

the state of *C* is not the  
of other factors such as  
stricted to silica may be

phase is quartz. As the  
at of quartz at this tem-  
will now become -6000  
any other component)  
e and at the end of the  
cess, phases may have  
the final products.  
hydrate boundary. Data

- 2H<sub>2</sub>O  
+ water  
ities (KENNEDY, 1950a)  
500 cal/mole above that  
ill have a Δ*G* of +3000  
cal/water molecule and  
ilica may be 100-150°C  
agnitude by the data in

On the basis of entropy  
l also be the high tem-  
amounts of silica bound  
a the greater amount of  
t assemblages such as  
not stable. It might  
m mordenite relative to  
ce make it the higher

O + 3SiO<sub>2</sub>  
opy of free water in the  
ore stable at high tem-  
le at all, but it would be  
atures than mordenite.  
O) is unlikely to occur  
iate hydration between  
is hydrated to the same  
pected to occur only in

The situation with the calcium zeolites is more complex owing to the great number of possible phases. Further, the range of composition of a single phase (e.g. heulandite and its possible polymorph epistilbite) is often considerable (see Appendix 2). In Table 2 some of the possible compositions of calcium end members are listed in order of decreasing water content in relation to anorthite and quartz.

The entropy argument used above would lead one to suggest that the order of

Table 2

Zeolite	Composition
Heulandite (var. clinoptilolite)	An + 8SiO <sub>2</sub> + 8H <sub>2</sub> O
Chabazite	An + 3·2SiO <sub>2</sub> + 7·2H <sub>2</sub> O
Mordenite	An + 8SiO <sub>2</sub> + 7H <sub>2</sub> O
Stilbite	An + 5SiO <sub>2</sub> + 7H <sub>2</sub> O
Heulandite	An + 5SiO <sub>2</sub> + 6H <sub>2</sub> O
Chabazite	An + 2SiO <sub>2</sub> + 6H <sub>2</sub> O
Stilbite	An + 3·2SiO <sub>2</sub> + 5·6H <sub>2</sub> O
Heulandite	An + 4SiO <sub>2</sub> + 5·3H <sub>2</sub> O
Epistilbite	An + 4SiO <sub>2</sub> + 5·3H <sub>2</sub> O
Chabazite	An + 1·3SiO <sub>2</sub> + 5·3H <sub>2</sub> O
Levyne	An + 2SiO <sub>2</sub> + 5H <sub>2</sub> O
Heulandite	An + 3·2SiO <sub>2</sub> + 4·8H <sub>2</sub> O
Yugawaralite	An + 3SiO <sub>2</sub> + 4H <sub>2</sub> O
Laumontite	An + 2SiO <sub>2</sub> + 4H <sub>2</sub> O
Gismondine	An + 0SiO <sub>2</sub> + 4H <sub>2</sub> O
Scolecite	An + 1SiO <sub>2</sub> + 3H <sub>2</sub> O
Thomsonite	An + 0·8SiO <sub>2</sub> + 3H <sub>2</sub> O
Thomsonite	An + 0SiO <sub>2</sub> + 2·4H <sub>2</sub> O
Wairakite	An + 2SiO <sub>2</sub> + 2H <sub>2</sub> O

stability would be basically controlled by water content. Further, one might anticipate that, given equal water content, the most stable species at any temperature would be that with the most silica. Field data indicate that this latter suggestion is not generally valid; for example yugawaralite should be stable relative to laumontite, but the latter is the common zeolite. Laboratory and field studies suggest that although the silica content of zeolites reflects the silica activity, the silica effect does not override the water effect; with respect to water content (calculated relative to (Ca, Na<sub>2</sub>) O. Al<sub>2</sub>O<sub>3</sub>, contrast CORNU, 1908), the order of stability is normal.

4.3. Dehydration reactions at high pressures

The experimental boundaries between zeolites and feldspars are normally steep but as they are ill-defined it is a matter of difficulty actually to measure the slope. Changes in slope of zeolite-feldspar boundaries must occur at high pressures owing to the large molar volumes of zeolites. At very high water pressures some zeolites should be dehydrated to anhydrous phases (cf. GRIGGS and KENNEDY, 1956). In