Phase Equilibrium in the System MgO-H_2O at High Temperatures and Very High Pressures up to 1500°C., 50 kilobars

by Shinobu Yamaoka, Osamu Fukunaga, Shinroku Saito

Abstract:

The phase equilibrium in the system MgO-H_2O at high temperatures and very high pressures was investigated using a piston-cylinder type high pressure-high temperature apparatus. The pressure-temperature curve of brucite was given experimentally from 4 kb. to 25 kb. water pressures by the following expression,

$$\log P_{H_2O}(kb) = -3.18 \times 10^3/T\ (^\circ K) + 3.91$$

Brucite, however, did not decompose to periclase but melted congruently at water pressures greater than about 25 kb. The melting curve was measured by differential thermal analysis up to 50kb. and the pressure gradient of the melting temperature, dT_m/dP was approximately 2.0°C/kb.

As the liquid phase was non-quenchable, X-ray powder diffraction pattern of the quenched sample from the liquid phase did not show the presence of glass but crystalline brucite, while this was clearly distinguished from the originaly brucite phase by microscopic observation, affirming the existence of the liquid phase.