

Thermochemistry of double carbonates in the K_2CO_3 - $CaCO_3$ system

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ABSTRACT

Enthalpies of formation, ΔH_f , of the double carbonates $K_2Ca(CO_3)_2$ (with two polymorphs, bütschliite and fairchildite) and $K_2Ca_2(CO_3)_3$ from the components K_2CO_3 and $CaCO_3$ were determined at 298 K by drop solution calorimetry in molten $2PbO \cdot B_2O_3$ at 974 K. The enthalpies of formation were -38.7 ± 3.2 kJ/mol for bütschliite, -5.1 ± 3.3 kJ/mol for fairchildite and -7.2 ± 5.8 kJ/mol for $K_2Ca_2(CO_3)_3$. The entropy changes for the formation, ΔS_f , were also evaluated for the double carbonates. Assuming $\Delta S_f(\text{bütschliite}) = 0$, because of its ordered structure, the entropy of formation of fairchildite is 40.9 ± 5.1 J/mol·K and of $K_2Ca_2(CO_3)_3$ is 39.4 ± 7.3 J/mol·K.