

Geological study around Strontian mine considered from zeolite and galena.

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The Strontian mine is located approximately 170 km northwest of Edinburgh in Scotland. The Strontian mine had been produces lead and zinc since the 18th century, and barium in the 20th century. Not only mineral ore but zeolites containing Sr and Ba have been reported(Green et, 2008).

Utada (1995) reports that there is no relationship between host rock and zeolite in the Izu Peninsula, but in recent years Fujita et al.(2016) have closely related host rocks and zeolite as their composition in the Ogasawara Islands. The purpose of this study is to compare the composition of zeolite from the Strontian mine with the host rock and another rocks and to examine the formation and neighboring geologic relationships of zeolite.

This study investigated ore formation centered on zeolite. Zeolite was found at the Strontian mine. They were analyzed using SEM-EDS and XRF, XRD. The zeolite and rocks produced at The Strontian mine were analyzed using SEM-EDS and XRF and XRD. Three types of zeolite produced at the Strontian mine, harmotome, brewsterite, and heulandite-Sr, were confirmed by XRD and SEM-EDS. From the symbiotic relationship of these minerals, the temperature during zeolite formation was estimated at 65-85 °C. Zeolite from the Strontian mine is rich in bivalent cations. Also, they contain a lot of Sr and Ba. The granodiorite around the mine is rich in Sr and Ba. Sr and Ba were the most abundant in plagioclase. Observation of granodiorite with a polarizing microscope and SEM-EDS revealed that Ca and K of plagioclase were replaced and became sericite.

The age of formation of the lead mine was estimated using galena isotopes. The Strontian mine was estimated at 430 Ma, considering a two-stage evolution from 2670 Ma Lewis gneiss. This age was consistent with the age of titanium and zircon granodiorite.

From the analysis results of these zeolite and galena, Pb, Sr and Ba derived from granodiorite formed the Strontian deposit at the Strontian mine by hydrothermal circulation accompanying the intrusion of the 430 Ma Strongian granodiorite. Finally, it is considered that the hydrothermal activity contained in the veins formed zeolite as the temperature of the series of hydrothermal activity circulation decreased.

Keywords: zeolite, Strontian mine, Pb isotope ratio, galena