at 100°C,10MPa P_{CO_2}.What's more ,we also find that although some property of scCO2 is similar to liquid, we didn't detect any sign of migration of Mg from water into scCO2 .