

The reaction talc + forsterite = enstatite + H₂O: New experimental results and petrological implications

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ABSTRACT

The reaction talc + forsterite = enstatite + H₂O has been investigated between 6 and 20 kbar. Previous high-pressure experimental studies suggested various reaction positions, mostly with positive *P-T* slopes. The new results show that the reaction has a negative slope in the pressure range studied. It was bracketed between 640 and 680 °C at 10 kbar, between 620 and 640 °C at 15 kbar, and between 580 and 600 °C at 20 kbar. The growth of antigorite at high pressures prevented the reaction from being determined above 20 kbar. The reaction position is consistent with the previous low-pressure data of Chernosky et al. (1985), is in very good agreement with the position calculated using the thermodynamic database of Berman (1988), and is in reasonable agreement with the calculation using the thermodynamic database of Holland and Powell (1990). The high reaction temperatures suggested by previous high-pressure experiments may reflect metastable or quench growth of talc in those experiments. Talc in equilibrium with forsterite is stable over a wide *P-T* range in hydrothermally altered and metamorphosed ultramafic rocks and may be important for carrying H₂O into subduction zones. However, talc dehydration occurs at too shallow a depth for the H₂O to contribute directly to subduction zone volcanism.