Mineralogical characteristics of Asbestos Occurring in Carbonate Rocks in Jecheon, Cungbuk, S. Korea

HAEMIN JUNG[1]*, JUHYUN KIM[2], HYEWON JEONG[3], SUNGJUN YOON[4], HOJU LIM[5] AND YUL ROH[6]

[1]Chonnam National University, Gwangju, S. Korea hm27501268@gmail.com
[2]Chonnam National University, Gwangju, S. Korea fawkes3@hanmail.net
[3]Chonnam National University, Gwangju, S. Korea St1990@hanmail.net
[4]Chonnam National University, Gwangju, S. Korea Sungjunyoon8@naver.com
[5]National Institute of Environmental Research, Incheon, S. Korea limhoju@gmail.com
[5]Chonnam National University, Gwangju, S. Korea rohy@jnu.ac.kr

Naturally occurring asbestos (NOA) occurs in rocks and soils as a result of natural geological processes. NOA in S. Korea has been reported mostly on metamorphic ultramafic-mafic originated rocks. Inspite of wide distribution of carbonate rocks in S. Korea, few researches focused on NOA derived from metamorphic of carbonate rocks. The purpose of this study was to investigate mineralogical characteristics of NOA occurring in carbonate rocks in Jecheon, Chungbuk, S. Korea.

In Jecheon, fibrous minerals mainly occurs in areas where Precambrian carbonate metasedimentary rocks are dominant. 20 rock samples were taken from the hydrothermally altered carbonate rocks using target sampling method. XRD and PLM analyses were used to examine the mineral assemblages and mineralogical characteristics of the rock samples, respectively. SEM/TEM-EDS analyses were used for the morphological and chemical characteristics.

XRD and PLM analyses showed that most rocks from the site contained tremolite and actinolite. Mineral assemblages were dolomite-tremolite-vemiculite-talc-diopside dominant in asbestiform minerals and lime silicate-actinolite-vermiculite-talc-diopside dominant in non-asbestiform minerals. SEM and TEM images of asbestos minerals showed fibrous crystals in a bundle and needle shape in tremolite and prismatic forms in actinolite. EDS analysis indicated that asbestos minerals are composed of Ca, Mg, Fe, Si and O in common. The ratio of Fe/(Mg+Fe) could be differentiated between tremolite (more than 10%) and actinolite (less than 10%).

XRD, PLM, SEM/TEM-EDS analyses suggested that the asbestiform tremolite and non-asbestiform actinolite occurred along the hydrothermally altered metamorphic zones of carbonate rocks. Natural weathering and human activities may disturb the NOA-bearing rock or soil and release mineral fibers into the air, which pose a greater potential for human exposure by inhalation.