

ADDENDA TO 'THE EFFECT OF CATION SUBSTITUTIONS ON THE PHYSICAL PROPERTIES OF TRIOCTAHEDRAL MICAS'

ROBERT M. HAZEN, *Department of Geological Sciences, Harvard University, Cambridge, Massachusetts* AND DAVID R. WONES, *U. S. Geological Survey, Washington, D. C.*

In our recent article on cation substitutions in synthetic trioctahedral micas (Hazen & Wones, 1972) we neglected to refer to the important work of Lindqvist (1966). In his study of potash-bearing sesquioxide silica systems Dr. Lindqvist synthesized a variety of layer silicates containing transition metals. These included several that were discussed in our investigation. Among these were cobaltous phlogopite $\text{KCo}_3^{+2}(\text{AlSi}_3)\text{O}_{10}(\text{OH})_2$, nickelous phlogopite $\text{KNi}_3^{+2}(\text{AlSi}_3)\text{O}_{10}(\text{OH})_2$, ferri-phlogopite $\text{KMg}_3(\text{Fe}^{+3}\text{Si}_3)\text{O}_{10}(\text{OH})_2$, nickelous ferri-phlogopite $\text{KNi}_3^{+2}(\text{Fe}^{+3}\text{Si}_3)\text{O}_{10}(\text{OH})_2$, and a manganese-bearing phlogopite.

Lindqvist's tabulated unit cell dimensions for all micas synthesized are in extremely close agreement with our data. In his Figure 7 Lindqvist demonstrated convincingly that all synthetic trioctahedral micas from his and several other studies obey the unit cell relation $b = \sqrt{3} a$.

Lindqvist concluded that while a large variety of transition metal cation substitutions are possible in either the octahedral or tetrahedral sites of layer silicates, the extent of these substitutions is limited by the relative sizes of the resultant octahedral and

tetrahedral layers. In most micas studied, these two layers conform through the mechanism of tetrahedral rotation and octahedral flattening as described by Donnay, Donnay, and Takeda (1964). Lindqvist stated that manganous phlogopite is at the limits of such compensation mechanisms due to the large Mn^{+2} octahedral layer and predicted on this basis that "manganous talc ($\text{Mn}_3^{+2}\text{Si}_4\text{O}_{10}(\text{OH})_2$) can never form, since this would require a quite inconceivable deformation of the octahedral sheet." In our work we reached similar conclusions regarding the instability of manganous layer silicates. Thus, our investigations corroborate and extend the earlier data and conclusions of Lindqvist.

References

- DONNAY, G., J. D. H. DONNAY, AND H. TAKEDA (1964) Trioctahedral one-layer micas. II. Predictions of the structure from composition and cell dimensions. *Acta Crystallogr.* **17**, 1371-1381.
- HAZEN, R. M. AND D. R. WONES (1972) The effect of cation substitutions on the physical properties of trioctahedral micas. *Amer. Mineral.* **57**, 103-129.
- LINDQVIST, B. (1966) Hydrothermal synthesis studies of potash-bearing sesquioxide-silica systems. *Geo. Fören. I Stockholm Förh.* **88**, 133-178.