

components in solution for both anorthite-åkermanite (de Wys and Kapadia, 1971) and anorthite-forsterite (Adams and Cohen, 1966).

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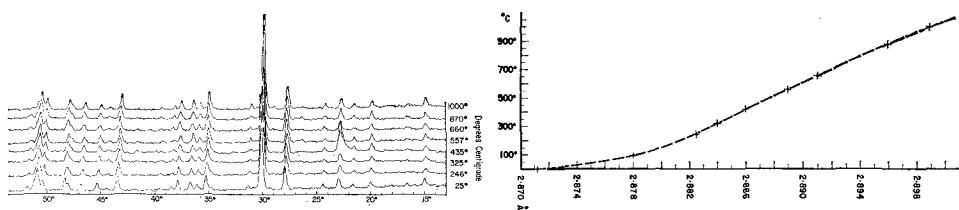
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Additional data concerning the stability of åkermanite

ÅKERMANITE was initially alleged to decompose into diopside when held at and below 1325 °C (Osborn and Schairer, 1941). Experimental data by others (de Wys and Foster, 1955, 1956) revealed, however, that åkermanite was stable down to at least 1000 °C. Later Harker and Tuttle (1956) indicated that at various pressures in a water



FIGS. 1 and 2: FIG. 1 (left). X-ray diffraction patterns of åkermanite at various temperatures. Abscissae are degrees 2θ for Cu- $K\alpha$ radiation. FIG. 2 (right). Diagram showing the shift in d_{211} of åkermanite with temperature.

vapour atmosphere åkermanite was stable to 700 °C, below which it decomposed by a univariant reaction such as: $\text{Ca}_2\text{MgSi}_2\text{O}_7 \rightleftharpoons \text{CaSiO}_3 + \text{CaMgSiO}_4$. The present author has attempted to investigate the stability limits of åkermanite below 1000 °C in an anhydrous atmosphere.

Pure microcrystalline åkermanite was mounted in a high-temperature furnace attached to an X-ray goniometer and diffraction patterns obtained at first at 25 °C followed by one at 1000 °C. The temperature of the sample was then slowly dropped to various temperatures, as indicated by fig. 1, and diffraction patterns obtained after

at least 72 hours at each data point. Over 400 hours were spent below the alleged decomposition temperature of 700 °C. Finally the sample was exposed to a hydrous atmosphere by means of steam introduced into the furnace for over 120 hours, the sample itself being at 580 °C.

Fig. 1 does not reveal any tendency for the åkermanite to decompose into wollastonite and monticellite. Fig. 2, which is a plot of the atomic spacing of the 211 plane at various temperatures, also does not indicate any tendency for åkermanite to break up (if it did, a significant change in the slope would be expected).

The above data tend to indicate that åkermanite, at least in an anhydrous atmosphere, does not, even over a prolonged period of time, decompose into other compounds, but is apparently stable from its melting point down to room temperature. That the åkermanite did not decompose at 580 °C in the increased humidity environment caused by the introduction of steam is of some interest.

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Pyrrhotine and the origin of terrestrial diamonds

HYPOTHESES on the origin of the diamond usually begin with graphite, iron carbide, or free carbon. This seems appropriate in considering the origin of meteoritic diamonds. However, terrestrial carbon-bearing abyssal magmas, which have surfaced as kimberlite diamond pipes, are rare. Only one in twenty kimberlite pipes or fissures contains diamonds (Shand, 1952). Where diamond does occur, special conditions seem required.

Quite possibly, a carbon or diamond phase originated from the reduction of carbon dioxide, a common mantle constituent (Hearn, 1968; Kennedy and Nordlie, 1968). The reduction could be centered around a specific reducing agent, where its absence in abyssal magmas could mean the absence of diamond as well. Pyrrhotine could fill this role. It is a common syngenetic inclusion in South African diamonds (Sharp,