TRI-KALSILITE, A NEW MINERAL

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This note records the discovery of yet another mineral of composition $(Na,K)AlSiO_4$. The properties of the other phases in the nepheline-kalsilite system have been collected by Smith and Tuttle (1956). The newly-discovered order-disorder in kalsilite is recorded in the following note.

In addition to crystals of kalsilite-nepheline microperthite, the lava from Kabfumu, North Kivu in Belgian Congo, contains parallel growths of a new mineral, tri-kalsilite, and nepheline. After heating to 1000° C. for two hours, one crystal consisted almost entirely of tri-kalsilite. Weak, slightly diffuse reflections revealed the presence of nepheline in parallel association. Tri-kalsilite is hexagonal with a 15.4 Å, c 8.6 Å, space-group probably $P6_3$. Along with d-kalsilite (a 5.15 Å), nepheline (a 10 Å) and tetra-kalsilite (a 20 Å), tri-kalsilite (a 15.4 Å) is geometrically related to high-tridymite (a 5.0 Å). The structures of kalsilite and nepheline have been shown to be based on a tridymite-type framework of Si, Al tetrahedra and the geometrical and mineralogical relations make it certain that tetra-kalsilite and tri-kalsilite are also based on this type of framework. Tuttle and Smith (in preparation) have shown that just above the nepheline-kalsilite unmixing solvus, nepheline is stable from $Ne_{100}Ks_0$ to $Ne_{30}Ks_{70}$ whereas kalsilite is stable from Ne_0Ks_{100} to $Ne_{20}Ks_{80}$. The tetra-kalsilite phase is produced in charges of composition $Ne_{20}Ks_{80}$ to $Ne_{37}Ks_{63}$ and it is likely that tri-kalsilite occurs in a similar composition range. That these two phases only occur for compositions near the boundary between the stability fields for nepheline and for kalsilite suggests that they are formed metastably, for it is well-known that metastable phases occur readily near phase boundaries.

The close similarity of the optical properties of the tridymite-type phases in the nepheline-kalsilite system renders impracticable a determination of tri-kalsilite by optical methods. The form of occurrence has made it impossible so far to obtain a powder pattern of tri-kalsilite uncontaminated by other phases.

The name tri-kalsilite has, of course, been assigned on the basis of the length of the a-axis.

REFERENCE

SMITH, J. V., AND TUTTLE, O. F. (1956), The nepheline-kalsilite system: I. *X*-ray data for the crystalline phases: *Am. Jour. Sci.*, in press.

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