

# **Merohedral twin and incommensurate structure in nepheline from Hamada, Shimane Prefecture, Japan**

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Crystal structure and crystal chemistry of nepheline in melilite-olivine nephelinite from Hamada, Shimane Prefecture, Japan, were investigated using single-crystal X-ray diffraction and electron diffraction methods in order to clarify the structural property and to reveal relation between ionic substitution among four independent tetrahedral sites and incommensurate (IC) structure. The Si contents of Hamada nepheline are 1.024-1.042 atoms per formula unite (apfu; O = 4), indicating slightly excess Si content. Single crystal X-ray diffraction data of the nepheline were collected at 200 °C, -173°C and room temperature (RT). Space group is determined as  $P6_3$ , and  $R1$  and goodness-of-fit are converged to 2.63 - 3.63 % and 1.08 - 1.23, respectively, by taking four types of twin cells into refinement. In this study, derivation of O1 atom from triad axis was observed at -173°C, suggesting existence of incommensurate structure. Moreover, in addition to O1 oxygen atom, deviations of oxygen atoms at two or three oxygen positions are recognized, which is a new result indicating incommensurate structure in nepheline. However, the deviation of O1 atom from triad axis is not resulted in from the X-ray diffraction data at 200 °C and RT. It seems to be consistent with the fact that there are no satellite reflections in the electron diffraction pattern at RT.

Merohedral twin in natural nepheline and oxygen disorder other than O1 oxygen are new finding in this study.