

*American Mineralogist, Volume 84, pages 389–391, 1999*

## **Enthalpy of formation of katoite $\text{Ca}_3\text{Al}_2[(\text{OH})_4]_3$ : Energetics of the hydrogarnet substitution**

**MIRKO SCHOENTZ\* AND ALEXANDRA NAVROTSKY**

Thermochemistry Facility, Department of Chemical Engineering and Materials Science, University of California at Davis, Davis, California 95616, U.S.A.

### **ABSTRACT**

The silicon-free end member of the hydrogrossular solid solution series, katoite  $\text{Ca}_3\text{Al}_2[(\text{OH})_4]_3$ , was synthesized in a solid-media, piston-cylinder apparatus. The enthalpy of formation from the component oxides was measured by high-temperature oxide melt calorimetry and found to be  $\Delta H_f = -255.6 \pm 12.2$  kJ/mol; the resulting enthalpy of formation from the elements is  $\Delta H_f = -5551.5 \pm 16.4$  kJ/mol. From this value, enthalpies for breakdown reactions of hydrogrossular were calculated and the relative energetic stability of katoite evaluated.