From the above we conclude that at shallow depths the experimental curves will suggest transition temperatures that are too high, the discrepancy being small at very shallow depths but being considerable at depths of more than 1 km. At great depths the free pore condition probably no longer applies so that the experimental results will apply more closely to the natural conditions.

If the rocks are well sealed and a fissure opens we may have in the rock that $P_{H_2O} = P_{load}$ while in the fissures $P_{H_2O} \simeq \frac{1}{3}P_{load}$, so that analcime might grow in the rock while albite grows in the fissure. But if the conditions in the rock are osmotic, i.e. $P_{load} \simeq 3P_{H_2O}$, and a fissure forms and is held open for free growth, then where albite grows in the rock, analcime could grow in the fissure.

The above effects appear to provide a possible explanation for overlapping of zeolite zones at Taringatura. In particular, the relict heulandite assemblages low in the section characteristically occur in non-porous, well cemented beds, where a closer approach to the condition $P_{load} = P_{H_2O}$ may be expected than in some of the coarser beds which have been converted to laumontite. Variation in composition is another major factor to be considered.

It should be noted that at high temperatures the osmotic correction will be smaller as the entropy of dehydration is larger.
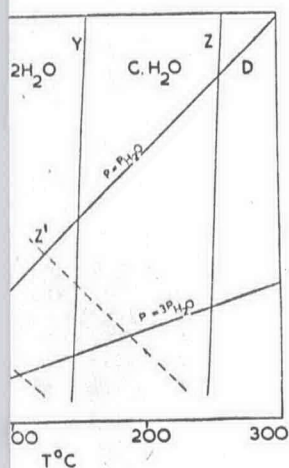
As the apparent molar volume of water in most hydrates is in the range 14–20 cm³, the high value being typical of low density zeolites, the term ΔV_{solids} in most zeolite reactions will be similar to that for the analcime–albite reaction, and the differential pressure effect will be similar in magnitude. Nevertheless the thermal gradient in natural systems operates to restrict the effect. In Fig. 8 an attempt is made to summarize the type of effects anticipated in an environment where $P_{H_2O} = P_{load}$ (full lines) and where $P_{H_2O} = \frac{1}{3}P_{load}$ (dashed lines) in an area with a temperature gradient of 30°C/km. The crossing points on the gradient lines are changed by about 10–60°C. If the thermal gradient was less, the adjustment would be larger and conversely. In thermal areas such as Wairakei where gradients may be as large as 200°C/km the osmotic corrections should be small.

4.6. The significance of quartz veins

In New Zeland the appearance of quartz veins on a large scale is typical of rocks near the zeolite–greenschist facies transition and these veins continue into the greenschists. Where they first appear they commonly carry prehnite and/or pumpellyite. In a very broad sense these veins may serve as an indication of the temperatures in the prehnite zone. KENNEDY'S work (1950a) indicates that high pressure solubility isobars have the form shown in Fig. 9. In the region of liquid water, i.e. at temperatures below the critical temperature, pressure has little effect on solubility. Above the critical temperature the isobars steepen rapidly with increasing temperature.

If water is moving out from high temperature areas at a pressure of 2000 bars then between 250 and 350°C 100g of water would deposit about 0·12g of silica. In the range 250–150°C the amount deposited is only 0·04g. It is apparent that the extent of solution and deposition falls off rapidly below the 300°C region. Experimental data (see Figs. 17 and 18) indicate that the incoming of prehnite relative to zeolites should occur at similar temperatures.