American Mineralogist, Volume 82, pages 354–367, 1997

Melting experiments on komatiite analog compositions at 5 GPa

CLAUDE HERZBERG[1,2] **AND JIANZHONG ZHANG**[2]

[1]Department of Geological Sciences, Rutgers University, New Brunswick, New Jersey 08903, U.S.A.
[2]Center for High Pressure Research and Mineral Physics Institute, State University of New York, Stony Brook, New York 11794, U.S.A.

ABSTRACT

The results of multi-anvil melting experiments are reported for a wide range of komatiite analog mixes with compositions in the system CaO-MgO-FeO-Fe_2O_3 ± Fe^0-Al_2O_3-SiO_2 at 5 GPa (CMAS and CMFAS ± Fe^0). The liquidus crystallization fields for olivine, orthopyroxene, clinopyroxene, and garnet were mapped out, as were their intersections at various cotectics and invariant points. For the assemblage L + Ol + Opx + Cpx + Gt, the compositions of liquids at the invariant point in CMAS and at several pseudoinvariant points in CMFAS were determined to within ±0.50 wt% (1σ). The effect of FeO is to expand the liquidus crystallization fields in the following relative ways: garnet at the expense of all other crystallizing phases, pyroxenes at the expense of olivine, and clinopyroxene at the expense of orthopyroxene. The results reported here are in excellent agreement with previous determinations (Fujii et al. 1989; Herzberg 1992; Trønnes et al. 1992), but the uncertainties are much lower. It is demonstrated that the multi-anvil apparatus is capable of yielding crystal-liquid phase-equilibrium information at 5 GPa with an accuracy that is comparable to those at lower pressures.