Changes in chemical composition of emitted gas from rock under an uniaxial compression(2)

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1.Introduction

In order to make clear the mechanism of geochemical changes relating to earthquake occurrence, a rock rupture experiment is very important. A pioneering work by Jiang and Li(1981) reported compositions and in amounts of gas emitted from a rock were under stepwise loading.

We have already carried out a continuous loading experiment for detailed discussion on gas emission before and after the rock fracture. As a results release patterns of methane were different between granite and gneiss, and the release amount of methane from the granite depended on the loading rate (Koizumi et al, 2005 fall meeting, Seismol.Soc.Japan). However H2O, possibly originated from other than the sample rock, and unknown species detected. In this study, we have carried the origin of gas species released from the fractured rock of minerals.

2.Experimental

A granite sample from Inada, Japan which was dried naturally in the air was used. A small piece of sample (up to 1.0 g), and placed in a crushing apparatus. This crushing apparatus consist of a stainless tube (15 mm inside diameter,160 mm high) and a piston made of nickel.This piston is lifted upwards and accelerated downwards by an external magnetic field generated by solenoid coils. Rock piece was crushed to fine powder by totally 2000 strokes of this procedure. Evacuated an interior of this crushing apparatus with crushing samples was to 1 Pa. Gas species H2,4He,CH4,H2O,N2,O2,36Ar,40Ar,CO2 emitted from the sample were measured by a quadrupole mass spectrometer (HAL-201, HIDEN, UK), as similar to the previous experiment(Koizumi et al.,2005)

3.Discussion of Data

As a result of the crushing experiment, a small amount of CH4 was detected, which supports the result of the previous uniaxial compression experiments. Furthermore a significant amount of H2O was detected even after preheating (150-180 degree),of crushing apparatus and a rock piece to remove surface absorbed H2O.This suggests that H2O inside rock were released.