5.5. *Synthesis of prehnite*

From glass of its own composition there was little difficulty in growing prehnite at pressures above 2000 atm. Below this pressure, a range of metastable phases appears at low temperatures. Prehnite also formed readily from glasses of epidote composition. In runs with glasses high in silica prehnite was much more reluctant

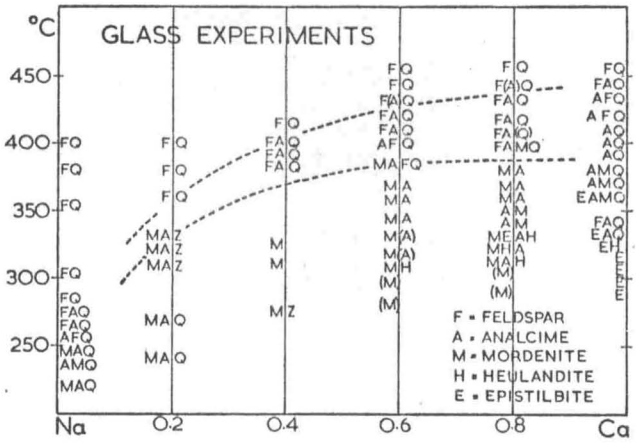

Fig. 12. Phases formed by hydrothermal crystallization of plagioclase plus silica glasses at 2000 bars.

to grow but appeared as a major phase in runs at 5000 bars. The following conclusions emerge. Experiments with three different starting materials (Figs. 13, 14, 15) indicate that prehnite passes to anorthite plus wollastonite at about 450°C at 5000 bars. At temperatures below 300°C (Fyfe, 1955) we consider thomsonite to be the stable phase in silica-deficient environments as is also suggested by the thomsonitic alteration of the Otama gabbros. In these earlier experiments although thomsonite and anorthite grew readily, prehnite was most reluctant to form. Data found previously are summarized in Fig. 16. With more siliceous glasses as starting materials prehnite is cut off in the low temperature and pressure regions by the zeolites wairakite and epistilbite.

The recrystallization of epidote glass indicates that prehnite and vesuvianite form readily.

6. Correlation of Field and Experimental Data
(W. S. F., D. S. C.)

In active hydrothermal areas such as Wairakei zeolite-forming reactions occur in an area of steep thermal gradient, and solutions moving upwards tend to be supersaturated with silica. At Wairakei the principal zeolites are wairakite and mordenite, phases readily formed in the laboratory by using amorphous silica in the starting materials. However, laboratory data suggest a higher temperature for the metastable transition from mordenite to wairakite than is observed at Wairakei. Three factors may contribute to this lack of temperature correlation. There is evidence that the degree of silica supersaturation at Wairakei is small (Ellis and Wilson, 1955; Ellis, 1958) even though amorphous silica is deposited in bores.