

Forward calculation of the formation of chemical zoning in garnet

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Chemical zoning in garnet enables deduction of temperature and pressure history during garnet growth, assuming chemical equilibrium between garnet surface and other matrix minerals. Although differential thermodynamic method (Gibbs' method) is enough to derive the P-T changes, the absolute P-T values or the history of volume changes of garnet are not determined. Forward calculation, including mass balance, was performed to model the formation of garnet consuming chlorite. Published thermodynamic data of minerals were used for the Fe-Mg-Mn system, which had the degree of freedom of 2. Heating and compression path were given to reconstruct "normal zoning" observed in garnet from the Sambagawa metamorphic belt.