

Differential Thermal Analysis of KNO_3 under High Pressures

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Abstract

A phase diagram of KNO_3 was determined up to the pressure and temperature of 45 kbar and 600°C by differential thermal analysis using a single-stage piston-cylinder type high pressure apparatus. This paper discusses in detail the modification of Kennedy's press for DTA study, pressure measurement in the sample cell and temperature measurement under high pressures. Three new polymorphs of KNO_3 , phase V, phase VI and phase VII were detected by the DTA technique.

(1) Kennedy's press was modified to serve easy-controlling of press space by changing end-loading ram position. Several techniques for preventing the shortening of the lead wires were discussed.

(2) Pressure measurements in the cell of talc-AgCl were carried out using Bi and Tl foil with a electrical resistance change technique. The calibration curve for a 30 mm. long cell based on the measurement at room temperature was obtained as follows;

$$P = 0.97 L - 4.7 \text{ (kb.)}$$

(3) The change in emf of Chromel/Alumel thermocouple with pressure up to 31 kb. was laid within 20°C at 600°C .

(4) Phase diagram of KNO_3 above 14 kb. was similar to those of CsNO_3 , TlNO_3 and RbNO_3 .