

## **Heats of mixing of silicate liquid in the systems diopside-anorthite-akermanite, diopside-anorthite-forsterite, and diopside-silica**

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### **ABSTRACT**

Fusion enthalpies were measured by differential scanning calorimetry (DSC) for mineral mixtures of eutectic composition in the systems anorthite-diopside ( $\text{An}_{42}\text{Di}_{58}$ , wt%), anorthite-akermanite ( $\text{An}_{46}\text{Ak}_{54}$ ), akermanite-diopside ( $\text{Ak}_{42}\text{Di}_{58}$ ), diopside-silica ( $\text{Di}_{84}\text{Qt}_{16}$ ), and anorthite-diopside-forsterite ( $\text{Di}_{49}\text{Fo}_{7.5}\text{An}_{43.5}$ ), along with akermanite. Heats of mixing of silicate liquid in those systems were calculated based on the DSC data. The liquids of  $\text{Di}_{49}\text{Fo}_{7.5}\text{An}_{43.5}$ ,  $\text{An}_{42}\text{Di}_{58}$ ,  $\text{An}_{46}\text{Ak}_{54}$ , and  $\text{Ak}_{42}\text{Di}_{58}$  have negative excess enthalpies of  $-4$  to  $-10$  ( $\pm 5$ ) kJ/mol, whereas the  $\text{Di}_{84}\text{Qt}_{16}$  liquid has positive excess enthalpy of  $5.0$  ( $\pm 1.7$ ) kJ/mol. Those values are consistent with the heats of mixing estimated by thermodynamic analyses of phase equilibria of the above systems. The results suggest that the differential scanning calorimetry is useful and sufficiently accurate for direct calorimetric measurement of small endothermic or exothermic heat of mixing in silicate liquid.