Mineralogy, geochemistry and fluid inclusion study of Anguran deposit, NW Iran

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Anguran Zn-Pb deposit is located within the Urumiah-Dokhtar zone, 120 Km west of Zanjan City (47º 20´ E, 36º 40´ N). Anguran open pit mine is the largest of it's kind in Iran. Geochemistry and mineralogical study reveals that the sphalerite basically lacks elements like Cobalt and Nickel. Hence, this is hypothesized that sphalerite is replaced by smithsonite by alteration and Nickel is present in the matrix of carbonate zone as a trace element in addition to the existence in the structure of smithsonite. Definitely, source of nickel is not related to sphalerite and sulfide ore, and its increment is related to the later alteration of the ore deposit. The data obtained from geothermometric studies and also REE composition of flourite asociated with Zinc-Lead mineralisation at Anguran mine are compatible with a structurally controlled, Sedimentary –hydrothermal origin. Hemogenization and last ice melting temperature of primary fluid inclusion indicate that mineralization taken place over a temperature range 155-165°C and salinities of inclusion fluids range 18.63 to 22.38. Finally According to feild geology, mineralogy, Geochemistry and fluid inclusion study Anguran deposit is like to Irish –Type Zn-Pb deposits.

The petrologic study of Za-To5, Zao Volcano, northeastern Japan arc

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Zao Volcano is located at the central part of the volcanic front of northeastern Japan arc. The volcano has been active since 1Ma. However, the activity has only occurred on Goshikidake and Okama from ca. 30ka. The tephra layers can be divided into 10 units, named Za-To1-10 from older to younger. They include volcanic sand, scoria and agglutinate mainly. There was a long inactive term between Za-To4 and Za-To5 (ca. 16,000 years). Za-To5 eruptions are the largest scale after the term and the eruptive products are different from those of the other tephras in the petrologic characteristics. In this study, we represent geologic and petrologic features, and discuss magma feeding system of Za-To5.

In the representative outcrop at ca. 1.5km east from the vents, Za-To5 includes alternation of beds of dark gray volcanic sand and scoria (ca. 30cm), dark gray scoria (ca. 45cm), dark gray scoria which is held by two thin volcanic sand layers (ca. 12cm), and red scoria (ca. 30cm) in the ascending order. The scoriae are andesite and contain phenocrysts of plg, opx, cpx, olv and mt. Plg phenocrysts occasionally show dusty zoning as well as oscillatory zoning. Opx phenocrysts include euhedral (Mg-v=60-64) and anhedral (Mg-v=76-80) crystals. The euhedral crystal sometimes has a reaction rim of cpx, and also has characteristic reaction rim of opx (Mg-v=76-78). Cpx phenocrysts are homogeneous (Mg-v=66-68), sometimes shows reverse zoning in the rim. Olv phenocrysts have two peaks of composition in the cores (Mg-v=84, 78). However, the both in the rims show lower Mg value (Mg-v=78). Bulk silica content of the dark gray scoria (thickest layer) is 55.0~55.9 wt%.

Many petrologic features suggest that the magma which produced the scoriae derived from magma mixing of several chemically different magmas. The phenocrysts are classified into three groups; plg (An62-70), opx (Mg-v=60-64), cpx (Mg-v=66-68) derived from magma A (felsic side), plg (An74-78), opx (Mg-v=76-80), olv (Mg-v=78) derived from magma B (intermediate composition) and plg (An80-86), olv (Mg-v=84) derived from magma C (mafic side). The temperatures are estimated to be ca.900-1000, ca.1100-1200 and ca.1185-1240 degrees C respectively. It is deduced that magma C was underplated to magma A, and magma B was formed in the boundary layer between magmas A and C before the eruptions. The characteristic opx rim was formed in the magma B. The three magmas were mixed during the eruptions. In the Za-To5 eruptions, same magma would be relevant because the phenocryst combination and the chemical composition are the same.