

The highest sulfur content observed in olivine-hosted melt inclusions from O95 layer of Izu-Oshima pre-caldera volcano

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Melt inclusion study provides chemical information on volatile species dissolved in magma. The volatile abundances in magma of Izu-Oshima volcano were first investigated by Kazahaya et al. (1994), who measured the H₂O and S concentrations of melt inclusions in plagioclase from the 1986 scoria to be 0.89 to 1.1wt% and 240 to 340 ppm, respectively.

We have analyzed major element and volatile (H₂O, CO₂, S, Cl) concentrations in olivine-hosted melt inclusions in scoria from the O95 layer (Tazawa 1980) of Younger edifice of pre-caldera volcano of Izu-Oshima volcano. We collected scoria from the O95 pyroclastic fall deposit layer exposed at Chisousetudanmen. We selectively collected scoria less than 3 cm in diameter to ensure that the samples had cooled rapidly enough to quench magma to glass in the inclusion.

The light to dark brown melt inclusions are mostly subspherical to ellipsoidal and their diameters are normally ranging from 60 to 80 micrometer with a maximum size of 220 micrometer. Typical melt inclusions contain a single bubble with 0.1-1vol%. No sulfide phases were observed inside melt inclusions and phenocrysts.

Major elements, S and Cl of 7 melt inclusions and matrix glasses were analyzed using EPMA with the Bence and Albee matrix correction procedure. Analyzed major and volatile element data were corrected for the effects of post-entrapment overgrowth of olivine. Experimentally determined partitioning relationships for Fe-Mg between olivine and melt are used to monitor such overgrowth. The SiO₂ contents of melt inclusions after the correction range from 50.2 to 54.7wt% and the sulfur concentrations vary from 527 to 1063 ppm. The concentration of 1063 ppm S is about three times higher than reported values by Kazahaya et al. (1994). The S contents of matrix glasses are below detection limit suggesting that almost all the S in magma was released to atmosphere by degassing. Chlorine contents vary from 468 to 620 ppm.

H₂O and CO₂ in the 3 melt inclusions were analyzed using FTIR. The concentrations of dissolved CO₂ are below detection limit within all melt inclusions analyzed. The total dissolved H₂O was determined by measuring the height of the peak at approximately 3510 cm⁻¹ attributed to the fundamental OH-stretching vibration. The H₂O contents vary from 1.5 to 2.1wt%.

Further studies of melt inclusions from the other tephra layers are needed to discuss whether the magma with high S content was common or not through the whole volcanic history of Izu-Oshima volcano.

References

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