Fig. 5. X-ray patterns of pentaerythritol taken under pressure (lower picture) and without pressure.

lus K enable us to find the change with pressure of the Debye temperature of pentaerythritol from the formula given in [7]:

$$\frac{\Theta_P}{\Theta_1} \cong \left(\frac{K_P}{K_1}\right)^{1/2} \left(\frac{V_P}{V_1}\right)^{1/6},$$

where Θ_p and Θ_1, K_p, K_1, V_p, and V_1 are the Debye temperatures, the bulk modulus, and the unit cell volumes at pressure P and 1000 kg/cm^2, respectively. Calculating Θ_p/Θ_{1000} as a function of pressure from this formula has shown that it is qualitatively the same as that of the modulus K as a function of pressure.

4. After the pressure was completely removed from a pentaerythritol sample that had been in the apparatus for ten days, a series of x-ray patterns was taken which showed that there are residual changes in the lattice parameters (exceeding the error of measurement) which decrease with time.

To verify this data a pattern was taken in the VRS-3 chamber (diameter 143.25 mm) on a pentaerythritol sample which had been subjected to the same pressure. The pattern showed that the changes in the lattice parameters actually occur, and even persist for 30 days after the pressure has been removed.

It was shown in [8, 9] that hydrostatic and quasihydrostatic pressures can have different effects on the structure of the samples being tested. To verify this, we took a series of patterns of pentaerythritol under pressure under the same conditions but with the cylindrical channel in the beryllium chamber filled with pentaerythritol powder without any lithium envelope. It is obvious that these conditions differ more from hydrostatic pressure than the conditions under which the previous series of measurements had been made, and represent essentially compression from two sides.

Analyzing the x-ray patterns and working up the results showed that the way $\Delta a/a_0$ and $\Delta c/c_0$ varied with pressure remained the same and was still expressible as a polynomial of third degree in the pressure. However, the absolute values of the changes in the parameters a and c became less than at the corresponding pressures in the first series of experiments.

Another interesting result of this investigation was the demonstration that the (002) line becomes more intense under pressure. Figure 5 shows x-ray patterns taken in our apparatus at atmospheric pressure (upper picture) and under high pressure. It is easily seen from the diagrams that the intensity of the reflection from the 002 plane (the second line from the small hole in the diagram) becomes considerably greater under pressure. This change in intensity of the (002) line persisted for ten days after removing the pressure.

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