
Mineralogy of Bilemot-Kul Cave in Cheju Island, Korea

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Introduction

Cheju Island is located the southernmost part of Korea, between 126° 10' to 126° 57' east longitude and 33° 12' to 33° 34' north latitude. It is composed mainly of alkali basalt lava flows, minor pyroclastic rocks, hyaloclastics, and numerous parasitic scoria cones of early Pliocene to Quaternary age.

After the 5th International Symposium on Volcanospeleology held in Cheju Island in November 1988, the writers visited Bilemot-kul Cave for an investigation of speleo-minerals.

Bilemot-kul Cave

The entrance of Bilemot-kul Cave opens in Eum 2 Ri, Aewol Eub, Buk Cheju Kun, 33° 24' 01" N, 126° 24' 08" E. This cave is developed in the Sihungri lava (hawaiite) where the lava flowed against a ridge of the Pyosonri lava and stagnated. The narrow entrance barely allows a person to go through but leads to grand halls and an extremely complex cave system with branching and crossing horizontally and vertically. There is even a spiral passage between upper and lower parallel caves. The main cave is 2,917 meters long but the length of the complex branch cave system is 8,832 meters making the total length 11,749 meters.

Mineralogy

The mineralogy of the specimens was determined by X-ray powder diffraction analysis using a Shimadzu Seisakusho Ltd. X-D 3A unit equipped with a copper tube and nickel filter and scanning microscope scrutinies using a JEOL JSM T-20.

The < 2 μm size, suction collected, handpicked specimens were oriented on the glass slides with acetone.

Analytical results for specimens were as follows: Carbonates (calcite, trona), Phosphate (taranakite), Silicates (albite, opal, quartz), and Sulfate (gypsum).

Albite, (Na, Ca)(Si, Al)₄O₈. This mineral may be crystallized under syngenetic conditions.

Calcite, CaCO₃. Calcite speleothems occur as thin white crusts which are sublimates.

Gypsum, CaSO₄ · 2H₂O. This mineral is a common speleo-mineral in volcanic caves, and occurs as white wall coatings which are sublimates.

Opal, SiO₂ · nH₂O. Composed of amorphous silica, opal is a common speleothem (anthodite) in this cave.

Quartz, SiO₂. The mineral quartz is a syngenetic product in high temperature conditions. A 28-centimeter long siliceous pillar was found in this cave.

Taranakite, (K, NH₄)Al₃(PO₄)₃(OH) · 9H₂O. In lava caves, taranakite occurs as a result of reactions between water leached through bat guano and the clayey cave deposits; the phosphorus and ammonium derived from the bat guano and the aluminium from the clay.

Trona, Na₃H(CO₃)₂ · H₂O. The sodium and carbon dioxide gas for the mineral trona are derived from alkali basalt lava flows erupted from deeper (high pressure) igneous activity.

As to the origin of speleo-minerals in Bilemot-kul Cave, there are two main mechanisms: (1) Syngenetic (rock forming) and (2) Epigenetic (biochemical) processes.

References

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