

Mixing properties of aluminosilicate garnets: constraints from natural and experimental data, and applications to geothermo-barometry: Clarifications

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In this paper (Ganguly and Saxena, 1984) we have developed a restricted formulation for garnet-biotite geothermometry by introducing certain corrections for compositional effects on the $K_D(\text{Fe-Mg})$ vs. T calibration of Ferry and Spear (1978) in the Fe-Mg system. To use this formulation, one needs to evaluate, according to (14), the compositionally dependent interaction parameter $W_{\text{FeMg}}^{\text{Gt}}$ in equations (12) and (13) for the garnet composition in the sample of interest and for that ($\text{Alm}_{90}\text{Py}_{10}$) maintained in the experimental work of Ferry and Spear, respectively. Thus, $W_{\text{FeMg}}^{\text{Gt}}$ (eqn. 13) ≈ 2270 cal, and consequently, the term A (eqn. 12) $\approx 1175 + 9.45 P(\text{kbar})$. The term W_{Mn} in equation (12) is to be read as ΔW_{Mn} .

The W parameters in equations (A.1) and (A.2) in the Appendix are W_G 's (see eqn. 5). The equation (A.3) is for 1 bar, T . $RT \ln \gamma_{\text{Ca}}(\text{Gt})$ at $P > 1$ bar can be calculated through the relation $RT \partial \ln \gamma_i / \partial P = (\bar{V}_i - V_i^\circ)$. The volume data for grossular are given in Newton and Haselton (1981), and those for pyrope in Haselton and Newton (1980).

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References

- Ferry, J. M. and Spear, F. S. (1978) Experimental calibration of partitioning of Fe and Mg between biotite and garnet. *Contributions to Mineralogy and Petrology*, 66, 113-117.
- Ganguly, J. and Saxena, S. K. (1984) Mixing properties of aluminosilicate garnets: constraints from natural and experimental data, and applications to geothermo-barometry. *American Mineralogist*, 69, 88-97.
- Haselton, H. T. and Newton, R. C. (1980) Thermodynamics of pyrope-grossular garnets and their stabilities at high temperatures and pressures. *Journal of Geophysical Research*, 85, 6973-6982.
- Newton, R. C. and Haselton, H. T. (1981) Thermodynamics of the garnet-plagioclase- Al_2SiO_5 -quartz geobarometer. In R. C. Newton et al., Eds., *Advances in Physical Geochemistry*, Vol. 1, p. 131-148. Springer-Verlag.