

A Geochemical study on submarine hydrothermal deposits collected from the Suiyo Seamount of Izu - Bonin arc

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[Introduction]

Hydrothermal activity is a geochemical process where a large quantity of heat and a chemical materials are supplied from interior of the earth into the ocean, which affects on long time scale variation of the ocean chemistry and hence the earth's environmental change. The Suiyo Seamount is one of the active volcanic seamount at the middle of Ogasawara Suiyo Islands, Izu-Bonin Arc, whose hydrothermal activities are extensively studied through Archaean-Park expedition (2000-2002).

In the present study, chronology of hydrothermal ores, chimney and core sediments are studied in the range of modern to 200 years, as well as chemical and mineral composition of the samples.

[Materials and Method]

Ore samples: Chimney samples (SHINKAI2000 Dive #1222, 1223, 1224, 1225), Oct. 2000. Core sample: APSK-03, -04, -07. (July 2001)

Samples are cut into stubs along the growth texture and ground into powder by the agate mortar. Powdered samples are tested for radioactive nuclides, elemental composition and mineral composition by gamma-ray spectroscopy, non-destructive neutron activation analysis and X-ray diffraction analysis. For the age determination for mixed ore deposits of sulfide and barite, selective dissolution methods by 1M-NH₂OH-HCl, and 4N-HNO₃ are employed.

[Results and Discussion]

(1) Uranium-series radioactive nuclides such as Ra-226 (223-743 dpm/g), Pb-210 (202-734 dpm/g), and Th-series Ra-228 (8-105 dpm/g) and Th-228 (2-99 dpm/g) are measured in barite ore. Excess Pb-210 activity relative to parent Ra-226 is measured in sulfide ores.

(2) Major elements are Ba, Fe, Zn, Cu, Al, Ca, and Pb, depending to the type of ores. Sr,As,Ag,Hg,Sb,Mn,Cd,Ga are minor constituents, and trace amount of Au, V, Co, In, La, Sc and Ta are detected.

(3) Barite (BaSO₄), Sphalerite ((Zn,Fe)S), Pyrite (FeS₂), Chalcopyrite (CuFeS₂) are major mineral constituents.

(4) Chronological study show that ore samples at the Suiyo Seamount are formed during present day hydrothermal activity ; Barite(5.6~33.0 years by Pb-210/Ra-226 method, 2.9~8.2 or more years by Th-228/Ra-228 method), Sulfide (37.2~79.6 years by Pb-210/Pb method)

It seems that Fe-Zn sulfide was formed firstly, while barite was formed very recently.