ABSTRACT

Volcanic explosive eruptions are classified by dispersal and fragmentation of pyroclastic deposits. It has been recently recognized and argue the mechanism of Plinian eruption of mafic magma. The volcanoes in this study, Kukusan and Genteng in Ijen caldera complex in Indonesia, produced explosive eruptions of mafic magma. These volcanoes are useful to compare because they are located in inside a single caldera and produced a different style of eruption. This study will also contribute to the volcanic hazard mitigation in Ijen. The objectives of this study are to estimate eruption types of Kukusan and Genteng and to understand the conduit dynamics of the explosive eruption of mafic magma by comparing the cases of Kukusan and Genteng volcanoes.

Fieldwork was conducted to observe the stratigraphy of pyroclastic materials at 31 locations. The analyses of geochemistry, grain size, component, density, petrography and microtextural analysis were conducted. Based on the microtextural analysis, quantitative data of bubble and microlite was obtained.

The volcanic products of Kukusan and Genteng are composed of scoria fall, ash, and lithic materials. The chemical compositions of Kukusan magma are similar with those of Genteng magma in term of SiO_2 contents. Component analysis shows that scoria at these volcanoes can be distinguished by the bubble size. Microtextural analysis shows that Kukusan scoria has higher bubble number density (BND), higher microlite number density (MND) and higher microlite crystallinity than Genteng scoria.

Based on the dispersal area and fragmentation degree, the eruption type of

Kukusan is estimated as sub-Plinian, while that of Genteng is estimated as Strombolian. Higher BND and MND of Kukusan scoria suggests rapid decompression and rapid magma ascent in volcanic conduit. Higher microlite crystallinity of Kukusan scoria suggests higher effective viscosity of magma. Higher magma ascent rate and higher effective viscosity of magma at Kukusan suggests that the magma prevents both gas separation from melt. In the result, bubbles are immobile relative to the magma, which leads the more explosive sub-Plinian eruption. In contrast, relatively lower ascent rate and lower effective viscosity of magma in Genteng let some bubbles migrate upward in volcanic conduit, which leads the Strombolian eruption.

Keywords: eruption type, degassing process, scoria, bubble, microlite