

Several Phenomena under High Pressure

By

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In this paper, are treated pressure calibration and distribution in a sample assembly, variations of ionic radii in alkali alides under high pressure and effect of pressure on the eutectic temperature of the bismuth-cadmium binary system.

1. Pressure Calibration and Pressure Distribution

The high pressure apparatus used for the investigations was the modified piston-cylinder devices which was developed by Kennedy¹⁾. The schematic representation of this apparatus is shown in Fig. 1. The only difference between our apparatus and that of Kennedy was the absence of the lever arm for rotation of a piston which Kennedy used to relieve the friction in a sample cell. The pressure calibration was performed by observing the phase transitions of bismuth and changes in electric resistance of manganin wire. The sample assemblies for bismuth (prepared by Mitsubishi Kinzoku Kogyo Co., Ltd.) and manganin wire (prepared by Toshiba Denki Co., Ltd.) are represented in Fig.

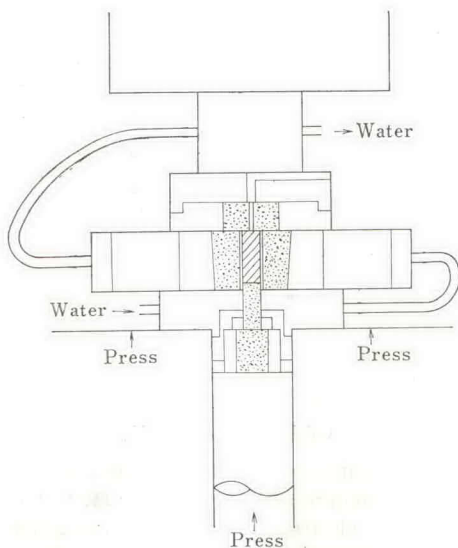


Fig. 1. The schematic representation of our apparatus. Water is flowed in high temperature experiment. Press loading was measured by the Heise Gauge (Heise Bourdon Tube Comp. Inc.)

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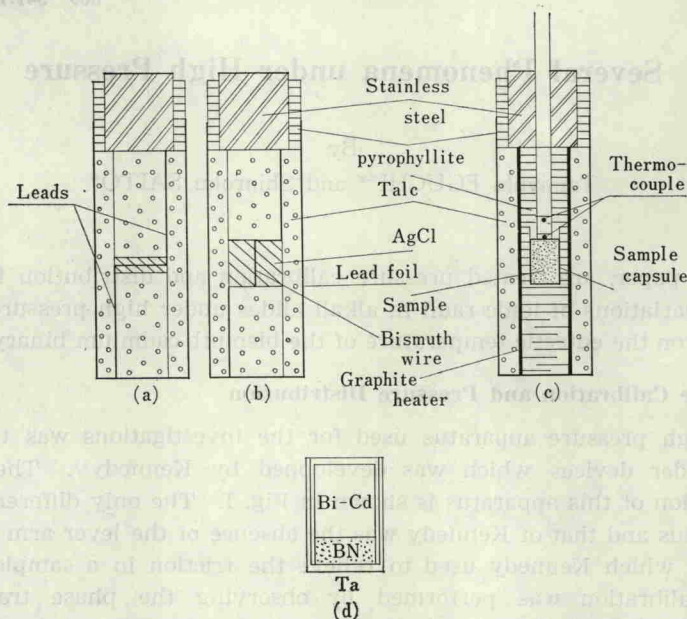


Fig. 2. Sample assemblies; we used (a) for the pressure calibration, (a), (b) for the measurement of pressure distributions and (c) for high temperature experiments. (d) shows the typical sample capsule for high temperature experiments.

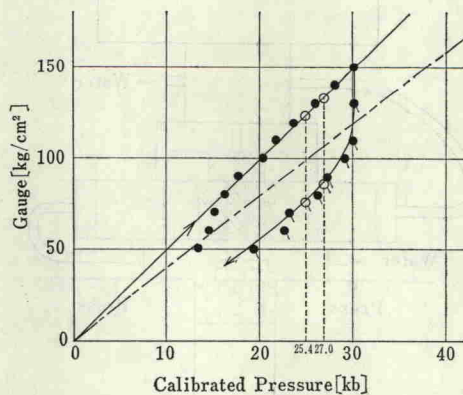


Fig. 3. The pressure calibration curve for our apparatus at room temperature; \circ , \square , the transition pressures of bismuth; \bullet , \blacktriangleright , the observed values obtained from the electrical resistance of manganin wire. The assembly for this experiment is shown in Fig. 2(a).

2(a) and Fig. 2(b). Bismuths used for the calibration had the purity of 99.999% and the impurities were Au, Ag, Cu, Pb, Fe, Sb and As. As the fixed points¹⁾, the bismuth I-II transition at 25.4kb and the bismuth II-III transition at