

comes more stable, but  $\Delta S$  will tend to positive values. Typical trends in dehydration entropies per water molecule are indicated in figure 2 and are reasonably constant. From these data we may conclude that  $\Delta S$  of reaction (1) will not change sign until temperatures near 175°C are reached. Further, when lawsonite breaks down at 250°C, laumontite will still be relatively stable in water at its saturated vapor pressure.

Scanty evidence (Coombs and others, 1959) indicates that laumontite would become unstable relative to anorthite, quartz, and water in the region of 300°C. For the reaction:



We estimate:

$$\Delta G^\circ = +10.1 \text{ kcal} \quad 20.0 \text{ e.u.}; \Delta S \text{ at } 300^\circ\text{C}$$

and liquid  $\Delta S = 10 \text{ e.u.}$

These figures also suggest laumontite breakdown to anorthite a little above 300°C which appears perfectly reasonable. It should be noted that at low pressures a field of stability of wairakite appears to be interposed between laumontite and anorthite (Coombs and others, 1959).

Returning to reaction (1) it is obvious that lawsonite is stable relative to laumontite at higher pressures and that the initial boundary slope will be positive. If we allow only for the compressibility of water, the transition pres-

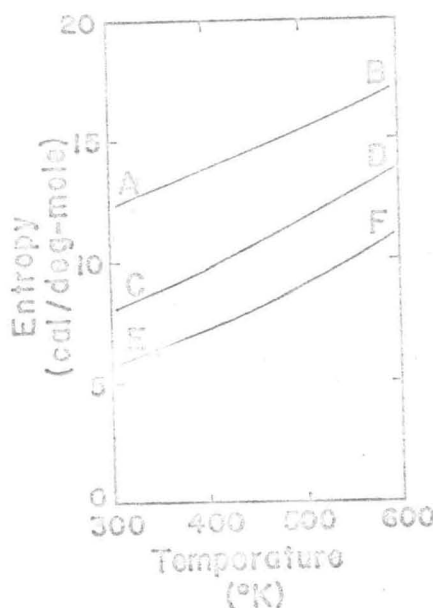


Fig. 2.  $\Delta S$  of the following dehydration reactions as a function of temperature (estimated by  $T \Delta S^\circ$ ).

A-D  $\text{Lawsonite} = \text{pyroxene} + \text{corundum} + \text{water (liq)}$ .

E-F  $\text{Lawsonite} = \text{pyroxene} + \text{water (liq)}$ .

G-H  $\text{Boehmite} = \text{corundum} + \text{water (liq)}$ .