Mineral chemistry of scheelite from the Weondong polymetallic deposit

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Scheelite($CaWO_4$) occurs as one of the ore minerals in the two distinctive skarn zones, vein skarn zone (VSZ) and massive skarn zone (MSZ), of the Weondong polymetallic deposit, Korea. On the basis of mineral assemblages determined by using polarized microscope, X-ray diffraction (XRD), scanning electron microscope (SEM) and energy-dispersive X-ray spectroscopy (EDX), VSZ and MSZ can be subdivided into two types, respectively. In VSZ-1 type, scheelite occurs in small fractures of quartz porphyry as a subhedral medium sized(0.8~1mm) in the long dimension with distinct internal zoning, and is associated with quartz, plagioclase, K-feldspar and fluorite. In VSZ-2 type, scheelite occurs in the altered quartz porphyry as a subhedral relatively large sized (0.5~5mm) in the long dimension, and is associated with diopside, garnet, wollastonite, calcite, fluorite, galena, pyrite and molybdenite. In MSZ-1 type, scheelite occurs as a euhedral relatively large sized(1.5~3.5mm) in the long dimension, and is associated with enstatite, diopside, vesuvianite, fluorite and magnetite. In MSZ-2 type, scheelite occurs as a patch-shaped anhedral small sized(0.3~0.8mm) in the long dimension, and is associated with garnet, calcite, wollastonite and vesuvianite.

In this study our goal is to reveal the chemical characterization of scheelites from the different types using SEM-EDX and LA-ICP-MS and to consider how the different types of scheelite can be linked to the geochemical conditions that they formed. The W-Mo substitutions increased in VSZ-1 and MSZ-1 types, indicating scheelite in these types formed at relatively oxidized state. Mineral mapping results using SEM-EDX imaged clear chemical difference of internal zones of scheelite crystal. Chondrite-normalized REE contents steeply decreased from La to Lu, with negative Eu anomalies in VSZ-2 and MSZ-1 types. VSZ-1 scheelites were significantly enriched in middle REEs of 10~100 times those of other scheelites. MSZ-2 scheelites showed unique HREE enriched pattern.

In the further study, we will try to explain the main factors that caused these differences in the mineral chemistry of each type of scheelites and find out the geochemical condition changes of each scheelite's forming process.