$$-\frac{\Delta V}{V_0} = 40{,}97 \cdot 10^{-7} p + 94{,}00 \cdot 10^{-12} p^2 + 4{,}53 \cdot 10^{-15} p^3. \quad (1)$$

According to our experimental results the analogous relation for the γ-phase of cerium may, up to $p = 10{,}000$ kg/cm^2, be given in the form

$$-\frac{\Delta V}{V_0} = 36 \cdot 10^{-7} p. \quad (2)$$

Equations (1) and (2) and the experimental data are shown graphically in Fig. 4.

2. Lines of the high-pressure phase of cerium (α-phase) were found on the pattern taken at $p = 1100$ kg/cm^2 (the photographs were started at this pressure); the lattice parameter of α-Ce was determined as $a_0 = 4.879 \pm 0.005$ Å, and taken as the start. The volume change of the γ-α transition was 15%.

The following reflections of α-phase planes were observed on the high-pressure diffraction patterns of cerium: (111), (200), (220), (311), (222), (400), (420), (422), (333) and (511), and of these the (420), (422), (333) and (511) lines were well resolved doublets on most of the patterns.

From the X-ray diffraction results we can give the $\Delta V/V_0 = f(p)$ relation for α-Ce as follows:

$$-\frac{\Delta V}{V_0} = 88 \cdot 10^{-7} (p - p_0), \quad (3)$$

where $p_0 = 1100$ kg/cm^2; p is a series of pressures from 1100 to 10,000 kg/cm^2. This relation is shown graphically for α-Ce with the experimental points, in Fig. 4. The coefficients in equations (2) and (3) were determined by the least-squares method. The results obtained from the diffraction patterns and the corresponding calculations for the γ- and α-phases are shown in the Table.

3. In all the experiments in the pressure range 1-4000 kg/cm^2 a spontaneous increase in pressure was observed in the apparatus, and when diffraction patterns taken at 1100 kg/cm^2 and a series of pressures ranging up to 10,000 kg/cm^2 were analyzed, diffraction lines belonging to the hexagonal phase of cerium (β-Ce) were established. These lines have the following indices: (100), (101), (004), (102), (103), (104), (110), (114), (107), (008), (203) and (204). Both the experimental and calculated relative intensities of the reflections are qualitatively the same.

The a and c lattice constants determined from (104) and (111) lines of diffraction patterns taken at $p = 6000$ kg/cm^2 proved to be $a = 3.671 \pm 0.004$ Å, $c = 11.700 \pm 0.006$ Å. This pair of lines, which can be used to determine the lattice parameters, is the best for the hexagonal phase of all the diffraction patterns taken.

Some diffraction lines of α- and β-Ce consist of short separated streak reflections. This probably means that the phase transformation of γ- to α- and β-Ce begins in the larger grains.

Between 6300 and 7000 kg/cm^2 there was a big reduction in the amount of hexagonal phase and increase in the amount of α, but the hexagonal phase still coexists with γ- and α-phases at 10,000 kg/cm^2.