

## Foaming temperature and textural classification of vesicular substance by heating experiments of obsidians

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Obsidian includes H<sub>2</sub>O component in the glass. The H<sub>2</sub>O component is vesiculated when heated at a high temperature, and their foams surrounded by dense obsidian glass expand to porous material, referred to as "perlite". We have carried out heating experiments with an electric furnace for 11 obsidian samples from each different locality to determine the foaming temperature (T<sub>f</sub>) and perlite-formation temperature (T<sub>p</sub>) of their obsidians. The results are as follows; Akaigawa obsidian T<sub>f</sub>=780°C; T<sub>p</sub>=830°C, Okushiri obsidian T<sub>f</sub>=790°C; T<sub>p</sub>=850°C, Kozushima obsidian T<sub>f</sub>=890°C; T<sub>p</sub>=950°C, Shirataki obsidian (IK outcrop) T<sub>f</sub>=900°C; T<sub>p</sub>=1030°C, Tokachi-Mitsumata obsidian T<sub>f</sub>=930°C; T<sub>p</sub>=1060°C, Oketo obsidian (Tokoroyama) T<sub>f</sub>=990°C; T<sub>p</sub>=1100°C, Oketo obsidian (Kita-Tokoroyama) T<sub>f</sub>=1010°C; T<sub>p</sub>=1090°C, Shirataki obsidian (Tokachi-Ishizawa outcrop) T<sub>f</sub>=1030°C; T<sub>p</sub>=1160°C, Shirataki obsidian (Kyukasawa outcrop) T<sub>f</sub>=1060°C; T<sub>p</sub>=1150°C, Shirataki obsidian (Nishi atelier) T<sub>f</sub>=1070°C; T<sub>p</sub>=1190°C, Shirataki obsidian (Ajisainotaki outcrop) T<sub>f</sub>=1070°C; T<sub>p</sub>=1190°C.

Perlite texture was classified into three types (type-A, -B and -C) based on the diameter, morphology and number density of vesicles. Type-A has discrete spherical forms with about 1 mm in diameter, which belongs to T<sub>f</sub>>990°C, T<sub>p</sub>>1060°C group. Type-B, T<sub>f</sub>=900-930°C, T<sub>p</sub>=1030-1060°C group, has distorted spherical forms with 1.5 to 5.0 mm in diameter. Type C is characterized by high number density and small size of vesicles (< 0.5 mm) connecting with each other, belonging to low T<sub>f</sub> (<890°C) and T<sub>p</sub> (<950°C) group.

The texture of perlite made by obsidian heat experiment is different from that of natural vesicle substance such as pumice and vesiculated obsidian. Lower number density of vesicles in the experimental product perlite is due to low H<sub>2</sub>O content in quenched obsidian after degassing of H<sub>2</sub>O in obsidian magma. The difference in vesicle morphology between the spherical form of perlite and reticulated irregular-shaped vesicle of natural vesicle substance is related to the difference in the static or dynamic condition of formation environment.

Keywords: obsidian, perlite, heating experiment, foaming temperature, volcanic glass