TABLE 1

Chemical analyses and optical properties of lawsonite and anorthite used as starting materials

Oxide	A	B	C
SiO_2	38.11	43.13	44.49
TiO_2	0.29	nd	nd
Al_2O_3	30.91	35.87	36.00
Fe_2O_3	1.56	0.45	0.08
FeO	0.13	0.29	nd
MnO	0.01	nd	nd
MgO	0.03	0.08	0.04
CaO	17.54	19.27	19.49
Na_2O	0.06	0.65	0.59
K_2O	0.14	0.05	0.03
H_2O	10.72		
H_2O+		0.63	nd
H_2O-		0.35	nd
Total	99.53	100.77	100.72

Refractive Indices

	A	B	C	D
α	1.665 ± 0.002	1.5748	1.5748	1.57 ± 0.005
γ	1.686 ± 0.002	1.5880	1.5880	1.59 ± 0.005
An %		94.3	94.9	96 ± 2

A. Lawsonite. Analyst, D. Thaemlitz; optical properties, G. A. Davis; Blake Gardens, North Berkeley, California (Davis and Pabst, 1960).

B. Anorthite. Analyst, Y. Kawano; optical properties, I. Kato; crystal lapilli erupted in 1940, Miyake-jima volcano, Tokyo Prefecture, Japan (Kawano and Aoki, 1960).

C. Anorthite. Analyst, H. S. Washington; optical properties, I. Kato; crystal lapilli erupted in 1874, Miyake-jima volcano, Tokyo Prefecture, Japan (Kawano and Aoki, 1960).

D. Anorthite. Miyake Island, Tokyo Prefecture, Japan. Optical properties and universal stage An percent determination, Crawford.

The simplest reactions which field evidence suggests bear on this problem involve:

$$\begin{array}{llll} \text{laumontite} & = \text{lawsonite} & + 2\ \text{quartz} & + 2\ \text{water}\ (1) \\ CaAl_2Si_4O_{12}\cdot 4H_2O & = CaAl_2Si_2O_7(OH)_2\cdot H_2O & + 2SiO_2 & + 2H_2O; \\ \text{thomsonite} & = \text{lawsonite} & + 0.4\ \text{water} & (2) \\ CaAl_2Si_2O_8\cdot 2.4H_2O & = CaAl_2Si_2O_7(OH)_2\cdot H_2O & + 0.4H_2O. & \end{array}$$

Some data bearing on (1) are available, and we can make some reasonable guesses concerning (2).

Thermodynamic data (table 3) are available for leonhardite, a close relative of laumontite. Coombs (1952) described the conditions for the reversible conversion of laumontite to leonhardite. Laumontite in dry air loses water forming leonhardite, $Ca_2Al_4Si_{18}O_{24}\cdot 7H_2O$. Leonhardite, when soaked in liquid water at room temperature, is converted to laumontite. These observations